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HOW TO USE ADVANCED TECHNOLOGY

In most of our recent reports, we have been discussing some new computer and communications technologies that are just reaching the marketplace. Our subjects have included the use of computer message systems, electronic files for letters and reports, color graphics for management reports, and so on. Two major questions can arise, of course, for many user organizations. One is: What can these new technologies really *do* for us? And the other is: How can we get our people, including our managers, to accept and use these new technologies? In this report, we give some user experiences that bear on both of these questions.

Texas Instruments Incorporated, with headquarters in Dallas, Texas, is a major manufacturer and supplier of electronic components and equipment, mini- and micro-computers, hand-held calculators, and digital watches. Sales are in excess of $2.5 billion yearly, and the company employs about 78,000 people world-wide. TI has 39 manufacturing plants in 18 countries of the world.

In late 1966, TI began the installation of a real-time communications network, extending from the Dallas headquarters to all plants in the U.S. By 1972, the network had been extended to the plants and other TI operating units in Europe, via satellite. And by 1976, the network had been connected to most of TI's locations world-wide. International network hubs are located in Dallas, Japan, Singapore, Great Britain, France, and Germany. By 1976, TI was the largest commercial user of international satellite channels for data and voice communications.

Within a continent, TI uses conventional landline and microwave circuits. For inter-continental transmissions, satellite channels are used. All except two TI plants world-wide have at least 9.6 kbps service and some have as high as multiple 56 kbps. Most of the sales offices have 4.8 kbps service, although some small, remote sites have teletypewriter service (at 50 bps).

Even though world-wide data communications are now a routine matter with TI, the network is still evolving. At the present time, a variety of network protocols are in use. These include teletypewriter protocols, IBM 3270, RJE, and so on. However, the international X.25 protocol is becoming TI's standard for *accessing* their network. It is expected to replace these other protocols in the next two years. Within the network, node-to-node transmission uses TI's own protocol, which is quite similar to some of today's most advanced protocols.

With its network in place, TI has moved ahead with a number of uses of advanced tech-

nology. These are improving the ways the company is operated and managed. Here are some of the uses.

Distributed system

During the decade from 1965-75, TI consolidated most of its data processing in its Dallas center. (A substantial amount of the scientific computing is done in a large center in Austin, Texas.) By 1973, TI management began to see advantages in moving to a distributed system that would put processing power and data storage facilities at end user locations. Some of the advantages of distributed systems appeared to be: reduced communications costs for the corporation, and improved reliability, availability, and system responsiveness for the end users.

TI's distributed system is basically a four-level hierarchy in structure. There is a fifth level in existence, but it will gradually be absorbed into the fourth level.

Level 1. At the top of the hierarchy is the corporate information center (CIC) in Dallas. Currently, it has five large IBM systems—three 3033s and two 168APs. In addition, there are some 250 spindles of disk storage, 80 tape drives, and 80,000 magnetic tapes. While the center's prime workload is batch processing, it does provide database inquiry services (via IMS), time sharing services (via TSO), and computer message switching.

Level 2. The second level of the hierarchy is made up of TI's major sites around the world, mainly manufacturing plants. TI has standardized on intermediate size IBM systems that are planned for these sites. The workload of these sites will be mainly interactive processing, thus providing these sites with database inquiry services and time sharing capabilities. Some batch processing will be done.

TI's distributed system does not provide for regional computers *per se.* Thus, the manufacturing plants have direct communications with corporate headquarters. But some of these second level sites do provide a form of regional processing, by serving remote terminals that are located within, say, 100 miles of the sites and where a local computer is not yet justified.

Both the level 1 and level 2 batch workloads are scheduled and managed by the central staff. Level 2 is considered to be an extension of level 1. TI uses a variety of tools for scheduling and managing these batch workloads, including some of the products offered by Value Computing Inc. In fact, some of this management extends to level 3 computers. We will have more to say about the management of such workloads in a near-future report.

Level 3. Level 3 is the local work-area computers that serve clusters of terminals or level 4 processors. TI has standardized on its own products for levels 3 and 4. The TI 990 minicomputer, which uses the TI 9900 micro processor family, is widely used for this purpose.

It is at level 3 that most of the interactive capability is being provided (although time sharing and inquiry services are available from levels 1 and 2). There is some batch processing done and most of it is triggered 'on demand'—for example, by the time of day (say, a job that is always run at 4 a.m.) or by an event (say, a queue reaching a predetermined threshold).

Also, some level 3 systems provide remote job entry of batch work to be run at one of the higher level processors.

