Volume II

April 1982

# OFFICE COMMUNICATIONS SYSTEMS PROGRAM

# GENERAL OFFICE AUTOMATION ABSTRACTS

Office Communications Systems Program
Department of Communications
Room 1642
365 Laurier St. West
Ottawa, Ontario
K1A

Volume II

April 1982



# OFFICE COMMUNICATIONS SYSTEMS PROGRAM

## GENERAL OFFICE AUTOMATION ABSTRACTS

The enclosed articles on office automation outline a variety of practical subjects and considerations devoted to helping prospective users understand and capitalize on this emerging technology. It is recommended reading for everyone who has an interest in increased office management effectiveness.

Office Communications Systems Program
Department of Communications
Room 1642
365 Laurier St. West
Ottawa, Ontario
K1A 0C8

# The Office Technology of the Future

by John J. Connell

Executive Director
Office Technology Research Group
Pasadena, California

This article is based on a paper given by Mr Connell at the annual conference of the Association for Systems Management at Las Vegas in May 1981, attended by Mr J. M. A. Gibson, a Vice-President of the Institute. It is published here by courtesy of Mr Connell and of the Association for Systems Management.

The first of several messages which I hop to get across in this paper is that the action is in the office.

Over the years, as we have been involved in the development of computer-based systems, our operating strategy has been to identify potential computer applications, to design systems to handle them, and then to remove those applications from the office for processing in the data centre.

Time and again the office has been left with input, output, and the handling of exceptions, while the processing of traditional office work has been turned over to technical specialists operating in the data centre.

Even now, with all the sophisticated technology available, most office workers are equipped with little more than a calculator, a telephone, and perhaps a dictating machine.

All of that will change in the next decade. The basic trend in new office technologies is to put the machines in the office, in individual workplaces. The action, as far as new technologies are concerned, is in the office itself.

That is not to down-grade in any way the importance of the data centre and its activities. The developments in data centres in the 1980s will, however, be a continuation of the developments of the 70s: developments in the office itself will be entirely new. Technology in a variety of forms will make its appearance in every aspect of office operations.

The second message is that the objective is not to automate the office; it is to improve the productivity of managers and professionals. One automates processes, and in offices processing is done by clerical personnel. We have been working for years to introduce machines aimed at mechanizing or automating clerical processes, and that activity will continue throughout the 1980s as the capabilities of machines improve. But when one cuts through the smoke-screen of so-called office automation, one often finds that the highly-touted new technology is really another approach to the automation of clerical processes, and not much different from what we have experienced in the past. Unfortunately, since the machines are more expensive, the economic pay-off is at best marginal.

More sophisticated companies are not talking about automating the office: they are talking about using an increasingly powerful array of tools and techniques to help managers and professiona's do a better job in running the business, and to help them become more effective and productive. That is where the real pay-off exists with modern office technologies.

### A Question of Integration

The future of technology in the office can be summed up in one word: *networks*. We have grown up in a world where each new technology has developed separately from every other technology—computing, micrographics, word processing, reprographics, or whatever. Each has its own manufacturers, its own languages, its own trade associations, and its own gurus. What is happening in the 1980s is that all these previously separate technologies are being interconnected through telecommunications.

The primary technology in the 1980s is not computing, which attained a position of dominance in the last decade; not word processing, which gets all the publicity nowadays; not micrographics or reprographics or electronic mail or any of the other technologies being pushed by their respective advocates. The basic underlying technology

Reprinted by permission from THE BRITISH JOURNAL OF ADMINISTRATIVE MANAGEMENT.
February 1982, Vol. 31, No. 11.

in the office of the future is the integrated network connecting all office machines.

The next important consideration is not what the machines will do—but whether, and how, managers and professionals will use them.

For the first time in the field of office technology the success of the application depends entirely on the users, whether they choose to use the tools available, and how well they use them. When we put payroll on the computer we established a cutover date and the entire payroll operation was converted from its previous mode to the new computer mode on that date. There were no exceptions.

On the other hand, when one puts in an electronic mail system to handle internal correspondence, the success of that system depends on whether people choose to use it. The decision whether to read one's mail on a screen rather than on a piece of paper, and whether or not to respond in the same way, will be made by each individual based on his or her perception of the benefits of doing so. If no benefits are perceived, the electronic mail system will not be used, and the investment will go for naught.

Contrary to some previous practices, new office systems must be responsive to the perceived needs of users. The major problems in the office of the future are therefore not technological. They are behavioural—they are *us*.

The office of the future is crying out for good systems expertise. At present it is a hardware world. There are, for example, more than a hundred vendors of word processing equipment alone. But in such a highly competitive hardware world no one is giving serious thought to the design of comprehensive systems for using word processing and other technologies. Instead, the machines are being brought in willy-nilly on the strength of the sales pitch.

We desperately need systems professionals who can analyze office requirements and then evaluate the relative merits of the various technologies being offered to meet those requirements. We need professionals who will think through the implications of one technology versus another, and develop applications within the framework of an overall strategy for improving office productivity.

### Office Productivity

The case for improving office productivity is based on the fact that office costs, already high, are rising precipitously. We must therefore improve productivity so that a constantly increasing workload can be handled without increasing staff, and so that the continuing escalation in payroll costs can be absorbed without increasing expense levels.

Over the years we have introduced accounting machines, punched card equipment, computers, word processors and a variety of devices aimed at improving the productivity of the clerical workforce, and the margin for further improvement is not very great. On the other hand we have done virtually nothing to improve the productivity of managers and professionals. It is in this fertile ground, accounting for more than 70% of total office costs, that we must introduce new techniques, new technologies, and new approaches aimed at improving the productivity of the 'knowledge workers'.

But while our objective is to improve managerial and professional productivity, not only do we not know how to measure it, but we have in fact no generally accepted definition of the term. We have no clear understanding of how productivity relates to performance, or where the concepts of efficiency and effectiveness fit into the whole picture. But we have to work out the answers to these questions and come up with generally accepted ways of measuring productivity in the managerial and professional ranks.

### New Technologies

Productivity is therefore one subject area of major importance in the future office; and technology is another. There has been an explosion in new office technologies both in the number of machines available and in their capabilities and capacities. Chip technology, lasers, fibre optics, and a variety of other technological developments have combined to provide an almost endless array of new equipment capabilities.

The most mature office technology is data processing, and the most widely publicized nowadays is word processing. Physically the machines used in these two technologies are very much alike, and the information they store, a combination of bits, looks the same internally; but operationally there are major differences.

Information stored in a computer is defined logically, and a computer program is nothing more than the logical manipulation of the logically defined data fed into the computer. Once the program is in memory, the human interface is primarily one of monitoring. Even in interactive systems. the information presented to the user on a screen has been defined logically beforehand and the user's actions are carried out according to a pre-defined set of logical procedures.

The opposite is true of word processing equipment. Information stored in word processing equipment is not defined logically —it is in fact not defined at all until a human being reads the information on a screen and interprets it mentally. Without that human interface the information is meaningless. Since word processing, electronic mail and a host of other new office technologies require a human interface for their successful operation, human reactions are infinitely more important in the new office technologies than they were in the world of computers.

The second difference between data processing and word processing is in the approach taken to training.

In the computer world we were taught not only how to operate computers but how the machines functioned internally. It is not so in word processing and in many other office technologies, where users are taught that if they push a particular button the machine will perform a particular function. Here training is orientated much more to the user as an operator than as a programmer. As a result, when people in data processing or telecommunications interface with those trained in some of these other technologies, there is not only a language barrier be-

cause of the differences in jargon, but also a barrier in conceptual understanding.

### Routes to Interconnection

The key change taking place in office technology is embodied in the word *interconnection*. Each new office technology—conferencing, micrographics, reprographics, electronic mail, electronic office systems—has developed as an independent technology, and what is happening today, and will continue to happen throughout the decade, is that all these technologies will be interconnected through telecommunications. In the future we will not deal with individual technologies but with networks of technologies. Information introduced into the network through any one machine will be available instantaneously to every other machine regardless of location. Information in computer files will be available to word processing, and information in word processing text files will be available to computers. Both will be able to supply information to photocomposition and other equipment in the reprographics area, in the micrographics area, and so on.

Once compatibility problems have been resolved, the introduction of integrated networks will be extraordinarily important for several reasons.

Networks can provide an increasingly powerful array of office technologies to every office worker in every office location. The tendency in the past has been to apply technology to office work by moving work out of the regular office into a technology centre. Data processing is a classic example of that approach, with its history of identifying potential computer applications, programming them for computer operation, and then physically moving the processing to the data centre.

The same approach was followed in establishing word processing departments, reprographic facilities, and micrographics centres. The capabilities of the technologies were made available to the specialists in the technology centre but not to the general office force, and especially not to managers and professionals. The introduction of networks changes all this by bringing the power and capabilities of modern office technologies into one's work place, available quite literally at one's fingertips.

Integrated networks are also important because individual technologies must be subordinated to them. This fact has extraordinary organizational and operational implications. Offices tend to be organized round technologies, with data processing departments, word processing departments, and so on. Each department has established its own priorities and operating ground rules and is accustomed to 'defending its own turf'. With the introduction of networks, each technology must be tailored to fit the requirements of the network. As a result, data processing, word processing and all the technologies used in the office will change drastically in the 1980s. It is not the merger of word processing with data processing that is so glibly proclaimed in EDP literature: it is the subordination of data processing, word processing, micrographics, reprographics and all other previously independent office technologies into the framework of integrated networks.

The third reason why integrated networks are important is that to provide a vast array of technological capabilities to all office personnel in all office locations requires a level of co-ordinated planning never before encountered in the office. We plan by departments or functions, each going its own way and co-ordinating as little as possible with other departments. The requirement thrust upon us by networks is the need for an on-going co-ordinated planning effort which must be centralized and managed from the top down, and must include all office disciplines.

The fourth reason why networks are important is that as more and more information is stored in the network and can be accessed by the various machines tied to the network, so will the need for paper records lessen.

I don't believe we will ever see a paperless office; but paper is an extraordinarily inefficient and ultimately a very costly vehicle for storing, moving and retrieving the information which is the key product of the office. Any serious attempt to improve productivity in the office and reduce costs must tackle the problem of paper head-on. Even if we cannot eliminate it we should strive to reduce it; but to do so requires a complete change in attitudes on the part of all of us.

In the office of the future, virtually all information, whether data, text, image or voice, will be capable of being moved, stored and retrieved in electronic form. Further, if we can learn to change our way of operating, much of it need never be converted from electronic image form to paper.

How can modern office technologies improve productivity? I believe that the benefits from new technologies occur from workload redistribution, improved access to information and improved information flows.

We seldom re-examine workload decisions. I believe every new machine coming into an office, every new system or technique, should be looked on as a catalyst to re-examine the way we do things, and to reconsider who does what.

Thus the standard approach to the introduction of word processing equipment is to eliminate secretaries, move typing into a word processing centre, and establish administrative support staff to serve several managers. That may improve the productivity of secretaries, but it does nothing to improve the productivity of the manager, who incidentally costs three times as much as the secretary. In fact, it may affect the manager's productivity adversely.

A more sophisticated approach is to ask what functions being handled by the manager could be transferred to the secretary if the typing duties of the secretary could be off-loaded on to a word processor. Some companies which have taken this approach now look on word processing not as a device for improving clerical productivity, but as a means of redistributing work so that managerial time can be devoted to more pressing matters.

The economic pay-off in such an approach

is far greater—and, the job enrichment potential, as employees take on new and more important duties, is very great. The first and most immediate way, then, that modern technologies can improve managerial productivity is through their use as catalysts to re-examine work assignments and come up with a better distribution of work.

Two other ways in which new technologies can help managers to become more productive are in providing access to machine-stored information and in speeding up the flow of information. As we move more and more into an information society, the availability of meaningful information and the capability of communicating that information rapidly will become increasingly important competitive tools. Corporations tend to be bureaucracies. The time it takes information to flow through the system slows down the decision-making process badly. What new technologies do is permit managers to interact directly with information which is stored in a variety of locations and then respond to that information in a much more timely manner. Instead of waiting for information to be fed by the system, tomorrow's managers will be able to go after the information themselves and then act on it quickly. This ability to respond more quickly to changing business conditions may turn out to be the greatest contribution of modern office technologies to business.

There are some severe technological problems to be overcome. The lack of compatibility among various office technologies at the present time makes the translation of such networks from paper to reality virtually impossible. Eventually, however, because of the pressing need for users to solve their productivity problems, compatibility and other technological difficulties will be resolved. A bigger problem—in fact the biggest problem of all in looking to the office of the future—is behavioural: the fact that managers resist technology.

### User Resistance

The primary reason for this is that they perceive it to be rigid, structured, unforgiving of errors, and unresponsive to changes in business conditions. They base that perception on the experience they have had with computer-based systems, most of which have these characteristics. Over the years we have developed a methodology in the design of computer systems which encourages analysts and programmers to design systems which optimize the efficiency of processing, using the smallest amount of memory, the fewest number of machine cycles, and so on. In so doing we have introduced so much rigidity and structure into our systems that users have been affected adversely; and they have not forgotten. As a result, when we talk about the great capabilities available in new office technologies, we find ourselves facing the perception on the part of most managers and professionals that technology inhibits creativity and forces one into a box.

We brought in word processing with a fanfare about improving the productivity of the secretarial function. The first thing we did in order to achieve this was to take away the manager's secretary. We then set up word processing centres much like data processing centres and established operating schedules designed to optimize the production capabilities of the word processing equipment. The responsiveness of those schedules to the needs of the managers involved, and the effect on their productivity, were ignored in the drive to make the processing more efficient. Is it any wonder that managers regard technology as rigid, structured, and unresponsive to business requirements?

This behavioural resistance to technology must be overcome if we are to address ourselves to the productivity problem. The first way to do this is to adapt the technology to the individual—which runs counter to all the training we have had in designing systems. We have been trained to establish common procedures so that they can be automated in an orderly fashion. The systems of the future, especially those used in the office, must be adapted to a non-homogeneous group who may choose to use the systems in full, or partially, or not at all. These systems must be designed to accommodate to different users. In short, they must be adapted to the individual.

Most managers think they are already operating at a maximum level of efficiency, and the idea that a machine will make them more efficient does not cut ice. The fact that a new system can save money is also not a strong motivating factor because the savings usually show up in someone else's budget. On the other hand, a speed-up in information flow is perceived as highly beneficial by most managers. The ability to communicate more effectively, to avoid telephone delays, to cut down on the number of meetings, to be more responsive to what is happening in one's area of responsibility—these are the benefits that appeal to managers. New technologies must therefore be conceived of, and presented, in terms of the benefits they will provide users. Otherwise the systems will fail.

From a management point of view there are three areas of concern: productivity, technology, and people. Office operating costs are rising faster than costs in any other sector of business operations, and we must offset these increases through improved office productivity. There has been an explosion in new technologies for improving office productivity, but their usage has extraordinary organizational and operating implications. Ultimately, therefore, behavioural considerations rather than technology will determine whether the productivity improvement effort is successful.

### The Role of Systems Staff

Where does the systems professional fit into this picture? We need professionals who can define a set of objectives for the office and develop co-ordinated plans for meeting those objectives. We need professionals who can understand technology without being mesmerized by it. We need professionals who can concern themselves, not only with improving information flows, but also with the organizational and behavioural impacts of new approaches. We need professionals who can plan, direct and control the extra-

ordinary changes which will take place in the office throughout the 1980s.

Systems professionals should be 'generalists' and concern themselves with the total office and what is happening in it. They must be knowledgeable about a variety of technologies and how they inter-relate, about the concept of networks, organizational impacts, behavioural considerations, the measurement of productivity, and many other fascinating subjects.

They should also take part in formal efforts to exchange the information which results from use and experience. We are moving from a world of technological change, with which we are familiar, to a world of behavioural change, with which we are not. The old ground rules of what works, and what does not, no longer apply. We have to learn by doing, or from the experience of others who have learned in the same fashion. It is a field where the user has the knowledge, not the vendor or the consultant.

The ultimate value of office technology from an economic point of view is in improving productivity and controlling costs. But from a 'people' point of view, technology has the capacity to expand human potential; and to me this is far more important. Corporate planners who use computer models to test alternative business plans are not only more efficient: potentially they are better planners because the equipment allows them to examine more alternatives than could be done by hand. Corporate librarians have the potential of being better researchers because they have access to a wider array of information on microfilms than they could handle in book form. Company treasurers who use machine-aided cash management systems are potentially better treasurers because they can consider a number of alternative fund movement strategies.

In each case the technology is expanding the potential of the people using it, helping them to be more efficient, more effective and more productive. In the long run this may turn out to be the greatest contribution of the entire office-of-the-future movement —that technology was introduced which broadened the intellectual capacities and expanded the potential of every person who works in an office.

# *Planning for Office Automation*

## *A Round Table Discussion*

*Auerbach: The Information Company, publishers of the successful information service* Electronic Office, *capped the anniversary of this publication by convening an expert round table. The members of the panel consisted of two of the publication's originators, Jim Hannan and Janice Wright; consulting editors Dr. James H. Carlisle and Caroline M. Watteeuw of Office of the Future, Inc.; and Frank Brignoli, adviser. Ruth Covell, Auerbach's director of product marketing, led the discussion, which was designed to explore emerging issues in office automation.*

**What are the first steps in planning and implementing a successful office automation system?**

**Watteeuw:** The term "planning" is much too generalized to apply to the initial steps. Strategic planning comes first and has nothing to do with technology. You have to first answer the questions, "Where is the company going? What goals do we agree on and how do we get there?" Until that's settled, technology is irrelevant.

Next comes organizational planning. You need answers to questions such as, "How do we prepare our people for change?" The third step focuses on implementation, starting with the feasibility study and a detailed start-up approach. It is at this level that you can look at the technology out there and see how it fits into your plans and overall corporate strategy.

**Brignoli:** After the initial steps are completed, I like to think through and identify some of the problem spots in the current office routines and procedures. Usually these can be found in the areas of text processing or communications. After the problems have been identified, you need some solid systems work to identify what's happening right now — what the bottlenecks are, what the cost is in people and time.

These studies help you identify your initial requirements; interviews and consultants are also helpful. The user needs should be measured against the goals of your strategic plan, goals that should be continually scrutinized. As you get into the problem, users become more informed, management continues to explore possibilities and, before you know it, the original goals are no longer being considered. Suddenly you say, "Wait a minute. That wasn't quite what we had in mind." Or somebody comes along and tells you that your plan doesn't match the original mandate.

Quite often the business picture changes during implementation, and management, without clearly articulating a new goal, imposes cost avoidance as the measure of performance. Meanwhile, you're happily working away bringing in the best technology to solve the user's problems — problems that have shifted with new business conditions.

**Hannan:** I think Frank and Caroline have both hit on some important aspects of this entire problem. I would like to expand on one of Frank's points — rethinking the way in which things are currently being done. Good systems procedures, user interviews and the like are often wasted effort if you fall victim to the technological imperative, an attitude that says, "Now that we have identified a user's felt requirements, let's throw a little technology at it and watch the problem sink under the weight of the technology." We all know that this kind of thinking has caused more problems in the world of data processing than almost any other. What I'm advocating is serious rethinking of the way in which things are being done and then applying technology to these systems solutions.

**Brignoli:** I agree. One of the sentences I like is, "Technology is only as effective as the users permit it to be."

One of the ways you can test for people's willingness to use technology is to let them experiment with it. This technique keeps you from rushing new and poorly understood technology into the production process, a move that always ends in disaster, no matter how effective your advance planning might be. Many companies bypass any deliberate experimentation; whether they know it or not, they go through it anyway when they go into full-scale use.

Often, management will take a look at their systems six to 12 months down the line — and find a big surprise. When they compare actual operational and systems procedures with what they planned, they discover that operational people have run into major problems and solved them with superior procedures. Though ultimately successful, the operational people have often limped along for months trying to implement a plan they knew was not going to work.

The experimental period happens, planned or not, so you might as well plan it and move into production with a lot more "smarts" about the way the technology, the process and the system interact and actually work together.

**I would like to go back to something that Caroline said about "full-scale strategic planning." Are you advocating this process for both the large and the small computer?**

**Watteeuw:** I think it's a very useful technique for any organization, regardless of size. If you don't have a strategic plan, there's no way you can plan intelligently how to implement and use technology. Remember, strategic plans aren't short-term — they're generally projected over at least five years. The strategic plan allows you to build a family of plans with short-term goals, which are more detailed, but which further your overall strategy.

**Carlisle:** I'd like to relate some of

our previous comments to the common pitfalls we see in business planning. The first of these was identified as the "technological imperative." Organizational planners often start with, "What is available, and what can it do?"

When planners focus on technology, it dominates their planning. They make a long-range decision based on current technology and end up being locked out of exciting developments.

The second pitfall is to confuse decision making with strategic planning. Decision making, on one hand, is frequently accompanied by time pressures, incomplete information and other constraints. Strategic planning, on the other hand, should specify overall goals and contain checkpoints that guide your decision making. It should answer the question of whether you're ready (according to the strategic plan) to make a given decision.

A strategic plan requires more than knowing exactly where your company is or what its strong and weak points are. It demands that you understand the industry and the competition and that you delineate those factors crucial to continued growth and success.

The third pitfall is "amateur planning." It's clear that unless your management is trained in professional planning techniques, they will stumble into the first two pitfalls. Your operational managers are decision makers by temperament, training and experience. It's unlikely that they'll be concerned with systems that address "theoretical" future needs of the business; they're more likely to relate to systems and processes that can solve present practical problems.

Companies that place the responsibility of strategic planning on their operations people will probably skip planning altogether and continue making short-term, short-range decisions. Though your managers will deny that they're making today's decisions without regard for the future, the fact is that they are. Planning and decision-making hats just do not sit comfortably on the same head; the distinction between them tends to get lost.

A fourth pitfall is to develop strategic plans on a one-shot basis. Planning is educational; you have to employ professionals and you have to teach people to do it. The press of daily decision making and the extraordinary information resources that must be readied for the planning process almost always force operational executives into delaying planning or doing it incompletely; you have to keep people aware of the continuing nature of the process. You have to keep them involved, so they update information from the environment, competition, industry segment and the technology. Most companies scurry around any time they want to plan strategy, reassembling all the needed baseline information. This is just not cost-effective, nor is it feasible in terms of company resources.

**How do you motivate a company to get its plan out of the drawer, dust it off and revise it? You're in the ideal position to do that, aren't you?**

**Carlisle:** To start with, most companies don't even have a strategic plan for data processing. It's very difficult to get companies to do a better job in office automation planning than in data processing, particularly since office automation is often considered a stepchild of data processing. The impetus for continued planning must come from professional planners and from those corporate managers who can consider the future as well as the present.

Picking the right lead person is probably the most important part of the entire planning process. This person should have a pretty good understanding of the technology, whether it be data processing, communications or office services. This person should have positive expectations for the future, plus a fully developed sense of the corporate objectives. We've found that the more trust the chief executive has in the leader, the higher the probability that management will understand the ramifications of good planning and that office automation will be successfully introduced in the firm.

The approach to office automation must be broad. Companies are asking, "What word processor should we get for the legal department?" They should be asking, "What should our company do about office automation?"

All too often, the data processing department gets the assignment and falls into one of our four pitfalls. Generally, data processing is the worst group to undertake planning.

**Of course, you work primarily with larger companies, Dr. Carlisle. Many small companies are, in fact, looking for a specific item such as word processing. They haven't given much thought to, nor do they seem to feel a need for, comprehensive planning regarding office automation. How should a small company start?**

**Brignoli:** I think that a small company, no matter how it regards office automation, must seriously consider whether it wants to start at all. Benefits and costs must be determined. The best bet is to find a consultant you can trust — one who has the requisite understanding of the problem, who can tell you if your perceived benefits and costs are realistic and show you how to steer clear of the standard pitfalls.

**Carlisle:** I'll try to comment on this point. A small company must be even more careful in its planning than a large company, because small companies just can't afford to make costly mistakes.

If you analyze the history of factory automation, which is still in its infancy, you'll see that mistakes were made and that there is always a learning curve. To think you can bring office automation in during the next decade without some mistakes and failures, and a lot of learning, is pure foolishness.

When a firm is rigid in its thinking, and its planning is geared toward achieving immediate operational status, no learning takes place. This is inexcusable, but frequently happens because of managers who feel that they can preplan everything. They force regimentation on their people so that no learning takes place. There must be room for experimentation, room for failure, room for learning and growth. When managers try to convince everyone that all their decisions are good, they end up justifying and perpetuating bad decisions.

Not all small companies have the resources to conduct this kind of ex-

perimentation. If you can't afford it, here are a few guidelines that may help you decide on a system:

- Don't be first. Let someone else experiment.
- Find at least two or three users of the system in your own industry area and talk to them.
- Do cost/benefit analyses.
- Hire a professional consultant to evaluate your perceived costs and benefits.
- Stay away from single-function systems.

This last point needs some explanation.

Large companies tend to be more highly specialized and can use single-function systems. Small companies need multifunctional systems; you would be ill-advised to install word processing systems without remote dial-in, data processing, forms processing, plus order entry capabilities and several hundred million bytes of storage. Limited functionality in a small company is foolish, because expansion requires you to start all over again. Plan to use the multifunctional capabilities of your system by staggering work hours and bringing in additional shifts to exploit the system.

Small companies must beware of local distributors who say, "I've got just the system (usually a Data General, small Digital Equipment or IBM Series/1 system with custom software) for your industry." What this means is that they wrote software for Joe Smith down the street, and they don't know anything about industry-wide needs. Stay away from vendors who make this claim; custom software traditionally has limited flexibility.

On the other hand, let's assume that a vendor really does have a package that has been improved by nationwide development. Since they give you the package but not the source code, you're bound to the vendor's procedures, forms and data storage mechanisms. This poses an interesting dilemma to which I frankly don't know the answer. You have the choice of going with a vertical industry package or with a set of loosely organized generic tools.

**Watteeuw:** Some packages are much more flexible than others. You can get a package that combines basics with variables so you can make adjustments for yourself.

**Wright:** There's another pitfall. If you do buy a package that's fairly successful and allows for modification, you tend to get too involved in doing your own modifications. I've known companies that have become so tied up in rewriting software packages that they end up spending far too much time and money for the projected benefits.

**Carlisle:** We've already skirted the question of strategic planning. No matter what size your company is, you must do strategic planning. In addition, particularly in a small company, you must get a commitment in writing from the power center regarding what they consider important and where they are willing to invest. If you have a pet project that no one in top management is willing to back, don't perform a cost/benefit study to illustrate that it's a good area to invest in. It's much easier to start in the direction that they want.

The second thing is that if you're a small company and you can't afford R&D, do some experimentation so you can learn. That's our motto: Learn before you burn.

**You have just suggested staying away from single-function systems. However, if I'm a small company and know that I'm not going to need a multifunctional system for at least four years, could I benefit from leasing a single-function system until my system needs change?**

**Brignoli:** I can't see that as a benefit in any situation. I just don't see anyone reaching that conclusion.

**Wright:** There are many users who can focus on only one application initially and who react negatively when you suggest a multifunctional approach. Frequently, such users measure their needs only in terms of their immediate expenditures, no matter how effective a multifunctional system might be in the long term.

**Brignoli:** Well, Jan, that may be true, but if they can't be persuaded to look at the needs of the future, they should probably lease the equipment. They're going to change their minds quickly once their people are educated to the limitations of the single-function machine.

**Carlisle:** But isn't that decision considerably more complex? These vendors aren't dumb; in a lease deal, they'll get the full purchase price out of you in two years, and beyond that you're paying them pure profit. If you're buying a piece of equipment based on a pure minicomputer or just a printer, they're going to be sufficiently valuable to warrant your having bought them in the first place. Leasing a terminal is crazy unless you're getting an extremely good price on a short-term lease.

**Watteeuw:** If you sign a two-year lease with most companies, you're going to give them the purchase price of the equipment. The only advantage is the financial terms — you may not have the purchase price in hand. The other advantage is that you can always stop paying the lease if the equipment isn't working right. Under these circumstances, the vendor generally responds quickly to your needs. This may be especially appealing if you're a small company that needs some vendor clout.

**Wright:** There are also some psychological advantages to leasing. Small companies often buy equipment, but don't reevaluate their applications on a continuing basis — they just keep grinding away with the same equipment year after year. With a lease, you have the opportunity and incentive to periodically reevaluate your equipment, applications and procedures.

**Watteeuw:** That's changing, Jan. In these cash-scarce days, even small firms — firms with as few as 10 people — are making the financial calculations and asking, "What's my return on the investment?"

**Carlisle:** There is one situation where leasing may be distinctly advantageous to either a small or large company. Today there are a number of large leasing companies around that are financed by people who are in the 50% tax bracket. These companies are trying to provide their investors with investment credits, and they're looking for write-offs.

They'll give you a lease for one month, two months, whatever, but the most important thing they'll give you is a generous lease/purchase deal. We have gotten as much as 60% to 70% of the lease payments applied toward purchase. By the time you've gone four or five months, they've already taken the investment tax cred-

**it, and they're happy to sell to you. This is good if you're in a situation where you are really trying to evaluate whether or not you can make effective use of the system.**

**How can users protect themselves, during negotiations or in the contract itself, from product or installation problems?**

**Carlisle:** We always help our user clients to develop exacting performance requirements and include these in the contract. We're also very careful about ensuring that the vendor lives up to the formal and informal agreements made. We write clauses into the contract that assure the user the vendor will live up to their promises. Vendors often make informal agreements during meetings; we record those meetings, transcribe the notes and have them signed. We've saved clients more than $100,000, considerably more than our consulting fees, through this technique.

What we have to watch out for is a "turned-on" user who generally comes out of the DP department. This person is so eager, he can't wait — forget the acceptance tests, forget the other protections, let's buy it. When we are pushed into taking on this kind of job, the project is generally late and extra costs are incurred in beating the vendor into performing what should have been included in the contract and negotiations.

The trick is to write a contract that at least one vendor will accept. If that isn't the most desirable vendor, twist the others' arms so they'll come in your direction. A good contract beats a lease any day. You can always get a good maintenance contract that meets your performance requirements. Some maintenance contracts stipulate that if the vendor doesn't meet the performance requirements, he's obliged to supply you with alternative working equipment.

Brignoli: Good point. I'm always amazed at what vendors try to foist off on users as a purchase agreement or contract. I saw one contract recently that was little more than, "Congrats, you have just purchased our equipment. We will install it sometime during the month of April or May. After we install it, if it breaks, we'll come and fix it between the hours of 9 and 5." No time frame, no mean time between failures, no performance guarantees and no service guarantees outside of normal business hours, which is something you need if you're in a production situation.

I couldn't agree with you more, a good contract is a necessity. You must build in what you require in terms of performance. If your equipment arrives on time in March, but you can't use it until July, you have a very large problem.

**Hannan:** I certainly can't take issue with the importance of a good contract, but again, the issue is far more complex than it appears on the surface. You could have several potent forces working against getting a good contract in any typical company. You either have people that are too naive to demand the right clauses in a contract, which is the case with most users, or you have DP people who are either too jaded or too pressured to take the time to examine these very important issues.

**What should a good contract contain?**

**Carlisle:** You certainly must include a clause that makes the vendor responsible for all site preparation and contacts with the phone company. You need detailed clauses that specify what responsibility and authority the primary vendor has when dealing with other vendors. Let me give you an example.

The vendor has to tell the phone company what it plans to do and what the requirements are. Normally this must be done in good time, detailed in content and installed in good order. The phone company requires three months' advance notice. The vendor comes along two weeks before delivery with a set of requirements on the back of an envelope. If the contract isn't drawn up properly, the vendor says, "I did my part." Meanwhile, you're sitting there two months waiting for phone installation, the vendor wants his check and you have to pay him.

Many times, users fail to adequately define acceptance tests and end up with equipment that won't perform at the level it seemed to when the vendor presented it. It's nobody's fault but the users' for not having anticipated the problems and stipulated what they expected.

I can't provide you with a standard set of clauses or contract, because almost every contract is different and should be. There are different requirements, vendors, distributors and software people involved. Users must develop a sensitivity to these issues, educate themselves through available information sources and obtain assistance from qualified people.

**Jim and Caroline, you have been doing a lot of installations with large companies. What errors have you observed during these installations which could easily be avoided in the future?**

**Carlisle:** One of the biggest errors that companies of all sizes make is that they don't seriously commit themselves to training their people. If you inspect their plans, they always pay lip service to training. But in retrospect it's clear that most firms don't appreciate the importance of freeing good people to complete training on a new system before the final contract is signed.

We often find that companies are reluctant to send quality people for training before the system is installed. This lack of concern for training frequently spells delay, and sometimes disaster.

**Watteeuw:** It's not unusual for a firm to spend $500,000 on a system and then neglect to spend a few thousand dollars to free key people and have them properly trained. All too often firms think the training they receive from the vendor is enough. Additional training is not only desirable but necessary; one or two hours of training a week is not good enough.

Animals can be trained to do tricks, but humans must be educated to understand the system in order to use it efficiently. Often the vendor training people are not really aware of the application and the work environment of the system, so they train users in a generalized manner. True education is teaching the user not only the mechanics, but also to think in terms of an electronic system. When users are educated to think of the system as it will actually work, you see rapid strides in adapting the system to the environment and efficiently utilizing system capacity.

**Training continues to be a problem area for many companies. What do you advise companies to do to improve this situation?**

**Carlisle:** Let me try that one. Part of the problem is that in almost all cases, the technical planners and decision makers in office automation are not trainers, nor do they have the disposition for it. Very often they've been technical decision makers in data processing, which compounds the problem. Basically, they're used to hiring professionals with a proven skill, for example, programming in Fortran. They tend to buy people who are already trained; to them, training means getting accustomed to the way "we" do things.

When you move into office automation, the training problem is completely different. Users must be taught to understand the underlying concepts. You have to "infect" the user with these concepts so that they're examined in terms of the user's environment. Here, familiarity breeds innovation, the innovation spreads, and with luck you get continued innovation at different levels within the user group.

What normally happens is that the properly "infected" user begins to train himself. In today's world, continual dependence on professional training is not effective. Companies can't hire professional trainers fast enough to keep pace with the growth of office automation.

Good consultant trainers, who understand the need for continued education and training, will provide their clients with the tools to develop this capacity. Firms should be wary of consultant training companies that provide "face-to-face" training that simply teaches people to type a bunch of letters or send out a lot of messages. A good consultant firm will work with a company to develop procedures and handbooks that continue the training process. In our company we use videotapes that help key users to train other users.

**Brignoli:** I'd like to comment on what Jim has said. So often you go out and buy a piece of hardware, let's say for word processing. The equipment is demonstrated at a convention, you make the buy and you send people off to the vendor's school for training. When they get back you're amazed to find out that they know little more than they did after the initial demonstration. Real understanding of the system takes place when your people begin to learn from each other. If the group doesn't have the tools to continue the training and exploration process, the cost goes up, and the real benefits of the system are either postponed or never develop at all.

**Hannan:** To reinforce what Frank and Jim are saying, an effective continuous training program must be based on a body of shared experience on the system. It takes time for that body of shared experience to build up in a company; the cost of gaining the experience must be figured into the cost of training. Without that experience, training can't be reinforced and interactive.

**Wright:** That's right. Companies often believe that office systems don't require the kind of documentation generally found in well-tuned computer systems. The only way to hold on to that shared body of experience and effectively use it in training is to thoroughly document all procedures. Staff turnover alone will destroy office system effectiveness unless users can reproduce their shared experience in documents and carefully constructed training tools.

**Any discussion regarding the electronic office inevitably ends up attempting to describe how one should or should not go about measuring productivity and how that affects the bottom line. Can we measure productivity in terms of the knowledge worker?**

**Hannan:** Measuring the productivity of the knowledge worker is a complex undertaking. Paul Strassman at Xerox Corp. has described some interesting experiments that were conducted there. They've defined, tracked and measured many administrative information handling activities. They tracked information handling functions as industrial processes, not as undifferentiated overhead. Needless to say, this represents a massive effort.

On the other hand, Duncan McDonald at Wang [Laboratories, Inc.] says that the concept of treating the office as an information factory is misdirected. You can't look at the office as a place that creates information. Rather, the office is a place that processes and communicates information. The attempt to manage the cost of information handling within this environment in the same way that you would manage industrial and agricultural costs is simply not justifiable.

**Carlisle:** I know the various positions regarding this argument, but companies often insist that you predict their productivity gains when considering office automation. The problem is that most companies have not defined what they mean by "productivity."

The first thing that should be done is to create a task force to study productivity instead of technology. This task force must examine productivity in the large context. It must identify areas where productivity may be high or low and suggest ways in which it can be measured.

One of the key aspects of the study is a very thorough analysis of the steps needed to develop measurable productivity standards. Is productivity worth measuring? What is the cost of measurement? What can you expect in terms of a payoff? The task force must steep itself in the theory of productivity, paying particular attention to the many pitfalls into which traditional time and motion studies have led investigators.

Independent of these issues, any productivity study that's conducted within the firm must be consistent with how the firm measures its total productivity, whether it's return on investment, return on net assets, profit expansion or some other yardstick. From this analysis you should be able to identify some of the critical indicators. Getting more documents for the same or less money is not a legitimate productivity improvement. Measuring work in the wrong organizational structure is a worthless exercise.

**Brignoli:** I understand what you're saying, but my experience tells me that cost is an excellent way to measure the increased productivity of a certain section or department. If you're spending less money and producing more output, your productivity actually has increased.

**Carlisle:** What happens is that management begins to think in terms of introducing new technologies with a specific function in mind and with great assurance that cost can be avoided and displaced. Once the

technology is introduced and more people begin to use it and see expanded uses for it, however, the use of the technology logically expands — or at least there's pressure in that direction.

The manager of the department or unit goes back to executive management and says he needs more capital to buy more equipment and he needs more people. The controller goes bananas: "I thought you guys told me this thing was going to displace some costs, and now you want more, more, more." As a planner and implementer of office systems, my experience is that if you play up productivity too strongly, you're painting yourself into a corner.

**Watteeuw:** It's hard to tell management that the projected cost benefit might not be immediately discernible. It's even more difficult to tell them that the payoff may not come for five years. But still, they want you to calculate the numbers, they want you to measure.

**Hannan:** What you're asking, Caroline, is how do you instill farsightedness in corporate managers? I don't know. It's been a problem that has been addressed in some of the leading business journals. A recent article in the *Harvard Business Review* suggests that we may be mortgaging the future by turning over the management of companies to accountants and lawyers. Overconcern for short-term profits will do just that.

One of the mistakes that firms often make is equating productivity with efficiency and effectiveness. Efficiency and effectiveness can be improved considerably within a knowledge worker's environment. This is something that newly hatched MBAs have difficulty dealing with. A very simplistic definition of productivity — output per unit input — just doesn't tell the entire story. That's a throwback to the early days of the industrial revolution.

What normally happens when you install an automated system in an environment of knowledge workers is that it improves efficiency and effectiveness, leaving them with more time to improve the quality of their output, to be more responsive, to handle complexity more effectively.

If the "bean counters" don't see an immediate increase in the number of documents produced for the dollars invested, they start having doubts about the system and its management. They never think about the reduction of stress on the worker, the improvement in the quality of their work life, the long-term payoff in the quality of the output. Their method is simply not going to work. So, Jim, I would add to the work of your task force the inclusion of these difficult-to-measure payoffs I have just mentioned.

**Carlisle:** I think corporate management should carefully examine any automation plan that promises a saving based on a reduced number of people. Where will that saving come from? What's the analysis of that projected cost avoidance? "I need only this many people, but give me $100,000 worth of technology, invest in the training and all of the organizational changes I am asking for." Is my projected saving real or imagined? I find it hard to feel confident about those kinds of projections.

**What you are saying, then, is that cost justification is not really possible. In fact, soft reasons are more important when you try to sell office automation to your management.**

**Carlisle:** No, "soft reasons" is the wrong phrase. Numbers are considered hard, because they define simplistic situations. The other reasons are not soft, but infinitely more complex. I think it would be much more accurate to define them as complex reasons.

**Watteeuw:** When you're planning a move toward automation in the office environment, there are many variables involved — systems interrelationships, for example. To come in and count the amount of paper flowing across somebody's desk is so simplistic that it's almost ridiculous. "Well," somebody says, "if that's not enough, we'll count the telephone calls, the amount of paper, the time spent in the john, in meetings, at lunch and then we'll improve your productivity." This attitude is even more absurd.

Look at the variables, the time variables, the competitive strategy of the company. Does management want this department to expand or contract, does it expect higher quality work, does the department need more training, greater longevity, lower turnover? These are the important variables. These are where management must look to understand the long-term value of office automation.

---

1 *Ruth Covell, who conducted this interview, has been director of marketing for Auerbach, Inc., Pennsauken, N.J., for the past two years. She was previously the owner of a consulting company specializing in public relations and advertising for consumer markets and an editor of* Redbook *magazine. Covell has a B.S. in chemistry from Cornell University and an MBA in finance from The Wharton School, University of Pennsylvania.*

2 *Dr. James H. Carlisle is a respected innovator and educator in the electronic office field. He is president of Office of the Future, Inc. in Gutenberg, N.J., the first management consulting firm specializing in office automation design and implementation. Carlisle has been involved in the development, implementation and evaluation of office automation systems for a number of clients, including the Rand Corp., Fiat Automotive and Chase Manhattan Bank.*

3 *Frank Brignoli currently manages the development of office systems for the Air Line Pilots Association International (Alpa). He was previously a member of the Office of Administration, a unit of the Executive Office of the President, where he managed the Office Automation Facilities Branch. While with the Naval Ship Research and Development Center (1968-1976), he was involved in the areas of computer networking, office automation and computer security. He is an adjunct associate professor at the New York Institute of Technology and has been an instructor for the University College, University of Maryland. He holds a B.S. in mathematics and an M.S. in computer science. He is an officer of the IEEE Computer Society (Washington, D.C., chapter) and a member of the International Word Processing Society and the American Association for the Advancement of Science.*

4 *Caroline M. Watteeuw is vice-president and a member of the Executive Committee of Office of the Future, Inc. She has had responsibility for the development and direction of the firm's international network of consulting associates. Watteeuw has served as consultant to a number of leading companies, including Digital Equipment Corp., Associated Biochemical Engineers and Consultants and Siemens.*

5 *Jim Hannan is managing editor of the Auerbach Information Management Series, a group of 10 stand-alone information services designed to address the management needs of DP professionals. Prior to joining Auerbach, Hannan taught at the University of Pennsylvania, where he was engaged in a computer-assisted research study for his doctoral dissertation. He holds an M.A. from the University of Pennsylvania and a B.A. from Seton Hall University.*

6 *Janice Wright has been a project editor for three volumes of the Auerbach Computer Technology Reports. She played a key role in developing Auerbach's office automation information service, Electronic Office — Management & Technology. Her areas of expertise include word processing and office communications systems as well as automation software for mini- and microcomputers. She was previously a member of the Business Development Group at Vydec, Inc., a subsidiary of Exxon Information Systems. Prior to joining Vydec, she was a communications consultant for New Jersey Bell Telephone Co. Wright has a B.A. degree from the University of Kentucky and an M.A. from Seton Hall University.*

# Office Automation: At Which Stage Are You?

By John Rhodes
Special to CW

There is general agreement that office automation needs to be managed, but few people agree on what office automation is, and even fewer know how or why to manage it.

