

NEW RESPONSIBILITIES FOR THE TOP COMPUTER EXECUTIVE

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Good morning Ladies and Gentlemen!

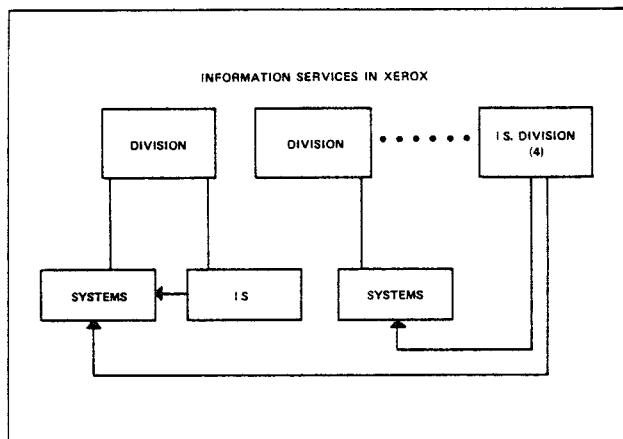
I do not know of a better audience anywhere in the world with whom to share my concerns about the growing role of the top computer executive. This is a subject that is very close to each of you individually. Since this subject concerns my work, the entire topic will be presented in terms of my own personal experiences.

The environment in Xerox has been very stimulating to experimentation on the various roles a computer executive can assume. Even though the specific Xerox experience cannot be considered to be universally applicable, it seems to be moving in the same direction that is becoming gradually observable in many large organizations: the top computer executive is growing to become the chief information processing executive rather than remaining merely the chief EDP executive. If this general tendency will become a frequent occurrence, it will have far-reaching implications on the structure of the entire information processing industry.

- BACKGROUND
- ASSESSMENT
- ACTIONS

Slide 2

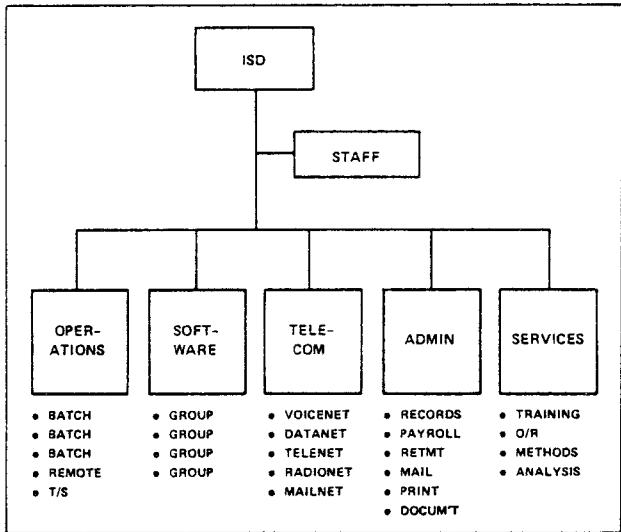
This talk will follow the outline on Slide 2. First, I will try to portray for you the background against which the role and experience of the top Xerox computer executive is evolving. Next, I'll attempt to make an assessment of the significance of this experience. Lastly, I will attempt to do something risky. I'll present a "cook-book" sequence for any top computer executive who may wish to pursue the direction of providing broad information services. Ten action-oriented suggestions will be presented for structuring the specific strategies and particular policies which I would consider essential for such a job enrichment program.



Slide 3

Let's start with a highly simplified and stylized organization chart of Xerox (Slide 3). There are a large number of Operating Divisions of the Corporation. These Operating Divisions purchase their information services from Information Services Division. I happen to be the General Manager of the Information Services Division (ISD) supporting U.S. Operations. Comparable structures exist elsewhere in the world. The ISD for the United States does not, however, encompass all of the information processing activities. Operating Divisions, in every case, do their own systems work and specify their own information processing requirements. We see to it that Operating Divisions are competent buyers of ISD services and that they have full visibility of the economic trade-offs necessary to make sensible short-term as well as long-term systems procurement decisions. In addition, most Operating Divisions own and operate their own input/output equipment, dedicated computers as well as non-network stand-alone computer facilities. The role of ISD is to act as

- the central computer "utility" network operator, and
- the contractor for development of major new applications



To see how this works, let's turn to Slide 4 depicting the organization chart of the U.S. ISD Division. Just to give you a feeling about the scope of this operation, you ought to realize that this organization has a staff in excess of 1600 people.

To operate such a large business as a responsive professional organization requires a high degree of decentralization. We achieve this by breaking up the Division into 27 separate Business Centers, each headed by a Business Center Manager with full responsibility and accountability for profit, performance and quality. Only a small Personnel and Control staff is kept at the Divisional level. Individual Business Centers have their own Personnel and Control staffs in direct support of operating needs.

Starting from the left on Slide 4, let me first describe the Operations Group. It is run as five separate businesses—four Batch Processing organizations (at three physically separate Data Centers, one in the East, one in the Midwest and the other in the West); one Remote Job Entry business and one Time Sharing Service Business Center. These businesses each average revenues of about \$5 million per annum, which seems to be the optimal size for economy of operation and for maintaining full customer service awareness at our current level of technology.

The Software Development Group is organized on the principle that they must be competitive with comparable practices in the software industry. Consequently we have four "software houses" of about 100 professionals in each, independently contracting with the various Divisions for work.

The Telecommunications Group is structured on a product basis. One business designs and operates our rapidly growing corporate voice network. Another performs engineering, installation and operating services on the Data Network. We have set up our highly cost effective international administrative network (Telenet)

as a telegram utility. We also operate a nationwide network of over 100 radio stations for service dispatching as well as what is probably the world's largest internal network of facsimile senders/receivers.

Next on the list is the Administrative Group. It has custody of all of the personnel records; including the custody of profit sharing, retirement benefits and other benefit information. It acts as a payroll service bureau as well. In Administration we have also incorporated those elements of Office Services that are heavily involved in the increasingly complex information flows of our corporation. mail services, copying, duplicating and printing services. More importantly, we have also found it attractive to become involved in the whole area of document and text preparation through our documentation business centers.

To complete the organization picture we have a few service oriented consulting businesses: in-house training; operations research; methods and procedures as well as a systems analysis consulting service.

So far, this organization framework may not seem to you to be especially newsworthy, except perhaps for its scope. The most important attributes are not in the organization chart itself, but can be found in the highlights of the "ISD Operating Methods" shown on Slide 5.

ISD OPERATING METHODS

- COMPETITIVE RATES • COMMERCIAL PRACTICES
- PROFIT ORIENTATION • MULTIPLE PROFIT CENTERS
- ENTERPRISE STYLE • PERFORMANCE MEASUREMENT
- QUALIFIED BUYERS • PRODUCTIVITY MEASUREMENT
- COMPETITIVE PROCUREMENT

Since ISD is operated as a decentralized services "conglomerate", I think that it would be quite relevant to talk about the organizational techniques and methods that seem to be especially applicable in such an environment. As many of us may have concluded, the major barriers to effective information systems implementation in large organization are not technological, but managerial.

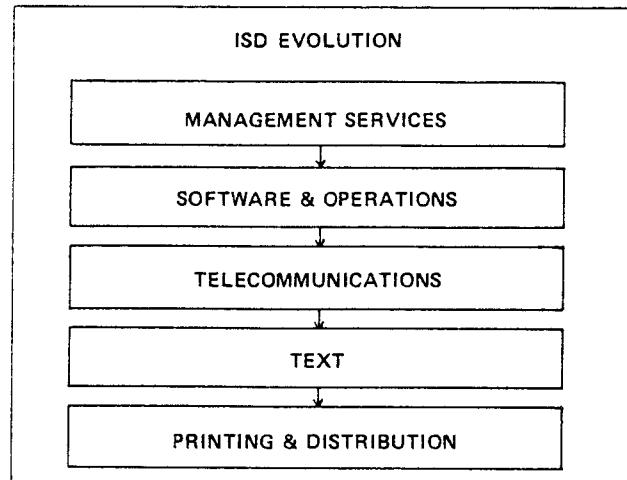
Each of the 27 businesses previously enumerated are allowed to operate—to use Peter Drucker's phrase—as simulated profit centers. This means that each business center must continually compete for its business, must charge prevailing free market prices for its services and must adhere as closely as possible to generally accepted commercial practices in conducting its business. Wherever possible, each business must quote to its

customers fixed prices or fixed unit costs for an entire budget cycle in advance. After receipt of customer's commitments for services, each center must then adjust its cost base accordingly to generate an approved profit margin. As contrasted with other "cost absorption" practices where efficiencies and inefficiencies are equally charged out, in the ISD Business Centers we have established as closely as is possible within a corporate structure a clearly entrepreneurial profit motivation and profit efficiency measurement where each Center Manager reaps the benefits of his efficiencies and gets penalized for generating losses.

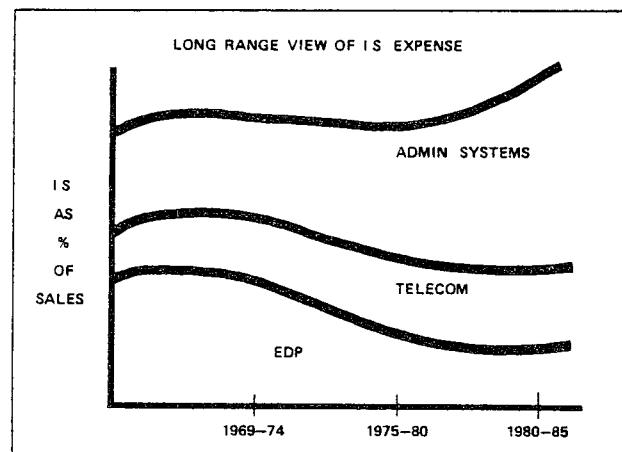
Since each Center must make profit, each Manager is driven to optimize his resources and technologies accordingly. Managers are also encouraged to develop new services and products. To have appropriate checks and balances, we see to it that systems people are allowed to compare costs with outside vendors. On several occasions we have thus lost business, but that is how the corporation and the user have benefited. ISD has also gained enormously from this process, since it has forced upon us the adoption of good commercial practices which otherwise would have been rented. I also find it quite interesting to see how individual businesses compete against each other to give a user the best value. For instance, our users have learned how to "shop around" for best technical solutions between our batch, RJE and Time Sharing businesses. Systems analysts are also straining to find the optimal compromise between custom-made programs and general purpose file inquiry systems. This competitive environment has resulted in the cost per job for all of our transactions. Our unit costs have continually declined at a rate in excess of 8% per annum in real dollar terms. On top of this we have managed to absorb all inflationary cost increases.