Level 4. Level 4 is the work-station computer, for serving the individual employee (executive, manager, staff, clerical, and so on). Level 4 units are often intelligent terminals with some facility for data storage, as required by the employees.

As mentioned, TI has standardized on its own products for this level. For instance, the TI 765 is a small hardcopy terminal that has from 20k to 80k bytes of magnetic bubble storage. It has built-in text editing and some file management capabilities, and an optional built-in acoustic coupler.

Other level 4 units include TI's word processing systems, based on the TI 990 minicomputer.

Level 5. This level is the non-intelligent terminal that must be tied to one of the higher levels. These terminals are used for data entry, data collection, and so on. It is expected that they will be phased out over the next few years and replaced by level 4 units.

Size of the system. As mentioned, the level 1 center is at Dallas. The large scientific center, in Austin, uses a TI array processor computer, the Advanced Scientific Computer (ASC).

Level 2 is the intermediate size IBM systems. Currently, TI is planning for the installation of level 2 systems around the world.

Level 3 has some 87 distributed work-area computers installed, and tied into the network.

Levels 4 and 5 are the individual work-stations. At present, TI has well over 6000 terminals of various types tied to the network (plus another 5000 or so tied to minis and micros throughout the company, for automated production, automated testing, etc.; these latter are not tied to the global TI network). Some 4200 of these network terminals are TI 914 CRT units, and most of the remainder are hard-copy terminals.

The number of terminals tied to the network is growing at somewhere between 50% and 100% a year. By the end of this year, TI expects to have well over 7000 terminals tied to the system.

The TI 914 has three control buttons by which the user can easily select the service desired. One could be marked 'local,' for instance, another 'CIC/IMS,' and the third 'CIC/TSO.' The user can assign what each button means, for accessing the most used services. By depressing the 'local' button, the work-station is connected to the local level 3 processor, and by depressing the 'CIC/IMS' button, the station is connected to the level 1 IMS service. Actually, the user can access other processors in the network by entering the necessasry message prefix.

The distributed workload. A good amount of the workload on levels 3 and 4 systems has been off-loaded from level 1. The remainder is made up of new applications that are appropriate for distributed processing. For instance, common production control applications have been programmed in Dallas to operate on the appropriate levels 2 and 3 systems at the various manufacturing plants.

Levels 3 and 4 workloads, to a major extent, represent new work which is best handled in an interactive mode. This work includes both standard work that is programmed in Dallas, and 'local unique' work that is programmed locally.

TI policy does not discourage local programming capability; just the opposite, it is encouraged. TI's standard programming languages are COBOL, FORTRAN, and TI's version of PASCAL.

All changes to standard programs are carefully controlled. All local changes (except 'dire emergency' changes) must be external to the corporate programs. But 'dire emergency' changes *will* be made to standard programs, TI recognizes. These are flushed out by the next releases of the corporate programs.

Security. TI is well aware of the need for adequate security in its far-flung distributed system. The company is very active, we were told, in providing the necessary security procedures.

Let us now look at some of the major uses of this extensive distributed system.

Uses of the system

We single out just three of the important uses of TI's distributed system and communictions network—local responsibility, computer messages, and on-line reporting.

Local responsibility. The goal of most distributed systems—and TI's is no exception—is to give local management the necessary computer resources to do their jobs. As a friend of ours says, "People work best when they have no one to blame but themselves." Distributed systems remove much of the argument that "We didn't meet schedule because data processing didn't ...."

But there is more to it than just making local managers responsible for their own data processing. Many countries have either adopted, or are in the process of adopting, privacy legislation that seeks to control the flow of data across national boundaries. Distributed systems allow units of an organization that are located in other countries to store and process their own data. Only the data that headquarters needs would then have to be transmitted across national boundaries.

There is still another aspect of use that TI is encountering. The distributed system is encouraging local management to make increas-

ing use of the computer, in ways that the staff at headquarters never envisaged. Not only are these uses helpful for the local operations, they also are excellent sources of ideas that possibly can be used corporate-wide. The local programming capability makes this extension of use possible.

Computer message system. All of the 6000-plus terminals with access to the network can inter-communicate via a corporate computer message system. An end user can enter a message and direct that it be sent either to an individual or to a group of people. Each user can have his or her own set of pre-defined distribution lists. Or a new list can be set up for a specific message.

