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Office Automation Trends in the United States

Alan Purchase SRI International



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Förord

Telematik-världen befinner sig i snabb omvandling. Redan själva begreppet är sprunget ur förändringens vind. Men med tekniska och kostnadsmässiga scenförändringar följer också sådana vad gäller tillämpningar och spridning av dessa tillämpningar.

TELDOK har till uppgift att följa denna förändringens vind och då särskilt att söka beskriva praktisk användning i yrkeslivet av nya teleanknutna informationssystem. TELDOK satsar på studier av nya företeelser liksom på beskrivningar av satsningar i olika länder och rapporter från konferenser.

Ett land vi har en del att lära från är USA. "Telemognaden" är hög, ungefär som Sveriges. Även om det finns många företag och organisationer som släpar efter, ärt landet så stort att det också finns ett antal pionjärer. Här finns ovanligt stora företag och här sker en stor del av världens forskning och utveckling. Den geografiska, språkliga och kulturella närheten mellan resursrika organisationer på utvecklingsfronten ger underlag för ovanligt tidiga projekt.

Flera "tankesmedjor", think tanks, studerar utvecklingen — när de inte själva med utredningar och experiment bidrar till den. För mer än fyra år sedan avslutade dr Alan Purchase vid SRI International en studie av ett antal pionjäranvändare av ny telematik på uppdrag av Televerket och TELDOK. Göran Axelsson, civildepartementet och TELDOK Redaktionskommitté, lade ned ett stort arbete på att översätta, komplettera och vidga Purchases rapport, TELDOK Rapport 18, "Kontorsautomation i USA".

1986—1987 återvände Purchase, med samma uppdragsgivare, till sina tidigare studieobjekt. De har begärt att få vara anonyma, dels för att de inte vill ha alltför många besökare, dels för att telematik har strategisk innebörd. (Det första företaget är General Foods, och den som jämför båda rapporterna kan möjligen gissa. Det är dock inte poängen.)

Det är vanligt med ögonblicksbilder av installationer och erfarenheter från dessa. Vad dr Purchase gjort är något ovanligt, och ovanligt fruktbart: en longitudinell studie, ett snitt längs tiden. Därmed får vi en inblick i hur t ex inledande trögheter eller entusiasm förbyts i relativ vana och rutin men också i hur nya tillämpningar hela tiden förändrar rollerna för gamla och etablerade liksom för bara *nästan* nya.

Dr Purchases rapport presenteras denna gång utan bearbetning, i originalskick, "via TELDOK".

Bengt-Arne Vedin
Ledamot

Bertil Thorngren
Ordförande

TELDOK Redaktionskommitté

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I INTRODUCTION

Background

In 1983 SRI conducted a research project for the Teldok program that analyzed office automation (OA) trends in the United States by in-depth case studies of major U.S. organizations. The results of that study were documented in our report dated November 1983. This report documents a similar research program undertaken in 1986 consisting of updated case studies of many of these same organizations.

Comparing today's situation with that of 3 years ago provides a unique opportunity. During this time, the effect of personal computers (PCs) was greatest, and local area networks (LANs) and departmental class systems were starting to evolve. By in-depth analysis, we are able to identify the changes that have occurred and to gain an accurate perspective on the rate at which OA is being implemented, the motivations and constraints, and the directions of future system planning.

As is noted in the "Summary of Important Findings," fundamental changes have taken place in OA systems during the past 3 years. These changes are affecting organizational responsibilities, budget responsibilities, operational responsibilities, and OA hardware and software considerations. Being aware of these changes and anticipating the direction of future changes should assist Teldok members in taking full advantage of the system capabilities and in being alert for possible problems resulting from these changes.

Objectives

The specific objectives of this project were to:

- Analyze trends in OA systems among major U.S. organizations
- Gain perspective on how fast OA is being implemented and the directions of future systems
- Understand the motivations, constraints, and justifications for implementing OA systems
- Identify who is responsible for the planning, implementation, operation and management, training, and user support
- Analyze how PCs are being utilized within large organizations and how they are being integrated into networks and larger systems.

The project leader for this research was Alan Purchase, Principal Management Consultant, Information Industries Division, SRI International.

METHODOLOGY

The research approach for this project was similar to that used in the 1983 study. It consisted of in-depth case studies of selected major U.S. organizations representing different industries, geographical locations, and approaches to automation. During 1986, six organizations were researched. All were included in the 1983 study. The changes that have occurred in the past 3 years were analyzed to determine changes in the organizational responsibilities related to OA systems, the effects on users (both professional and support staff), the direction of future systems, and the anticipated effects that these will have upon the way organizations perform their work tasks.

In researching these organizations, SRI conducted personal interviews with typically six to eight staff members at different levels of management, professional, and support groups. The interviewees were selected to include both the information systems (ISs)--or service providers--and advanced end users within different functional departments.

In addition to the data obtained from the case studies of the individual corporations, a comprehensive review of applicable literature and nonproprietary information gained from other relevant SRI research projects was conducted. This information was then analyzed to increase the breadth of the research findings.

II SUMMARY OF IMPORTANT FINDINGS

The past 3 years has been the time of transition from standalone word processors and PCs to integrated approaches within leading organizations. It has also been the time of major growth in the professional staff's use of automated systems.

The late 1970s and early 1980s was the period of rapid growth in automation of the work of secretarial and support staff, the mid-late 1980's is the period of rapid growth of automating the work of the professional staff or "knowledge workers." With automation for the knowledge worker has come a demand for ease of communication between knowledge workers, between them and their support staff, and access to databases of information.

These end-user demands have come faster than most corporate information systems departments have been able to respond to. Requirements have also emerged for systems oriented toward specific applications beyond the scope of IS departments' operations. The result has been a dramatic shift of systems responsibility to the end-user organizations.

In the majority of companies researched for this project and verified by the results of the other research projects, the end-user departments are the instigators and motivating force for new generations of office information systems. These end users are taking responsibility for determining the application requirements, system characteristics, implementation, and operation. They are also paying for the system out of their budgets. In many cases, this means that they are hiring their own IS professionals, sometimes hiding them under different titles and job descriptions.

The corporate IS functions have dramatically changed as a result of the shift of office system responsibility to the end users. With the new organizations, IS functions are split between the traditional responsibility for the "corporate data processing (DP)" or mainframe computing function and the provision of urgently needed support to the end-user departments. Thus, the corporate IS organizational structure and responsibilities are becoming very different from those of 3 years ago.

The emphasis toward integrated systems has opened the corporate door to additional suppliers. The "typical" large U.S. corporation 3 years ago had IBM mainframe computer systems and Wang secretarial word processing systems. With end-user oriented integrated systems, other suppliers, notably Digital Equipment Company (DEC), are penetrating large corporations with their departmental systems solutions. This has resulted in many corporations adopting multivendor systems as part of their corporate IS policy, rather than the relying on a single vendor as in the past.

The evolution of end-user computing and departmental systems will continue over a number of years. With these trends firmly set and in view of the dramatic changes that have occurred in the past 3 years, we can anticipate that even greater changes will occur during the next 3 years.

III HISTORICAL PERSPECTIVE ON THE DEVELOPMENT OF INFORMATION PROCESSING

To appreciate current trends in information processing, it is valuable to have a perspective on the historical growth of information processing. This will provide a better understanding of present-day trends, the changes that have taken place in the past 3 years, and the effects that we can anticipate from changes during the next few years.

Most large companies started computerizing some of their activities in the late 1950s and early 1960s. This was primarily the automation of accounting functions such as accounts receivable, payable, general ledger, and balance sheets. The computer was used as an electronic replacement for manual or electromechanical accounting machine activities. The installation of business computers gained momentum with the introduction of the IBM 360 in 1964, and companies started computerizing their order entry, inventory control, and other accounting/financial functions. During this phase, companies installed computers because they considered it to be something they had to do to keep up with their competition--"everyone was doing it." Most managements did not understand computer technology and they were very dependent on the computer vendors. The vendors generally guided the in-house DP planning, direction of programming, and even the staffing. The data processing directors in many instances were hired from vendor staffs.

This combination of factors often led to the showcase "glass houses" full of computer equipment that a company's management would proudly show off to visitors to demonstrate how modern and up-to-date the organization was. These trends continued on through the 70s and the introduction of the IBM 370 family. It also resulted in an ever-growing DP staff with the addition of more and more programmers and systems analysts. It often resulted in a DP budget equivalent to 1-3% of corporate revenues and in the DP manager, a vice president, reporting to the senior vice president of finance or similar senior corporate officer.

During the 1970s, time-sharing also grew. Terminals were located in various departments to provide selected users with access to mainframe data bases. Commercial service bureaus offered similar time-sharing services for the small- and medium-sized organizations that did not invest in their own in-house mainframe and DP staff.