Lastly, but most importantly, we are pleased that we have developed an environment where individuals are beginning to have a much greater sense of personal freedom and accomplishment through performance measurement which tries to frame a more objective approach to the appraisal of an individual's contribution. We have routine performance measurement methods which are an integral part of our reporting relationship with our customers. These performance measurements record. a) work quality, b) business center profitability, c) unit cost productivity. Each business center completes a management performance control package that delivers convincing answers when frequent management reviews raise questions concerning information services expenditures.

As you may readily surmise, what I have described to you today is not an organizational picture which is static. As a matter of fact, it is a product of an evolutionary sequence (see Slide 6). ISD had its root in corporate management services. In 1972 its charter was enlarged to include Operations and Software. In 1974 Telecommunications were added. In 1974 the text, printing and administrative services were included. The



logical question is. what additional growth can or should our ISD function sustain? That's really the topic of today's talk and I'll attempt to analyze the thrust of the possible future developments by searching for the possible underlying economic causes that may be relevant to predicting the future.



I have a chart (Chart 7) that will give you a general idea concerning the pattern of our expenditures as seen through our long-range planning projections. The variable that I consider most significant in such an analysis is the "Information Systems Expense vs. a % of Sales". I am not showing specific numbers or ratios, because these are usually characteristic of a particular company within a designated industry. What matters is the general shape and trend of these curves.

What is our current outlook? We operate on a seven year long-range planning cycle. Since 1969 we have been tracking the ratio of EDP expense vs. sales and have found this percentage to trend up, both in the short operating cycle horizon of two years projected in detail, as well as in the long range perspective. In the last two cycles we have detected, however, a new trend: after 1975 we expect the relative importance of EDP to decline as related to other elements of expense.

The long-range planning cycles are gradually revealing for us the underlying reasons why the relative importance of the EDP operations must be coming down. There are three reasons for this (Chart 7A).

REASONS FOR RELATIVE DECLINE OF EDP

1 – REMOVAL OF INPUT AND OUTPUT LABOUR FROM EDP CENTERS INTO GENERAL ADMINISTRATION THROUGH DISTRIBUTED NETWORKS.

First, we are in the process of installing large interconnected networks that offer large economies of scale through access to single, centralized data bases. We have just completed the first round of this program with the placement of 86 minicomputers, one in each marketing branch. We have plans to pursue this approach for all other major operating functions and we are talking of hundreds of mini computers handling thousands of intelligent terminals placed throughout the corporation by the early 1980's. This then removes large amounts of input and output handling labor from the central EDP sites. It removes substantial portions of this labor category out of the EDP budget and places it into the general administrative budget of the corporation.

REASONS FOR RELATIVE DECLINE OF EDP

2 – REMOVAL OF PROGRAMMING AND ANALYSIS LABOR FROM EDP ORGANIZATIONS INTO GENERAL OPERATIONS THROUGH INTERACTIVE APPLICATIONS.

Second, (Chart 7B) timesharing use is growing at an unbelievably high rate. We now have six dedicated in-house timesharing computers. The terminal population approaches one thousand and the number of active users exceeds this number. The net effect is, however, that we are in the process of displacing programming and systems analysis labor out into the direct operating budgets and out of the EDP domain.

REASONS FOR RELATIVE DECLINE OF EDP

3 – CENTRALIZED PROGRAMMING SUPPORT OF MULTIPLE SITES THROUGH STANDARDIZATION OF BUSINESS FUNCTIONS AND REMOTE DIAGNOSTICS.

Lastly, (Chart 7C) and perhaps more significantly, we are starting to see large economies of scale through central programming supporting multiple application sites with standardized software functions. In the past, we have always grown the labor component of the EDP budget at a faster relative rate than the equipment component. Inflation and the accumulated program

maintenance workload has forced us to grow the programming labor budget at a more rapid pace than anything else. Our current forecasts are that we should be able to grow a substantial new portfolio of applications with the same headcount as we have today. For instance, the minicomputer network I have just described is centrally programmed under centralized data base management, centralized diagnostic supervision and the program revisions are distributed for the central testing site via telecommunications into each local computer. Thus, we can spread the overhead of a single programming staff over a very large number of sites.

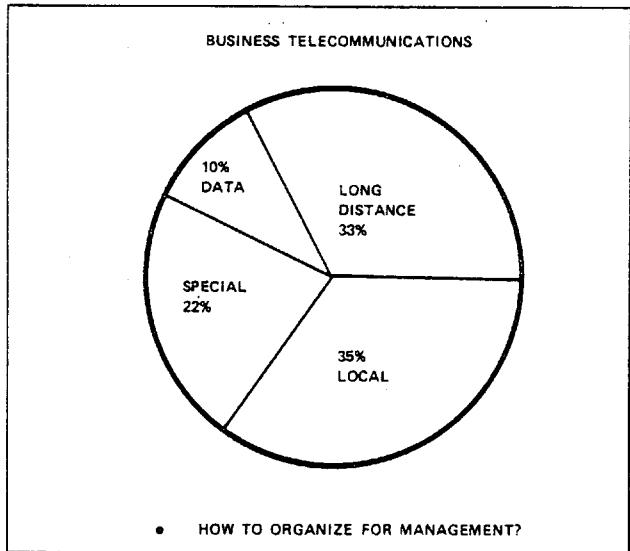
These are the forces that are bringing the relative importance of EDP down. I think that this is a good development because if we look at other areas of the information processing spectrum of our corporation, we are finding much more attractive payoffs in areas where most of us have not recently concentrated much effort or technology investment. Therefore, I will not dwell further on EDP, but will discuss the Telecommunications and Administrative Systems sectors of the Information Systems budgets.

Let me first talk about Telecommunications. When I started looking at this expense component three years ago, I could not find anywhere a consolidated analysis of this important function. I suspect that most people in this audience do not have a good insight into the scope and technologies of their companies' telecommunications. Yet, the aggregate costs average more than half of the EDP budgets and, in special cases,

TELECOMMUNICATIONS COSTS (1970)

INDUSTRY	RANGE	AVG.	BASIS
MFG.	.3–1.0%	0.5%	SALES
RETAILING	.2–.7%	0.4%	SALES
INSURANCE	1–3%	2%	PREMIUMS
BANKING & FINANCE	.6–4.2%	1.5%	EXPENSE
AIRLINES	3–7%	4%	EXPENSE
SECURITIES	8–12%	10%	EXPENSE

exceed EDP budgets (Chart 8). With significant trade-offs available between telecommunications expense and EDP expense, you simply cannot afford abdicating your leadership role in this critical area to local office managers. Technology and systems analysis tools give you long-term opportunities for large improvements indeed. In fact, when you look at telecommunications, you may have to segment the problems into separate sectors (see Chart 9) for the application of different technologies and staff skills.



Now, your initial temptation will be just to get hold of the small data communications sector and to manage that piece. I do not think that it will suffice. You must be in a position to effect trade-offs between all

TELECOMMUNICATION STRATEGIES

- TRADEOFFS BETWEEN ALL SERVICES
- CIRCUIT POOL MANAGEMENT
- MULTIPLEXING ECONOMIES
- LOAD LEVELLING
- SYSTEMS MANAGEMENT APPROACH
- JOB ENLARGEMENT
- SERVICES PRICING
- TECHNOLOGY ACQUISITION

telecommunications services (see Chart 10). For instance, we are now pursuing the policy of circuit pool management. All telecommunications circuits are purchased centrally and then allocated to a variety of uses, such as for administrative message handling for voice connections, for data traffic as well as for signalling and monitoring traffic. By controlling circuit routing and by making circuits serve multiple uses or by reassignment of circuit services, we obtain good opportunities for optimizing the total cost of expensive fixed facilities.

We have also found great opportunities in multiplexing multiple purposes into a single carrier circuit. We have a number of situations where instead of just providing a dedicated voice line, we have invested

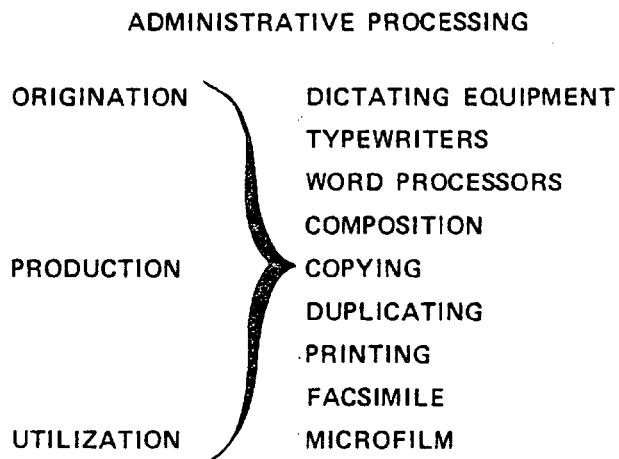
in equipment that allows us to partition the available frequency into separate voice, low speed telegraph and timesharing traffic channels. Even though we are getting more throughput for a single telephone line, the voice quality is actually better than was previously the case with phone calls through the public switched network on account of better technology and improved control.