Large companies have been adding "Office Automation Manager" to their personnel lists in the last two or three years. In smaller companies, "office automation" is being added to the management information systems (MIS) director's job charter.

The situation resembles the early days of DP, when brand new applications were being developed; the hardware had an aura of mystery and excitement and there was very little experienced management. Also, like the early days of DP, there is a dangerous hype for office automation: People talk about "slashing clerical costs" and about "integrated MIS systems" based on word processors. These benefits can be true, but they do not come easily or automatically.

## A Staged Approach

The key to successfully introducing office automation is, first, careful preparation and, second, establishing clearly defined, limited, phased objectives. It is useful to think in terms of a basic number of stages.

In the first stage, the objective is to contain or reduce cost by improving repetitive clerical functions. The technology involved is fairly simple and management can be handled through normal office equipment purchasing functions. Most offices in the U.S. are at this stage.

In the second stage, the objective has moved beyond simple cost control to the improvement of administrative productivity and performance. For the first time, consideration is given to whole processes, not just single workstations. The office is viewed as a system. Administrative systems analysis techniques are applied to functions such as typing, filing and archiving, and functions such as a typist or a secretary may be redefined. The most important piece of equipment at this stage is the word processor.

The third stage is marked by efforts to manage information. The functions of the documents produced are analyzed; the ways they are distributed are improved and streamlined. Who needs what information, at what frequency, in what format?

There are perhaps two stages beyond this point. In the first, all information systems — DP, WP, graphics, voice and video — are integrated. Some pilots of this type exist. The final stage is still in the future and depends upon further technological development. It will probably include voice-driven input systems, true plain language programming, sophisticated communications and teleconferencing and unforeseen wonders for a new generation of advanced business applications.

Each stage is concerned with the introduction of a new technology. Stage 1 is primarily electromechanical and is based upon efficient ways of producing and storing words on paper. In Stage 2, word processing systems with magnetic storage should replace much of the paper that now clogs the office.

In Stage 3, communications are wedded to office systems. The tremendous breakthroughs in cost, reliability, flexibility and standardization in communications permit highly effective machine-to-machine communications at the office level. Electronic mail can now parallel distributed data processing. Advances in voice technology permit far more cost-effective uses of communications links.

Stage 4 links WP and DP, currently feasible from the hardware viewpoint, but requiring much more sophistication in data base technology than presently exists. And Stage 5 awaits improvements in voice recognition and plain language compilers and improvements in the economics of broad band communications for video transmission.

## Managing Change

Each stage requires a different approach to management. In Stage 1, management should be primarily concerned with cost avoidance and cost reduction. A degree of oversight is necessary to ensure economies of scale and bulk purchasing. Central supervision of communications — such as mail and message — is important to maintain overall cost consciousness.

In Stage 2, the main tasks of management should be training and support. Corporate coordination of purchasing is necessary to ensure future communications compatibility, but heavy-handed standardization should be avoided. So, too, should be faction fighting between DP and office administration groups for control.

Wise managers of office automa-

tion, like wise managers of DP, encourage users to take control of the equipment. This leaves the managers free to concentrate on functional management, support, consultation and standards to simplify communications.

Good management of Stage 2 also means easing the fear of change. Secretaries fear being demoted to word processing pools; managers fear or resent having to use keyboards. Helping to anticipate and ease these worries about changing work conditions can be critical.

Managing Stage 3 requires cooperative management of technology, particularly for the integration of telecommunications, and agreeing on the basis for managing information. Successful management requires combining end-user responsibility for automation with corporate responsibility for the supply of communications utilities.

In addition, because Stage 3 is involved with information, not just words or pictures, there are some sensitive issues to be managed. For example, we must determine the ownership of information and answer the questions "who must generate it, who must deliver it, who is accountable for accuracy, and — most difficult of all — who will pay for it?"

Stage 4 — fully integrated systems — has existed in military environments for many years, but offers few corporate examples. Stage 4 is concerned with full integration of all available information — usually to assist in the decision process. This, from a management point of view, enters the sensitive area of management functions, how decisions are made and on what information.

The most common cause of failure appears to be the old problem of technology in search of a use. The most common cause of success appears to be the equally old but vitally important characteristics of good leadership, participation and support by top management.

Stage 5 still lies ahead. In the future, where do personal computers fit into the management process? Hopefully, beyond the clutches of the DP manager. At one firm we know, a senior systems person remarked, "The trouble with micros is that users want to use them." Management, or at least the professional systems people, should assist the introduction and ease the frustration of nonprogrammers in using personal computers.

If you are a typical Stage 1/Stage 2 company and want to move ahead on office automation:

• First, get user management — not technical management — to set objectives for office automation and get those built into the stated business plan of the corporation, based upon stated business priorities, such as reduced costs. The office is the most undercapitalized segment of American business, so some internal selling will be needed. However, office automation projects often show excellent return on investment (ROI).

*'Stage 5 still lies ahead. In the future, where do personal computers fit into the management process? Hopefully, beyond the clutches of the DP manager. At one firm . . . a senior systems person remarked, "The trouble with micros is that users want to use them."'*

• Second, work through pilot implementations. Successful pilot users will do all the selling necessary. Pilots also have the advantages of limited risk and cost exposure, the opportunity to learn how to implement successfully and the opportunity to measure ROI before a major capital commitment is made.

• Third, introduce better ways of doing things, not just boxes. Make the boxes fit the environment, not vice versa. Concentrate on solving the human problems involved.

• Fourth, make heavy use of the users. It's their system. The biggest single factor for success is user commitment. Any experts involved should be limited to roles where specialist knowledge is genuinely needed, such as overall program planning and defining requirements and certain areas of technology — communications and information management.

### Uses of History

Fortunately, in introducing office automation the history of DP provides for a valuable case study. There are obvious historical pitfalls to avoid, such as the overselling of grandoise integrated MIS; the benign neglect of communications as an integral component of a system; overconcentration on the technology and underconcentration on the business problems to be solved; corporate centralization/decentralization issues; the high cost of the "Not-Invented-Here" syndrome.

There are also case studies of success: full visibility and participation by all parties within the context of a clearly defined and operating decision process, stage development controlling risk, analysis and design before implementation and the use of pilots.

As the use and acceptance of the technology matures, office automation will need to find answers to new problems.

But let us first solve the problems of today.

*Rhodes is the founder of John Rhodes & Co., a management and systems consulting firm specializing in banking and financial institutions, located in Lyndhurst, N.J.*

| Stage | Primary Objective | Primary Type of Implementation |
|---|---|---|
| 1 Introduction | Clerical cost containment | Use of electromechanical devices on a one-to-one basis to reduce/eliminate clerical activities (microfilming archives). |
| 2 Multi-Functional Devices | Improve office productivity | Use of advanced electronic devices (word processors), again on a case-by-case basis. |
| 3 Integrated Computer-Driven Systems | Improve management productivity | Develop techniques to speed up information movement (electronic mail) and information management. |
| 4 Advanced Automated MIS | Directly support planning and decision processes | Implement integrated information systems (all necessary information can be assembled whenever needed.) |
| 5 "Office of the Future" | To be determined; but includes:<br>• Integration of inter-corporate processes.<br>• Reduced need for personnel mobility. | |

Figure 1. Office Automation Phases

| Stage | Primary Technology/ Technological Objective | Examples of Types of Equipment |
|---|---|---|
| 1 Introduction | Paper communications; paper storage objective is to reduce paper handling costs. | • Magnetic card typewriters<br>• Plain paper copiers<br>• Microfilm |
| 2 Multi-Functional Devices | Paper communications; some nonpaper storage; objective is to limit the use of paper for storage and communications. | • Word processors<br>• Advanced copiers<br>• Advanced voice systems<br>• Advanced office designs |
| 3 Integrated Computer-Driven Systems | Electronic storage and communications; objective is to integrate communications into discrete office systems. | • Communicating WP<br>• Electronic Mail<br>• Some integration of WP and DP<br>• Digitized voice system<br>• Distribution of personal computers |
| 4 Advanced Automated MIS | Multiple media; objective is to make all forms of information (graphics) available on-line. | • Full integration of WP and DP<br>• "War room" decision support<br>• Significant use of remote video<br>• Elimination of most paper flows |
| 5 "Office-of-the Future" | Objectives include electronic substitutes for travel and elimination of computer "programming." | • Voice-driven systems<br>• Advanced video applications<br>• Plain language programming |

Figure 2. Office Technologies

*The Rocky Road to Office Automation*

# On Course?

By Ann Dooley
Special to CW

Navigating through the seas of office automation (OA) during 1981 was essentially a matter of trial and error for both prospective users and OA vendors. The OA onslaught has been a subject of discussion for several years. But it was not until 1981 that OA became a reality for these prospective users and a major factor in the marketing strategies of OA vendors.

As with any young industry, problems exist. Promises are made and not necessarily kept. Users are confused or frightened about the new technology and its potential effect on their jobs. Organizations are grappling with integration, cost justification and implementation procedures with the certain knowledge that efforts in these areas are just beginning.

Most users are still hovering at the brink of OA. A few large firms have implemented pilot studies — and even fewer have installed some sophisticated systems. But OA remains a buzzword to many companies that have, to date, limited their commitment to implementing word processing in specific departments.

A recent survey of nearly 400 *Computerworld* readers illustrated the status of OA during 1981 and shed some light on areas that will concern users over the next year. The results look promising for OA's future. Most respondents — nearly 72% — are now using some form of an OA system in their companies. Of the remainder, 51.9% are exploring the possibility, 11.1% are currently evaluating applications, 8.3% are evaluating vendors and 2.8% are waiting for a system to be installed. There are some holdouts to the technology, however. Nearly 42% of those 6% not currently using OA techniques do not expect to venture into the OA arena in the foreseeable future.

In 1981, OA seems to have stayed within the jurisdiction of most organizations' technical branches. More than one-third (36.3%) of those departments charged with operating their company's OA system were in the DP/management information systems (MIS) sector.

End-user departments were most frequently responsible for operating their own systems. The administration department came next with 14.9%, followed by the WP department with 9.3%. The DP/MIS department was also the overwhelmingly favorite chosen for planning and implementing automated office procedures in a company, with nearly 50% of the respondents indicating this to be true in their company.

Participating user departments and administrative departments were judged equal in responsibility for implementation and planning, while 20% of the respondents indicated that a centralized interdepartmental committee was given the responsibility of planning and implementing OA in their company.

The primary concern about OA on the part of the respondents — mentioned by nearly 50% — related to hardware/software capabilities. Cost justification was the second major concern, mentioned by 44.5% of the respondents. Incompatibility of equipment was the third most frequently mentioned concern among the respondents followed by concerns over service, implementation procedures and vendor selection. People worries also drew some response with the difficulty of selling management on the need for OA and selling staff on the usage being mentioned by large numbers of respondents. Local-area communications networks were listed as a major concern by the respondents, who also expressed a fear over equipment obsolescence.

Respondents indicated that the OA equipment already in use in their organizations included integrated computer systems followed by stand-alone word processors, intelligent terminals and clustered word processors.

What will their major purchases be next year? Top choices for additional equipment will follow along the same lines as the current top installed base. Integrated systems, intelligent terminals and stand-alone and clustered word processors are seen as the most frequent additional purchases with computer graphics coming in fifth place. Among new

| | Currently Use | Plan to Purchase Additional | Plan to Purchase New |
|---|---|---|---|
| Integrated computer systems | 69.2% | 12.5% | 5.2% |
| Electronic mail | 16.6 | 3.5 | 8.4% |
| Word processor — stand-alone | 54.1 | 10.5 | 9.9 |
| Word processor — clustered | 30.8 | 8.1 | 8.7 |
| Teleconferencing | 14.2 | .6 | 3.2 |
| Computer graphics | 23.5 | 6.4 | 8.4 |
| Micrographics | 16.9 | 3.8 | 3.5 |
| Local networks | 26.5 | 3.8 | 6.7 |
| Records management | 20.6 | 1.2 | 7.0 |
| Facsimile | 26.2 | 2.6 | 2.6 |
| Management workstation | 8.4 | 2.6 | 4.9 |
| OCR | 10.5 | 1.5 | 4.1 |
| Intelligent terminals | 37.2 | 10.2 | 7.3 |
| Intelligent copiers/printers | 14.2 | 2.0 | 4.4 |
| Relational data base software | 18.9 | 2.3 | 10.2 |
| Private phone systems (i.e. PBX) | 37.8 | 3.8 | 5.5 |

CW Chart

**Current Usage or Purchasing Plans for OA Equipment**

purchases, relational data bases came in first, word processors will be bought in high numbers and computer graphics and intelligent terminals will be among the top choices for new purchases (see related chart).

Most of the survey respondents viewed automating the office in fairly simplistic terms. They considered OA techniques as a means of automating manual procedures, reducing paper or increasing productivity without having any definitive idea of how this is to be accomplished. Others saw OA in terms of technologies — electronic mail or WP, for example — rather than in terms of what OA can mean to the end user through specific applications.

One of the major stumbling blocks to widespread, efficient implementation of OA is the lack of equipment standards. Users who began implementing OA, department by department, are increasingly concerned as they discover that equipment is incompatible and incapable of communications. An International Data Corp. (IDC) report "Office Automation: Blueprint for the '80s" stated that 88% of the companies it surveyed are experiencing problems due to the lack of standardization. This problem will continue for the forseeable future, with more companies running up against the dilemma in 1982.

Most pilot projects implemented during 1981 were in WP applications, followed by electronic mail and then WP interfaces with the host computer, electronic filing and document retrieval and micrographics interface. A number of pilot projects were started this year and as many as 30% of all U.S. companies initiated project planning, according to Walter Ulrich, president of Walter Ulrich Consulting.

As user needs for information increased, OA conferences proliferated during the past year. The buzzwords heard at every conference dealt with increasing managerial effectiveness, reducing the cost of performing office functions and increasing white-collar productivity. The problems users were most eager to learn about included resistance to change by management and staff, cost effectiveness and educating management on the benefits of automating the office.

In 1981, the beginnings of a power struggle over who would control the OA process began. Should it be under the jurisdiction of administrative department personnel who are most frequently knowledgeable about their organization and dealing with people, or the DP/MIS department, which understands and can implement the technology? The question will not be solved during the next year and will probably rage on for several more years until OA becomes more firmly established in individual companies.

### Technology Trends

New technology proliferated this year as product after product was introduced. Some were even announced on the same day and at the same hour. Some analysts fear that vendors are concentrating on making these announcements rather than on selling office products that can be made immediately available to users. "Everyone's in it — it's not just a hot market, they're in it for their survival," David Terrie, IDC's manager of OA services, stated.

Technological development in the OA sector is increasing so fast that users have a hard time staying on top of new products, let alone starting to set realistic implementation strategies.

Technological breakthroughs to watch for in 1982 and beyond will include alternative input devices such as the Xerox Star Mouse, transient menus that quickly appear at the push of a button, on-line tutorials, nonprocedural languages and friendliness in systems, according to Caroline Watteeau, vice-president of Office of the Future, Inc. in Guttenberg, N.J.

High-level programming languages like Pascal, Unix and Xerox's Mesa will become more commonplace. Desktop laser printers — some from the Japanese companies — and new print technologies will be more prevalent. More powerful personal computers will begin to gain increased attention. And almost all top private branch exchange (PBX) vendors introduced an integrated voice/data feature that enables PBX to support low-volume users for electronic mail, according to Ulrich, who rated this as one of the most important events in 1981.

Low-cost terminals proliferated, enabling the low-frequency user to seriously consider them, another important 1981 landmark. Reducing costs to a generally affordable level will open up a threshold market, according to Ulrich. Low cost is more important during a start-up phase than high functionality in order to gain widespread interest, the Houston-based consultant stated. Printer costs also dropped dramatically, which correspondingly reduced the price of stand-alone systems, IDC's Terrie said.

A number of coaxial cable local-area networks were announced with Wang Laboratories, Inc.'s Wangnet, attracting a large amount of attention when it entered the competitive fray against Xerox's Ethernet.

Confusion and controversy con-

rning local-area networks abound- in 1981. Local nets were the buzzwords of 1981 and will probably hold that title in 1982 as the battle between baseband and broadband technology continues to rage. Nineteen hundred eighty-one was supposed to see Xerox's Ethernet local-area network become a defacto standard and it is significant that it has not been accepted.

Instead of the cooperative environment Xerox hoped would develop, an intensely competitive and uncertain environment exists and will probably continue to do so for the near future. IBM is also expected to announce its local-area network strategy in the first portion of 1982.

The hesitancy to accept a standard has deterred growth in the industry, according to Melody Johnson, an analyst at Kidder, Peabody & Co., Inc. in New York. Large companies that are change agents are adopting a wait-and-see attitude about local nets, she stated.

For the user, this means that there ..l be no simple solution. Users will ..ve to survey all of the alternatives ..nd possible repercussions.

In 1982, integration will continue to be a major factor in the industry with more voice/text message systems being introduced or enhanced. Companies will begin to implement integrated communications networks in which one line shares voice/data/text.

Some analysts speculate that AT&T will play a greater role next year in OA. IBM is expected to continue in a dominant position and Exxon Office Systems, which had a disappointing year in 1981, will see the same thing happen in 1982. Datapoint Corp. should continue to show a strong presence, according to observers. Wang, according to analyst Ulrich, did a "dynamite" job in terms of delivering products in '81 and will continue to play an important role in '82.

The outlook for both NBI, Inc. and CPT Corp. appears optimistic since both companies offer shared-resource systems as well as stand-alone products, according to Kidder Peabody's Johnson. These companies can exploit the small and medium-size markets that the larger vendors are bypassing as they strive to attract Fortune 1000 users. However, completely stand-alone vendors must carve out their own niche in order to survive, she noted.

According to Johnson, some leading-edge products that appeared on the scene this year included Wang's audio workstation and voice message system, the Xerox Star and the Datapoint laser printer. By rushing into the OA marketplace, major vendors are legitimizing it in the eyes of users and also admitting to themselves its true dollar potential, Johnson remarked. Video disks, which were just gaining attention on the OA scene in 1981, are expected to emerge and become more of a reality in 1982.

The proliferation of low-priced workstations is expected to continue next year with more tested versions on the scene. The professional workstations like the Star and Wang's Alliance were significant beginnings, most analysts agree.

Next year will see large amounts of effort going toward research and development and pilot projects rather than in placing large orders for equipment, according to Boston analyst Thomas Billadeau, president of Automated Office Systems.

---

*Ann Dooley is editor of Computerworld OA at* Computerworld.

*The possibility of reducing total business costs by 20 to 25 percent, improving productivity, having vital information at his fingertips, and being able to communicate instantly to any one of the 9000 other offices in his corporation have been intriguing incentives for Pat McHenry, a typical American manager, to investigate the so-called "office of the future" movement.*

*Pat's first exposure to this new concept came when* Business Week *(in 1975) carried an article entitled "The Office of the Future." This article sought to portray what a future office might resemble if the powers of technology were put to work to solve the problems of the office. The futuristic scenario describes how an executive seated at a TV-like display can call up information, compose documents, transmit and receive messages, and perform many other office activities electronically. In this system, data processing computers, word processors, telecommunication devices, and other equipment all work together in an integrated fashion. It is a true utopian working environment compared to the offices of today.*

# The Office of the Future: Managing the Changes

By Dr. William H. Baker and Dr. Harold T. Smith C.A.M.

During these past few years, since the first "Office of the Future" article was published, countless articles have been written and speeches given on the topic of office automation, but few offices have made major progress in implementing this ideal. Vendors of electronic office technology continue to sell increasingly more sophisticated systems to organizations, thus advancing office technology. But each installation of this equipment is just a small step toward the total integrated information systems comprising a true "office of the future" concept. Offices are still people-intensive entities with secretaries, clerks, and managers working to accomplish the administrative responsibilities of the larger organizations they serve. Increasing workloads and rising labor costs make it imperative that the trend toward the adoption of automated technology in the office continues at an accelerated pace. This article will identify a number of driving forces behind the trend toward the automated office of the future and will also describe several restraining forces holding it back. We will also focus on specific actions that should be taken by managers to move wisely toward a smooth-functioning automated office.

## Driving Forces

At least four driving forces have been identified as being the major stimulants behind the movement toward the automated office of the future: (1) high office costs, (2) low productivity, (3) increased information needs, and (4) more powerful and useful technology.

High Office Costs. Many decades ago, before businesses had grown to their present massive size, before widespread governmental intervention into business, before the advent of computers, and before the trend toward service industries, the functions performed by the business office were rather insignificant when compared to today. Governmental reporting requirements were limited. Information processing was performed by human labor assisted by a few simple office machines. Business organizations were much smaller and were much more product oriented rather than service oriented. Hence, the number of blue-collar workers far exceeded the number of white-collar workers.

As businesses enlarged and as the demands for greater information and

Reprinted by permission of EXCHANGE, a publication of
The School of Management, Brigham Young University, Provo, Utah 84602.

**The annual cost of office information workers was $800 billion in 1979, and is rising at a rate of 12 to 15 percent per year. If left uncontrolled, these costs could reach $1.5 trillion per year by 1990.**

support services provided by the office increased, the gap between the numbers of blue-collar workers and white-collar workers began to narrow. In 1979 the number of "information workers" surpassed the number of "noninformation workers" in our work force for the first time.

The annual cost of these information or office workers was estimated at $800 billion in 1979, and these costs are rising at a rate of from 12 to 15 percent per year. If left uncontrolled, these costs could, by 1990, increase to $1.5 trillion per year at the present rate! Of these costs, about 75 percent are human costs—only 25 percent are applied to supplies, capital equipment, and overhead.

Of the total personnel cost, approximately 75 percent is for managers, professionals, and other knowledge workers; the remainder represents clerical costs. When the capital equipment investment rate—the amount spent for the workers' tools—for clerical workers is compared to those of factory workers and farmers, some rather startling differences are found. The average capital equipment investment rate for each factory worker is $24,000; for each farmer, $35,000; and for each clerical worker, $2,000.

Office costs have in the past gone relatively unnoticed by top management. Their attention has been typically focused on increasing productivity in manufacturing and on increasing sales volume. With the high office costs of today and with the current economic difficulties, however, top managers are beginning to look more carefully at their office costs and are directing some efforts toward reducing them wherever possible.

Low Productivity. Productivity of office workers over the past several decades has stayed relatively constant. An intriguing contrast can be drawn between office worker productivity and the productivity of farmers. The percentage of the total U.S. population engaged in farming activities in 1930 was 24.9. By 1977, this figure dropped to 3.6. The following productivity figures illustrate some of the increases experienced by American farmers:

*From the early 1950s to the mid-1970s, for example, the annual average yield of corn leaped from 39.4 to 87.1 bu. per acre, wheat from 17.3 to 30.4 bu. per acre, potatoes from 15,100 to 25,800 lb. per acre, milk from 5,400 to 10,600 lb. per cow, and eggs from 181 to 234 per laying chicken. At the same time, the man-hours necessary to produce each 100 lb. of chicken broilers dropped from eight to one.*[1]

To increase output of the office, most organizations have simply hired more office workers rather than finding new ways to make the existing work force more productive. (It is interesting to note, in connection with agriculture, that "while the number of farms and the farm population have plummeted, the number of employees at the Agriculture Department has grown like weeds. In 1930 there were 26,050 employees, 98,694 in 1960, and 127,497 in 1977."[2]) With current productivity concerns in mind, today's managers are beginning to look toward technology as an aid to make their office workers more productive.

More Information Needs. An important factor in the growth of office expenses is the increasing amount of information available and the increasing need for more, or at least more selected and relevant, information. With the mountains of information created by computers, the many duplicates of documents that are made in large and complex organizations, the volume of new information created by those engaged in research and development, and the reporting requirements of government, information has truly become an expensive resource. The White House Office of Management and Budget has indicated that the federal government "has about 5,000 reporting requirements to which business, recipients of federal aid, and the general public must spend a total of 786 million hours a year responding."[3] Add to these requirements the need to have large amounts of information available just to stay competitive with other organizations in one's industrial line.

It is ironical to note that computers have helped to answer the call for more and better information, but at the same time they have created more information management problems. At least one person has suggested that what we need now is not more *management information* but rather more *information management*.

Advanced Technology. Computer development has accelerated during the past 30 years at a rapid pace while related costs have rapidly decreased. For example, the speed of state-of-the-art IBM processors was 2,193 multi-

plications per second in 1952 and 239,120 multiplications per second in 1979. In contrast, the monthly rental cost of storing one million bytes of data was $221,867 in 1952 and $430 in 1979.[4]

Advancing electronics technology has had a major influence on all areas of information processing and management. Data processing, word processing, reprographics, telecommunications, and records management have all seen microprocessor and computer technology automate many functions that were previously manual routines. In addition, these administrative services are being merged into integrated systems, and boundaries between these areas are fading. Advanced technology offers all aspects of information creation, processing, retrieval, transmission, and storage in multifunction systems.

New systems, now only on the drawing board, will offer greater information management capabilities, greater ease of use, less reliance on paper, improved compatability between systems for greater information transmission capability, and greater miniaturization of system components to ease space demands, reduce costs, and make technology available to more workers and managers.

### Restraining Forces

With all these pressures on the present-day business office, one might wonder why movement toward the future automated office has not been more accelerated. In reality, there are many pressures and forces that work against the adoption of office automation and which slow the trend toward automation. Let us examine a few of these opposing forces that seem to be most prevalent.

Fear of Change. Many business people are fearful of new office technology because they suspect that their jobs might be jeopardized or that the benefits of the system might be more than offset by unanticipated disadvantages. Workers and managers have learned to perform their work using manual methods, and they are able to keep their work somewhat under control using these methods. They feel that automation would introduce new and complicated methods of performing work, that they would lose control of their own situation, that their social relations on the job would be disturbed, and that their job requirements would become more complex and difficult. Whether these fears are justified is not the major point here. The point is that workers and managers feel the way they do, and, to them, the problems are real. Until these anxieties can be eliminated or greatly supressed, fear of change will continue to deter the implementation of automation in the office.

Disorganization and Lack of Standardization. Business organizations have generally experienced a great deal of prosperity throughout the post-World War II years. As a result, management of growth has been one of their main problems. Added to the rapid growth problem is the problem of managing information—the bulk of which is written on paper. All phases in the life of information—creation, reproduction, transmission, utilization, storage, retrieval, and destruction—have been largely restricted to the paper medium. This paper-management condition has resulted in such problems as excessive reproduction, cumbersome and costly transmission, costly and space-consuming storage, slow and disorganized retrieval, and an overall lack of centralized control. It has become common for different branch offices of a large corporation to follow different business procedures in managing their information. Such a condition is similar to an octopus with a brain in each tentacle.

Because of this widespread disorganization, the process of converting to automation presents a major challenge of (1) finding out what different branches of a company are doing, (2) determining standardized procedures and policies for the entire organization, (3) implementing the standard procedures company wide (including the difficult task of getting people to change), and (4) implementing automation. The difficulty of getting the "company act" together before automation can be pursued tends to cancel many automation conversions that would otherwise be undertaken.

Lack of Management Awareness. Business managers have experienced awareness problems in two major areas—office costs and technological capabilities. Because they have not been aware of the real costs of the office element of their organizations, managers have focused more attention on improving products and sales than on cutting office costs. Even today, most top managers have no idea of the percentage of their costs going to fund office operations.

General managers have also been unaware of the capabilities available in modern automated equipment. Trade magazines addressed to adminis-

**What we need now is not more management information but rather more information management.**

trative managers have been effective in explaining current technological advances, but magazines going to non-administrative managers generally have not carried this message well. Consequently, most managers have little understanding of how automated equipment can provide at least partial solutions to many of their management problems.

Expensive Equipment. Even though the cost of automated equipment has been decreasing, most automated equipment still represents a large outlay of funds, and many managers are not yet convinced that the benefits of the equipment outweigh the costs. Managers are frequently heard to ask, "Why buy a $12,000 word processor when I can get by with a $1,000 electric typewriter?" The expense of equipment is especially significant during the early marketing phase of a new technological advancement—when the vending company is trying to recover the costs incurred in the research and development of the product. As these costs are recovered, and as competition from other vendors increases, the prices of the equipment begin to fall, thus partially offsetting the impact of price as a deterring factor.

Equipment Not User Oriented. Most of the automated equipment introduced during the last 25 years has not been truly "user oriented." Equipment has been cumbersome and complex to operate, inflexible in its operation, and unforgiving of human weaknesses. As a result, users have been forced to change drastically the way they perform their work. In many cases, users are able to get more information with automated equipment, but it is not always the right information, in the right format, or at the right time.

Much of the automated equipment has also resulted in a sort of "assembly-line" approach to performing office tasks, and the work of many employees has become routine and void of real challenge. Consequently, motivation of office personnel has become a significant factor, and turnover rates have increased in many cases.

## Implications for Management

Driven by the needs of managers to make the office function more efficiently and by improved technology, the office of the future movement is pressing forward. The restraining forces tend to slow the movement while human beings and technology make necessary adjustments to each other. Some people see office automation as a paragon to solve all cost, productivity, information, communication and other problems. In reality, office automation is merely a tool that will be only as effective as the managers and office workers who use it.

Adopt Automated Office Systems. Each organization, as a part of its total organizational planning effort, should investigate the feasibility of implementing automated office systems. Strategic planning efforts should produce a long-range planning document which incorporates statements of policy concerning information and its use as a vital resource within the organization. Such strategy development and high-level policy making denote that senior management has an obligation and an opportunity to make sure that the new tools of office automation and information resource management serve the organization's best interest.

The appointment of a member of top management to oversee the investigation and implementation of information processing is vital because the new system will require decisions that affect the total organization and will change the way it does business. Also, very large commitments of resources are likely to be required. The appointed manager will be an information resource person to the senior management councils of the firm. As a generalist, this person will have a relatively small support staff of technologists who provide needed expertise. At the recommendation of the senior management member heading the group, task forces and possibly a steering committee will be appointed as needed.

Based on information obtained by the task forces, recommendations for strategic implementation steps and policy will be referred to the steering committee or to other executive councils or decision makers. The primary point is that regardless of what implementation strategies are used, senior management should assume responsibility for the planned introduction of office automation. The wise management of this process will show great benefits for the organization.

Investigate Real Information Needs. Possibly even more important than the methods of processing, storing, retrieving, and transmitting information is the process of identifying the real information needs of an organization. Some of the pertinent questions are:

- What information is essential for various individuals in the organization?
- What additional information is helpful and should be provided if convenient and not too costly?
- What information can be eliminated?
- What formats and summary levels should be provided for various individuals?
- Where is information needed, and where should it be processed and stored?
- Who needs copies of reports, forms, and correspondence?
- What materials should be filed, and what materials should be destroyed?
- How can information be displayed and highlighted to make it more readable, understandable, and useful?
- When would estimates be adequate in replacing actual figures?
- When are information items needed?

Solid answers provided to these questions by people who use the information provide the basis for any program to manage—not just process—information. Some real payoffs in effectiveness will result to organizations that make a serious effort in this regard. This process is important, but very difficult. One giant oil company commissioned a task force a number of years ago to investigate its real information needs. Soon the group turned away from the question of *what* information is needed to address the more readily answered question of *how* information can be better processed. To date the group has not returned to the more difficult question of identifying its real information needs.

Generally, managers and other personnel should receive only that information for which a need-to-know requirement has been established. Electronic mail systems and office automation in general may tend to move us away from this objective. With new office systems people find that they can communicate more easily than in the past; therefore, they tend to communicate more information, more frequently, more widely. Typically, however, higher level managers need less

information, not more. They need good summary information with a backup of a few salient points. Also, according to management theorist Henry Mintzberg, they tend to rely very heavily on "soft" information. Soft information includes opinions, rumors, feedback on ideas, tidbits about customers and competitors, etc., as compared with hard data such as sales figures, cost of goods sold, inventory volume, and similar financial and quantitative information.

A study to determine the real informational needs of the organization should be initiated. The person appointed to head this task force should be accountable to top management. Line personnel should be involved in the identification of real needs, format, and time requirements for information. The administrative manager is in an excellent position to assume this responsibility.

Organize Administrative Support Teams. A consistent finding among office studies is that managers and professionals spend 20 to 25 percent of their time performing routine clerical activities. These tasks could easily be delegated to an administrative support team member making only one-third the salary of the professional manager. The head of such a support team can work directly with the executive or professional in an administrative assistant capacity. People with various specializations in administrative skills report to the administrative assistant and perform needed services. For example, one person with a combination of business communication, journalism, public relations, and or English skills might be in a better position than the executive to compose a message to stockholders or a letter to an irate customer. Perhaps a person with good library skills might be able to obtain necessary facts or figures needed for a systems proposal, and a quantitative specialist could develop and interpret a needed econometric model.

The use of such support personnel could operate in a manner similar to a surgical team in which each person has highly specialized functions to perform. The highly skilled surgeon is paid to make important decisions and to perform the critical strokes of the scalpel while other team members handle the more routine functions.

Use Proven Management Techniques. The last, and possibly the most important, implication for managers who desire to improve the effectiveness of their operations is to continue to apply tried and proven effective management techniques that have produced good results in the past. Some examples of these programs are management by objectives, job enrichment, team building, motivation procedures, communication techniques, and employee selection. As new personnel approaches, such as quality circles and assessment centers are developed, they too should be investigated.

## Conclusion

Effective management produces results through people. In healthy organizations, employees work hard and do their best because they feel a team spirit and because they want to see the organization succeed. These employees probably have engaged in open, two-way communication with their managers. These employees also have probably been involved in making decisions about changes that affect them. Success is likely to be obtained given this kind of healthy organizational climate with or without automated information processing systems. The ideal is to interject improved and automated systems into such well-managed organizations. ≡

William H. Peterson, "Farm Policy Only Bureaucrats Will Love," *Business Week*, April 23, 1979, pp. 16–17.

Ibid., p. 17.

"Federal Paper Work: As Some Agencies Are Reducing It, Others Are Producing It," *The Wall Street Journal*, Sept. 3, 1979, p. 4.

John J. Connell, "Office of the 80s—Productivity Is the Impact," *Business Week*, February 18, 1980.

**Some people see office automation as a paragon to solve all cost, productivity, information, communication, and other problems. In reality, office automation is merely a tool that will be only as effective as the managers and office workers who use it.**

# Automate the Business Office - how and when?

C.E. WHITE, Executive Editor

## TRADITION IS MORE THAN A SONG

Close questioning of manufacturers involved in production of equipment commonly associated with automating the business office, reveals that acceptance of the changes offered quite often falls on deaf ears, particularly the ears of old-line managers. Whether a manager feels that sitting before a keyboard is demeaning or whether he feels reluctant to put people on his staff out of work, is immaterial. His training was along conventional lines using conventional staffing and, until he is replaced by the coterie of young, ambitious, and electronically-trained would-be managers, resistance to automation will persist.

There should be no surprises here. Wasn't it just about ten years ago that we were told that the home of the future would have many wonders with the advent of cable communications — a daily newspaper printed on the premises, grocery ordering from selected bargain lists on the TV screen, bank accounts manipulated from home keyboards, entertainment and transportation tickets readily ordered via the cable station, etc., etc.? I don't have these things at home, and in business I still refer to my personal reference library for data although I admit to secreting my slide rule when I found my seven-year old grandson performing mathematics on his home pocket calculator.

Let's face it — the old line, although passing, is still very much involved in conservatism and, unless engaged in business functions requiring exchange of voluminous data, cannot justify replacement of human assistants for a cold impersonal machine. Perhaps Brancatelli in his Newsweek article* said the whole thing in the article's title "Automated Office: Affront to Tradition?" Perhaps we should, as his reference sources put it — *make terminals a fringe benefit.* If it's as easy as that, why is it taking (as quoted in the article) Continental Illinois Bank so long to integrate the new technology into its Chicago home office? They started in 1978 and expect the changes to be evolving for 4-7 more years in the future.

According to J.J. Connell[1], there are three areas of concern when viewing the office of the future. These are: 1) productivity, 2) technology, and 3) people. Let's take the third concern first for, as he says:

"... the biggest problem of them all ... is behavioral. Our goal is to improve the productivity of the managerial and professional work force, using the tools of technology to accomplish that objective. The problem is that managers resist technology ... for a number of reasons ... fear of the unknown, fear of looking bad, fear of making errors ... when we talk about the great capabilities available in new office technologies, we find ourselves facing the perception ... that technology inhibits creativity and forces one into a box.

"How can managers and professionals be persuaded to take advantage of the capabilities of new technologies? (They) will accept new systems if they perceive that the system will be benefit them ...

"In many companies, efforts to utilize the capabilities of new technologies to improve office productivity are being stymied, and in some cases have come to a virtual standstill, because of disputes as to who should lead the way. The combatants are EDP personnel versus non-EDP personnel, and word processing is usually the pawn. In the process, the participants in these jurisdictional disputes do a terrible disservice to their companies because, while the battle goes on, the cost of office operations continues to rise unchecked. I believe that once senior management learns of the stakes involved, those who are letting their personal ambitions interfere with efforts to improve office productivity will find themselves out in the cold.

"The second people problem arises from the use of the term *office automation.* It is an unfortunate term because of its implication that we are all going to become automatons. It also puts the emphasis in the wrong place. The goal is not to automate the office. The goal is to improve office productivity, using every tool and every technique we can find to achieve that objective. Further, office automation is being used as an umbrella term to group together certain office technologies like word processing, micrographics, reprographics and embryonic forms of electronic mail. The definition excludes computers and most forms of telecommunications. However, the Office of the Future is one in which all technologies are interconnected and subordinated to integrated telecommunications networks. Establishing separate categories of technologies at this stage may postpone the trauma of facing up to the implications of networks. It also will postpone the achievement of any real benefits from the use of new technologies.

"The third people problem concerns female clerical office workers. In

*"Automated Office: Affront to Tradition," Newsweek, 11 May 1981.

As reprinted from TELECOMMUNICATIONS, July 1981

all of the hoopla during National Secretaries Week about "Raises Not Roses", and "The Pettiest Boss in Town" awards, scant attention was paid to a special report issued in conjunction with the Week's activities. The report, entitled "Race Against Time: Automation of the Office," was written by Karen Nussbaum, executive director of Working Women, of the National Association of Office Workers. It details the concerns of its authors about emerging office technologies and the effects they could have on the clerical and especially the female clerical workforce. Four concerns predominated — jobs, working conditions, career paths, and health. The report contends that the kinds of equipment being developed for the office and the way we reorganize office operations and work assignments to take advantage of the equipment has had and will continue to have an especially adverse effect on the female clerical workforce. I believe that these concerns should not be taken lightly. Various European countries are already legislating work rules to protect office workers from the real or imagined effects of new machines on people and jobs. The same can happen in this country if we do not concern ourselves directly and specifically with the people implications of introducing new technologies into the office."

Where control of the automated office should exist becomes a viable selling point for PABX manufacturers. The trend of these manufacturers, to incorporate electronic mail and data switching functions into future PABX equipment, is noted by many. In a report issued by International Resource Development, Inc.,[2] the linkage between office automation and the PABX was pinpointed thus

". . .one challenge of the PABX market in the 1980's is to introduce new features and functions which will induce users to upgrade equipment frequently. Another challenge is to establish the links with the automated office equipment and new networks which an increasing proportion of organizations will be using in the 1980's. This will require the PABX, if it is to remain the central office hub of office communications, to support such features as electronic mail, store-and-forward switching, high-speed digital transmission channels associated with satellite systems, viewdata and other office data-base systems both private and public, and compression and switching of facsimile signals.

"Some of these functions will be performed within the PABX, while others will be handled by various types of attached logic services (which may be physically packaged with the PABX or plugged in separately). Actually, the major market growth in the 1980's will not be for the PABX itself but rather for these attached-logic elements."

The preceding statement certainly fits the sentiment of the Rolm planning team which looks toward manufacture of peripheral equipment other than the company's standard items, such as copiers and facsimile equipment, as a means of sustaining Rolm's growth.

The PABX solution does not remain undisputed, however, as the control. AT&T speaks of "the system is the solution" with its public switched communications network as the control function. Another solution is that advanced through the Xerox "Ethernet" approach — tie all the equipment into a single coaxial cable. IBM, of course, believes that a computer center within a company should exercise control.

The battle for a solution to control of the automated office will be a vicious and confusing (to the user) one and undoubtedly will once again force into being a hybrid answer.

How about the idea of getting rid of the Yellow Pages? The electronic directory is almost here — but that's marketing talk. The French who are, perhaps, farther along this path than most nations, expect to phase out paper directories by 1991! That, obviously is not just around the corner and most definitely is not an *assured* phase out, particularly since a projection by International Resource Development[3] declares that electronic yellow pages in the US will, in 1990, have taken over only 10% of the regular classified advertising revenues.