A buzz word during the early 1970s was "management information systems (MIS)." The concept was that the entire enterprise would be put on-line to the mainframe and that management would have instantaneous knowledge of all activities happening within the enterprise. This was too idealistic. Despite rapid growth of DP staffs, they were never able to keep up with users' demands. In the late 1970s, an 18- month to 24-month backlog for development of new applications was typical. The same 18- to 24-month backlog existed in most organizations in the early to mid-1980s and exists even today, despite greatly enlarged programming staffs.

During the 1970s, with the increased size and importance of the DP operation, it often became bureaucratic, systematized, and unable to respond to users' requirements. This resulted in a growing dissatisfaction on the part of many using organizations. Charge-back systems were also implemented, often with arbitrary and unrealistically high charges for end-using departments.

During the 1970s, as a completely separate development, word processing systems also were starting to be installed on secretarial desks, replacing typewriters, and the term OA was starting to be used. The OA activities were very much a bottom-up approach, and were located within various user departments and under local control, as compared with the top-down centralized DP organization. This brought automation to the secretarial staff (whether they wanted it or not). With local control, system support, training, system management, or future planning were minimal. It was generally left to the lead secretary in the department.

The 1980s brought dramatic changes with the advent of PCs. This started the emancipation of the professional staff. These PCs were primarily used in a standalone mode. Through terminal emulation, however, many of them could access mainframe data bases; or through communications links, many PCs could access external information resources.

In many cases, corporate DP departments ignored the early wave of PCs. Then, the proliferation of PCs occurred more rapidly than they could respond to. The result was uncontrolled use of PCs from different suppliers, utilizing a wide variety of software programs, with many of the users requesting assistance, and a growing demand for communications.

To respond to the changing user requirements, many DP organizations reorganized to create information centers, PC "help desks," or PC stores located within the company facilities. These activities are now coming together to form the foundation for end-user computing support organizations.

The major current trends are the merging and integration of the mainframe computer systems, word processing/OA systems, and end-user personal computing workstations. With this integration, end-users are taking a leading role in planning and implementing new applications, and the IS organization is assuming a supporting role.

It will be noted from this review of information processing developments during the past 30 years that new generations of IS hardware and software are coming at a more rapid rate and that each new wave of change brings greater complexity. This is expected to continue well into the 1990s.

An example of the present-day pace of change is a large financial services organization located in the United Kingdom. In this organization, 40 investment account managers control equity funds with a value of £10 billion. In anticipation of "big bang" (the opening of the London exchange to outside firms and electronic systems), the investment management department believed that it had to dramatically upgrade its IS. In January 1986, this IS was typical of systems of other conservative U.K. financial organizations in that it had been slowly evolving but was primarily paper-based with batch processing on the mainframe. It had all of the delays, errors, and limited flexibility inherent in such systems. In fewer than 12 months, a system was designed, developed, implemented, and in operation in which all 40 investment account managers had PCs tied into a network through minicomputers to both the in-house mainframe and external information services. These account managers receive the London stock exchange transactions on line as they are taking place, access external investment advisors who provide specialized financial modeling and other services, and access individual investor's portfolios for analysis from their in-house mainframe, make "what if" projections, and analyze other investment considerations.

This system was installed at the motivation of the investment management department that defined the applications and managed the system development, equipment selection, systems implementation, testing, and training. The department used outside contractors and software developers and had some guidance from the corporate IS staff. The installation was completed in an estimated one-third of the time that corporate IS organization would have required. The department has its own DP support organization within the department; in turn, the DP support group works closely with a group within the corporate IS department dedicated to the investment management activities. This example demonstrates the dramatic changes taking place as IS are developed to satisfy the end-user requirements. Another example is companies that are developing IS to provide them with a competitive advantage in customer service. Changes anticipated in the coming years are expected to be even more dramatic with major impacts on internal organizations, information-handling procedures, and new products and services provided to customers in virtually all industries.

IV IMPORTANT ISSUES AND TRENDS IN INFORMATION PROCESSING TODAY

Today, corporate management is facing a number of important IS issues and trends. These are brought about by the independent evolution of corporate DP, departmental word processing and PCs and the growing forces for integration of these incompatible systems. End-user knowledge of ISs is rapidly increasing and is being supplemented as a new generation of students who have been using PCs in school are entering the workforce and are ready to expand their application to business tasks. These users are demanding enhanced ISs. At the same time, corporate management is searching for ways to increase professional productivity. Some of the specific issues and trends that result are addressed below.

Information System Management Issues:

Several issues relevant to IS management need to be addressed. These issues include:

- Mainframe solutions versus departmental/distributed solutions
- End-user support--centralized versus distributed organizations; under control of centralized MIS or of distributed functional departments/divisions with dotted line relationship to corporate MIS.
- Interconnection of business and the manufacturing/process control networks
- Security, integrity, reliability of the IS and data bases
- Integration, system management of data bases and of information networks
- Voice integration with data at the workstation level, or completely separate data and voice networks
- Electronic mail: mainframe, department or local network solution
- Stay with single vendor solution (i.e., IBM) or accept multivendor solutions. If so, how are format, protocol, compatibility problems solved?

Information System Trends

Integration of information system resources is the most important trend in information systems today, and this will continue for at least the next 5 years. Some companies are integrating their PCs and word processors directly with their central mainframe DP systems: the "mainframe solution." A growing number of major corporations, however, are going to departmental computing systems or "three-tier

computing." Departmental computing systems can be mini- or supermicro-computers or LANs, with file servers, print servers, and the like. From an IS architecture perspective, departmental computers are positioned between the PCs, word processors, terminals, and the centralized DP mainframe system.

The motivations for departmental systems are:

- End-user departments want their own systems. They want to be in control and make the decisions on application requirements, systems configuration, workstation interfaces, and software selection. They want the IS staff to provide support, recommendations, and training. It is also easier for the end-users to make changes to systems before and after implementation, to suit their changing requirements.
- New applications are a major factor in the installation of departmental systems. These applications could be completely new services or the automation of paper-based activities.
- The desire for decentralized data bases, often organized for the functional activities of the department such as purchasing or personnel, is a factor favoring departmental systems. It is then easy to provide on-line inquiry and data input without the complications of interacting with a centralized mainframe data base.
- End-user departments often can more easily obtain approval for systems because the cost comes out of their budget rather than the corporate MIS budget.
- Much more rapid system implementation. The centralized MIS organization typically has an 18-month to 3-year backlog for developing new system requirements. The system is important to the end user; it is just another system to corporate MIS. End-user departments often have the flexibility of using outside IS consultants, or hiring their own IS staff, as well as using the corporate MIS staff. Thus, departmental systems are often brought on-line in 1/4 to 1/2 the time required for a mainframe solution.

Justification for departmental systems is based on:

- Providing new customer services or responding to competitive threats
- Improving professional productivity. Information is provided faster, with higher accuracy, in desired formats. One internal auditing department was able to decrease its staff 10% (five professionals), resulting in system payoff in fewer than 2 years. Our research shows that the cost factor is not the

primary motivation or justification for implementation of departmental systems. Increasing professional productivity and offering new or improved services for customers is much more important.

- Providing integrated systems for standalone PCs and word processors; gaining control of individual data bases, restoring integrity and reliability to data through responsible system management and backup; providing means for data and document communication, with multiuser access; and promoting work-group solutions instead of individual solutions.

V CASE STUDIES

The case studies developed in this project are based on personal interviews with managers and senior level staff of six major U.S. corporations. The interviewees include information systems specialists as well as end users of information systems.

The results of these interviews are presented in narrative form, with emphasis on qualitative information rather than quantitative data. This approach was selected to more effectively communicate the status of office IS within these organizations.

A review of these case studies will be show that different approaches and different levels of information systems development were used in the various companies and within different divisions or departments within the same company. Moreover, what has worked well for one organization has not been acceptable for another organization. What is apparent from the results is that no one way is the "right way" to design information systems, even though similar organizations are struggling with similar problems. The "culture" of the department or division, as well as of the corporation, definitely influences the approach and the rate of IS implementation.

General Food

Case Study No. 1

Case Study No. 1 is a large, multinational, food processing organization with revenues exceeding \$8 billion.* It has operating subsidiaries or joint ventures in 21 countries and export or licensing activities in 100 more. The corporate headquarters located in the New York area is a large modern facility with 1,500-2,000 employees. The various operating divisions operate autonomously, but closely follow the policies of a strong, structured corporate management.

In 1983, a very large consumer goods company acquired this company. It is being operated, however, as a separate organization.

Service Provider-End-User Support Organizations

Three years ago end users support was set up in two competing areas: the PC Center and the Information Access Center for time-sharing services on the mainframe. Both did training and education. End users did not know who to talk to. These centers have now been consolidated into one organization, which is a major part of the Information Management Division (IMD). Office Systems, in turn, is a significant part of the end-user computer support organization. Office Systems was a very small part of the IMD facilities organization 3 years ago and was concerned primarily with technical evaluation of equipment. Now, the Office Systems staff work with the users in solving their problems, as well as providing the technical solutions. Overall, the IMD organization is 20% smaller than it was 3 years ago; however, the number of IMD staff devoted to end-user support has more than doubled.

