INTRODUCING ADVANCED TECHNOLOGY

The subject of sources of assistance for introducing new technology is a broad one. It is so large and diverse, in fact, that we have returned to this subject several times over the past year. This month we discuss two more sources in some depth. One is consultant research programs, which are membership awareness services offered by consulting firms. The other is multi-disciplinary research organizations, which provide a wide variety of services in many fields. And we will recap the sources of help we have uncovered over the past year.

Atlantic Richfield Company (ARCo), with headquarters in Los Angeles, California, is in the natural resources development business. ARCo has annual sales of over $12 billion and employs some 50,000 people, most of them in the United States. The company is best known for its oil and gas operations, but it also has interests in coal, copper, aluminum, and petrochemicals.

Last year ARCo implemented a major reorganization that divided it into eight autonomous operating companies; six are divisions of ARCo and two are divisions of a subsidiary, Anaconda Company. Under this new structure, the corporate staff can only make recommendations to the various divisions on how to use some of the new technologies. The corporate staff cannot decree use of certain office automation systems, distributed processing strategies, and such. We talked with the manager of the corporate office automation project about their approach to introducing the new information handling technologies.

ARCo's work in office automation began in the corporate tele-communications group. In 1977 Xerox Corporation asked the vice president of corporate services whether ARCo would be willing to be an experimental site for an electronic filing system that Xerox had developed. The vice president agreed and five executive workstations were installed in the tele-communications group. These were connected to a central mini-computer with its associated 'filing cabinet'. The system was used for nine months by some eight professionals in the tele-processing group. At the end of the project, ARCo decided that the technology in the system was too futuristic to be of immediate widespread use to them.

Following this project, ARCo decided to broaden its office automation study to include information systems as well as some other pertinent departments. A committee of middle managers, called the electronic office support committee, was formed. Department managers from administrative services, space planning, tele-communications, corporate information systems, employee relations, and human relations are on the committee. They meet periodically to hear updates of all ARCo office automation pilot projects and to help make future plans. ARCo thinks this broadly based committee will help give a corporate-wide view to its office automation planning.

During 1977 and 1978, responsibility for office automation projects resided basically with the vice president of administrative services. In addition, other departments, especially information systems, were conducting research studies on their own.

Joining consultant research programs. In mid-1978 ARCo decided to broaden its exposure to new ideas about office automation by joining two consultant programs. One is the Diebold Automated Office Program. It was formed in early 1978 to assist office automation implementation teams. Its corporate members attend two yearly conferences, four yearly working sessions, plus they receive research reports and some on-site presentations and consulting.

At about the same time, ARCo also joined the Office Technology Research Group, headed by a former ARCo vice president, John Connell. This group focuses on senior management's need for managing the transition to a more automated office environment. Corporate members attend two yearly conferences and receive a bi-monthly newsletter and a ten-volume library of reprints, updated monthly.

Then in January 1979, ARCo established a corporate office automation project team and staffed it with two people. By December 1979 it had grown to five people. This growth was prompted in part by what

ARCo had learned from the two consultant programs that they had joined earlier.

The people at ARCo who became involved in the two consultant research programs told us that these services have helped in several ways. First, these programs have provided ARCo with numerous contacts with people in other companies who are working on similar office automation projects.

Second, these programs have helped broaden their view of office automation. For example, the heavy emphasis on human factors in office automation planning led them to involve a training specialist and an industrial psychologist in their office automation projects to provide this knowledge.

Third, these programs provide a good means for bringing new people 'up to speed' quickly on the office automation field, because they give a good external perspective of what the field is all about. These new people include new project members as well as managers of other departments who are toying with the idea of starting pilot projects in their organizations. The ARCo office automation team often takes interested executives as guests to the consultant program conferences, we were told.

And fourth, the consultant programs have provided an opportunity to test ideas and exchange experiences with others involved in similar projects.

Co-ordinating pilot projects. The team is responsible for doing research and co-ordinating pilot projects, as well as advising the various ARCo companies on implementing their own office automation projects. The team also makes periodic presentations to the office support committee.

