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PLANNING FOR MULTI-NATIONAL DATA PROCESSING

A growing number of organizations are finding that they have data processing operations in more than one country. At first, it may seem that such data processing operations are really no different from multiple data centers within one country. But the situation *is* different for the multi-national operations. True, many of the problems seem similar to those of domestic operations—but they differ enough in degree that they become different problems. In this issue, we report on what we have learned from talking to some directors of information services for multi-national organizations on both sides of the Atlantic Ocean.

Just what is a multi-national data processing? We use the term to apply to the situation where an organization has data centers in multiple countries. In some instances, these will be essentially free-standing centers, acting somewhat independently of each other. In other cases, one international data center will serve the needs of the organization in several countries. In still other instances, there will be a combination of national data centers tied to an international data center, within the organization.

(Since "multi-national data processing" is such a long term, we'll use the letters MNDP for most references to it.)

And why should MNDP be of interest to data processing management? Aren't most data processing managers concerned mainly about their own domestic operations? We don't think so. It looks to us as though a large and growing number of organizations with medium and large size computers are getting into MNDP. These organizations are not just manufacturing enterprises, either. We have come across references to MNDP for financial services, accounting firms, consulting firms, research organizations, time sharing services, and even universities.

Also, it is quite possible that solutions developed for the multi-national environment can be applied to domestic data processing operations.

The subject of MNDP is so broad that we will have to return to it from time to time in future reports. In this report, we will give an overview of the subject area and some of the major problems connected with it, based on discussions in the U.S., Canada, U.K., and Western Europe. And next month, we will discuss one approach to the problem of obtaining people trained in EDP, in the different countries in which a multi-national organization may operate.

We will start our discussion with the views of an advocate of international data centers.

One executive's view of MNDP

Several years ago, Mr. J. R. Porter, General Manager of Mobil Data Services, Ltd., located just east of London, England, gave a paper on

"The problems of international data processing." We interviewed Mr. Porter and found that his ideas on international data processing to be most informative. While he expanded on the ideas found in his earlier paper, and stressed that his views were purely personal, we found that his message is basically unchanged.

Why an international data center? One approach to MNDP, of course, is for the affiliated companies in the different countries each to have its own computer center. The alternative is to have an international center, serving the data processing needs of those affiliated companies. From having observed both approaches, Porter favors the international data center (although international centers are the exception rather than the rule within Mobil). Instead of each affiliate having its own computer, each can have *access* to a computer at the international center, he says.

There are a number of pros and cons pertaining to an international center, according to Porter:

ARGUMENTS ON INTERNATIONAL DATA CENTERS

Favoring

1. Economy of scale can be obtained by a centralized installation.
2. Such a center will avoid the proliferation of computers and the problems of incompatibility.
3. An international center can make the best use of data processing expertise, which is usually in short supply (such as system programmers).
4. An international center will encourage the development of common application programs.
5. Such a center can effectively form part of a combined data processing/accounting center.
6. It *can* be located in a low rent area (although it is often located in the head office, usually a high rent area).

Against

1. The center may become *too* large, resulting in dis-economy of scale.
2. Data communications for serving the affiliate companies can be quite costly.
3. Economic studies are required, to compare the costs of centralized versus free-standing installations on a country-by-country basis; effects of inflation, particularly in personnel costs, must be considered; high communications costs may more than offset economies of scale normally associated with centralization and may favor the free-standing data center approach.
4. If applications systems are developed at the center, local requirements may be overlooked and local management may be undermined.
5. An "elite" class of employees may be created at the center—namely, the data processing technologists; the clerical people at the center and the people at the remote sites may feel discriminated against.

He has considered the question of what functions an international data center might perform. He advocates the full integration of commercial and scientific processing, since the output of commercial processing so often is the input to the scientific processing. In addition, the center can provide message switching services and it can provide a centralized accounting service.

A critical question is: who should control the center and assign work priorities? Should the center "belong" to one affiliate company, or should it report to regional or corporate headquarters? The organizational location is not as important as the policies for running the center, according to Porter. The significant thing is to treat all customers impartially and equitably. Further, not only should such equitable treatment be given, it must be *seen* to be given.