The major philosophy is that IS resources should be placed where they are needed—with the users. This means locating end-user support personnel within the marketing, finance, and manufacturing divisions.

These provider-end-user support organizations rely on four vendors: IBM, Wang, DEC, AT&T. They are going to an AT&T system 85 PBX that they hope to use as the digital interface to the outside world. They are solving system incompatibility problems by installing a specialized software program called "Softswitch" on the mainframe computer. This program converts the protocols between specific software programs operated on incompatible hardware so that revisable documents can be communicated without loss of "special effects".

IBM systems 34, 36, 38 were field order processing computers 3 years ago. Now, however, these support organizations are prototyping departmental systems based on DEC microvaxes and tying together eight microvaxes with an ethernet network. The network and software management will be by the Office Systems organization. This network will span all divisions. The

* All dollar amounts are in U.S. dollars

ethernet will be a backbone network for information transfer between the microvax processors located within the individual divisions. Within each division, an ISN network from AT&T will be used, which uses telephone wiring. The principal software will be DEC's All-In-One. They are also developing a marketing information system to process the vast amounts of data derived from their customer information base.

One part of this system is "trade deal planning." It will factor in data from the corporate order processing/accounting system that will be available for analysis. Each division will have its own data bases that will be protected from access outside the division. Although a high degree of commonality exists between the different divisions, a 10-15% special component remains that each division wants.

One decision to go with this architecture is the concern that LANs are not fast enough and lack security. The groups believe communication with a host, such as a VAX, is needed.

There is a strong belief in the need to integrate all of the information that a person needs: documents, charts, spreadsheets. The DEC All-In-One software provides this. The case study organization also is implementing electronic calendaring.

Only 10-15% of the PC users have standalone PCs. The others are all tied in to various communication systems. Some departments have Wang OIS and VS systems with Wang PCs. Others have DECmates tied in to a DECnet. In the future, these departments will have IBM PCs or a new DEC PC. They want to standardize on PCs to enable managers and secretaries to exchange files rather than to have the problem of a manager having a PC and the secretary having a word processor.

These support organizations are studying "executive workstations" that are targeted for the vice-presidents, with the system designed to give access to stratified summary data. They are moving to touch-screen technology to overcome objections of executives who do not want to use a keyboard. The mouse is expected to be used by 20% and the touch screen by 80%; the keyboard could also be used. They are demanding a common interface with user-friendly software that will not restrict users to a single input device--everything is common. A PC/AT with an ANST graphic monitor is the basis for the executive workstation. The touch screen is from Interactive Images, and the software package is EASEL. The software is very dynamic and easily modifiable. A front end for IBM's PROFS is being built so that a user can log on by pushing one button. This is part of the requirement for a simple way for the executives to deliver and receive information.

They are starting to equip executives with lap-top PCs for use in travel, and PCs for home. The expectation is that agendas and presentations for staff meetings will be sent ahead of time so that it can be reviewed on screens prior to the meeting. PROFS are being used for the E-mail and document delivery. The goal is to provide a very high

level of connectivity for all workstations. What is also needed is effective library services and training. Training on information systems will be provided through the corporate IMD organization, as well as outside services as required.

As part of their new approach, IS users on maternity leave will be given a terminal for use at home. This is true for both the fathers and the mothers.

The support centers used to have a rigid cost justification requirement for purchases of PCs. It is easier now based on the evidence that these tools can be used productively. Purchases are now authorized by the using department and are expensed (rather than becoming capital equipment). The purchases are approved by Office Systems to ensure that the hardware and software can be supported. The purchase requisitions are issued from the IMD end-user support organization to make sure that the description is accurate, complete, consistent. They support Lotus, Multimate, Display Write 3, and Whips Plus. PCs are bought from local dealers, on volume purchase agreements, negotiated with the manufacturers. The business is spread among three to four dealers and the using department keeps track of how many dollars are spent with each.

The video conferencing facility that was planned 3 years ago was never installed. A decision was made that people want to travel and to meet the other people they are working with. Personal relationships must be established. In addition, full video conferencing is still too expensive; it also required a full-time administrator to keep everything working.

An ISN was installed within the different divisions for communications between the PCs/workstations and the departmental systems, such as the IBM 36, DEC microvax, and Prime system. ISN is data-equivalent to a PBX. It operates at 9.6 Kb. It could operate 19.2 KB, but most Ascii boards operate at 9.6 KB. ISN does not require modems for communication. The connections are US\$400-\$450 each. The ISN communication is utilized within buildings, modems are used for external connections, and ethernet is used to tie together the DEC departmental systems. The support centers have found that an administrator is needed to run the various networks, even though DEC and the other suppliers are selling the networks on the basis of no problems.

Use of laser printers is increasing. Even though the majority of the correspondence is internal, laser printers are now used for just about all printed matter. They are much more reliable than the daisy wheel impact printers, and they are much quieter. "A year ago you could go to a meeting with hand-drawn overhead vu-graph projections. Now people use lasers with high-quality printing and a variety of print sizes and styles."

Research and Development Division

The Research and Development Division has two primary laboratories, one approximately 20 minutes from corporate headquarters

and the other is about 1-1/2 hours away. This organization operates quite independently from the other product and functional organizations.

R & D has 250 PCs for 800 scientists. These are all IBM or compatibles. About 40-45 are connected by coaxial cable to the mainframe for time-sharing. The R & D division is installing an AT&T-ISN network, initially with 50 connections. It plans to install a Softswitch software program on its mainframe to solve the PC-Wang incompatibility problem. Of the secretaries, 100% use Wang, 60% still have word processors, and 40% have PCs; however, R & D is moving to all PCs with VS systems. It plans to do a requirements analysis and open the door to new suppliers when replacing and upgrading some of the older Wang OIS systems.

This division has eight people dedicated to training and support for the research organization. It also uses outside training consultants for classes on introduction to the PC, Lotus, and others.

Many of the R & D division's secretaries support 20-40 researchers. During the past 3 years, the division has reduced the number of salary grades in the research division from eight to five. It has eliminated one level of middle management.

R & D is using substantially more graphics in its reports. Hewlett-Packard laser jet printers are being installed in all the facilities. The division is buying a Kurtzweil intelligent scanner to create technical information data bases. This device will scan abstracts of past research reports that will be stored on the facility's mainframe computer memory. R & D plans to use a technical library software language providing card file, index, and full text search and that does not need key words. It has looked at optical disc memories, but considers them to be too expensive at this time. A "beta test" site will be provided for a chemical abstract data base system using "CD-ROM". One problem is the lack of standards on the search formats.

In 3 years, R & D expects to have a workstation for every scientist, permitting analysis during rather than just at the end of the research. It will provide much better documented research and is expected to increase effective productivity and communications through a better integrated system.

Purchasing Division

During the past 3 years, the Purchasing Division has gone from every two secretaries sharing one standalone Wang word processing system to every secretary having a Wang PC connected to a Wang VS system. The division also got rid of the Apple computers and other nonstandard PCs and bought IBM, COMPAQ, and other compatible PCs, so that every buyer has a PC/workstation. The division standardized on IBM because the buyers have to deal with many outside people who have information. Previously, the buyers had data telephones, but required more computer power. Now, with the PC on their desk, they can get requirements sorted by supplier, by weeks, by months, by year, by

color, by flavor, and so on. They can model, analyze, and get answers about different prices, quantities for 250 different items, and material specs.

The Purchasing Division started with five to six applications that were fairly universal across the group. When those were running smoothly, more were added. The goal is to eliminate paper. The division is now sending paper to its plants, to suppliers, to accounts payable, to logistics. It hopes to eliminate internal paper this year.

The continuing problem is the lack of compatibility between the Wangs used by the secretaries and the IBM PCs used by the buyers. The secretaries are very productive with the Wangs and had trouble when they tried the IBM PC. The buyers have the IBM PCs to enable them to communicate with the other parts of the organization. The division hopes to solve this problem when the IMD organization installs "Softswitch" on the mainframe.

The division had 25 secretaries and 50-60 buyers, for a total staff of 86 three years ago. They produced 7,000 purchase orders per year. The division now has 15 secretaries and 66 other people (buyers plus support staff) for a total of 78. They are now producing 9,000-10,000 purchase orders per year. Thus, they have increased the number of purchase orders 36%, with 10% fewer staff. Management believes that the quality has improved as a result of the access to more information and better analysis techniques possible with the PCs.

In 1983, 1-1/2 weeks were required to turn around a purchase order. Now, with much, much better control, only 1 day is required. The division has an approved vendors list, with a cross-check against POs written. At present, management sees no need for PCs incorporating the very powerful 80386 microprocessor--"who needs 140 megabytes of memory on a PC?"