The team is now co-ordinating several pilot projects. In one, a cluster of seven secretarial work-stations is being studied to determine how to improve secretarial productivity *without* creating a word processing center. ARCo wants to find out: (1) what training is needed for secretaries

to use the system, (2) what new functions the secretaries can perform with the system, (3) what functions such a system *should* provide in order to benefit the secretaries, and (4) what effect such systems have on the working environment. ARCo is considering adding a message system to this project to evaluate its impact, also.

In another project, a cluster of professional work-stations has been installed in the corporate public relations department. Writers use the work-stations to compose their public affairs speeches, press releases, etc. They mainly use this shared system's word processing capabilities. After seeing what the system did to improve the productivity of his staff, the department manager asked for a work-station, so he could more quickly review their work and use it for his own writing.

ARCo expects to extend this system by adding an information retrieval capability, so that corporate statements on various economic, political and technical issues can be tracked and followed consistently.

ARCo is continuing to follow a conservative path toward office automation. A prime ingredient in their approach is participation in consultant research programs. By participating in these, they discover what is being done elsewhere in the field, what solutions are possible, and which issues are most important in preparing for eventual office automation.

Imperial Chemical Industries, Ltd.

Imperial Chemical Industries Limited (ICI), with headquarters in London, U.K., is an international company which employs some 151,000 people world-wide. It is ranked by *Fortune* magazine as the 27th largest industrial company outside of the U.S. The company is engaged in the manufacture, distribution, and sale of chemical-related products.

ICI operates in a very divisionalized manner, with each division and subsidiary having much freedom to chart its own

course in the use of new technology, for instance. The central office does seek to obtain compatibility in the use of new technology, however, by its co-ordination efforts and by the use of consensus policy guidelines.

We talked to the ICI people at the central office about their corporate approach to the introduction of new computer technology, such as electronic office technology—the automated office. They see the electronic office area as consisting of a number of components, including: word processing, data communications, message switching, information retrieval, and the use of the new viewdata technology.

The introduction of such technology into ICI must be subject to a number of considerations, they pointed out. For one thing, the technology will be used over a *wide range of operating environments*. The company has plants and offices ranging from the U.K. to the U.S. to Southeast Asia. Among the many locations, there are wide variations in hardware and software support that are available. Then, too, as mentioned, there is a high degree of *division autonomy*. It is quite impractical for the company to try to standardize on one type of computer hardware, for instance. In the case of word processing systems, there are about 150 systems in use at ICI locations in the U.K., represented very predominantly by three brands of equipment. Thirdly, the introduction of new technology requires the development of acceptable *corporate policy guidelines*. Such guidelines are needed to help steer the introduction of new technology over the next several years—by which time, additional guidelines will have been developed.

With this background, let us now look at how ICI is approaching the introduction of electronic office technology.

ICI's approach

The people at ICI's central office see the introduction of the electronic office as a

socio-technical issue. The new methods will have a big impact on how employees perform office functions. The behavioral aspects of the task are just as important as the technical aspects.

ICI's approach divides into the following four components.

Advisory service. To keep them up-to-date on new technology and its practicality, ICI makes use of advisory services. Among these are services provided by the National Computing Centre, with headquarters in Manchester. A number of ICI locations are members of NCC, and ICI people are active in NCC committees, work groups, and projects. One area of participation has been in NCC's electronic office project. Information is also exchanged with other major companies in the U.K. where benefit is derived from avoiding too much 're-inventing of the wheel'.

Set longer range goals. Knowing what is coming and how it might apply, the people at ICI's central office set up possible goals to accomplish in the next several years. For instance, they see ICI as using a number of applications networks, for serving quite different functions, as opposed to one monolithic architecture serving all company needs. But these applications networks must operate via a cohesive communications network technology which is independent of specific hardware and software, and can interface with other networks, particularly public ones.

Possible goals such as these provide a framework for obtaining the organized participation of divisional representatives.