## DIAMONDS ALSO COST MONEY

But suppose automation is not held back because of tradition. Suppose for one minute, it's a question of cost. Word processors aren't a grocery-store item — not with prices ranging from $4-12 thousand and up (yes — there are some that are cheaper but they're called electronic typewriters). What of facsimile equipment, and with whom can you communicate when you install one in your small-company office? If you wish to purchase an ultra-high-speed unit, one with a compressed voice band, or just something suitable for Group III operation (and have your competitors intimate that you still use a telegraph key rather than a "modern" stand-up telephone for communication) your budget will find a range of $800 - 15,000 (and don't forget line charges).

Let's discuss cost-effectiveness for a moment. In a study done by and published in two parts by the newsletter *Electronic Mail & Message Systems*[4] the subject of leasing office automation equipment was considered. Benefits and risks of leasing are discussed and the size of the leasing market for office automation and telecom equipment is predicted, starting in 1981 at $1-5 billion and rising to $7 billion in 1990. A solution to costs? Perhaps. However, consider carefully the concluding sentence in the second part of the article: "But the typical results seem to indicate that if a new telecommunications or office automation system won't pay for itself in about forty months, the user is better advised to wait for next year's less expensive model!"

The careful buyer could take heed from an observation made in Siemens Review:[5]

"This increase in efficiency through new forms of communication and information focuses on the office in the business, administrative and scientific sectors. The office is a source, transmitter, communicator, processor, and consumer of information. At present it is already equipped with all types of technical aids to help it run more efficiently. . . new communication technologies can bring about an efficient combination of these aids, and they can be enhanced considerably. Combining communication and information services in one multifunction terminal results in a simpler man-machine interface.

"When new functions are added to an integrated work station, the number of system components increases negligibly because existing typewriter keyboards already possess keys for function selection, and the function keypad will be expanded to allow the selection of communications forms. The flat video display, designed to sit on the desktop, is used for text preparation with correction and editing functions, the input and output texts into memory, and the input and

output of texts to be transmitted. The flat screen is the input/output medium for videotex, interactive videotex, cable television, storing data from the user's own integrated work station, and for departmental or central data-processing systems. Finally, it also serves as the output medium for the picturephone and video teleconferencing, for which an additional camera, microphone and loudspeaker are incorporated into the work station.

"One prerequisite for the introduction of such a system is a thorough analysis of the requirements at the work station. This leads to a proposal for solving technical problems, whereby the basic model is modularly expanded to suit the capabilities required at the work station.

"While the hardware interface must comply with ergonomic principles, the application software adjusts the basic system to suit the requirements of the individual organizational structure."

## REFERENCES

1. Connell, John J., "The Office of the Future Revisited," presented at 25th Annual Conference, Assn Records Mgrs and Administrators, Inc., Boston, MA, 21 Oct. 1980.
2. "PABX, Interconnect and the Future Office Controller," Report #139, International Resource Delopment, Inc., Aug. 1980, price $985.
3. "Electronic Yellow Pages," Report #161, International Resource Development, Inc., Dec. 1980, price $985.
4. "Leasing Telecom and Office Automation Gear," *Electronic Mail & Message Systems*, International Resource Development, Inc., 1 May 1981 and 15 May 1981.
5. Ohmann, F., "Telecommunication in the 1980's," *Siemens Review* XLVII (1980) No. 6.

# A Different Perspective On Office Systems

To augment productivity and performance, it's important to look at spending from a broad view

RAYMOND R. PANKO

*The following has been written not so much to estimate the size of the office systems market as to get a better understanding, through quantitative estimates, of what we really mean by the term "office systems." OS is a vastly nebulous and complicated topic, and only two people are said to understand it thoroughly. One is an analyst at a major university on the West Coast. The other is a lead typist in a small law office in Kansas. Unfortunately, they disagree violently on the issue.*

*Although a great deal of effort has gone into making these estimates as accurate as possible, there are many uncertainties in our calculations, and total figures should be taken as "provisional." To have derived better figures would have been difficult, and in some cases impossible. It seemed best to publish these provisional estimates than wait for more accurate, but also much more out-of-date, figures.*

EVERYONE AGREES that office work is being radically transformed by new information technologies. However, few realize at what cost!

U.S. organizations spent about $120-billion in 1980 on office systems. Approximately $90-billion was spent on hardware and services; the remaining $30-billion was spent on corporate staff expenses to support the hardware and services. With an estimated 38-million office workers in the U.S., this comes to approximately $3,000 per year, per worker—a far higher figure than most sources give.

The $3,000 estimate does *not* include the cost of office space. We estimate that companies spent another $2,000 last year on space for each employee.

If we are already spending so much, a critic might ask, why are we not seeing any impact on productivity? The answer is that we *are* seeing an impact.

During the 70s, the Bureau of Labor Statistics conducted a major ongoing study to measure the productivity of Federal office workers. To the surprise of many, the study revealed that information technology has already had marked impact on Federal office productivity.

The next criticism might be, "If office-systems spending is so big, why does everyone say that it is negligible?" The answer is that few analysts have viewed office-systems spending broadly. Instead, they have focused on flashy, but minor, bits and pieces of the market and have wrongly equated this with the whole.

The broad-end need in purchasing office componentry is to improve the productivity and performance of workers. Spending can be divided into four categories of roughly equal size (excluding office furniture): (1) audio and video communications (telephones), (2) office data processing, (3) systems support labor, and,

finally, (4) there is text processing. Vendors need a broad view of office-systems spending. "Integrated" office systems are appearing, merging voice, text, and data processing. Unless a vendor understands the market, it is likely to design the wrong system or, at least, market the right system incorrectly.

Users, too, need a broad view of office systems due to ever-growing office employment, coupled with unsatisfactory productivity. Integrated office systems will soon require users to develop coherent information technology strategies or face growing equipment incompatibilities.

While office space is clearly a different kind of expense than office equipment, the latter has a large impact on the cost of office space. Open-plan office furniture, for instance, can probably *reduce* the space per worker by about 15 square feet. An added piece of office equipment, on the other hand, may *increase* an employee's space requirements by 15 square feet. Fifteen square feet of office space costs about $250 per year, and effects of this size cannot be ignored when deciding which system to use, or whether the equipment's benefits exceeds its cost.

## INVISIBLE TECHNOLOGY

In most "general offices," one sees only a desk, a chair, a book shelf, and a filing cabinet. These cost about $50 per year. But what about the telephone? It is a small instrument, but it averages $950 per year, and this figure is substantially higher for managers and professionals. There is also a copier nearby that costs per average employee another $220 a year. Now add the expenses of hand calculators, occasional professional computation, electronic mail and postal delivery, and so on, and the total becomes surprisingly large.

Judging from historical growth trends and annual reports, U.S. revenues for telephone companies should have reached $60-billion in 1980. Knowledgeable sources in two telephone companies indicate that 60 percent of all their revenues come from organizations. If nearly all of these organizational telephones are handled by office workers, then office telephone revenues woud be $36-billion in 1980.

The telephone is far from being a mature technology. New switching and transmission techniques continue to reduce long-distance costs, at least in constant dollars. Indeed, the basic services provided by telephone companies are being completely revised.

For example, electronic switching —including customer-premises PBXs—allows three-party conferences and also allows a person to have calls transferred automatically. If the telephone is busy, the system can wait until that phone is free, ringing it as soon as it is hung up.

We are also beginning to see the emergence of the voice message system (VMS). VMS allows you to leave a message, as does a telephone answering system. But it provides greater flexibility—for example, delayed delivery and multiple delivery. VMS may very well completely change telephone communication, making it much more competitive with written electronic mail systems.

## OFFICE DATA PROCESSING

Office data processing (ODP) breaks into two major categories. First, transaction processing systems handle complex multiperson clerical tasks. The fact that COBOL, a transaction processing language, is the most popular programming language in the U.S., attests to the continuing dominance of transaction processing in ODP.

The other category is professional computing. DP professionals (who outnumber managers) have little in common besides their common census classification. Their jobs are highly diverse and specialized. Managers, too, are becoming specialized and differentiated—in short, they are being professionalized.

The computational needs of professionals and managers vary remarkably, and in general, they are quite substantial. These include need for computerized tools, such as MIS, DDS, financial analysis systems, modeling, and inventory control systems.

An International Data Corp. (Waltham, Mass.) survey of DP centers, shows DP center *labor* costs of $28-billion in 1980. Most other large equipment categories, including telephones and copiers, require little internal systems support.

## MORE PAPER

In 1979, U.S. organizations spent $11-billion on office paper. Instead of reducing paper consumption, the computer has actually accelerated paper use. We estimate roughly that DP centers spend about $4-billion each year on paper. Another $3-billion is included in reproduction and other spending categories.

Although sales of text-editing systems are growing, they shoud remain quite small in the future. Secretaries and typists together are only 5 percent of the work force. One study places their total typing chores at 37 percent of the day. Another study, this time of private secretaries only, placed their typing time at only 20 percent of the day. In addition, not all typing chores can benefit sufficiently from text-editing tools to justify the expense.

To fill the gap between regular

## WHAT DOES IT REALLY COST?

- Office furniture—a desk, chair, shelves, and file: $50 a year.
- Each telephone: $950 a year, per average employee.
- Paper copier: $220 a year, per average employee.
- Typical cost of office space (15 square feet): $250 a year.

typewriters—which cost $800 to $1,000—and text-editing units—which begin at $4,000 to $8,000—several manufacturers offer "electronic typewriters," which have limited processing power and typically cost $1,200 to $2,500.

The Yankee Group, Cambridge, Mass., projected 1980 electronic mail revenues at $900-million. This reflects a message volume of 900-million and a cost per message of $1. Volume is expected to grow rapidly in the future, but declining costs per message should hold back revenue growth. For example, the Yankee Group forecasts 1982 traffic at 1.8-billion messages, but the forecast cost per message is only 50 cents, putting total revenues at $900-million—the same figure as was reported in 1980.

There's a problem is deciding where messaging ends and transaction DP begins. Electronic mail traffic is usually dominated by business forms. There is a natural progression over time from memos, to forms, to transaction processing as a process becomes more and more routine over its life cycle. The transition between forms and transaction processing is a tenuous one because many forms ostensibly going directly to people are really, in actuality, going instead to a computer.

In 1979, International Data Corp. estimated the computer-output-microfilm (COM) market at $730-million and forecast that this would double by 1982. COM has the lion's share of the micrographics market. A doubling from 1979 to 1982 would be a compound growth rate of 26 percent placing 1980 revenues at about $900-million. COM is used extensively in transaction processing systems as an archival tool. It's estimated that 25 percent of all computer output already goes onto microform.

**Office systems spending as a whole is growing at about 5 percent annually**

## GROWTH TRENDS

Controlling for inflation, office-systems spending as a whole is growing about 5 percent annually. This is substantially faster than the U.S. economy is growing. In fact, the office-systems industry is one of the star performers in U.S. business.

A 5 percent growth rate, if sustained, would put office-systems spending at $204-billion (in 1980 dollars) in 1990, resulting in 63 percent growth over 1980 spending. During this same period, the office work force will grow about 20 percent giving a net growth per office worker of about 36 percent.

While these growth forecasts are not staggering, they are being added to a current spending rate that is already very large. In addition, the value purchases should grow much more rapidly than total spending, first because many computer prices are falling rapidly, and, second, because applications are growing rapidly in sophistication and usefulness.

Buildings have been excluded from our estimate of the office systems market. But buildings—physical office space—should not be ignored in planning, because new office equipment could change the amount of room needed by a worker.

The sizes of offices naturally vary. We estimate an individual's work space at about 100 square feet. (In an open-plan office, 85 square feet is about average.) To this add about 15 square feet for conference rooms, terminal rooms, and filing cabinets.

The high cost of office space indicates why so many companies are interested in open-plan offices. Reducing space from about 100 to 85 square feet could save a great deal of rent and overhead. And costs are saved whenever office space has to be rearranged.

A new kind of planning is needed within organizations. There must be overall planning and cost control, and the administrative manager's office seems best suited to handling this, as well as attending to personnel and legal matters. DP will have to install the backbone network and handle centralized operations, but care must be exercised in deciding whether the DP staff should be allowed to specify, or even influence, the user interface.

In conclusion, the amount of technology used by office workers is vastly underestimated. Forget about the "Office of the Future." The Office of the Present is already here. □

*Raymond R. Panko is assistant professor of decision sciences at the University of Hawaii's College of Business Administration, Honolulu. Previously, he was a communications analyst with SRI International. Panko has been actively involved for a number of years in the study of office systems and the impact they have on all types of organizations.*

# Viewpoint

## Office automation: from barriers to gateways

*Office automation is a concept with which the majority of executives and senior managers profess to agree but to which few have made a serious commitment. The authors examine the barriers to office automation which may be responsible for the reluctance of many executives to proceed with automating the office. In addition, they offer suggestions for removing the real and perceived obstacles to office automation.*

For the purposes of this article, 'office automation' is defined as the integration of technology with office functions and organizational requirements to improve the productivity of the office and the effectiveness and efficiency of the managerial, professional, secretarial and clerical people who work in it.

Barriers to office automation have been raised in part by misconceptions and misunderstanding, through insufficient background and knowledge, is a result of disillusionment arising from previous experiences with new technology and are, in part, those barriers common to any organizational change. The major barriers to the commitment to and the implementation of office automation technology and techniques are:

- Lack of strategic long-term plans.
- Unsubstantiated productivity improvement claims.
- Lack of technical sophistication.
- Previous failure.
- Cost justification.
- Human factors.
- Organizational structure.
- Existing regulations and policies.

These factors can have a significant impact upon an executive's appreciation of office automation and willingness to pursue its benefits.

### Planning

Office automation is a long-term commitment which represents the integration of organizational methodology, organizational structures and organizational objectives. Just as strategic long-term plans are developed for research, development, marketing, finance and other major aspects of the organization as a sucessful business environment, the principles of long-term planning should be applied to office automation. Without planning, office automation is extraneous to the functions of the organization and will remain insufficiently controlled to realize benefits.

Good management techniques are as essential to the planning and implementation of office automation as to all other aspects of a business. User needs and goals in acquiring technology must be clearly and accurately defined and placed within the strategic perspective of the overall goals and objectives of the organization. The user must identify the reasons for acquisition, the results expected and the priority for implementation. By so doing, the costs and benefits of office automation become quantifiable on the one hand and an integral part of the business planning process on the other.

The several levels of planning which characterize the planning process in other areas must also be addressed in the overall development plan for office automation. Development and implementation strategies for any given organization are dependent upon the scope and function of the organization, the nature of its goods and/or services and the client/customer interface. These parameters and the priorities attached to them will assist the decision maker in determining the optimum introduction strategy and site for office automation based upon the organization and its internal and external environment.

### Productivity

The requirement for productivity improvements in the office is an undisputed fact. However, the realization of productivity gains is a somewhat more elusive entity, especially when a learning curve of about six months is taken into consideration. The actualization of full productivity potential depends upon the familiarity and experienced knowledge of those using the technology. Where automation can replicate existing functions and work patterns as closely as possible and where the automated technology can be 'programmed' by the user, productivity (and acceptance) will be readily forth-

Reprinted from TELECOMMUNICATIONS POLICY, Vol. 5, No. 4, December 1981,

coming.

In its initial phases, office automation was directed at augmenting secretarial and clerical productivity. As the salaries of all office workers continue to rise and to represent a progressively higher proportion of the costs of operating an office, more and more demands, both conscious and subconscious, are being placed upon executives, managers and professionals to increase their productivity. Presently, the pen or pencil is the primary tool of that particular group. Much room exists for enhancing managerial/professional productivity through the use of automated tools such as teleconferencing, electronic mail, filing, scheduling, text preparation and information retrieval.

While it is difficult to measure increased productivity at senior levels, such improvements may be divided into three components. Examples of each of these components are provided in Table 1.

In many cases it may be found that managers will choose the qualitative rather than the quantitative benefits as more significant for the organization.

The only sure way to determine the productivity improvements possible for any given organization is to implement a limited pilot trial for a select group of executives, managers and professionals. A detailed time and motion study should be conducted to determine which automated tools would most benefit the people involved. Choose individuals interested in office automation for the pilot trial to maximize the benefit, noting that even those eager to participate will require learning and adaptability time.

The best proof of productivity enhancement through office automation is that which occurs within the specific organization. A limited field trial–in terms of equipment, personnel, time and money–is a worthwhile investment.

## Technology

Rapid changes and advances in state-of-the-art technology are barriers to office automation. Executives and managers hesitate to implement new technology on the one hand because it is new, and on the other because something newer is promised imminently. This state of flux, in addition to the multitude of products on the market, creates serious difficulties for decision-makers and vendors themselves contribute to the confusion.

To date, the market has been characterized by technology-push rather than demand-pull. It is the prerogative and the responsibility of executives and managers to determine their own office requirements and to specify their needs functionally, not technically. The technology exists. It need not be imposed upon the office and its functions; it can, and should be adapted and integrated to meet the needs of the organization.

A lack of detailed and sophisticated technical knowledge should not be a deterrent to office automation. It is a fact that the leaders in office automation are enlightened administrators, *not* engineers and technicians. And that in itself is part of the reason for the successful integration of office automation. The emphasis is, and rightly so, on the functions of the office or organization and the implementation and application of automated technology to enhance the performance of those functions. And who better understands the functions and the process of the office than the administrator?

This is not to say that engineers and technicians are not an important aspect of both the planning and design of automated applications. They should be consulted to develop the imaginative applications required to fulfill identified needs and to adapt technology accordingly.

## Previous failure

Having been 'burned' in the past, with respect to new technology, some managers may be reluctant to learn about office automation and others will adamantly refuse even to consider it. There are those who will refuse office automation until it has been tested and proven.

Unfortunately, what works for one organization may not work for another. The emphasis must be, and the development of applications depends, upon the identification of the particular functions and requirements of an organization and its place in the whole. Part of this will be developed in conjunction with the long-term planning process but every administrator must identify the functions of the office, how those functions are performed and who performs them. The room for error is negligible if automated technology for the office is designed and implemented to enhance the functions of the office and the people who perform them.

The lesson of many earlier mistakes is the identification of the need to integrate the technology and the functions in order to maximize the potential of both tool and user. Adapt technology to the environment not the environment to the technology. Too many people already know the latter does not work.

## Expense

Having considered other factors and determined to proceed, the executive or manager may find that the capital investment necessary to automate the office is itself a barrier. In addition, faced with evidence of radically decreased and decreasing costs regarding the computer, as the calculator in every pocket exemplifies, many may prefer to wait, believing and not unjustifiably, that the cost of technology will continue to decline. While it is true that equipment costs will drop over the next few years, the costs associated with maintaining the present office are increasing rapidly. One must consider the cost of *not* introducing automation now.

The private sector is automating and the justification is profit. A large company with a substantial catalogue order business recently decided to automate its order processing function. the expense is considerable. The justification is that if the company did not automate it would forfeit the catalogue business entirely because of the costs of perpetuating the existing system, which is both labour and paper

Table 1. Components of improved productivity at senior levels.

| Qualitative | Quantitative | Personal |
|---|---|---|
| Improved access to information | Reduce cost of operating the office | More efficient use of time |
| Better service to client | Study/production/review of more documents | Improved organization of materials & time |
| Improved product | Increase in ratio of number of employees to manager | Greater control and confidence |

intensive.

As office automation occurs, those businesses or organizations ignoring it will be unable to compete. It is not unrealistic to expect that orders, tenders, etc, may be required electronically. Business will be lost if an organization is unable to respond by electronic means. In addition, competitor's costs will be decreasing, in juxtaposition to the increasing costs of the conventional office.

There is a corollary of this for government. If office automation is profitable for the private sector it is reasonable to expect similar benefits in the public sector. As government is required to become more accountable for its activities, as discussions continue regarding a revenue dependent government bureaucracy and as financial and human resource restraints are imposed, government must automate its offices in order to reduce expenditures and maintain, or increase, its level of service to the public.

Dramatic changes in technology and the office environment have dramatic effects upon all the people who work in the office, from the senior executive to the secretary/clerk. Apprehension, fear, anxiety regarding productivity expectations, adaptation to new technology, the possibility of unemployment or job obsolescence and the need for retraining will prejudice many employees while office automation is in the discussion phase. The behavioural dimension of office automation must not be neglected.

A senior executive may vehemently oppose a terminal in his office not because of an objection to typing *per se* but because spelling mistakes will be visible and cause embarrassment. Some professionals may feel that working on a terminal allows management to scrutinize their work during the preliminary stages and would rather that management see only the finished product.

Implementation strategies can be chosen which ameliorate negative reactions and produce positive responses and elicit cooperation and acceptance. For example, pilot test sites should be highly visible and involve personnel eager to use the new technology. Their ease and acceptance will generate willingness and even anticipation to be involved on the part of some of their more reluctant counterparts. Involvement of staff in the decision making and consideration of their requirements to obtain user-friendly technology is part of a successful integration process.

## Commitment

There will always be resistance to change. However, managers who are aware of the human dimension and can anticipate problems before they occur can not only minimize resistance but can actually inspire an appreciation for and acceptance of new technology. Commitment on the part of management, adequate preparation of employees in terms of training and understanding and discussions of the effect upon them, their work and their working environment (such as explanation of career development potential or reassurance of ongoing stability) will create a successful electronic office of the future.

Current organizational distinctions between telecommunications and data processing inhibit the implementation and acceptance of office automation. The perpetuation of such distinctions retards the successful introduction of office technology.

To realize the efficiency and effectiveness potential of the automated office a separate functional outlook is required. Office automation is a concept which utilizes both telecommunications and data processing based upon the functions and processes of the office. Therefore, the successful methodology will be one which identifies, plans and implements office automation as an integration of disciplines. A correspondingly broad perspective is required in the design of organizational structures to complement and enhance this integration.

Enlightened administrators developing both imaginative applications and new management techniques for office automation are realizing the benefits of technology. The concept of the 'information manager' as a leader overseeing the integration of telecommunications, data processing and office equipment technology is one which can create for the office environment the correct symbiosis of function, technology and human interaction.

As a result of office automation some of the tasks performed in the office will change or the time required to perform them will be drastically reduced. Management must be cognizant of these changes and provide new functions or tasks or additional responsibilities for those individuals affected. As people take on new responsibilities, they learn more about the organization and begin to contribute in new areas. This means that managers must prepare career development opportunities for staff as well as identify additional tasks and responsibilities.

## Regulations and policies

Existing regulations and policies can act as barriers to the implementation of office automation. Policies which maintain the organizational distinctions between telecommunications and data processing or regulations which restrict procurement of technology in a manner conducive to integrated systems, networks and facilities may prevent even the most enlightened and advanced executives and managers from accomplishing their goals. While the convergence of technologies is widely recognized, there are no policies which facilitate that convergence. Yet, paradoxically, it is precisely that convergence of telecommunications, computer technology and office equipment which has led to the development of both the concept and the reality of office automation.

For office automation to become viable and cost-effective a period of flexibility and experimentation is required. While executives and managers are nevertheless accountable for organizational developments, activities and expenditures, a relaxation of regulations and policies in order to promote the maximization of office automation should be beneficial over the long term. This is not to say that they should be given *carte blanche*; experiments may be limited to control groups and pilot tests can be rigorously monitored and results analysed from an overall business perspective. Following an evaluation of office automation pilot trials in the institutional setting policies and regulations can be formalized to maximize the benefits of office automation within the goals and objectives of the organization.

As the benefits of the automated office become more and more visible to a greater number of decision makers.

the top-down impetus for automating the office will become increasingly evident. As the barriers to office automation, which have been identified in this paper, are confronted, they will be overcome by conscientious decision makers and their information managers. Awareness of the barriers and potential obstacles to office automation renders them less formidable and the gateways to the successful realization of the automated office are opened.

*Susan L. Baldwin & Gilles P. Rouleau,*
*Department of Communications,*
*Ottawa, Ontario, Canada*

# How To Boost Your Office Productivity

**A refocusing is needed before managers and other professionals can achieve the impressive productivity gains made possible by automated office tools.**

by Wayne L. Rhodes Jr.
Senior Editor

A major study of the performance of managers and professionals in the office concludes that a nationwide productivity gain of $125 billion could be achieved through office automation in five years. Before that happens, however, a redefinition of "office automation" and of the scope and responsibilities of information systems executives is required.

The issue is not automation of offices, insists Harvey L. Poppel, a senior vice president of Booz-Allen & Hamilton Inc., the New York City firm which conducted the research. "It is office productivity through automation," he says. "Anybody who says 'my title is manager of office automation' or 'my subject is office automation' is misdirected. They have a solution looking for a problem. It's the wrong focus. The right focus is office productivity, especially in the knowledge-worker area."

The $1.5 million, year-long "Multi-Client Study of Managerial and Professional Productivity" conducted by Booz-Allen, one of the world's largest market research and management consulting firms, found that managers and other professionals—"knowledge workers"—are spending anywhere from 15 percent to more than 40 percent of their time on "less productive" activities which they consider wasteful. Such activities include doing clerical tasks, finding and screening the "right information," waiting idle while traveling, expediting previously assigned tasks and scheduling and organizing their work. Booz-Allen estimates that by 1985 an average of 15 percent of the knowledge worker's time can be saved through office automation—at least half of that coming in the area of wasteful activities.

**Most extensive study ever**

Booz-Allen's conclusions were drawn from what may be the most extensive study of its kind ever undertaken. The study probed the activities, output, working habits and attitudes of 299 professionals in 15 major US manufacturing, banking, insurance and government organizations. During the past year, nearly a million data elements were compiled. They include 90,000 time samples recorded every 20 minutes by the participants and over 100 person-months of interviews, observations and evaluations by Booz-Allen consultants and systems specialists.

The study's purpose was to determine how well-justified automated office systems can be in terms of boosting the performance of the decision-makers and professional workers in business and government. "Mounting demands on managers and professionals and the impact of inflation could easily push their compensation costs to $1.35 trillion by 1990," Poppel predicts. "However, our study shows that time savings with an opportunity value of close to $300 billion can be realized annually by 1990 through the proper use of automated office equipment and services throughout the private and public sectors. And, the annual opportunity value of time saved by 1985 can amount to $125 billion."

Since the study focused on departments generic to almost every industry, including marketing, personnel, purchasing, operations, information systems, legal and customer service, these findings have wide-ranging implications for businesses and governments in all developed countries, according to Poppel. Moreover, Booz-Allen studied a variety of office situations, ranging from offices where virtually no automation existed to those where very sophisticated stages of automation had been achieved.

In addition to the 15 organizations providing case studies for the project, many leading worldwide suppliers of automated office equipment and services joined in funding the study. They include AT&T, Bell & Howell, Bell Canada/Northern Telecom, Burroughs, Computer Corp. of America, Control Data, Digital Equipment, Dun & Bradstreet/NCSS, Exxon Enterprises, GE, GTE, IBM, In-

surance Systems of America, ITT, NBI, Pitney Bowes, Rockwell/Collins, SBS, Siemens, Steelcase, System Development Corp. and Xerox. None of the suppliers was told the identities of the 15 case studies, Poppel says.

**Focused on support personnel**

Until very recently, most of the major attempts to improve white collar productivity have focused on the clerical and secretarial support group. Such efforts as data processing for transactions and word processing for secretaries have generally sought to improve the productivity of those individuals, Poppel points out. "While approximately $50 billion is spent annually on purchased information resources (computers, communications equipment and the like) to aid clerical and other nonprofessional office workers today, only $21 billion is being spent on similar resources that support managerial and professional productivity," he reports.

While a sizable number of people are employed as clerical workers and secretaries, their total compensation in the US is only about half that eamed by managers and other professionals, he claims. The specific numbers are close to $250 billion for clericals, secretaries and other support people and close to $500 billion in compensating costs for managers and other professionals.

Booz-Allen conjectured that the reportedly small gains in office productivity attributable to automation stemmed from a misplaced focus on support personnel. While it is important to make sure that workers at all levels are operating in a satisfying and productive mode, there has been very little work—at least until recently—that focused on the productivity and the performance of the real heavy hitters in most organizations: the managers who make the decisions and the other professionals who develop products and do a lot of the thought work.

The researchers were concerned not only with the productivity in the narrow sense of the word (which an economist would define as a ratio of outputs derived per unit of input) but also with the quality of what comes out. "You can break that up and talk about quality in terms of the substance of an output," Poppel explains. "In other words, is it thoughtful, does it have impact, is it comprehensive, and certainly, is it timely or is it accurate? In the area of productivity, on the other hand, we're dealing with more quantitative measures—the scope of what's done."

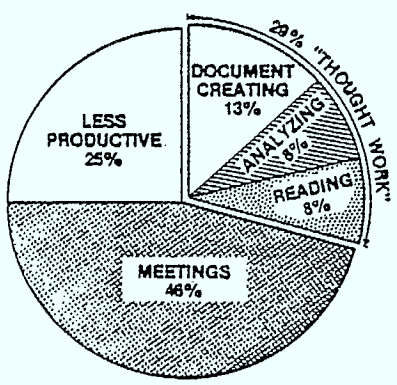
The study revealed that the 299 participants, averaging $40,000 in compensation including fringes, spend about half their time in meetings, a quarter of their time in less productive pursuits and a quarter of their time in what Booz-Allen characterizes as thought work: creating documents, analyzing and reading. Meetings, the most frequent activity, include face-to-face or on the telephone. About 80 percent of the meetings were face-to-face.

The figures become somewhat more significant "when we start to look at the differences that exist between managers and other professionals," Poppel says. "I might add that of the 20.4 million office-based knowledge workers in the US, slightly over half are nonmanagerial people. When you multiply by their compensation, though, the managerial side actually consumes slightly more dollars than the professional side."

Managers spend much more time in meetings. Professionals spend twice as much time in less productive tasks, creating documents and analyzing. Managers use hard copy less. Professionals are heavier users of automated tools. In total, however, Booz-Allen found that the two groups use "professional tools" less than 10 percent of the time. These range from dictating machines and handheld calculators to data terminals and visual aid equipment. Pen, pencil, paper and telephone are still the most frequently used tools.

Interestingly enough, before embarking upon the study, Booz-Allen asked all of its participants to estimate how they spend their time. The firm found that most people aren't very good at estimating how they spend their time. In fact, the exercise produced significant and somewhat consistent variations. For example, the guesses on less productive time averaged out at 34 percent; the subsequent study's average was 25 percent. And it turned out that in 15 out of 15 cases, the estimated less productive time exceeded the actual. The perception on meetings was 29.1

**How Knowledge Workers Spend Their Time—By Activity**




percent and yet the actual was 45.6 percent. Some of the individual estimates were off by as much as 50 percent.

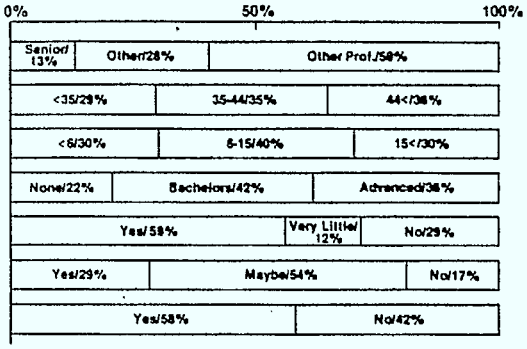
Three opportunities for improvement offered themselves and Poppel emphasizes that it is important to understand the differences among those three. "First of all, there's out-and-out time savings," he says. "One might relate that to the classical definition of productivity. In other words, can we find a way to do what we're doing and just not spend as much time getting there? The second is the quality of what comes out. Is there a better quality out there? And third, from the individual's point of view, will it be something that makes the person feel better about the job? Is he more motivated, more satisfied with the quality of workload?"

Booz-Allen tried to balance and consider all three. Through proper application of systems office automation or automated office tools over the next five years, an average of 15 percent savings in time of the case study groups was achievable, the firm decided. About half of that 15 percent could come from reducing less productive activities.

The other half is derived from savings in the other activities. Surprisingly, meetings are the most resilient, the most difficult to attack. Only 22 percent of those savings come from meetings. Reading also proved difficult to attack. Mainly because even by 1985, the electronic publishing systems required to make reading more efficient will not have matured to the point of providing really large savings, Booz-Allen believes.

The conversion into dollars provides numbers that can grab the hearts and minds of any executive with an eye on the bottom line. In the seven manufacturing case studies, Booz-Allen comes up with a 10 to 15 percent savings on operating income before taxes and dividends. The four finance studies come in at 35 percent and the three insurance cases' savings range from 30 to 50 percent. Although the federal agency does not have income, taxes and dividends per se, Booz-Allen theorizes a 14 percent savings in knowledge workers compensation.

**Profile Of Individual Participants***




* Based on the 285 participants which were interviewed.
** All 299 participants.
*** Based on 253 participants; 32 interviews did not include these questions/responses.

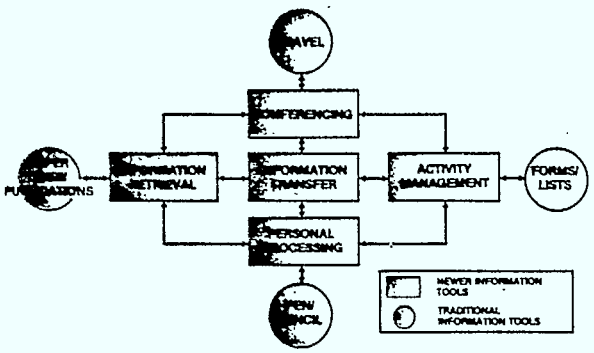
Office automation calls for a redefinition on a broadening scope of responsibility, Booz-Allen contends. This requires information systems executives to develop a strategic direction. Office automation is an area, together with office productivity, that is going to take many, many years to wholly unfold and achieve the full benefits of the deal, according to Poppel. Managers of information systems are going to need new skills in the area of behavioral science, human factors, office methods, personnel and office layout. "If they're smart, they're going to seek the paths of least resistance," he advises. "No organizations I know of will have achieved full potential in five years; it will take at least 10 to 15 years. This doesn't mean to say that they ought not to get started, because there are benefits achievable in the next couple of years." □

# A 'Unifying Theory' Of Office Automation

Office automation is a term bandied about by different people to represent different scopes of the subject of improving office functions. Booz-Allen takes a "wholistic and all-encompassing approach" to the subject. In its "Unifying Theory" of office automation, "we are talking about a wide range of data processing and telecommunications and word processing and reference management tools that can potentially displace other more traditional, paper- and energy-intensive ways of doing it," explains Harvey L. Poppel, Booz-Allen senior vice president.

The accompanying chart, prepared by Booz-Allen, depicts the fact that each type of newer technique can potentially displace an older way of doing things. For example, conferencing—a video conference or an audio conference—is a potential substitute for traveling. Various forms of information retrieval at one's fingertips are substituted for having to dig out information from a paper file or a library of published material. Personal processing in the form of word processors and personal computers is a potential substitute for old fashioned pen and pencil ways of doing things.

**OFFICE AUTOMATION**




There is a class of automated tools Booz-Allen calls "activity management." This includes automated calendars and tickler files. "Ways of tracking information automatically are potential substitutes for forms or lists and other things that we do in order to keep track of our time and the time of others," Poppel points out.

One class of applications relates to communications which some people might conventionally call electronic mail. "We look at it in kind of broader terms to encompass not only facsimile but things like keyboard mail, speech- or voice-activated mail, and other forms of information transfer," Poppel says. "In some respects it is a communications device that can link most of these other types of automated tools together."

It's important in the Booz-Allen scheme of things to look at the classes in their entirety. Not only is each of them perhaps independently substitutable for some traditional form, but collectively one might be substitutable for another. "While we might instinctively ask ourselves the question of should we have a video conference instead of traveling to a meeting, the better question—the broader question," Poppel emphasizes—"is 'Should we have the meeting at all?' If we were able to pull the information out of a data bank through information retrieval or send some messages and get some responses pretty promptly through information transfer, we might not necessarily need to have the meeting in the first place.

"Wouldn't we hold more meetings if teleconferencing were available, cheaper? Wouldn't we invite even more people?!" □

# Implementing Automated Office Systems

BY DR. JAMES C. WETHERBE, CHARLES K. DAVIS and CHARLENE A. DYKMAN

■ The acceleration of the introduction of computer technology into all aspects of industry in the last twenty-five years has continued unabated. Particularly, in the last ten years, the advent of the minicomputer has begun to have important effects.[5] As business competition increases domestically and internationally, the increases in worker productivity that are touted widely as benefits of the use of computer technology become a key focus of industrial management.

Increased capability, availability, and applicability of computing technology have resulted from reduction in the costs and improvement in the efficiency of modern computers. Accordingly, many traditional organizational activities have become candidates for cost-effective support with computing technology. This article is about the "automated office." The changing economics of computers have created new applications of automation in office settings. Automating offices will be a great challenge for MIS professionals and organizations in the 1980's.[13]

Productivity of office workers is currently receiving increased attention. In the decade preceding 1970, blue collar productivity increased 83% due to various forms of automation.[21] During the same period, office worker productivity increased only 4%. Capital investment per blue collar worker averaged $24,000 during that decade. The corresponding figure for office workers is only $2,000. The white collar proportion of the labor force is growing dramatically (reaching approximately 50% by 1980). The costs of operating offices are also increasing (often estimated at 10% of revenues for a large corporation).[21] These figures, while they are only estimates, do indicate that a potential exists for improving an organization's economic standing through the implementation of systems to improve white collar productivity. Not too surprisingly, MIS managers have been advised to keep abreast of this "automated office" technology.[16]

As with other kinds of computer implementations, effective use of office systems applications are lagging behind the availability of potentially cost-effective technology from vendors. This lag in successful implementation is due to two major factors that can be broadly categorized as technological and organizational/behavioral. From a technological viewpoint, there is considerable confusion and misunderstanding surrounding the actual focus, capabilities, and degree of sophistication of the various automated office offerings that are currently available. Similarly, due to the evolving nature of this technology, there are new approaches and new systems appearing continually. Within this proliferation of technology, a fairly wide consensus of opinion about the *basic* functions for office systems is beginning to emerge. Accordingly, a fuctionally based structure of the various office systems is possible.

Beyond understanding office technology and its application, successful implementation of automated office systems requires an understanding of the impact of this technology upon the work done in an office and the organizational and behavioral aspects of the office setting. Organizations are for the most part, not prepared to assimilate advanced computing systems. There are essential educational, organizational, and behavioral dimensions to be considered before attempting the "Office of the Future." The structure of office systems and the organizational and behavioral issues addressed should help organizations to better plan, coordinate, and implement office automation technology.

## Automated Office Functions

The basic operating units for the automated office are "work stations"; they may be any of several types of terminals for interfacing to a centralized mainframe computer or a distributed minicomputer (that may be linked to larger mainframes or other distributed minicomputers as appropriate).

"Office automation" is the latest information systems "buzz word." It is used to describe many different kinds of systems. The underlying concepts tend to be unclear and confusing in practical applications. Thus, it is appropriate to take a functional approach to considering automated office systems. Four categories of functions are discussed in this article.

Reprinted from the JOURNAL OF SYSTEMS MANAGEMENT.

- Document Processing
- Electronic Mail Systems
- Executive Support Systems
- MIS Interface

## Document Processing System

Document processing systems consist of standard word processing applications. Included are correspondence preparation, forms preparation, general text editing functions, an automatic spelling dictionary, and an electronic filing capability. These systems primarily augment the duties of secretaries (and are sometimes confused as encompassing all of office automation).

Correspondence preparation includes formal document preparation for a principal by a secretary, such as letters, memos, etc. This is the "word processing" function. Forms preparation includes a set of electronic video screens that are posted on a terminal as needed. These provide electronic forms for travel, training, personnel action, payroll history, etc.

A powerful text editor is a prerequisite for the creation, formatting, and updating of documents. Vendors have taken numerous approaches to the text editing function, and this area is often the focus of critical evaluation of the systems available. Likewise, an electronic dictionary that can detect and identify misspelled words in the text is an important feature that is fast becoming a requirement on word processing systems.

A storage-and-retrieval system for electronic filing of documents provides facilities for filing standard paragraphs, for filing work in progress documents, and for archival of documents with specified periods of retention.

## Electronic Mail Systems

Electronic mail systems provide facilities for composition of messages, notes, and similar informal communications, a facility for editing such compositions, and the ability to transmit electronic messages to other persons on the automated office system. These systems also include the facilities for printing and distributing these messages through an automated "mail room" facility. Sending capabilities support transmissions to individual addresses, distribution lists, or broadcast to all members on specified mailing lists. Standard messages can also be generated. Finally, a filing and retrieval capability manages the mail that is received, and provides for access to correspondence by author, date, address, etc.

## Executive Support System

Executive support systems consist of a series of on-line, storage-and-retrieval modules and files that support general executive functions with automated services used directly by executives to perform their work more effectively and more efficiently. These systems are presently available with various levels of sophistication. Simple executive support systems are often developed in-house for particular applications. The executive support systems available include calendars, directories, tickler files, and calculator packages.

Automated calendar facilities commonly include three subfunctions: A personal calendar, a public calendar, and a calendar of events. The personal calendar is maintained by the executive to provide a chronology of planned activities. The public calendar is a planning vehicle that allows groups of individuals to be efficiently scheduled for participation in required activities. The calendar of events is another view of the scheduling data that must be tracked and that involve entities external to the department.

The directories are retrievable (and modifiable) lists of key officials, important telephone numbers, and other basic listed data that is of use to the executive. Similarly, the tickler files are lists of projects to be done ("to do" lists), lists of staff assignments and deadlines, and lists of action items that are outstanding. The tickler file allows an executive to schedule future "reminders." These support the executive in project control efforts and assist him or her in tracking progress on work efforts for which he or she may be accountable.

Finally, calculator functions are easily used modules for doing simple arithmetic calculations at the executive work stations. This allows the executive to perform calculations as needed at the same work station that is used for the other support functions.

## MIS Interface

Management Information Systems have, of course, been used prior to the "automated office." However, the automated office concept provides for more tailored local MIS support as well as providing for links into traditional corporate MIS capabilities, such as personnel or operational control systems. Consequently, automated office systems are an extension and an enhancement to existing MIS technology. These systems are sets of on-line computing programs and files that provide the executive with generally routing decision-making information.

