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The Changing Role of Data Processing in the Business Firm

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The Changing Role of Data Processing in the Business Firm

by

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This independent study submitted by Ernesto Rosado in partial fulfillment of the requirements for the Degree of Master of Business Administration from the University of North Dakota is hereby approved by the Faculty Advisor under whom the work has been done. This independent study meets the standards for appearance and conforms to the style and format requirements of the Graduate School of the University of North Dakota.

Faculty Advisor

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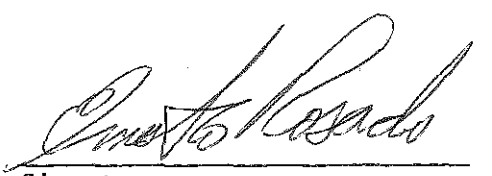

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CHAPTER 1

INTRODUCTION

BACKGROUND

Today's managers of the computing or automation resource are considerably different than those of a decade ago. Large organizations are hiring data processing managers whose technical capabilities are less prized than their managerial skills. The improvements in computer system through-put capabilities and the potential of these machines placed a high premium on the manager who was technically sound even if he or she was not an excellent planner or organizer, or even lacked the ability to achieve sound relationships in the rest of the organization. All that is changing now. What is wanted is a director of the computer resources, one that can speak the language of the managers. Because of this, today's managers must manage resource allocation differently than they did a decade ago to still be effective. There are a number of reasons for this change.

The clear and distinct boundaries separating the data processing function from the rest of the organization no longer exist. These were centered on the skill and expertise of the data processing staff and the rest of the organization. Data processing personnel are no longer automatically leaders of the change producing groups.

Data processing personnel were usually the people who took the lead in planning for new corporate automation activities. It is now common in most companies for the planning process, particularly as it relates to data processing technology, to be a shared one involving the participation of other functional areas and often including the presence of an outside consultant.

Another planning issue which has made the data processing managers somewhat reluctant participants in the planning process is the significance of the companies computerized management information systems to the essence of many companies existence. As a result, the management information systems planning function is frequently divided between data processing and other groups like the controller or other strategic planning personnel. The technical planning responsibilities which were once the responsibility of the data processing manager have been diffused and changed in order to assume sustained frequent top level usability.

As stated before, data processing managers are no longer the technical backshop wizards. They are taking on new and broader responsibilities and repositioning data processing in organizations so that it is more influential and more responsive to users business systems needs and executive information needs. The strategy of creating an information manager rather than a data processing manager in the company's organizational structure is an important primary role for data processing managers to assume in the decade ahead.

The very nature of information management requires that information managers be planners. Long lead times for equipment deliveries, systems development and hardware/software modifications requires advanced systems planning.

Systems people have always been agents of change. Their very work dictates that change will take place. Changes should be introduced with care and sensitivity because, to many, change is upsetting as it introduces the unknown and disrupts the status quo. At the same time, change is necessary. Information managers cannot simply sit back and react to requests for service. They must actively sell technology to the places where it will do the most good for the firm and not just where the discord is most vocal.

STATEMENT OF THE PROBLEM

The evolution from data processing to information management represents a merger of different fields that will change today's conventional organizational charts. The information manager must take the initiative in leading the merger of the firm's information resources, such as word processing, telecommunications, distributed processing, and many others. It is important this new role be taken on because someone in the firm is needed to run the information area. What information must a manager know?

It will not be enough simply to be responsive to user needs in the future. Information managers will have to be aggresive in taking the initiative to guide the firm's use of technology in seeking out opportunities to apply systems solutions to company problems, always keeping in step with corporate strategy. A pro-active change agent is quite different from the more traditional reactive approach followed by most systems organizations. In a reactive role we say, "To be simply

reactive is to give to the users the task of deciding how to best use the computer for the most benefit to the company."[1]

Being responsive to user needs is only half the task facing the manager of tomorrow. Being responsive to data processing resource problems and limitations is another dimension which cannot be neglected. Human resources, software and hardware resources, capacity planning, project control and forecasting future computer trends are just a few of the many problems a manager must face in order to keep his company competitive in the decade to come.

METHODOLOGY

This study was conducted in two phases: gathering of information and analysis of this information. Many articles address this subject as do many secondary sources of information. These sources are library books, business publications, business reviews, journals and magazines.

This paper will describe the different problems associated with an Information Manager. The information manager needs to look at different business areas associated with this important change. This study is limited in scope as it will not analyze all the areas of responsibility of a new information manager.

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[1]Ephraim Mclean and John Soden, Strategic Planning for MIS (New York: Wiley, 1977), p.65

CHAPTER 2

HUMAN RESOURCE MANAGEMENT

"Our most valuable natural resource weighs three pounds and wakes up at six in the morning. The human brain..."[2]

Thomas Roosevelt Jr. said in his article, "Managing the Psychological Contract,"

> The number of systems professionals in the corporate information management function of one large multinational company has been 25% below the manning table for over two years. The director of systems and several of his senior managers spend hours each week in the search for and evaluation of potential systems professionals. Employment search firms are a primary source of new staff professionals at a cost of 20-25% of first year earnings. Managers in user divisions are concerned about the level of systems support they receive. Some user divisions have employed systems professionals because of dissatisfaction with systems staff support from the corporate information management function. User divisions have purchased minicomputers and employed time-sharing services. Salaries of systems professionals have been bid up faster than the salaries of most other corporate staff employees. A sizeable budget has been allocated for employee development. Management in this corporation's information function must take time every day for staff assignments and training because of the percentage of inexperienced staff professionals.
>
> This is just a small list of human resource problems confronting information management directors. The critical shortage of competent computer personnel is a major factor in the creation of backlogs, which are now two to three years in most companies. Employee turnover is at 30% and increasing at a rate of 28% a year! At this rate, half of the employees at an average data processing site won't be there in two

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[2] Roosevelt Thomas, Jr., "Managing the Psychological Contract," Harvard Business School Publication 9-474-159, January 1978.

> years! Management must find strategies that will handle both the acquisition and the retention of these scarce human resources.[3]

A more efficient management system is needed to deal with these problems. Several large companies have come up with a "staff management system" as a step in trying to solve these problems. A description of the staff management system is as follows: "a set of integrated building blocks used to attract and retain qualified professionals that spans recruitment, skills identification, job assignment, staff development, performance evaluation and remuneration."[4]

> Under recruitment the staff management system's tasks may involve one or all of the following: 1) the establishment of a network of contacts with faculty and placement officers in universities with strong data processing science programs 2) the use of referrals from company employees accompanied by some type of monetary reward for the employee 3) recruitment brochures of advancement opportunities 4) well advertised open house programs 5) attending job fairs as an attempt to attract potential candidates 6) advertising not only in local media but in distant cities in order to attract people in moving into your geographical area. Many more techniques are available but these few serve as a good basis with which to begin a sound and successful recruitment strategy program.[5]

The staff management system must also realize the development of a skills inventory and an assessment of personality attributes for each staff position can contribute significantly to improved person-job matching. In order to achieve this, one must define the key results expected in the job. All positions should have a complete job

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[3]Ibid.