Federations of managers. Another component of ICI's approach is the use of federations of ICI information managers, representing the divisions and subsidiaries. These groups meet, exchange views, and consider the possible goals for the use of new technology. These managers can, and do, inject the needs of their many operating environments, as these possible goals

are considered. The goals, in turn, are sharpened and refined so as to better meet the diverse needs of the various divisions.

In addition to helping formulate the goals for introducing new office technology, these federations of managers also help in the selection of pilot projects and in the dissemination of pilot project results.

Pilot projects. When a particular new technology is considered to have arrived, ICI sets up one or more pilot projects to test it out in typical operating environments. These pilot projects explore the advantages and shortcomings of the new technology, and aid in deciding how it can be exploited more widely.

When we talked to them, ICI had pilot projects underway in the following areas: (1) integrating word processing and message systems; one site was doing its invoicing via this combination; (2) integrating word processing and data processing so that, for instance, ad hoc reports can be obtained by accessing data processing files with a word processing system; and (3) tele-conferencing using the regular telephone network to connect the participants, and with participants using handwriting transmission (Tele-note) equipment.

So ICI has a multi-pronged approach to the introduction of new technology into a very far-flung and diverse operating environment.

The problem: Changing behavior

The use of most of the new computer field technology will require behavior changes on the part of many people in the using organizations. These changes will involve not only data processing personnel but also the operating staff of other departments, plus managers and executives. And where behavior changes are involved, problems arise.

The difficulty is, when introducing something very new, one is not sure just what types of behavior changes will be in-

volved and what difficulties will be encountered. It is often 'uncharted territory'. The reason for looking for assistance is that (hopefully) the experts have studied the subject and know what you should expect. They should give you advanced warning of difficulties plus guide you in obtaining desired benefits.

Why does the use of advanced computer technology require behavior changes? Just consider some of the leading technology areas:

SOME ADVANCED TECHNOLOGIES

Automated office systems
Automated system development methods
Computer support for managers
Distributed systems
Encryption
Graphics
On-line interactive systems
Voice recognition systems

Each of these will require a new and different behavior on the part of users. For instance, when you are changing to your computer supplier's latest CPU and/or operating system, the impact is limited mainly to the data processing department. The behavior changes may be rather limited in nature (although there have been some important exceptions to that statement). But if your company is installing an automated office system, it will impact the behavioral patterns of secretaries, managers, and other staff members. Such an installation has a much wider impact, with more opportunity for difficulties.

The types of information you need

To get prepared for introducing new technology—technology that will require behavioral changes on the part of your organization—we think you will need three types of information:

Awareness information and the updating of this information. You seek to learn: What are the particular new technologies? How fast are they changing? What is the current status of each? When will each be feasible for us? And where are they being introduced?

Assessment information. You seek to learn: What have the pioneer users found in the way of benefits and problems, in connection with using each particular new technology? What are the costs of installing and using each? What side effects have occurred? And what is the likely 'upheaval factor' for the organization?

Installation information. This information covers details of selecting particular products and services, training people in their use, overcoming resistance to change, and so on.

With this background, let us now look at two sources of information for introducing advanced technology—consultant research programs and multi-disciplinary research organizations.

Consultant research programs

Consultant research programs are on-going services from consulting firms to which companies can subscribe. They may be simple updating services or an elaborate, multi-service programs. They are aimed at specific subject areas, such as coping with certain types of new government regulations, dealing with foreign government regulations, keeping up with the state of the art in specific industries, etc.

What services do you receive from a consultant research program? Well, here are some that we think exemplify what you can find, but we would not expect all of these services in every program.

Plenary meetings. A major component of some consultant research programs is their general meetings, which they hold once or twice a year. These meetings last several days each. Most often they are aimed at senior management and deal with

strategic, political and managerial concerns. A typical meeting has some formal presentations (to introduce attendees to new ideas and interesting case studies) and some small group discussions, possibly with the speakers.