Load levelling has given us opportunities to further optimize network usage. For instance, we can now use the dip in voice traffic during lunch time to schedule bulk remote job printing.

The systems approach to telephone traffic has allowed us for the first time to consider job integration across several functions. For instance, our service organization handles a large number of incoming customer calls. The message handling queue involves not only switchboard operators, but also customer answering people as well as dispatchers who communicate with our service people via radiotelephone. A systems approach to this complex chain of functions has proven to be especially worthwhile. The jobs and functions were enriched and streamlined by adding to the telecommunications functions microfiche reference data bases prepared by computer output microfilm (COM) as well as providing the operators with access to dynamic data bases through computer terminals.

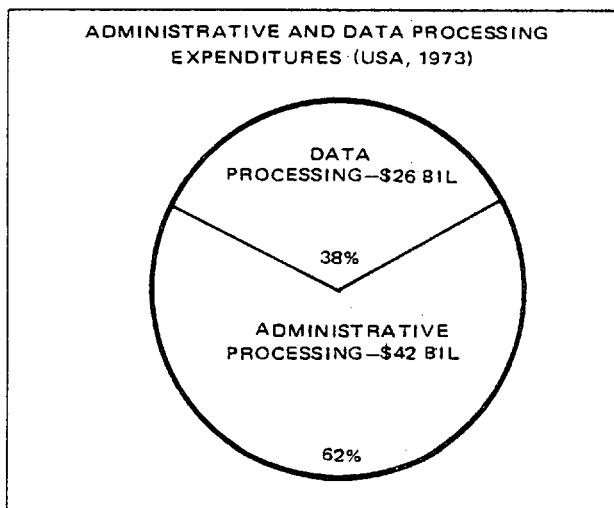
As you can see, the trade-offs between a large number of telecommunications, data processing and conventional technologies are highly complex and dynamic. That's why the telecommunications function must be priced on a transaction basis in a consistent manner with all other technologies. By bringing the telecommunications manager into the central information systems organization, we are in a position to factor appropriate telecommunications technologies into all of our technology acquisition plans both in the short as well as in the long run. Since telecommunications will be driving most of the major trade-off decisions (especially in Europe, where line costs are relatively higher than in America, as they relate to on-line vs. batch, centralized vs. decentralized, etc.) integration of these decisions under single management seems to me to be very important. I trust that this will stimulate each of you to look at this opportunity.

Let us now direct our attention to the administrative area which is much bigger than the telecommunications function. From a practical standpoint, it is much larger than EDP and telecommunications put together. Yet, from a systems analysis and technology application experience, it is relatively unexploited. I have found that the returns on investment in this area are very large, even though they are relatively harder to get on account of the cultivated myopia of all of the systems people who have been virtually hypnotized in the last two decades by the attractiveness of exclusively EDP solutions.



Administrative Processing covers functions shown on the above chart (Chart 11). This is a point of view as seen through established hardware devices. I am showing it to define the differences between EDP and non-EDP equipment.

Perhaps another way of portraying the segmentation between EDP and Administrative Processing is to show the estimated size of these separate segments. The next chart (Chart 12) shows the breakdown in absolute and relative terms.

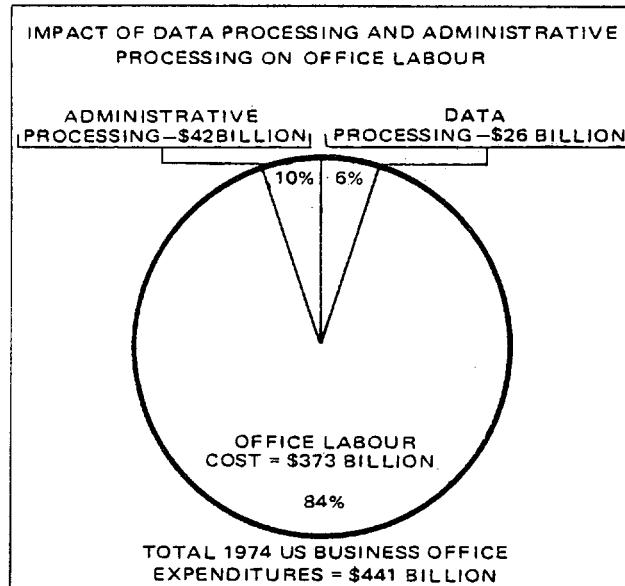


Now, I believe that if you wish to qualify as the information processing executive of your organization, it is absolutely essential that you know the ratio between total administrative and data processing expenses and that you fully understand the make-up of the components making up these total costs.

Let me now interrupt this presentation by administering a simple test to this audience. May I have a show of hands from those organizations present who have well-defined functional cost analyses for their data processing expenses? For their administrative cost expenses?

If you do not have this information yet, I suggest that you begin the very difficult process of data gathering. You will be rewarded by discovery of unbelievably large pockets of expense that have not been previously subjected to any methods of analysis process. I am sure that your organizations will be very pleased with your discovery of new and exciting profit improvement opportunities.

Before we proceed into a discussion how you, as a Data Processing Executive, can engage the new challenges in administrative processing, I'll attempt to present to you the broadest possible definition of this new area. My purpose is to place into an overall economic context, the target of opportunity before us (see Chart 12A).



This chart should make all of us pause about the true significance of our jobs: to increase the productivity of office labor which is the fastest growing component of the labor force in any advanced industrial country. Yet, this labor element is one of the least productive and least capital intensive sectors of our economic scene. Therefore, we must use the tools available in both the administrative as well as in the data processing systems disciplines to significantly improve the effectiveness and profitability of our organizations. We have no choice, because the current strong inflationary forces are primarily labor driven. Only through an accelerated application of capital intensive technologies will it be possible in the next decade to counteract the influence of labor cost-pull inflation.

In the light of this necessary development, we should then be able to find some answers how we ought to act to keep up with the rapidly evolving forces around us.

If this audience wishes to identify itself as the MIS (Management Information Systems) leadership, what is then the significance of all of this? How do these broad new perspectives on our new job scope place a demand

for new actions? How is this relevant to the development of MIS leadership and MIS staffs? (Chart 13).

SIGNIFICANCE TO M.I.S.?

PERSPECTIVE ON ACTIONS?

PERSONNEL DEVELOPMENT?

The perspective that I suggest for your consideration calls for redefinition of MIS from its current preoccupation with data processing to including administrative processing functions for the purpose of achieving total information systems management, regardless by what technology the systems are executed.

I suggest to you also that the focus of MIS should be to counteract increased labor costs, especially in the indirect labor cost categories.

I further suggest that this can be accomplished best by increasing the capitalization of labor which means increasing assets invested for each information handling work station.

The limiting factor is not, however, technology. We must find ways of organizing the new work environments for high motivation and job satisfaction of individuals.

Perhaps meetings like these should begin shifting emphasis from topics dealing with technology to subjects that most likely hold the keys to getting ultimate payoffs from our capital investments in the information processing areas: in job enlargement, in job enrichment and in job redesign. In summary, the major theme I am suggesting for the MIS activities of the 1980's is a focus on people, on administrative and on clerical productivity of our large office populations.

We need then a new perspective for the executives who until now have been occupied with mastering the computer technology. We need to acquire new insights how we can conceptualize the stages of growth and the evolutionary steps necessary for making a change from where we are to where we ought to be going. In all of this, we must cultivate a sense of timing, a feeling for the ripeness of events.

So far, I have found only three writers who have been concerned with the evolutionary aspects of information systems. In the broad conceptual framework we find the work of Professor Richard Nolan of the Harvard Business School most relevant. The summary of his position can be found in the *Harvard Business Review* under the title of "Four Stages of EDP

Growth". Nolan's analysis concerns itself mostly with the forms through which EDP organizations pass as they evolve and mature.

Another important paper is by Fred Withington of the consulting firm of A.D. Little. His paper on "Five Generations of Computers", that also appeared in the *Harvard Business Review*, is perhaps more technologically oriented, even though I find Withington's frame of reference particularly useful if I want to compare relative levels of development across multinational boundaries.

The last writer to be mentioned is Bob Benjamin of Kraft Foods whose article on the "Generational Perspective of Information Systems Development" was published by the ACM. In many respects, Benjamin's paper is close to my position since it is behaviorally oriented and it focuses on new functions as they are brought under systems control.

All of these three writers are important, but they all fall short of the ultimate scope of a total information management responsibility. Perhaps this short-fall can be best illustrated by a real challenge in the choice of your strategies and the direction of your personal careers:

- Do you wish to keep increasing your responsibilities by following the dramatic growth curve of the computer technology? If your answer is "yes", then you will have an ample challenge before you.
- Do you wish to pursue the goal of becoming the top information management executive of your organisation by enlarging your responsibilities beyond EDP, to include telecommunications and administrative processing? If the answer is "yes", then your challenges really increase tremendously because of the lack of structure and previous experience in these areas.

As you can see from chart 16, my vote has been placed solidly behind the latter choice for the simple reason that I recognize that the EDP executive will end up working for the top information executive. This choice is not necessarily recommended for everyone. Many of us have spent most of our careers building up a base of expertise as well as a position of influence in the areas of computer technology. Abandoning this dearly won position of strength for the much broader new unexplored opportunities, with all of the attendant risks, may be too much of a shock. Many top computer executives should therefore remain where they are and become fully dedicated to mastering the technical problems ahead when the evolution to the fourth generation of systems comes upon us.

For those who would like to venture further, I will present a set of specific recommendations and particular action items. I do not think that this audience will want

to settle for only generalities. Therefore, ten "how-to-do-it" agenda items will now be enumerated, in a sequence that you will most likely follow in the prescribed order.