[4]Peter F. Drucker, The Effective Executive (New York: Harper & Row, 1967), p169.

[5]Ibid.

description. This way both the employee and management can work with a common denominator in evaluating both jobs and personnel.

Senior data processing people should have young trainees assigned to them to help develop their technical skills, in hardware, software and documentation. The senior data processing person should also help develop a sense of organizational assimilation, such as power, job expectations, key factors in the improvement of performance and user characteristics.

Staff development is one of the most important tasks of the staff management system. Once the desired personnel have come "on board," it is of utmost importance to keep them thereby reducing turnover costs. Education and on-the-job learning are two of the most important factors to the data processing professional. Some of the strategies a company may employ to effectively train their personnel and at the same time not misuse giant quantities of their training budget are as follows: attendance at technical and management seminars should be scheduled for those who would most benefit from it and should not be left to choice; popular topics and lecturers can be hired to give in-house seminars for a fraction of the cost it would take to send the same amount of people to a seminar. Popular independent study guides have now hit the market making education a much more feasible option. Some of the more popular videotape training sessions are SDI, DELTAK, ASI and IBM.

The staff management system must also bear the responsibility of establishing guidelines and strategies for performance evaluations. One good basic strategy is to establish a management by objective contract between the employee and their manager. Thereby the employee has something to shoot for and be measured by.

The acquisition of technical skills, the meeting of job objectives, the rate of knowledge assimilation, interpersonal abilities, and management talents find their way into performance appraisals, and these, in turn, are used to guide salary reviews and promotion decisions. The staff management system function should also conduct surveys at least once a year. It should be noted that the organization is continually competing with other companies for the best data processing professionals and these should not be allowed to slip away, if possible.

No discussion of human resource management would be complete if one did not recognize the importance of managing the peoples' time efficiently. It is understood that the three most important principles of management are planning, organizing, and managing time. A strategy must be developed for managing their time more effectively. Managing their time better will not only increase their productivity but also that of their employees. The following list establishes the basic principles needed for effective time management. The list is taken from "Managing a Manager's Time:"[6]

1 self-motivation is the key

2 time management is but a disciplined self-management

3 apply the basic principles of management to yourself

4 set priorities and review your workload everyday

5 practice fire prevention, not fire fighting

6 organize your job, yourself, and then others - in that order

7 delegate - never do anything someone else should and can do

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[6]William R. Synnott, "Managing a Manager's Time," Association for Systems Management Conference Proceedings, Washington, D.C., 1977, pages 131-145.

communications will eat up two-thirds of your time - so be good at it

avoid meetings if possible - send someone from your staff

read smart - see how necessary the demands are, how they may be merged with similar requests, try to anticipate future demands

increase your planning and thinking time

identify the time thieves in your life and try to cut down on them

CHAPTER 3

CAPACITY MANAGEMENT: SEGREGATING AND SETTING USER REQUEST PRIORITIES

Projects are running overdue, both in time and money. User requests are backlogged. Which ones should be done, which should be put off? These are but a few of the problems facing information managers in terms of satisfying a company's growing need for information.

Developing an effective strategy in dealing with requests is of utmost importance. The manager has to ensure that the department has enough resources on hand to process a given amount of work within desired service objectives. In other words, the manager must be able to ensure the user that his department can do the job well and cost-effectively without forgetting to provide dependable service to all users.

However, with today's rush environment, such planning and control is put aside to fight new "fires." Individual ambitions are often put ahead of sound corporate objectives. Requests are done based on how much political influence the user has within the company or how many resources are to be tied up by certain requests. Corporate goals and objectives should be pursued, and fire-fighting should occur only when inevitable. Studying requests will help the manager understand the working relationship between different user departments. This might enable the manager to merge several requests into one or establish

effective communication between two departments that are going in the same direction but are taking different roads. Following company objectives may, at times, seem difficult to achieve but the use of a long term plan is essential as a guideline for this purpose.

Capacity management is an important management procedure, both for data processing and for the users of its services. A useful definition for capacity is "that amount of plant, machinery and equipment with which management expects to operate a business. From an operating point of view, it also includes personnel employed to conduct the business."[7]

Corporate planning provides data processing with a work plan and a set of service level objectives with which to measure resources. A technical specialist and financial analyst work together to execute the capacity management procedure. For example, they might produce performance projections, hardware and staff plans, budgets and capital requests.

This view of capacity management is taken for two purposes: a) in implementing a capacity management procedure it is helpful to tie it in with the rest of the data processing planning process and b) it is accepted that capacity management is related to budgeting and costing, and implementing it with that context in mind aids in cost/performance analyses.[8]

From a functional view point, capacity management can be viewed as a procedure that controls the variables within the physical process

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[7]Barry Stevens, "Capacity Management and DP Planning: A Basic Approach," Computerworld, September 7, 1981.

[8]Ibid.

called data processing. Changing those variables affects the way data processing behaves. The basic variables involved are different work flows through data processing, utilizing a certain level of resources. That utilization, together with other factors, creates a set of service levels for the work load. Service levels are then divided into timeliness, accuracy, cost and reliability.

Therefore, capacity management can be broken down into several tasks:[9]

1) identifying and measuring the resources to be included in capacity planning
2) identify, characterize and forecast the work load to be processed by those resources
3) identify service levels to be delivered from those resources, and project them during the capacity management process
4) compute the costs of providing the specific levels of performance desired.

By controlling the amount of resource available to process the work load, capacity management controls the service levels provided by those resources.

Various work load measurement and characterization techniques may be used to aid in this portion of the effort. Next, simulation or analytical methods are used to make performance predictions. Finally, the resulting system of methods is used to arrive at satisfactory work plans, resource plans, expense budgets and performance predictions for data processing.

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[9]Ibid.

The data processing work plan should contain all items for which resources will be required.[10] This includes development activities as well as operations. There are two major categories of work on the work plan: external items, related directly to the work submitted by any users of the data processing facilities, and internal items, related directly to the way in which data processing has chosen to run its business.

Each group of resources included in the capacity plan must be identified and specific details about them determined. Each work center should contain one type of resource (tape drive, people, hardware, etc.), have one point of administrative control and have at least one nonambiguous measure of its use. Using this approach one would measure people work centers in hours; CPU time is measured in hours; disk time in cylinders or blocks; storage in blocks, kilobytes or kilowords. The number of resources in each work center should be determined, along with the capacity of each unit of resource to perform work. The number of units times the capacity of each is the capacity of the work center. This data can usually be obtained through interviews or analysis of available policy or operational information.