Working sessions. A second type of meeting that a consultant program might hold is working sessions. These are generally aimed at the implementors of the new technology. The intent of these sessions is to get the implementors involved in more in-depth tactical discussions. In the automated office area this would involve department managers and project leaders, and the discussions might cover building high leverage pilot projects, implementing electronic mail systems, or integrating existing systems.

Research reports. Each year the consulting firm might publish several original research reports for the program. These could be aimed at any level in organizations: for executives, exploring organizational issues and trends; for managers, human factors implications of change; and for implementors, describing newly announced products or specific applications.

Literature service. In order to keep members aware of new literature published on the subject, the consultant program might have a literature service, and maintain a library. The firm would review published articles, case studies, papers, and even vendor and equipment evaluations and reprint the most pertinent ones for its members. Upon joining, each member would receive one or more copies of this library of reprints, and thereafter receive periodic additions. Or the consulting firm might simply summarize literature it thinks members would be interested in reading.

Newsletter. The consulting firm might also send out a monthly or bi-monthly newsletter to members. It might summarize the most interesting recent articles, announce pertinent upcoming conferences and seminars, comment on new product announcements, and generally keep members abreast of what is happening in the field.

On-site presentations. Membership in the program might also entitle organizations to a few days of on-site presentations each year. Each firm would pick the topic(s) it would like to hear about, structuring the time provided in any manner it chooses. The presentations could be for a few company executives or for, say, many department heads and their staffs.

Consulting. Finally, the member organization might receive some on-site consulting. Companies could use this service to review their future plans with the consulting firm, to explore possible problems, or to discuss alternative approaches for dealing with technological change.

In the automated office field, we found two consultant research programs in the United States—the Diebold Automated Office Program and the Office Technology Research Group.

The Diebold Automated Office Program is one of three Diebold research programs. It aims at managers and project members charged with implementing automated office projects. It held its first plenary meeting in July 1978, with seventeen sponsoring companies attending. There are now 36 member organizations.

The program consists of the following services. Two plenary meetings are held a year, and each lasts two and one-half days. These are aimed at senior management and deal with strategic, political, and managerial aspects of moving toward the automated office. Four working sessions are also held each year. These are aimed at implementors of automated office systems and deal with technical issues. Each sponsoring organization also receives several research reports, two days of on-site presentations, and one day of on-site consulting each year. Sponsorship for the program costs $14,000 per company per year. The program has its headquarters at the

Diebold Group, 430 Park Avenue, New York, New York 10022.

The Office Technology Research Group focuses on senior managers and the information these executives need to direct their companies' moves into the automated office. It was formed in early 1978 and held its first plenary meeting in June 1978, with ten member companies attending. The program now has 27 sponsoring organizations.

For a fee of $2,400 per quarter per company, the program provides three services. First is their ten-volume library. It consists of reprints of pertinent articles, case studies, and papers in ten areas within the automated office field. Some subjects covered are electronic mail, word processing, electronic office systems, and human and organizational factors. The library is updated monthly.

Second, the program holds two plenary meetings a year, for two and one-half days each. And third, it publishes a bi-monthly newsletter which contains digests of new additions to the library and highlights of new developments in the automated office field. The Group is located at P. O. Box 65, Pasadena, California 91102.

Pros and cons of consultant programs

Of the four approaches we are discussing this month and last month—consultants, user roundtables, consultant research programs, and research organizations—consultant research programs can potentially give companies the broadest high level view of a particular field. In essence, these programs 'package' the field. They uncover pertinent work going on in various technologies and then package their findings in various forms—conferences, reports, newsletters, etc. They may sponsor some research projects themselves, but mainly they are aimed at finding out what others are doing. Thus, these programs are very helpful to companies gathering awareness information. And since this is a continuing awareness service, it can alert sponsoring companies to new trends in the field.

In addition, consultant research programs can provide *some* assessment information—in-depth information about specific technologies. For example, one working session might be devoted to discussing only electronic mail systems or word processing systems. However, we see multi-disciplinary research organizations providing more in-depth assessment information (as we will discuss shortly). Also, consultant research programs do not provide information tailored to an organization's specific needs as would hiring a consultant.