Depending on their use, some programs and files may reside on a large-scale centralized computer while others reside locally on a minicomputer. Whatever the physical arrangement of hardware and data, managers are provided, at their work stations, with easy and timely access to information that was previously either unavailable or difficult to acquire. These information systems consist of the following business systems:

*Organizational data systems* consist of records of budgets, personpower, property, and similar departmental accounting or personnel data. This information may have been available to management previously, however, having the key information electronically on file and readily accessible, increases the potential for effective use of the information.

*Decision support models* are sets of programmed models and queries that manipulate current data files regarding business operations or planning forecasts, and that provide a basis for management decisions.

*Program monitoring systems* provide periodic status reports and tracking information for assessing progress of programs of business activities. In the simplest form, these are project management and reporting systems, but they also include business systems for monitoring a wide range of ongoing business efforts.

*Electronic filing systems* entail a simple and convenient facility for indexing, storing, and retrieving documents and correspondence that an executive decides to keep in his or her personal on-line files.

## Summary of Applications

Table 1 provides a list of the basic functions of automated office technology and their primary level of use. It is important to properly define the organizational levels impacted by the proposed automated technology. The economic justifications necessary for successful implementation of this technology differ according to the organizational level (e.g. levels of management, staff, clerical, or secretarial personnel) to be augmented by systems proposed. This is primarily due to differentials in costs and types of work for personnel at different organizational levels and provides a clear rationale for incorporation of the organizational focus into any technical evaluations performed.

## Critical Factors in Automating Offices

Technical evaluation and economic justification are only two steps to be performed in successfully introducing automated technology into the office. As previously discussed, advances in electronic computing technology have made many aspects of the "Office of the Future" possible today; however, there are non-economic considerations that often impede the successful implementation of this technology. Those responsible for office systems implementation must focus on these elements and make the appropriate plans, decisions, changes, etc., to achieve success.

**TABLE 1**
**STRUCTURE OF AUTOMATED OFFICE SYSTEMS**

| APPLICATION | ORGANIZATIONAL LEVEL OF USER |
|---|---|
| DOCUMENT PROCESSING SYSTEMS | |
| Correspondence Preparation | |
| Forms Preparation | |
| Text Editing | SECRETARIAL |
| Spelling Dictionary | |
| Electronic Filing Capability | |
| ELECTRONIC MAIL SYSTEMS | |
| Composition of Messages | |
| Editing of Messages | |
| Electronic Transmission of Messages | MANAGERIAL/EXECUTIVE |
| Standard Message Generation | AND SECRETARIAL |
| File and Retrieval Capability | |
| EXECUTIVE SUPPORT SYSTEMS | |
| Calendars | |
| Directories | |
| Tickler Files | MANAGERIAL/EXECUTIVE |
| Calculator Packages | |
| MIS INTERFACE | |
| Organizational Data Systems | |
| Decision Support Models | |
| Program Monitoring Systems | MANAGERIAL/EXECUTIVE |
| Electronic Filing Systems | |
| Electronic Bulletin Board | |

These decisions differ according to those office functions to be automated as well as factors unique to the organization itself. This relationship is examined in the following analysis with the critical elements to be considered organized into two dimensions:

- Behavioral.
- Organizational.

## Behavioral

Office automation often represents the first direct exposure of office workers to computing hardware and software. It is likely to change their daily work activities. Because of this, successful implementation demands that workers are motivated to use these systems and adapt to the technology and its impact on their work patterns. This motivation is made easier when there is a well designed approach to implementation that considers the systems' impact on work groups, job definitions, and management styles. An overview of these impacts follows.

*Group Structure*—A distinct advantage of office automation is that it will facilitate the communication of work groups. Important information can be easily disseminated to managers and their subordinates for timely action. However, in order for this to be successful, an accurate assessment must be made of the dynamics of such groups. For example, if group structure changes frequently, an electronic mail system should adapt to these changes quickly. System implementers must recognize that such mail systems will reduce the need for face-to-face contact among work group members. For groups where social contact is important, the impact may be negative. Conversely, groups where communication was seriously hindered by distance or time commitments may find communication much easier and control potentially more effective.

The implementation of document processing systems often results in a pooled or clustered approach to typing activities. A group may have previously consisted of a manager, his workers, and a secretary; however, with a pool or cluster, the group will need to rely on several secretaries to accomplish work. Acknowledging such changes and assuring managerial personnel of a high level of service is important in generating their support for the implementation of document processing systems. Likewise, assisting secretaries in adjusting to work inputs from several sources is crucial to successful implementation of a clustered or pooled system.

*Management Style*—Office systems often serve as the foundation to provide information to managers for use in planning, organizing, and controlling activities. As such, developers of office systems must address each manager's approach to these activities. For example, a manager who prefers to make decisions intuitively may not find statistical analyses or summarization very helpful in his decision making efforts.

There is no one best way to design management information systems. Rather, they must enhance and complement the style that an individual manager uses in planning, organizing, and controlling activities. Understanding the way in which each individual performs managerial tasks allows selection and development of systems that closely meet requirements as they exist rather than expecting an executive to significantly change management style and approach to match a new system.

*Job Redesign*—Job redesign or redefinition is a major element in automating office functions. Office automation can be expected to change the nature of daily work within organizations. At the secretarial level, workers will become involved in more technical computing-based work efforts. At higher levels in the organization, daily work activities will change as managers and staff personnel learn to use various information systems that will allow them to make better use of their time and make more informed decisions.

Systems designers must identify the components of each job that will be affected by office systems implementation. Documentation of the changes that will result from automating the various functions and recognition of these changes by reward restructuring, upgrading of work status and titles, and providing necessary support, are key issues to address in this area.[10, 14, 24]

There is a learning curve effect associated with previously non-technical users beginning to utilize newly automated facilities. As a result, employees must be specifically motivated to expend the extra effort needed and supervisors must be ready to accept less than optimal performance in the early stages of an implementation. Effective motivation is more likely if those who are implementing office systems attempt to match the equipment to the work groups that exist, and to the styles of managers. At the same time, job descriptions and remuneration should acknowledge the inherent higher skill levels needed, particularly at the clercial level.

Addressing the behavioral issues discussed will help to limit the demotivating factors associated with changes to work patterns and provide the incentive needed for success.

## Organizational

Organizational level considerations are those attributes which are descriptive of the organization itself rather than particular people or groups within the organization. Research in complex organizations has resulted in an understanding that organizational structure and size, the organizational climate, and the distribution of power within an organization are all significant variables to be considered when major changes are being introduced.[11] The automating of office functions within an organization involves major change and the following analysis illustrates the major impacts that must be anticipated.

*Organizational Structure*—The structure of an organization, centralized or decentralized, simple or complex, highly formalized or more informal will often determine the type of system to be installed. For instance, a highly centralized, simple organization, with formalized procedures may indicate that a time-sharing document processing system across the organization will be best; alternatively, a decentralized complex organization with little formalization may mandate stand-alone systems tailored specifi-

cally to meet departmental requirements.

There is also a more subtle consideration related to organizational structures. The actual management of the process of automating office functions should be located at the appropriate organizational level, normally the highest level impacted by the implementation. This assures that those at the highest management level affected are aware of what is being done and solicits their support of the project. This is crucial for successful implementation.

*Organizational Size*—The size of the organization is most important because of the resources at its disposal for the implementation process.[20] As a result, the cost effectiveness of the various systems and the approach to system design and ongoing support may depend upon size.

A smaller organization may need to use consultants during the design process, contract externally for the necessary training, and use a time sharing service to access organizational data systems and decision support packages. Such an organization may require a smaller volume of documents to be processed, filed, or electronically mailed. With the decreasing cost of computers, many small companies are increasingly capable of cost-justifying office systems. However, it will often be necessary to take a detailed but flexible approach to developing the potentially most cost-effective design with close monitoring of cost savings realized.

A larger organization may have the resources needed for all steps in the process. In such organizations, a specific group may be charged with support and integration of office automation into existing manual and data processing systems. This type of group may be able to consider long-term investments, both in capital and in personnel, and cope with longer term payback issues.

*Organizational Climate*—The climate of the organization, the internal atmosphere of tension, stress, cooperation, warmth, support, etc. affects the successful automation of various office functions.[2, 19] For example, an organization that exhbits a high degree of tension and distrust with little cooperation among organizational members may be impacted negatively by executive support systems that assist managers in tighter control of their subordinates' activities.

As a result, system designers must realize that organizational development and team building efforts may be needed prior to the implementation of an office system. The climate may limit the types of systems which can be successfully installed unless there are serious efforts made to prepare the organization for these systems. The social system, including working groups and worker attitudes, and the technical system, including the facilities provided, training efforts, and user friendliness, should be coordinated for the implementation to be successful.[3, 4]

*Power Distribution*—The various types of power that exist in an organization can greatly affect the implementation of new systems.[9] An organization may be formally centralized with legitimate power existing at a corporate level while informal power may reside within component departments where various operational "experts" may influence the acceptance of the systems implemented. Analysis of this situation indicates that these "experts" must be involved in system design and implementation. The power nodes may not be readily apparent from studying the organizational chart, however, identification and use of the "opinion leaders" has been shown to be crucial to successful implementation of technological innovation.[24]

*Organizational Environment*—Factors that are external to an organization are referred to as environmental factors and there are two major environmental influences to be considered in the implementation strategy for automated office systems. These factors are the competitive environment of the organization and governmental regulations and influence.

The competitive environment raises the issues of competitive advantage to be gained or lost as well as the transfer of knowledge and experience with office systems technology. A planning strategy should concern itself with these issues in assessing office automation strategy. Competitive advantage assessments are concered with identifying those competitors who are gaining or could gain significant advantages by implementing office automation. These advantages could be gained through increased productivity, cost reductions, faster and more effective response to customers, etc.

Additionally, it is important to understand experiences of others with the new technologies. Transfer of knowledge can minimize "reinventing the wheel." When evaluating office automation, it is useful to determine what other organizations, particularly competitors, have done with these systems. Vendors as well as users of office automation are good sources for such information and systematic efforts to learn from others' efforts in this area of technology will be an important aspect of strategic planning.

The second organizational environment factor, governmental regulations will also impact automated office systems. This will be particularly true in areas of communications systems technology, privacy legislation, and antitrust actions against major vendors such as IBM and AT&T. These actions by

government may limit the scope and may change the basic rules for persmissible office system technology.

Accordingly, it is important to systematically evaluate the regulatory situation as it will impact proposed systems. This evaluation should include tariff regulations related to communication capabilities, and restrictions on electronic mail transmissions. Likewise, governmental actions may open new markets. An example can be seen in the approval of electronic funds transfer systems. Systems planners must design flexible systems which can adapt to changing regulations while at the same time predicting these changes in order to position the organiation to take advantage of new opportunities as they become feasible.

## Conclusion

This article has presented the basic functional structure of automated office systems. The focus has been on implementation of these systems and the array of factors that must be considered in planning and executing such implementations. The prime conclusion to be drawn is that, unlike traditional data processing systems, the use of office systems with their technically unsophisticated users at all organizational levels must include careful assessment of many factors outside the actual electronic technical feasibility of office systems. The importance of these factors differs depending on the application being considered. A careful assessment and systematic approach is necessary if successful implementation of these systems is to be reasonably anticipated by office managers. •jsm


### DR. JAMES C. WETHERBE

Dr. Wetherbe is Director of the Management Information Systems (MIS) Research Center and an Associate Professor of MIS in the Graduate School of Business Administration at the University of Minnesota. He has held MIS management and technical positions with Computing Software, Inc., NCR, Houston-Oil and Minerals. He directed the computer center at Texas Tech Univerity and Idaho State University and was on the MIS faculty at the University of Houston. He is widely published in MIS journals and is the author of two texts on systems analysis and design.

### CHARLES K. DAVIS

Mr. Davis is Manager of Customer Services in a large centralized computing and networking facility, servicing M.W. Kellogg Company and several other divisions of Wheelabrator-Frye, Inc. Mr. Davis has held analyst and management positions with IBM, Chase Manhattan Bank, and Occidental Petroleum Corporation. He holds a Bachelor's degree from Oklahoma State University and Masters degrees from Harvard and Columbia.

### CHARLENE A. DYKMAN

Ms. Dykman is Assistant Vice President of Information Services at Houston National Bank (Republic of Texas Corporation). Ms. Dykman has a Bachelor degree from Saginaw Valley College and Masters degrees from Michigan State and the University of Houston. She has served as a data processing systems consultant with the University of Houston and directed office systems reviews and implementations for Pullman Incorporated and many of its Divisions.

# Office automation needs

## Studying managerial work

Raymond R. Panko

**Managerial work stations are expected to proliferate in the near future. But managers have diverse needs. To serve managers well, we must have ways of studying managers, so that we can adapt systems to their individual needs. The author discusses three roads to the study of managers: use-of-time analysis, the analysis of procedures, and the critical success factors approach. The author also raises the issue of how much individualization we can afford and how much users really want.**

The author is with the College of Business Administration at the University of Hawaii, 2404 Maile Way, Honolulu, HI 96822, USA (Tel 808 261-2675).

This article is an edited version of a paper submitted for presentation at the Fifteenth International Conference on System Sciences, Honolulu, Hawaii, January 1982.

In 1981, students at the University of Pennsylvania decided to pit a modern TRS 80 desktop computer, costing about $2000, against ENIAC, which was the world's first electronic computer. ENIAC was built at the end of the second world war at a cost of $400000 (about $2 million in today's dollars). In the contest, both machines were given the same numerical problem: to square all integers from 1 to 10000. There was no competition. The little desktop computer was about twenty times faster than ENIAC.[1]

The price/performance ratio of computers has been increasing by about 25% annually in recent years,[2] and most people expect this trend to continue. If it does, a $3000 desktop computer ten years from now will rival today's $30000 microcomputers. Twenty years from now, when most of us will still be working for a living, it will have the power of today's $250000 'super-minis'.

Today, personal (desktop) computers are comparatively rare. However, according to one recent forecast by the International Data Corporation, the number of desktop computers in the USA will grow from 371 thousand units in 1979 to 3.1 million in 1984.[3] The number of terminals through which managers and professionals can reach computers is also growing explosively. In 1981, there was only one terminal for every 48 US workers; by 1986, there will be one for every ten.[4]

With this kind of power soon to be available, it makes sense to plan very diligently for office work stations. About 40% of the US work force now consists of office workers,[5] and office productivity has been growing by a sluggish 1.3% annually.[6] As processing power becomes cheaper, we should be able to trade off machine costs against people costs to ever greater advantage.

The problem, of course, is that office work is very diverse. Table 1 shows the kind of diversity found among just professional and technical jobs. There is also great diversity among managerial jobs. Many so-called 'managerial' jobs, in fact, are really professional jobs in which the discipline has not been recognized by the Bureau of Labor Statistics. Corporate planning is a good example of this. Furthermore, even 'general' managers find that the type of work they do is highly dependent

[1] Lois Paul, 'First large-scale computer, Eniac, turns 35 years old', *Computerworld*, 2 March 1982, pp 1, 4.
[2] Pretrial Brief for Defendant International Busines Machines Corporation, *United States of America vs IBM Business Machines*, 60 civ. 200-civ. No 72-344 (DNE), 15 January 1975.
[3] "IDC expects "staggering" desktop growth', *Computerworld*, 1 December 1980, p 78.

Reprinted from TELECOMMUNICATIONS POLICY, Vol. 5, No. 4, December 1981,

**Table 1. Professional and technical workers, 1978.**

| | |
|---|---|
| Accountants | 975 |
| Computer specialists | 428 |
| Engineers | 1265 |
| Lawyers and judges | 499 |
| Librarians, archivists, and curators | 202 |
| Life and physical scientists | 273 |
| Personnel and labour relations workers | 405 |
| Physicians, dentists, and related practitioners | 756 |
| Registered nurses, dieticians, and therapists | 1351 |
| Health technologists and technicians[a] | 498 |
| Religious workers | 325 |
| Social scientists | 255 |
| Social and recreation workers | 505 |
| Teachers, college and university | 562 |
| Teachers, except college and universities[a] | 2992 |
| Engineering and science technicians[a] | 985 |
| Technicians, except health, engineering and science[a] | 173 |
| Vocational and educational counsellors | 171 |
| Writers, artists, and entertainers, except athletes | 1092 |
| Athletes[a] | 101 |
| Research workers, not specified | 122 |
| Other | 310 |
| Total professional, technical and kindred workers | 14245 |

[a]not counted as office workers.
*Source:* US Department of Labor, Bureau of Labor Statistics, *Employment and Earnings*, January 1979.

on the kind of organizational unit they are managing. Personnel managers and factory managers, for example, do very different things on their jobs. Finally, managerial styles differ greatly, so even managers with identical responsibilities may approach their jobs very differently.

## Dealing with diversity: alternatives

In our system designs, we must respect the diversity that exists. We must be able to customize our information systems to individual jobs and individual people. Borrowing from Sprague,[7] we must be able to build 'generators'–flexible tool boxes, from which designers can quickly build customized subsystems for individual workers. Otherwise, the cost of customization will be horrendous. But the generator 'solution' only raises another and more fundamental problem–how to decide what to put into the individual's system.

There seem to be two quite different approaches to the design issue. One is to build a limited line of application packages, each designed for a major class of jobs. These 'packaged' products can then be tailored to the extent the user wants them tailored. The second approach is to conduct a detailed analysis of the officer worker's job, so that we can tailor a precise package to begin with.

Most designers intuitively prefer to take the second approach, beginning with a detailed work analysis. There are two reasons to suggest, however, that this might not be the better approach. The first is cost, pure and simple. Most work analysis techniques are simply too expensive to use broadly in an organization. Granted, costs of our current approaches are likely to decrease over time, but keep in mind that the Model T and the early Honda cycles were cheap because they were *designed* to be inexpensive in the first place. Scaling down a large-scale analysis tool may work, but a safer approach is probably to think very hard about how to build an inexpensive work analysis tool from the start.

The second reason to be wary of individual tailoring is that history suggests that most people do not want to bother with tailoring in the products they use. The first colour television sets allowed very fine colour adjustment. Most customers, however, ignored the adjustments and lived with green faces. Finally, the set manufacturers began to make

[4]Lewis M. Branscomb, 'Computer communications in the eighties – time to put it all together', *Computer Networks*, February 1981, pp 3–8.
[5]Raymond R. Panko, 'Perspectives on office work', accepted for publication in *Office Technology and People*.
[6]Charles R. Ardolini, 'Federal sector productivity measurement', *Selected Papers from the North American Conference on Labor Statistics*, pp 49–53, Boston, MA, 18–21 June 1979. Data are for all federal workers, not just office workers.
[7]Ralph H. Sprague, Jr, 'A framework for the development of decision support systems', *MIS Quarterly*, December 1980.

automatic colour adjustment. It was never very good, but neither was it ever very bad. In microwave ovens and 35 mm cameras, too early designers overshot the mark and built equipment too intricate for most people. Not until Canon's simple, cheap, and automatic AE-1 did the 35 mm camera really explode in the marketplace.

We have already seen a strong user requirement for KISS ('Keep it simple, stupid') in the office products market. In a study of electronic message system users, for example, managers were found to fall into three major categories.[8] About a sixth made extensive use of filing, editing, and retrieving functions for their mail. Another sixth rarely did. The rest delegated terminal work to their secretaries. It should be noted that the delegators *liked* the system's end results. They just saw no real benefit in using any of its features. In comparison, most EMS system designers have tended to be heavy and sophisticated users. And most of their feedback comes from heavy users. Unless extremely vigorous and forceful efforts are made to design systems to suit all market segments, the 'light majority', who should be the prime design targets, are usually overlooked.

In word processing, which today contains the best examples of good office products design, current systems are much *simpler* than earlier systems. Sometimes they can do things earlier systems could not, but these new features are almost always very simple to use. Any programmer who wants to develop products for office workers should first look at the IBM Display writer, the CPT 8000 and other popular word processors to see the kind of elegant simplicity that marks successful office products.

In general, well designed office products seem to anticipate what users will do even before the user knows. In fact, there is a lot of truth behind this impression. Well designed systems are based on careful studies of what people do and in what order they do things. Then, designers follow three simple rules:

- The user must be able to do simple things simply.
- All frequent sets of actions must be handled elegantly.
- Your competitors are probably smarter than you; study all competitive products and use their best insights when possible.

In perspective, the amount of power and tailoring a user wants probably depends on two things: how important the system is in his or her work and how much he or she likes to tinker. If you need a system three or four hours per day (if you are involved mainly in records management work, for example), then you are much more likely to demand customized functions. Even then, surprisingly, many people never learn the full range of sophisticated features of their systems. Few people, in turn, who use a system for only half an hour per day find it worthwhile to do 'fancy' things with the system. While there are some tinkerers among the light users, they do not seem to be in the majority, and there are even serious doubts that tinkerers are really being more productive by using the system in a heavy and sophisticated manner.

Whether the full-tailoring or limited-product-line approach ultimately wins out, excellent tools are still needed to study managers. Under full tailoring, we must understand each person in detail. Under a limited-product-line approach, we must be able to design our product line very intelligently and understand how much alteration different market segments will desire for any given product.

[8]Raymond R. Panko and Rosemarie U. Panko, 'A survey of EMS users at DARCOM', *Computer Networks*, March 1981, pp 19–34.

[a] Respondents were both managers and professionals.
*Sources:* Rosemary Stewart, *Managers and Their Jobs*, Pan Books, London, 1967; Thomas Burns, 'Management in action', *Operational Research Quarterly*, Vol 8, No 2, 1957, pp 45–60; James Horne and Thomas Lupton, 'The work activities of middle managers – an exploratory study', *Journal of Management Studies*, Vol 1, No 2, 1965, pp 14–33; R. Dubin and S.L. Spray, 'Executive behaviour and interaction', *Industrial Relations*, No 3, 1964; J.D. Croston and H.B. Goulding, 'The effectiveness of communication at meetings: a case study', *Operational Research Quarterly*, Vol 17, No 1, 1967, pp 45–47; Henry Mintzberg, 'Managerial work: analysis from observation', *Management Science*, Vol 18, No 2, October 1971, pp B97–B110; A.W. Palmer and R.J. Beishon, 'How the day goes', *Personnel Management*, 1970; Notting, reported in Sune Carlson, *Executive Behavior*, Stomber, Stockholm, 1951; Wayne L. Rhodes, Jr, 'How to boost your office productivity', *Infosystems*, August 1980, pp 38–42.

**Table 2. Managers' use of time.**

| Study | No of subjects | Percentage of working day: Face-to-face meetings | Telephone | FTF plus telephone | Reading writing | Total Communication |
|---|---|---|---|---|---|---|
| Booz-Allen & Hamilton[a] | 299 | – | – | 46 | 21 | 67 |
| Stewart | 160 | 54 | 6 | 60 | 28 | 88 |
| Burns | 76 | – | – | 52 | 24 | 76 |
| Horne and Lupton | 66 | 54 | 9 | 63 | 24 | 87 |
| Dubin and Spray | 8 | 55 | 6 | 61 | 5 | 66 |
| Croston and Goulding | 6 | 56 | 7 | 63 | 18 | 81 |
| Mintzberg | 5 | 64 | 6 | 70 | 20 | 90 |
| Palmer and Beishon | 1 | 54 | 6 | 60 | 15 | 75 |
| Notting | 1 | – | – | 59 | 17 | 76 |
| 'COMPOSITE' | – | 50 | 6 | 56 | 24 | 80 |

This article surveys tools that are now being used to study office work. There are, of course, many more tools available. In particular, there have been extensive studies of how scientists and technologists use various information sources and even empirical studies on the relationship between a professional's performance and his or her use of information. The three approaches that have been selected for review in this article have been included primarily because they are the most frequently used in the study of office work.

## Time studies

Perhaps the simplest way to study managers is to observe them and record what they do with their time. This way, we can at least identify major activities and perhaps pinpoint some minor activities. As shown in Table 2, the analysis of managers' time is not a new activity.

From the summary data shown in Table 2, it is clear that most studies are in strong general agreement. Managers spend most of their day communicating–a quarter of it reading and writing, 5% or so on the telephone, and half of the day in meetings of various sorts. It is no accident, then, that communication support is now a major preoccupation of system designers.

Of the studies shown in Table 2, probably the best known is that by Mintzberg.[9] Unfortunately, Mintzberg used only a microscopic sample of five managers. Furthermore, he studied chief executives only. Other studies (cited less often) have demonstrated that use of time varies greatly according to managerial level. Lower-level managers spend a great deal less time in the chaotic communication-on-the-fly mode observed by Mintzberg, more time in thought and analysis.

Use of time studies pinpoint the need for improved communication services–telephone service, electronic message systems, dictation systems, reading enhancements, and so on. But few have analysed the 'residual' non-communication category in any depth.

Thus the Booz, Allen and Hamilton study[10] is notable for its attempt to look beyond communication, at what it called 'less productive' activities–things that either waste time completely or that could be delegated to lower-paid employees. These less productive activities accounted for 15–40% of the work day in the organizations studied. They included 'doing clerical tasks, finding and screening the "right information", waiting idle while travelling, expediting previously assigned tasks and scheduling and organizing their work'.[11]

The Booz study also examined the use of 'professional tools', such as

[9] Henry Mintzberg, 'Managerial work: analysis for observation', *Management Science*, Vol 18, No 2, October 1971, pp B97–B110.
[10] Wayne L. Rhodes, Jr, 'How to boost your office productivity', *Infosystems*, August 1980, pp 38–42.
[11] *Ibid.*

[a] 3132 time samples.
*Sources:* 'An operations research study of the scientific activity of chemists', Case Institute of Technology, 1958; John R. Hinrichs, 'Communication activity of industrial research personnel', *Personnel Psychology*, Vol 17, November 1963, pp 194–204; Klemmer and Snyder, cited in J.E. Carlin, 'Human factors research – some recent findings and future problems', Proceedings of the Fifth International Symposium on Human Factors in Telecommunications, 1970.

**Table 4. The secretary's day.**

| Category | % of time |
|---|---|
| Face-to-face | 9.8 |
| Telephone | 10.5 |
| Typing | 37.0 |
| Other paperwork | 33.0 |
| Mail handling | 8.1 |
| Filing | 7.4 |
| Copying | 6.2 |
| Proofing | 3.9 |
| Collating and sorting | 2.6 |
| Calendar | 2.6 |
| Pick-up and delivery | 2.0 |
| Other | 7.2 |

*Source:* See text, Engel *et al*, Ref 14.

**Table 3. Scientists' and technologists' use of time.**

| Study | No of subjects | Percentage of working day: Face-to-face meetings | Telephone | FTF plus telephone | Reading, writing | Total communication |
|---|---|---|---|---|---|---|
| Case Institute | 1500 | – | – | – | – | 53 |
| Hinrichs | 232 | 29 | 6 | 35 | 26 | 61 |
| Klemmer and Snyder | [a] | 35 | 7 | 42 | 26 | 68 |
| 'COMPOSITE' | – | 30 | 7 | 37 | 26 | 63 |

calculators, audiovisual equipment, dictation, and computer terminals. It found that these are used for less than 10% of the average office-based knowledge worker's day. It also noted that this average worker spent about 8% of the day analysing.[12]

Other office occupations have also been studied with use-of-time techniques. Three studies of professionals are summarized in Table 3. They indicate that professionals also spend a great deal of time communicating, although less time than managers. Secretaries, surprisingly, have not been well studied, at least in any project of which the results have been published. Naremco's famous study,[13] for example, which found that secretaries spent only 20% of the day typing, was a study of private secretaries only, so its general usefulness is in doubt. Engel *et al*,[14] in turn, asked general secretaries to *estimate* how much time they spent on each task; estimation has been found to be inaccurate in a number of studies. Nevertheless, since that by Engel *et al* is the only available study of general secretaries, it is included as Table 4. I have not found a public study of sales workers.

The main problem with use-of-time studies is that they tend to fall far short of what we need to tailor systems. We need an extension of the methodology to understand the individual activities we have identified.

One possible extension is benefit-deficiency analysis, taken from consumer market research. Some time ago, Texize wished to understand the market for home cleaning products in considerable detail. So it surveyed 500 housewives with at-home personal interviews.[15] Each respondent was asked to remember their chores from the previous day. One of these chores was then selected at random. This process, barring the problem of memory, was designed to give a random sample of use occasions, because benefits are obviously tied to what was being cleaned.

The respondent was then given a list of benefits that might have been desired on that occasion and were asked to rate how strongly each benefit was desired. Next, respondents were asked to rate the extent to which the benefit was *not* satisfied. This was done to identify benefit-deficiencies, not just use occasions or benefits alone. Texize realized that to make a product sell, one has to solve real problems that are not being solved by other products. The end result of the study was a strongly perceived need for a product that would cut grease effectively. Later, Texize introduced *Grease Relief*, a very successful product.

This simple example is designed to that use-of-time analysis is really only a first step in analysing office work. We probably have enough general studies of time use in offices. If the technique is to be useful in the future, it will have to be greatly extended.

## Analysis of procedures

A great deal of office work consists of procedures – series of steps that

[12] Stewart (Rosemary Stewart, *Managers and Their Jobs*, Pan Books, London, 1967) also found that about 8% of the day was spent in calculations.
[13] Harold Tepper, 'The private secretary: a company liability', *Management Review*, February 1973, pp 22–42.
[14] G.H. Engel, J. Groppusa, R.A. Lowenstein and W.G. Traub, 'An office communications system', *IBM Systems Journal*, Vol 18, No 3, 1979, pp 402–431.
[15] James H. Myers and Edward Tauber, *Market Structure Analysis*, American Marketing Association, 1977.

must be completed in some basic order, perhaps by a single person, perhaps by many people. Automating such procedures is likely to bring considerable productivity gains. In fact, it already has. Procedural automation systems are now used extensively in every large and medium-size corporation. In 1948 when we first began computerizing them, they were called 'office automation' tools.[16] Today, for some reason, we exclude them from the definition of office automation, despite the fact that they are clearly tools for office work and are still done by office workers. What do we call them today? Data processing. Nearly all DP applications in business are designed to automate procedures for office work.

In the last generation, DP applications have matured greatly. The large applications are far more sophisticated and powerful. We have seen the emergence of powerful techniques for analysing office procedures, programming tools for building certain classes of applications, and even techniques for designing packages to fit common applications in a way that is attractive to users. Packages for many common applications are even available today for small offices, thanks to small business systems that use minicomputers and microcomputers.

Now we are beginning to attack the problem of small scale and infrequent clerical applications, the kinds too specific and uncommon to generate a market (at least today) for packages. A number of tools for studying, modelling, and programming these specialized procedures are now being created.[17]

Before we can model or program, of course, we need data. The standard procedure manual for an office is often a surprisingly good starting point if it is a decent manual. Even if it is more ignored than followed, it generally indicates major problems and general approaches, as well as specific exception problems.

The next step is to interview people who work in the office to see what they really do. Having studied the procedure manual, we are likely to understand their work better, so that we can quiz them intelligently on what they do in known exception cases, and ask them specific probing questions on why they do in known exception cases, and ask them specific probing questions on why they do not follow the procedures manual in certain instances.

One problem with interviewing people is that there are certain things that are frequently overlooked. Holzman and Rosenberg[18] have called these 'shadow functions'. They seem to come in two major categories. First, there are things so routine that they become invisible and are overlooked in interviews. Second, there are exceptions when the basic system 'breaks down'. These frequently go unreported, even when they consume a great deal of time.

After the data have been collected, the next step is deciding how much to program. The basic flow is usually simple and easy to program. But there are usually many exception conditions that lead to secondary branches in the work flow. And every system has 'break downs' in which the programmed flow fails–for instance, if an important piece of information needed to do some step in the procedure is missing.

One approach to handling the complexities of office procedures is to build a fairly simple prototype. This prototype is put into operation (as a back-up system) and then modified as needed. Prototyping fits one of the most troublesome problems in creating systems: the fact that knowledge of user needs tends to evolve even after diligent search. Prototyping is not always possible, but the growing number of 'applications generator'

[16]George R. Terry, *Office Automation*, Dow Jones-Irwin, Homewood, IL, 1966.

[17]For a slightly dated but excellent survey of tools for modelling and programming, see Clarence A. Ellis and Gary Nutt, 'Office information systems and computer science', *Computing Surveys*, Vol 12, No 1, March 1980, pp 27–60.

[18]David L. Holzman and Victor Rosenberg, 'Understanding shadow functions: the key to system design and evaluation', Workshop on Evaluating the Impact of Office Automation, Xerox Palo Alto Research Center, Palo Alto, CA, 13–14 May 1976.

software packages make prototyping and adaptive design relatively simple.

A caution should be added at this point. In much recent literature on procedural automation, an implicit assumption seems to exist that office work is largely procedural work. But consider what happens when a new office is created. At first, every problem is handled as a unique crisis. Later, as experience grows, certain problems are seen to be recurrent; effective and efficient procedures are usually created to handle them.

Even in the long run, however, not everything can be procedurized. Many problems must be solved individually or by general hueristic search strategies ('Why don't you look through the *xyz* file and see if anything there helps?'). There is sometimes a real danger that computerizing major procedures will destroy access to files needed for one-of-a-kind and hueristic problem solving.

In the end, office work is practical action,[19] that is, an environment in which goals have to be met and problems solved 'any which way you can.' Procedures are useful and desirable where they are appropriate, but they still constitute only one weapon in the office worker's arsenal.

Again, a basic question is how much complexity is really desirable. As discussed above, a simple system that handles basic things well may be more acceptable to users than a powerful and sophisticated but complex tool. Power that goes unused is meaningless, expensive, and often daunting to users.

## Critical success factors

One of the most discussed techniques for studying managerial work is based on the idea of 'critical success factors' (CSFs) a concept invented by Daniel[20] and popularized in the MIS area by Rockart.[21]

The idea is simple. As Drucker has pointed out so eloquently in his book *The Effective Executive*,[22] we must focus not on individual tasks but on the external contributions that tasks are designed to generate. An office exists to solve some problem, provide some information, or give some direction to other parts of the firm. An effective executive, Drucker notes, constantly asks what he or she could be doing to improve the overall performance of the firm. In the parallel language of CSF theory, every person or department has a relatively small number of critical success factors that will probably bring success if executed well and that will probably guarantee failure if not executed well.

The problem with traditional management information systems is that they merely provided predigested accounting data to managers. They never asked whether the reams of data really served some pressing need (pertained to a CSF). *Nor* did they ask whether they were serving all the CSFs of individual managers.

In the CSF approach, you either begin with goals (say, MBO objectives) or CSFs, depending on whom you talk to. If you begin with goals, you then identify CSFs for each. If you begin with CSFs directly, you define CSFs for that manager's job in total. In either case you create a *limited* set of critical factors for each manager and group. The world 'limited' is the key one. If there are too many CSFs, the manager will effectively have too little guidance on how he or she is to allocate time and resources.

The next step is to identify what information must be supplied in the support of each CSF. (Other resources have to be supplied, too, but that

[19]Lucy A. Suchman, 'Office procedures as practical action: theories of work and software design', Workshop on Research in Office Semantics, Chatham, Cape Cod, MA, 15–18 June 1980.
[20]D. Ronald Daniel, 'Management information crisis', *Harvard Business Review*, September–October 1961, p 111.
[21]John F. Rockart, 'Chief executives define their own data needs', *Harvard Business Review*, March–April 1979, pp 81–93.
[22]Peter F. Drucker, *The Effective Executive*, Harper and Row, 1966.

**Table 5. Critical success factors for one manager (chief executive officer of a major oil company).**

| |
|---|
| Decentralize organization |
| Improve liquidity position |
| Improve government/business relationships |
| Create better social image |
| Develop new ventures |

*Source:* See text, Rockart, Ref 21.

is not our consideration here.) Now ways have to be found to measure whether each CSF has been satisfied. The last step, of course, is to measure the attainment of the CSFs and reward or punish the manager accordingly.

Table 5 is a CSF plan for one manager. Note that only some of the information needed is computerized. As use-of-time studies indicate, managers and other office workers obtain much of their critical information verbally.

The CSF approach is supposed to be superior to traditional management by objectives. MBO tells the manager what to do but not how to do it. MBO measurement may give us 'lagging indicators', which may only indicate trouble after the situation is very bad. CSFs, in turn, give the manager guidance in what sub-objectives to focus on to achieve the main objective. They also help the manager's superior to monitor partial progress. In practice, the gap between MBO and CSF is more subtle than this. Most MBO programs deal with partial objectives that build to a larger objective. Perhaps the greatest contribution of the CSF literature is its stress on finding those *few* things that will really make or break a manager or office when working toward goals.

Because the CSF approach was designed for the MIS environment, it has traditionally focused on the *information* that managers need to achieve their critical success factors. But in future systems, office workers will also be given *processing tools* to help them achieve their CSFs.

The Massachusetts Institute of Technology has been working to combine CSF thinking and procedure analysis into a full tool for studying office work. The MIT approach is called 'Office Analysis Methodology' (OAM).[23] It is currently evolving from a loose collection of ideas and intentions into a full and specific methodology.

## Conclusion

Overall, we have a long way to go in understanding how to analyse office work. Our current tools solve only parts of the problem. They are also too expensive. We do not even know how much we need to tailor our systems.

Despite such discouraging conditions, the analysis of office work is probably the most critical contribution we can make to the future of office automation. The work already done indicates glaring weaknesses in past approaches to office automation. For too long, we have focused on secretaries, and then on parts of secretaries' jobs. For too long, in addition, we have cherished absurd notions of what managers and professionals do. Unless we can destroy many myths quickly and make progress in other areas fairly quickly, the billions of dollars that firms now plan to spend on office systems in the next few years have little chance of being spent wisely.

[23] Marvin Sirbu, Sandor Schoichet, Jay Kunin, and Michael Hammer, *OAM: An Office Analysis Methodology*, MIT, Laboratory for Computer Science, October 1980.

# Fighting the Paper Chase

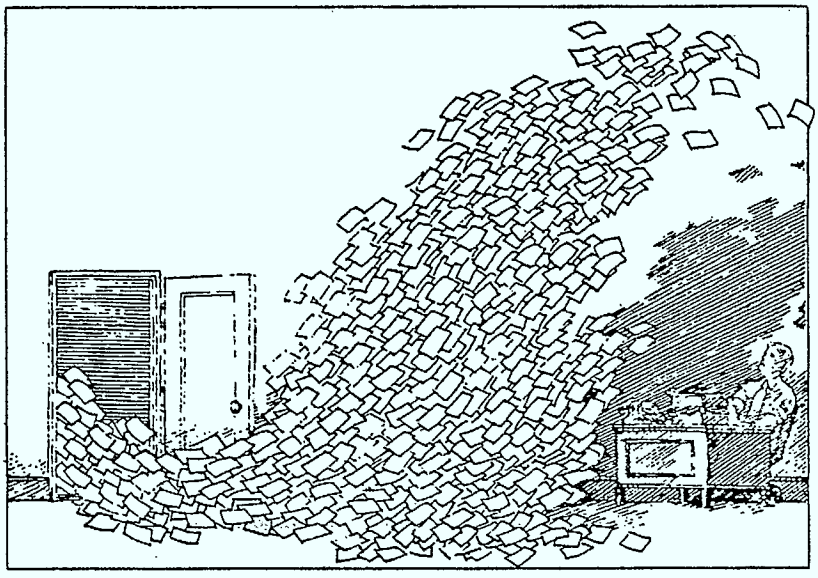
*Companies look to office automation to boost white-collar productivity*

The executive is paid to think, to decide and to manage. In fact, he spends much of his time doing anything but that. All too often, he finds himself buried under paperwork, endlessly returning phone calls only to get a busy signal or no answer, or simply waiting for late reports. The struggle to boost sagging American productivity has usually centered on the shop floor and on ways to make men and machines work faster. But businessmen should be spending just as much time looking into their administrative offices and executive suites. There, some of the biggest bottlenecks of all are to be found among the 52 million American white collar workers.

With U.S. business continuing to shift further and further away from basic manufacturing, which now accounts for less than 25% of G.N.P., and toward service-type fields such as law, accounting, tourism and finance, armies of white collar employees have become indispensable to the conduct of business. Last year, workers, ranging from clerks to chief executives, earned more than $760 billion in wages and salaries, or more than 25% of the total output of the economy. Getting control of that skyrocketing cost, and making sure that the money is well spent, has become one of the most critical challenges facing business today. Says Donald N. Frey, chairman of Bell & Howell: "The decade of the '80s is going to be very much concerned with improving white collar productivity."

Measuring the efficiency of office employees is difficult, and trickier by far than merely monitoring the output of a plant making automobiles, refrigerators or shoes. In the world of the white-collar worker, measurements that focus on such things as simply increased output in the office are just not relevant. Turning out more reports that do not get read may decrease rather than increase office productivity. On the other hand, by entering just about any American business office it is easy to see that hours are being poorly used or frittered away.

A 1980 study by the Booz Allen & Hamilton management consulting firm found, for example, that business managers often spend no more than 29% of their time on actual "thought work" such as reading, creating documents and problem solving. More often, the workday gets drained away in such time-consuming and distracting activities as arranging meetings and conferences, searching for information, and waiting for the preparation and delivery of reports and studies.



The basic office structure has changed very little when compared with the rest of U.S. business. Xerox quips in an ad that the businessman of 1981 would feel right at home in an average 19th century office furnished with such "modern" inventions as the eraser-tipped pencil, patented in 1858. The level of capital equipment is also much lower than in a manufacturing facility. A blue collar worker today is backed up by $25,000 in machinery, while a white collar one has only $2,000 in equipment at his or her fingertips.

From this inefficiency is now blossoming a whole new industry, producing a steady stream of exotic-sounding electronic and computer-based office machines. The companies that make and market the gear range from office-product giants as big as International Business Machines (1980 sales: $26 billion) to Altos Computer Systems of San Jose, Calif., an aggressive young microcomputer manufacturer that has been in business for less than five years and already has racked up annual revenues of $60 million in the current fiscal year.