The first and foremost starting activity is a budgeting exercise. You must find out the total information processing cost of your organization. You must determine its segmentation, first by function, then by technology and lastly, by organization and geography. In addition to the conventional EDP and telecommunications costs, you must include first the administrative processing costs and ultimately the total clerical and administrative expense. If the routine analytic support for your business is a material activity, you also must reveal the size of this organizational segment which is a prolific customer and producer of information. To accomplish this objective, you must have complete access to the job classification part of your personnel records. Most likely you will have to work with your financial and budgeting organizations to properly classify people into a number of new categories that cut across established lines of organization.

In addition to this internal people-oriented analysis, you should also focus on technology acquisition costs and external purchases. I am finding that the total cost of information handling for our company is subject to continual confusion because some of the expenses are actually technology transfers or new technology investments to be amortized over a number of years, whereas other expenses are on-going support costs. Similar confusion arises with regard to outside purchases. These are disguised in many forms and are hard to track.

Finally, a word of caution. Do not view Action Recommendation #1 as an easy short-term activity. Depending on the size and complexity of your organization, it may take you up to five years to find a method for getting fairly consistent data about the total functional cost of information processing.

The next action item is important so that you can get a handle on the trends of administrative costs independent of volume or work element mix. I have wrestled with this problem now for three years and have concluded that you must start tracking unit costs for discrete output functions if you want to get any controls on the administrative costs of your corporation. It is the "real" (deflated) trend in unit costs which becomes your actual measure of productivity for typical key events such as:

- cost per invoice
- cost per service call
- cost per payment
- cost per transaction

In approaching this task, it is important that you define your unit cost measures at a sufficiently low level of disaggregation, so that responsibility for the measure is easily assignable at a local organizational level. If you

start at too high levels, such as with Divisional Overhead Burden, you will end up with very little that can be traced to specific productivity investment projects, because productivity improvement comes always in relatively very small increases.

You must also make sure that total unit costs are included. Budgeting techniques of various corporations have the unfortunate tendency not to account for all overhead. You must flow the full cost of administrative overhead, employee benefits and cost of capital into your unit transaction costs before you can start making valid comparisons for productivity improvement decisions. The same cost accounting disciplines that were instituted by the automobile industry 20-30 years ago must find their way into our new "paper-work factories".

Consistent with the principle of looking at your information processing services as an industrial process, rather than as an undifferentiated overhead, you have to proceed then with Action Recommendation #3: This calls for the establishment of standard costs for each element of information output. If you are targeting for cost reductions, these have to be locked into your planning system well in advance by means of standards against which your management will be measured. Existing absorption costing systems too often disguise cause and effect relationships in managing expensive information processing activities and make it practically impossible to track management accountability. Perhaps that is why they are so popular. Standard costs for information services are also essential for making long-term commitments: a predictable cost picture is important for making new investments with confidence and for allowing decentralization of systems investment decisions to the lowest organizational levels possible.

At Xerox, we have begun pricing all information services transactions. This has had very healthy organizational implications, especially as it has related to overhead costs. We have always had the tendency in the past to build up all sorts of overhead staffs, review staffs, technology consulting staffs and so forth. We have found that as these staffs could not be allocated as direct overhead to product costs, they gradually vanished.

I believe that information processing activities should be burdened only with a small indirect overhead. This principle is very important if you want to manage the data processing or the administrative processing activities toward highly productive levels of performance. You have to serve as a prime example of the principles of good cost management before you can ask others to do likewise. If your own house is not in good order, you cannot credibly come before other functions of your organization and ask them to manage better.

In acting as a model user of information processing, we are especially proud of a standard costing technique

which we call a job processing "profile". In our 27 businesses we have thousands of "process sheets" that contain the job cost "profile" for every discrete information output transaction. Each unit step of activity making up an output transaction job is costed out in the same way as if it were a manufacturing assembly. The "profile" sheets are available to everyone who may wish to look for unit cost reductions. In this way, analysts can examine each element of cost such as: handling costs, editing costs, output preparation costs, mailing costs, reproduction or storage costs. We have found that the ready availability of standard costs have become an enormously powerful tool for cost reduction. In the last 18 months, we have taken out over 12% in absolute unit cost reductions just because the cost profiles were available. Our systems analysts had a good tool for doing a thorough industrial engineering and value engineering job on thousands of discrete jobs, saving a penny here, five cents there, with the result that our internal information services activities are now on a much more solid footing than most comparable cost centers.

Action item #4: . The creation of information processing costs centers is a major organizational innovation in taking large numbers of people engaged in information intensive activities and structuring them into profit accountable units. The whole tendency on the part of the large organizational bureaucracies has been the pursuit of centralization of information processing functions because this has been dictated by specialization, concentration of technology and concentration of expert management. The problem occurs after centralization takes place. How do you manage large agglomerations of clerical and administrative people without sacrificing other very important attributes which made these people effective in their local environment, even though they were not efficient?

The answers seem to lie in finding an organizational compromise between centralized efficiency and decentralized effectiveness of people who can relate more directly to their jobs. We have accomplished this compromise by grouping small numbers of people, sometimes as few as 15 and never more than 50-80 around well-defined functional missions and then giving them full responsibility and accountability to handle their information output as a product. For instance, our manager of the Billing Information Processing Center has complete control over his input, output, data center costs, programming expense, consulting fees, telephone costs, etc. He also has available to him both quantitative and qualitative performance measurements relating to factors under his control. Unit cost of his output is certainly one of the most important indexes by which he is measured. But cost reduction objectives are also further constrained by indicators such as error rates,

document turnaround, influence on cash outstanding, etc. In fact, he operates an invoicing business and must account to his management for an overall optimization of his resources as a decentralized action unit.

Most importantly, we encourage this manager to make trade-offs between a variety of resources within his information processing center. He has a large number of options to trade, such as:

- Training vs. manpower
- Salary level vs. training
- Information investment vs. manpower expense
- Teleprocessing vs. data processing expense
- Output processing vs. Output methods investments

We guard the capability of our decentralized information processing managers zealously. I find that in all of the arguments between centralization and decentralization, or what it means, the rhetoric is largely ineffective until it is subjected to a test of freedom of making trade-off decisions at a first, second or third level of supervision. An organization is decentralized if you have at a fairly low level management accountability and performance measurements. It is decentralized if a manager can make decisions to improve his performance.

In a decentralized environment, it is possible to configure data processing and administrative processing centers irrespective of the structure of the users of these services. The user manager of an information processing center becomes simply a purchaser of specialized services. If he has the option of comparing prices from several sources, his relationship becomes much less political because all he is interested in is to get his services vendor to keep improving his performance and costs, which will in turn improve his own results.

Action item #5 is a very difficult one, since it requires coordination and planning at the highest policy levels of your organization . This calls for a redirection in the functional Long Range Plans of your corporation.

The basic thrust here is to integrate information processing trade-offs into the fundamental planning process of each operating unit, of each functional organization. There has been a time when the Information Services Director was expected to take the initiative in seeking and defining the application objectives and the development priorities within an organization. The I/S Director simply cannot perform this role because he does not have the requisite know-how or qualifications to know everything about the economic trade-offs between manpower levels, training efforts, facilities and information services investments. This role must fall increasingly on the functional executives who must be helped by the I/S Director to become better qualified and more knowledgeable to consider data processing and administrative processing as an increasingly important factor of their planning

process. Foremost, the I/S Director must help the Operating executives and the Functional executives to become increasingly proficient in using systems investments in the long-range strategic planning context as contrasted with short-term tactical decisions.

From the standpoint of organizational planning and organizational power balance, however, the most significant department of Action Stage #5 is the shift of the data processing and administrative processing budgeting approach to initiating the flow of Information Systems funding to Operating and Functional Long Range plans in the 2-5 years. planning horizon, and away from annual budgets. This means that the Information Systems function, even if it is completely centralized, should not contend for funding as an independent cost center. I/S funding should flow through the long-range contract demands placed by the individual information processing users on the I/S organization. The exception to this rule should be technology investments and new productivity enhancement developments that the I/S function needs for its own improved performance. The funding in such situations would be identical to those that are applied to all other users.

Action item #6: is a logical outgrowth of the shift of planning initiatives from the data processing sector to the user sector. It is not enough to leave only planning with users. They must be squarely in control of the execution of their systems. There is a strong propensity among computer people as well as all technicians to claim that they know what is good for their clients. Well, systems are just too important to the life of an organization to be left exclusively in the custody of technicians.

Under this action item, I propose that the business analysis, methods planning and application installation training function be moved organizationally as close to the ultimate user as is possible. In this process, we not only provide the user with a capability to do intelligent procurement of data processing and administrative processing functions, but we also create a powerful tool for balancing out business needs against the technician's claims.

I am frequently asked how to structure the user's organization in order to accommodate the systems planning and systems implementation personnel. There are many possible organizational combinations. I favor the assignment of business systems analysts into the planning organization. Each function, each operating unit, each Department must have somewhere a group of people who are concerned about the future, unless of course, we are dealing with an absolutely static environment. This future planning entity must increasingly rely on information systems as a means of reaching out to its goals. Therefore, I am convinced that the planning activity will ultimately become the organizational placement of information systems in the

same way as it was initially logical to keep tabulating equipment under the aegis of the chief accountant.

The actions outlined under #7 represent the true new frontier and challenge to the top computer executive. Whereas his primary skills until now had to focus on technical management, administrative systems leadership calls for a humanist, non-technical and general management perspective which are usually not a part of the computer executives' skills. The ability to carry out actions then becomes the true measure of a man's growth potential.

In the last few years, I have gradually discovered that the greatest opportunity for productivity improvement lies in job redesign and job enrichment, not in improved running of the existing EDP operations. It is clear that new computer technology and new systems approaches are frequently essential to achieve the new approach to jobs. But, there should be no mistake about what comes first: not technology but human work needs.