Finally, consultant research programs can provide installation information, through case studies of how other organizations have selected equipment, trained their personnel, and dealt with resistance. These programs are a good source of case study information to help implementors determine what approaches appear to work best, based on real-life experiences.

One question that can arise about a consultant research program is: Will it progress along with the users or will it remain in the awareness stage as the users move on? If new organizations continually join, then both introductory as well as advanced material will need to be presented.

Let us now turn our attention to multi-disciplinary research organizations.

Research organizations

Research organizations, as we use the term here, provide a variety of services for companies seeking information and help on new technologies. Often their major service is contract research or consulting. In addition, they may offer several types of memberships, through which companies can obtain summaries of research findings. And, they may provide educational services. So they generally offer in-depth knowledge in a number of specific areas, but it is not packaged into a single 'pro-

gram'. The user must pick and choose among the various services offered.

Here are a few research organizations we have come across.

National Computing Centre

The National Computing Centre, with headquarters in Manchester, U.K., was set up in 1966 by the British Labour Government to promote the more effective use of computers. Until 1977, most NCC funding came from government grants, enabling the Centre to study a wide variety of computer-related subjects. Since 1977, the Centre has been independent of the government but still receives government funds for specific projects, performed under contract. Profits are taxed; earnings are not distributed but are used to further the objectives of the Centre.

NCC is an organization of members— and the members, in turn, are establishments, not individuals. An establishment is defined to be an organization/location. Thus a company that has six locations, all of which want to be members, may have six memberships. Almost 80% of the NCC members are computer-using private and government organizations, while the remainder are hardware, software, and service suppliers plus some educational bodies. Currently, NCC has over 1,800 members and the membership is growing at about 15% to 20% per year. Membership fees range from £110 per year.

NCC has six regional offices throughout Great Britain and Northern Ireland, where training courses, committee meetings, working group meetings, and the like are conducted. The Centre employs over 250 people.

In addition to the member services performed, which we will discuss, NCC also has both national and international roles. In its national role, NCC provides staff experts to serve on almost every national committee set up by the government that deals with the use of computers. On the international scene, NCC is active in EEC working groups, in international standards efforts, and in international privacy guideline development efforts.

Following is a brief summary of the main services that NCC provides.

Assess new technology. NCC performs a substantial amount of research in the use of new technology. In general, the Centre does not originate research but rather concentrates on the transfer of useful results of original research performed by others. NCC staff members look into new technology and report on it to the membership, so that members can evaluate it.

The results of these studies are also used in other ways. They are used to develop new training courses in the application of computer technology. They are used in literature that NCC publishes. And they are available for information retrieval by the NCC information services. Areas of study in the past have included system analysis and design methods, micro-processors, database technology, and data communications.

Most of the funds for these studies have come from the government.

Software packages. NCC has developed, and sells, a number of software packages. Most of these are application oriented. However, one package, FILETAB, is a generalized file handling and report preparation package, and is the best selling independent package in the U.K.

Training. NCC conducts extensive training programs in the use of computer technology. Over 200 seminars and courses are given publicly each year, and more are given in-house to member organizations. In addition to these classroom courses, NCC has developed audio-visual training courses, using video tapes, and an *awareness program* that includes six updates per year—with each update consisting of material on audio cassettes plus a booklet.

Publications. NCC has an extensive publication function, which includes books, periodicals, reports, working papers, and

so on. The current book catalog lists more than 80 titles covering such subject areas as careers, programming, distributed computing, and documentation methods.

Information services. NCC maintains a comprehensive library service that handles over 6,000 information requests per year. Six indexes are maintained: (1) computing hardware, (2) software, (3) computing services, (4) computing education, (5) computing literature, and (6) computer installations in the country. For a current awareness program, the Centre publishes the bi-weekly *Computing Journal Abstracts*, which gives abstracts of current literature. Also, the monthly *Computer Hardware Record* lists available hardware in specific subject areas.