A related question is: in which country should the center be located? Porter identifies the factors bearing on this decision as: economics, politics, communication, geography, language, and the availability of staff and equipment. (These are the same factors that must be considered for the basic feasibility of the center, he adds.) In selecting a location, minimum cost should be one goal; for instance, the country from which the most input transactions are received might be selected for the location. The laws and regulations that could affect the operation of the center must be studied carefully. For example, the customs regulations of some countries inhibit the shipment of media such as magnetic tapes, cassettes, and disk units. In most instances, procedures that are satisfactory to the customs people can be worked out—but this factor still can influence the site selection for the center. Communications includes not only data communication but also the physical shipment of the media. In general, the data communications services in Western Europe are about equal to those in the U.S., he says, but with some specific exceptions. There are a relatively high number of industrial disputes in Western Europe—such as strikes, slow-downs, etc.—that can affect essential services upon which a center depends. International data communications involves dealing with multiple PTTs; also, it can take longer to obtain new services than it usually

does in the U.S. Since an international data center is based on the concept of communications, it is essential that reliable, economical communications be obtained, he says.

Geographically, the center might best be located near the center of the countries being served by it, if the other factors are satisfactory. Not only would communications costs be reduced by this choice but also the problem of language might be more easily handled—and the extent to which there is a common language among the countries can influence the site selection.

The center might be located in a rural area, to obtain low space rental costs. From a staff standpoint, this has both benefits and problems. It is likely that the center will have to train its own staff, starting out with a nucleus of trained people from the head office. But once the staff has been trained, staff turnover is generally much less than is the case in a city.

The question of vendor support must also be considered, for both hardware and software vendors. A rural location may not have the same degree of support as does a city location. Also, vendors that are just setting up support offices in one or more countries served by the center may in fact not give a desired level of service.

Thus the question of where to locate the international data center is a complicated one and deserves careful study before making the decision.

Another question addressed by Porter is: how can the center obtain accurate input? Error detection and correction can be very troublesome if data entry and validation are done at the center, particularly if the remote sites speak other languages. Two solutions have been found effective, he says. One is to have the data entry and validation function performed at the remote sites. The data is then communicated by either data communications or by physically shipping the media. The other solutions is to have an input screening group at the center, staffed with people from each of the countries served by the center.

Commonality of programs for serving the various countries is often sought by management. But for commercial data processing applications, where the business of the enterprise seems to be the same in the several countries, only about 50% of the routines can be common for all countries, says Porter. The remainder are specific to the various countries. For scientific processing, however, the degree of commonality can be much greater, he adds.

What are the most critical problems encountered in running a multi-national data processing operation, we asked. Some are the same as for any data processing operation, said Porter. Getting application systems developed on time and within budget is always a challenge. Also, the center must run, and be seen to run, economically and reliably; it must produce its outputs accurately and on time. But some of the problems are particularly complex in a multi-national environment. Each country's needs must be given the attention they deserve—and it must be apparent to all that such attention is being given. And center management must set up a complaint procedure whereby shortcomings of the center are brought promptly to management's attention and not used to undercut the center.

So the problems related to locating and running an international data center have aspects that are different from those encountered in running a domestic operation, as J. R. Porter sees it.

Planning for MNDP

We have talked to a number of information processing executives in North America and in Western Europe on the subject of multi-national data processing. It is a subject that is not yet well documented in the technical literature. Moreover, there is as yet no mechanism for the easy exchange of information and ideas in this subject area—although we will have more to say on this point later in the report.

The goals of an MNDP operation would seem to be the same as for any data processing operation. The operations should be reliable, accurate, responsive to local needs, provide timely processing and output, and have a satisfactory cost/benefit ratio. The question is, how best to achieve these goals?

It is the thesis of this report that these goals can best be achieved by *planning* the multi-national data processing operation—and moreover, to plan it by way of a top-down approach.

As we see it, this is not the way MNDP has grown in most organizations. We suspect that, in general, an organization with multi-national operations will go ahead and set up a data center in one country when it first encounters the need to

mechanize its data processing operations in that country. Later, a similar need is felt in another country, so another center is set up. This process continues. Someone may suggest that one center can serve the needs in another nearby country but this proposal often is resisted by the people in that other country. "Our needs are different; we should have our own computer," is the customary claim.

The result of this evolving MNDP function is a bottom-up approach. Moreover, MNDP tends to be viewed in terms of the individual data centers. The overall data processing function is the sum of the strengths and weaknesses of these individual centers.

What is wrong with this way of obtaining a MNDP function? We can get a hint to the answer to this question in a paper by Gibson and Nolan, on stages of growth.