The variable, fixed and overhead expenses should also be noted for each work center to complete a cost/performance analysis. It is necessary to treat cost information at the work center-level for this analysis. In that way, as a specific resource is changed to improve performance, the cost of that change can be quickly and simply related to work center expense and total organizational expense data.

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[10]Ibid.

For example, variable expenses are those that depend directly on the number of resource units within a work center. These could include the monthly cost per person for telephone expenses, salary and benefit costs per person and other similar resource-related costs. Fixed costs, on the other hand, would be those that do not depend directly on the number of resource units, such as fixed monthly charge for facilities or supplies. Overhead costs are those that are apportioned to the data processing department from other organizational functions, such as personnel or maintenance services.[11]

Resources within each work center are divided into tasks or activities. These tasks are referred to as work units. For each work unit, an average, or standard value should be determined. These averages will be used, together with the data processing work plan, to compute the number of resource units needed in each work center. This method has proved more than adequate in the planning of overall resource needs. However, work load characterization and simulation techniques should be used in detailed work and configuration analysis. They can determine peak-to-average ratios, identify performance groups, link them to entries on data processing's work plan and project service levels expected from the organization. Data needed to determine standard values is usually available from a number of sources. In people work centers, average time per task may be determined using project management reports, personnel summaries and some measurement data on overall system performance.

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[11]Garrison, Ray, Managerial Accounting (Ontario: Irwin-Dorsey Limited, 1979).

Once the basic work plan has been defined and the work centers and work units identified, those internal activities must somehow be linked to the items on the work plan. This produces a detailed description of each type of work and the resources required by it called application units. These are used to describe all work of the data processing department, whether external or internal.

After the work plan is defined and the link is made between items on that plan and internal data processing resource use, the volume to be expected from each work plan item must be defined. Volume estimates for the data processing related items on the work plan are obtained from internal data processing sources, such as job accounting summaries, production schedules, documentation or development groups and other support personnel within data processing. Items that are in user terms are reviewed with the users, who in turn provide volume forecasts.

After the data has been gathered, the job of computing the number of resource units begins. For every entry on the work plan and for each month in the forecast, the expected volume is used as a multiplier for each work unit included in the definition of the item on the work plan. Finally, the standard costs or prices for work units can be added together in the application unit definitions to provide a unit cost or price in "user unit of work" terms. These numbers will give the users cost and performance information that can be used in their own planning and budgeting cycle and in strategic planning for the rest of the firm.

Once resource counts in each work center have been determined and work center utilization computer, service levels must be estimated. Average service levels may be determined directly from basic work load

and utilization information. Although average times and static analysis will be adequate for general planning purposes, more detailed analysis is needed to predict actual times in the face of work load peaks and configuration problems. Such analysis will yield additional amounts of resources which must be made available to handle a specific problem. The basic resource computation and budgeting activities can be used together with service level projection methods to analyze specific alternatives for work load configuration and to arrive at cost/performance trade-off information.

As one can see, a capacity management system can become a powerful strategical planning tool for data processing management[12]. Specific work plans can be developed and "run through" the system to determine resulting resource plans, costs and performance. Technological changes can be tried out by making appropriate changes to work load descriptions, resources and expenses, then using the system to produce cost, plans and performance data.

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[12]Barry Stevens, "Capacity Management and DP Planning: A Basic Approach," Computerworld, September 7, 1981.

CHAPTER 4

HARDWARE AND SOFTWARE DEVELOPMENT AND THEIR EFFECT ON MANAGEMENT

"The single factor most affecting how companies will be managed in the 1980s will be technology..."[13]

The driving reason for the growth in minicomputers and the accompanying trend toward distributed processing is largely economics. Users want their own computers in order to have more control over their own destiny and to get out from the unresponsive centralized support.

Minicomputers and distributed processing have become even more enticing due to the technological breakthrough of the "chip." Because of the "chip," hardware costs have been dropping by a factor of ten every five years! Memory costs have been halving every two years. Therefore, it can easily be determined that increased speed and memory at lower costs is the main contribution of "chip technology."[14]

One cannot continue to talk about technological advances without studying the impact of these advances on the information managers. How will these advances affect the productivity of the data processing employees and their managers. Productivity is obviously a great concern to management at all levels. However, in the last ten years, it has decreased to an average of 1.5%! With computer technology

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[13]James Martin, The New DP Environment and How to Design for It (Toronto: James Martin Services, 1979), p1.

[14]Ibid.

taking leaps and bounds the data processing manager faces a stern task when confronted with improving productivity under such circumstances.

A productivity strategy for an information manager is one which results in increased investment in automation and systems research, to exploit technological gain by applying technical capabilities to company needs. While computing capability has been improving at a rate of 15-25% per year, memory costs dropping 30% per year and communications costs dropping 11% per year, personnel costs have been rising inexorably, with inflation, by 7-10% per year. What is the inevitable conclusion of this trend? Users will be motivated to seek more computing power and more communications capacity in order to hold down growing labor costs. Computing will continue to replace labor because automation equals productivity!

Information resource managers need to perceive each coming change, recognize its impact on their business and products, and exploit it to their advantage. The success of a productivity strategy will depend upon the ability to perceive the change and exploit it. To use emerging technologies and products successfully will require: 1) awareness of business needs and 2) an awareness of technological capabilities.

The information manager will need to seek out new automation fronts where computers can replace labor or increase the volume of it. For example, office automation represents an opportunity to increase productivity, microprocessor developments will permit the automation of smaller and smaller functions within a business. These and many other trends will represent opportunities for alert managers to exploit emerging technological trends by matching them to company needs and

thereby increasing the productivity of their companies, which translates directly into bottom-line performance through better cost control.

While the cost of hardware continues to drop, the cost of software continues to climb. The reasons for the rise are a combination of lower hardware costs, higher labor costs, and the greater sophistication and complexity of today's systems.

Probably the biggest barrier to automation in the 1980s will be programmers! The shortage of skilled programmers coupled with an ever increasing demand for application programs is creating a widening gap between what is needed and what can be delivered. The demand comes from two sources: new development and maintenance. It is easy to see that the burden is being increased by the necessity to rewrite systems every five to seven years. The upshot of all this is that in the 1980s, there will not be enough programmers to use the power of the computers produced.[15]

Several steps can be taken to help shorten this ever increasing gap. The hiring of contract programmers will certainly be on a rise. Skilled contract professionals will prove very valuable to a company's immediate needs. The increased purchasing of packaged systems is another step. Most packaged systems are almost always cheaper to buy than to develop. This is an excellent way to cut costs and still achieve the same objective. Perhaps the most promising answer of all is to increase direct end-user interface with machines, bypassing the programmers all together, especially for maintenance operations. We are rapidly moving toward the day when most people will be in

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[15]James Martin, The New DP Environment and How to Design for It. (Toronto: James Martin Services, 1979), p2.

programming or computer related jobs. Thus, the programming burden will have, in effect, been automated. The use of more package programs will reduce development work and the use of user-oriented languages will reduce maintenance work. A premium is being placed today on reducing the time and the costs involved in systems development. Therefore, one must remember that as the need for programmers grows people-related costs will demand an increasingly high percentage of the budget.[16]

> Alvin Toffler says there are five good reasons to consider buying software today, when feasible, rather than development: 1) rising development costs 2) scarce resources 3) time pressures 4) increasing demand for automation and 5) increased package availability.