In most cases, users have hardcopy terminals in their immediate areas—even at their desks—which they leave turned on. Typically, the messages are delivered immediately by printing out on these terminals. We saw this occur while we were talking to one manager. The terminal on his desk suddenly started printing a message—quietly, because it was a TI 'Silent 700' terminal. After a quick glance, the manager could tell that the message was not urgent, so our discussion could continue. Further, the manager knew that as soon as our talk was over, he would read the message and take whatever action was needed.

If the message information is sensitive, the originator has the option of putting the message into the recipient's 'mail box' in the system, and then sending a simple message saying that a message is waiting. The recipient must then use password access to get the message.

The message system is heavily used. When we were there, message volume was in excess of 21,000 daily. The average message is 600-800 characters in length and goes to four destinations. The cost for a message like this is 6 to 8 cents for each destination, be it in the same building or on the other side of the world, we were told.

On-line reporting. TI has faced the same problems that many other large, far-flung organizations face—that is, the distribution of computer-prepared reports to the many locations. Delays in preparation and distribution—due to heavy printing loads, delay in the mails, etc.—can effectively isolate the remote units.

TI's solution has been to store reports in disk files in page format. Using a terminal, a user can access any page of any report, subject to security procedures, of course. The user can either scan the page to get the desired information or can have the page (or a collection of pages) printed out on the local hardcopy terminal.

TI also stores the documentation for the distributed system in this fashion. The distributed system, and hence its documentation, are undergoing continual change. With on-line reporting, users are always sure of seeing the most up-to-date documentation that has been prepared for the system.

If necessary, reports and other documents can be distributed via the computer message system.

This on-line reporting facility is also heavily used. When we visited TI, over 51,000 references a day were being made to these electronic files.

TI is in the process of tying this facility in with their word processing capability, for the dissemination of internal textual reports. The report author uses standard procedures for entering the report on word processing equipment (that is, by dictation and transcribing, or by direct keyboard entry by the author). The report may have to go through numerous revisions before it is ready for release; word processing makes the revision process much easier. Finally, when the report is released, it is put into the on-line reporting system and messages to that effect are sent to the designated recipients. They can then scan the report (by using high speed scrolling on their CRT terminals) and can have selected pages printed out on their local hardcopy terminals, if desired.

Training for system use

How does a company move into the use of advanced technology? How are people trained to use the new concepts embodied in distributed systems, computer message systems, and on-line reporting? We asked the people at TI these questions, to see what their experience has been.

TI has a variety of training requirements. One requirement, of course, is for training the customers of their computer and terminal products. Much of what TI has learned from their own pioneering is carried over into customer training.

For their internal training, TI has a number of training groups. The company's Learning Center is the closest thing TI has to a corporate-wide training facility, we were told. The learning center provides training courses for TI people at all major sites world-wide. A very broad training program is offered, ranging from orientation on the corportion to training in semi-conductor technology. Programming training is included in the curriculum. Most of the learning center training uses audio-visual material, such as courses on film or video tape.

The information systems and services function at TI has its own training facility in Dallas. The facility includes a laboratory for providing hands-on experience with equipment such as the TI 990 mini. They use instructors as well as packaged audio/visual materials.

Also, the information systems and services function has developed plans for a formal training program to be offered to TI people in Europe. This program will deal with application system development and programming.

Finally, for training end users within TI on the use of the computer message system and the on-line reporting system, TI makes extensive use of the ne work itself. A 3-level formal training program has been developed and is stored in the on-line files. The top level gives an overview of the system operation. The second level describes the variety of services that the system can provide. And the third level gives specific instructions on how to use each of the services. So an end user can focus in on the specific information needed at the moment.

The end result

What have been the benefits to TI of this use of advanced technology?

The company has not precisely quantified the total benefits, we were told. The communications network, the distributed systems, the computer message system, and the on-line reporting system have all been readily accepted and assimilated into the way the company conducts its business.

The various levels of TI management did not have to be sold on the merits of using advanced technology. After all, TI's product lines lie at the heart of this new technology. Rather, the main need has been to show the members of management *how* they could use the new technology to improve their operations and their management functions.

Remote sites no longer feel so remote. They can and do receive messages from headquarters as readily and as quickly as do people in the headquarters buildings themselves. The on-line reports they see are the same ones that people at headquarters see.

The computer message system has helped to cut down some business travel—an effect that other users of computer message systems have reported. Other advanced technologies that TI is considering may go even further in reducing the need for travel.

It seems to us that TI provides an excellent example of how advanced computer and communications technologies can be introduced into an organization, as well as some of the uses that can be made of those technologies.