The division has a pilot of an executive software system called "command center". The idea is to have one-button access to the three to ten most important pieces of information that they need to know. A post-audit file with security and control is maintained. Training and support for the office system is from a "systems resource" assigned to the Purchasing Division from IMD.

In the future, the plan is to put in a PO release system. This will allow plants to send E-mail to vendors authorizing shipment in specific quantities.

Most of the planning is now being done within the division, by the users, with some assistance from IMD. Graphics is being used, but in a limited fashion. Graphics is not innovative. The laser printer on the Wang system used is excellent.

CASE STUDY No. 2

Case Study No. 2 is a bank that is one of the largest in the world with more than 700 offices in 33 states and more than 100 facilities in 41 countries. Total revenue exceeds \$8 billion. The bank has 30,000 employees (all white-collar workers) of whom 10,000-12,000 are professionals. More than one-third of these employees work at the corporate headquarters facilities in New York City.

Corporate Information Support Services

During the past 3 years, the bank has had a major restructuring of the organization. It has gone from a strong centralized organization to a decentralized structure with separate operations, such as retail services, international banking, investment banking, asset-based management, each with its own IS organization. As a result of the increase from one to five data systems support organizations with five data centers, the number of IS staff has grown significantly. The bank now has three work shifts with international banking operating 18-24 hours per day.

The growth of the central programming staff has temporarily stopped during the decentralization of the IS functions. In the future, however, the bank expects a rapid growth in tying together the front office with the back office. A "product profitability analysis" indicates that the bank wants to have a more mature approach in trying to understand front office needs/cost/results when tied into back office systems. When the bank divided into five sectors, each with its own operations, it was recognized that a need for corporate central services still remained. These services include a corporate telecommunications (voice and data), internal time-sharing and E-mail, information center, and STAR (Strategic Technology and Research).

Electronic Mail Services

E-mail currently has 7,300 users and is adding 130 users per month--a very steady growth. The average E-mail user time spent is 2-1/2 hours per month, 5+ minutes per session. Of the users, 40-50% are bank officers, 80% in the New York area, 10% in the remainder of the United States, and 10% in international areas. The bank now has 40 consumer service offices on the system in the United States. Studies are being conducted to bundle E-mail with other bank information service products for communications with bank customers.

Users are provided with a 1/2- hour of training in the use of the E-mail service. Within E-Mail services, 100-200 liaison people can provide support. One major user is the Human Resources Department that uses E-mail broadcast for training, employee benefits, quarterly earning reports, special travel programs, and other information bulletins.

For the E-mail service, three DEC PDP11/70s are used. The services are studying where it is going, functionally. The existing technology is

obsolete, and adding CPUs greatly increases the complexity. Some use E-mail to arrange meetings, but it is not used much for conferencing.

Time Sharing Services

The time-sharing service uses three DEC 20s. The bank plans to migrate to DEC VAX. There are 40-50 applications. Applications include work scheduling, customer data base, bulletin boards that are private, and analysis of major news events. Some of these only have three to four users.

Office Automation

The bank has no central dedicated OA group. Each sector has its own PC support group. A previous OA group that championed Wang word processors and E-mail became decentralized and evolved into PC support. Word processing became a commodity and E-mail became institutionalized. Some word processing centers remain, but they are declining. More and more, the secretaries do all of the word processing--most of them using Wangs. The professionals are obtaining IBM or compatible PCs with Multimate, a word processing package similar to the Wang word processor. The use of the two kinds of devices has caused some problems in communicating between the professionals and the secretaries.

At present, about 50-75% of the secretaries have workstations (word processors or PCs). The bank still has only 1,500-2,000 PCs. Some 4,000-5,000 of the professionals use dumb terminals. In total, the bank has approximately 8,000 workstations, of which 60-70% are dumb terminals.

Strategic Technology and Research (Technical Policy and Standards

STAR takes a macroview of technology and develops policies and standards. So far, 18 policies have been approved, reaffirming existing policies, that affect day-to-day operations. Policy development is interactive and participatory. It requires input from the different user areas to set future directions. The individual areas have maximum latitude.

The technology committee is composed of the technical heads from the five areas plus two from the corporate level. It acts as a prescreening committee for executive management. Senior management appreciates (or at least their interest is piqued or fears raised) the importance of technology. The management committee now deals with technical issues. This is a milestone.

Management distributes policies on paper to electronic bulletin boards and through staff meetings. The policy focus is on how the information resource should be managed. The technology committee establishes guidelines for the different areas to manage their information services and try to focus on what they should be doing rather than negatively focusing on what they should not do. Standards will follow the policies. The committee tries to have life-cycle planning for policies and standards. There are some de facto standards such as IBM PCs. The different areas can install

any networks/departmental systems they want, but if a system ties into the corporate network, it must meet corporate standards.

The technology committee intends to develop criteria for product evaluation that will establish preferred vendors and product lines. The equipment will still go through central purchasing and inventory. The bank is setting up special-interest groups across sectors. An example is business graphics. Graphics have been used for some time. They have an education program on graphics. Even before the advent of PCs, the professional staff has long been a major user of graphics for internal communications, particularly with corporate management. The committee uses Storyboard and Chartmaster with their PCs.

The committee will concentrate on policy development for the next 18-24 months. They plan to focus on new technology impacts in their policy development program.

Investment Banking Division, Application Development Manager

The Investment Banking Division is using PCs to develop software for the bank's customers--such items as letters of credit, funds transfer, and such. The idea is to push a button and obtain a letter of credit "skeleton" that can be customized for each customer. The user fills in the blanks, approves, and sends it electronically to one or more locations. There are many checks and cross-checks for the transfer of funds. The users create, get separate approval, send to the bank's mainframe computer, and acknowledge to the customer's PC--all of it done electronically. They are currently working on foreign exchange and commercial paper.

Managers use the PCs for wordprocessing, spreadsheets, E-mail, or PC to PC. They have developed a personnel system for PCs which controls personnel reviews, status, and all types of personnel statistics. The security system consists of locking the PC.

Right now there is no apparent need for advanced office automation functions. "If you try to develop overall office systems plans it will require 2-3 years, and get into politics and turfs, which causes further delays and so you proceed on an ad hoc basis."

The E-mail system is the corporate system that is based on DEC processors. The broker/dealer system is also all DEC. The division believes that DEC offers the best total all-around system, but because Wangs and IBMs are already installed, DEC will be considered for new operations. This group likes the Toshiba portable, also the mouse, but does not like touch screens. The staff uses graphics on the PCs, with software programs Dr. Halo, Intervision (micrographics), and Draw, which is a subset of Intervision. The group also likes the software package, Sidekick, that automatically dials the telephone.

This division sees no need for integrated voice and data. It also sees no need for Unix. "You can get multiprocessing through windows and export it through MS/DOS 4 and 5."

One limitation at the bank is the difficulty of getting PCs into organizations. Considerable paperwork and bureaucracy are required. It used to take up to 10 months, but has now been reduced to 6-8 weeks.

Liaison Function, Personal Computers, Investment Banking, and International Areas

The bank uses standard programs such as Lotus, D-Base, and Multimate. It has yet to integrate the PCs with the true business operations. The liaison function, personal computer, investment banking, and international areas have 1,200 people with 400 PCs. This actually amounts to about one PC for five professionals.

The number of secretaries is stabilizing. The banking and international areas have 123 secretaries and all will have Wang workstations by the end of the year. The new units are Wang PCs. The future strategy is to attach the IBM PCs, as well as the Wang PCs, to the Wang VS system that connects to the Wang Geonet. At present, much discussion is occurring between the division and the areas, IS staff, users, and the corporate telecom function regarding LANs. Are they ahead of their time, etc.?

Management originally planned to have 300-500 workstations on a Wangnet covering the basement to the 47th floor. This is now on hold to see what develops in LANs and ISD universal productivity.

A typical Wang VS system will have 45-50 users. Wang, Xerox, and HP laser printers are being used. The bank is trying to come up with a strategy for laser printers.

The bank provides and encourages the use of electronic publishing support from the central area. It plans to start soon some pilots within different departments shortly and assess developments. Electronic publications is an adjunct to office systems. One application is credit proposals. Overseas offices input data to the New York system and credit proposals are now printed on an IBM 3270 matrix printer. In the future, they will use laser printers with different type sizes and fonts. The system will be set up to have New York approval and then print out overseas.

The work is becoming far less technical with more user orientation and management orientation. There is much more listening to users, needs development, and satisfying user needs. The technology is almost a given.

The key issue/need in departmental systems is not what they will do, but the control that they will make possible. Professional management and data integrity are needed. "We go out of our way to hide the machine from the users in applications." Loan officers don't want spreadsheets or database management, they want modeling capability and access to information.