> The following table summarizes the pros and cons of purchasing software packages and developing the same:

PROS	CONS
Build:	Buy:
get custom-tailored product	modifications often extensive
get state-of-the-art system	system may not be state-of-the-art
integration with other systems	integration more difficult
system familiarity-easier maintenance	more difficult to maintain
Buy:	Build:
lower costs	higher costs
less development time	longer development time
frees scarce resources	hard to get needed resources
system proven and tested	more debugging needed

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[16] Ibid. Pg. 17

Information resources are the most valuable category of corporate physical assets. Human resources are the only category of asset that has a higher value. The importance of information resources as a corporate asset has been recognized only in the last few years. Information management must keep abreast with all the changes if their corporations are to maintain their competitiveness. Information management is also seeing the arrival of the "user roundtables." This new strategy puts pressure on the data processing manager to keep up-to-date with other companies in the same market. For example, most major banks in the United States belong to one of several "user roundtable" groups which meet periodically to exchange views and information in what they are doing in various areas of banking activity. The rapidly growing international banking business, coupled with technological advances in recent years, has led to a corresponding interest and growth in international systems planning and development. A simpler and less formal "user roundtable" was recently formed in Boston for the purpose of exchanging research and information on office automation planning.

All told, data processing managers have their work cut out for them in the 1980s. Keeping abreast and anticipating hardware and software trends seem to be the key words here for success.

CHAPTER 5

PROJECT SELECTION, CONTROL AND MANAGEMENT

The current laws of project selection, control and management taken from Harrell Clayton Jr. in his article "Project Management Systems" are:[17]

1) a project not worth doing is not worth doing well
2) a carefully planned project will take only twice as long to complete as expected
3) a project will progress to 90% completion, then remain 90% complete forever
4) if project content is allowed to change freely, the rate of change will soon exceed the rate of progress
5) when things appear to be going better, you have overlooked something
6) any attempt to debug a system will simply add new bugs
7) no major project was ever developed on time and within budget, your project will not be the first.

There are many reasons for poor project management and for project overruns. Four major contributing culprits are that: 1) project management is not an exact science 2) cost estimates are generally made prematurely 3) too many projects suffer from loose management control and 4) poor definition by users results in bad specifications, leading to frequent requests for changes.

Systems people are often required to estimate project development costs too early to possibly be accurate. Moreover, the scope of the project being estimated is often much too large, which contributes to a bad estimate. This is like trying to judge the size of an iceberg by its tip; one needs to see much more of it come out of the water before one can judge with any accuracy. To compound the problem, many

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[17] Clayton Harrell, Jr., "Project Management Systems," EDP Analyzer, September 1976.

estimating techniques are inherently poor because of three primary factors: 1) there are no standard guidelines in the industry 2) there is inadequate accounting for uncertainty and 3) management tries to underbuy and systems managers often undersell, because they are unsure of their estimates, because they assume that all will go well, because they desire to accommodate, or simply because they are just plain optimistic.

A technician is a doer, a manager is a manager of doers. When project managers allow themselves to become so immersed in the technical aspects of the project that they are no longer managing the effort, then the basic principles of management (planning, organizing, staffing, directing and controlling) are not being addressed properly.

Systems projects are usually funded by the users, who have authorized the expenditures for new or improved computer applications. Users only rarely have a clearly detailed idea of what they want from a systems project. The front end of a systems project requires significant amounts of time from users if the project is to be well specified. Two to three year backlogs for systems projects are common in large companies today. Forecasting of the future business activities of users to be served by new systems projects is a very difficult task. Changes requested by users partway into a systems project are a major source of project cost and time overruns. The failure to specify user needs correctly is one of the most serious sources of project failure.[18]

The business information planning phase includes preliminary research, project identification, definition and scope.

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[18]Ibid.

The proposal phase, sometimes referred to as a feasibility study, has as its main objective the understanding of the user's problem. It is proposed that the project manager have two arms: the "systems representative" and the "user representative." The systems representative should be responsible for the technical efficiency of the system throughout the project and is assisted by other systems personnel assigned to the project. The user representative should be responsible for the system's effectiveness and is assisted by other specified user personnel. A critical decision in this strategy is the selection of the key user representative. This should not be a junior-level person. The user representative should be high-level, thoroughly knowledgeable about the user's business and needs, and committed full time to the project for its duration. The desired person is probably the one who will have to make the new system work once installed. One will know if one has the right person when his or her name is suggested for this long-term, full-time assignment the department head will scream at the very suggestion. If so, you have the right person; if not, you have the wrong person.

After the systems representative and the user representative have been designated, the rest of the team can be put together. The user representative can conduct a thorough analysis of the present system and develop the requirements for the proposed system. The systems representative should have primary responsibility for evaluating alternative system solutions and selecting the best alternative.[19]

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[19]Ibid.

The objective of the functional design phase is to describe the new system in terms that the user can understand and accept. The functional design document is a major document prepared by the systems representative. The document might include a general system definition, list of all files, hardware requirements, output reports, control, backup and security consideration.

Whereas the functional design describes what is to be done, the detail design describes how it is to be done. This and the succeeding two phases should be primarily a systems representative's responsibility, with little or no user involvement. The user representative should review the work done by others and continue to balance off the cost of information with the value of information. The users must begin work on a user operations manual, and prepare test data for systems testing.

Detailed design results in each element of the system being designed, detailed and accepted by systems management. Programming can proceed rapidly from this point, giving real visibility to the system for the first time. The systems representative can monitor the accuracy, efficiency, and completion of all program codes. Following progress and target dates closely will help make project dates feasible.

The systems representative and the user representative begin to work more loosely together again as conversion nears. The systems representative conducts systems integration testing and tuning to ensure that all the pieces fit together and work as a system. After the system is successfully converted, the project can be closed, and a maintenance project can be opened to handle ongoing support and the resolution of "bugs."