The impact of new technology

Computers and data communications have already had major effects on the ways that some companies conduct their business. Consider, for instance, the airline reservation systems. There is just no comparison between the speed and efficiency of today's computerized systems and the old manual methods of some years back. Other examples include on-line order entry and inventory checking systems and mechanized credit checking, to name just two.

It seems to us, though, that today's new technology promises even greater changes for even more types of organizations—changes in the ways that these organizations are managed and conduct their business. One reason is that there are so many new developments appearing on the marketplace. Another reason is that the prices of these developments are dropping so rapidly that the potential marketplace for them is almost exploding.

Let us briefly review some of these developments and indicate what effect they can have on user organizations.

Micro-computers. The micros, with their associated hardware/software (floppy disks, hard disks, character and line printers, data communications, plus a wide range of software) are making computer technology affordable by even very small organizations (say, ten employees). Already they can perform at about the same pace as the upper end of the mini-computers, and soon they will be at the middle to upper range of today's main CPUs.

Advanced tele-communications. The communications picture is changing very rapidly these days. Both public and private data networks are bringing generalized data communications heretofore not available. Soon, a mixture of data and voice will be offered. And not far off is the capability for private video transmissions.

Database technology. This technology offers generalized facilities for the storage and retrieval of data. Data will be seen as a *corporate* resource, not a resource that is 'owned' by the functions of the enterprise as at present. The same data will be available for serving multiple applications. And the 'distributed database' is not far off.

Interactive systems. Just arriving are systems designed for use by the casual end user—someone not familiar with the use of computers. The newer systems are quite 'friendly,' in that they provide help for the casual user and are tolerant of most types of human operating errors.

Graphics. Line drawings, bar charts, etc. can now be economically prepared and displayed by computer. In fact, for not a great deal more money, color graphics can be used. Graphics aid the end user in comprehending data, by showing trends, significant variances, and so on.

Structured methods. Better methods for developing computer applications are becoming available. These methods result in fewer errors in the programs and make the programs easier to enhance and maintain. Further, libraries of common procedures help reduce the development effort.

Security methods. With more and more data and information being stored in computer systems, it is important that access be controlled. Only those people with legitimate needs should have access. A number of techniques have been developed for providing a high degree of security.

What these components lead to

These components of new technology in turn lead to new types of uses of computers. Here are some.

Distributed systems. It has become economical, with the advent of the mini-computers and now the micros, to put processing and data storage capabilities in the hands of the end users. Much of the economy of scale of large, central computers has been displaced. Further, many end users seek to have their own computers. In well-managed organizations, distributed systems will be developed under corporate standards and rules, to avoid the proliferation of incompatible application systems.

End user retrieval systems. End users no longer need to ask programmers to write special programs for them, for retrieving much of the data they desire from computerized files. Generalized software is available that allows the retrieval of specific data (such as the accounts receivable status of a specific customer) or report data from the database. The end users simply specify what it is they want and the system gets it, for a large fraction of the user requests. Further, retrieval can be controlled by security rules.

Electronic files. In addition to data, information can be stored in the database—information such as letters, memos, written reports, etc. Again, these can be retrieved directly by end users, according to security rules.

Computer message systems. These systems provide many of the advantages of the telephone—such as immediate delivery, ease of response, contacting a specific individual, etc.) but without some of the telephone's shortcomings. The recipient need not be interrupted in order to receive the message, nor is the sender faced with 'busy signals,' nor does the recipient have to be at his/her desk at that moment to get the message.

Word processing systems. These systems can aid in the preparation of many types of textual material, such as letters, memos, messages, reports, etc. Further, once prepared, they can not only be sent (electronically, if desired) but also can be stored in the database for later retrieval.

Tele-conferencing. Computer message systems, facsimile, video, graphics—all of these allow a group of people to communicate over wide distances in real-time. So it is becoming feasible to hold meetings without the need for the participants to all be at the same place. Further, computer message systems and facsimile provide archival records of what was discussed.

Effects on the organization

What are the likely effects of this new technology on the way that organizations conduct their business? Here are some of the things that we have heard discussed.

Cut across organizational boundaries. Part of the reason that companies are organized the way they are today is the need for putting people into groups so that (1) they can inter-communicate easily and (2) they have ready access to job-related information.

New technology is changing this picture. Data and information are not so likely to be functional resources as corporate resources; if stored within a function's computer system, they will still be accessible to others in the corporation that have a legitimate need to know.

Databases inherently cut across existing organizational boundaries, in many cases. Organizations that have attempted to install database systems that are constrained to organizational boundaries have generally been unhappy with the end results.