CASE STUDY No. 3

The Case Study No. 3 company is engaged in the exploration and production of oil in the United States and abroad. Revenues exceed \$10 billion. The company has approximately 20,000 employees worldwide and 2,000 employees at corporate headquarters. Approximately 45% of the total employees are white-collar workers. Of the eight operating divisions, four have chosen to be autonomous in planning for and implementing office systems.

Office Information Systems, Corporate, and Subsidiary Systems

The corporate systems organization tries to maintain standards. These are: Wangs for secretaries and IBM PCs with Multimate, Lotus 1-2-3, and D-Base II/III for professionals. The corporate mainframes are IBM 3081s and 3083s and research has a 3086. The company also has 370s and 3033s located in the U.S. midwest and south and some system 34s, 36s, 38s, and 4344s around the country. It has a Datapoint system for the refining/marketing division for remote data entry, and the credit card center uses a Honeywell for billing.

To prevent unauthorized access to information the PCs dial into the mainframe computer and hang up. The mainframe then automatically dials back.

Hard dollar justification is needed for all capital expenditures.

Corporate communications is responsible for all publications. It uses an outside typesetting service and transmits material electronically. When considering a desktop publications system, it wants to know "what will it do for us?". This group has a very active electronic "Wang mail" system that transmits an estimated 20,000 documents per month (average 2-5 pages) on a worldwide basis. The initial E-mail system was installed in 1981-82. Since then, growth has been strong and 40 nodes have been added to the system. The majority of workstations on secretaries' desks are Wangs, and a few of the managers/supervisors have Wang terminals. Typically, the secretaries receive E-mail messages and print them out for their bosses.

About 20% of the professionals/managers have IBM PCs or compatibles. They can communicate with the mainframe and then to the Wang Mailway system. The corporate information systems org and the engineering org regularly have professional staff who create documents and send them by E-mail to the secretary for polishing. Users typically printout the messages, but generally do not file them because the documents are filed electronically. Security features are built into the system. An example of a major user is the legal department that sends 50 to 100-page long contracts back and forth.

A change is being made from the Wang Mailway system to the Wang Office. "Office" is an improvement in that it uses newer technology.

They looked at DEC, Hewlett Packard (HP), and IBM. DEC was the preferred system, but the investment in Wang workstations made the decision for Wang Office. A DEC VAX or Microvax may be used for a communication controller.

The Office IS group is "piloting" IBM PROFS with the Wang gateway to PROFS. In the past, systems from as many as 80 different suppliers have been installed. That is why an effort is being made to standardize in IBM, Wang, and DEC.

No one is using voicemail, but Corporate IS (CIS) looked at it. This group sends many messages using the Wang. The messages are sent to the telex operator for routing information and then sent to a telex switching service. Some messages are also faxed.

Outside data bases are accessed through the Wangs. "Washington Alert Services" are used for legislative alert, American Petroleum Institute Services for industry data, Human Resources Information Network for labor laws, and Environmental Control Agency Database for their compliance system and regulatory system.

The E-mail usage has leveled off since users have the equipment. The number of users is not growing. Of the 500 Mailway users listed in the directory, 80% are active. Between 120-150 users are remote from headquarters, which means that about 350 of the headquarters employees use E-mail.

Legal Department

The headquarters facilities has 43 attorneys, 30 secretaries and 15 clerks and paralegals. With four other legal offices at remote locations, communication is needed between the office and attorneys in Washington DC, New York, and overseas. Secretaries at headquarters share 16 Wang word processing terminals and two standalone Wang systems, but no more than two secretaries share one terminal. The department also has eight PCs that any of the staff can use, but primarily the technical staff. The PCs are relatively new, and more are expected to be installed and used next year. Four of the PCs are stationary, and the others are on carts. A portable PC is located on each of the four floors of the legal department. Two lawyers use the PCs for word processing. They like to write their own drafts. One lawyer uses the Public Utility Database for indexing, and another lawyer uses the Spreadsheet Analysis for damage claims.

The Legal Department is developing an information management system on the IBM mainframe. It hopes that the attorneys will want the PCs to access it and then start using the PCs for other purposes. The department would like to tie the PCs together--also the Wangs. With "normal" economic conditions, all the attorneys are expected to have PCs within 3 years. Justification for this equipment is based on:

- Ability of attorneys to do cost analysis instead of guessing

- Replacement of expensive capitalized Lexis terminals that had been rented for years
- Reduced use of outside legal services through increased productivity.

Attorneys make use of dictation equipment. They also use fax to transmit contracts or copies of documents received from outside the department. Telex and E-mail are sort of interchangeable. They use E-mail within the company and telex externally when speed is necessary to transmit documents.

To date, suitable software packages for "corporate legal" activities have not been found. All the software packages that have been located are for independent legal firms or companies with much smaller, simpler legal requirements. Software is needed to cover:

- Case management
- Outside legal counsel bills
- Conflict of interest
- Docket and calendar
- Outside legal counsel list with names and addresses

The department normally has approximately 1,200 active lawsuits. The software that has been developed is designed for smaller companies with about six attorneys and maybe 300 active cases.

The future need is to computerize more. The department would like to have portable PCs for the attorneys to take on trips and for work at home.

Telecommunications Services

The telecommunications operations has 50 people. This staff is responsible to keep the system going.

Telecommunications Services has a microwave system that originally followed the pipeline with 50 locations within the state. This is analog microwave. Three other microwave systems cross different parts of the country; one of these is half-owned by an outside organization, and another is shared with another organization.

Because the company owns the right-of-way for its microwave it could put in fiber optic transmission systems in the future. (GTE Sprint is reportedly getting rid of all its microwave and laying a fiber optics cable at the rate of 8 miles per hour.)

This service has six foremen located in the field at different locations on their main microwave system within the state. The foremen have the

responsibility for maintaining the microwave communications network. Each foreman has a portable PC and through a dial-up modem can access a common data base containing inventory and location for critical parts and test equipment. Most of the parts are in a central location; however, each foreman maintains some parts inventory. The foremen are responsible for maintaining their own parts inventory update. With this system, they are able to track the inventory and thereby buy fewer spares and get better utilization from expensive test equipment that must be shared among the foremen.

An alarm system at headquarters monitors the microwave operations. A service foreman at a remote location can dial-up the alarm system and then obtain the read-out status of all alarms. Previously, these had to be read manually. Now they can respond much faster, 24 hours a day. If the microwave is broken, they must shut down the pipeline because of the environmental impacts, because the leak detection monitoring system is lost.

Supervisory control is used for the pipeline department. The pipelines carry crude, refined products, everything. All of the controls are out of one central location, thereby enabling one person to control the entire pipeline network throughout the state.

The Telecommunications Service has voice connections to 200 offices. At headquarters, a Northern Telecom SL-1 switch is used. A trunk switch near the headquarters location is used for the network and a switch at a remote location for the field offices. A Rockwell/Collins digital switch was purchased about 10 years ago with the plan to switch 64KB, but this has not been done. The service has some 14.2 KB data on voice microwave channels and some 9.6 KB data on dedicated microwave channels.

A Research Center is located about 5 miles from corporate headquarters. All of the scientific processing is done there and is linked to headquarters by a T-1 line. Outlying offices go through headquarters to reach the Research Center.

A Novell LAN was installed at headquarters to link 10 PCs together. This is an experimental stage. The users motivated LAN installation. "If you plan to spend over \$25,000 on computer/communication, you must prepare a plan for approval by CIC." This initial pilot LAN is an ethernet. After testing this LAN, they will switch to a "token ring" with the same PCs so they can compare the two LANs. They are trying to understand the problems of each design.

The Telecommunications Service has not given much thought to voice mail. The teletype is used some, but fax is used quite a bit. More than 100 of the offices have fax and they like it.

Over the next 3 years, this service plans to combine its Northern Telecom SL-1 and the Rockwell/Collins into a single switch. It also plans to upgrade the microwave system to digital and/or look at fiber. The terrestrial microwave has high maintenance costs.

Personnel Services

Of the 80 staff members in the corporate personnel services, 45 are support staff. About 25 of these are secretaries.

This service has one Wang word processing system in each of the six departments. These are standalone office systems. It also has one Wang PC in one department and IBM PCs in each of the other five departments. Every secretary has a Xerox memory typewriter, and they have two terminals to the IBM mainframe. One of these terminals is used to review data such as personnel files. The operator cannot make changes in these files. Security is maintained through use of passwords and having the terminal in a locked room. Some sensitive data, such as salary information, are blocked off. The terminal is used primarily to access individual benefits, such as health and dental, and to verify employment.

The other terminal can input selected data such as educational changes and absences, and can manipulate the data to get reports in other formats.

The PCs are standalone. They are used for succession planning, compensation planning, manpower planning, medical reports, and health surveillance. Two people share one of the PCs. The other five are located in individual offices for the use of only the one person in each office.

One of the main concerns is a data base management system. The old system was developed in-house and never worked smoothly. The new system, called "Answer DB," was purchased outside.