Stages of growth

Gibson and Nolan (*Harvard Business Review*, January-February 1974) have analyzed the four stages of EDP growth in an individual organization. They have considered the growth in types of application systems, the growth in personnel specialization, and the growth in management techniques applied. The pattern of growth that they describe for the types of application systems will give the flavor of their analysis.

The first stage of an organization's use of the computer generally is concerned with cost-reduction accounting applications. After the organization gains some experience with the computer and builds up confidence in its ability to use the computer, the second stage begins—the proliferation of the computer into all functional areas. Costs begin to mount rapidly; management becomes concerned and the third stage begins. In this third stage, a moratorium is called on new uses of the computer and controls are imposed. New applications now must be more carefully thought out and must be economically justified. The fourth stage, which the authors categorize as "mature," finds the organization installing rather sophisticated applications which are carefully managed and controlled.

We have not seen any such studies of multinational data processing. It appears to us, though, that similar growth patterns may exist. (We say "patterns" because it is possible that more than one pattern may emerge, due to the different environments involved.)

Following are four possible stages of growth in the data processing function of a multi-national organization where commonality of processing logic can be achieved.

The first stage would be that of free-standing centers in several of the countries in which the organization operates. At the outset, these centers would be concerned mainly with cost-reduction accounting applications. The second stage is a continuation of the free-standing centers, with a proliferation of applications and a proliferation of centers. The use of data communications begins, mainly in the form of batch transmission. Costs begin to rise to the point where management imposes strict controls—and the third stage begins. During this stage, strong pressure builds up for centralization of data processing, into international data centers. In addition, the pressure for common processing routines begins to mount. And the use of advanced data communications begins. Finally, in the fourth stage, sophisticated multi-national application systems begin to emerge. Application systems and their component programs are designed so as to achieve as much commonality as possible. Either a centralized or a distributed structure is used for logic and storage, based on the use of advanced data communications.

As we say, we have not seen any reports of good quality research studies in this subject area so the above picture can only be classified as conjecture at this point. However, the first three stages of the growth pattern do seem to fit the few cases that we have been able to observe to date.

Why plan?

So what is wrong with this evolutionary approach? The basic problem lies in the lack of control, resulting in a proliferation of applications and of data centers. Costs rise to the point where management becomes very concerned, both with their magnitude and their continuing growth. Substantial variations are noticed in the quality of work of the various centers, due to differences in the capabilities of staff, or to differences in vendor support, or to a number of other factors that we will discuss shortly. Also, the organization may desire to obtain a greater commonality of proce-

dures so that resources can be shared among the divisions. Further, certain data centers can continue to be trouble spots, due to local conditions—labor problems, strikes that curtail electrical energy or other necessary supplies, and so on.

The point we wish to make is that planning for MNDP is most likely to occur during stage three of the growth pattern. It seems probable that most organizations will go through the first two "growing" stages and national centers will proliferate. Then, when management becomes concerned for the reasons just mentioned, a halt is called to rapid growth, controls are imposed, and management asks for a sensible plan for future growth.

It would be desirable, of course, if the planning could be done at an earlier stage. Once national centers have been set up, it becomes difficult (although not impossible) to take computers away from those centers. Management has less freedom for deciding how to best structure the MNDP function.

Assuming that the need for planning the MNDP function is accepted, what is the next step? A friend of ours—the top information services executive for a large, multi-national corporation—has been urging other MNDP executives to follow a top-down approach to this planning. He has successfully put them into practice in his own organization. We will give our interpretation of these ideas.

A top-down approach

The top-down approach to planning the MNDP function, as we see it, consists of the following four major steps:

First, determine the environment in which the MNDP function must operate.

Second, determine the basic policies which the MNDP function must follow to best adapt to that environment.

Third, determine the structure and the organization of the MNDP function.

Fourth, set the management style for the MNDP function, to harmonize with the parent organization's management style as well as with the needs of the MNDP function.

The heart of this planning process, it seems to us, is the first step, that of determining the environment in which the MNDP function must operate. In the remainder of this issue, we will attempt to point out a number of the ways in which this environment differs from that of a domestic data processing operation. Upon study, we believe that most multi-national organizations will find that the MNDP environment *is* different, in kind and in degree, from the domestic environment.

Because the remainder of the report will deal with the environment for MNDP, we will say just a few words at this point about the other three steps in the planning process.