So some existing organizational boundaries may tend to disappear.

Geographic location less important. In the past, people working in units that are geographically remote from headquarters have felt their isolation. Telephone calls have been expensive, and the mails have been slow. Now, with computer message systems, distance is much less of a factor. Remote sites can receive messages as quickly and cheaply as units within the headquarters site itself.

Better centralized/decentralized balance. Two points stand out here. For one thing, it is now economically feasible to give operating units of a company their own processing and data storage capability. These units are then made fully responsible for their own operations. In addition, innovative uses of the computers are encouaged.

The second point is that, at the same time that the above is happening, some new developments will allow corporate management to have an improved visibility of what is going on in the operating units. Moreover, corporate executives need not be overwhelmed with reports and data in order to perform this monitoring and control. Thus new technology will support centralized strategic planning plus decentralized operations, as well as centralized monitoring and control of those operations.

Reduce business travel. Not all business travel will be eliminated, of course, but a lot of the annoying travel can be. For instance, the one-day trips that people take simply to attend one-hour meetings might be greatly reduced by tele-conferencing.

Not just for big organizations. Many of these effects will be seen first in large organizations, because they have the resources to do the pioneering. However, some of these services are becoming available for small business. For instance, we have come across computer message systems that are available to organizations on a per-message basis. And interactive systems are being developed for micro-computers, for use by small business.

Some problem areas

As with the introduction of anything new, there are problem areas involved with the use of this new technology. Here are some we foresee.

Proliferation of incompatibility. So much new technology is becoming available at relatively low prices that it will be hard for companies to exert corporate control. Hardware, software, and data communications services may be selected by organizational units to solve immediate, specific problems and without regard to their ability to communicate with other corporate systems.

Multiple supplier problem. This is very similar to the proliferation problem. Even if the small computer systems are obtained under corporate control, they may well involve multiple suppliers. This raises the familiar problem of 'finger pointing' when troubles arise, where each supplier blames the troubles on someone else.

Changes required. To adapt existing application systems to the new technology, it may well be necessary to change hardware, system software, application programs, etc. Such changes can be costly and may require an extended period of time to accomplish. Perhaps even more important, the company may need personnel changes in order to obtain the required new talents.

Acceptance by users. One of the major problem areas is that of acceptance by users—from chief executives to clerical positions. The new technology may well change the way that an organization conducts its business and may involve the reassignment of responsibilities.

How can an organization get itself prepared for the introduction of this new technology?

One approach is via the DELTAK 'Advanced Technology Library.'

Advanced Technology Library

DELTAK, Inc., with headquarters in Oak Brook, Illinois, is a leading supplier of multimedia training courses, primarily video tape courses. The company was formed in 1970, and in recent years has had an annual growth rate of over 50% per year. Revenues in 1978 were in excess of $18 million. The company's products are marketed in North America, U.K., Western Europe, Australasia, and the Far East.

In 1978, DELTAK entered into an arrangement with James Martin whereby they and he would develop an 'advanced technology library' (ATL). Martin is well known as the author of books on data processing technology (which we have discussed in prior issues). In recent years, he has been giving very popular seminars around the world on the use of advanced technology.

Martin's role in connection with ATL is to help plan the courses that will be developed, do research into the new technologies, write manuscripts, and participate in the production of the video tapes. For this purpose, Martin has a TV studio in his home.

The objective of the library is to introduce the concepts of advanced technology for three distinct audiences. One is *high-level orientation* for executives concerned with the strategic decisions about the use of new technology. Another audience is that with a *technical management orientation*, such as data processing managers, who are more concerned with the tactical decisions about the use of the new technology. And the third audience is the *technical staff*, where the courses will be aimed at explaining how the new technology can be employed.

The library is divided into six subject areas: (1) distributed data processing and communication networks, (2) tele-communications and data transmission, (3) on-line and interactive computer systems, (4) database and database management, (5) system security, reliability, and performance, and (6) office automation and the office of the future.

So the structure of ATL consists of the six subject areas for the three audiences, giving 18 subject/audience categories. In total, DELTAK and Martin foresee over 200 courses within these 18 categories. Each course consists (usually) of three video tapes, which are approximately one-half hour in length each, and may be supplemented by printed material and an audio cassette.

DELTAK calls the top two levels *video journals*, to emphasize that they are not detailed training courses but rather management orientation courses.