Two weeks ago, the Wang Laboratories of Lowell, Mass. (1981 revenues: $856 million), announced the introduction of a new system that supports as many as 24 separate word- and data-processing terminals and can receive information by actual telephone voice command. Days earlier, the Hewlett-Packard Co. of Palo Alto, Calif., a leading computer manufacturer, announced its own entry into office automation by unveiling 20 new state-of-the-art products.

The firms are storming into a market that last year produced revenues of approximately $4 billion and may increase by 40% to 45% in yearly sales gains through 1985, a rate that dwarfs almost every other sector of U.S. business. Says Sanford Garrett of the New York investment brokerage firm of Paine Webber Mitchell Hutchins Inc.: "What you are dealing with is a market measured literally in hundreds of billions of dollars on an annual basis."

Already, companies everywhere are experimenting with some form of office automation. Earlier this year, Atlantic Richfield Co. of Los Angeles, the nation's eleventh largest industrial concern, installed an elaborate $300,000 system of Xerox-designed word processors linked to a central memory bank. The system enables professionals in the company's corporate systems department to type and send memos among themselves as well as prepare their own reports and even store and retrieve research. Not only has this saved time and effort by file clerks and administrative assistants, but the entire department of 95 now functions smoothly with only five secretaries, a 1-to-19 ratio that compares with a 1-to-5 relationship throughout the rest of the corporate offices.

Aetna Life and Casualty Co. of Hartford, Conn., the nation's largest diversified financial organization, has already installed upwards of 7,000 desk-top

word and data-processing terminals for its 38,000 employees, approximately a 1-to-5 ratio that the company expects to boost to 1-to-2 by 1985. Competitor John Hancock Mutual Life Insurance Co. of Boston has spent $1.5 million on office automation. Company vice presidents now sometimes can be seen using the machines on their secretaries' desk tops during lunchtime and after-hours. Says William Boyan, executive vice president of corporate operations: "You are able to make better-informed decisions quicker. When we get equipment into the hands of people who report to me, filing will be reduced by one-half."

The pitfalls of office automation, though, can be as great as the promise. Companies that automate with planning and foresight enjoy leaps in output, while those that rush blindly into the uncharted world of the office-of-the-future come soon enough to regret it. Adding word processors and an electronic mail system to a department filled with middle managers might simply boost their output of pointless memos or reams of undigested numbers, thereby actually adding to company overhead instead of paring it back. Says a staffer at Apple Computer Inc., a leading manufacturer of personal computers: "We found ourselves generating hundreds and hundreds of pounds of papers until top management decided it wanted fewer numbers and more thoughts." On the other hand, a study by the General Accounting Office on office automation within the Federal Government found only isolated increases in productivity resulting from the purchase of word-processing machines, largely because the equipment was not sensibly and widely used.

The fact is that many firms make the mistake of automating without a long-term strategy and a comprehensive plan of what they want to accomplish. The purchasing department may have needs entirely different from those of finance and accounting, for example, and only after it is too late does the company discover that it has installed different procedures or totally incompatible machinery in the two departments.

Though office automation is already making large strides among clerical and lower-level administrative workers, the real gains seem destined to come from getting professional and management personnel to use the new equipment. And this is likely to take place before too long. Says John F. Cunningham, executive vice president of Wang Laboratories: "Of top management in the FORTUNE 1,000, less than ½% today use office automation equipment themselves. By 1991 the figure will probably be 50%." Adds Robert Morrill, vice president for marketing at Prime Computer Inc. of Wellesley Hills, Mass., a leading office products concern: "We sense an explosion of interest from engineers, financial analysts and market planners. We are focusing on the productivity of the professional as opposed to that of the clerical. It is an untapped market where there has been little real productivity gain since the dictating machine and the telephone."

Many managers, though, still resist the idea of a computer terminal on their desks. Some feel threatened by the sheer unfamiliarity of the new technology, while others wonder whether an automated office will really help them to do their jobs better or faster. Says John McCarthy, assistant vice president for office systems at First National Bank of Boston: "There is no device yet on the market that addresses genuine executive functions." A survey of business managers earlier this year by a subsidiary of the Dennison Manufacturing Co., an office products firm in Framingham, Mass., found that many regarded computer-generated planning data as simply too detailed for the sorts of strategic decision making required of executives. Said one insurance executive: "The way computers are applied today is like using the space shuttle for home milk delivery."

Thus the major problem of office productivity is to develop machines that are easy to operate. Many executives are dismayed to learn that a computer is harder to use than a telephone or food processor, and are quickly discouraged when the device does not instantly perform as wished.

Studies show that one effective way to overcome middle-management resistance is for senior executives to take the lead and demonstrate a firm and highly visible commitment to the new equipment. Says Donald J. Gogel of the management consulting firm of McKinsey & Co.: "Behind every change there has to be a product champion. A senior role model is very important." Adds Brian Usilaner, the director of the General Accounting Office's National Productivity Group: "The only way you are going to get office productivity improvement is from the top down. You must hold the managers accountable for the improvement in productivity." After years of urging their employees to work more efficiently, the bosses themselves will now have to step up their own output. ***—By Christopher Byron.***

***Reported by Gisela Bolte/Washington and Sara White/Boston***

Illustration for TIME by Chas B. Slackman

# Productivity Improvement for Office Systems

BY MARY BAUMGARDNER

■ American productivity in business and industry has declined alarmingly since the mid-seventies and in 1979 and 1980 dipped to a negative growth rate; office systems contribute to this dismal picture with costs that are rising at a rate of 12 to 15 percent a year.[1] Current studies of costs of office operations reveal that labor and fringe benefits account for three quarters of the total spent, with charges for space, equipment, and other indirect costs combining for the remaining fourth. Projections that the $600 billion labor cost in U. S. offices for 1979 will double by 1989[2] have forced businesses to look at the value received for the labor dollars expended in the operation of office systems.

The function of the office is the efficient acquisition, storing, processing, and transmission of information. More and more information is being asked for by internal managers, external agencies, customers, and government. Supplying the right information at the right time to the right person provides a competitive edge, but the expansion of this service has changed the mix of clerical and professional staff. More information professionals—analysts, accountants, and other information specialists—are needed to analyze, interpret, and process information for managerial decisions. The salary dollars required for these professionals are considerably greater than for clerical and secretarial staff; hence, the soaring labor costs.

The unbounded growth in personnel and the resulting costs cannot continue indefinitely without inviting financial ruin. To obtain a greater return from dollars invested in the human resource, businesses must improve productivity in the information systems: word processing, records processing, telecommunications, reprographics, data base management, and information distribution. There are few guidelines to follow in attempting to measure productivity of office personnel; except for the clerical/secretarial areas, very little has been done to define what productivity is or how it can be increased. Greater attention must now be given to the productivity of supervisory and management personnel.

The planning model shown in Figure 1 provides a strategy for the development of productivity as a goal for all personnel of any office system. This plan enlists the aid of office workers, clerical through managerial, in searching for new procedures, new technologies, and new approaches to handling work in the office and is based on the premise that a productive employee is likely to be a happy employee.

How can the concerned person apply the model to the productivity issue? The first step is the assembly of facts and figures on office costs, activities, and trends in the specific system. Armed with this information, the next step is the education of those whose futures depend upon improvement of office productivity; in short, everyone who is part of the office operation. Agitation for a meeting with management to present the data and press for the formation of a productivity improvement council with representation from all office systems and senior management would be next. The Council could then define the areas to be addressed and plan the actions to be taken.

## Inputs

The facts and figures needed can be obtained through cost analyses, interviews, questionnaires, observations, and inspections. The positive aspects of productivity improvement which reduce work complication and duplication should be emphasized in this phase to reduce resistance and encourage cooperation.

Cost analyses bring to light patterns in cost fluctuations of all components of the system; information on past investments in technology and personnel; and evidence of increasing or decreasing costs. Interviews with key personnel involved in management, supervision, and operation within the system identify what a job consists of, how long it takes to do it, and whether or not it brings satisfaction. Procedure interviews spotlight rewards or frustrations, ease or difficulty, and time well spent or time wasted in each person's activities; and, at the same time

Reprinted from the JOURNAL OF SYSTEMS MANAGEMENT.

**A Planning Model**
**for**
**PRODUCTIVITY IMPROVEMENT FOR OFFICE SYSTEMS**

| Inputs | Operations | Outputs |
|---|---|---|
| Information from<br>cost analyses<br>interviews<br>questionnaires<br>observations<br>inspections | Enlist management support<br>Involve all personnel<br>Accelerate introduction of advanced technologies<br>Improve personnel planning<br>Develop in-service training<br>Monitor and evaluate productivity improvement | Company commitment to productivity improvement<br>Employee commitment to productivity improvement<br>Managerial time for analysis of information<br>Decisions based on accurate, timely information<br>Quality products/service from office operations<br>Job enrichment for office employees<br>Improved morale for office employees<br>Employees prepared for advancement |

Feedback

Management involvement in productivity effort
Employee participation in productivity effort
Customer response to productivity improvement
Improved competitive position of company
Office systems dedicated to productivity improvement

**Figure 1**

develop an analytical approach to the disparate facets of the job. Questionnaires are valuable in compiling factual information for organization charts, work distribution, activities on the job, task lists, and work logs. Observations and inspections provide data for flow process charts, layout flow charts, and workflow and fill in the gaps to complete the background information.

## Operations and Outputs

*Enlist management support.* With representation from senior management on the Productivity Improvement Council, both financial support and management backing on planning and decisions should be secure. This clout will get the program moving and will assure cooperation from all personnel. With publicity given to all efforts, successful or otherwise, productivity will become an issue in the office systems.

*Involve all personnel.* A recently developed technique for involving employees in working through problems related to their job activities is the quality circle (QC).[3] This is a group of employees, usually fewer than a dozen, who do similar work. The participants meet regularly, during working hours, to identify problems associated with their work, plan improvements in methods of dealing with their difficulties, and look at both short- and long-range possibilities for change. Assigned to each group is a leader and, ideally, a person with a background in personnel planning or industrial relations to be used as a resource person.

Circle members are given training in proven group communication and problem-solving techniques. When any technical or special expertise is needed for help in solving problems, members are encouraged to interact with company individuals outside the circle. When solutions to problems are worked out, they are presented to management for approval; management is obligated to make a response within a specified length of time.

To encourage wholehearted participation, employees are assured that no one will lose a job because of more efficient, productive work methods. Also, if there is a substantial cost saving achieved, at least some of the saving is returned to the group responsible. This return is in the form of new equipment, improved working conditions, bonuses, or salary adjustments.

Experience with quality circles has shown that productivity increases, quality of work rises, and employee morale improves. The QC concept is applicable to any level of performance within the office system and could be designated a "productivity circle" for supervisory and management personnel. An annual productivity improvement plan against which performance could later be measured would establish a point of reference for measuring progress on a regular basis.

Accelerate introduction of advanced technologies. Advanced office technologies have the potential for

improving office productivity at all levels from clerical through managerial. The use of electronic equipment for the production of correspondence, revised and edited copy, reports, and typewritten documents of all kinds has been measured and the resulting increase in productivity documented again and again. However, even more startling are the potential gains in productivity to be achieved when work distribution is altered and the non-managerial duties usually performed by the manager are offloaded to the secretary to be accomplished in the time freed up by the use of electronic equipment. A recent study shows that middle-level managers spend up to 25 percent of their time performing clerical duties.[4] A dialogue between manager and secretary could result in shifting the workload—some duties would be passed to the secretary with the manager now able to be more productive in the managerial role of reading, analyzing, planning, and acting in decision situations.

### Improving Information Access

A second method of improving productivity through advanced technologies is better utilization of improved information access. A vast resource of facts, figures, and information are ready to appear to improve productivity; information banks of records, correspondence, budgets, accounts, and personnel files are waiting to be called forth at the touch of the fingers. Improved managerial productivity can result as the information made available so easily and quickly is put to effective use in making decisions.

Beyond the improved access to information is the speed up of information flow which modern technologies are making possible. The office is now moving into a system of networks which will interconnect the information contained in one machine with all other machines and will, in effect, make that information available instantly, in voice, data, text, or image form. With this speed up, managers can be aware at all times of what is happening within an area of responsibility and can respond from a background of up-to-the-minute information. To invest large amounts of money in advanced technologies might seem risky; however, the argument is that the need to increase managerial productivity almost dictates the trial of previously unavailable options which offer a possibility of success.

*Improve personnel planning.* Business has long been aware that the most important resource is the employee. A program to improve personnel planning from the initial hire throughout employment is of long-range value and an investment in overall productivity.

Preparation of complete and accurate job descriptions and careful selection of employees are fundamental. Strategic employment decisions can be guided by an analysis of the general background, level of formal education, entry-level position, and subsequent movement within the office systems of employees recognized as exceptionally productive.

The development of a pool of persons with a proven record of productivity to be groomed for movement to higher level openings as they occur is as important as initial selections. Early identification of individuals with apparent potential for increased responsibility gives time for movement into intermediate-level jobs that will supply the necessary experience for later promotions. The placement of persons with a commitment to productivity in leadership positions will expedite the implementation of improvement plans.

*Develop in-service training programs.* Through a comprehensive in-service training program, each employee can obtain the education needed to work productively and fulfill potential. This training could include reinforcement of technical ability, acquisition of new capabilities, and the broadening of individual perspectives. Out of this will come a higher level of expertise in dealing with the immediate tasks of the job and a better understanding of company needs and problems; these combine to increase productivity.

Independent study using textbooks, exercise manuals, videotapes, and computer terminals would be one alternative of instruction. Internal and/or external classes taught by company personnel or experts in the field would be another. Charts, slides, scripts, and manuals could be prepared to be used as the teaching strategies dictate. Role playing, simulation, team building, laboratory problems, and case discussions connect the instruction to company situations and tie the learning to company objectives.

Relating the opportunities of the program to the job descriptions and career ladders would stimulate interest and involvement. Emphasis is on the recognition of the possibilities in people and the willingness of the company to create a climate encouraging growth.

*Monitor and evaluate productivity improvement.* Each office system must develop its own criteria, according to its unique plans, for the evaluation of its productivity improvement efforts. Before-and-after cost figures are revealing. Employee satisfaction and morale are less obvious but can be measured. Personnel records of employee participation in company-sponsored activities are available. Achievements accomplished through productivity

improvement plans provide a yardstick for realistic planning in the future. The percentage of time spent by managers in managerial activities is an indicator. The number of in-house personnel qualified for promotion to positions of higher responsibility can be researched.

## Feedback

The model is completed by putting into place a means of cycling information on changes, improvements, mistakes, gains, losses, worker reaction/involvement, and customer response back to and through the Productivity Improvement Council. Data collection techniques to secure information on the progress of the new projects and new approaches would be part of the responsibility of the Council. Successes could be reviewed to discover the elements that combined to bring about the happy ending so the pattern could be repeated in other efforts. Publicizing this information through speeches, seminars, reports, memoranda, and articles would keep all personnel aware of progress being made and would recognize the individual effort of every participant.

## Conclusion

To make the promise of the office of the future become reality, the productivity issue must be addressed and the current downward trend reversed. The procedures to be followed may have to be new, strange, untested, and unfamiliar; but they must be tried, evaluated, and adjusted for another effort. The ingenuity of the human mind is limitless; this attitude places a return to productivity in office operations within the reach of people with a commitment to that goal. •jsm

### References

1. John J. Connell, "Improving Office Productivity," Paper presented at 25th annual Association of Records Managers and Administrators Conference, Boston, Massachusetts, October 21, 1980.
2. *Ibid.*
3. *David Pauly, Joseph Contreras, and William D. Marbach,* "How to do it Better," *Newsweek*, September 8, 1980, p. 59.
4. "Employees Will Have a Stronger Voice," *Business Week*, September 3, 1979, p. 198.

**MARY BAUMGARDNER**

Mary Baumgardner is presently an Associate Professor of Business Education at the School of Business Administration at Central Michigan University, Mt. Pleasant, Michigan. Degrees include an Ed.S. from Central Michigan University, the M.A. from the University of Illinois, and a B.Ed. from Illinois State University. She teaches classes in Records Management, Office Systems, and Office Procedures.

# Integration Is the Essential Key to All Planning for Office Automation

**By Dan Hosage**
Vice President and Group Executive
Office Systems Group
Datapoint Corporation

Office automation has captured the imagination of business and industry on a scale to rival the enthusiasm which met the advent of the microprocessor. Articles, news stories and speeches on office automation abound and "office of the future" terminology permiates our conversations.

Companies from industries as diverse as energy, banking and electronics have entered the fray to garner their share of the office automation market. As each new entrant appears on the scene, the race to develop and produce technically innovative office products becomes more competitive.

**"The user must be able to take information entered through the data processing function, convert it to a graphic presentation, affix a memo created through word processing and transmit it via electronic message services—all within the same, integrated system. Selecting a system which integrates these functions for an entire company will require managers to adopt a more conceptual approach than they may have used in the past."**

The office functions which these products address are as traditional as the telephone and typewriter and as sophisticated as color graphics and video conferencing. For every office function which exists today, from the copier to the coffee pot, there are ten good reasons to automate it.

## Price Coming Down

Significant advances in technology over the past few years are certainly contributing factors. Large-Scale Integration and VLSI chips, with their reductions in costs and improvements in efficiency, are having tremendous effects on the industry. As a result, function and performance are increasing tremendously while the price and space required is coming down.

It is amazing that today's commercial enterprise can place such importance upon knowing the details of product costs, money flow and product profitability without knowing what costs are incurred by producing a simple business letter. It should not be surprising that the consequences of such neglect have produced office productivity gains of a meager three percent over the past ten years. Factory productivity during the same period, even with the recent slump, produced gains of over 80 percent. Contributing to this discrepancy, spending per factory worker during the last decade has also been roughly eight times that of the office worker.

One of the reasons that the area of office productivity and efficiency have been neglected for so long is due to the problems in quantifying the results. For instance, if a production line is streamlined to increase output by 50 percent, it's quite simple to see the result in terms of both dollars and product. But if we provide more timely, comprehensive information to a manager, thus eliminating his information float and enhancing decision making, we have a much harder time in tracking the results.

## Information Float Problem

Yet, such information float affects virtually all business and is so pervasive that office workers routinely make allowances for it. It's a natural occurrence for employees to hand carry important documents from one company department to another because of deficiencies in the company mail service. A study done at a major U'S corporation found that it took an average of two-and-a-half days to transmit one piece of mail between two people within the same department. It took almost four days for interdepartment mail delivery, sometimes even on the same floor of this 40-story office building in New York City. Once the mail went to another location it took five days for it to reach its destination.

## Spurring Office Automation

In addition to cost and productivity incentives, other factors such as demographics and education are driving the office towards automation. Roughly 50 percent of America's work force is presently employed in some type of office support capacity. Our industrial society is being transformed into an information processing one and yet an increasing number of secretarial positions go unfilled each year. Likewise, a declining birth rate means fewer people will be entering the job market and those that do will have increasingly higher levels of education.

These economic, demographic and educational imperatives coupled with technical innovation promise exciting new office products and capabilities which will increase productivity and

Reprinted from the September 1981 issue of COMMUNICATIONS NEWS.

provide accurate information in a more timely, comprehensive manner. But there are problems which arise from such innovation, especially for the managers who must evaluate and implement office automation systems. They run the gamut from how to prepare office workers and company executives for automation, to the ramifications of merging technologies which blur the traditional distinctions between telecommunications, word processing, data processing and the like.

### Need Integrated Approach

It is important to remember that, just as office automation means different things to different users, vendors too will take various approaches in the systems they develop. These differences are most visible in the types of hardware each vendor offers and in the office automation "architectures" which they promote. The one key which absolutely must tie all viable office automation approaches together is integration, integration from a functional standpoint, from an application standpoint and from an equipment standpoint. The investment cost in the equipment that is needed to automate office work is significant and multi-functional approaches must be employed to make office systems as productive and cost-effective as possible.

### Local Nets and New PBXs

The integration philosophies which currently dominate the marketplace include coaxial-cable-based local networks and third-generation PABX type office switches or office "supercontrollers."

Besides the tremendous economies which integrated systems offer in terms of the incremental addition of functions, many also provide increased productivity due to the resource-sharing capabilities which are inherent. Whereas separate systems inhibit the intra and inter-company flow of information, with integrated systems information need only be entered one time. Once information resides on the integrated system it can be used by all persons permitted access and transmitted within and outside of the company as desired.

### Different Way of Thinking

In terms of automated office needs, managers must take an entirely new approach when evaluating integrated systems. Unlike traditional stand-alone or even dual-purpose equipment, integrated system vendors must demonstrate proficiency in a number of office applications. And, of utmost importance, an integrated system must incorporate sophisticated communications capabilities which allow the disparate functions to work well together. The user must be able to take information entered through the data processing function, convert it to a graphic representation, affix a memo created through word processing and transmit it via electronic message services—all within the same, integrated system.

Selecting a system which integrates these functions for an entire company will require managers to adopt a more conceptual approach than they may have used in the past. Individual departments will require different timetables to implement the same functions, and each will want these functions to provide different capabilities. There will also be levels of implementation within the same department. In an accounting department for example, secretaries would typically be provided with word processing and accountants with data processing. Meanwhile, management may be provided with data processing, electronic message services as well as executive calendar and "tickler-file" functions. Over time, additional functions may be supplied to users as the need arises.

### Must Be Modular

The need for this degree of flexibility suggests both hardware and software that is extremely modular. Hardware must be modular in the sense that workstations, processors and peripherals can be added to the system where and when they are needed. It must also be vertically compatible to facilitate system component upgrades whenever necessary. Software in terms of both functional and application capabilities must be modular so that additional system features can be added at will.

This degree of flexibility is absolutely essential in an integrated system because of the various communities of interests which it is meant to serve. In today's DP-oriented shop it's difficult enough to convince the company programmers that the system must be taken down for maintenance or upgrade. Imagine trying to perform the same type of operation in an integrated office where everyone from the president to the secretary utilizes the system on a daily basis.

### Man-Machine Interface

In addition to the hardware and software considerations posed by office automation, there are some very important ones which deal with the question of man-machine interface. When automating an office function we run an increasingly greater risk of negating productivity gains as the complexity of this man-machine interface increases. It is essential that these integrated systems are easy to use by the vast number of people whose jobs they will impact. This includes not only people-oriented hardware and software but also vendor-supplied user documentation and customer education courses.

Managers who choose to implement an integrated systems approach must be cognizant of the fact that there will be some resistance to its use. Other types of systems have, in the past, been met with resistance from office workers. Bringing managers and executives on-line may be an even more challenging task. We have already seen some resistance on their part. This is only the initial reaction and will definitely change. This writer had a very pleasant surprise while speaking at the University of Texas Graduate School of Business recently. Of the 2,000 persons in attendance, all had some type of hands-on experience with a computer system. They understood the concepts involved and they viewed the systems as tools to help them succeed. These managers and executives of tomorrow will not only welcome office automation, they will demand it. Such an attitude will bring pressure to bear on their company peers and competitors alike.

Planning will be the key to successfully implementing integrated office systems. Each office function, and the extent to which automation can effectively address that function, must be considered. And the chosen system must allow these functions to be implemented at the customer's own pace.

### A Systems Approach

In order to address the cost-intensive areas of the office environment and improve the productivity of the office worker, companies must make a positive move toward integrated systems. For too long we have approached office problems on a piecemeal basis, solving them one at a time and independently of each other. Technology is furnishing totally new concepts for problem solving. We must utilize a sophisticated systems approach, rather than thinking in terms of independent machines or functions, if we hope to maximize the potential which technology offers us.

# Networks Of Office Machines Provide Desktop Access To The Information Pool

**By John J. Connell**
Office Technology Research Group

The office of the future field is concerned with managing the introduction of advanced technologies into the office in order to improve overall productivity, but especially to improve the productivity of managers and professionals. The driving force is economic. Office costs are rising precipitously because of wage escalation and growing demands for information. Managers and professionals, who account for almost 75% of all office costs, are the major beneficiaries of these increases. Any serious effort to control costs must concentrate on improving productivity in that sector of the work force.

The interest in technology as an aid to productivity improvement in the office stems from success stories on the farm and in the factory. It also arises because of the extraordinary developments in technology that have occurred in the past several years. The literature abounds with claims that new office technologies will improve managerial and professional productivity. However, experience with office technology thus far has been in the area of the clerical work force, where assignments are precisely defined and output can be measured in quantitative terms. The managerial assignment, on the other hand, is not precisely defined; in fact, far from it. Further, it is a qualititative rather than quantitative assignment.

The thesis, then, that modern office technologies can help improve managerial and professional productivity must be subjected to close scrutiny. In so doing, it is not enough to look only at equipment capabilities. One must also consider the impact of new technologies on the office and the people who work there. It is also not sufficient to equate saving time with improving productivity. Rather, one must identify how productivity is to be improved and the manner in which the improvement should be measured. Given those caveats, the subject of office technology and its relationship to managerial productivity can be explored.

## Office technology

There are many ways to look at the world of office technology. At a data processing conference, one hears that since all modern office machines have microprocessors built into them, they are all part of the computing field, and data processing "owns" them. At a word processing conference, one hears all kinds of arguments as to why word processing ought not to be owned by data processing. Instead, it should be the key technology inside the office while data processing stays out in the data center.

To micrographics personnel, the key discipline in the office is records management, which all machines should be designed to serve, led, naturally, by micrographics. Among most office automation pundits, advanced office technology is equated with electronic mail and its sister technology, computer conferencing.

A broader approach to office technology, from a management point of view, is asking what is different about office technologies in the '80s as compared to those of the '70s. A body of knowledge exists on how to manage data processing, word processing, micrographics and the like.

## Network connections

There is room for improvement, but the management processes are reasonably predictable, and product advances can be absorbed within those processes. The question is, are there technological differences of significance coming in the '80s, and if so, what are the implications of those differences, and how should they be managed?

In the opinion of this author, there is one really significant difference coming in the '80s, and that is the

interconnection of all office technologies through networks. To those who are technically inclined, the challenge associated with bringing many technologies together in a network is fascinating. It involves working with different kinds of machines, different languages and different operating techniques. From a management point of view, however, the introduction of networks, and of integrated networks once compatibility problems are resolved, is extraordinarily important for several different reasons.

The first reason is that networks allow one to provide the capabilities of an increasingly powerful array of office technologies to every office worker in every office location. The tendency in the past has been to apply technology to office work by moving the work out of the regular office and into a technology center. Data processing is a classic example of that approach with its history of identifying potential computer applications, programming them for computer operation and then physically moving the processing to the data center.

The same approach was followed in the establishment of word processing departments, of reprographics facilities, of micrographics centers and so forth. The capabilities of the technologies were made available to the specialists in the technology center, but not to the general office force, and especially not to managers and professionals. The introduction of networks changes all this. Networks bring the power and capabilities of modern office technologies into one's work place, available quite literally at one's fingertips. In short, networks provide technological "power to the people."

## Subordinating technologies

The second reason that the phenomenon of integrated networks is important is that, in a world of networks, individual technologies must be subordinated. This fact has extraordinary organizational and operational implications. Offices tend to be organized around technologies, with data processing departments, word processing departments, telecommunications departments, micrographics departments and so forth. Each department has charted its independent route and established its own priorities and operating ground rules and is accustomed to defending its turf.

With the introduction of networks, however, each of these technologies becomes a subset and must tailor its operations to fit the requirements of the network. As a result, data processing, word processing and all the other technologies used in the office will change drastically in the 1980s. It is not the merger of word processing into data processing, as is so glibly proclaimed in data processing literature. It is the subordination of data processing, word processing, micrographics, reprographics and all other previously independent office technologies into the framework of integrated networks.

Each technology will continue to perform certain stand-alone functions—independent applications, one-time uses and the like. But the primary thrust and the greatest potential will come from the use of all office technologies in integrated networks.

## Planning required

The third implication of integrated network is that they will require coordinated planning. Contemplation of networks that provide a vast array of technological capabilities to all office personnel in all office locations requires a level of coordinated planning never before encountered in the office. Most planning is done by departments or functions, each going its own way and coordinating as little as possible with other departments. Even in the design of computer-based systems that cross departmental lines, an ad hoc group is generally set up to handle the planning, and once the system is installed and operating, the group is dissolved.

The requirement brought on by networks is the need for an ongoing, coordinated planning effort that includes all office disciplines. Such an effort will have a substantial impact on organization structure and operating practices in the office. To succeed—in fact, just to get off the ground—it must be a top-down effort. How the office is ultimately organized and the extent to which one espouses a centralized or a decentralized approach for office operations remains to be seen. What is clear is that the planning effort must be centralized, be managed from the top down, and include all office disciplines.

Thus networks will have a profound effect on the future office and all who work there. It is vital, in any effort to improve office productivity, that what is happening in office technologies be explained to all managers, at least in terms of the network concept and what it means. Technology should not be the bugaboo that it has been in the past. It should be looked on as a set of tools for improving office productivity, tools that are provided automatically by the network.

Technical personnel can concern themselves with what goes on behind the network, but those activities should intrude as little as possible on the office. The network concept should be employed to facilitate the introduction and use of new machines and new techniques.

## Managerial productivity

The motivating force behind the introduction of networks of technologies is the need to improve managerial productivity. But managerial productivity is a paradox. The term "productivity" conjures up a vision of measurable output of lines of typing per day, automobiles manufactured per month, wheat yield per year and similarly quantifiable measures. When new machines or new methods are introduced, their value can be measured in terms of improved output versus investment.

However, when the term productivity is applied to managers and professionals whose assignments call

for the gathering of knowledge, the analysis of alternatives and the making of choices, the contradiction in terms becomes apparent. Those tasks are qualitative in nature and not subject to measurement in mathematical terms. Yet the term "managerial productivity" is used constantly, in business literature and at the podium, even though it has not yet been defined. One has to assume it will continue to be used until a more precise term is developed. Therefore, some working definitions must be postulated if one is to address the question of how modern office technologies can improve productivity.

Most managers, when asked, will say that they are too busy doing their jobs to worry about improving their own productivity. The statement is a valid observation of managerial life. Managers spend a large amount of their time coping with interruptions and unanticipated events, which detracts from their ability to take an orderly approach to maximizing their effectiveness.

The statement also provides a clue as to what a working definition of managerial productivity might be. In a well managed organization, every manager has an assigned set of duties and a set of measures, both objective and subjective, for determining how well those duties are being carried out. For example, a sales manager may be responsible for achieving a specified share of market while developing and training a sales force. The former can be measured objectively, but accomplishment of the latter must be judged according to subjective measures.

## Measuring performance

Formal managerial performance measurement systems are in use in many companies, and they are gaining in popularity. They employ both objective and subjective measures. Perhaps the most widely used is termed Management by Objectives (MBO). Under that approach, each manager develops, with his or her supervisor, a set of goals to be accomplished within a given time period. Subsequent performance measurement is based on achievement of the agreed-upon goals. The beauty of the MBO approach is that managers participate in the setting of their own goals, the goals may be susceptible to either objective or subjective measurement, and the agreed-upon goals and methods of measurement are clearly documented.

Given the existence of time-tested performance measurement systems, one of the first questions that arises in looking at productivity measurement is whether one should attempt to develop a separate productivity measurement system. It appears that trying to define productivity separately from performance and set up a separate measurement system for productivity is not only difficult, but superfluous as well.

A more business-like approach would be to identify productivity improvement as a performance goal and have a measurement approach agreed upon and carried out under the MBO system. The same principle would apply when other managerial performance measurement systems were used.

## Productive managing

A working definition, then, subject to discussion and test, is that the term *productivity,* when applied to *managers as individuals,* is a *performance* characteristic and should be measured within the framework of existing management performance measurement systems. If so, current statements that a given machine or system will improve a manager's productivity really mean that they will help him or her perform better and do a better job.

Managers can also be looked at as a class, and in this context the term managerial productivity may have a different meaning. Any business enterprise organized in typical pyramidal fashion with several layers of management has a dollar investment in its management work force from which it hopes to achieve a substantial return.

To the extent that new machines or new systems permit that return to be achieved with less investment in the class or allow a greater return without proportionally higher investment, the productivity of the dollar investment in managers is improved. Therefore, the case can be made that when managers are looked at as a class, it is possible to develop some economic quantification to the investment in that class against which productivity improvement efforts can be measured.

A second working definition, again subject to discussion and test, is that the term *productivity,* when applied to *managers as a class,* is an *economic* characteristic and can be measured in terms of variations in investment versus return. If this is true, claims that some new device or approach will improve the productivity of managers as a class must not only help managers perform better but also lead to improvement in organizational effectiveness.

## Professionals' productivity

Professionals often are paid as much as managers, and as a class, their numbers are rising faster than all other classes, along with their share of the office payroll. Improving productivity among professionals is an important goal. Do the two working definitions developed for managers also apply to professionsls? The answer is yes, with some variations on the theme.

Professionals as individuals tend to have more precise lists of job duties than managers, deal less with the handling of unanticipated events and have a more measurable output. Thus, the idea that productivity improvement should be looked at as a performance goal applies equally well to professionals and managers. Productivity improvement efforts can also be applied to professionals as a class. In fact, since classes of professionals are more easily defined and organizationally delineated than classes of managers, economic measurements of productivity improvement efforts among the former can

be even more specific.

The working definitions, then, in the broadest sense, postulate that performance relates to managers and professionals as individuals and productivity relates to managers and professionals as a class. The question of how modern office technologies can improve managerial and professional productivity must be examined in the light of these definitions. It also must reflect the fact that no machine will improve managerial performance or productivity.

Machines are tools. Managers improve their own performance through the use of such tools if, in their judgment, the effort will bear such results. The old strategy of machine use by edict, which was inflicted on the clerical work force, no longer applies. Managers and professionals must choose the tools and techniques they feel will help them perform best. Any look at the possible use of modern office technologies in the managerial suite and the professional's office must allow for that freedom of choice.

## Improvement potential

Once a strategy for measuring productivity improvement efforts is postulated, one can go back to the identification of productivity improvement opportunities and flesh out those opportunities in terms of the measurement strategy. Starting with managers as individuals, there are four broad areas in which modern office technologies can help improve performance and productivity. The first is saving time, the use of machines to cut down on the amount of time spent on regular managerial duties. The second is redistributing workloads, the use of machines as catalysts to effect a re-examination of who does what.

The third is becoming better informed, the use of machines to provide access to a vastly greater assemblage of information than is now available. The fourth is speeding up communications, the use of machines to accelerate the communicating of information throughout an organization.

No one machine provides all these benefits. Rather, it is a combination of machines, organized and operating under the umbrella of a network, that offers the potential of helping improve managerial performance and productivity.

## Activities categorized

Booz, Allen Hamilton, Inc., conducted a major study in which work sampling methods were used to categorize the activities performed by managers. Once activity categories were established and the time spent on each determined, an analysis was made of the potential impact of modern offfice technologies. Dictating, word processing and electronic mail systems were applied to the correspondence handling activity, teleconferencing to meetings, microprocessors to calendars and databases, and so on.

The key finding was that the first and most obvious effect of new technologies on individual managers is in the area of saving time. The time required to handle typical management activities is reduced.

The ultimate payoff, of course, is not in the time saved, but in what is done with that time. It is unrealistic to say that time saved by managers can be aggregated in some way to effect a personnel reduction. Rather, the additional work a manager can now take on should be factored through the regular managerial performance measurement system and its value certified as part of that system.

## Reevaluate assignments

Once the decisions are made as to who does what in an office, they are seldom reexamined. Inertia takes over, and if nothing goes wrong, the decisions are cast in concrete. As a result, much of what goes on in an office is done the way it is because it has always been done that way. What is needed is a catalyst that can be used to force a reevaluation of work assignments. Used properly, modern office technologies can be that catalyst.

Consider this example. The standard approach to the introduction of word processing equipment is eliminating secretaries and then reorganizing the secretarial function by moving typing into a word processing center and establishing an administrative support group to serve several managers. That approach may improve the efficiency of the secretarial function, but it does nothing to improve the performance of the manager, who incidentally costs three times as much as the secretary. In fact, it may affect the manager adversely.

A more sophisticated approach is to ask the question, if the typing duties of the secretary could be offloaded to a word processor, thus making secretarial time available, what functions being handled by the manager could be transferred to the secretary?

Some companies follow that approach. They look on word processing not as a tool for improving clerical productivity, but rather as a means of redistributing work so that managerial time can be freed up and devoted to the handling of more pressing matters. The economic payoff of such an approach is far more attractive, and the job enrichment potential, as employees take on new and more important duties, is an added benefit. Again the value of the new work taken on by the manager can be certified under whatever performance measurement system is used.

## Expanding the base

Few would argue the importance of information to managers. In today's information-glutted world, those who are better informed usually have the competitive edge. The ingredients that foster better decision making start with a good base of relevant information. At present, the base of information provided to managers by machines is not very good or very relevant. The criteria used to determine what information is stored on machines are based much more on the economics of machine conversion than on value to management. As a result, a relatively small percentage

of the total company information base is now available from machines. In addition, relevancy of information is in the eyes of its user, and tools and techniques that facilitate user specification of information needs have been hard to find.

What modern office technologies do is expand very greatly the information bases available on machines and provide improved techniques for accessing that information in data, text, image and voice form. As proficiency is gained in the use of these tools, managers will participate more actively in specifying their information needs, and the machines will provide essentially instantaneous response. The ingredients will be there to help improve the caliber of managerial decision making and thus the performance of each manager.

## Speeding communications

The greatest benefit of networks is in the area of speeding up communications. Faster communications means greater responsiveness, the ability to stay on top of what is happening and respond to the unexpected. The typical managerial assignment includes planning, directing and controlling, and communications plays a role in all three. Cutting down the time involved in sharing planning information, in communicating directives and in monitoring performance can improve managerial performance.

Of perhaps even greater importance is a manager's ability to respond to the unexpected, to handle situations that are not in the plan. Communications is the key to responsiveness, and as networks speed up communications flow, a manager's ability to respond and make better decisions faster will be greatly enhanced.

Modern office technologies, then, can help individual managers improve their performance in the ways cited. In addition, the productivity of managers as a class can be improved. For example, offices are organized in hierarchies. These hierarchies are established in the traditional organizational pyramid to facilitate communications. Since networks speed up communications and permit simultaneous access to information by all levels of an organization, the validity of the hierarchial approach can be reexamined.

Consider the company wishing to establish a nationwide marketing operation. It sets up district offices in key locations that report in to the home office. Initially, the operation is small enough that the home office is completely on top of what is going on in the districts.

As the business grows and more districts are added, however, there comes a time when communications begin to break down between district offices and the home office. Time zone differentials, people in meetings or traveling, the vagaries of the mail system and a variety of other communications delay factors combine to make the home office less responsive to changing business conditions in the field.

To solve this problem, companies establish regional headquarters to act on communications from the district and to consolidate district information for transmission to the home office. The primary function of the region is to facilitate communications between the districts and the home office. Every sizable geographically dispersed marketing operation is organized on this home office-region-district basis.

The numbers of districts reporting to regions and regions to the home office are determined to a great extent by communications delay factors. Introduce new office technologies that eliminate or at least greatly reduce these communications delays, and serious consideration can be given to cutting down on the number of regional headquarters, or perhaps doing away with them altogether.

## Span of control

The same principle applies throughout the office. Organizational layers are established in hierarchical fashion based upon span of control concepts as to how many subordinates a manager can direct. These concepts of optimal span of control reflect the fact that much of the process of managing is concerned with communicating. Delays occurring in traditional communications processes involving paper correspondence, telephones, meetings and the time constraints of each become one of the major controlling factors in defining optimal span of control guidelines.

Looking at the world of networks, however, paper correspondence is replaced by electronic mail, telephones are augmented with voice and electronic message systems, and meetings are streamlined through teleconferencing. Traditional time constraints no longer apply. Consideration can therefore be given to reevaluating span of control guidelines.

## Fewer organizational layers

If information is available in the same time frame to several layers of organization, and if communication among layers is essentially instantaneous, a perceptive senior management will challenge the need for so many organizational layers. The traditional organizational pyramid will tend to flatten, managerial assignments will broaden, and the entire decision making process will become more streamlined. Thus the productivity of the class of managers a company has invested in will be greatly improved.

Another example of productivity improvement through the use of modern office technologies can occur in the management process itself. The trend in business is toward more participative management, getting more people involved in and contributing to the decision making process.

The key to making participative management work is to make certain that everyone is equally informed. The extraordinary growth in the numbers of copies of correspondence and reports produced in business and the continuing proliferation of meetings are mute testimony to the efforts

being made to keep everyone informed. They also are the biggest stumbling blocks in any attempt to streamline the management process, as any manager will testify.

### Simplified communications

In a world of networks, however, copies of correspondence and reports need not be produced. The originals are available to everyone on a screen. Informational meetings need not be held. They can be replaced by such techniques as computer conferencing where meeting participants communicate items of informational interest through the networks, without holding a formal meeting.. Operating meetings can be held in the form of a teleconference, in which participants communicate by audio or video from geographically separate locations, thus reducing the need for travel.

Networks of technologies do not change the intellectual aspects of decision making—the analysis of known information, the gauging of unknown factors and the evaluation of risk. Networks facilitate, but in no way take over the traditional managerial tasks of planning, directing and controlling.

What networks do is streamline the management process. They facilitate simultaneous access to information and speed up the communication of information. They reduce dependence on paper copies, informational meetings and the like that tend to interfere with management processes. They help make participative management work far more effectively than is possible today and thereby improve the productivity of managers as a class.