The basic policies. Once corporate management has obtained an understanding of the environment in which MNDP must operate, it can begin setting some of the basic policies for the operation. One of these is the centralized versus free-standing data center decision. Another policy decision would relate to where to locate the center(s). Still other policies are needed for the "ownership" of the center(s), the staffing and promotion policies to be followed, and the work priority system which will (hopefully) assure equitable treatment for all users. A key policy relates to the degree of commonality that is to be sought in the application systems among the several countries. (Here is where a good understanding of the environment is vital, for determining just how much commonality is really practical.) Still another policy would specify how the MNDP function will support the goals of the parent organization.

Fundamentally, these policy decisions will determine how the organization will attempt to operate in its multi-national environment.

Structure and organization. This planning step provides the details in support of the policy decisions just made, as well as making a number of subsidiary decisions. If, for instance, the decision is to have an international data center serving a number of countries, then a whole series of decisions must be made about the exact location, organization and reporting structure, timing of the installation and how it will be supported organizationally, and so on.

Management style. This aspect usually is not planned, as far as we can tell, but rather is just adopted from the parent organization. However, in reading "horror stories" in the business press about multi-national organizations, we have been struck by how often failures in foreign operations have been due to management style. Management has tried to impose its style of management on the foreign operation—and it did not work be-

cause of differences in the foreign environment. So good planning will take this very important aspect into account.

Let us now consider in more detail the environment in which the MNDP function will operate.

The environment of MNDP

As mentioned above, the environment will have perhaps the most pervasive influence of all factors on the plans for MNDP. Three main aspects make up the environment:

- Characteristics of the enterprise
- Characteristics of the countries
- Human relationships

We will discuss each of these in turn.

Characteristics of the enterprise

In the following discussion, we will use the term "division" to refer to the operations of the enterprise in a foreign country. In some instances, this term is not appropriate as it has another meaning in particular enterprises; some organizations use "affiliated companies" or "operating companies" in this context. However, "divisions" will be satisfactory for our discussions.

From our interviews with executives of multinational organizations, the following seem to be the main characteristics of the enterprise that affect the MNDP environment:

- Type of enterprise
- Expansion policies
- Headquarters orientation
- Division characteristics

Type of enterprise. As we discussed in our July 1975 report, the two main types of enterprises are "make to inventory" and "make to order." These terms are not limited to just physical production; they can also apply to service organizations, government agencies, educational institutions, etc., as well as to commercial enterprises. The "make to inventory" organizations know what products and services they will be offering in the years ahead. The "make to order" organizations react to what customers are ordering or requesting now; they have a hard time anticipating what customers will ask of them in the years ahead.

Because they can forecast future demand for their products or services with some confidence, the "make to inventory" organizations *tend* toward centralized data processing for economy-of-scale and economy-from-commonality purposes. The "make to order" organizations tend toward free-standing data processing centers in order for each division to control its own data processing operations and be able to react quickly to changes in customer demands.

These are not hard-and-fast rules. For instance, other factors may override the economy-of-scale factor for a particular "make to inventory" organization and influence it to set up free-standing data centers. But we believe that the general tendency is as we have described it.

Expansion policies. The so-called "monolithic" organizations tend to expand by setting up divisions in different countries to offer their proprietary products or services. Examples include the oil companies, computer manufacturers, automobile manufacturers, and such. Since the operations of the various divisions are so similar, the tendency is to set up centralized data processing services for serving a number of countries. At the other extreme are the "conglomerate" organizations that expand by acquisition—by acquiring a variety of divisions in the several countries. In this case, the divisions generally feel relatively independent of the parent company, and look to the parent mainly for financing. In fact, the divisions may want to play down their foreign ownership because of "buy from local companies" feelings within the countries. Divisions in such companies generally make strong arguments for having their own data processing operations.

Headquarters orientation. The question here is whether the company headquarters has mainly a line or a staff relationship with the divisions, or perhaps more precisely, the degree of autonomy granted to the divisions. An organization favoring line orientation wants to control the operations of the divisions from headquarters. An organization favoring staff orientation sees the headquarters staff as using persuasion and coordination—but not direct authority—for getting the divisions to follow a course of action favored by headquarters. The line orientation tends toward centralized data processing, while the staff orientation tends toward free-standing data centers for the divisions.

Division characteristics. There are several characteristics of the divisions that will have a significant effect on the environement for MNDP. These are: (1) inter-division relationships, (2)

commonality of products or services, and (3) size and location of the divisions. We will discuss each briefly.