The company is in a consolidation mode due to declining profits resulting from lower oil prices. The staff has been reduced by 10%. No new equipment is budgeted for next year. The request for a LAN for the PCs was denied for security reasons. The main justification when the PCs were procured was that they were standalone units. Otherwise, terminals connected to the mainframe would have been purchased. The managers use the PCs to input data and prepare confidential reports. The secretary is not involved. They can download data to their specific PCs but they cannot input or scan mainframe data. In the future, the PCs are expected to be able to use the Answer DB program to access the mainframe.

CASE STUDY No. 4

Case Study No. 4 is a large, diversified multinational organization with major operations in food and beverage products and services. Total revenues are in excess of \$7 billion, and the company has more than 100,000 employees working at its facilities worldwide.

This company functions with a highly decentralized management structure. Each division has a president and develops its own plans and goals in accordance with its operating environment and the overall corporate objectives. The corporation has enjoyed steady growth with high performance standards and is strongly oriented toward marketing. Approximately 1,000 employees work at the corporate headquarters.

Information Systems

IS has 120-130 people on its staff. This group is currently evaluating the concept of three-tier computing with a departmental processing system and/or LAN. It does not like the IBM system 36 that it is using for remote job entry. It is basically an IBM shop and hopes that IBM comes out with some suitable midlevel processing systems soon.

PROFS are being used on the mainframe for E-mail and calendaring. Currently, about 160 people use PROFS, primarily from MIS and the Human Resources Division (which has gone 100% to PROFS). IS expects that everyone will have PROFS within the next 2 years. The policy on PROFS is that to succeed it must be all or nothing. The Human Resources director said "we will use PROFS," and it has been successful so far.

The Wang word processors have IBM terminal emulation so that secretaries can access PROFS. The DP department does not really see a need at the corporate level that the mainframe cannot satisfy.

Originally, MIS staff were physically located in the different functional departments to provide support. Because of management problems of working with the users, however, this did not work out.

The data from different divisions comes into corporate headquarters on paper. The corporate data analysts have become keypunchers inputting this data. It is too slow since they need flash reporting for senior management. They also have to maintain security and integrity. Executives sometimes get different data, one from the mainframe and one from the PC. At the present time there are about 4,000 Lotus files floating around on floppy disks. They definitely need larger databases.

Corporate senior management wanted to install a LAN against IS's recommendation. It is difficult to manage and is unwieldy. Users need a person within the department who will manage their LAN. LAN support is a critical issue: should it be the IS organization, a network support center, or user staff that manage the LAN?

Information Center

The Information Center (MIS) was conceived in 1981. It is an IBM concept. Originally it was oriented toward the mainframe; however, mainframe courses are not even taught any more. PCs are now used to do 95% of the work.

Volume purchase agreements (VPAs) have been established with suppliers. Their PCs are purchased from Computerland on an IBM VPA.

IS has made a statement of direction—an IBM workstation on every desk. Senior management has not yet bought this concept; consequently, departments have to keep trying to justify each purchase. All Information Center staff members have their own word processor or PC.

Keypunch activity is decreasing. When the general ledger system goes on-line, there will be no keypunching. The biggest keypunch job now is payroll, but this will be going on-line sometime in the near future.

No activity in voice mail is being purchased at this time. A number of the senior executives have display telephones. Of the 13 top executive secretaries, seven have PCs plus laser printers. A number of the top executives have PCs at home.

Human Resources Division

In this highly autonomous organization, a different culture exists within each division. The basic concept is consistent in that the longer term perspective is to grow the business. All divisions share the same MIS systems. They have regular user group meetings to discuss what the users want and to keep some consistency among the organizations.

Human Resources had a Wang OIS system, and each secretary had a Wang workstation. When the Wang leases ended, an outside consultant recommended Wang VS with Wang PCs. IS corporate policy was to standardize on IBM and so they provided the secretaries with IBM PCs. These PCs have "Erma" boards that can access the mainframe and PROFS. With PROFS, users have E-mail and calendaring and can also access MIS data on a read-only basis. This would include the personnel profiles. They cannot change the data. They can update calendars.

One problem with PROFS is the convolution of the calendar. They started inputting PROFS a year ago. Part of the justification was the reduced budget for paper and supplies. The PROFS system has proved to be very much a continuing process of development.

The telephone directory and location files are on PROFS. The personnel policy manual is not on-line because it does not change much.

With the shift to PCs, the secretaries cannot share data as they did before with the Wang OIS system. The "Wang Office" would have been a more department-oriented system. With PROFS, they can more quickly access people in other corporate facilities throughout the country. They use FOCUS and SAS that provide faster and more complete service.

The division might consider a departmental system (IBM system 36 or 38) in 1988. The system 38 is very easy to query. Since Corporate Systems says "IBM only," DEC or Wang will not be considered unless the experience of other organizations is very good.

Technology Planning, Computer Technology Group

This is a new function, and management is in the process of determining what the Computer Technology Group responsibilities are. The basic thoughts are: to monitor technology, set technology goals, to do strategic planning, and evaluate software. This company is an IBM shop, and therefore it needs to study IBM to identify "strategic products". IBM itself sometimes does not know which of its products will be "strategic".

In the short term, the Computer Technology Group is coordinating an evaluation of laser printers. In the longer term (3 years), it needs to determine what to do about 3-tier processing (departmental computers) memory systems. At this time, this group can really only look ahead 2-3 years for company needs.

As yet, no policy on departmental processors has been established. Installation of LANs is starting--primarily end-user driven owing to the need to share information. The software that permits this to happen requires a LAN. A serious MIS question is "is MIS to control support of LANs or let end users do it themselves?". A business study should be made of the actual cost and value of LANs in departments. They might show that twisted pair wiring is inadequate, and this would have major cost implications. The departmental processor issue is expected to be resolved next year.

The group has a couple of data base management systems (DBMSs). None, however, is recognized as a corporate standard. The group has SQL which is an interactive query language, and is studying D-base II & III. A standard will have to be set for PC data base systems. It will probably be Paradox, although Oracle is still being considered, because Oracle has an interface to SQL. All PC data base systems will most likely have to interface with SQL.

The headquarters offices are going to have a major renovation. They will be open offices, and only a few senior-level managers will have closed offices.

Budget and Systems Control, Financial Department

The general ledger and payroll programs have just been upgraded. For the general ledger, the department shifted from MSA to McCormick and Dodge. All of the coding for the general ledger update was done within the Financial Department rather than by MIS. It took about 1 year to complete. MIS was critical of this approach. Subsequently, MIS took responsibility to upgrade the payroll, over the Financial Department's objections. Some 54 special reports are required from the payroll program.

The Budget and Systems Control Department believes that operational departments should be encouraged to write their own reports in formats that they desire. The Financial Department is responsible for controlling the data base integrity and security for its reports. If the operating departments write their own reports, fewer reports will be necessary. After the Financial Department's major study of report usage, many reports were deleted; however, a few had to be revived when users finally noticed they were not getting them and started to complain.

All of the employees in the Budget and Systems Control department will have new IBM PC XT's within the next few months. The Financial Department now has 14 PCs and is getting eight more by the end of the year. The controller has a capital expense limit of US\$10,000. Any expenditure above that goes to the top three managers in the corporation.

Some principals input their own data. All employees in accounting will soon start keying in their own entries. This will provide up-front edits and corrections. The accounting reports are produced by a Xerox laser printer.

They justify the use of PCs on the basis of:

- Electronic data transfer for consolidation
- On-line ledger software and Lotus for calculations.

Forecasting, Treasury Department

Rather than relying on the MIS Department, the Treasury Department hired a capable professional who developed a financial analysis and decision support system for them. The decision support system provides senior management with operating results in geographical and tabular form from ten divisions. It shows what is going on through the use of 200 graphs and ten reports. It also shows what to do about what is happening or why it is happening. The system was developed within the Treasury Department and now MIS is supporting the system in the ongoing phase.

The department is forecasting financial results and interest rates. It relies on four "international experts" within the corporation for foreign exchange forecasting. A PC is used to assemble the data and provide crude analyses and projections. Most of the spreadsheets are on Wang PCs. The department will migrate to IBM PCs in time. Much of the process is still manual.

The Financial Analysis Group at headquarters has 26 users on a LAN, and they all have their own IBM PCs. This way spreadsheets are accessible by all. The system has 400 megabytes of hard disc. The LAN is an ethernet, 10 megabyte from Novell.

This group has two HP laser printers, two HP plotters, and a high-speed matrix printer on the LAN. This system requires a system administrator, who spends 40-50% of the time monitoring storage, backing up the system, and providing assistance from the help desk.