There is no definitive last word on how modern office technologies can improve managerial productivity. The ultimate impact of networks on office organization and operation is still an unknown. One can only gauge early effects at this stage. Approaches to the measurement of productivity need considerably more research and testing. The improvements in productivity one can foresee from the use of modern office technologies are dependent on user acceptance, which is a behavioral issue rather than a technological one. Much needs to be learned, by users and practitioners alike, which is what makes the Office of the Future field so exciting. The challenge will be to expedite the learning process. Office productivity must be improved. The economic viability of business offices, and perhaps even the survival of business itself, hang in the balance. ■

# How Westinghouse measures white collar productivity

**Following a lengthy study of the often frustrating problem of devising a methodology for measuring productivity of office and other nonproduction-line workers, the Westinghouse Productivity Center is implementing a system that begins with an employee brainstorming system. Ultimately, however, the procedure focuses not on the individual but on criteria, or performance ratios, calculated on a departmental basis.**

**DAVID L. ROWE**

WITH THE DRAMATIC SHIFT in workforce demographics toward white collar and service jobs, U.S. managers have become acutely aware of a pressing need for a methodology to measure white collar productivity. This is a matter of particular importance because, at a time when the role of white collar workers in industrial operations is expanding dramatically, their productivity has failed to keep pace with blue collar production workers, the traditional focus of productivity concerns.

Just ten years ago, a typical manufacturing corporation's workforce comprised mostly blue collar workers. Today white collar employees make up about 50 percent of a manufacturing company's workforce—and about 70 percent of its payroll. Both numbers are expected to increase dramatically in the years ahead. In fact, the American Productivity Center predicts that by 1990, nearly 90 percent of all employed Americans will be working in either white collar jobs or in service-sector occupations.

Over the years, however, American industry has invested far more in the blue collar worker. Since 1960, industry has spent about $25,000 for every blue collar employee to improve productivity in the factory, but only $2,500 for every white collar employee. Not surprisingly, in that same time period, the blue collar sector has boosted its productivity by 83 percent, while the white collar sector has managed only a scant 4 percent increase.

While increased automation of the factory has no doubt greatly contributed to the output of the blue collar sector in recent years, the figures nonetheless seem grossly out of balance. At least part of this imbalance can be attributed to the inability of management to evaluate the effectiveness of the people who work in marketing, engineering, personnel, and all the other departments that comprise a company's white collar population.

## Quantifying the unquantifiable

The great nemesis of measuring white collar output has been, of course, the inability to quantify the end results of the white collar employee. The task is formidable wherever a thought process is involved, or where decisions and actions evolve across a complex organization over extended periods of time.

Productivity consultants with the Westinghouse Productivity Center have been wrestling with this problem for several years. Initial studies within the corporation relied upon traditional textbook yardsticks, such as value added per employee (sales minus the cost of goods, divided by the number of employees), variations on ROI, and the like.

The limitations of such yardsticks were recognized quickly. Aside from simply measuring the wrong things, these approaches are based upon either corporate or individual yardsticks. Corporate norms, such as sales per employee, have little value as management indicators. Individual yardsticks, such as pounds of paper per employee (which have actually been adopted by an insurance company), also fail to provide management with useful information.

In addition, such fragmented yardsticks cannot accommodate contradictory trends. Sales per employee could be high, but certain departments could be terribly understaffed, a condition that could obviously play havoc with productivity over the long term.

What was needed, then, was a totally new methodology that would

consider the employee in the context of his job function, accommodate complex organization, and provide useful data over the long term.

### Focus on the department

In spite of the nebulous nature and complexity of the issue, the Westinghouse consulting team believed that a useful methodology could be devised and began with two important assumptions:

- While it was desirable to develop a quantifiable methodology, it was agreed that the resulting data should be taken in the spirit of the law, not the letter of the law. The purpose, again, was not the accumulation of hard evaluative data, but the development of soft numbers that would alert management to trends in productivity improvement or stagnation.
- It was determined that the only meaningful way to measure white collar productivity was to focus not on the corporation as a whole, or the individual employee, but upon the individual department.

By focusing upon the corporation's functional units, it was felt that useful indicators could be developed—indicators that would tell management how a particular department was contributing to the company's broader objectives.

More importantly, the indicators would serve to evaluate a department against its own objectives. The productivity emphasis, therefore, would be placed upon the "producing" unit. Engineering would be measured for the engineering it produced, marketing for marketing, and personnel for personnel.

Once each function of the corporation was measured against its own objectives, pertinent "performance ratios" for the total operating division could also be established.

With the approach established, a pilot study was undertaken at one of the corporation's major divisions. Since the pilot study, which was completed in 1979, numerous other divisions have adopted the approach.

### The benefits

A quantitative technique for evaluating productivity on the department level provides major benefits. First, the process brings out into the open the issues that are most central to departmental productivity. In this way, the approach supplements management's insights into the operation of a division, or any of its functional components, by flagging potential problems and identifying opportunities.

The procedure increases the visibility of information relative to white collar productivity. In doing so, the resulting data impel the implementation of those actions that will improve the focus of an organization's activities.

The technique provides a means for measuring organizational effectiveness against broader divisional and corporate goals.

And finally, since the approach is based upon the participation of all employees within a department—management, professional, and hourly—it helps heighten the awareness of all employees toward the need to improve productivity. It can thus promote renewal of professional pride and can enhance employee involvement. In this way, the measurement approach can play a significant role in a company's participatory management program.

### Performance criteria

The procedure begins with the establishment of measurement criteria for each department. Once the criteria, or performance ratios, are established, a composite index can be calculated for the department. This index is derived by first assigning weights to the various performance ratios, then combining the values into a composite value.

A division-wide index can also be established by combining departmental indices. This process also takes into consideration the various "weights" of department functions.

While the process may seem somewhat complex and mathematical, the procedure is, in fact, relatively simple, and allows ample room for subjective evaluation and management "intuition."

### Employee involvement

The process begins with the employee—with a simple brainstorming exercise that serves as the basis for the establishment of performance criteria. This exercise, formally known as the nominal group technique, also serves to introduce employees to the program. It also encourages them to think about productivity.

All employees of a department are included in the brainstorming sessions. Each group member is asked, in a round-robin fashion, to contribute one idea on how productivity might be measured in the department. All ideas are recorded. There is no discussion or management analysis at this point.

Similar ideas are then grouped, and a candidate list is developed. The employees are then asked to write down priority numbers for each indicator. The group leader (usually a productivity consultant) develops a final ranking from the number of points assigned to each performance ratio by the employees.

In the pilot study, the top three performance ratios nominated by the engineering department were (1) dollar value of reported cost improvements, (2) number of overdue shop orders, and (3) cost of engineering errors.

The personnel department con-

**Figure 1**
**Productivity Measurement Ideas Generated Through the Nominal Group Technique**
*(Manufacturing Department)*

| *Ideas* | *Votes* | *Total* |
|---|---|---|
| 1. Number of shop overdues | 8-8-8-8-8-5-5-2 | 52 |
| 2. Constant $ value added/employee | 7-7-7-5-5-6 | 37 |
| 3. ROI (division) | 8-8-7-6-5 | 34 |
| 4. Downtime waiting for parts | 8-7-6-5-2-1 | 29 |
| 5. Machine downtime | 8-7-6-4-2 | 27 |
| 6. Constant $ billed/employee | 8-7-6-4 | 25 |
| 7. Stockouts per week | 8-8-3-2-1-1 | 23 |
| 8. Hours absent/employee | 7-5-4-3-2 | 21 |
| 9. Quality cost of output/$ of scrap/sales billed | 7-5-4-2-2 | 20 |
| 10. Shop development time | 8-6-4-2 | 20 |
| 11. Number of set-ups broken into | 8-5-3-1 | 17 |
| 12. % of due/overdue orders eligible to be built | 7-5-4 | 16 |
| 13. Cost improvement/year | 6-5-2 | 13 |
| 14. O.T. hours per week/employee | 6-4-1-1 | 12 |
| 15. Actual manpower vs. weekly load | 3-3-3-3 | 12 |
| 16. Change lead times | 7-4 | 11 |
| 17. Number of customer complaints | 6-4 | 10 |
| 18. WIP/Sales | 6-2-2 | 10 |
| 19. Efficiency ratio | 5-4 | 9 |
| 20. Number shipped/employee | 8 | 8 |
| 21. Ratio of defects found early (producer) vs. user-found defects | 4-3 | 7 |
| 22. Time spent expediting vs. elapsed time | 4 | 4 |
| 23. Exp. hours/number billed | 3-1 | 4 |
| 24. Machine queue time (cycle efficiency) | 3 | 3 |
| 25. Performance vs. MBO | 2-1 | 3 |
| 26. More efficient way of identifying parts (index) | 3 | 3 |
| 27. Variance in units shipped per day (weekly) | 3 | 3 |
| 28. Number of employee grievances | 1 | 1 |
| 29. % capacity efficient loading of product lines | 1 | 1 |
| 30. Utility cost/sales billed | 1 | 1 |
| 31. G-letters per week (engineering changes) | 1 | 1 |
| 32. Housekeeping hours/employee | 0 | 0 |
| 33. % of N/C equipment | 0 | 0 |
| 34. Customer audit results | 0 | 0 |

sidered (1) average time to fill employee vacancies, (2) average time to process insurance claims, and (3) number of lost-time injuries to be important measurements.

The marketing department listed (1) increased market penetration, (2) field sales performance, and (3) forecasting accuracy as its yardsticks.

Each department, in fact, listed between 25 and 50 performance ratios, from which eight to ten were selected for the development of the composite index. (Figure 1 lists the ideas generated by the division's manufacturing department.)

### Management evaluation

After the brainstorming sessions, the department's management and professional staff teams evaluate the resulting lists and select the criteria that best suit the department's charter. Obviously, not all of the employee-generated ideas are utilized. While there will be some correlation between the employee list and the management list, total correlation is not necessary or desirable. Even if few ideas are used, the exercise is invaluable in gaining the total department's support and alerting staff to the productivity issue. It also greatly speeds the data collection process and facilitates the implementation of resulting actions. In addition, the process causes the manager to clarify his own goals and objectives for the department.

To help managers select performance criteria for their own departments, the corporation's productivity experts have developed a simple set of guidelines. To be useful, the resulting ratios must—

- Be specific and quantifiable, consistent over time, and unique to the department.
- Measure the group effectiveness of the organization, not collective employees.
- Consider the interdependence of departments.
- Involve short-term objectives that are compatible with long-term plans.
- Support the departmental mission and division objectives.
- Demonstrate hard results.

Figure 2 lists the six performance ratios selected by the quality assurance section of the test division's operations organization. Of these six ratios, four were judged to reflect most accurately the overall scope of the QA function. (The other two indicators either denoted the relationships among the first four or served as a check on the four primary ratios. Their inclusion in the department's composite index would only have resulted in needless duplication.)

### Composite index

To arrive at a composite index for the department, weights are assigned to the selected ratios. In the pilot study, it was determined that the fourth ratio—sales billed divided by

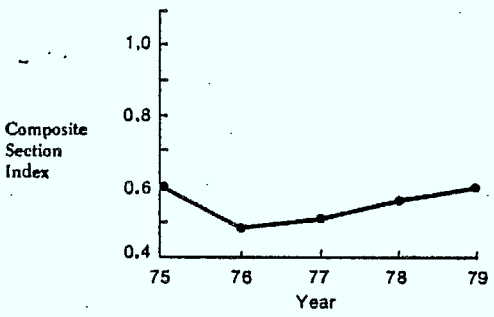
**Figure 2**
**Productivity Measurements**

*(Quality Assurance Section)*

| *Indices* | *Years:* | '75 | '76 | '77 | '78 | '79 |
|---|---|---|---|---|---|---|
| 1. Sales billed / QA budget | | 73.6 | 101.3 | 90.8 | 79.7 | 63.0 |
| 2. Warranty cost / QA budget | | 0.330 | 0.554 | 0.769 | 0.641 | 0.466 |
| 3. Sales billed / Salary and benefits of inspectors | | 197.4 | 271.7 | 243.6 | 213.8 | 168.9 |
| 4. Sales billed / No. defects (in $) | | 80.8 | 23.2 | 75.0 | 85.3 | 126.0 |
| 5. Sales billed / Warranty cost | | 222.7 | 182.7 | 118.1 | 124.4 | 135.3 |
| 6. Time spent on prevention activities by QA engineers / No. QA engineers | | N/A | N/A | N/A | N/A | N/A |
| Composite section index (CSI) | | 0.608 | 0.477 | 0.503 | 0.513 | 0.590 |

$$CSI = 0.2\,(0.01)\left[\frac{\text{Sales billed}}{\text{QA budget}}\right] + 0.4\,(0.006)\left[\frac{\text{Sales billed}}{\text{No. defects (\$)}}\right]$$

$$+ 0.3\,(0.004)\left[\frac{\text{Sales billed}}{\text{Warranty costs}}\right] + 0.1\,(N/A)\left[\frac{\text{Time spent on prevention}}{\text{No. QA engineers}}\right]$$




defects—had the greatest impact upon departmental productivity; it thus was awarded a 40 percent rating. The other ratios were assigned lesser values, with the total of the four adding up to 100 percent.

A mathematical adjustment is then made so that the ratios can be compared on the same scale. To achieve this, an arithmetical base factor must be created. (An arithmetic base factor is calculated as a reciprocal of a number that falls within a ratio's normal range of values.) For example, in Figure 2, ratio 1, the number 100 falls within the normal rate of recorded values. The base factor, then, is the reciprocal of 100, or 0.01. This number (enclosed in parentheses in the CSI formula in Figure 2) serves to "level off" the wide discrepancy of range values of the various indices. In our example, the third ratio, for instance, covers a range of values that is 1.9 times that of the first rate.

By multiplying the various ratios by an arithmetical base factor, their values are equalized. Thus management is provided with a more meaningful view of the data, in which fair comparisons between the various factors can be made.

The final composite index is obtained by simply adding the weighted and adjusted values of the performance ratios.

The resulting index serves as a useful yardstick for measuring the effectiveness of a specific organizational component against itself over a period of time.

Since the choice of base factors influences the overall values of the various indices of various departments, this figure cannot be used to compare different organizational components until the departmental indices are also weighted and adjusted arithmetically.

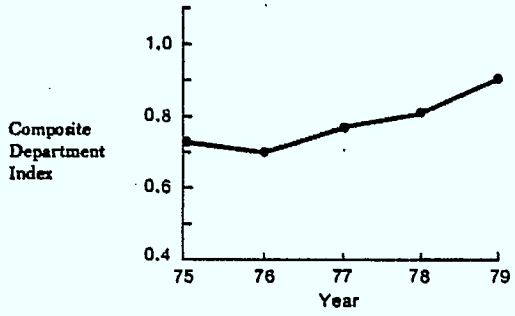
Figure 3 illustrates how four indices from department sections can be combined to yield a composite index for a total department. (After the sectional indices [CSI] were weighted by management, it was determined that the first three ratios had a combined index weight of 90 percent, while the fourth index was awarded a 10 percent weight.)

This process can be taken a step

**Figure 3**
**Productivity Measurements**
*(Total Operations Department)*

| *Indices* | *Year:* '75 | '76 | '77 | '78 | '79 |
|---|---|---|---|---|---|
| 1. Production CSI | 0.826 | 0.816 | 0.828 | 0.879 | 0.892 |
| 2. Manufacturing Planning CSI | 0.658 | 0.534 | 0.714 | 0.753 | 0.845 |
| 3. Quality Assurance CSI | 0.608 | 0.477 | 0.503 | 0.513 | 0.590 |
| 4. No. Productive Employees / No. Operations Employees | 0.704 | 0.689 | 0.714 | 0.720 | 0.724 |
| Composite department index | 0.745 | 0.726 | 0.763 | 0.808 | 0.839 |

$$CDI = 0.9(1.0)\left[(1.1)(\text{Production. CSI})\left[\frac{\text{Prod. salary \& benefits}}{\text{Dept. salary \& benefits}}\right] + 1.1(\text{Mfg. Planning CSI})\left[\frac{\text{Mfg. Plan. salary \& benefits}}{\text{Dept. salary \& benefits}}\right] + 1.25(\text{Quality Assurance CSI})\left[\frac{\text{QA salary \& benefits}}{\text{Dept. salary \& benefits}}\right]\right] + 0.1(1.4)\left[\frac{\text{Productive employees}}{\text{Total Dept. employees}}\right]$$




further to develop a composite index for the total division. This final set of indices, obviously, should include only the factors that have a bearing on the division as a whole.

### Monthly updates

To be meaningful, the basic data compiled for the various departments should be updated on a monthly basis. Management should utilize discretion and evaluate the rationale for the established ratios on a periodic basis, especially if the organization itself changes.

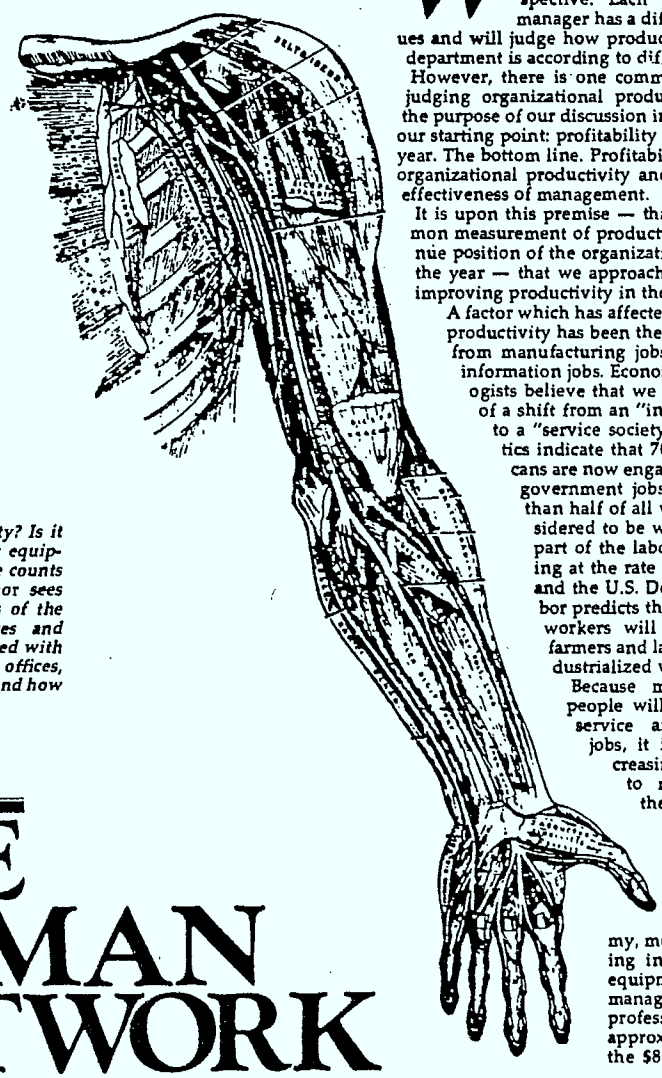
While monthly measurements are necessary in most cases to generate a useful set of indicators, it should be kept in mind that the usefulness of the various indicators is based upon trends over the long term. Thus normal monthly variations should be discounted.

Familiarization with the methodology and generation of the initial set of data demand time and effort. Maintenance of data, however, requires only a nominal investment of time.

Once established, the system provides management with a useful set of indicators to monitor white collar productivity. The payback, in terms of improved departmental effectiveness, should more than justify this initial investment. •

---

David L. Rowe *is an associate consultant with Westinghouse Electric's Corporate Productivity Center, the first corporate-funded center devoted exclusively to improving productivity on a corporate-wide basis. His article is based on a pilot study conducted by Mr. Rowe and his colleagues at a major Westinghouse division. The methodology described has since been adopted by several other Westinghouse divisions to monitor white collar productivity.*



*What is office productivity? Is it word and data processing equipment, bits and bytes, page counts and printouts? The author sees three critical components of the office: People, Procedures and Equipment. He is concerned with the people who work in offices, the kind of work they do and how it gets done.*

*By Harry Viens*

# THE HUMAN NETWORK

When talking about productivity, it is important to keep it in perspective. Each organization or manager has a different set of values and will judge how productive a person or department is according to different standards. However, there is one common standard for judging organizational productivity and, for the purpose of our discussion in this article, it is our starting point: profitability at the end of the year. The bottom line. Profitability reflects total organizational productivity and the leadership effectiveness of management.

It is upon this premise — that the only common measurement of productivity is the revenue position of the organization at the end of the year — that we approach the problem of improving productivity in the office.

A factor which has affected the U.S. rate of productivity has been the shift of workers from manufacturing jobs to service and information jobs. Economists and sociologists believe that we are in the midst of a shift from an "industrial society" to a "service society." Recent statistics indicate that 70% of all Americans are now engaged in service or government jobs and that more than half of all workers are considered to be white-collar. This part of the labor force is growing at the rate of 2% each year, and the U.S. Department of Labor predicts that by 1990 office workers will outnumber the farmers and laborers of the industrialized world.

Because more and more people will be engaged in service and information jobs, it is becoming increasingly important to make sure that they are productive. As we become more of a service and information economy, more money is being invested in office equipment. While managers and other professionals receive approximately 60% of the $800 billion spent

annually on salaries and benefits for office-based white-collar employees, most of the time and money spent in the office has been to make the clerical staff more efficient. A Booz Allen & Hamilton survey recently predicted that by the year 1990, white-collar operations will exceed $1.5 trillion annually.

In addition, a recent survey conducted by Louis Harris and Associates of a cross-section of 1,004 office workers in the U.S. indicated that they believe they could do more work in a day if the conditions and circumstances they work under were changed.

### No 'Quick-Fix'

In view of these statistics, it becomes evident that any effort to increase the rate of productivity in America cannot ignore the office environment. Increasing productivity, however, whether in the office or in a factory, is not a simple task. It cannot be accomplished by the application of a "quick-fix" solution such as simply buying expensive new equipment or firing workers and demanding more from those who remain.

Frequently, the solutions which are offered in hopes of improving productivity focus on only one of these areas. Most common is the assumption that new, advanced office equipment will automatically solve the whole problem. Technology, however, while playing a potentially major role in productivity improvement programs, is not the whole answer.

Above all, it is important to remember that the office is a human network, where people — with their different habits, attitudes, abilities and needs — are the central element in the office environment. Office solutions that bypass people and the way they perform their work will clearly not be effective.

So, while businesses are making profits, there is always room to improve, to capture more of the market and become more productive as a total organization.

We believe a better corporate understanding of the factors that contribute to making office workers more effective and efficient would greatly enhance efforts to improve an organization's overall productivity.

***What are these productivity factors?***

We suggest that any effort to improve the organizational contribution of office workers be assessed in terms of people, procedures and equipment. There is no mystery to this approach. It is a very commonsense way of looking at what often seems to be a confusing office environment. But successfully improving and integrating these three elements of the modern office cannot be done without hard work and patience.

### People Factor

People are the life-blood of organizations and if people aren't productive, their organizations aren't productive. From secretaries to top management, employees must be motivated to do their jobs the best they can for success to be possible.

It can be said, of course, that this is obvious — that management learns how to motivate and manage people through on-the-job experience and business education. Certainly, that should be the case, but how many times has a new way of doing things failed to work because the people who have to make it work were not involved in, or supportive of, the change? How many times have managers gone through a lot of work to make a procedural or system change, and then found that the problem all along was really a "people" problem?

Without question, the interpersonal and leadership skills of managers play an important role in influencing the productivity of subordinates. And it is frequently overlooked that such skills can stimulate high levels of effectiveness and efficiency in the office, even without the aid of new procedures or equipment.

Research into managerial work habits indicates that management is not really the science some think it is, but rather an art. And the art must be further developed and refined with regard to leadership and motivation if office worker effectiveness and efficiency are to improve.

The office has traditionally been treated as if it were a factory, where centralization and assembly-line-type procedures could be applied to increase worker productivity. Computerization of manual office functions has often reaped savings, but the impact on worker effectiveness has more often than not stopped there. Middle managers have frequently resisted the centralized mainframe computer, viewing it as unresponsive, overly structured and isolated from their daily decision-making environment.

Cost savings and quality improvements in the early days of centralized word processing were also lower than anticipated. Savings were sought through more efficient typing, but it turned out that clerical staffs do not spend most of their time typing. Quality levels were often inconsistent largely because quality was still directly related to the individuals who compiled, wrote and typed the material.

Similarly, many managers rely excessively on written and more structured communications, ignoring informal lines of communications with subordinates. It is very important that subordinates have verbal and lateral contact with their managers; it satisfies their need to participate and allows the manager to get honest reactions and feedback that would not come through in a one-way memorandum. Recent surveys indicate that workers believe they could be more productive if they were to receive more encouragement from managers and supervisors.

In general, it is a good policy to design new office systems and procedures around those that have to make them work — be they managers or support staff — rather than unilaterally force changes and be sorry later.

Make more environments "good environments." In the survey conducted by Louis Harris and Associates, Inc., it was found that the majority of office workers feel there is a strong correlation between the quality of work environments and the quality of job performance.

For instance, 71% of office workers felt that improvements in air temperature and circulation would help make them more productive. A majority (67%) also cited a need for quieter offices to increase concentration. And 54% thought better or more office equipment could contribute to improved work output.

The office is a dynamic place where people often work on several projects at once and are frequently interrupted by the phone, their superiors, or other workers who need information. It is a place where information must be easily accessible and readily understandable. Office work is a mixture of repetitive, standardized, structured activities and the often spontaneous unstructured activities which characterize the information flow between higher level employees.

Studies show that managers work at an unrelenting pace; their activities are characterized by brevity, variety and discontinuity; they are strongly oriented to action and dislike reflective activities.[1] Managers strongly prefer the verbal media of telephone calls and meetings to any highly regulated hierarchical decision-making system. Also known from previous research is that the vast majority of mail a manager receives is of no immediate or specific use in making important decisions.

Certain human characteristics must be carefully considered when planning the office environment. For example, people have a limited ability to recall information. They need to converse and interact with others. They need a certain amount of privacy. They need to move around to retain their vitality. They need positive feedback and recognition And, they like attention. The famous Hawthorne experiments taught us some time ago that attention is in itself a motivator.[2]

So what does this tell us about office design? Most importantly, it tells us that the office environment does have an influence on job performance in terms of personal comfort, work flow and the employee's capacity to assimilate and access information.

There are many examples of the negative effects of "bad" environments and bad office design. The important thing to remember, however, is that there are as many ways to design offices as there are organizations and individuals to design them for. There are no absolute right or wrong ways to do it, but there are a few proven successful practices:

1. Involve those who will be using the space in the planning stage.
2. Design office space only after you understand the needs and work characteristics of those who will be using the space. In other words, know their procedures and how they use various office equipment.
3. Whenever possible, allow individuals the freedom to make adjustments to their office space. Permit the individual as much creative expression as possible.

Make more jobs "good" jobs. In the late 1970s, the term "quality of work life" gained wide currency in the field of industrial relations. A fuzzy, broad, inadequate term, it sufficiently confused enough people to stimulate numerous authors to define it and detail how it could be achieved in the work place. Everyone — authors, rank-and-file workers and managers — ultimately had their own definitions.

Thanks to the American Center For The Qualify Of Work Life, the meaning of the term has since become more focused and better defined.

### Primary Problem

One of the primary problems with the term is that "quality of work life" isn't a single, specific notion. Rather, it subsumes a whole collection of terms and notions, all of which really belong under the "quality of work life" umbrella:

- Industrial effectiveness.
- Human resource development.
- Organizational effectiveness.
- Work restructure.

**"There are as many ways to design offices as there are organizations and individuals to design them for."**

- Group work concept.
- Labor-management cooperation.
- Working together:
  Worker involvement.
  Worker participation.
- Cooperative work structures[3].

The "quality of work life" concept suggests that human energy can be more easily released and applied by adapting traditional organizational management methods to the needs and values of the 20th-century worker. This adaptation is particularly important in light of the changing nature of the world work force — from a heavily production-oriented labor force to a service- or information-based labor force.

We should try to make more jobs "good" jobs. A substantial portion of office jobs are currently characterized by low pay, little training or advancement, little job security, authoritarian supervision and arbitrary discipline.[4]

In the production environment, the result of having too many jobs with these "bad" characteristics was absenteeism, rapid turnover and, most important, "don't-give-a-damn-ism." Employee commitment to the product, the company's competitive position and the quality of their own work all deteriorated.

As with the office design, there is no universal solution. Each organization must customize its solutions to its own unique character. This will happen naturally if people participate in the problem-solving process, with the support of top management. By recognizing people as the most important variable in improving organizational effectiveness, the quality of work life approach could do much to enhance organizational productivity.

***What Is A Procedure?*** Normally, we tend to think of a procedure as a predefined sequence of activities required to complete a particular task or objective. From this perspective, procedures can be viewed as a means of establishing control over a process, thereby ensuring consistency in timeliness and quality of response to a given problem or set of conditions. Procedures serve as control mechanisms in an organizational structure.

Procedures can also be viewed as a way of minimizing the time people need to complete a task. Or they can be seen as the result of the natural human tendency to make work easier by establishing a process that can be routinely followed.

Regardless of how one perceives office procedures, there is an underlying reason for their existence. Procedures, after all is said and done, are really efforts to control the use of knowledge within an organization — knowledge being defined as useful information (financial reports, sales orders, credit authorizations, invoices, memos, telephone listings and so on) that has been captured within the organization, in one form or another. Thus, we can look at the office as a sort of clearinghouse for knowledge, and procedures as the vehicle we use to help us utilize this knowledge and achieve our organizational objectives.

Procedures can be loosely or strictly enforced. They can apply to long-term projects or everyday activities. They affect everything from the filing of information to the processing of sales orders to the dictation of memos. They can evolve around computers, or have nothing to do with computers.

People and procedures are inseparable. Efforts to improve productivity through improvements in procedures and work methods must address total systems — not just individual effectiveness or efficiency. Procedures relate to the total process. For this reason, it is important to understand corporate or departmental objectives before implementing or changing procedures. It is important to ask: "What is it we are really trying to accomplish?" Is it more work, faster work, higher quality work, better customer service, cost cutting, elimination of red tape, more competitiveness or better management?

Once the objective is understood, it will be easier to design appropriate procedures and work patterns. A manager can then go to his staff or subordinates and say: "This is what we'd like to accomplish. What do you think? It is realistic? Can we do it? How would you do it? How do you see yourself fitting in?"

A natural conflict often exists between people and procedures, as is the case when organizations employ rigid control systems. These systems help organizations minimize redundancies and inefficiences, allow for careful monitoring of important aspects of organizational performance (for instance, productivity, financial status and staffing levels) and provide a concrete basis for taking corrective action. However, such control systems also tend to limit the complexity and challenge of jobs. In an attempt to pinpoint accountability, these systems often specify in considerable detail exactly who is to do which tasks — thereby restricting the autonomy in jobs.[5]

Successful productivity improvement programs in such environments require the use of tailor-made strategies. Take the following strategy used by a middle manager in a large bank who wanted to make changes in her department. In this case, virtually all organizational systems were thrown into disarray as

**"With the current burgeoning shift from the factory to the office has come a perceptible shift in computer applications."**

plans were being laid for introducing new data processing equipment into the department and, as a by-product, reducing staff size by almost one third. The manager was responsible for redesigning the work flow around the new equipment and she took the opportunity to create a motivationally sound set of jobs.

She began by conducting a diagnosis of existing jobs, to identify existing motivational strengths and weaknesses. She then persuaded her staff to generate fresh ideas on how to enhance the motivating potential of the new jobs. The new ideas were then tried out by some of the people who would fill the redesigned jobs and were further revised, based on their reactions and suggestions.

Finally, when the basic work flow and new job descriptions were almost ready, she examined each operating system in the unit and made changes where necessary to ensure that those systems would fully support the work and the employees. The payoff for all of her efforts was a relatively smooth implementation of the new system, with minimum employee dissatisfaction.[4]

***What differentiates good procedures from bad procedures?*** As with measuring productivity, choosing the best procedure for a given work situation is largely a subjective judgment. It is also what managers get paid for. There are no hard and fast rules and the needs of no two organizations are the same.

There are, however, some characteristics of good procedures and productive management attitudes towards procedures in the office:

1. Good procedures not only contribute to the achievement of corporate or departmental objectives, but they also allow those involved to take pride in and identify with the completed product or service.
2. Good procedures allow those completing the work as much autonomy as possible in scheduling the work and carrying it out.
3. Good procedures incorporate feedback mechanisms to provide office workers direct, useful information on the effectiveness of their performance.
4. Good procedures assign to people what they do best and to machines what they do best. Since organizations are increasingly installing more and more computers or computer-based word processors, this is a critical point.
5. Good procedures help meet the needs of the individual, as well as those of the organization.

Similarly, good management attitudes toward procedures are characterized by:

1. An openness to procedural changes.
2. A commitment to looking for new ways to improve a process or system.
3. An active encouragement of workers' offering their perspectives.
4. An awareness of the total system and desired objectives.
5. A willingness to experiment, to tinker with the "system" by trying new ideas on a test basis.

With the current burgeoning shift from an industrial to a service economy, from the factory to the office, has come a perceptible shift in computer applications. From its traditional use as a control and number-crunching device — typically centralized and in the realm of the programmer, systems analyst and data processing specialist — the computer is increasingly being applied as a decentralized tool for helping office workers at all levels do their jobs. The focus is moving, quite naturally, from the centralized computer service approach of the past, to the decentralized "office automation" approach of the future.

***What is office automation?***

It is the process of optimizing, at any given time, the cost-effectiveness ratio of human vs. technological resources in the creation and management of knowledge in the office.

Implicit in this definition are several important ideas, all of which center on the People, Procedures, Equipment concept proposed here for improving productity in the office.

1. Office automation is a process, not a product; it is an attitude as much as it is an identifiable set of hardware and software. It is a commitment to considering new ways of doing work.
2. Office automation is an ongoing, dynamic activity. As people and organizations change over time, so too must office automation systems.
3. Office automation requires a careful consideration of the relative cost-effectiveness of human resources and machines. Basically, this means letting machines do what machines do best, while letting people do what people do best.
4. The objective of office automation is to improve the management of knowledge — information which has predictive or historical value — in the office.

Of these ideas, the one that relates most directly to equipment is the relative cost-effectiveness of applying machines or people to particular tasks. People are best at identifying tasks, evaluating the results and making decisions based on their experience. Machines, on the other hand, are much better equipped to perform repetitive, routine, tedious tasks — the kinds of tasks people should not only not do, but typically don't want to do. When computers

and people are optimally utilized, then, the result is not only improved cost-effectiveness, but an enhanced quality of work life for the employee.

The primary function of computers in the automated office is to condense the communication and decision-making process so that information can be acted on almost immediately upon being "captured" within the organization. When word and data processing leverage or replace human effort, they shorten the communications and decision-making cycle.

***Can an investment in equipment produce direct cost savings and a return on investment?***

Yes, it can. Typically, the savings take the form of displacing outside services, freeing up space and freeing up human resources through a reduction in manual effort. Equally important are the indirect benefits of such investments, which may range from improved customer service to more effective management decision-making to higher quality reports.

The possible cost of not investing in office automation should also be taken into account. These costs could realistically be quite high in terms of not having needed decision-making information available.

***Will equipment disrupt or contribute to the organization?***

The answer to this question depends on how well each organization understands the sensitivities of its people, the objectives of the organization and the limitations and uses of equipment. If equipment is forced on people, if it is not introduced with care, if it is perceived as a threat rather than an asset, if it does indeed make a job "bad," it will surely be disruptive.

People are the key to getting equipment installed and operating at optimal effectiveness. Equipment should be introduced and used to help individuals do their jobs better, not to overly simplify and diminish the meaningfulness of their jobs.

As managers who make decisions that impact many people, we should refine our management skills. As clerical workers, we should seek out more responsibility and show that we deserve it. We should consider it our obligation to tell the boss: "This might work better if we try it this way." And as planners, we should be concerned about the role of people in the office, about what challenges and motivates them and how technology will impact them.

To the extent that we are successful in creatively addressing our concerns and responsibilities, tomorrow's office will be a better, more productive, more rewarding place to work.

**Notes:**

[1] *Harry Mintzberg, "The Manager's Job: Folklore and Fact," Harvard Business Review, July-Aug. 1975, pp. 49-61.*

[2] *Robert Propst, "The Office: A Facility Based On Change," Herman Miller, Inc., 1968.*

[3] *Quality of Work Life; "What's In A Name?" General Motors Corporation, 1978, pp. 7-8.*

[4] *James Driscoll, "People and the Automated Office," Datamation, Nov. 1979, pp. 106-112.*

[5] *J. Richard Hackman, Mary Dean Lee, "Redesigning Work: A Strategy For Change," Work in America Institute Studies in Productivity, 1979, p.9.*

[6] *Ibid, p.14.*



*Viens is manager of corporate communications at Wang Laboratories, Inc., Lowell, Mass.* ◆

# *Productivity: Does It Scare the White Collar Worker?*

By John F. Fischer

Over the past year, we have been inundated with information on the decline of productivity in the United States. Everyone is pointing the finger at the American workforce and, in particular, white collar workers. We are constantly reminded that these are one of the primary causes of our spiraling inflation.

Like a superstar in the twilight of his career, the clerical workforce takes the worst of this attack, and searches in despair for the way to reattain the level of success once enjoyed by all American workers following World War II. Will ignorance turn despair to fear? It may, and here is why.

If we retrace our steps back to the 1940s, we see a nation's overnight rise to become the greatest and most efficient producer of goods in the world during a time of war. In 1945, the men and machines that produced military goods made a smooth transition to consumer goods. No one matched American technology, motivation, and ingenuity, and there wasn't a world market we couldn't capture if we so desired.

During this time and until the mid-fifties, we maintained the pace to a great degree with a workforce of 80 percent blue collar workers and billions of dollars invested in capital goods to support them. Today, that investment amounts to over $25,000 per blue collar worker, and for those engaged in farming, where we continue to be the world leader, the amount approaches $35,000.

These statistics are not new and have been repeated many times, but they do have a significant impact on how the descendants of the 1940s and 1950s workforce view productivity today. It may also explain why today's white collar workers are apprehensive when the term *productivity* is applied to their era, the eighties, where they represent over 60 percent of the workforce and are rapidly approaching the 80 percent level.

Productivity generally refers to units produced per person-hour. Today, this output is seen in terms of automobiles, television sets, nuts, bolts, etc. — in the form of mass production from an assembly line. They see highly sophisticated machines perform tasks that previously required hundreds of labor hours, faster and at a higher level of quality. They relate to this because their conception of work was formed by witnessing the preceding generation, comprised mostly of blue collar workers.

Although today's clerical force is acquainted, to some degree, with electronic typewriters and displays, they cannot visualize new technology replacing such tasks as filing, calendaring, answering telephones and a host of other administrative duties. Nor can they see technology providing the means to process massive paperwork in the form of invoices, receipts, etc., faster and more efficiently.

What today's clerical workforce does see when the word *productivity* is mentioned is working faster, or becoming a human robot. The result is a fearful, suspicious working climate. People's perception of improving clerical productivity is a reversion to sweatshops and the inhuman conditions prevalent in the 1930s.

Why do we find people in this state of mind? The main reason is that we are so intent on productivity as the salvation for our economic problems, we have never taken the time to explain it to the people who are responsible for improving it. We have inadvertently excluded the very participants who are essential to the success of our plans.

Several reports have indicated that people today want to do a good job and are looking for ways to improve their productivity. They would also welcome new technology to assist them. The average capital investment supporting a white collar worker a few years ago was approximately $2,000, only eight percent of the blue collar investment previously mentioned. A dramatic change in this ratio must and will come about in the 1980s as clerical support technology continues to arrive on the scene, and significant improvements are made.

Today's workers want to become involved in all facets of the office environment. Technology is only a part of it. Managers should encourage worker participation in improving operating methods and procedures, the interfacing of functions such as data processing with word processing, office layouts, and myriad human factor con-

Reprinted from IMPACT: INFORMATION TECHNOLOGY, with permission from the Administrative Management Society, Willow Grove, PA 19090.

sideration. This is easier said than done as we try to merge two schools of thought — the managers, mostly older personnel, versed in the 1950's concepts, and the new generation who seek new horizons.

It may be a difficult task but by no means an impossible one. We can start by exposing our white collar workers to new techniques and technology. We can communicate how improving productivity is the result of many factors, and will not be accomplished by armies of people manually processing paper or performing other activities faster, in a rigidly controlled work environment. We must spend more time communicating what productivity means and ways to improve it, and less time faulting people for its decline.

We must explain that improving productivity does not lead to layoffs and increased unemployment. To the contrary, we currently face a chronic shortage of office workers. We must inform the white collar workers that improving their productivity makes us more competitive as a nation. We cannot expect people to be motivated in an atmosphere of fear and ignorance.

With a positive approach, there is no reason why we cannot accept the challenge to improve productivity. The time is right. □

*John F. Fischer is a manager on the staff of Coopers & Lybrand's Office of the Future practice.*

# Interfacing People, Systems In Automated Offices

By Thomas R. Conroy, Director,
Office Technologies Appl. Research,
Control Data Corp.,
Minneapolis, Minn.

*(This essay is excerpted from a paper presented at the Information Management Exposition & Conference held in New York City.)*

This conference takes place at a very significant time, a time when one of the major challenges facing companies in the United States and many countries is the need for increased office productivity. The changes resulting from the needs for increased productivity during the '80s, will transform the office environment and materially affect the nature of work within this changed environment.

Subsequently, this will have a dramatic affect on all of us who work in the office, especially in the United States, where the knowledge worker is fast becoming over 50 percent of the work force.

Many organizations have taken some steps along the road to office automation, but have been frustrated by poor results and adverse effects on office behavior. Growing awareness of these situations is causing concern among organizations which in turn are becoming increasingly cautious in their approaches to the subject.

Control Data as a large (53,000 employees) international corporation has been actively pursuing the benefits of office automation for several years and is not removed from this concern. Our experience has been invaluable, because we now have first-hand knowledge in office automation, and are moving to develop a staff organization to support and coordinate corporate-wide development in this most vital area.

One of the first Control Data departments where we attempted to introduce "Office of the Future" concepts was our Traffic Department, which numbers about 70 to 80 people. This organization has the responsibility for the physical distribution and transportation of people, products and supplies, both internally and externally, domestic and international. This involves a high degree of paper-handling and verbal and written communications. Their critical activities have a major impact on our company earnings.

Our first experiment in the Traffic Department was to test the feasibility of using a remote word processing workstation in conjunction with our keyword textual-search database management system. The result is a highly efficient and effective workstation with word processing, text editing, distributed data processing and messaging capabilities.