Inter-division relationships. This characteristic refers both to the products and services offered by the enterprise as well as to the people in the divisions. As far as products and services are concerned, the question is the degree to which these flow among the various divisions. If the enterprise is highly inter-related, then there is much inter-division flow. For instance, sub-assemblies manufactured in plants in several countries may flow into assembly plants in still other countries. At the other extreme, the divisions may operate relatively independently of each other, with very little flow among them.

As far as the people in the divisions are concerned, there may be strong nationalistic feelings which inhibit close relationships among the divisions. Some of the "monolithic" companies have been quite successful in getting company loyalty to transcend all but the most fundamental nationalistic feelings. The "conglomerate" companies may not have been able to achieve this degree of company loyalty and hence may be faced with strong nationalistic emotions among the divisions.

Importance of commonality. Commonality is just another aspect of inter-division relationships but is so important that it should be singled out. If products and services flow among the divisions, then the "business" of the divisions is usually considered to be the same. Management then encourages commonality of products and services—and data and computer programs—as much as possible, to avoid the waste of duplicated efforts. Commonality, in turn, is usually achieved by some form of centralized control. Conversely, if each of the divisions has its own free-standing business, then commonality is much less likely to be an important factor (except perhaps for financial reporting information).

Size and location of the various divisions. The two extremes here are: (1) a few, relatively large divisions that are geographically close, and (2) many small, highly scattered divisions. In the former case, an international data center might well be economically and practically feasible. In the latter case, communications problems and costs alone might make an international data center infeasible.

Not a black-and-white situation. We have come across cases of multi-national organizations where the characteristics of the enterprise would seem to favor centralization but in fact free-standing operations exist. There are probably numerous explanations for this. For one thing, the desire of divison management to have its "own" computer is a common one. In those cases where division management is strong and its performance is outstanding, it can make a good case for a free-standing data processing operation. In other instances, the centralized data processing function may do a less-than-satisfactory job in supporting the needs of the divisions. In such cases, division management may be successful in disengaging from the centralized data processing operation.

However, we believe that the above characteristics of the enterprise contribute heavily in the decision as to whether centralized or free-standing data processing operations will be used.

Then, too, there are the characteristics of the countries in which the enterprise operates that must be considered in this decision.

Characteristics of the countries

As we see it, there are three questions to be explored when considering the characteristics of the various countries in which the enterprise operates:

- Can the division in Country X be served by an international data center located in another country?
- Can an international data center be located in Country X?
- Is a free-standing data center the best answer for Country X?

As in the case of the enterprise, there are a number of characteristics of the countries that bear on these three questions.

Laws and customs. In some instances, we have been told, national laws require that data processing done in support of operations within a country must be done in that country. We have heard that Austria recently passed a law of this type. One company that we talked to, which had been handling their Austrian division's data processing in an international data center, had to set up a new center in Austria. In another instance, we were told by a U.S. credit bureau representative that Canadian officials refused to allow the credit

bureau to set up computerized credit files on Canadian citizens in their U.S. centers. No law was yet on the books, the credit bureau people were told, but if they proceeded with their plans, such a law would be passed. So the credit bureau set up a data center in Canada. It is possible that similar laws and regulations exist in other countries or will be enacted in the future.

In addition, each country may have laws and regulations that affect the data processing operations within that country. In some instances that we have heard about, a country's laws were based on manually-maintained ledger files and computer-based systems are expected to comply with those laws. One executive said to us, though, that in most such instances, satisfactory solutions can be worked out that are not too burdensome for data processing. But it should be recognized that each such problem must be worked out with the particular country; there are no general solutions. Further, before setting up either an international data center to serve a country, or setting up a national data center within that country, the enterprise should find out what laws and regulations will apply.

One common problem area is that of customs regulations of the various countries, as they apply to the physical shipment of data (on magnetic tapes, cassettes, disk packs, or punched cards) across national boundaries, or the transmission of data via data communications across national boundaries. Again, there seems to be no general solution. Satisfactory solutions must be found with the particular countries in each case. One piece of advice that we were given is: inform the customs officials of what action is planned well in advance of that action. (For instance, taking a hardware performance monitor into a country for a short time, for making measurements on a division's computer, can pose a problem unless arranged in advance.)

Labor relations. We have been told that the labor unions in the various countries can have significant effects on data processing operations within those countries. For one thing, strikes, slow-downs, and work stoppages in general can affect a data center directly—or indirectly, as when electric power is shut off. Labor policies can affect hiring, firing, and promotions of data processing personnel. Also, labor policies can affect the decision on where the data entry function, for data originating within the country, must be performed.