Project managers who are successful encourage postaudits; those who are not avoid them. Evaluation after the fact has several important benefits: 1) people hopefully learn from mistakes 2) the quality of future work is improved 3) evaluation leads to better future utilization of resources and 4) the success of projects is communicated to management for good "pr."[20]

Project life cycle standards, with heavy user involvement, can be invaluable to successful project management. Benefits include easier program maintenance (due to good documentation); easier transferability of work and people; consistent management review of checkpoints, which is ensured by standard project structure and easier training because the standards become part of the in-house education program. The scheduling of tasks within each phase between the systems representative and the user representative guarantees strong user involvement throughout the project, assuring a high probability of success.

In considering project costs, we are concerned with two factors: development costs and return on investment. Much project estimating is done the way some backwoods people weigh pigs; by balancing a porker on a teeterboard with rocks and then, when the board is even, estimating the weight of the rocks. A major reason for underestimation is estimating too early in the process.

Estimates given before the facts are known to be less than worthless, because they can be permanently damaging to a systems professional's reputation. Accurate estimates cannot be made until the

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[20]Ibid.

functional specifications have been completed. It is estimated that 5% of a project is needed for a feasibility study and that 15% is needed for the detailed functional requirements. Therefore, 20% of the work is needed before a good estimate can be made. To combat the problem of early estimating, we suggest the adoption of phased estimating based on specific deliverables using the following 50-20-5 rule: the phase zero deliverable is a written problem definition which produces a rough cut estimate of the project which has an accuracy expectation of no more than 50% The phase one deliverable is the feasibility study, or the proposal. The proposal makes possible an increase in precision because it develops more and better information on the proposed project. The analyst's estimate after the proposal should be accurate to within 20%. The phase two deliverable should be written, signed-off, functional specifications of the system. It can be detailed enough to give a fixed cost for implementation, which should be accurate at this point to within 5%. The 50-20-5 rule can work for all but multimillion-dollar projects.

Much of the poor performance in systems development in the past, and probably most project slippage, can be attributed to oversized projects. As stated before, the reason for such failure is obvious; such projects are too complex to grasp. As a result, there is more likelihood of underestimating the project's scope, of forgetting certain activities, or being fuzzy about requirements. A good strategy to help combat this fallacy is that of the "iceberg theory." The one-year iceberg rule can be effective in breaking down large tasks into easy-to-manage subprojects. The first law of the strategy is that 7/8 of what is there cannot be seen. The strategy deals with breaking down

an iceberg into many smaller icebergs therefore, big projects into smaller subprojects. The one-year iceberg rule says that no project will be undertaken unless it can be brought out of the water within one year. If it will take longer, it must be broken down further into free-standing subprojects. In theory, work moves in a straight line from project start to project to project end. In practice, long elapsed times cause the project's progress to sag. As the project nears completion, slippage creates a crisis, and a major effort is made to pull the project back up to the original schedule. When a project is broken down into subprojects, shorter goals can be established, minimizing the "sag" phenomena.

In summary, the benefits of the one-year iceberg rule are that:[21]

1) the project is easier to comprehend and therefore, can be planned more accurately
2) there are few gaps in systems design
3) scheduling is easier with the use of short intervals
4) there are fewer changes in requirements specifications during development
5) there is less turnover to affect project progress and
6) management sees results faster.

This topic cannot be terminated without discussing the elements of risk involved in project selection. Let us refer to it as a portfolio approach to data processing projects. For example, the following case studies will help shed some light on this new strategy for helping to reduce the element of risk for project management.

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[21] Ibid.

A major industrial products company discovers one and a half months before the installation date for a computer system that a $15 million effort to convert from one manufacturer to another is in trouble, and installation must be delayed a year. Eighteen months later, the changeover has still not taken place!

A large consumer products company budgets $25,000 for a new computer based personnel information system to be ready in nine months. Two years later, $2.5 million has been spent, and an estimated $3.6 million more is needed to complete the job! The company has to stop the project.

A sizeable financial institution "slips" $1.5 million over budget and twelve months behind on the development of programs for a new financial systems package, vital for the day-to-day functioning of one of its major operating groups. Once the system is finally installed, average transaction response times are much longer than expected.

It is suggested that there are three serious deficiencies in practice that involve both general management and data processing management. The first two are the failure to assess individual project risk and the failure to consider the aggregate risk of the portfolio of projects. The third is the lack of recognition that different projects require different managerial approaches.

The typical project feasibility study covers exhaustively such topics as financial benefits, qualitative benefits, implementation costs, target milestones and completion dates, and necessary staffing levels. Only rarely, however, do they deal frankly with the risk of slippage in time, cost overrun, technical shortfall, or outright failure! Rather, they deny the existence of such possibilities by

ignoring them. They assume the appropriate human skills, controls, and so on, will ensure success.

By risk one can suggest exposure to such consequences as: 1) failure to obtain all, or even any, of the anticipated benefits 2) costs of implementation that vastly exceed planned levels 3) time for implementation that is much greater than expected 4) technical performance of resulting systems that turns out to be significantly below estimate and 5) incompatibility of the system with the selected hardware and software.

These kinds of risk in practical situation, of course, are not independent of each other; rather, they are closely related. At least three important dimensions influence the risk inherent in a project:[22] 1) the project size - the larger it is in dollar expense, staffing levels, elapsed time, and number of departments affected by the project, the greater the risk. A related concern is the size of the project relative to the normal size of a systems development group's projects 2) experience with the technology - because of the greater likelihood of unexpected technical problems, project risk increases as familiarity of the project team and the data processing organization decreases with the hardware, operating system, data base handler, and project application language. A project that has a slight risk for a leading-edge, large systems development group may have a very high risk for a smaller, less technically advanced group. Yet the latter group can reduce risk through purchase of outside skills for an undertaking involving technology that is in general commercial use and 3) project structure - in some projects, the very nature of the task defines

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[22]Ibid.

completely, from the moment of conceptualization, the outputs. Such schemes are classified as highly structured. They carry much less risk than those whose outputs are more subject to the manager's judgment and hence are vulnerable to change. The outputs of these projects are fixed and not subject to change during the life of the project.[23]

In addition to determining relative risk for single projects, a company should develop an aggregate risk profile of the portfolio of systems and programming projects. For example, in an industry that is data processing intensive, such as banking and insurance, managers should be concerned when there are no high-risk projects. In such a case, the company may be leaving a product or service gap for the competition to step into. On the other hand, a portfolio loaded with high-risk projects suggests that the company may be vulnerable to operational disruptions when projects are not completed as planned.

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[23]John Toellner, "Project Estimating," Journal of System Management (May 1979), p8.

CHAPTER 6

COST-BENEFIT ANALYSIS FOR INFORMATION MANAGEMENT

Cost-benefit analysis can help data processing managers make decisions regarding computer hardware, software, and operations. A good cost-benefit analysis provides quantitative and systematic data for comparison of two or more data processing alternatives.