Advisory services. Members often call upon the expertise that NCC staff members have developed in specific areas, on a consulting basis. These consulting services are mainly for NCC members or first-time users of computing.

Special area involvement. NCC has been particularly active in a number of areas, which deserve brief mention, in addition to their wide ranging studies of new technology.

Standards development. NCC is active in U.K. and international efforts for developing computer field standards. These are long term projects, of course; standards usually move very slowly, and particularly on the international level (x-25 was an exception). In 1977, NCC submitted a report to the U.K. Department of Industry on encouraging the development and use of computer standards, and has since received government funds for implementing some recommendations.

Privacy and security. Five or six NCC staff members are working in the area of privacy and security of computer systems. Government contracts have been received to develop books, courses, and seminars as a result of their findings, in order to make people more aware of the problems and how the development of solutions might be approached.

Computer user viewpoint. NCC is acting as the secretariat of the new National Computer Users Forum, which has representatives from almost every major users association in the U.K. The aim of the Forum is to give user viewpoints on important computer-related issues (such as standards and privacy, for example).

Advanced technology. NCC, from time to time, prepares forecasts of computer-related developments for the next decade. And the Centre prepares surveys of hardware, software, and services. From these efforts, NCC identifies important new technological areas that they feel deserve more attention. Some that have currently active projects are: database, data communications, and the electronic office.

In the electronic office area, NCC has tested some of the new technology internally and has then reported results to members. For instance, a study group was formed in the fall of 1976 to look into word processing. A recommendation was made to acquire two stand-alone systems which would integrate well with their secretarial and publication activities. These were obtained in early 1977. Then, in 1979, a report was prepared that deals with the Centre's two years of experience, covering such subjects as training, documentation, initial use, utilization, productivity, faults, service, supplies, and data s - curity.

We have given this rather lengthy description of NCC to illustrate the variety of services that a multi-disciplinary membership organization can provide to members, to aid them in introducing new technology. NCC headquarters are at Oxford Road, Manchester M1 8DX, U.K.

Other research organizations

There are numerous other research organizations around the world. To broaden our discussion, here are brief descriptions of services offered by two more.

Arthur D. Little, Inc. is an international consulting and contract research organization. Since its founding some ninety years ago, it has concentrated on helping industry introduce new technologies. It started in the chemical industry and today it is involved in every technology-based industry. ADL has over 1200 professional staff members worldwide—in the U.S., Canada, Western Europe, the U.K., South America, Africa, the Middle East, and Japan.

In addition to its consulting, ADL has a subscription awareness service, called IMPACT. For a fee of $9000 a year, ADL keeps its IMPACT subscribers up-to-date on new developments and research findings in all fields it is working in, such as international matters, tele-communications, economics, construction projects, electronics, data processing, energy research, health care, chemicals, and so on. Part of the fee provides subscribers with ten research reports, about thirty research letters, and invitations to attend ten discussion meetings a year. The remainder of the fee is for consulting services from ADL. For companies interested only in developments in the data processing and communications fields, the service costs $7000. But most companies opt for the broader based service, we were told. There are some 275 IMPACT subscribers.

And finally, in 1964 ADL established its Management Education Institute in Cambridge, Massachusetts. It offers an accelerated eleven-month business program leading to a master of science degree in management. The program stresses modern management techniques and is aimed at the needs of managers and future managers of companies in developing countries, but students from developed countries also attend. The 1979 class included executives from 23 countries. Arthur D. Little's headquarters are at 25 Acorn Park, Cambridge, Massachusetts 02140.

SRI International provides basic and applied contract research services as well as information system consulting and a membership information service. SRI operates in 67 countries and these services are available worldwide.

SRI does research and consulting in a wide range of subjects; one SRI circular lists more than 300 such subject areas. In addition to work for government and commercial clients, SRI develops new technologies on its own and makes its findings available for commercial use via sale or licensing. In the contract research area related to computers, SRI designs and develops new computer-oriented hardware and software, as well as systems and procedures. Recent work has emphasized microprocessor and mini-computer technologies, software packages for use by decision makers and managers, tele-communications, and artificial intelligence.