The group spent 4-6 months defining what it wanted to do (including 2 months to get approval). It started in June 1985 and the system was completed 1 year later. (The system was on a "live" basis in 6 months.) The driving force to install this system was executive management. They were dissatisfied with the information they were getting, and they wanted more prompt information, common formats, and the capability for analysis. They have a 30-million character data base in Lotus. Even with the strong support of the Chief Financial Officer, acquiring this system required substantial justification. The operations in the Philippines and Mexico had developed problems from excess inventory. This helped to justify the installation of this system.

This Financial Analysis System is tied to a mainframe through a dial-up network. In some cases, it can emulate IBM dumb terminals. Some consideration is being directed toward a transfer to "SNA BISYNC Gateway".

The group has no Apple MacIntosh PCs. It does have a few HP portables and some compacts. In the future, it sees more special "toys" for communications and faster machines.

Case Study No. 5

Case Study No. 5 is a \$30 billion holding company consisting of four separate businesses. The businesses are general merchandise, insurance, financial services, and real estate. The merchandise group is the largest unit with more than 800 U.S. stores and 2,000 catalog outlets. The company in total has approximately 50,000 employees, 7,000 of whom work at corporate headquarters. Our interviews were at the corporate headquarters with members of the merchandise group corporate staff.

End-User Computing, Data Processing Department

DP Department encompasses four departments with end-user computing. These are OA, microcomputers (PCs), mainframe/information center, data center. End user computing 3 years ago consisted of three to five people in an information center. It is now a formal end-user computing organization with a staff of 20 people. Over the next 3 years, total DP staff is expected to increase 50% and the end user-computing staff is expected to increase more than that.

When new equipment is required, the using departments make the acquisition. DP provides recommended lists. At present, there are typically four to five PCs per department throughout the organization. PCs are considered a capital expense, whereas terminals are a leased expense. PCs are expected to replace terminals within 2 years. A system 36 is being considered for use as a file server, print server, and PC software distribution center. Currently, two system 36 are on trial with Displaywrite 36. One uncertainty is what type of support is required for the system 36.

The Technology, Hardware/Software Group is currently studying diskless workstations. These would be used on networks in place of PCs.

The main systems used for word processing at headquarters and the regional offices are IBM 5520s. Since the 5520 is no longer available, the plan is to use a system 36 or a PC with Displaywrite 4 for new word processing applications. An IBM token ring network is being tested in a department with 125 people. Some laser printers are being installed; however, the staff has had trouble using bond paper with them.

The merchandise group has no voice mail. It does have some voice-programmed transaction/ordering systems. Corporate Communications uses voice mail.

One of the groups is testing an organization approach suggested by IBM called the "work group concept". The secretaries do not report to the managers or professionals; instead, they report to a corporate secretarial staff group.

Principals are doing more text and data inputting. They are just getting started with E-mail. They still print out most of their correspondence for filing rather than leaving it in electronic form. They hope that E-mail will reduce telephone tag and that they can use it to communicate with the regional offices through their 5520s. Users get a 1/2-day training course on the use of E-mail, and a help desk with a departmental coordinator is available.

The knowledge workers are using Lotus 1,2,3 and recommending Dataease for their DBMS. They can download from the mainframe directly to Lotus 1,2,3 spreadsheets.

The DP Department has developed a communication network called "send-in" that covers data, text files, and telex. This allows communication with suppliers, with their 5520s using Disoss through this network. Disoss is the E mail-hub.

The department installed scan masters in the regional offices. These devices are used for communication to headquarters and to provide better service for customer complaints.

Much time is spent putting presentations together through four+ different competing internal services as well as outside services. For the publications, they contract with outside typesetting services. Data can be scanned and transmitted to and from the regional offices and to and from their external typesetting service to speed communications.

They feel they need more "at home" or off-site access. At the present time they have no portables. They need to look at on-line directories and global directories.

To provide terminals for all 1200 buyers, wiring is currently being installed between the 4th floor and the 20th floor for the Purchasing Department. . This will provide E-mail (IBM TS 370) plus internally developed application software plus report display (IBM RMDS). This will provide information when reports are completed rather than receiving a hard copy through the internal mail system 3 days later.

The wiring being installed is IBM Type 1 cable that goes from the receptacle in each office to the telephone closet. The department decided not to use fiber optics between floors. The telephones use separate wires from the data terminals. The heat output of the new equipment is very critical. The Purchasing Department is providing one person for each department who will become a trainer for the buyers and support staff.

Merchandising Research

The activities of the Merchandising Research Department are reporting, analysis, data retrieval, administration, and communications. For reporting, this department has seven Displaywriters and three printers in central locations for word processing. These will be phased out as leases expire over the next 2

years. Although IBM's 5520s were considered, they cost too much (and are no longer available). The department plans to replace the Displaywriters with PCXTs. It hopes to include software for graphics to prepare pie charts and such. The manager's secretary uses a Memorywriter electronic typewriter; 14 other secretaries share the seven Displaywriters.

The analysis activity is done on-line with a PC. Nexus is used for external data and the corporate mainframe for internal data bases. On a standalone basis, the department has Datex and Infomark. This is a data base built around the 1980 census, provided by Decision Support Incorporated in California. The Donnelly Electronic Yellow Pages, on-line also is used.

Datex sends a disk every month with annual report data for all major companies. This is being tested on a trial basis and very likely will be cancelled after 3 months. The impression is that the information is not maintained up to date. The Infomark Census Data is supplied on a 12-in. laser disk.

An outside service bureau is used to process market research data for analysis. The department would be able to analyze the data in house using PCs if the service bureau would put data on a floppy disc.

For most of the markets, the department obtains market share information once a year. It would be preferable to receive it quarterly, and some managers would like it monthly. This market share information is needed for the greater metropolitan areas. Moreover, the department would like it for all of the different major product segments that are relevant so as to compare its sales success with that of its major competitors.

The administrative activity covers budgeting and project control. The Merchandising Research Department includes 39 professionals and 37 full time support staff plus eight part-time support staff. The plan is to start phasing in the PCXTs next year and to place them in locations where they will be used by two secretaries. They hope the market analysts will also use them.

Ten of the staff are engaged in graphics. This graphic activity supports the corporate economists, the real estate location staff, and other areas. In addition to report graphics, they provide slides, transparencies, and maps.

At present, the Merchandising Research Department does not have E-mail. It hopes to get it, however, when the PCXTs are installed.

This department believes that no policy guideline has been set for planning OA systems (except by IBM). As a result, systems just grow, with the manager obtaining information wherever it is available. The pervasive thinking is that the hardware and software is coming out too fast to keep up to date.

Legal Department, Public Affairs Department Merchandise Group

The Legal Department consists of 75 attorneys and 91 support staff for a total of 166. The department previously had part of its legal staff decentralized in the regional offices; however, that activity was closed last spring and most of the staff were transferred to the headquarters facilities.

The attorneys do not have workstations. The department uses IBM 5520s for word processing and some DP and has 55 terminals and 17 printers. All of the secretaries have word processing terminals. These terminals used to be in a word processing center, but now are with the individual secretaries. All of their printers are impact printers. The Public Affairs Activity has one ink jet printer but it is unreliable and users do not like it. They can access the mainframe with their terminals, but they have no real need to do so. Similarly, they have E-mail but find that they do not use it since the regional office's legal operations were closed.

The Legal Department has five PCs, each with its own software. Of the five PCs, 1 is used for custom software for trademarks, 1 for records management, 1 for the "briefs" data bank, 1 for management reports for case/risk analysis, and 1 for product liability litigation support. The liability litigation support PC uses a mainframe data base that is shared with the Insurance Department. All of these PCs are used by the paralegal staff.

The Public Affairs Department sends data from its PCs (after approval) over wires to the press via wire services. Press releases are prepared on 5520s and then sent via telex. Internal newsletters are sent from the 5520s to an outside printer. The department expects to buy one to two PCs per year. The attorneys are not expected to use the PCs, and they do not want the PCs to become status symbols.

To acquire PCs, the department has to go through a conservative cost justification. The head of public affairs had to go to senior management twice to get approval for two PCs. The approval was based on increased productivity.

The department is reluctant to purchase anything that has not been tested internally. Product recommendations all come from the End-User Computing, Data Processing Department.

The use of optical scanners to convert the tons of data from the trademark files has been considered. The department has 40,000 index cards that an outside service microfilmed and then keypunched the data into a data base on the mainframe system.

Case Study No. 6

Case Study No. 6 is a \$3 billion consumer products corporation with 32 offices and 32,000 employees in 32 countries. The largest single division handles more than 600 consumer products and accounts for 40% of total revenues. The company's products are sold by more than 1.3 million independent sales representatives. To support this large direct selling network, the company has taken a strong initiative in communications and office systems.

Integrated Office Systems Perspective

Several years ago, to keep up with its own growth, this company saw the opportunity to manage information and reduce costs by investing in computer technology in the office. Before most other major American companies had contemplated a computer-based integrated office system, this company was building its own. It did not create the system piecemeal, but developed corporate strategies for OA to promote worldwide hardware and software standardization. An important consideration in this strategy has been the strong support of senior corporate management.