While top executives may not be interested in taking the tactical or technical level courses, DELTAK recommends that the inverse be done. That is, data processing managers should take all of the courses that executive management takes. And the technical staff should take all three levels, to see what the managers have been told.

The video journals that we viewed were organized as follows. First were some introductory remarks by James Martin, given in a rather informal interview type of setting. Following this was the description of a case example, shown in animation form. The case example might show, for instance, a company that

now has a variety of data communications networks, each serving a different application, and the problems that this approach has caused. This case example is also used for introducing a number of technical terms to help the executives build their working vocabularies. Then the third part, which is the bulk of the journal, consists of the continuation of the interview with Martin, conducted in a question-and-answer fashion.

In these presentations, Martin points out that the new technologies will change the way that the best corporations are managed. The whole strategic planning process will be centralized, and functional operations will be even more decentralized than they are at present, he believes. But to achieve the benefits, management needs a strategic plan for introducing the technology. So a management structure must be created under which the advanced technologies can be put to use.

The new technologies require new management viewpoints, says Martin. For instance, if 'mail' arrrives instantly, via tele-communications (such as in computer message systems), then managers will take a very different attitude toward 'mail.' He foresees a massive growth in electronic 'mail' in the next five years.

Also, Martin sees the concept of the database as fundamental to the running of the enterprise in the future. Data and information are very important resources and will have to be managed as such. They would be put into the overall database as created, and then selectively withdrawn as needed.

What with database technology, data communications, interactive systems, and distributed processing, the 1980s will see the building up of the computerized corporation, he believes.

In one of the video journals that we observed, Martin pointed out that in his seminars, he asks the attendees to draw diagrams that represent their current management structues for data processing, in terms of six data processing functions. The diagrams show whether each of these functions is currently centralized or decentralized (or both!). Martin says that the outcome of this exercise usually shows a wide variety of existing structures. Then he asks the attendees what they think the most desirable structures would be for their organizations. There is much more agreement here, he says.

As one example of a likely organizational change, Martin points out the need for a *corporate* tele-communications responsibility, covering all aspects of tele-communications. One executive should be put in charge, to oversee that all tele-communication resources are used to the best advantage. With the coming computer message systems, tele-conferencing, etc., a background limited to voice communications will probably not be adequate for this executive position.

As mentioned, each ATL video tape runs about 20 to 35 minutes. Some of the courses consist of three such video journals; some have more. DELTAK markets these courses in terms of course/months—and one course can be obtained for as short a time as one month. It may be used as often as desired during that month, using a special DELTAK video tape playback unit and color video unit.

DELTAK recommends that a course be given to small groups—say, four to six managers from the same general management level. At the end of the video tape portion, the group should enter into a discussion of what was shown and bring up any questions they have. DELTAK has prepared pamphlets and audio cassettes to provide questions that help stimulate the discussion. Such discussions are a big part of the learning process, the people at DELTAK believe.

For more information on the Advanced Technology Library, see Reference 1.

Let us now consider how one company has begun using the ATL to introduce the concepts of this new technology into their organization.

Western Bancorporation

Western Bancorporation, with headquarters in Los Angeles, California, is a bank holding company with assets of over $26 billion. It has over 20 affiliated companies in the 11 western states, primarily commercial banks, the largest of which is United California Bank (UCB). *Fortune* magazine lists Western Bancorp as the eighth largest commercial banking company in the U.S.

In 1975, all data processing functions of the affiliated companies were consolidated to form Western Bancorp Data Processing Company (WBDPC), also with headquarters in the Los Angeles area. WBDPC performs most of the data processing services for the banking affiliates of the holding company. It is divided into six regional processing centers, and has a staff of some 1,195 people, over 200 of whom are concerned with application system development and maintenance. The company has developed and is operating some very large batch systems, of course, such as the daily processing of demand deposit account transactions. Also, some large on-line systems have been installed, such as one that provides interactive query services for tellers throughout the eleven western states serviced by WBC banks.

Each regional center is responsible for the technical training of its staff. For this training function, the regions use both instructors in classrooms and audio-visual training material. About two years ago, the company selected DELTAK as its main audio-visual course material and pooled the existing regional contracts with DELTAK into one corporate contract.

The main use of the DELTAK video tape courses has been for skills training for the technical staff. Nothing was available for helping managers better understand the new technology. But in late 1978, the people at Region I of WBDPC heard of the new ATL courses offered by DELTAK. They examined the first ATL course, on distributed data processing, at the Los Angeles office of DELTAK. They liked what they saw and ordered the course for one month, for use in January of this year.