To achieve the transition from an excessive computer orientation we have deliberately begun increasing our investments in methods, procedures and training following years when these activities have atrophied as talent moved into the more glamorous and better paying EDP field. This reorientation of objectives has been traumatic for individuals whose career goals were set by high salaries in the technical fields and a relatively strong neglect in the more traditional analysis tasks.

The payoff from this redirection is high. For instance, in the network we are currently installing detailed methods and work flow analysis has shown that computer terminal access to central data bases allows us to rearrange accountability for work functions. Under the old system, work had to be partitioned by areas of specialization. Accounts receivable specialists handled accounts receivable. Equipment order entry clerks handled customer orders. Credit was another speciality.

The new approach allows us to make generalists who handle several tasks out of narrow specialists. The job satisfaction level has increased substantially since people now can identify much better with total results. Such a change does not come for free. I estimate that the procedural, job re-design and training costs—what I call “soft software”—has, in fact, exceeded the technical costs for delivering an operational computer terminals network—what I call “hard software”.

Lastly, I am suggesting that you should begin reversing the process of dramatic build-ups of technical personnel in your computer systems activities as a way of financing the growth of manpower in the administrative systems categories. This will call for a thorough new campaign to increase the relative productivity of your technical resources through standardization of technologies, automation of programming and testing tasks, output measurements, quality control and making increasingly better trade-offs between rapidly dropping

prices for hardware while software labor costs keep inflating.

Action recommendation #8' actually elaborates on the prior directions. It is noted here for emphasis because it calls for transformation of a static information systems environment into a mode where it acquires many of the attributes of a learning system. One of the problems that I see in most of the existing terminal oriented systems is the relatively rigid task and functional orientation. People do not readily fit into such an environment. The training levels of individuals vary. Therefore, designing the terminal functions to the lowest acceptable common denominator and leaving only the output volume as a personal variable is clearly unsatisfactory both from the standpoint of productivity as well as from the vantage point of the operator. The terminal protocols have to be designed as a combination of tutorial learning and job execution devices that are much more permissive to changes both in task contents and in job scope. As I see it, terminal systems of the future should encourage people to deal with situations of increasing complexity as organizations and individuals grow in their experiences.

Action recommendation #9 is aimed at the personal goals and organizational objectives of the top computer executive. If you want to broaden your responsibilities, you will have to learn how to delegate the management of technology to others. You will have to wrench yourself away from the discipline with which you are comfortable and into which you have invested most of your professional energies during your career. Some of you will have great difficulty in making this change because it will be hard for you to abandon an area where you have a professionally unique monopoly as an "expert". The new direction calls for your entering into competition with management generalists and to delegate the management of computers to another level. Your own motivations and ambitions will play an important role in making this change. You may wish to remain at a level of your current comfortable competence rather than expose yourself to a failure at the next, more difficult, level of executive responsibility.

I think that you will really have to make a thorough assessment of yourself as an individual and make a good evaluation of your talents to grow further. It is going to be a large self-education endeavor. You will have to acquire new skills. The know-how that may be of greatest value to you in this process concerns the fundamental economics of information handling of your firm. Unfortunately, there is not enough research or other published material in this new field. Almost all of the literature in journals and magazines concerns itself with the technological issues.

As your organizations, as well as our entire advanced industrial society, takes ever-increasing proportions of its resources input in the form of information products and information services, managers of information systems will have to be capable of making increasingly complex economic judgements concerning alternative investment opportunities. Choices between programming, training, methods, telecommunications, facilities, incentives, job design, technology choices and salary levels will present difficult challenges to be met by the new information systems executive.

This brings us to the concluding action item of this presentation . Will you rise to the opportunities and daringly search for the achievement of becoming your organization's "architect" of information? Will you pursue the mastery of the total communication process around you? Or, will you be satisfied with expert management of the complex technological environment of your computers?

Ladies and gentlemen; let me leave you the last set of questions to be answered by each of you the best way you can and perhaps the only way in which your environment will permit you to act. Regardless of your choice, the challenge will remain there for you to embark on one of the greatest adventures possible today: to help in providing the necessary leadership in managing the information environment of our society. Thank you very much for listening to these thoughts. I wish you well in using those few ideas that you will find worthwhile, when you return to your homes.

QUESTIONS AND ANSWERS SESSION

by P. Strassmann,
Xerox Corporation, USA

OXENBRIDGE (British Post Office): Paul, I enjoyed your talk. There are two points that I wish to make, the first on clerical performance. As it stands at the moment, I have operated a clerical performance scheme on some 40,000 staff, by using Paul B. Mulligan's time standards on the various elements of their functions. This has resulted in an increase in performance of something like 25%. If you analyse a typical clerical work situation, you will find that something of the order of 52% is the present achievable clerical performance. Therefore, it is fairly straightforward if one applies clerical work measurement to try to improve the performance ratings of clerical staff; so your \$373 billion could be eaten into by a straightforward, non-EDP clerical performance rating system, which of course would improve the overall clerical productivity of the business.

The second point is that the behavioural science concept of job enlargement which you raised is extremely valid, and I accept it fully; but there is a big difference between America and Europe—well, at least between America and England in this concept, because we have tried to introduce job enrichment in our own organisation and have met with little success on the part of the unions. The unions take the view that it is merely a method of trying to make people work harder.

(*Laughter*) The reason they say this is because of the consultants you employ. We employed one of the most eminent American consultants in the field of behavioural science; when he came to see us he said, "Look brother, you'll get back all my fees by making your guys work harder." This being the case, the unions don't go along with behavioural science because they take the view that not everybody wants to excel and take on extra responsibility; life is pretty sweet as it is and it should stay this way. You probably have a difference here from the American point of view—and certainly the UK point of view—that in reality it's difficult to bring in the behavioural science concept.

I merely make the point that, leaving aside EDP, leaving aside the behavioural science concept—in which I am extremely interested and I fully recognise the benefit—it nevertheless means that you can improve clerical performance by some 25% or 30% by means of using Mulligan time standards on clerical performance activities. These are standards which operate to four

places of decimals of an hour in the various work elements. I have in fact operated on 42,000 staff these particular elements and have improved the performance rating by some 25%. I'd be glad, Paul, if you have any comments on this particular aspect.

STRASSMANN: The first comment is on your 25% improvement potential through measurement in the clerical area. I agree with it; I think that it's achievable; I have seen better than 25% improvements. I would say that I have seen better pay-offs with less investment by straight method approach in the administrative area than EDP. I think that we ought to start looking at a portfolio of investment opportunities, and perhaps find that the investment in non-EDP techniques yield us better profits than investments with the conventional computerised approaches. I am very glad, Brian, that you have brought up the point, because this was one of the major messages of my talk this morning, calling for reinvestment and redirection of our investment opportunities away from an area which may have received an excessive share of our attention in the last 15 years.

That was the easy one. Now let me go to the behavioural and cultural issues which you confront when you're trying to do job enrichment. Rather than comment on the propensities of the labour union movement in England, which would get me in trouble next time I'm in London, I should like to comment on perhaps something much less controversial, where you have the same problem but perhaps on a more universal basis: it has to do with the role of women and secretaries in restructuring and job enlargement. One of the unique aspects of this huge clerical manpower that I portrayed to you is that predominantly it is made up of women in a much lower clerical and compensation category than males. In fact, we have created a sub-class of disadvantaged and sometimes disenfranchised parts of our population; and when you try to do job enrichment, in the female area you run into the same cultural bias to work enlargement as you have in the union case. Basically, what you have to confront is that you cannot cheat, or you cannot come in and say, "We are doing behavioural work enlargement because we love you and because we want to support the Women's

Liberation Movement." I think that you have to be very candid; go to the women and point out that their ability to participate in the economic life of the company, or the organisation, or the country, is impeded by virtue of the poor job structure to which they have been assigned. You have to work with them and say, "Look, if we enlarge your jobs out of just performing errands for your male bosses into really participating in the productive processes, by adding functions which enrich the job, then you will be entitled to more compensation and a greater economic share of the organisation's profits and revenues." I would say that you have to have pilot experiments where you find a sympathetic group which is willing to work with you; and I suspect that even in the UK you may find one or two sympathetic groups even in the UK postal service!

Then I think that you have basically to share the productivity improvement. One way that I have done it, particularly with women, is to create new positions which are more compensated, which are more cognisant of the enriched jobs. In the last three years we have taken women who had a very narrow distribution of jobs, and we have created management jobs to supervise these new clerical enterprises that I discussed in my presentation.

You have to do it by example. The first few examples will be traumatic; most likely nobody will trust you. Certainly if you have an American consultant, you will create an additional cultural impediment. I think that you have to grow your own experiments driven by your own people, sow a few seeds and hope that a few flowers will sprout, and that they will find a sympathetic environment.

OXENBRIDGE (British Post Office): If I could just come back, Paul, as a matter of information we've just had a union conference. It was a national union conference of the people concerned on this clerical work measurement programme, and they've just passed a resolution that they will want to withdraw completely from any form of productivity agreements that have any relationship at all to work measurement systems, because productivity in any sense of the word is now anti-social; we are in a decline and unemployment is rising fast; and therefore jobs are to be spread and jobs are not to be sacrificed on the altar of productivity. This is the latest resolution, which has of course completely put the skids under my programme of getting any more work done. It's just a matter of information; in other words, productivity in the form of clerical work measurement, from the union point of view, currently, is anti-social.

STRASSMANN: May I extend to you my condolences and sympathy.

BUTLER: I have a question here from Sven Yngvell of Saab-Scania. ISD is operating in a competitive environment; is ISD free to buy the equipment that it thinks is most competitive? For example, are you free to buy IBM equipment if you find it best?

STRASSMANN: There is a whole range of equipment that Xerox does not manufacture, and we do have IBM equipment in ISD.

BUTLER: The next question is from Monsieur Cumin of the PTT, France. What is, according to your opinion, the correct place for the information department in an organisation?