Another point was made to us. Labor unions, by communicating with unions in other countries, can learn what pay rates and benefits the enterprise is giving in those other countries and demand similar treatment.

Language and character set. Differences in language and character set used can be important for both data entry and output. If source data is sent in handwritten form across national boundaries to an international data center, and if the languages and/or character sets used are different, the problems can be severe. Sometimes the languages are almost the same but subtle differences exist which can cause confusion in error correction and report interpretation. And, as one executive pointed out to us, an English "7" and a Swedish "1" are essentially indistinguishable.

If data is to be transmitted across national boundaries for processing, we suspect that the best solution will be to provide intelligent terminals for local data entry. Data entry and validation can then be performed in the country of origin, where error correction can be handled most readily.

Technological differences. The question here is: how well equipped are the various countries for supporting a data processing operation? We will discuss shortly the aspects of availability of trained personnel and vendor support. But there are still a number of other aspects that must be considered.

One aspect is the stability of electric power supply in the various countries. In Western Europe, we are told, electric power is relatively stable—except when industrial disputes arise. Because of such disputes, one executive we talked to advises that each data center have a standby motor-generator set for providing electric power. In other countries that we have visited, the generators do not have sufficient capacity to handle peak loads—so electric power is turned off in some portions of the country during peak load periods ("rolling blackouts"). Again, this argues for backup motor-generator sets which would probably be called into use fairly frequently.

A related aspect is the ability to install and maintain air conditioning and humidity controls, for both the computer and for media storage. This aspect can become vitally important for the long

term retention of data on magnetic media, as we discussed in our July 1973 report.

Data communication services that are available will play an important role in deciding on the structure of the data processing function in a multi-national enterprise. We have discussed some types of services available in the U.S. (March and April 1969, March 1973, and January and February 1975), in the U.K. and some Western European countries (January and February 1975), across the Atlantic Ocean (January 1975), and in Japan (April 1973). In our interviews on MNDP, it was pointed out that an enterprise which sets up an international data network will have to deal with a number of telecommunications authorities which have somewhat different service offerings, different qualities of service, and different rates of response to user requests. As we pointed out in the above-mentioned earlier reports on data communications, the service offerings *do* have differences. Yes, there are international voluntary standards that apply to data communications—but to date, these have been implemented mainly at the lower transmission speeds.

One particular aspect that we have encountered is the reluctance of some telecommunications agencies to permit the use of acoustic couplers on the telephone lines, due to the characteristics of their data signals. There is fear that the acoustic couplers will cause sufficient interference on the lines that voice traffic signals will be impaired. This fear may or may not be justified. We have heard of one test in a country that prohibits the use of acoustic couplers. The computer test worked well and no interference with voice traffic was reported. But one test does not prove the case. It may take a good number of tests to establish just what the risk of impairment of voice service might be, for each country with such prohibition.

It appears, from all that we have heard and read, that international data communications networks are and will continue to be a problem area for multi-national organizations. We plan to explore this area more in future reports.

Still another aspect of technological differences is the backup facilities that are available in each of the countries. Not only does this include backup processing capabilities but also the civil forces for restraining man-made catastrophes (bombings, riots, etc.) and restoring order after natural catastrophes (fires, floods, storms, etc.).

As we say, all of these technological differences should be considered in deciding on centralized versus free-standing data processing centers.

Availability of trained personnel. In some developing countries, there just is no supply of trained data processing personnel. And the problem of training local people in the technology can be complicated by the difficulty of obtaining technical literature in the local language.

One solution is to support national computer institutes for building a population of trained people in various countries, as we will discuss next month.

For the interim, it is likely that multi-national organizations will have to adopt some combination of three approaches. One, send a task force of people from the home office to work at each new center for a period of time. Next, set up a comprehensive in-house training program for a new center and then keep it operating so as to keep the staff abreast of the technology. Finally, select some key local people to be sent back to the home office, to work there in data processing for an extended period of time (say, nine months to a year).

Vendor support. A multi-national organization soon finds that it is dealing with more vendors of hardware and software than it expected. Even if the organization has standardized on one type of computer, it finds that the vendor has different operating policies in the different countries. For instance, services and software may be bundled with the hardware in some countries and unbundled in others. Also, organizations that have been accustomed to using plug-compatible peripherals supplied by independent peripheral manufacturers may find it difficult to follow this practice in an MNDP environment.