All capital investments must be cost-justified. Studies that the company conducted indicated that the productivity of the management and other professional staff is increased up to 23%. Secretarial and administrative staff results show productivity increases of 50% or more.

The heart of the integrated office system is located at the corporate headquarters in New York. It consists of two DEC VAX 11/750 computers running VMX operating system. The application software is based on DEC's All-In-One, from which other application software is accessible. More than 300 users across the United States communicate with the system from a variety of PCs and terminals. The secretarial and clerical staff use DECmate II workstations running word processing software. Managers and other professionals use terminals, IBM PCs or compatibles. They communicate with the DEC VAX systems through emulating VT 100 terminals. They communicate with IBM's mainframe computers through emulating 2780/3780 terminals. Of the 400 employees at the corporate offices, an estimated 90% of the management and staff and 48% of the other professional and administrative staff access the system regularly.

In 1984, the company conducted a major study of the secretarial role in the automated office. One result of that study was a desire to automate as many secretarial functions as possible. To simplify the administrative task, many of the forms used by secretaries were automated onto the system. An example is expense reporting, now an automated task that frees the secretaries from extensive manual labor, boosts productivity, and gives managers expense report information more quickly. As expenses are incurred, secretaries enter the information into the system. At the end of each

month, the system automatically creates an expense report; it even converts the currency for international trips. In another application, conference room scheduling was previously a full-time task for one secretary who kept track of the reservations and cancellations on a hand-written list. This is now automated, and anyone who needs a room can just consult the system to see what is available.

Managers make heavy use of electronic mail. To varying extents, they also use the other desk management tools available.

Before the system was implemented in various departments, a number of planning meetings were held and extensive communications sent to make sure everyone in the department was aware of the plans and fully informed of the schedule for system implementation, training, results obtained in other departments, and the benefits expected for the various individual jobs. The initial request for automation must come from the using department. Systems are never implemented piecemeal; they are installed from the executive level down to the junior clerical level. Interest in implementing this system was developed with demonstrations and high-level presentations to department management.

Corporate Financial Systems

The tax, treasury, insurance, legal, financial reporting, financial analysis, public relations, and facilities organizations all use departmental systems (DEC VAX) for storing strategic data bases. They are offloading as much as possible from the mainframe to the departmental systems where data are unique to the departmental function. The group only had a few standalone PCs 3 years ago. Now, approximately one hundred PCs connected to the departmental systems are available to a 380-person organization. Within the next year, 60% of the staff is expected to be tied into the system, and everyone will be connected within 2 years.

E-mail is used as the phase-in application. This will be followed with desktop tools and then the full range of applications including financial modeling and analysis. With the PCs, they are able to do word processing, desk top analysis, and graphics.

Departmental systems are expected to serve functional work groups of 10-30 people. The group is aiming toward the use of the DEC Micro VAX II. Considerably more graphics is expected to be utilized, particularly in the financial area. Although the use of graphics is just starting, it will be a key for future management reports. With four MacIntosh computers and a laser printer, high-quality graphics can be provided.

M.I.S., End User Support

The MIS group has standardized on the IBM PC and selected approved compatibles for the professional workstation. Because of its ease of interfacing and capability in making presentations, the MacIntosh was selected as the executive workstation. The DECmate is used as the secretarial workstation owing to the heavy word processing requirements. The PCs and MACs are able to emulate the VT 100 to communicate through two of their local networks: one ethernet, the other for multiplexing.

More and more laser printers are being used. In fact, all presentations are now done with laser printers.

A voice mail system from Voice Mail International that works with the DEC processor is being tested. The application is primarily for district managers calling in to different product centers to determine order status and obtain product information. The \$200,000 system is expected to be paid back in 1 year.

With OA, one of the most difficult things to do is to show hard dollar savings. The group tries to have a payback in 2 years. OA pilots in 3 different departments were paid back in 1 year. One department demonstrated the elimination of 27 positions, including management, professional, and secretarial. Out of 400 staff, 5 managers, 8 professionals and 14 secretaries were eliminated. Moreover, measurement of productivity before and after installation determined an indirect improvement in productivity of 23% for managers and professionals and 67% for secretaries and support staff.

MIS has made a conscious effort not to promote LANs unless they share peripherals. This is expected to change with growth of departmental systems and OA.

As indicated earlier, MIS wants to store departmental information on the departmental system data base and "enterprise" data on the mainframe data base. With departmental systems, two approaches are: have one system such as a DEC VAX 8500 serving 100-200 people, or have work group systems of 20-30 people using a Microvax.

Office Automation Systems Support

OA was a distinct group from the PC support group 3 years ago. Now, there are five people: three primarily for OA and two primarily for PCs.

There is no centralized word processing activity. DECmate workstations are used for word processing and spreadsheets. They communicate with the VAX departmental system to use the All-In-One software for communications--E-mail and document distribution. With the IBM PCs, OA uses an off-the-shelf package called V-Term that provides VT 100 emulation.

The professional staff itself is writing letters and entering data on spreadsheets. Across the corporation, an estimated 95-100% of the secretaries have DECmate workstations and 60-70% of the professional staff have PCs. There are about 1,000 PCs for 1500 people. The controllers department, manufacturing, IS all have PCs tied into VAX departmental systems. One customer information area uses Videotex.

In 3 years, the OA group expects to have a fully integrated network of text, voice, and data. Their branch offices are expected to have two VAX departmental systems--one for regular use and one for back-up. These systems will be used for OA activities when they are not required for inventory control.

One new capability being examined is called "Centerpoint". It is a voice-integrated/comments for data on a workstation display. The OA group has not used touch screens--nor had time to evaluate them. Users have had no problem with eye-hand coordination in using a mouse.

User support is increasing. Users do not want to look up questions in a manual. They want to keep doing more with their systems.

The problems that OA Systems Support has encountered are: dealing with other groups (user departments) to get things done; novice users want their hands held all the way through, and vendors are not as responsive as desired. Fixes often are needed "right now", and there are problems in the coordination between information systems, users, and suppliers. Often, IS gets involved too late in the discussion process.

The use of the mainframe memories is increasing by an estimated 30% per year. In 3 years, the PC programs will probably be stored on the mainframe to maintain software change control and properly implement upgrades. It will probably be 1 year before end users will be permitted to access mainframe data bases from their PCs, so users can analyse "what if" questions and answers. End users cannot update the centralized data bases; they can only download the information. They expect to use "on-the-guard" security programs to protect their data.

The past philosophy was to concentrate all devices/support within the IS department. Although the Tokyo office had computer operators, it had no programmers; consequently any fixes had to come from corporate headquarters, thereby resulting in delays and poor communications of the true end-user requirements. Now OA wants every end-user organization to be responsible for its own activities and hire its own staff. The first step in implementing this approach was to restrict the number of vendors. In-house software "shells" also were developed to provide easier user interfaces to standardized software programs. It is hoped that artificial intelligence (AI) will have a major effect

on user interfaces through the use of natural languages and expert systems. "What we really need for our users always shows up 18 months late".

The automated warehousing system runs on a DEC and an automated purchasing system on an IBM, each with its own data base. The problem is getting the data bases to communicate.

A 6-hour graphics training program has been developed that covers applications on both the MacIntosh and IBM PC. All the secretaries and most managers and professionals have been trained on graphics. They all make their own presentations now: 20 slides in 90 minutes for \$20.

Corporate executive management, strategic planning all have MacIntoshes with lasers. With an in-house program, they can now go from a MacIntosh file to an IBM PC.

This concludes the six case studies.

Telestyrelsen har inrättat ett anslag med syfte att medverka till snabb och lätt-tillgänglig dokumentation beträffande användningen av teleanknutna informationssystem i arbetslivet. Detta anslag förvaltas av **TELDOK** och skall bidra till:

- Dokumentation vid tidigast möjliga tidpunkt av praktiska tillämpningar av teleanknutna informationssystem i arbetslivet.
- Publicering och spridning, i förekommande fall översättning, av annars svåråtkomliga erfarenheter av teleanknutna informationssystem i arbetslivet, samt kompletteringar avsedda att öka användningsvärdet för svenska förhållanden och svenska läsare.
- Studieresor och konferenser i direkt anknytning till arbetet med att dokumentera och sprida information beträffande praktiska tillämpningar av teleanknutna informationssystem i arbetslivet.

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Via TELDOK 6. Telematiken hemma. Rapport från "Social implications of home interactive telematics". Februari 1988.

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Via TELDOK 8. Datoranvändning vid handelshögskolor i USA. Februari 1988.

Via TELDOK 9. Intelevent 87. Konkurrens och samexistens. Mars 1988.

Via TELDOK 10. Office Automation Trends in the United States. April 1988.

Några andra publikationer från TELDOK:

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TELDOK Rapport 32. ISDN ur ett användarperspektiv. December 1987.

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