The premise of this test was that the technology should be adapted to work needs. Further, that the trauma of change should be minimized and the secretarial/clerical role should remain essentially unchanged vis-a-vis the support to the manager.

Early on, we recognized that improving the productivity of our managers and professionals would provide the greatest return on investment in office automation. We realized part of this objective through leveraging the increased effectiveness of the office support functions.

Direct gains in productivity by managers and professionals can be realized through their use of electronic messaging and computerized information-filing and retrieval. Perhaps a more significant and yet subtle benefit has been their increased awareness of office automation, by leading them to apply these technologies.

The objective was to determine the changes introduced by office automation and to make these changes an accepted part of the way that people work. The implementation methodology used was developed to explicitly recognize the organizational, social and psychological issues. Attention and resources were committed to transferring the "new operational" applications to the user organization.

The experiment looked at the secretarial/clerical function as an originator, manager, communicator, scheduler and administrator of information. Additionally, we have found that the secretarial/clerical support role is not well understood in its entirety; that the technology is not totally responsive to the needs; that principals, including the managers and professionals, spend a great deal of their time in clerical tasks.

From this and other similar experiments, and based on the fundamental belief that it is easier for the office worker to understand technology than it is for the analyst to understand what goes on in the office, we should be able to develop a set of procedures to guide the office automation program.

Based on our preliminary experiments with the Traffic Department we have grouped our implementation

methodologies, which "bridge" the needs of the user with the capability of these technologies, under the term "Self-Actualizing Systems."

This methodology differs from the typical systems analysis and other computer-based approaches, in that, throughout the various phases of development, the user is in control, both as a participant and as a change agent.

This process differs from the standard "top-down" approach in that the users stay involved throughout the entire implementation of automation into the office. As they become involved in this process each individual becomes an integral part in designing applications that fit their particular job function.

In the past, technicians have designed systems that only they understand and can use. For years we have continually strived to develop "user friendly systems" — usually with the same results. A recent study has found that 40 percent of MIS systems that met the design specification have failed to gain user acceptance. When introduced to the office worker they do not succeed, not because the system isn't good, but because of the normal human response to change, compounded with the disregard for the human factor.

The humanistic approach to bridging the gap is a key factor, not only in the development phases of office automation, but also in this self-actualizing system process.

In order to ensure the success of this system, a "facilitator" is assigned the responsibility of working with the user organization.

It has been our experience that the expectations and associated frustrations encountered in many of the more traditionally developed systems are missing from humanized interactions. The catalyst for this improved process is the facilitator, a key member of the user team who is loaned from, in Control Data's case, our office technologies group. This group has representative skilled personnel in most of the technologies associated with the Office of the Future.

**"Increased involvement by users increases the motivation of the knowledge-workers supported by these new systems and thus contributes to increased productivity."**

The composition of this team, being so user-oriented and facilitator-led, unleashes many times the creative energy possible through previous traditional methods. Because of this new office technology it is far easier to aid the user in understanding the technology than it is for the analyst to understand the increasing complexity of the office environment.

An additional benefit of this high level of user involvement is that each user becomes an advocate in the attributes of office automation. Increased involvement by users increases the motivation of the knowledge-workers supported by these new systems and thus contributes to increased productivity. New career paths become available for users who, as they become increasingly familiar with the new technolgies, develop the potential for becoming the facilitators of tomorrow.

Much has been written about the projections of technological growth, and if the '70s are any indication of what we might expect in the '80s, we can readily believe that further development of the computer systems and technology will be both evolutionary and revolutionary. The "chip era" will continue on its fast track to "componentize processors" and memory systems to provide micro-miniaturized machine hardware, with which we can build digital automation products and distance-insensitive communication systems.

The changes associated with the introduction of new technologies into the office are far greater than office personnel have ever encountered. We are dealing here in an environment which not only contains a fairly complex set of relationships that are not well understood or structured, but ironically one that has been relatively stable for many decades. We are dealing also with well-developed office and information culture.

The issue is behavioral not technological. The challenge is to find a way to introduce office automation while minimizing the trauma of change. The systems introduced must be flexible and adaptable. The atmosphere one of excitement and challenge.

New implementation processes have to be developed which allow office automation systems to be created by the office worker so the systems will become self-teaching, self-designing, self-developing and self-maintaining.

It is time to put the freedom to choose back into the bands of the user, its the only way it's going to work. "Bridging methodologies" through "Self-Actualizing Systems" is the answer; how you develop and use them, is the challenge.

# The Office of 1990

# HUMAN RESOURCES

## The changing face of the workforce portends dramatic changes in management styles

By Joseph McKendrick

The workforce and work environment of the typical office in 1990 will be the product of perhaps the most dramatic upheaval in work relationships and demographics in North American history.

Gone will be the predominance of the 9-to-5 mentality with which companies packaged their daily activities. Gone will be the single, powerful boss who made all the decisions. And a smaller percentage of the employees will be males working to support a homemaker wife and family.

Indeed, the next several years will see the human resources world being turned upside-down. As one analyst put it, "human resources is *the* issue of the eighties."

The ways organizations are responding — the changes they are considering or implementing — are more than experimental or isolated cases. These adaptations will be the key to business survival and prosperity through the 1990s. The workplace is being radically restructured by the forces of economics, social change, and attitudes. An organization's very existence will depend on its ability to respond to these movements.

Our economic system is in the process of undergoing a historic transition, from a manufacturing-based economy to an information/service-based economy. White-collar employment, encompassing professional, technical, and clerical occupations, is displacing blue-collar, or manufacturing-related occupations. According to the U.S. Bureau of Labor Statistics, 53 percent of the workforce held white-collar jobs as of January 1981, compared to a little over 20 percent in 1950.

Demographically, the composition of the workforce will have changed by 1990. It is predicted that a majority, 61 percent, of all employees will be women. More and more women, due to either economic conditions or a raised consciousness about their potential, are now pursuing careers. In addition, members of minority groups, aided by equal opportunity programs, will make up a large part of the workforce and more will be moving into management ranks.

Lower birth rates in the 1960s — which wreaked havoc on school districts that had already expanded for

Reprinted from MANAGEMENT WORLD, with permission from the Administrative Management Society, Maryland Road, Willow Grove, PA 19090.

the previous "baby-boom" generation — will result in labor shortages by 1990. The number of young, entry-level workers is expected to fall sharply.

The massive boom generation, however, will be in the prime-age bracket, between the ages of 25 and 45, by 1990. There will be 60.5 million workers in this age bracket, with 37 million in the 35-to-45-year-old group, a jump of 55 percent over 1975. Their numbers will comprise over half of the workforce.

At this stage in their careers, this "bulge" generation will be flooding the management field with the largest influx of any generation before or after, resulting in stiff competition for promotions, professional recognition, and responsibility. Add to this glut a generation of older executives who are delaying retirement because their pensions can not keep pace with the cost of living.

Experts forecast that the trend toward early retirement will reverse, and the number of older workers will be increasing throughout the '80s. People are foregoing retirement for several reasons: they are in better health, inflation has hurt them, Social Security guidelines concerning additional income are more liberal, and they enjoy the social interaction of the workplace.

Traditional values, centered around the "work ethic," are becoming a thing of the past, according to studies conducted by Yankelovich, Skelly and White. In the 1980s, the percentage of people whose lives are based on traditional values will fall to 15 percent of the adult population. A 60 percent majority will adopt a new set of values centered around self-fulfillment, with the remainder of the population adopting a blend of both ethics. In the early 1970s, 60 percent of employees were still guided by traditional values. In addition, the number who agree that "hard work always pays off" has dropped from 58 percent to 43 percent.

However, people's willingness to work has not changed. What has changed are the values and composition of the workforce.

Looking back, most employees in the 1950s and 1960s were married men who were the sole providers for their families. The work was regulated by time clocks and strict rules. A "class system" separated hourly workers from salaried employees, who enjoyed more income, more privileges, and more self-fulfillment on the job. What the workers valued were the eventual material rewards of their hard work — such as a new house or a large car.

In the 1970s this changed as more and more workers began to resent managerial authority and job conditions, and place less value on material gains — and this began to show as their performance and commitment to the company deteriorated.

Members of the present generation of employees question authority and want to participate in decisions that affect their work. They want interesting work, preferring variety to routine and informality to structured settings. They want psychological as well as financial incentives — they are concerned with the "quality of worklife," or the humanization of their work environment.

A study conducted by Louis Harris and Associates, Inc., reflects further the changed attitudes toward work. Work is seen by a majority of employees as more than "earning a living" — it must be a source of satisfaction. The study found that most men and women rank attaining a personal sense of accomplishment as the main reason for working, above supporting a family. About one out of every two women would also rather work part time, as opposed to homemaker work or full-time work, in order to better meet their obligations at home.

Another finding of the survey reflects the growing importance of the balance between employees' family and worklives. It was found that more than two out of three compensation officials of major corporations will permit "job sharing," or allowing two half-time employees to share one job, within the next five years. At least half of these executives expect their companies to put their employees on flexible work schedules in five years.

There is a growing belief, according to Jerome M. Rosow of the Work in America Institute, Inc., that work schedules, travel demands, career pressures, and overtime should be balanced with employees' needs and responsibilities for family, leisure, recreation, and self-renewal. With the growing tensions between work and society, it will become increasingly important in the '90s to develop innovative ways for "prepackaging" work.

Rosow points out that there is a growing desire on the part of employees to participate in decisions that affect their jobs. The question of democratic management goes right to the heart of society itself. An organization is a total society in microcosm, and living in a free and open democratic system, employees are coming to expect that conditions in the workplace be compatible with the system at large.

**Employees are coming to expect that conditions in the workplace agree with the system at large — a democracy**

## PEOPLE VS. MACHINES?

By 1990, computer technology will be a large part of the office scene. As electronic office technology becomes more commonplace, so will pressure to "humanize" the automated office. Failure to weigh the human factor, in terms of the upheavals it will wreak on employee relationships and jobs, will cause resistance, and eventually will sabotage productivity improvement prospects.

According to a report compiled by Towers, Perrin, Forster and Crosby, the coming decade presents a challenge to introduce the human factor into the design of machines — making machines and the environment in which they are placed more responsive to the needs of those who use them. Technology, besides increasing productivity, can reduce frustration.

At this point, technological ad-

*Joseph McKendrick is assistant editor of* Management World.

vances are viewed by many as threats to job security, the report states. Technology and automation also affect self-esteem. People tend to bring their own low self-image to work, and are afraid the machine will reveal that their own worst fears about their inability to function are true. And third, it has always been socially acceptable to dislike machines.

The behavioral aspect of the automated office was recently examined by James W. Driscoll of the Massachusetts Institute of Technology at a meeting of the Office Technology Research Group. Driscoll stated that the current approaches to office automation have not paid off and are not likely to do so in the future, unless a humanistic approach, rather that a "systems analysis" approach is adopted in implementation.

Driscoll defines the humanistic approach as being based on the premise that office personnel are highly motivated, trustworthy, and capable of working with minimal control.

Office automation could have an adverse impact on clerical functions, and particularly women, as they occupy most clerical positions. According to Stephen Peitchinis of the University of Calgary, as quoted in *The Financial Post*, "If the electronic office were to be totally implemented within five to ten years, there would be a serious problem, because in those cases where automation has taken place, employment, mainly of women, has fallen 30 percent. But I don't think it's likely to happen that fast. I doubt it will occur before the year 2000."

It is also claimed that automation efforts will block women's career paths. According to Helen Menzies, author of *Women and the Chip*, very few women who perform clerical functions are promoted into the expanding professional ranks, due to a lack of technical knowledge and the prevailing management attitude.

These accusations are helping to form the base of an office union movement which may be a force to reckon with by 1990, especially if they grow as strong as European office unions already are.

Organized labor has been working more closely with women's groups. One group organized from a network of clerical advocacy groups, Working Women, serves as a link between unions and women's groups. Out of this alliance came District 925 of the Service Employees International Union, which is launching organizing drives for women office workers across the nation.

The major concerns voiced by clerical workers, which the activists want to use as rallying points, include: work reorganization, where automation has placed female clerical workers in low-skill, boring, and monotonous jobs; health, especially in matters involving stress and eyestrain from working at video display terminals; job displacement; and low pay.

Office automation could have an adverse impact on clerical functions, and particularly women, as they occupy most clerical positions

The difference in salaries between males and females will also affect the workforce over the next decade. At this point, according to U.S. Department of Labor statistics, women earn, on the average, 60 percent of what men earn. The issue of comparable worth is likely to result in the restructuring of pay scales for positions held mainly by women by 1990. There will be efforts to upgrade the salaries of positions which are female-intensive, such as clerical and secretarial positions.

## QUALITY OF WORKLIFE

A key workplace issue involves efforts to improve the quality of worklife, one of the major issues to be confronted by 1990. Many of the prospective changes in the nature of work will result from new attitudes toward work and responses to the needs of a growing number of women, minorities, and older people in the workforce.

Flexible work methods are a means to adapt to the needs of this new workforce. Such methods include:

- *Flextime:* flexible working hours, where employees choose their starting and quitting times, usually revolving around a set of core hours when all personnel must be present.
- *Permanent part-time employment:* this is beneficial for older employees or employees with family needs, as they can work less than a standard full-time day or week.
- *Job sharing:* two employees can split one full-time job, another form of part-time work.
- *Flexplace:* the employee works from his or her home or from a branch office close to home. This is now a possibility with remote workstations installed in employees' homes. Decreasing energy resources and inefficient transportation systems, rising fuel costs, and the increased awareness of the handicapped will make such arrangements desirable.
- *Compressed workweek:* employees work full-time hours in less than five days — for example, the four-day workweek with workdays ten hours long.

Attaining job satisfaction will also hinge on the employers' ability to match the right jobs to the right employees. In addition, management will need to provide for the personal and professional growth of employees, providing comprehensive, ongoing management and development programs.

In the next decade, employees at all levels will have a greater role in decision making through participative management programs. The rise of quality circles is one example of the increasing emphasis on employee participation. Actual employee ownership of companies through pension funds and stock ownership will increase.

By 1990 we can expect to see development of new values, new work schedules, and a changed workforce, translated into a new, dynamic approach to management. Increased productivity and increased satisfaction at work are two elements that do not contradict each other. It is the right combination for success through the next two decades. □

# The Importance of Strategic Planning in Office Automation

**By Brian R. Blackmarr**

A frequent concern of organizations wishing to improve their office operations through the implementation of appropriate office automation is how to prepare for this from an organizational standpoint. Usually included are concerns as to where various responsibilities should be assigned and how to direct the office automation effort; the planning and implementation stages and the operational phase. In addition, there is often the need to get various levels of management involved and aware of the potentials, and a desire to "stave off" or hold back precipitous ill-conceived actions by managers who seem in a tremendous rush to move immediately.

While the management and organization of office automation certainly should be considered a major effort, and will vary in each organization, there are a few basic principles which must be adhered to. The first and most important is that the effort must have *visible* top management support. To effectively utilize office automation as an information resource, as it will cross organizational boundaries, direction from the top is absolutely necessary to get everyone to work together. Without visible top management support the study and design efforts will often be hampered by a lack of cooperation and incomplete or misleading data.

It's also a fact that office automation should mean more than automating what may be inappropriate or awkward manual office processes. This means the *way* we work using office automation will be different; the office activities and jobs of both the professional and support staff will be modified. Without visible top management support we are much less likely to effect these changes in the way they should be made.

This leads to the second major point — the participants in office automation need to be "sold," not ordered, to help the effort. Although we need the support of top management, often this is primarily intended to get everyone's attention, let them know we're serious and that this is not a trivial task, and to encourage them to listen to and honestly consider the recommendations for moving ahead. Again, it is often necessary to have top management assist with a firm nudge to get the change process rolling.

We are not implying the operating staff would need to be ordered to cooperate. Rather, we need to lead the users into change by thorough planning, careful analysis of the impacts and descriptions of the reasons as to why they would *want* to change, and most of all, by open and frank communication. A plan for office automation which is developed solely by a team of technical specialists and stuffed down the collective throats of mid-level management is headed for trouble, if not failure. If they have the desire to do so, users can prove that any idea you've developed won't work well on a day-to-day basis. To avoid these problems, there must be open communication, a cooperative project effort and "sales" of the changes to all levels of managerial, professional and support staffs.

Some additional organization factors include the requirement for technical planning and the timing of long-term improvements. While much of the true development of office automation does not require technical gurus, we do need at least limited assistance from the existing technical specialists in communications and database systems. After all, office workstations are quickly becoming an integral part of the information networks of most large organizations. To ensure compatibility, we need to develop specifications and standards for use in planning and procurement.

This brings us to the issue of timing and the fact that many of the most important features of office automation will require a careful phasing-in procedure over a fairly long period. The organization needs to be structured to provide continuity and support to multi-year efforts, not a series of discrete and discontinuous unrelated projects resulting in a "stutter-step" implementation.

Given this basis for organizational and project support requirements, the overall effort may be organized into a layered structure which includes elements to address each need. The structure includes three separate units: an office automation committee, a strategic planning subcommittee and the project team(s).

The office automation committee (OAC) resembles a steering committee and is comprised of up to about 10 to 12 individuals from various parts of the organization. This group meets on a monthly basis to review the results since the last meeting and to express concerns and questions from the organizational unit they represent. The members may be executives or their designated managers.

Typically, the true function of the OAC is largely one of communication and also assisting in establishing pri-

Reprinted with permission from IMPACT: INFORMATION TECHNOLOGY,
a publication of the Administrative Management Society.

orities. There are no project assignments *per se* to OAC members and their time commitment is quite limited. This group can also effectively slow down overly ambitious individual department or division efforts until the job can be done right.

The second group, the strategic planning subcommittee, is a smaller group that consists of the technical specialists and the others necessary to plan long-term office automation development. Included might be a personnel representative, an MIS person and an administrative division person. This group of no more than six to eight people meets on a monthly or biweekly basis and also reviews ongoing office automation progress.

The group also has the responsibility of developing technical specifications and operating recommendations in areas such as office automation and job descriptions. They monitor technical developments, new equipment, and the like, and prepare all their results in the form of recommendation reports to the OAC. All such recommendations should be fully explained and cost-justified, not vague "wish lists." A member of this group should also be responsible for a "sign off" of all equipment acquisitions.

On an annual basis this group should also prepare a strategic plan describing the planned development in office automation over the next three to five years. The efforts of the strategic planning subcommittee thus provide the necessary long-term support and continuity needed to tie the effort together from an overall organization standpoint.

The final group (or groups, depending on the magnitude of the effort) is the project team. The project team is responsible for analyzing, planning and implementing office automation in a specific portion of the organization. Where time and circumstances permit, the project team will address the organization in one major unit at a time and basically step through the entire organization at a local level on a prioritized basis. If time doesn't allow this approach, then a solution would consist of several simultaneous project team efforts.

Each project team is comprised of specialists and representatives of the areas being studied and may include up to about six people. These individuals all spend considerable time on the project (at least one-quarter of their time), and will stay with the effort through start-up. They will also be responsible for establishing ongoing performance reporting and will conduct a brief post-implementation audit about six months after start-up.

The efforts of the project team fall under the plans and standards developed by the strategic planning subcommittee. The project team presents its results to the OAC on a regular basis. All such presentations are written and are as quantitative and brief, yet factual and complete, as possible.

The overall office automation effort may be directed by the OAC, but if the OAC is big and meets only on an occasional basis, the effort is frequently the prime responsibility of a project director. The project director is then chairman of the OAC and directs the day-to-day efforts. When external specialists and consultants are used to assist the various efforts, they report to the project director.

Although this organization structure might seem rather large or complex, it works well in practice and addresses the needs of the increasingly complex area of office automation. Only by establishing such a carefully designed organization structure can we effect the changes so vital to efficient operation over the next few years. □

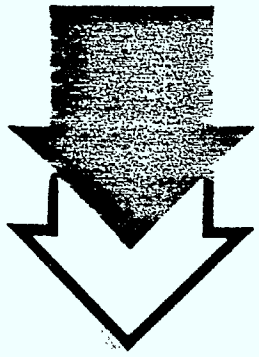
# The Frustration Factor And How to Avoid It

## Technology is only as productive as the people who use it. Ergonomics, the science of human factors engineering, points the way to designing machines that are responsive to the user.

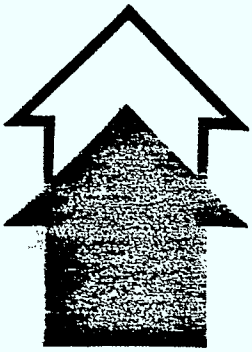
*Lately there has been a questioning of the work ethic, especially by the young. Communiques from the assembly line are frequent and alarming: absenteeism. On the evening bus, the tense, pinched faces of young file clerks and elderly secretaries tell us more than we care to know. On the expressways, middle management men pose without grace behind their wheels as they flee the city and job.*
*—from "Working" by Studs Terkel*

For many, frustration is a constant companion in the work environment. The pressures of a demanding pace and the anxiety caused by unreliable machines can combine to produce angry, frustrated employees, who, because of their frustration, are less productive, less efficient, and unhappy.

By the time Arnold Toynbee popularized the phrase "the Industrial Revolution," people had realized the impact technology could have on increasing both the rate and the volume of production in factories. Along with an increase in the speed of every kind of production, the Industrial Revolution brought serious problems to the American workplace. Industrial accidents were frequent. Lighting was poor, factory air was unhealthy, and unemployment was always a threat. Some workers lost their jobs to machinery. And, as workers saw their skills replaced by automation, frustration became a constant on-the-job companion.



**The key to a successful office system is its ability to let people feel that they control the system, rather than being controlled by it.**



Frustration is still with us. The pressure to produce faster and more efficiently has never been greater, and people must painfully try to keep up with technology that always seems to outpace their abilities.

Offices in the U.S. generate approximately 600 million pages of computer printouts, 234 million photocopies and 76 million letters daily. And all this paper (about 45 new sheets of paper a day per office worker) is threatening to overwhelm us in a flood of information.

Towers, Perrin, Forster and Crosby, a Chicago-based marketing research firm, has conducted worker attitude surveys that yield graphic descriptions of employee frustration:

- "Whenever I use the new word processor, I have to squint my eyes to read what I've typed. My eyes are blood-red by the end of the day."
- "You've really got to be careful when you use this machine. One wrong move and you can undo hours of work."
- "Whoever designed this thing must have forgotten that humans have only

*This article is based on the study "Frustration in the Workplace, Its Effect on Productivity," which was prepared for A. B. Dick Company by Towers, Perrin, Forster and Crosby, a Chicago-based marketing research firm.*

Reprinted with permission of GOVERNMENT DATA SYSTEMS, Vol. 10, No. 5
September/October 1981. 

two hands."

The challenge is to introduce the human factor into the design of machines —making machines and the environment in which they are placed more responsive to the needs of those who use them. Besides increasing efficiency and shortening production time, technology can help reduce frustration as well.

**Frustration's Impact on Productivity**

"No economic issue is more important or more poorly understood than productivity," writes Alvin Toffler, author of "The Third Wave." But it is clear that frustration has a direct negative impact on productivity, especially if there is no relief in sight. The absenteeism alone that results from worker frustration is estimated to now cost American employers $26 billion per year.

Some workers even sabotage equipment to relieve the frustrations they find in their work environments. Such sabotage ranges from disabling a typewriter to the malicious destruction of large pieces of machinery, closing down plants for extended periods.

The relationship between employee attitudes and productivity was first studied by social scientist Elton Mayo in experiments conducted at Western Electric Company's Hawthorne Plant in Chicago from 1924 to 1932.

Looking for a correlation between the amount of illumination in a workplace and employee productivity, Mayo studied two groups of workers who were producing the same part. He varied the light for one group and kept the light constant for the other. To his surprise, *productivity rose for both groups*. Even when Mayo told workers that the intensity of the light was going to be changed and then it was not changed, productivity continued to rise. Mayo then conducted a second series of experiments varying temperature, rest periods, humidity and other factors. No matter what varied, productivity increased when workers sensed a change that would make their working environment more comfortable.

Mayo saw that a significant variable was not physiological but psychological and concluded that social and psychological influences could produce greater productivity than changes in wages and hours.

Although his studies have since been amended and qualified, the phenomenon Mayo observed in the 1930s continues to be observed and is referred to as the "Hawthorne Effect."

**Eliminating Frustration: Worker/Machine Harmony**

How can the negative impact frustration has on productivity be reduced? Start with the frustration in the working environment: humanize the workplace and concentrate on the human factor when adopting new systems and ordering new equipment.

"Many of the horror stories about companies that have tried to automate and flopped are related to this. The problems are 90% human and only 10% technology-based," Toffler writes.

The issue is not who should provide the human support services—vendor or customer. Equipment manufacturers and buyers both must pay attention to the human side of the equation. Vendors cannot think all they have to do is turn out a good machine and walk away from the human element. If they do, they ultimately will find it harder to sell their equipment.

Ergonomics is now getting a great deal of attention as businesses attempt to decrease worker frustration. Ernest J. McCormick, author of "Human Factors Engineering," defines ergonomics as "the process of designing for human use."

Henry Dreyfuss, in "Designing for People," agrees. "We bear in mind that the object being worked on is going to be written in, sat upon, looked at, talked into, activated, operated, or in some other way used by people individually or in mass. When the point of contact between the product and the people becomes a point of friction, then the industrial designer has failed. On the other hand, if people are made safer, more comfortable, more eager to purchase, more efficient—or just plain happier—by contact with the product, then the designer has succeeded."

To reduce frustration in the workplace, the human factors engineer attempts to make machinery more responsive to the needs to those who use it. The process the engineer uses is one that *purchasers* would do well to follow. First, the intent or objective of the new piece of equipment is reviewed. Second, the engineer must gather as much information as possible about those who will actually use the equipment. Primary considerations include:

- The level of education of the average operator.
- The height, weight and other physical characteristics of the typical operator.
- The physical limitations of the workers.
- Are the decisions to be made at any given time within the reasonable capability of the operator?
- When there is a choice, should a particular function be performed by the operator or by the machine?

When these considerations are addressed and the machine's design complete, intensive research should be undertaken to assure that the machine is responsive to the needs of those who will use it.

Human factors engineering, however, does not end with the design of the human side of the system. The environment in which the machine will be placed must also be taken into account. The nature of this environment will influence the productivity and satisfaction of the operator; a comfortable decor is seen as a reflection of managerial support for workers and their work.

The color of a machine or room, for example, can affect employees' reactions to it. Colors such as yellow and red tend to give a sense of warmth. Conversely, cool shades of blue, green and gray tend to give a sense of coldness and recession.

After accounting for the environment, to smooth the introduction of new equipment, the human factors engineer must include the development of appropriate training techniques, training programs and training aids.

Ergonomics is expected to receive increasing management attention. Tom Stewart, a leading European ergonomics expert, says, "Ergonomics can be highly cost effective through reduced error rates, increased productivity, and improved staff morale and motivation."

**The Office of the Future Reduces Frustration**

The cost of running offices is estimated to be growing by 12% to 15% each year; the $800 billion spent on office operations in 1978 is expected to increase to $1.5 trillion by 1985.

Dataquest, a market research firm, reports sales of word processors at $1.1 billion in 1979, and projects $2.25 billion by 1982.

Computer terminals, giving workers access to a variety of information, is replacing mounds of paper on office desks. And micrographics, according to an industry expert, will "increase productivity by making more data available, will help to locate the best or most appropriate data, and will increase the time available to use and interpret the data."

Electronic mail can send graphic or printed material around the world instantly. Businesses, which now spend

almost as much time delivering material as producing it, look to electronic mail as the way to speed the delivery process.

Indeed, the office of the future could be a significant departure from the office of today. As the journal *Upper & Lower Case* commented a year ago, "The automated office of the late 1980s may not be an office at all, at least not by current definitions of what an office is or does or looks like. The '80s will be an era of electronic desks, and the office will have new tools and equipment, new kinds of furniture, and a different kind of floor plan. The office may no longer be a distinct administrative department but simply one element of a coordinated office/data bureau/reproduction/communications operation. In fact, some offices may be portable. They'll be where you are. They'll be the size of an attache case, they'll receive mail, take dictation and transmit it to your secretary and possibly do more than you can do today with a conventional office and desk."

To increase overall productivity, however, managers will look to more than just efficiency from machine design; they will also ask that machines be designed to reduce frustration in the workplace. "A system, of and by itself, can have all the appearances of a panacea for correcting the non-productive aspects of office work, yet fail to be accepted. The key to a successful office system will be its ability to permit people to feel that they are controlling the system, rather than being controlled by it," says a marketing manager specializing in record systems operations. "If the executive is to achieve the desired results with the system, it must be accepted by the people in the office and, therefore, the people productivity factor, which is often a 'soft' dollar figure, must be included in the buy/no-buy equation."

In his book, "Quality of Worklife", Tom Erickson adds, "The focus today is on the human factor. This has become increasingly important and one of the reasons I see it evolving in the '80s. These changes in management of the human resources and the work environment will have a significant impact on productivity improvement. Those that make the transition effectively will have the competitive edge."

---

If the companies that produce office automation technology do not consider the frustration issue, they run the risk of perpetuating conditions that may stand in the way of productivity improvement as well as implementing the office of the future. Says Alvin Toffler, "I see automation, combined with office humanization, as essential steps forward. And the two must go together."

# Educating the Manager To Use New Office Technology

The momentum for change must come from within the user organization, and will succeed only if the process involves self-designing and self-teaching

BY THOMAS R. CONROY AND JACQUE BIEBER

CAN EXISTING office technologies be used to improve productivity and the quality of work life? Yes—by educating every employee in the office about technologies and changes that will make the office of the future a reality. A comprehensive AET&C (Awareness, Education, Training, and Consulting) program will give users the ability to successfully design and develop their own automated offices from beginning to end.

Impossible, you think. Indeed, those industries that are unable to implement an integrated/automated office in the next decade may well find it impossible to compete in the marketplace. Involving users in the design and development of the automated office is not an easy task, but it is one that is achievable if commitment, sound planning, and education are present. Certainly, it must be accomplished if businesses are to realize the full potential of the available technologies.

Managers will play a key role in converting the office of the future into the "office of the present." Managers who understand the problems of implementing change in a dynamic organization; the solutions an AET&C program can bring; and the methodology needed to set the program in motion will have a head start in the automation race.

## THE PROBLEM

Look around and you will discover that appropriate office technology is available in abundant supply. Almost daily some new technological advancements occur that will print a letter faster or store more information on less space. One would think that the combined effect of these technologies and the demand for improved office productivity would lead to rapid implementation and acceptance of existing technologies. Yet, offices are not automated. Why have corporations simply scratched the surface of available technologies? Why aren't more corporations actively establishing meaningful office productivity-automation programs?

Barriers exist that block implementing integrated/automated offices. There are the vendors who don't really understand the problems of the office—yet continue to produce equipment to solve those problems. Then there are the implementors—these are the business managers and planners who don't understand the dynamic behavioral issues of implementing massive change throughout a corporation on the level that would be required by an integrated office automation system. Finally, there are the users who are not sure what is expected of them and fear the changes that will occur when automation comes to the office.

In order to overcome these barriers, a number of questions must be answered that deal with the architectural, financial, behavioral, and procedural issues of implementation.

The predominant questions in each area are:

- *Architectural*—How should existing technologies be utilized?
- *Financial*—How can the use of such technologies be cost-effectiveness justified?
- *Behavioral*—How can change be introduced effectively in the dynamic office environment?
- *Procedural*—How can the information currently available be utilized to convert the office of the future to the office of the present?

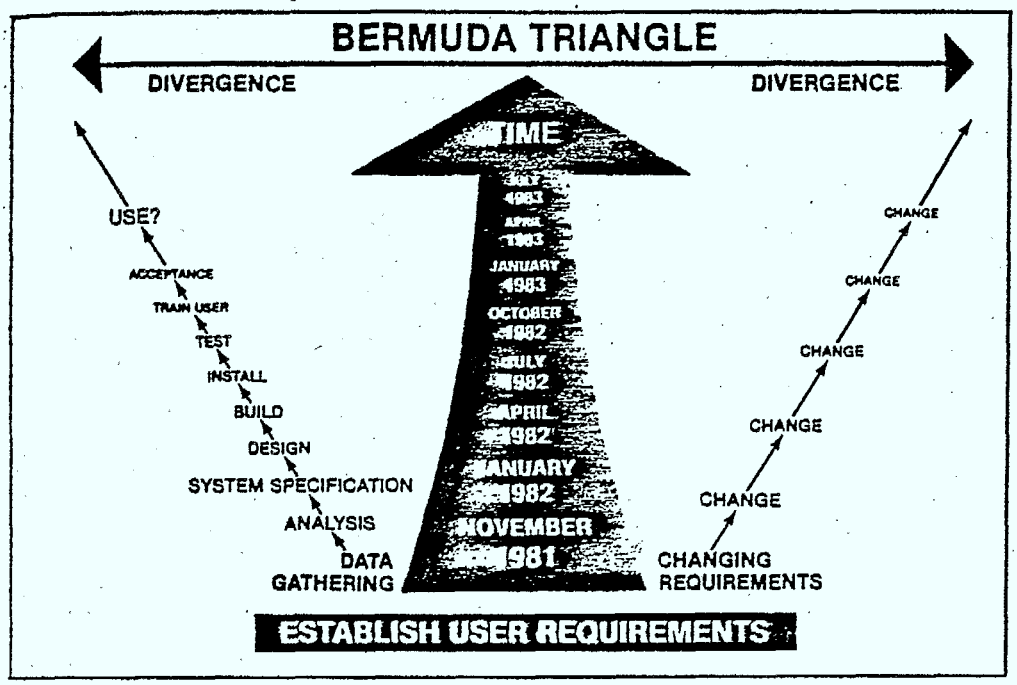
Or, to sum up all four areas, "How do we get from where we are to where we want to be?"

Before developing a plan on how to get from "here to there," let's examine what we know about the office. There are five things we know about office automation:

(1) The behavioral issues are not well understood.

(2) Though most of us work in the office, little is known about how the "office" functions.

(3) Those fascinated with technology tend to overlook organizational,




*Systems designed without user involvement cannot keep pace with the changing needs of the office. If no mechanism exists for incorporating these changes, the result will be a large divergence between the developed system and the users' actual needs.*

social, and psychological issues.

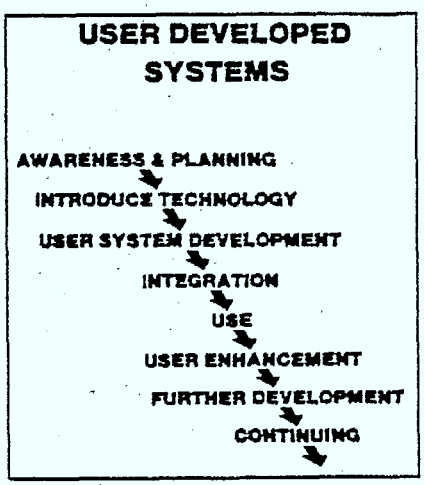
(4) Vendors of new services/equipment tend to emphasize new technological breakthroughs, rather than user benefits.

(5) The office worker is not educated in new technologies and their potential.

These "five things we know about office automation" have been learned through experience and failure. A very large percentage of the installed MIS systems that met specifications have failed to gain user acceptance. Why? Because as computers are brought closer to the dynamic parts of an organization, new problems occur and the standard systems implementation methodology that has worked well in the past is now failing. That old methodology meant taking the work out of the office to automated computing centers. Today, the work needs to be done in the office where it originates.

Implementors using the system implementation procedures of the past are often caught in the "Bermuda Triangle" (see illustration above). System specifications were designed, built, installed, and tested by systems analysts with minimal user involvement. User involvement often consisted of having a user sign off on a complex technical document that meant as much to the user as a foreign newscast. Users could be brought into the implementation loop when it came time to train them on how to use the equipment. By that time, the Law of Divergence had set in and gaining user acceptance was often difficult and sometimes impossible to achieve.

The Law of Divergence states that the office is dynamic. The longer it takes to build a system, the further it will be from user needs unless the user actively participates in the entire process or, to quote the law exactly: "The divergence between a delivered system and the user's real requirements increases proportionately to the length of time taken for the development of the system."




*User developed systems allow non-threatening introduction of technology.*

No matter how complete and accurate the data gathering process is, user needs are bound to change before the system is in place and ready for use. If no mechanism exists to incorporate these changes into the system, the final system that is implemented will not completely satisfy the user's needs, and there will be little or no motivation for the user to accept or use the system.

The conclusion to be drawn from this is that technology, in and of itself, is not the solution of the office productivity problem. In fact, technology is only the tip of the iceberg.

Deeper behavioral and organizational issues have made rapid acceptance of office technologies slow and uncertain. The idea that "people are extensions of machines" must be replaced by the philosophy that "machines are extensions of people." This goal can be accomplished through a holistic implementation approach supported by a training program for *all* managers and employees.

## THE SOLUTION

User involvement at all stages of implementation—via an Awareness, Education, Training, and Consulting program—can mean an escape from the pitfalls of the Bermuda Triangle and the Law of Divergence. Involvement is meaningful participation. Users are introduced to the technologies in the beginning of the implementation process. They are able to shape the systems to meet specific demands. Involved users analyze their own work flow, select and develop their own systems, describe how to introduce those systems, and direct the maintenance and support of those systems over time. User involvement at each step prevents the triangle from being formed.

Systems are developed that accommodate the changes in the office. The AET&C program is based on two assumptions. One is that all employees are responsible for improving office productivity through the successful introduction and use of appropriate office technologies. The other is that it is easier for the office worker to understand the technological tools and their application than it is for the systems analyst to understand what goes on in the office.

Each element of the program pro-

vides users with tools for successful implementation.

O *Awareness programs* develop an understanding of office automation through all levels of the corporation. They sensitize the entire organization to the upcoming changes —changes in how individuals, departments, and corporations operate.

O *Education programs* provide users with tools to analyze work flow, understand the technologies available to perform that work, and how to plan, design, and develop automated systems to perform that work.

O *Training programs* give users the hands-on skills necessary to use the technological tools selected for their individual offices.

O *Consulting programs* provide ongoing user support and information. Program consultants will answer questions and help integrate and coordinate the efforts of all user groups through ongoing seminars, a "hotline" service, a library, newsletters, bulletins, technology and research reports, individual consultation, and networking.

The implementation methodology that gives the users control of the design and development of the new automated office is established and supported by the AET&C program. The program calls for sound planning, user participation at all levels, and total commitment by the organization. All of these can be achieved through education.

The goals of the program are to assist users in:

(1) Identifying their roles in office automation implementation.

(2) Gaining the necessary knowledge and skills that will enable them to design their own systems and use the technologies.

(3) Improving office productivity and quality of work life through the continuing use of office technologies.

These main goals are accomplished through a series of briefings, seminars, workshops, and management forums. In addition, a support program, consisting of libraries, management reports, technology and research reports, case studies, newsletters, bulletins, special seminars, briefings, and workshops is necessary for successful implementation.

The first step to any successful office productivity improvement program is to raise senior management's awareness of the productivity problems of the office, the technological tools available to improve office worker's productivity, and the organizational, operational, and behavioral implications associated with introducing this kind of change.

The second step is to develop a holistic strategy for using office technologies that will improve productivity and *maximize* the effectiveness of the technological tools, while *minimizing* the impact of introducing change into the office.

The third step is for each participating organization to select a project, develop the project plans, and implement the project. The purpose of these projects is to learn about and test the potential of the new office technological tools in the various offices throughout the organization.

The fourth step, measurement and evaluation, provides formal reports to management of the progress being made, the problems encountered, the benefits realized, and recommendations on the future of the program.

The final step for each organization is to reenter the cycle at the strategic planning point to develop a strategy for the effective integration and consolidation of the new office technological tools or new office process throughout the organization.

There is an obvious question: Is this methodology and the seemingly elaborate program supporting it really necessary? The answer—absolutely yes, if we are really committed to improving office productivity and the quality of work life.

The momentum for change must come from within the user organization, and only with effective education and training will users develop the necessary knowledge and skills. In this way, it is self-designing and self-teaching. It is in fact, a self-actualizing methodology. □

*Thomas R. Conroy is director, office technologies, Control Data Corp., Minneapolis, and is responsible for developing programs to introduce new automation technologies to the office. Jacque Bieber designs educational programs for Contemporary Courseware Inc., Minneapolis, an instructional software company. She specializes in the training of knowledge workers.*

# Automating the Boss's Office

Ronald A. Frank

As we all hurtle toward the promised Information Age, the analysts keep dwelling on the fact that telecommunications holds the key to making the corporation more efficient. And hardly a day goes by that we fail to hear about the lag in productivity in various phases of the economy. In particular, the productivity pundits point to the office as an area where escalating costs have mandated the use of automated systems.

As telecommunications managers are drawn into planning groups to deal with the prospect of building a corporate information handling network, it is generally agreed that the office presents many opportunities for better efficiency. Every company has its word processing trials or electronic mail experiments either under way or "under active consideration." The latter is corporate code for explaining that we haven't yet found anyone to underwrite the cost of this great project.

Typically the secretaries, typists, and mail clerks are automated right out of their chairs in an effort to link everybody into the information movement generation. This is usually followed by surveys from the vendors involved to illustrate how letters are being generated at lower cost or memos are virtually zinging their way around the electronic network.

There is no doubt that office automation combined with communications is presenting new benefits to the company while often giving the telecommunications staff new challenges. Undoubtedly this trend will continue and office productivity will improve.

But there seems to be a growing number of observers who feel that the real productivity rewards lie in the inner office and not in the outer office. That is not to say the present office automation efforts are misplaced; rather it says that everyone has been rushing past the closed door to the boss's office. And behind that door some real opportunities may exist for the resourceful telecommunications manager.

It is obvious that improving the productivity of the higher paid managers will quickly translate into larger cost benefits on paper. But that is only part of the story. If management is to have an appreciation for the growing importance of the corporate communications network, direct involvement in the automated operations makes a lot of sense.