STRASSMANN: As you may recall, one of the points that I made was that the information activity should be composed of two separate pieces: one which is the information technology area, the information utility; and that in fact becomes an information factory. That can pretty well report in the corporation anywhere where you have the ability to administer and run the information establishment. That is a function which most likely should be entrusted fairly high up in the organisation, of course depending on the importance. If I were in an insurance company where my information establishment would perhaps form as much as 30% to 50% of my cost base, I suspect that I would have it reporting up to the president. If I am in a wholesale, large-scale grain export business where my information for billing purposes and measurement purposes is about one-tenth of a per cent., perhaps it could report to the controller or the manufacturing user.

That is not the most important organisational issue. The most important organisational issue is: where do the user, the system planner, and the people who make the trade-off decisions and who pay for information, report to? After much consideration and experimentation, I have concluded that they should report to that function which is responsible for the planning for the future of a given function. For instance, if you have a procurement function, you may have a large purchasing department consisting of people who do the actual procurement and vendor solicitation. Then the purchasing department may have some support functions. Lastly, the purchasing department would have a planning function, because I don't think that any large function anywhere today in the world can exist without being dynamic, without adapting itself to its future mission and its new challenges. This I call the functional planning sector of a given function. I am sure that in many manufacturing operations you may have an organisation planning manufacturing methods; in finance you may have a finance method, or a finance analytic function, again concerned about the future of the finance function in itself. This is exactly where the user systems analysis function should belong, because systems in a broad context is an absolutely inseparable part of the future of every organisation. You cannot talk about the future of purchasing, the future of personnel, the future of finance, the future of manufacturing, without looking at the way that you have to restructure your nervous system, and how you have to allocate investment funds into the way that your nervous system will have to work in the long run. Since, in my presentation, I believe that I called

for long-term funding from the users to the technology establishment, I don't know of a better place to embed this systems planning function than in the planning function itself.

CUMIN (PTT, France): It was I who put the question, sir. The problem that you have raised is a very important one, but I think that one might find a solution in one direction or, alternatively, in the other. I think that the whole problem lies in these alternatives and which one to adopt. If we consider the evolution of ADP in the various companies one sees that at the beginning, from the '50s to the '60s, ADP was something which was performed mostly by the users themselves. I would not call them exactly pioneers, but they all seemed to be travelling in the same direction; then between 1960 to 1970, there seemed to be a splitting up and specialisation in different jobs, and in addition to the users, we saw the emergence of the ADP services or departments where you had big computer shops. It was at that time that problems began to emerge because the EDP specialist, who is after all a technical man, tried to bamboozle the user, as it were, and of course the user tried to escape this capture; and this was the problem that you referred to a moment ago.

You also touched upon a third point, that is the present time and up to 1980, when the ADP man will perhaps be without any users, and be like the dog running around after its own tail. At that time, he will of course have to turn once more to the user and ask the user to co-operate with him. So the point here is to find a way to get out of this quandary. You have two groups of people who should co-operate and work together, whereas very frequently they are at sixes and sevens. Of course, we have to remember that ADP has produced an upheaval in the services industry. I think that perhaps we should refer more to ADP of organisation rather than ADP for management. When we say management ADP, we generally picture computerising services in their present form; whereas organisational ADP is something which postulates a restructuring of the organisations, bearing in mind this powerful tool that we have available, namely the computer and computer science.

This being accepted, I think that if any company wants to survive it has to have a management. If I understood what you said a moment ago, sir, you stated that the finance department or accounting is something by itself; it is a sort of walled-off compartment because it is handling one particular sector of the enterprise. This means, therefore that, quite rightly, one will always have to support the traditional functions of the enterprise, and perhaps one might not succeed in doing this; but it is mandatory that we still have to decide where the computer shop or the ADP department is to be located. I feel that the ADP department must be a means of providing a back-up, a support for the other functions of the company.

Let us take the example of the army, which I think is a very good example. In any army you have the artillery which is available to give aid to the other branches of the armed forces. I want to draw your attention to this because I think it's a basic problem; who is to direct the company? I think that it is the task of the ADP section to do this.

STRASSMANN: May I ask a personal question? Which function do you represent in your company, Mr Cumin?

CUMIN (PTT, France): I have a dual function. It is a dichotomy that I occupy, so I am quite at my ease.

STRASSMANN: Could you explain which two parts of the chair you sit on?

CUMIN (PTT, France): Well, at a certain level, sir, you are never sitting between two stools.

STRASSMANN: To continue this charade, are you the president?

CUMIN (PTT, France): The nation, sir, is the director general of my service.

STRASSMANN: I'm afraid that the job of restructuring the French Government has just been given to me! I wish that I'd stayed with the British Post Office! But seriously, I think that EDP is really the planning of the nervous system of the organisation. When you look at the gross national product of an advanced industrial society, you find that information processing, as we emerge into the 21st century, becomes the dominant preoccupation of an advanced industrial nation; unless, of course, the industrial nation does not want to advance—and we have cases like that. But if you take almost a political view—which in your case obviously is the thing to do—of where the information custody of the assets of a major industrial nation comes, you have to start looking at the fact that not labour, not capital, but information, position of information, and management of information may become the major preoccupation of any government, and certainly of any advanced industrial enterprise. Therefore, I would urge any organisation to take a long-term historical perspective and move information systems planning very much closer to the seat of power, in the same way as the management of capital has been gravitating over the last 100 years from decentralised entrepreneurs to a central body which is in the best position to look at the allocation of capital in an economy. I would say that certainly by the 21st century, which is not too far out for most of the people here, the management of information resources of an economy, which will be highly influenced by the computerisation and networking, will take top priority in deciding how investment resources in technology will be expended.

I must say that I really compliment the French Government on being one of the unique governments in this world, taking the long view that information technology is in fact a national asset. I think that certainly demonstrates that your nation is taking the

right long-term historical perspective on this issue.

BUTLER: Thank you, Paul. I have a question from Dr Kohnen of the Bundespresseamt. Mr Strassmann, do your figures, office labour costs, administrative processing and so on, depend on the business of your company? Or are these figures higher in your company than the average in the US?

STRASSMANN: The answer is "Yes". The EDP budget is 4% of sales, which is certainly among the top 10 percentile and perhaps as little as the top 5 percentile. The recent Diebold report on the distribution of ADP expenditures plotted a set of curves for various industries; and I could readily take off our particular point on that curve because I knew what data we fed to Diebold. In fact we find that Xerox is a precursor of the kind of information enterprise of the future, because we find that the major task of our enterprise is to use information as a by-product of manufacturing and logistics. We have trade-offs between logistics and information; we have trade-offs between travel and information; we have trade-offs between training and information. This is why we consider ourselves in the vanguard of the kind of cost structure that many other manufacturing enterprises will have to have.

My introductory remarks pointed out that, although we may be unique and we may be a precursor, there are many of the enterprises here that may follow that pattern. I only mentioned the 4% of EDP and the 1½% for telecommunication. The other part which is much larger, which is the administrative cost, is in the range of three to five times the range of the prior two put together. As I pointed out, the determination of what is the total cost of information in a corporation, a worldwide enterprise such as ours, takes many years to establish. It's a complex definition issue, and I certainly don't claim to be completely done with that, so I cannot quote you an exact figure.

BUTLER: Thank you, Paul. There is a question from Mike Taylor of GRIP. If ISD prices its services at commercial rates, does that imply that your users have the freedom to place their business outside Xerox? If not, how do you exercise control?

STRASSMANN: The internal establishment in fact does less than 80% of the total work. The users have placed a substantial amount of processing on the outside at rates which are much more attractive than I can produce internally; and in addition to that, they have found the ability to move fairly quickly into new technologies, such as mini computers, because of an extreme anxiety to get cost effectiveness. Although I am the titular head of the information systems establishment, I must confess to you that the people who work for me are sometimes as conservative and try to foist batch processing on to all problems, because that is what they are comfortable with. I think that one of the reasons that Xerox has progressed so immensely fast towards interactive

transaction processing, time sharing and mini computers, is because of the internal competitive pressure.

That brings me to the second part of the question: how do you control this nightmare or potential nightmare? The answer is that you control it by leadership and by planning. I think that if somebody wants to install a network of computers, it should not be done on an opportunistic basis, it should be part of a long-range plan. One of the burdens of leadership in this sort of competitive environment is that the big debates start at the planning level, rather than what happens to the usual EDP director when those people from that unnamed plant submit a request for a mini computer, and you have two hours to sign it; and if you don't sign it, the whole wrath of the bureaucracy and the power structure of that organisation brings to bear against the corporate staff. If you are in the short-term game you can never win it. You will always be on the defensive and you will ultimately end up with a mess.

The way that I control it—and so far the score has been at least reasonably even—is that I force these new ventures in transaction processing, terminal processing and mini computers into a four to seven year planning cycle. Let me say that sobers up not only my people, but it sobers up some of the plans that I see submitted to me; because these mini computers and these time sharing systems become frightfully expensive, very often, when you look at the total life cycle cost of that venture. One of the unique attributes between time sharing, mini computers and batch processing is that the highly systematised batch processing environment has a very high front end cost, whereas the nimble vendor and purveyor of mini computers gives your opportunistic plant manager a very low threshold cost, but very high costs afterwards. So my answer to you is that if you force everybody to play by the same rules, which is a long-term life cycle costing, you've got a better than even chance to maintain the vigour of competition without the dangers of chaos and anarchy.

BUTLER: Thank you, Paul.

ROMEIJN (Shell): I think that we are all listening with fascination to the broad picture that you are sketching. I think it was Peter Drucker who once wrote that one of the first duties of an entrepreneur is to create a customer. I am wondering whether your insistence on this very wide field has something to do with the marketing aim of your company, which I believe is setting out to provide tools for this type of problem. I think that you will probably be unique in the sense that you find a lot of understanding with your general management when you approach them with these ideas in mind.