SRI also does consulting in four areas related to data processing. The first is in managing computer and communication installations—staffing, long range planning, budgeting, etc. The second is in systems measurement—capability reviews, operational audits, defining user requirements, and system selection. Third, SRI does consulting in systems applications—software and programmer productivity, office systems, and market analyses. And fourth, SRI offers consulting in computer security, including a seminar program.

SRI's subscription information service, called the Business Intelligence Program, provides some 40 research and guideline reports a year, in any of 100 fields, as well as an inquiry service through which members can learn more about technical subjects in which they are particularly interested. For $7,500 a year, the service provides assessments of new technologies, industry/market studies, economic forecasts, and management techniques. Recent reports have discussed the U.S. tele-communications industry, digital data encryption, computer speech communications, high speed document storage/retrieval, managing distributed data processing, and assessing office automation.

SRI International headquarters are located at 333 Ravenswood Avenue, Menlo Park, California 94025.

Other sources of information

There is no single source (that we are aware of) that provides all three types of information—awareness, assessment, and installation—for even the list of advanced technologies that we gave earlier. In fact, among the many sources, we gather that there are large variations in the amount, types, and quality of assistance provided.

Besides the two sources we discussed in this report, here are other sources of information that we found. For a more extensive compilation of suppliers and addresses, write for our free listing: *EDP Analyzer*, 925 Anza Avenue, Vista, California 92083.

Consultants. We discussed hiring consultants last month. Consultant services are usually very specific, tailored as much as possible to your interests. And, as we stressed last month, the quality of these services depends almost entirely on the individual(s) assigned to work for you. So, by all means, interview several and try to determine their expertise in the subject areas in which you are interested.

We see several sources of consulting help. First, there are consulting firms. They range in size from the very large, well-known international management consulting firms, such as McKinsey and Company and Booz-Allen and Hamilton, or the international audit firms such as Coopers and Lybrand, to individual consultants who specialize in introducing specific technologies.

Second, many software houses also do consulting.

And third, many university faculty do consulting. There is a fair chance, if there is a university near you with a School of Business, that at least one of the faculty members has been studying the use of a technology in which you are interested. An advantage of using faculty members is that

they are often close to research and can keep you up to date on results. A possible disadvantage is that they may never have been directly involved with the many practical details dealing with the introduction of new technology.

Education and training firms. There are numerous suppliers of products and services in this category. The question is: Has a specific supplier really investigated the education and training question for introducing *the* new technology in which you are interested? Much education and training deals with 'here and now' technology, not with advanced technology.

Seminars are one source of education and training. While most public seminars deal with the efficient use of current technology, some (such as James Martin's) deal with advanced technology.

Video tape courses are another way to bring advanced technology education and training in-house. In the U.S., Advanced Systems, Inc. is developing a 200-module series on the use of advanced technology, called the Advanced Information Technology Curriculum, in conjunction with Frederic Withington of Arthur D. Little. And Deltak, Inc. is developing its Advanced Technology Library in conjunction with James Martin, and its new Information Resource Management Library in conjunction with the Diebold Group.

University courses and lectures are a third source of education and training. We suggest checking with your nearest college or university to see if they have courses (either regular or extension) dealing with the introduction of advanced computer technology. Such courses are not unusual. For instance, we remember one on the use of computers in business and industry offered at the University of California, Los Angeles, in the mid-1950s, when the business use of computers was in its infancy.

We believe, then, that you can find seminars, video courses, and/or university courses that can help you with the introduction of new technology.

Research programs, as we use the term here, apply to organized programs that investigate the use of computer technology. The 'research' may involve interviewing a good number of user organizations, to learn of their experiences. Or it may involve attempting to do something with computers that has not been done before. These programs generally attempt to give members both awareness and assessment types of information. Organizations interested in such research results may participate in some of these programs, at fees that range from, say, $5,000 to $25,000 per year.