This message of managerial involvement has apparently not been lost on some of the vendors who are working hard to tailor the executive workstation. Despite the desire to give managers hands-on access to the corporate network, there appears to be some uncertainty about the best way to go about it. The most ovious method is a workstation or terminal right in the office. The Xerox Star system is an implementation of this approach, and it is designed to be so easy to use that even the boss can become an expert. To make a system relatively simple to operate requires complex software which drives up the cost. But there is some validity to the idea that managers must be given friendly, non-complex terminals.

The same manager who is now entering the upper reaches of the corporate strata spent his middle management years avoiding any type of business device. To this manager, a typewriter was for secretaries — certainly not a device to keep in the office to type letters himself. Thus it was a display of corporate power to have those in the outer office type his letters, send his memos, and often even place his phone calls.

Now the relentless march of technology is prodding these same managers to move the electronic link into the inner office. But the jokes about making it idiot proof so even the boss can understand how it works are not really that far off base. Certainly the manager has the skill to operate any equipment that can tie him or her into the corporate network. The real issue is whether the manager feels that such hands-on access is worth the time involved. So it may be hard to convince a manager that instant access to information is better than having someone in the outer office do it for him. Remember that the manager makes a habit of delegating tasks to others and then having the summary report brought in for a final decision.

Thus the key to direct management involvement lies in demonstrating that the corporate network can deliver real time decision making information into the inner office. Moreover it must be demonstrated that this information is available with a minimum of

effort and that the statistics can be manipulated in special ways which make the results less efficient if they are called up by someone in the outer office.

At this point, the telecommunications manager is ready to bail out asking what all this has to do with communications when obviously the issues have to be decided by the manager and the data processing staff. That view may have been valid five years ago when a company was formulating methods to structure data and build data bases. Today's manager knows how the data he needs are being collected. The problem is that this information is being collected at the source and it is taking too long to be manipulated into reports which are then delivered to the inner office days later.

The perceptive telecommunications manager will study these corporate reporting methods that bring information to management. The real-time advantages offered by the network, together with hands-on access by the manager may suggest ways in which management can get important data in much less time than the present MIS reporting methods. Admittedly it is difficult to be very specific here. Every type of company has information which is considered vital. Even from one manager to another, opinions will differ on the information that is needed to make corporate decisions.

But let's try to focus on the concept a little tighter. Suppose that a large manufacturing corporation adjusted its production and inventory levels based on the latest sales data. There is now a one week lag in this adjustment because management gets MIS reports that detail sales figures at retail outlets up to the close of business at the end of the previous week.

Imagine further that the MIS reports are generated at the corporate DP center based on batch totals transmitted to the DP center at the end of each week. Now enter our heroic telecommunications expert who suggest to management that it would be possible to directly poll the terminal controllers at each retail site to get a real-time reading of sales. Further, this data could be accessed directly by the manager from his office, with the option of collecting data from some or all of the remote sites.

Any manager who could get same day information instead of days old information simply by pushing a few buttons would jump at the opportunity. The challenge lies in using the network to collect the data faster, and then in making it relatively easy for the manager to call up the data when needed.

Obviously the telecommunications and DP staffs will have to cooperate closely with other corporate operations to make such real time systems happen. But the communications staff knows what the network can deliver if the right equipment is installed in the right places.

There are still many questions to be answered if management is to be brought on-line. As mentioned earlier there are differences about the best way to connect managers to the corporate network. In addition to the terminal or workstation which could be described as a traditional DP approach, some vendors are experimenting with expanded versions of the telephone which will work through the in-house PBX. Northern Telecom executives have been experimenting for some months with a telephone that includes a CRT/ keyboard which provides access to electronic mail and other systems available on a company-wide voice/data network.

There is also a school of thought which believes that the access of management to data should be restricted. This is based on limiting managers to only important MIS-type information which is directly related to decisions which have to be made. It is a nice way of saying that the boss should not be trusted with everything because he might learn too much. The truth is that managers should have access only to the data they need. But that applies to any network user.

The workstation that will evolve in the executive suite still remains to be defined. To a great extent the shape of this device will depend on the information being collected by the managers who run it. While the exact role of management in accessing corporate information is being studied, the telecomunications manager can apply his knowledge and creativity to define the data gathering capabilities of the network which he controls.

*Ronald A. Frank is a journalist and consultant in Mont Vernon, New Hampshire.*

# AGE OF PRODUCTIVITY

By JOHN J. CONNELL, Office Technology Research Group

Presented at NMA's 30th Annual Conference & Exposition, Los Angeles, CA, April 28, 1981.

## KEYNOTE ADDRESS

The Age of Productivity is a subject of great importance to every one of us. We all work in offices. We are well aware that the opportunities for productivity improvement in the office are very great. How to take advantage of those opportunities, however, is one of the major management challenges we face. I would like to explore those opportunities and talk about the office from a management point of view. In so doing, I will suggest that there are three areas of management concern in looking at the future office—productivity, technology and people.

First, productivity. Office operating costs are rising faster than costs in any other sector of business operations, due to factors like wage increases and inflation which are essentially beyond our control. The only way to offset these cost increases is through improved office productivity.

Second, technology. There has been an explosion in new technologies for the office. The question that arises is how best to take advantage of that explosion and put those technologies to work to improve office productivity.

Third, people. New technologies coming into the office will impact people directly. Whether that impact will be favorable or adverse, and how office personnel react to these changes, are the ultimate determinants as to whether we can achieve meaningful gains in office productivity.

Let's look at the issue of productivity. I wrote the text for a special supplement to *Business Week* which appeared in the February 18, 1980 issue, and was entitled, "Office of the 80s: Productivity Impact." In it I cited some statistics which bear repeating. In 1979, the total cost of business office operations in the United States was $800 billion. Of that, $200 billion covered all the costs of space, buildings, computers, telecommunication networks, support services and all of the other indirect expenses incurred in regular office operations. The direct expenses of labor and fringe benefits amounted to $600 billion or 75 percent of total office costs. No other segment of business operations is so labor intensive or has such a high proportion of direct to indirect expense.

These percentages are not well-known. Most accounting systems do not break out office costs so that one can determine current status or trends. Typically, office costs are spread throughout a corporation showing up in marketing, in manufacturing, in field operations and in corporate headquarters. It takes special studies to aggregate all of the costs associated with office operations and then determine the direction in which these costs are moving. Some companies have undertaken such studies, and when they have, the results have been startling. Quite consistently the studies show that office costs are rising 12-15 percent a year and sometimes more. At that rate, office costs will double over the next six years. Studies cited in the *Business Week* supplement estimate that the $600 billion in direct labor

Reprinted from the JOURNAL OF MICROGRAPHICS, Vol. 14, No. 8, pp. 11-17,
with permission of the National Micrographics Association

costs incurred in 1979 will grow to one-and-a-half *trillion* dollars by 1989. No business can afford a 12-15 percent increase in office costs year in and year out. In fact, if major steps are not taken to arrest this growth, the health, and in some cases the very existence, of many enterprises will be threatened.

When I talk about the future office, then, I am not talking about some far out world where we are all mesmerized by the wizardry of technology. I am talking about a serious business problem that requires a serious business solution. The problem is that office costs are rising precipitously. The solution is to improve office productivity so that the constantly increasing workload we are faced with in the office can be handled without adding people and the continuing escalation in payroll costs can be absorbed without increasing expense levels. That is the challenge before us and it is a challenge that must be met.

How can we meet this challenge? There are a number of avenues to pursue, but the strategy that appears to have the greatest long-term potential is the same strategy that worked so successfully in improving productivity on the farm and in the factory. Productivity improvements in those sectors were tied directly to new investments in technology, in tools to help farmers and factory workers perform more efficiently and cost effectively. That lesson now must be applied to the office. We must accelerate the introduction of new technologies into the office to address the productivity problem.

More specifically, of the $800 billion in costs I cited earlier as being incurred in offices in U.S. businesses in 1979, less than 30 percent represented clerical costs. The costs of managers and professionals, the people whom Peter Drucker labeled the "knowledge workers," accounted for more than 70 percent.

Over the years we have introduced accounting machines, punched card equipment, computers, word processors and a variety of other devices, all aimed at improving the productivity of the clerical workforce. Great progress has been made, and although there is still room for improvement, the margin for further improvement is not very great.

On the other hand, we have done virtually nothing to improve the productivity of managers and professionals. It is in this fertile ground, accounting for more than 70 percent of total office costs, where we must introduce new techniques, new technologies and new approaches aimed at improving the productivity of knowledge workers—in other words, you and me.

Now, before you think I have some great panacea, let me pose for you the dilemma of what is becoming known as the "Office of the Future" field. Our objective is to improve managerial and professional productivity. We do not know how to measure managerial and professional productivity. As a matter of fact, we do not have a generally accepted definition of the term. We also do not have a clear understanding as to how productivity relates to performance; nor do we know where the concepts of efficiency and effectiveness fit in this whole picture. But we have to figure out the answers to these questions and we have to come up with generally accepted ways for measuring productivity in the managerial and professional ranks. No business can handle a 12-15 percent rise in office costs each year without being adversely affected. The success of our respective enterprises and in some cases their very survival depend upon our ability to make our offices more productive.

That is what the "Office of the Future" field is all about. It is a movement, perhaps even a crusade, to launch a concerted, well coordinated effort to improve office productivity at all levels, but primarily within the managerial and professional workforce.

The first management concern in the future office, then, is productivity; the second is technology. There has been an explosion in new office technologies, both in the numbers of machines available, and in their capabilities and capacities. Chip technology, lasers, fiber optics and a variety of other technological developments have combined to provide an almost endless array of new equipment capabilities. I do not want to get into technical details but I do want to make some observations about technologies and the implications of their use.

The most mature office technology is data processing. The most widely publicized technology nowadays is word processing. They both come in a number of forms with which you are probably familiar. I would like to point out some similarities and some major differences between the two. The physical machines used in the two technologies are very much alike. In some cases, they actually are the same machine, supported by different software packages. Also, once information is stored in these machines, whether computers or word processors, the information looks the same in internal storage—a combination of bits. As a result, there is a tendency to identify word processing equipment as an offshoot of computing equipment. That may be true physically but it is not true operationally.

Information that is stored in a computer is defined logically. Gross pay is the product of hours times rate. Net pay is gross pay less specifically defined deductions. A computer program, as you know, is nothing more than the logical manipulation of the logically defined data that is fed into a computer. Once the program is in memory, the human interface is primarily one of monitoring. Even in interactive systems, the information presented to the user on a screen has been defined logically beforehand and the user's actions are carried out according to a pre-defined set of logical procedures.

The opposite is true with word processing equipment. Information stored in word processing equipment is not defined logically. As a matter of fact, it is not defined at all until a human being reads the information on a screen and interprets it mentally. Without the human interface, the information is meaningless. Rather than a monitoring role, word processing, electronic mail and a host of other new office technologies require a human interface as a prerequisite for their successful operation. As a result, people considerations and behavioral reaction to technology are infinitely more important in new office technologies than they were in the world of computers.

The second difference between data processing and word processing is in the approach taken to training. In the computer world, we were taught not only how to operate computers but how the machines functioned internally. Every systems analyst and every programmer are taught about the logical structure of their machines and how to develop a set of instructions within that logical structure to cause the machines to do whatever is desired. The same training approach is used in telecommunications. Not so in word processing, or micrographics, or reprographics, or in many other office technologies. Users are taught that if they push a particular button, the machine will perform a certain function. Training is oriented much more to the user as an operator rather than as a programmer.

As a result, when people in the data processing community and also the telecommunications community interface with people trained in some of these other technologies, there is not only a language barrier because of the difference in jargon, but there is a barrier in conceptual understanding. As we see these two well-known technologies coverging, it is important to keep in mind their very different characteristics, in terms of human interface and conceptual understanding by users.

All of you are familiar with computers and many of you with word processing. Let's look at some of the other technol-

ogies in the office, every one of which is exploding with new features, new capacities and new capabilities.

- Conferencing technologies, including the whole field of audiovisuals, computer graphics and teleconferencing—audio, video and computer conferencing;
- Micrographics, with its many microforms, and its interfacing with computers through computer-output microfilm (COM) and computer-aided retrieval (CAR) equipment;
- Reprographics equipment like photocomposers and communicating copiers;
- Electronic mail, in both facsimile and digital form;
- Telephone system upgrades, including computerized PBX's and voice store and forward systems;
- Electronic office systems, using management work stations tied into telecommunications networks;
- Finally, telecommunications, interconnecting all office technologies and facilitating the transmission, storage and retrieval of information in voice, data, text and image form.

One would think, with a list of technologies this extensive, that the list would be complete. It is not. We will continue to see changes throughout the '80s and thereafter. In the more mature technologies such as data processing and word processing, the changes are reasonably predictable. The direction of these technologies has been set and the changes to come are more involved with improved functional capabilities than with new departures.

However, the limiting factor in getting more information into computers and word processing equipment is the cost of keying, of data entry. Most of the information in business is in paper form and it will stay in that form until we come up with an economically viable means for translating the information to a machinable medium. The real breakthrough in the Office of the Future field will occur when we are able to economically make a machine image of a piece of paper and then have the machine automatically interpret its contents.

Progress is being made in such image technology but there is still a long way to go. It is not yet clear what technological approach will prevail. What can be predicted is that image technology will emerge as a result of the interfacing of several technologies, including such candidates as micrographics, video, optical character reading, copiers, digital facsimile, lasers and microprocessors. This interfacing of technologies, which was pioneered in the micrographics field with COM and CAR equipment, is one of the basic trends in the Office of the Future field; the other is interconnection.

Each of the technologies we have mentioned was developed originally as an independent technology. What is happening today and will continue to happen throughout the 1980s is that all of these technologies will be interconnected through telecommunications. In the future, we will not deal with individual technologies; rather, we will deal with networks of technologies. Information introduced into the network through any one machine will be available essentially instantaneously to every other machine, regardless of location. Thus, information in our computer files will be available to word processing, and information in our text files in word processing will be available to our computers. Both can supply information to photocomposition and other equipment in the reprographics area or to equipment in the micrographics area, and so on. No longer will we be able to think of and deal with technologies separately. Instead, we will deal with networks of interdependent technologies.

The introduction of networks, and of integrated networks once compatibility problems are resolved, is extraordinarily important for several reasons. The first reason is that networks allow one to provide the capabilities of an increasingly powerful array of office technologies to every office worker in every office location. The tendency in the past has been to apply technology to office work by moving the work out of the regular office and into a technology center. Data processing is a classic example of that approach with its history of identifying potential computer applications, programming them for computer operation and then physically moving the processing to the data center. The same approach was followed in the establishment of word processing departments, of reprographics facilities, of micrographics centers and so forth. The capabilities of the technologies were made available to the specialists in the technology centers but not the the general office force and especially not to managers and professionals. The introduction of networks changes all of this. Networks bring the power and capabilities of modern office technologies into one's work place, and available quite literally at one's fingertips. In short, networks provide technological power to the people.

The second reason that the phenomenon of integrated networks is important is that, in a world of networks, individual technologies must be subordinated to the networks. This fact has extraordinary organizational and operational implications. Offices tend to be organized around technologies, with data processing departments, word processing departments, telecommunications departments, micrographics departments and so forth. Each department has charted its independent route, established its own priorities and operating ground rules and is accustomed to defending its turf. With the introduction of networks, however, each of these technologies becomes a subset to the network and must tailor its operations to fit the requirements of the network. As a result, data processing, word processing and all of the other technologies used in the office will change drastically in the 1980s. It is not the merger of word processing into data processing as is so glibly proclaimed in data processing literature. It is the subordination of data processing, word processing, micrographics, reprographics and all other previously independent office technologies into the framework of integrated networks. Each technology will continue to perform certain standalone functions—independent applications, one-time uses and the like. But the primary thrust and the greatest potential will come from the use of all office technologies in integrated networks.

The third implication of integrated networks is their requirement for coordinated planning. Contemplation of networks which provide a vast array of technological capabilities to all office personnel in all office locations requires a level of coordinated planning never before encountered in the office. We plan by departments or functions, each going its own way and coordinating as little as possible with other departments. Even when we design computer-based systems which cross departmental lines, we set up an ad hoc group to handle the planning. Once the system is installed and operating, the group is dissolved. The requirement thrust upon us by networks is the need for an ongoing, coordinated planning effort which includes all office disciplines. Such an effort will have a substantial impact on organization structure and operating practices in the office. To succeed, in fact just to get off the ground, it must be a top-down effort. How the office is ultimately organized and the extent to which one espouses a centralized or a decentralized approach for office operations remains to be seen. What is clear is that the planning effort must be centralized, managed from the top down,and include all office disciplines.

The fourth reason that networks are important is that as more and more information is in the network, and can be accessed by the various machines tied to the network, the need for paper records will lessen. As you know, information has a

life cycle, a period of time when it is important and relevant. After that it is history. In normal practice, a piece of correspondence is received, responded to and filed, seldom to be looked at again. If an electronic correspondence system is in place, the letter is read on a screen, the response transmitted electronically and both are stored in the machine file. During the active life of the communication, no paper document is created. As management reports, accounting records and other compilations of business information become accessible through a terminal, the potential for substituting images on a screen for paper grows geometrically.

Now I know that sounds like motherhood and another pitch for the paperless office. I don't believe we will ever see a paperless office any more than you do. But information is the key product of the office and paper is the vehicle we use for storing, moving and retrieving information. It is an extraordinarily inefficient and ultimately a very costly vehicle. Any serious attempt to improve productivity in the office and reduce costs must address head-on the problem of paper. Even if we cannot eliminate it, we should strive to reduce it. To do so, however, requires a complete change in attitude on the part of all of us. We are comfortable with paper because we are used to it. We know it is inefficient and costly, but it is easier to use than the alternatives we have seen, which, in comparison, appear awkward and jury-rigged.

In the micrographics field, you already have extensive experience in working with images on a screen. We also have word processing systems and some computer-based systems which substitute images on a screen for paper, but they are specific applications, slices of office work. In the Office of the Future, virtually all information, whether data, text, image or voice, will be susceptible to being moved, stored and retrieved in electronic form. Further, if we can learn to change our way of operating, much of it need never be converted from electronic image form to paper.

How can modern office technologies improve productivity? I am not going to mention individual applications or individual machine capabilities. I believe that, in a broad sense, the benefits from new technologies occur from workload redistribution, from improved access to information and from improved information flows. We seldom reexamine workload decisions. Once job duties are assigned, inertia takes over and the decisions get cast in concrete. I believe that every new machine coming into an office and every new system or technique should be looked on as a catalyst to reexamine the way we do things and to reconsider who does what.

Let me give an example. The standard approach to the introduction of word processing equipment is to eliminate secretaries, and then reorganize the secretarial function by moving typing into a word processing center and establishing administrative support people to serve several managers. That approach may improve the productivity of the secretarial function, but it does nothing to improve the productivity of the manager who, incidentally, costs three times as much as the secretary. In fact, it may affect the manager's productivity adversely.

A more sophisticated approach is to ask a question: If the typing duties of the secretary could be off-loaded to a word processor, what functions now being handled by the manager could be transferred to the secretary in the time now available? Some companies have followed that approach. They look on word processing not as a device for improving clerical productivity but rather as a means for redistributing work so that managerial time can be devoted to the handling of more pressing matters. The economic payoff in such an approach is far greater and the job enrichment potential, as employees take on new and more important duties, is very great. The first and most immediate way, then, that modern technologies can improve managerial productivity is through their use as catalysts to reexamine work assignments and come up with a better distribution of work.

Two other ways in which new technologies can help managers become more productive are in providing access to machine-stored information and in speeding up the flow of information. As we move more and more into an information society, the availability of meaningful information and the capability of communicating that information rapidly will become increasingly important competitive tools. Corporations tend to be bureaucracies. The time it takes information to flow through the system badly slows down the decision-making process. What new technologies do is permit managers to interact directly with information that is stored in a variety of locations and then respond to that information in a much more timely manner. Instead of waiting for information to be fed by the system, tomorrow's managers will be able to go after the information themselves and then quickly act on it. That ability to respond more quickly to changing business conditions may turn out to be the greatest contribution of modern office technolgies to business.

The Office of the Future, then, envisions networks of interconnected technologies. These networks can provide an increasingly powerful array of technological capabilities to help improve the productivity of all office workers, especially those in the managerial and professional workforce. The move towards such an office has organizational and planning implications of considerable import. There also are some severe technological problems which have to be overcome. I cringe when I hear statements that the Office of the Future is here today and similar claims. I may stand up here and glibly talk about integrated networks, but the lack of compatibility among various office technologies at the present time makes the translation of such networks from paper to reality virtually impossible. Eventually, however, because of the pressing need for the user community to solve its productivity problems, compatibility and other technological difficulties will get resolved.

We have talked about productivity and technology. Let's talk about people—most specifically, you. The Office of the Future field offers tremendous opportunities to those who understand its potential and who do something about it. As professionals in micrographics, what should you be doing about your future in the office? In my opinion, you should move quickly to get in the act. I was most pleased to see the National Micrographics Association begin to identify itself as The Image Processing People. It is a clear indication that you are concerning yourselves with a vital and dynamic new function, converting documents to a machinable image, rather than limiting yourselves to one technology. All of the lessons you have learned and principles you have developed in the micrographics field will serve you well in establishing a leadership role in the image processing field.

So, get in the act. How? First, by getting involved, by declaring yourself in. We tend too much toward specialization, each to his or her turf. We should strive to be generalists and concern ourselves with the total office and what is happening in it.

Second, by educating yourself. There is a lot to learn and few textbooks to learn from. One must become knowledgeable about a variety of technologies and how they interrelate, about the concept of networks, about organizational impacts, behavioral considerations, the measurement of productivity, the physical work environment and many other fascinating subjects. The Office of the Future field is filled with intellectual challenge.

Third, by sharing. We are at the beginning of a revolutionary metamorphosis in the office. We are moving from a world

of technological change, with which we are familiar, to a world of behavioral change, with which we are not. The old ground rules of what works and what does not work no longer apply. We have to learn by doing, or from the experience of others who have learned in that fashion. There are no experts in this field. It is a field in which the user has the knowledge, not the vendor or the consultant. If we are to avoid continually re-inventing the wheel, I think we should all participate in formal efforts to exchange user information.

One final thought to keep in mind in the years to come. We live in an economic world; the ultimate value of office technology, from an economic point of view, is in improving productivity and controlling costs. From a people point of view, however, technology has the capacity, if utilized properly, to expand human potential.

To me, this is far more important. Corporate planners who use computer models to test alternative business plans are not only more efficient. Potentially, they are better planners because the equipment allows them to examine more alternatives than they could by hand. Corporate librarians have the potential of being better researchers because they have access to a wider array of information on microforms than they could handle in book form. Company treasurers who use machine-aided cash management systems are potentially better treasurers because they can consider a number of alternative fund movement strategies. In each case, the technology is expanding the potential of the people using it, helping them to be more efficient, more effective and more productive. In the long run this may turn out to be the greatest contribution of the entire Office of the Future movement—that technology was introduced which broadened the intellectual capacities and expanded the potential of every person who works in an office. If so, the effort will have been well worthwhile.

John J. Connell is executive director of the Office Technology Research Group, Pasadena, California.

ABSTRACT The decade of the '80s brings with it new challenges for those involved in micrographics and the entire information industry. These challenges must be met if the declining productivity in the United States is to be improved. This decline has been caused in part by a lack of capital investment in the office worker and a failure to take maximum advantage of new and innovative technologies.

# Dp professionals face major challenge in automated office

**By Don Tapscott**

The "technology push" of the microelectronics and telecommunications industry, and the consumer "demand pull" for improved productivity in the office, is propelling us into a period where we are beginning to participate in profound changes in the ways in which people and organizations work.

A new generation of integrated office systems which differ from traditional data processing systems is arising as a major challenge to dp professionals.

Across North America those of us in the systems profession are trying to grapple with the vastly increased significance of these systems.

What exactly are these systems? Where are they headed? What do they mean for our organizations, our profession, and for us as individuals?

Most people think of office systems or office automation, as that of secretaries, mainly women, using word processing, is structured and routine jobs, to improve typing and clerical effeciency.

However, today more people are coming to the conclusion that this is not what office automation is really about.

Standalone word processing is just the tip of the iceberg. It addresses less than two percent of total office cost — typing.

The greatest opportunities are found by applying this technology to improve the execution of basic business functions.

This can be done by directly supporting professionals, managers, executives and other "multifunction" workers — those people who make up the big bulk of the white collar labor bill.

### *Three phases*

The three technologies of data processing, telecommunications and the office are converging to bring about the advent of integrated office systems.

The first phase of this convergence matured at the beginning of the 80s.

Computer technologies converged with communications technologies to produce capabilities such as remote job entry, distributed data processing and message switching.

The computer and office technologies converged to produce tools such as the calculator, word processing, COM (Computer Output Microform) and DIM (Computer Input Microform), smart copiers and key entry.

In addition, office technologies and communications technologies have converged to produce dial dictation, communicating copiers facsimile and teleconferencing.

The product of the convergence of all three technologies includes: professional work stations, communicating word processors, intelligent facsimile, computer conferencing, video text, portable terminals, compound document storage, intelligent PBX's, electronic mail, voice activated typewriters or terminals such as the Display Phone or the Sony Typecorder.

For each of the three technologies there is an organizational counterpart — the dp MIS department, the telecommunications group and the administration department.

In my opinion those from the dp side of the house are well positioned to play a leading role in the integration and application for these new systems and thereby in the transformation of organizations and human work as we understand it.

However, this role will require those of us in the systems business to expand our horizons somewhat. In particular, we will have to deepen and strengthen the process of acquiring a new orientation that corresponds with these new systems.

As well, we'll need to develop and apply new methodologies to building and implementing systems. Finally, we need to acquire new skills, some of which have traditionally been regarded as outside the domain of a data procession professional.

Integrated office systems are different from traditional data processing systems in a number of ways:

Dp deals with the processing of structured data. The goal is to process operational data to improve efficient invoicing, accounting, payroll, etc.

The new integrated office systems focus on the use of tools to assist with unstructured or semistructured work.

The goal is to directly support everyone in the office — improving their communications decison support information handling time use, etc.

Those who interact with data processing systems are either skilled technical experts or are operators trained to use a certain piece of equipment.

In the case of office systems the vast majority of those who use the system are nontechnical. Most know very little if anything about computer systems.

The objective of data processing is to improve operational efficiency, that is, to do things right.

The objective of integrated office systems is more to improve individual and organizational effectiveness, that is, doing the right things.

Data processing technology is mature. While it is true that systems are still evolving rapidly; the basic technology is proven and stable.

The technology of office systems on the other hand, is still in its infancy. It has really been over the last year that a number of major vendors have come out with product lines in this area.

Because of these differences, the new integrated office systems confront those of us in the data processing profession with new and important challenges.

### *New technologies*

The first challenge posed by integrated office systems is to grapple with four new technologies: multifunction work stations; technologies of new media in particular voice and image; personal computing; and local area networks.

The major data processing vendors, together with the suppliers of both traditional telecommunications and office products are all on a migration path towards integrated systems. Key products for all of them are the new generations of the electronic work stations.

Typical tools integrated into work stations: are electronic mail, decision support systems, interactive information retrieval, text processing, and personal support tools.

A good example of a new workstation is the Xerox Star. Designed to directly support the professional worker it combines a user-friendly bit-map display with tools such as text processing, graphics and messaging. The Star uses graphic symbols called icons to indicate what functions are offered to the user.

. For example, the user inbox is depicted on the screen as a small inbasket and a collection of files looks like a filing cabinet.

To print a document the user simply moves the document on the screen onto a representation of a printer, and so-on.

IBM's first entry into the professional workstation market is Profs which runs on VM. Profs links text messaging, word processing, informational retrieval with some administrative capabilities such as calendars, diaries and to do lists.

One of the first work stations from the telecommunications vendors is Northern Telecom and Bell Canada's Displayphone. This work station includes a display terminal, a telephone, and an office keyboard, having some degree of integration.

One of the most advanced system entries today is the Alliance work station by Wang. Using this workstation a professional manager, executive or other office worker can directly use data base management tools, text processing, both voice and text messaging, simplified data retrieval and an image transmission capability.

Other workstation contenders are Prime's Office Automation System (OAS), The Datapoint Integrated Electronic Office (IEO), Tymshare's Augment System, Office Power, and ISI (two systems which use the UNIX operating system), Zilog's Excalibur Power workstation, the Burroughs OFIS-1, and IBM's DISOSS, Data General's Comprehensive Electronic office, Digital Equipment's Office Plus and Dialcom.

A second area of technology in addition to work stations, comes about from the integration of the media of data, text, voice and image.

Many current vendors claim that their systems will "integrate data processing and word processing."

However we are starting to see systems which also add voice and image to the list.

In one scenario for example, a manager sitting at his or her work station, could:

- Analyse some data in a decision support system:
- Take graphic representation of that data and insert it into a text report on the system:
- The report could be sent as a text message with voice annotation to a colleague in Vancouver:
- Before sending the message the manager may edit the voice annotation: and
- There could be an automatic entry made into a calendar and tickle file to remind the manager to follow up.

Many data processing managers and executives are struggling with the proliferation of text processing equipment throughout their organization.

How best to handle this and integrate text with the overall data processing operation? To this problem integrated office systems raise a challenge of understanding how voice technologies and image technologies will be integrated as well.

Voice messaging systems like Shell Canada's VMS pose the issue of the relationship between voice and other computerized media.

Systems such as Wang's Alliance work station which integrate all four media pose the question more sharply.

Another example is teleconferencing. Not too far down the road it is likely that at least slow scan video and possibly full video teleconferencing will be available throughtout the office perhaps at every work station.

The growth of computerized PBXs and their ability to act as a switch for media other than voice is another example.

A third new technology is personal computing. IBMs entry into this market has stimulated the use of personal computers in the office.

This is a very positive development. Managers, professionals, executives are beginning to get an initial exposure to direct use of computer technology, gaining an appreciation of their potential.

The use of personal computers by managers also belies the myth that keyboards will not be used by senior personnel. Inexpensive microcomputers that are easy to use and which provide useful tools for managers (such as Visicalc) are finding widespread user acceptance.

A fourth new technology is that of local networks. These are systems for comunicating information in digital form, within a geographically restricted area such as an office, a hospital or a campus.

With the Dec-Intel-Xerox Accord and the introduction of Ethernet this has become a hot topic in office automation. It is also one of the most complex.

Vendors and users alike are looking for the most efficient and effective method of transmitting integrated data, text, voice, and image, information locally.

Various topologies for local networks have been presented. The most traditional is the star topology — a network which uses a central switching device to which all stations are connected. This is the current model for most voice and data communications within the office. Telephony vendors see this model being extended using the PBX as the central office controller. Many data processing vendors such a IBM continue to view a computer as the central office controller.

A bus network for example, Ethernet or Wangnet uses a length of cable (to which stations are attached by cable taps). Signals from one station are broadcast to all other stations, but only recognized by the correct receiving station(s).

Ring networks (Primenet or the Cambridge Ring) consist of a chain of signal repeaters with cable lengths between each repeater. Messages are relayed in packets around the ring to their destinations. Ring networks are examples of message switching networks. (for example Datapoint's ARC)

Various transmission media can be used. Coaxial Cable has the advantage of high bandwidth. Twisted wire pairs, currently used for telephone systems, has the advantage of already being in place. Most buildings in the western world are wired for telephone service. Fibre optics uses a flexible cable and interface electronics to give extremely high band width. Infrared light has also been proposed as a transmission medium.

The issue of transmission medium becomes sharply posed when one is trying to determine the local network for a new building.

Even in existing buildings it may be possible to avoid laying coaxial cable throughout the building if the telephone network can be adapted to meet local network transmissions needs.

### *Different system objectives*

The objectives of data processing are primarily to improve clerical efficiency.

The thrust of integrated office systems is to improve the effectiveness of knowledge workers.

It is essential to clearly differentiate these two from the outset of a strategic planning or design process.

These differences require imporiant changes in the way we approach systems design, implementation and cost justification. With office systems, for example, it is unwise to adopt a goal of displacing people.

The greatesi potential of these systems is in providing tools for knowledge workers to work more effectively.

Moreover, the integration of these tools into ones working life requires the suppori

and commitment of the user.

Experience has shown it is very difficult to win this support, if the stated or perceived objectives of the system implementation are cost displacement.

With proper macroeconomic planning, the impact of these new systems on overall emloyment will be positive.

However, the impact on specific organizations depends on the perspective which is taken by those in charge.

If the focus is on improving efficiency, the gains will be small and implementation rocky. On the other hand, if the goal is effectiveness the benefits are more likely to be great and the implementation smooth.

### *User-driven design*

One of the greatest sources of failure so far has been the problem of ensuring that systems correspond to user requirements.

"Technology-driven" systems,that is, systems which are designed without adequate consideration of what the user needs often result in low user-acceptance.

New approaches are required where the design process is propelled by data and information from the user and user organization.

It's one of the greatest ironies of these systems that we use state-of-the-art technology in telecommunications and microelectronics, but on many of the most critical issues to success or failure (for example determining user needs) we are still using methods which are quite outdated.

There is a need for a "user science", which can use measurements, techniques and analytical procedures to collect, analyze and interpret information to feed into the design process.

Another feature of a user-driven design methodology is the notion of "participative design."

Rather than the designer simply talking to the user, interpreting the user needs and producing a design, it is possible to cooperatively design systems with the user themselves.

By using such an approach it is possible to come up with not only a better design, but a user who has a sense of ownership in the system which has been designed.

Another aspect of user driven design is the extension of the pilot approach developed in data processing.

While there is strong experiential and intuitive evidence that integrated office systems can dramatically improve office productivity, little hard evidence exists.

As a result, most organizations are unwilling to make capital expenditures right off the bat.

So there is a need for an evolutionary strategy where organization can think big, but start small.

Through implementing a low risk, high profile, office system pilot the organization can get its feet wet.

Once some experience has been gained with the pilot and data has been collected such as the impact of the system on productivity, the organization is then in a position to proceed to the major investment of a full operational system.

An important requirement of user-driven design is to have a controlled evaluation of the impact of the system. Without measuring how the system was used and what its impact was on productivity and effectiveness in the office it's difficult to make appropriate refinements or to extend the system to become fully operational.

Many pilots fail to go fully operational because there is no convincing evidence for the controller or the vice president of finance as to why the system should be continued.

Finally, user-driven design is not just "applications development without programmers". This notion, popularized by James Martin, is an important and exciting one.

Martin refers to the end user programming in simple English languages. This can help reduce severe applications, backlogs, make systems more accessible to the user, and help win the user's sense of commitment to the system.

However "applications development without programmers" is one small part of what is becoming the design process. This process includes:

- Determination of the overall system functionality,
- Specification of user groups;
- Specification and development of backbone tools (for example computer messaging, administrative tools, text processing and decision support),
- Determination of user acceptance levels,
- Development of a system cost justification and evaluation plan;
- Specification local area network; selection of appropriate hardware and software,
- Development of an implementation strategy and plan;
- Specification of the social component of the office system, and
- Development of a plan for evolution.

In addition to this there is the domain of "applications development without programmers" which refers to the design of conjunctural information retrieval systems and decision support models.

### *Socio-technical systems*

Work systems in organizations consist of the design of jobs, of technology, and of environments. A change in any one of these three will necessitate changes in the rest.

Many work systems involving computers are still designed on Frederick Taylor's 1883 theory of "scientific management".

Taylor held that worker were lazy and untalented. Work systems, he said, should consist of simple repetitive tasks with tight employee supervision: high specialization for each employee: minimal responsibilities and decision making: and extrinsic motivators, like salary or threat of disciplinary action or dismissal.

Many word processing centres for example were designed basically on Taylor's model.

The result was that key-stroke efficiency was improved, but the overall effectiveness of the organization tended to decline.

Because jobs were highly simplified and repetitive and the typists had lost the interesting parts of their previous jobs, they lost motivation and tended to become less interested in the work; knew less about the terms used in the work and so on.

The conclusion is that Taylor's approach just simply doesn't work, especially when compared to new methods of designing high performance organizations.

The evidence is growing that when systems are designed such that the technical, social and environmental components are combined to produce interesting, meaningful and autonomous work, the result is much higher overall performance.

This is the new approach to building office systems. It's a "JET" age approach which seeks to jointly optimize Jobs, Environment and Technology.

### *Interface design*

Because the users of these new systems are non-specialists, there is a need to build user interfaces which are easy to learn and use.

One popular term is that of a "friendly" interface. These are interfaces that attempt to use natural language mantics and syntax. They must be tolerant of erroneous user input.

A spelling mistake in a system command, for example should be recognized as such, and accepted rather than as a "bad arguement" and rejected.

A friendly interface is also polite, never using words like "illegal entry" or "fatal error".

Sincerity has also been found to be important. Systems which give user feedbacks such as "you charming, good looking, devil you" have found low acceptance.

Another notion is on of transparency. Internal operations and processes of the computer are of little interest to the user, for example.

A key principle of good interface design is that of consistency. There is a need for uniformity of command structure, or a universal presentation mode. Terms like read, print, delete should mean the same in any part of the system whether it be the messaging system, information retrieval, admin support, text editing, etc.

Another principle is that of flexibility. The interface should be changeable with the sophistication level or request of the users. A beginner user may prefer menu interface. A more advanced user may prefer a prompt oriented interface or a command interface.

Integration of the interface, relocating an integrated architecture is also critical. The user should be easily able to move data and graphics for example from one part of the system into a message.

Columnist Bruce West wrote recently about a problem that he faces recently as a user of an unfriendly system.

> "To tell the truth the word "illegal" did worry me at first, particulary on those occasions when I happen to have just returned from lunch with some (condevial) friends at the Toronto Press Club. It looks so official that I thought it might have something to do with operating a computer "while under the influence". However, when I began to understand computer jargon a little better, I learned that the worrisome word was just another snooty term for something to which it objected.
>
> What nerve and gall! Illegal indeed! If this cursed machine ever decides to make an issue of it, I'm prepared to fight my case right through to the Supreme Court!

### *Implementation*

Probably the single greatest cause of failure has been poorly conceived and executed implementations. Many technically fine systems have failed because the implementors didn't adequately take into account the very real human and organizational needs and concerns of the user.

It's no news to most of us that many people in the office view computer systems as something which will make their life more horrible, that they'll be a slave to a rigid structured machine.

Sometimes these views are irrational, and sometimes these views are not. Often resistance to a computer system is based on the individual cost benefit analysis that the user performs.

The costs of learning how to use the new system and changing the way that one works may be perceived to simply not equal the benefits that can be gained.

So the starting point is to make sure that the system design corresponds with user needs and will actually be beneficial to the user.

Unfounded or irrational resistance can be diagnosed and treated using a good sound implementation strategy.

Traditionally implementation is viewed as something which occurs towards the end of the systems development cycle — somewhere after design and construction.

However, with office systems it makes more sense to view the implementation as something which exists throughout the gamit of the development cycle. Centrally the problem is one of managing massive organizational change. There is a need to unfreeze the situation, to create a climate for change, to integrate a system into that environment and then to refreeze it.

A key feature of this is the problem of training. Implementing an office system is very different from implementing an MIS system, a telephone system, or even a word processor. Sometimes there is a learning curve of several months.

So there is a need to develop training strategies which cannot disrupt the organization; can give the user immediate reinforcement and benefits for using the system, and which can enable the full integration of the system into the day to day working life of the user.

Some of us in the dp business will feel comfortable acquiring these skills or the ability to manage them. Others will not. At very minimum we have to understand their importance and be able to work in multidisciplined teams where these skills are covered off.

### *New planning methodologies*

New approaches to planning are required by these new systems.

To begin planning is critically important. These systems will constitute a major component of the capital expenditures of just about every organization over the next period of time. Technologies are rapidly evolving and changing, unlikely to coexist in this decade. So there is a need to position organizations to evolve as new technologies appear.

Mark Twain said the weather was "something everybody talks about but nobody's doing anything about it." The same, so far, can be said about planning for these new systems.

Just about everyone appreciates the importance of planning, but few have been able to develop methodologies to correspond to the new reality.

Two extreme views about the relationship between planning and systems implementation are both wrong.

One says that office automation is unplannable and that all we can do is implement systems until the volatile and changing technology settles down.

A second argues that there should be no systems implemented in an organization until a comprehensive plan is complete.

Rather, planning and implementation go hand in hand.

A concrete experience of implementing systems is essential to enable the planning process to be concrete. On the other hand, planning stituates system imlementations within some kind of coherent and rational context.

Another misconception is that the only goal of planning is to come up with the plan itself. Equally important is the planning process itself.

We are at a very early stage of these systems and there are many divergents used within most organizations regarding what perspectives should be taken, where the opportunities are and so on.

The planning process can bring the key stakeholders together and enable homgeneity regarding the key issues.

The office systems plan itself is also broader than with traditional systems. Among other things, the plan should contain:

- An over all perspectives statement outlining how the organization views this new generation of systems
- An overall opportunity analysis based on the assessment of business needs and some forecasting regarding the organization's size, demography, technical forecasts and so on
- A charter for the office system's function — where should it be located, at what level in the organization, what should its responsibilities be, its resources, etc.
- An eductional strategy outlining how top management, the system implementors, and the users themselves will be educated regarding basic concepts of these systems
- An ongoing evaluation of current integrated office system vendors and products,
- A design strategy which includes a user-driven methodology, an approach to local networks, data bases, external information sources, security, privacy, etc.
- A measurement methodology which will outline how the system is to be evaluated
- An implementation strategy dealing with all the problems with managing, change, training and so on.

### *A new challenge*

These are some of the challenges presented to us in the dp business by the new integrated office systems. Many leading practitioners in our business of working to acquire the new methods and skills necessary to successfully lead this process.

Whether or not data processing professionals and managers will be able to broaden their horizons and respond to this challenge remains to be seen. I am optimistic given the innovative and pioneering personality of the profession.

This challenge does not, by any means, indicate that we've failed. Rather our past successes require and challenge us to push on further.

> St. Exurpray said it well some time ago "We must welcome the future for soon it will be the past. But we should respect the past. For it was once all that was humanly possible."

[redacted]