STRASSMANN: Yes, I'm very fortunate. I'm a disciple of Peter Drucker and all my staff has a full set of all the books that Peter Drucker wrote; and once a year I give a course which happens also to include a final examination, and I always make sure that the latest

book from Peter Drucker is one of the items in the examination. I'm a great admirer; I think that he is one of the most relevant thinkers to information systems management that I know of. It's intriguing to me that when you really are looking for sources of inspiration, what to do in information processing and computers, you have to go out to a seminal thinker in general management rather than to a thinker in information systems.

I think that you are quite right: Xerox and ISD are out to create a customer; and that is really the proper symbiotic relationship. You cannot be like the dog chasing his own tail that was mentioned a short while ago; to be creative—and I don't want to draw the dog analogy too far—I think that some creative cohabitation is very much in order.

BUTLER: The next question from DAF.

ROELEVeld (DAF): I think that you gave a very good performance, but I don't agree with your telling us that you are among the right people to give your speech. I think you were not. I know Xerox as a company quite well and I know that everything is very centralised on two sides, England and America. With this in mind, when I am looking at your ten points, I think that you should have held your speech to the board of Xerox. If you are telling us to hold in the future 10% to 20% of the total turnover on the cost side remember that in your company, then why are you not on the board? I think that we are not there as ADP men within a couple of years. As long as information is needed but it is a cost operation of the business, I think we have to change our image. Tell me how are you going to tell it to your board and did you perhaps succeed in telling it?

STRASSMANN: Well, I was looking for a challenge from the audience. As a matter of fact, after so many provocative things tossed across here—which I believe is the right audience, by the way—I expected the arrows to come. Here is the first one, and I thank you for that.

One of the reasons that I am not on the board is because I really believe that, as the Information Systems Manager of Xerox, I am the technology servant of the people who are on the board. It is the people who are on the board, who represent marketing and manufacturing, the main line of the business, who contract with me as their servant to deliver to them products. I want to absolutely disabuse anybody of the idea that the information systems man should be a sort of lurking Cardinal Richelieu or a Grand Vizier who pulls the strings behind powerless puppets of the rest of the organisation. I don't believe that I belong to the board of directors of Xerox; in my present position I will never make it. I should not make it, and I want to be very emphatic about it. So I have tried to answer your candid question with as candid an answer as I could.

ROELEVeld (DAF): I am glad that you answer, but I am still wondering how to tell it to the board, even if you are not there.

STRASSMANN: I have the privilege of appearing before the Grand Inquisition, which is the executive committee of the board, twice a year. In the fall of each year, I show the total worldwide consolidated EDP budget by function and how it is going to be allocated in the next two years. I have to show how the next two years' operating plan will lie against the previously-approved long-range plan. I have a date with the executive committee of the board this August, where I will take all of the seven-year long range plans and consolidate and present them for their decision making and their pleasure. That is my principal line of communication with the board. The session usually takes anywhere between three to six hours; and I think that is a proper forum and proper allocation of time, if you have proper staff work done. I think that this is a perfectly adequate forum for me to do my job, and I am quite satisfied with that.

BUTLER: A question now from Monsieur Fontanel. The organisation of Xerox seems to me to be original in that ISD has administration and telecommunications. At what time did you start with this organisation and what are the problems to keep this sort of organisation alive?

STRASSMANN: I had a slide to that effect. (Slide 6) Monsieur Fontanel asked what was the evolution in the acquisition of the additional functions. As you may recall, this slide began with central administrative services in the period of 1970 to 1971, and at the end of 1971 management services was given the charter to create a new and dynamic user-driven organisation environment by overlaying its structure over the hardware and software operations and creating the competitive service environment, a network environment. Then late in 1972 and early in 1973, telecommunications was integrated; and early in 1974 text first, and in late 1974 printing and distribution, which is mail. That was the evolutionary sequence.

Now Monsieur Fontanel would like to know what the problems are. I think that one of the major problems existed when these organisations were created, that you have to pry loose these functions away from their captive functions. For instance, programming; we had programming located in approximately 18 locations, and we consolidated programming into four software businesses. The process was one of trauma and great problems of cultural identification; not only for the people from whom you took the programming away but, most importantly—and I don't want you to belittle the problems of centralisation—the programmers when suddenly put into a completely different environment were not altogether sure about their sense of identity. You see, many programmers like to dabble around in business decision making. For instance, the manufacturing programmers always prided themselves that they knew more about manufacturing than the manufacturing planning people. The market research people were totally dependent on a few very bright programming

people to do much of the prioritisation and planning of the kind of market research analysis that should be done.

The big problem was on both sides of the fence. If you are involved in a centralisation process, if you think that your problems stop when you finally are given your charter by which you annex a part of somebody's organisation, I suggest to those of you who have great centralist tendencies to be very humble and very much concerned about what happens after you get what you have striven to obtain.

One of the interesting examples is in the text area. I took 65 secretaries and created five text preparation and clerical support and administrative processing businesses out of it. It's true that some of the male owners of the various secretarial heads felt greatly deprived of their sense of value and status. But the real challenge was not the managers whose ego was threatened, but what happened to the women when suddenly they were removed from a relationship which is akin to a manservant/master relationship, and liberated? They had to compete for money and budget on the same terms as the men. The major problems that I have seen and most likely you will be seeing are cultural. The British Post Office example is just one of the many examples of cultural shock that takes place if your organisations evolve into the 21st century.

BUTLER: I would love to hear the British Post Office saying to its unions, "Hands up: you're liberated!"

CHEVALLIER (Berliet): You have so far been talking to us about administrative work performed by specialised personnel, but a very large part of the administrative work is done by people of whom it does not represent their major job. They have tools, they have technical methods for administrative work; but the main job that these people have to do, at least in their job description, is to prepare the manufacturing schedule, to prepare planning, sales, programs and so on. These administrative jobs are far more difficult to identify, quantify and organise. Have you any experience in this particular field that might help us to see the picture more clearly?

STRASSMANN: I really thank you for that question: it's a very challenging question. Basically we have done quite a bit of work in this area, particularly in production scheduling where we have virtually armies of clerks and, more importantly, expeditors, complementing the informal information system. The same applies in the whole area of accounts receivable, where you have credit and collection functions; where the boundary between a doing function and the administrative function is fairly fuzzy. As a matter of fact, even our marketing people spend an unspeakable percentage of their time filling out forms, which properly belongs in the administrative function. We have a very deliberate process by which we cost out fully the total administrative cost, say, of production scheduling and expediting; and thereafter we have fully priced it out and we understand it. We are continually driving

ourselves to specialisation and automation. We have taken an enormous amount of labour out of our procurement expediting, for instance, by creating specialised administrative para-professional centres which take away from the real purchasing people, who do technical vending and buying and who are real experts, administrative jobs. Basically you have to take administrative jobs which are worth perhaps as little as \$15 to \$18 an hour from people who, fully loaded, cost you \$45 an hour. That is the process that we have been following. I don't know whether I have answered your question, but that is precisely what is taking place on a massive basis throughout the corporation, and which is the primary justification for the fairly large budget allotment that I am able to get in Xerox for the information services function, because that kind of redefinition of jobs in fact is highly profitable.

CHEVALLIER (Berliet): But this is contrary to job expansion.

STRASSMANN: It turns out that you are doing basically two things at the same time. Productivity comes through specialisation. Let's face it: productivity comes through division of labour and specialisation. Therefore, on the one hand you have to pursue specialisation; but then, once you specialise, you have to take those jobs and make them very meaningful and large so that they can earn. I think that the phrase "job enlargement" is perhaps not the proper description of the strategy that we are following. What we are saying is that we are moving jobs from highly-paid jobs, which are done incompetently and without systems, into highly-structured, rich jobs; and we are taking rich jobs which are well structured and moving them down to automation. So we are in fact pursuing a three-layer strategy which we call "pull-down, push-down". It's a much richer set of evolutionary tendencies than "work enrichment" describes. It is a dynamics which encompasses the entire functional chain. I'm not sure that I was completely responsive to your question, though.

KOHNEN (Bundespresseamt): Mr Strassmann, when you were explaining your chart showing the organisaton of ISD, we noticed that you have, among other divisions, the administrative division, with records, payrolls and so on as subdivisions. Furthermore, you mentioned that you are doing documentation in these subdivisions—and you said "most important documentation". What do you mean in this administrative division by "documentation"? Do you mean documentation in the sense of an internal registration, or file keeping, or archives of internal business statuses and statements, or is it documentation going beyond this, that is documentation about scientific papers from scientific magazines or brochures? In other words, do you mean internal documentation from outside sources, which have to do only in a very broad sense with this particular division?

STRASSMANN: The answer is internal documentation of an archival nature of those records of the Corporation which are handled particularly ineffectively on a decentralised basis; for instance, insurance claims, benefit payments, payments to retirees, personnel records. We have found that, for instance, in the United States we have 185 people involved in personnel record keeping, because each branch maintained a second, third or fourth copy of the personnel information, which never was consistent, it was always partial. We have centralised all the personnel records of the Corporation, and the administrative function among other responsibility is the custodian of all the personnel records. When personnel records are needed at point of need our facsimile network provides this information on a point of need basis, with enormous saving in clerical labour and an untold number of file cabinets having been removed from the company.

BUTLER: Paul, I'd like to ask you a question myself, if I may. It's clear from everything that you've said that your company is making a very powerful effort to be as efficient as possible, to get maximum productivity from its administrative staff. Now apart from your own influence, I'd like to ask you where the initiative to move in this direction came from, because usually such an initiative is characteristic of a company which is in a highly competitive situation; and I've always thought of your company as one which had patent rights that meant you could, let's say, have a licence to photocopy money. So where did the drive come from?