Cost-benefit analysis systematically estimates and compares the costs and benefits of any undertaking. A cost-benefit analysis can be conducted to decide how to allocate scarce data processing resources among competing demands to choose among given alternatives for accomplishing a particular task to audit existing operations to determine their payoffs and to provide quantitative support for a decision already determined politically.

The following guidelines should be established before setting up a cost benefit analysis 1) establish a purpose - the analysis must have a well defined goal 2) establish a time period - an analysis can be conducted before a project to determine whether and how to conduct the project, during a project to assess progress, or after a project to evaluate results 3) scope determination - a cost-benefit analysis must evaluate the full range of costs and benefits and 4) decision criteria - the tests or decision rules to be used to select the best of several alternatives should be clearly defined. These guidelines must be considered before conducting a cost-benefit analysis because they

determine the types of data collected and the analytical procedures used.

A cost-benefit analysis should be performed in five steps 1) selecting an analyst 2) identifying valid alternatives 3) identifying benefits and costs 4) comparing alternatives and 5) applying a decision criterion.

Selecting a qualified analyst can come from several sources. Members of the in-house staff can be analysts, however, because the activity requires considerable technical skill and judgment, capable individuals might not be available within the organization. Another alternative is to hire an outside consultant. Qualified consultants can be well worth their costs.

Identifying alternatives involves reviewing the objective to be accomplished and determining which of the available alternatives should be analyzed in detail.

The identification of benefits and costs may appear simple, however, aside from the most obvious effects of a project, benefits and costs are often difficult to articulate. Cost determination involves identifying and assigning values for the resources required to implement an alternative. Outside resources are easily assigned values because they have a market price. In-house expenditures can be more difficult to determine and value. Market prices for these expenditures may not be available, and the indirect costs of internal resources can be difficult to establish.

Three steps are involved in comparing alternatives 1) normalizing costs and benefits 2) discounting costs and benefits and 3) calculating present value. Normalizing costs and benefits involve converting to

common measures for calculation and comparison. This usually entails expressing all costs and benefits in dollars. Dollar costs and benefits are easiest to use when market values are available or can be estimated from information collected on the prices that users will pay for data processing services. When market guidance is unavailable, surrogate values can be established by noting the economic impact of a particular alternative on a project or system. Another approximate value that can be used to determine benefits and costs is the impact of an alternative on the environment outside the immediate objectives of the project. Discounting costs and benefits is necessary to account for the time value of money during the life of the alternative being evaluated. Discounting requires use of a discount rate, a percentage that approximates the cost of capital to the organization. The cost of capital represents the interest costs of return on investment to equity owners of a private business. Cost of capital also depends on the risk factors of the individual company. Discount rates vary according to levels of risk. Calculating present value applies discount rates to decisions. It compares adjusted benefits to adjusted costs using the following equation:[24]

$$\text{Present Value} = \sum_{t=1}^{n} \frac{at}{(1+d)^{t}}$$

where "d" is the discount rate, "n" is the number of time periods until benefits are realized and "a"$_t$ is the future benefit or cost value

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[24]Litecky, Charles. "Intangibles in Cost-Benefit Analysis. Journal of System Management (February 1981): pp 15-17.

[25]Ibid.

occurring in the t^{th} period. To calculate present value of a project, a modified equation may be used:

$$\text{Present Value} = \sum_{t=0}^{n} \frac{Bt - Ct}{(1 + d)^t}$$

where "d" is the discount rate, "n" is the life of the project in time units, "Bt" is the value of benefits in period "t," and "Ct" is the value of costs in period "t."

The Present Value calculation can be illustrated by assuming a discount rate of 10% for a four-year project with an initial cost of $50,000. The project is expected to provide benefits amounting to $4,000 for the first year, $17,000 for the second, $22,000 for the third and $52,000 for the fourth. Fixed costs of 5000 per year will be also present. The figures can be calculated as follows:

TABLE 1

PRESENT VALUE[26]

d = 10%

t	Bt	Ct	(1 + d)t
0	0	50,000	1.000
1	4000	5000	1.100
2	17,000	5000	1.210
3	22,000	5000	1.331
4	52,000	5000	1.464

$$PV = \frac{-50,000}{1.000} + \frac{-1.000}{1.100} + \frac{12,000}{1.210} + \frac{17,000}{1.331} + \frac{47,000}{1.464} = \$3884.45$$

[26]Ibid.

At a discount rate of 10%, the project has a net present value of $3884.45.

Selection of a comparison criterion deserves special consideration. There are five possible comparison criteria 1) maximize benefits for given costs 2) minimize costs for a given level of benefits 3) maximize the ratio of benefits over costs 4) maximize the net benefits and 5) maximize the internal rate of return on investment.

Several important cost-benefit problems must be considered before performing an actual cost-benefit analysis. These are the incomplete identification of alternatives, the cost accounting problems, the problems with assigning benefits, the cost of cost-benefit analysis and the problems concerning practical realities such as the political environment.

The identification of alternatives is a difficult one that can be divided into two parts. First, identifying the many alternatives is a difficult chore. These are often too numerous and varied for one person to comprehend. The cost of searching for alternatives must be balanced against the danger of overlooking an important alternative. The second aspect is incomplete identification of acceptable performance levels among the alternatives.

In data processing cost accounting, one finds that full costs for certain expensive and crucial cost components are difficult to allocate equitably among different users and jobs. For example, some of the common problems might be: double counting, omission of costs, hidden costs and spillover effects.

Many analysts view determining and measuring benefits as the greatest obstacle to performing an information systems cost-benefit

analysis. Problems also arise from the difficulty of assigning consistent and comparable value to benefits.

Measuring benefits becomes even more complicated in multi-user environments, where opinions about expected benefits may vary among user groups. When a cohesive group of users accrue benefits, measuring benefits can be more difficult. If the users agree on the expected benefits but disagree on their value, an average can be used. If users claim different benefits, the net benefits of each proposed user can be summed and the total net benefits summed for the group. If double counting of benefits is avoided, this method will provide a rough estimate of the group's expected benefits.

Charging users hard dollars for services received can create a useful market-like environment that can help determine the value of benefits. Users can be given a cost breakdown for the alternatives that affect their use of the system and can judge whether the various alternatives are worth the price. As long as they pay with their own funds, users will prefer the most cost beneficial alternatives.

Intangible benefits present a particular problem for the cost-benefit analysis. Intangible benefits present a particular problem for the cost-benefit analysis. Intangible benefits are much more difficult to quantify in such normalized terms as dollars. They may or may not accrue in the levels predicted, and to whom and in what ways they ultimately will accrue is often unpredictable. The following strategy makes the consideration of intangible benefits more useful. First, with tangible benefits firmly established, best-case/worse-case boundaries can be set on what the intangible benefits might add. Second, a trade-off comparison can be performed among the intangible

benefits for similar levels of tangible benefits. Third, a sensitivity analysis can be conducted with some best-guess values on intangible benefits can be applied in turn to the evaluation to gauge their effect on the decision.