Because these video journals for managers were something new, the people at Region I of WBDPC moved cautiously. The training people sent memos to the senior managers in Region I, telling them about the availability of the course and urging them to view it at their convenience. In addition, the new course was listed in the monthly audio-visual library list that is sent to WBDPC staff members and to some nearby bank managers.

The acceptance of this first ATL course by the managers of Region I was excellent, we were told. Instead of keeping the course for just one month, as originally planned, it was actually retained for three months, before returning it to DELTAK. Most of the executives and managers who viewed the video journals had data processing backgrounds. But they liked this way of gaining additional knowledge on the use of advanced technology.

The people at WBDPC made several observations to us, based on their experience with this first ATL course.

For one thing, the initial course *is* suitable for viewing by the upper levels of management. It provides overview material on what is happening (in this case, in distributed data processing) that company management should be aware of. The course makes no attempt to teach skills, nor does it make heavy use of technical jargon. At the same time, it does present some rather advanced concepts.

Secondly, they found it quite difficult to present the course to *groups* of managers. It is hard to get a group of managers together at the same time, and the ATL video journals were an unknown quantity during this introductory use. So viewing was almost always by individuals, and consequently there was no group discussion of the material. For the second ATL course, scheduled for about the time we went to press, they hoped to have more group presentations, because the discussions that follow the video portion could be quite beneficial.

The third point they made caught our attention. The first course was available for viewing by the technical staff—system analysts, system designers, programmers, and so on—and, in fact, some did see it. But the staff members showed far less interest in the course than did the managers. The reason might have been, we were told, because *none of the staff members were involved in developing a distributed data processing system at the time.* Apparently, they did not see the application of the course material to their work.

While WBDPC probably will continue to list the ATL courses in their monthly library listings, indicating that they are available for viewing by the technical staff, for some time to come the emphasis will be on their use for providing management overviews.

The fourth point they made to us was that not all of the ATL subject areas are of equal interest to the WBDPC executives and managers

at this time. The two subjects of main interest are database technology and interactive systems, because the company is already active in these two areas (but the ATL courses in these areas are just now becoming available).

The next point they made was that interest in the ATL courses is beginning to spread to other WBDPC regions. One of the other regional centers borrowed the first ATL course from Region I for a few weeks; the reception there was equally good. And still another region has been talking to the people at Region I about using the courses.

Finally, it appears that the executive level of ATL courses will be appropriate for showing to banking management—but WBDPC people are not yet sure how best to begin this use. The various banking companies within Western Bancorp are beginning to install some office automation systems, such as word processing equipment. As interest grows in the integrated use of advanced technology, the ATL courses may be quite useful in showing bank management the advantages of an integrated approach.

The initial interest in the banks on the use of new technology will probably come from specific bank divisions, we were told. For instance, the bank divisions concerned with international banking are faced with the need to use new technology in order to retain their competitive positions. The new largely-European SWIFT bank network is a case in point. It is in situations such as this that bank management's interest in ATL overviews is most likely to arise.

The Advanced Technology Library is very new, and WBDPC has had the chance to use only one series of video journals (on distributed data processing) at the time we talked to them. They were impressed with this first series. It is quite possible that future ATL courses will play an important role within the corporation, in presenting to executives and managers a state-of-the-art overview as to how new technology can be used to improve the ways business is conducted.

Introducing new technology

Let us briefly review the situation relative to introducing new technology into organizations, as we see it.

The opportunities. New computer and communications technologies offer very significant opportunities to the management of organizations. In the discussions above, we have covered a variety of those opportunities. And, as we have mentioned several times, these opportunities are not limited to large organizations. Even very small companies, or small, remote units of larger organizations, can benefit.

The main requirement. But in order to exploit these opportunities and gain the benefits, organizations should really introduce any new technology on a planned, integrated basis. This does not mean doing everything at once. In fact, a planned approach generally calls for gradual, systematic progress. But it does mean that the various installations of new technology be designed to work together. For instance, if word processing is installed, it should work with future computer message systems and electronic filing systems.

In short, an organization needs a longer range strategic plan for adopting the new technology. An explicit charter should be prepared under which this plan is developed, the technology tested, and then applied. And a specific group should be designated to plan and oversee the installation.

The obstacles. The main problem to meeting this requirement, it seems to us, is: the key decision-makers in the organization—the ones most essential to the development of such strategic plans—may well have too many other matters on their minds to want to become involved with this. To develop the strategic plan, these executives are asked to concern themselves not just with data processing plans. Rather, they are asked to look broadly at the whole information exchange process within the organization. This includes all uses of telecommunications (both present and contemplated), business travel, staff meetings, and so on. These executives may feel uncomfortable dealing with new technology and may tend to postpone their participation as long as possi-

ble. Such feelings may be partly due to their belief that the new technology is 'over their heads.'