STRASSMANN: Apart from the fact that we have many visitors from the British Monopolies Commission and from the American Federal Trade Commission, the major drive has come from rapidly dropping profit margins of Xerox. That's a matter of record; and it has come about because of the increased competition in the copying business. Also, as you may or may not know, David, we had agreed with the Federal Trade Commission to grant licences to all of our patents, so we do not have an exclusive patent position any more.

So as we walked in the last four years from a position of patent dominance to a very tough competitive business, the rapidly dropping profit margins and the dropping returns to our shareholders have clearly indicated that we have to be extremely productive. As a matter of fact, I have a very specific mission by which I am measured, and that is that I have a very specific margin contribution improvement assignment, which is quite considerable but which can for the first time make an explicit measurement of the degree to which information systems will contribute to the margins which we expect to enjoy in the 1980s.

BUTLER: A question here from Monsieur Roux of Saviem. You have indicated that the EDP costs were decreasing. Are they decreasing in absolute value for Xerox, or has there been a transfer from the budget of ISD to the budgets of other divisions?

STRASSMANN: The absolute amount for EDP expenses is growing at a very small rate. We are down from a 25% plus growth rate in our EDP budgets to less than 5% growth. As you may recall, the graph that I showed was EDP budget as a percentage of sales, and that was dropping. We intend to continue increasing our sales, with a virtually flat or only slightly increasing EDP budget.

In addition to that, there has been a transfer of input and output labour because of terminal orientation out of EDP, because as you move several thousand terminals out to do input editing on line, that becomes part of that amorphous administrative cost; these purchasing clerks that we were talking about a short while ago who do these things on a part-time basis.

In addition to that, interactive application and time sharing, which has grown almost explosively, has taken a large number of report editing and analytical work away from the central batch environment, and has placed it against the user needs, financial analysts, procurement analysts and salesmen. That labour in fact does fairly rudimentary programming which does not show in the total EDP budget.

But lastly and most importantly, we have removed through centralisation a large amount of labour in programming; for instance, our network of over a hundred hundred computers out in the field is actually being programmed from a mother machine. When we change the software, it comes over telecommunication lines from three programmers located in Rochester, New York. They do all the debugging and version updating remotely, providing a very rich set of application routines.

So, by and large, the answer is that both in terms of productivity as well as migration of labour, we have had a change in the mix of how we look at our EDP function.

UNIDENTIFIED SPEAKER (CEM): If I understood you, sir, you change your hat from EDP to an organisation man?

STRASSMANN: Basically I believe that anybody who is preaching a topic should practise as he preaches; and that is exactly what I have done. I have tried, as part of my own personal self-development, in terms of career and scope and, if you please, job enrichment, to move from what I consider a function of a lesser scope to a function of a larger scope. This is certainly consistent with the "pull-down, push-down" philosophy. In fact I have pushed down one layer below me, the EDP function, as you have correctly observed. One of the major purposes of this morning's presentation is to pose the opportunity of going through the same transformation to each of you, because I believe, as you saw from one of the slides, that the EDP executive will end up working

for the administrative executive. So you are very correct in your observation.

BLUNDEN (Allied Irish Banks): Mr Strassmann, I'd like you to develop a little the distinction between the accounting function and the information systems function. Do you see the future relationship as a power struggle for political power in the organisation? Is it a conflict or a *détente*, or living together? What is your view in this area?

STRASSMANN: Well, this is a battle which was waged about five years ago in Xerox. You know, an accounting function is as much of a user as any other user; and they have complex issues of creating data bases for cost accounting and cost analysis, improved cash management and transfer of payment. They come in on the queue of demands for resources, like any other function. Once you create that kind of equilibrium of mutual respect or deterrent, as the case may be, I think that it's pretty straightforward, and you don't have the kind of power relationship any more. Accounting is equal among equals; and it should not be any other way.

BUTLER: But some are more equal than others.

STRASSMANN: They try to be that way.

BUTLER: A question from Virgil Myers of Diebold Europe. You have spoken about considerable investments and possibly a short-range increase in overhead. How do you cost justify these expenditures and what is the cash pay out time?

STRASSMANN: In the same way as years ago the only wealth that existed in the economy was land, and labour and certainly capital didn't matter, then with the Industrial Revolution you got labour as a factor of production, and certainly in the last hundred years capital became an important factor of production, the underlying economic tenet of what we're talking about here, that information is the fourth factor of production, and that information has to be managed and invested as a scarce resource, in the same way as your corporation manages capital. In Xerox, information investments go through a procedure which is analogous to what we call our CAR procedure (Capital Appropriation Review procedure) and all investments of a lifetime that are in excess of \$100,000 in fact are treated as capital, as a capital cash flow. I think that they have to take in their return on investment computations, which is the same discounted cash flow approach as we apply to any other investment, whether it is research, capital or facilities. I think that in that context you look at pay-offs. Because information is a fickle commodity and subject to very rapid obsolescence because of organisational and environmental changes, we right now have a cut-off for information investments below 36 months; and by and large we are trying to get our information returns back in 24 months or better. I am very happy to say that for 1975 we rationed our investments because we ate our inflation through productivity; so in terms of real dollars we in fact

remained constant, and the returns are very, very attractive. We have 30-month projects which don't get done, and they have to wait their turn. I think that is a very rational kind of environment, and certainly takes out of contention the kind of power struggles that take place when you administer your EDP budget with what I call the "pie-cutting" procedure.

I don't know whether you remember the fairy story about Ali Baba and the Forty Thieves, when they sat around the table and they were dividing the loot. There was always, "Two for you and three for you; and six for me. Two for you, three for you; and six for me". You remember that part; it was also done by Walt Disney and it was very graphic. Many of the budgeting processes in many corporations—and certainly I've been party to them in the last 20 years—are very much akin to the Walt Disney version of what happened to Ali Baba and the Forty Thieves; where usually the accountant took the six pieces of gold before anybody got two. I think that rationalising the process is really a way of making the budget allocation process a more rational one, as it befits this very important corporate resource.

HANUSE (Advanced Decision Making): I have three questions for you. First, you told us this morning that at present an EDP manager, controlling something like 0.5% to 3% of the total company costs, should become an information department manager as you have done, controlling something like 10% to 20% of total company costs. This afternoon you mentioned that those 10% to 20% were important, probably more important than any other costs in the company; and I quite agree with you on that point. My question is: could you guess how many of the DP managers should survive your programme? I should like you to make your forecast in percentages, please.

My second question is similar.

STRASSMANN: May I answer your first question? I will do it in real time. I would like every EDP manager in this audience who has within 25% even an inkling what the total administrative cost is of their organisation to raise their hands. One, two, three, four survivors. Five survivors. Not bad. Have I answered your question?

HANUSE (Advanced Decision Making): You are just answering my second question. You are probably based in the States and you have your operations there. My second question was: what for Europe? You have the answer yourself, so I will ask you my third question. How much for a complete release of your marvellous presentation?

STRASSMANN: The presentation that I gave this morning was a 45-minute version of a one-and-a-half-hour presentation which I originally prepared. I will release the entire text verbatim of the one-and-a-half-hour presentation immediately after this meeting. Our lawyers have allowed me to do so.

VANIER (Credit Foncier): So far, ADP has developed vertically; that is, we started handling problems of the administrative type; we went on to statistics and decision aiding methods. Then we had this stalemate of the management information system. Now I can't help wondering whether horizontal development of the kind that you are suggesting of the ADP system, that is to handle dictating machines and typewriters, is perhaps not the upshot of this stalemate which occurred. I must say that this prospect isn't a very attractive one.

STRASSMANN: Monsieur Vanier made an observation that the prospect of managing typewriters is not particularly attractive, but I should like to know from Monsieur Vanier what is the question that he is posing?

VANIER (Credit Foncier): The question, sir, is do you think that horizontal development of the job done by the ADP manager is more attractive than the vertical development of his job?

STRASSMANN: Let me say that I treated the discussion of Nolan, Withington and Benjamin rather superficially. You may recall that I pointed out that there is a whole set of stages of growth through which EDP has to move first; you cannot go from a primitive stage of EDP into horizontal expansion. I would say, Monsieur Vanier, that your observation is very astute and very proper. I would say that, all things being equal and considering the limited resources that you have available, the direction which Nolan, Withington and Benjamin points out for you should come first; in other words, your expansion should be vertical before it becomes horizontal. Therefore, I described to you a game which is not for companies that are satisfied for good reasons of economics to rest and stay arrested, maybe at stage 2 of development. Even with the Xerox family worldwide, since we have 140 operating companies, when you look at our

operations, say, in Kenya, or Ecuador, or Panama, where we have fairly small machines, the prognosis for those locations is that they are barely entering stage 1, barely learning the tabulating technology; and the chances are that with their volume and their complexity of operation, since they don't have manufacturing and they don't do procurement, they just do billing and sales support—that they will satisfactorily stay arrested at about ½% of sale at stage 2 of development, by Nolan's definition.

I'm very glad, Monsieur Vanier, that you raised this issue, because I want to make sure that I place my suggestion of horizontal expansion into a proper historical context; and suggest that only if you are either entering stage 4 or ready to leave stage 3 should you start giving consideration to horizontal expansion. Without that *caveat* and without that word of caution, possibly some of my remarks could be misunderstood and not taken in their proper context. By virtue of my position, I have to be able to operate in many national environments at various levels of economic intensity and importance of information systems. I am very glad that you brought up that question.

BUTLER: It seems to me that in any case an ending of vertical growth and a commencement of horizontal growth is part of the natural process of maturing. We have a number of other questions on the table; I fear that we will have to defer them all until the Meet the Speakers session, which will take place after the next presentation. I'm sure that there will be plenty of lively discussion during the Meet the Speakers session, but in the meantime, Paul, may I thank you on behalf of our audience for an excellent presentation, brilliantly delivered, and one which will start all of us thinking, even if we hadn't done so before, about what lies ahead for us all. Thank you very much indeed.