Finally, a break-even analysis can determine the value that must be attributed to intangible benefits for a project to be viable. Intangible benefits are weak supports on which to base a rational judgment. In most cases, intangible benefits should be mentioned as a context for the analysis, but they should not be used in the equations of the analysis itself.

Everyday realities are easy to see, but their effect on cost-benefit analyses is not always easily perceived. Care must be taken to place every cost-benefit analysis in proper perspective and to explain that it is only one input into any decision. In addition, allowances must be made for the shortcomings of analytic techniques applied in real settings, and the analyst must be sure that those who use the analysis understand what allowances have been made.

When projections of costs and benefits are inaccurate, the pattern tends to be predictable. Costs are almost always underestimated while benefits are too often overestimated. Runaway costs seen endemic to major development projects. This simple observation implies that costs are difficult to control and benefits are difficult to achieve. A rule of thumb employed by some organizations is to double all costs projections before entering them into the final report.

Finally, the political environment of the organization is one of the most important practical realities affecting cost-benefit analysis.

Much to many cost-benefit studies have been conducted only to provide a political point, either that a system saves or wastes money or that it should be expanded or eliminated.

The cost-benefit analysis worksheet should be a standard, formal document, and return on investment calculations should always be based on present value accounting over the life of the system. Without a standard method, there is a temptation to justify projects solely on the basis that future benefits will pay back the original investment.

CHAPTER 7

CORPORATE STRATEGY AND INFORMATION RESOURCE PLANNING

Approximately twenty-five years ago, consultants at a Big 8 accounting firm and a major industrial corporation teamed up to implement the first business computer installation. Now after twenty-five years of such computer implementation it is still common to find that data processing planning is not integrated with, nor in support of, corporate strategy. Sufficient experience with computers has accumulated to integrate computer planning with corporate strategy but many organizations fail to do so.

In the strategic planning process, the environment of the organization is continually scanned for any of the diverse changes in legal, economic, political, cultural, or social aspects which may affect the success of the organization. Information concerning these changes is traditionally used to shape corporate strategy. Less frequently have changes in the environment been monitored to guide the development of data processing. This information should be made available to the systems planning process so that an orderly plan of computer-systems development can be made, and moreover a plan which can be coordinated with other strategic developments.

One example of such strategic integration involves one of the larger Midwestern corporations in the paper products industry. This corporation was able to reestablish its market share dominance by

programming a highly integrated, on-line system involving order entry, production scheduling, inventory and delivery functions. In this corporation, management correctly interpreted changes in the corporate marketing strategy which in turn required development of a comprehensive on-line marketing information system to support marketing functions and decision-makers.

Another example of what happens when systems planning is not integrated into corporate strategic planning, involved a large corporation in the cereal industry. This corporation was attempting to diversify by acquisition, however, no one told data processing. Data processing's systems planning committee continued their policy of centralization of staff and computer facilities by relocating and selling acquired firm's data processing staff and computers. No one told data processing that top management regarded these acquisitions as commodities to be bought and sold. The value of these commodities could be severely lessened if the subsidiary's data processing capabilities were abolished.

The flow of information from the strategic planning process to the systems planning process communicates that a shift in corporate strategy is being made. The systems planning committee can then review systems plans to see if the shifts in strategy suggest a need for shifts in systems development, staff or computer strategy.[27]

Since systems development may often involve major expenditures of resources, it should be tied into the capital expenditure evaluation procedure of the organization.

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[27]Arthur A. Thompson, Jr. and A.J. Strickland, Strategy and Policy (Texas: 1981).

Financial and accounting staff of the controller have long played a significant role in the design of management information systems. Controllers remain the most experienced individuals in assessing reporting requirements and in developing the internal control, makes this function particularly crucial.

Formal documentation authorizing the analysis, design and implementation of specific phases of an information system is fundamental to the control of systems development. A fundamental precept of control is that no work should be undertaken without authorization. This precept has too often been ignored in systems development with unfortunate results. Further, the existence of a formal document authorizing the systems work provides a basis for the post audit of the work by the internal audit staff. A written record of the expected results and the estimated costs and benefits provides the basis from which the internal audit may be performed. Systematic capital expenditure evaluation is crucial to documentation of expected costs and benefits.

Finally, the results of the post audit of the systems work should be routinely fed back to the systems planning committee to provide a basis for clearer and more definitive systems authorization in the future.

In summary, the following would be ideal as a basis for a sound strategic planning process 1) the formation of a systems planning committee responsible for strategic support of corporate planning via development of information systems and review of developed systems, 2) the formal transmittal of strategic information from top management planning groups to the systems planning committee and 3) the development of a data processing audit specialist staff for effective

post implementation audit and effective feedback and participation in systems planning.

CHAPTER 8

INCREASING THE INFLUENCE OF THE INFORMATION MANAGEMENT FUNCTION

During the early years of the computer age, the corporate EDP function dominated because of the high cost of computers and the great technical difficulty of computer operations. The basic skills in the data processing function in the past tended to be used in transaction-processing systems. The management applications have been implemented only recently and only in the more aggressive, best-managed companies. The disparity between the business needs to management and the technical focus and skills of data processing professionals has gradually decreased the influence of data processing managers in the management of corporate information. Users in line divisions and functions are more and more often electing to buy their own computers or to contract directly with outside time-share vendors rather than attempt to work with what appears to be unresponsive corporate data processing functions. The distribution of data processing into the user areas that do not have the technical expertise to manage it can result in a number of problems: the redundancy of information is likely, serious technical errors can result from inadequate knowledge of data processing and the failure to utilize information technologies as a source of the integration of company organizational units.

"The next ten years contain the opportunity for the corporate computer executive to become obsolete. He is controlling dinosaurs while the ants are swarming over his world."[28]

It was suggested earlier that the 1980s will mark the transition from the computer era to the information era, a reorientation from data processing to information management and from central control over all resources to shared control over distributed resources. Data processing managers will have particular difficulty adapting to the latter changes.

Technically, the engine driving this movement is a combination of "chip" technology and telecommunications advances. As stated before, planning will be a major key to the successful transition from data processing to information management in the distributed environment of this information era that is now beginning.

The following are technological forecasts for distributed processing:[29] 1) trend identification 2) industry impact 3) company impact and 4) information management's role-shift in responsibility.

In the 1980s, effective management will require the monitoring of important technical trends, such as distributed processing, and the assessment of their likely impact on the organization. Failure to take advantage of technological forecasting could result in a company's handicapping its corporate effectiveness, and jeopardizing its future survival and return on investment.

Distributed processing and minicomputers are here to stay and are likely to mushroom over the next five years in all industries.