What can happen. If a strategic plan is *not* developed, then new technology is likely to be introduced on a piecemeal basis. The result will be a proliferation of incompatible systems—a repetition of what happened with both computers and data communications. In such instances, everything that is installed is for the solution of specific, immediate problems—and no two systems will work well together. The result is a waste of resources and a source of frustration from not being able to do what later seems so easy and obvious.

When management detects this situation, *then* the need for a strategic plan is recognized. *Then* begins a long, costly period of consolidating the incompatible systems. And it is finally recognized that it would have been much easier and less costly to have developed the strategic plan near the outset.

Now is the time to develop the strategy for introducing today's new technology.

The need for management attention

The evident problem facing the development of the strategic plan, of course, is that of getting the attention of executive management. Getting this attention is easy to say and hard to do. How might it be done? We see several alternatives. In fact, they might be used in conjunction with each other; it is not necessarily a case of selecting just one.

Computer manufacturer seminars. The computer manufacturers—and particularly IBM—have been successful in introducing executives to new uses of technology by way of executive seminars. These seminars often have an industry orientation, so that the executives can more easily visualize how the technology can be applied in their companies. The seminars carefully make only limited use of computer jargon. And the participants are selected from the same general management levels, to make more homogeneous groups.

The main shortcoming is that these seminars are clearly an important part of the computer manufacturer's sales efforts. The participants are exposed *only* to the supplier's products and to the concepts that the supplier's products support.

Public seminars. A variety of seminars on the use of new technology are now being offered publicly, and arrangements usually can be made to give them in-house for a company. While many of these have been designed for data processing management and/or the technical staff, some are appropriate for executive management.

It is quite possible that such seminars should be screened by staff members, before encouraging executives to attend them, to make sure that the quality is satisfactory. And for public seminars, an executive's travel time must be considered, as well as the fact that the seminars will usually have general (not industry) orientation and that the audience will likely be heterogeneous (ranging from, say, executives to programmers).

Use of committees. Some organizations have set up technical review committees, to investigate selected subject areas and then to make presentations to executive management. Such committees can be quite effective for pointing out the opportunities of using new technology, particularly if (1) a committee is headed by a senior executive, and (2) the use of technical jargon is avoided in the presentations.

The main difficulty with this approach in the present context, as we see it, is that such committees seem to have too limited a charter. They are usually chartered to look at one subject area, we gather from our discussions. The subject area might be 'office automation,' for instance, and the committee is asked to investigate and then recommend a corporate program within that subject area.

What is needed here, we think, is a charter that says, "Look at all the major types of information interchange within the company—meetings, telephone calls, correspondence, factory control, etc. Then consider where new technology might be most useful to us in the next five to ten years. Then propose a strategic plan by which we can introduce this technology in a business-like manner."

As we say, we gather that the committees that do exist do not have a charter this broad—possibly because executive management does

not see the need for it. Also, the charter may seem too sweeping, providing too much chance for 'empire building.'

Use of management overviews. Another alternative is to provide in-house 'training' for executive management, in the form of well-prepared overviews of what new technology has to offer. Such overviews should clearly point out the need for an integrated approach to the use of this technology, as opposed to the piecemeal approach that is likely to happen.

In this report, we have discussed the possible use of the DELTAK Advanced Technology Library courses for providing such management overviews. Some of these courses are being designed explicitly for executive management. Each video tape is relatively short in duration—involving far less of an executive's time than, say, attending a seminar.

It seems to us that the ATL is an interesting way for introducing executive management to the concepts of using advanced technology. And it could be used in conjunction with a carefully prepared program involving the technical review committee approach for setting the stage for the strategic plan. Those two approaches would make a pretty potent combination for planning the introduction of new technology, it seems to us.

REFERENCES

1. For more information on the Advanced Technology Library, write DELTAK, Inc., 1220 Kensington Road, Oak Brook, Illinois 60521.
2. We understand that the National Computing Centre (Oxford Road, Manchester M1 7ED, U.K.) is developing a video-assisted training course for executives and managers on how to control the use of computer technology for the benefit of the enterprise.
3. We have prepared a bibliography on sources of information for introducing advanced technology into an organization. For a free copy, write EDP ANALYZER.

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