One executive pointed out to us that a hardware or software supplier that is doing a good job of supporting its products domestically may deliver poor quality support multi-nationally. The problems of multi-national support show up in many ways, he said. One way is excessive travel costs. Another is communications problems. Still another is a lack of trained personnel and a lack of spare parts in the various countries. It is not an easy task, he said, for a successful domestic sup-

plier to enter the multi-national sphere, and users should be aware of this possibility.

In short, the characteristics of the various countries in which the enterprise operates very much influence the decision on the structure of the data processing function.

And then there are the "people problems." Perhaps a more polite term would be "human relationships."

Relationships to be considered

"People problems" are the well-known problems of human relationships. We have no desire to discuss them here. Instead, we will just list a series of questions that will help bring to mind the problems that appear most significant as far as MNDP is concerned.

CRUCIAL HUMAN RELATIONSHIP AREAS

1. What quality of relationships does in fact exist between the head office and the data processing function in the divisions in other countries?
2. How does this quality differ from that of the relationships between the head office and the domestic data processing operations?
3. To what extent do the divisions in other countries look to the head office for leadership in data processing matters?
4. How effective is the head office in providing this leadership?
5. What attitudes do the head office people have for the data processing people in the divisions? And vice versa? (These attitudes can range from mutual respect to antagonism. Where on this scale do the attitudes fall?)
6. What intelligence actually flows from the divisions to the head office as to (1) what data processing actions the divisions are contemplating, such as procuring new resources or undertaking significant projects, and to (2) inform the head office about problems facing the divisions, in sufficient time for the head office to help solve them?
7. Where does the head office look for candidates when managerial openings occur in the data processing function of the divisions?
8. Which organizational unit "owns" (or "would own") the data center performing the work for each division?
9. In practical fact, who gets (or would get) first priority in the use of resources? Whose work gets done first, when things get tight?
10. What is being done to insure that the different divisions are served equitably? And, just as important, are they *seen* to be served equitably?

These are only some of the questions that executives in multi-national organizations have brought to our attention. But they serve to indicate the types of things that management must keep in mind when the basic structure of the data processing function is being decided upon.

Exchanging ideas on MNDP

Multi-national data processing is an area of relatively new interest. While many multi-national organizations have had data processing operations in multiple countries, it seems that they have only recently reached the "stage three" in the growth pattern described by Gibson and Nolan. Not much has been written about planning, organizing, or operating an MNDP function. We have not heard of many conferences or meetings that have addressed this subject specifically. So where does an executive in a multi-national organization turn for ideas and information on this subject? And where do members of his staff go for details—such as designing an efficient international data communications network?

While not much information has been disseminated on this subject area in the past, there are some efforts underway to improve the situation. Here are several that we know about:

- IFIP/IAG
- Oxford Centre, U.K.
- North American program
- University of Pennsylvania

IFIP/IAG

IFIP is the International Federation for Information Processing, a federation which represents computer societies in 34 countries of the world. IFIP is perhaps best known for its conferences, held every three years, in various countries of the world (France, U.S., U.K., Yugoslavia, Sweden, with Canada, Japan, and Australia coming up). The activities of its technical committees are equally important, however, We will have more to say about one of them shortly.

IFIP is a federation of organizations, not individuals. The American Federation of Information Processing Societies (AFIPS) is the U.S. member of IFIP, for instance, and Dr. Richard I. Tanaka, former president of AFIPS, is the current president of IFIP.

IAG (IFIP Applied Information Processing Group) is a special interest group within IFIP dealing with the subject of "business data processing." IAG, like IFIP, has organizations as members. It maintains a staffed headquarters in Amsterdam, The Netherlands (at 40 Paulus Potterstraat), and conducts a wide range of activities, mainly in Western Europe.

One recently initiated IAG activity is on multinational data processing. The objective of this program is to hold workshops that identify problem areas and discuss solutions that are related to MNDP. Currently, most of this effort is occurring in Western Europe and in North America. But since IAG has member organizations in 32 countries of the world, it is hoped that the program will expand to other parts of the world. It is expected that some of the workshops will result in published reports or proceedings which will be available to IAG members and others.

Readers who are interested in learning more about IAG and its activities can write to IAG Headquarters at the above address.

In addition, IFIP Technical Committee 6, dealing with data communications, has undertaken a challenging project to spread the knowledge of international data communications around the world. This project consists of visiting outlying countries and giving a live demonstration of tying local terminals in to the ARPA Network via satellite communications. The demonstrations are aimed at showing what is feasible today and answering a number of technical questions for people in that and surrounding countries.