The type of university research that falls within our discussion area is that performed by Schools of Business (or their equivalent). They are concerned with the use of computers for management and business purposes. In our April 1979 issue we discussed research programs at: Massachusetts Institute of Technology, University of Michigan, University of Minnesota, and University of Pennsylvania. We suggest you check with the university nearest you that has a School of Business to see what types of research projects they are working on. These projects must meet certain academic standards and the results must be publishable, which constrains the research topics.

Private organizations sometimes organize research programs in specific fields by gathering information about what is going on in those fields. Organizations must be members of the program to obtain the results. Perhaps the oldest such program in the computer field is one discussed earlier in this report—the Diebold Research Group, which has active programs in the U.S. and Europe.

Discussion groups are less formal than the research programs just mentioned. They tend to draw on the talents and experiences of the members of the group, but they can (and do) go outside of the group for additional information.

User roundtables were discussed last month. These are closed, by-invitation-only groups that have been organized in a number of the larger cities (at least, the ones we know about are in large cities) among user organizations. Representatives of computer field supplier organizations and consulting firms are generally not eligible for membership. There seems to be nothing particularly unusual involved in forming these groups. Someone just takes the initiative and begins calling other people who might be interested.

These user groups, by means of co-operative efforts within each group, develop both awareness and assessment types of information for members. Each member generally reports on his or her organization's plans and experiences in a subject area. So we believe these groups are often effective in giving members insight into a variety of subject areas.

University/industry interaction groups are a second type of discussion group. We reported on one such group in the April 1979 issue. It is called the Information Systems Forum and it is co-ordinated by the School of Accountancy at the University of New South Wales, Sydney, Australia. This group is a bit more formal that the user roundtables. By involving a university, it can obtain presentations on appropriate research projects. The members might also provide moderate funding so that university members can obtain and report on research results from other universities.

Publications, of course, can be (and are) created under most of the above categories. We are concerned here with activities that involve primarily publications.

The trade press is voluminous, so we cannot hope to give a comprehensive list. Also, only a relatively few articles apply to the introduction of new technology—so you will have to do a fair amount of searching. We tend to look at the following two magazines first: *Datamation* (for instance see the September 1978 issue

with the article that begins on page 241) and *Harvard Business Review* (for instance, see the March/April 1979 issue beginning on page 106). We also read *Computerworld* (for U.S. news) and *Computing Europe* (for European news). From time to time both of these trade newspapers report on user experiences with introducing new technology.

A second source of publications is advisory services, such as Datapro and Auerbach. Both of these offer subscription services that deal with some of the types of advanced technology listed earlier. (The *EDP Analyzer* could be considered an advisory service.)

Bibliographic search services. We know of two automated search services that can help you make fast, economical searches of the technical literature. We use one of them and have found it very helpful. You will need a ten to thirty character per second terminal, a modem or acoustic coupler, and a telephone for accessing these services. There are some constraints that we will not discuss; contact the services for details. Two leading services are the Lockheed Dialog Search Service and the SDC Orbit Search Service.

Conferences can be organized by product user groups (such as the IBM GUIDE and SHARE conferences), trade associations, and professional societies. Most conferences tend to be concerned more with using 'here and now' technology, rather than with introducing new technology. However, recently we have found some conference sessions to be very informative on this subject.

Because there are so many conferences, on so many themes, we suggest that you and your staff save the conference announcements containing the program listing that you receive, at least for a period of time—say, one year. You can review them, as the need for a specific type of information comes up. And then you can order the printed papers or perhaps audio cassette tapes of any desired sessions. Also, these program listings can give you names of individuals to contact, and they may be able to lead you to the information you seek.

These then are the sources of information for assistance in introducing new technologies that we have come across. Unfortunately, none provides all of the information your company will need. So you will have to do a fair amount of searching and selecting to obtain the assistance you desire. Sorry about that, but we do not know any shortcuts. However, we hope the discussion in this report and the free listing that we are offering will make your search more profitable.

Prepared by:
Barbara C. McNurlin
Associate Editor

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