Oxford Centre for Management Studies

The Oxford Centre for Management Studies (located at Kennington, Oxford, U.K., near Oxford University), in cooperation with IAG, held a Briefing on Information Systems in Multinationals, in October 1975. It was designed for directors of information services in multi-national organizations and attended by people from the U.K., Western Europe, and North America. We were told that the discussions were good and covered a wide range of topics within the subject area.

The Centre plans on holding a similar Briefing during 1976. For more information, write to the Centre at the above address.

North American program

Four North American computer field societies, together with IAG, have started a cooperative program on the MNDP subject. These societies are the Association for Computing Machinery, Data Processing Management Association, Canadian Information Processing Society, and the Society for Management Information Systems. One planning workshop, attended by directors of information services in multi-national organizations, was held last April in Toronto, Canada. Further workshops, some for directors and others for staff members, are expected to be held in the future.

It is taking awhile to get this program organized and underway in a viable manner, since the subject is so new. Readers in North America who are interested in this program can write to the headquarters of the four societies or to AFIPS headquarters (210 Summit Avenue, Montvale, N.J. 07645) for more information.

University of Pennsylvania

Two departments of the Wharton School, University of Pennsylvania—the Department of Decision Sciences and the Multi-national Enterprise Unit—have set up a continuing research program on the design of multi-national information systems. The program is aimed at the interests of both users and of suppliers of software suitable for multi-national use.

Wharton School is planning a one-day conference (plus a session on the preceding evening) for the end of April 1976. The title will be "Multinational Information Systems—Problems and Prospects." Attendance is expected to be about 50 invited participants, from the U.S. government, the United Nations, user organizations, and software supplier organizations. The conference will discuss multi-national information systems *design* from the standpoints of privacy, standards, value of data, regulatory considerations, and accounting considerations. It is expected that the proceedings will be published as a special issue of *DATA BASE,* the publication of the ACM Special Interest Group on Business Data Processing.

For more information, write to Professor Howard Morgan, Wharton School, University of Pennsylvania, Philadelphia, Penna. 19104.

Planning your MNDP function

Some people that we have talked to have felt that the problems of multi-national data processing are similar in kind to those of multiple data centers within one country. It is true that there are similarities. But we hope that our discussion has brought out the point that there are substantial differences in degree between the two. Language differences, political differences, nationalistic feelings, technological differences—

these are only some of the things that make the problems so different in degree that they are really different in kind.

In most instances, we suspect, the structure of the data processing function in a multi-national organization has just grown. First a data center is set up in one country, then in another country, and so on.

But after talking to a number of executives in multi-national organizations, we have come to the belief that the MNDP function should be planned, based on a top-down analysis. This analysis should cover:

The environment in which the MNDP function will operate. The environment in turn is made up of the characteristics of the enterprise, the characteristics of the countries in which the enterprise operates, and the human relationships that do in fact exist.

The basic policies, which should be determined only after management gains an understanding of the environment. These policies include the degree of centralization of the MNDP function, the ownership of the centers, the staffing and promotion policies, and so on.

The organization and structure of the MNDP function, based upon the policies that have been decided upon.

The management style to be used in running the MNDP function, including line-versus-staff relationships, flow of intelligence on what is going on, and so on.

Further, we postulated four stages of growth of the MNDP function, based on an analysis by Gibson and Nolan of domestic data processing growth. It seems likely that most multi-national organizations would make such a top-down analysis mainly during the third stage of development—although it would be desirable to make such an analysis at an earlier stage.

These possible four stages of growth of the MNDP function are:

Free-standing centers in one or more countries, concerned mainly with cost-reduction accounting applications.

Proliferation of centers and of applications, with a consequent rapid rise in data processing and data communications costs.

The imposition of controls, to control the proliferation and to consider the desirability of centralized processing and commonality of programs.

The emergence of sophisticated multi-national application systems, carefully managed and controlled.

It is at the third stage—during the imposition of controls and the search for commonality—that management might begin to ask: what is the best structure for us for this MNDP function?

As we mentioned near the outset of this report, the subject of multi-national data processing is large and complex. In this report, we have been able to do no more than give an overview of the problems and solutions that have been reported to us. We expect to return to the subject, along with some of the solutions to problems that organizations have developed, in future issues.

Next month, for instance, we will consider one approach to developing a population of trained people that has been used successfully in some countries—that of "national computer institutes." Here is an approach that multi-national organizations should be aware of—and, we believe, should support.

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Number

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Number

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