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[28]Alvin Toffler, Software, January 1981, p.24.

[29]Ibid.

Economics is the driving reason. Minicomputers are becoming so inexpensive that they can be justified almost anywhere.

Consider the ways in which one multinational company might use minicomputers: 1) for automation of the domestic branch network 2) at international offices 3) in interlinked minicomputer systems and 4) for special purposes in user departments of the main headquarters.

Information management will very likely have less control over physical resources, but increased control over the function of information resource management. Thus, a coordinated master plan for integrating diverse systems needs to be developed, and management must be brought to recognize the need for such control by the central planning group.

Strategies must be developed to manage the controlled growth of minicomputers in the corporation. What is essential at this point is a long-term strategic plan.

The diffusion of minicomputers networked by teleprocessing does not mean the end of large central data centers. Data processing managers themselves, will need to change. One of the roles the information resource manager will assume will be that of the information controller, or controller over distributed information resources.

Distributed processing has both benefits and pitfalls. Under decentralized processing, everything is distributed, including management control. Under distributed processing, everything is distributed except management control. Few companies opt for distributed control, the majority want distributed processing, with a form of central management control. Information resource managers

should be information controllers in the same way that every company has financial controllers.

The following list of distributed processing "pitfalls" are taken from the article "Happiness is Distributed Processing:"[30]

Incompatibility - proliferation of incompatible systems makes integration difficult, if not impossible.
Inefficiency - poorly designed programs use the computer inefficiently and result in high maintenance costs over the life of the system.
Corporate ineffectiveness - remote computing serves local needs well but not overall corporate information needs.
Professionalism - amateurs doing professional work.
Redundancy - duplication of effort occurs as the same functions are programmed over and over again in different company areas.
No corporate data base - Failure to take advantage of data base technology.
No corporate consolidation - since data are represented in different systems, it becomes impossible to consolidate them into meaningful information for corporate management.
Weak security - inadequate control can exist over physical site, hardware, and media.
Escalation - the Xerox syndrome occurs as machines proliferate and expand at user sites.
High costs - these and other pitfalls can result in higher costs for the corporation than if distributes resources were under central management control.

Corporate management must be made aware of the potential pitfalls of distributed processing. When corporate management understands both the benefits and the pitfalls of distributed processing, they will also understand the need for an information controller for distributed information resources.

In summary, companies that fail to recognize the need for central management control over distributed processing may well find themselves moving in stages of escalating costs, inefficiency, incompatibility, and loss of control over distributed processing activities. It is the

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[30]John F. Rockart, Chief Executives Define Their Own Data Needs, "Harvard Business Review," March-April 1979, p82.

information manager's responsibility, as well as the distributed processing controller, to make management aware of the problems as well as the benefits of distributed processing and to lead the company toward controlled growth through an effective information controller strategy.

The problems must be corrected if the information management function is to reach its primary goal to increase its ability to properly support the business activities of the company and thus increasing its influence within the company.

The influence of the information management function will be increased when it is integrated within the organization. This implies the integration of the technological advances, the different but interdependent data bases with people. People integration means the bringing together of information management, user management and top management in the shared control and management of information resources. This integration is important not just to increase the influence of information management in the company but to ensure that these valuable resources will be utilized optimally to promote continued growth, competitiveness and profitability in the increasing complex business environments. There are some general strategies that can be followed by every information management organization wanting to increase its influence and effectiveness in the organization, however, each company's uniqueness will require some customization. For example, developing an information management policy, penetrating into the organization, planning pro-actively, extending the information management function, keeping users happy and focusing on top management are some of these strategies.

Companies cannot run without information. Managers cannot manage without information. However, organizations are only beginning to recognize the value of the corporate information resource. The information manager is the logical person to stimulate that awareness and to educate management on what that resource is and how to use it to the maximum advantage. The information manager is also the one with the technological tools needed to provide a system that will deliver the information to the rest of the organization. This situation represents the perfect opportunity for the information manager to take the lead and establish corporate policy for identification, coordination, consolidation, control and use of information resources.

Corporate policy should include the development of standards, procedures, protocols and systems that tie the diverse information resources together. A logical place to start is with the development of standards for distributed processing resources. Distributed resources need coordination and controls to ensure compatibility, consistency and effectiveness. This will enable information to be easily transmitted and consolidated. The standards should specify such things as the responsibility of the information management function for master planning and coordinating the criteria for an application going on a mini-computer versus the centralized mainframe, and the responsibility of the user for the operation and control of the mini in the user area. They should also include things such as hardware and software selection criteria, security over physical facilities, contract guidelines, corporate data standards, the use of outside services and systems implementation guidelines.

The use of corporate distributed resources through the organization will become more important as the trend toward distributed

processing accelerates in the future. The company that gets control over this diverse resource early in the game will ensure that its future information network is able to pass information around the firm easily and quickly for improved management information and control.

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In most organizations there are certain departments that have always been heavy users of the information management services. On the other hand, there are functional areas which have used little, if any, even though they might be able to benefit greatly from such services. Part of the reason is that automation was first applied to the labor intensive areas and these have remained heavy users. Specialization, managerial and professional areas have been slower to move into automation. We want to employ information resources where they will do most good since not all information management activity contributes equally to the corporate objectives. We need to identify those functions and divisions that are inadequately supported by information management resources. The information management function, even if overloaded with work, will be more effective if it maintains a strategy that reallocates scarce resource to the users with the greatest contribution to corporate performance. One can expect some type of user resistance to this approach. One way to overcome this is to assign a systems professional to the user, with top management's

approval. These professionals, from the information management function, will learn the business of the user and promote systems solutions to business problems.

The benefits of pro-active planning were discussed previously. One cannot be active in identifying opportunities for systems solutions to user problems or in getting technology working for the good of the corporation without also being active in the company's business planning. However, this is not always within the control of the information manager. A planned strategy that is within the information manager's control, however, is the planning of business information systems with user managements. The function is to work with management personnel to identify and start new business systems projects. This implies that systems are more effective if they are planned together and for the managers who will use them.

It will be mandatory to reposition EDP in the organization of the 1980s. The right image, the right name and the right responsibilities will be needed to go with the transition from EDP to information management. The right image can be brought through selling the information resource management concept to users and top management. The right name is important to this image. In the early days of computing Automated Data Processing was the common label attached to this function. As we moved from punched cards to electronic processing this label changed to EDP and later, in some cases, to management information systems (MIS). The important thing is to have a name that fits the responsibilities that are appropriate to an information era. Information is data massaged with intelligence, management is a broader concept than processing. Therefore, the term information management describes the new image and role of this function and the information

manager is the director of this function for the 1980s. With the right identification, the assumption of new responsibilities that extend the function beyond its present scope of activities is made easier.

Keeping users happy is the real key to any information management organization. High user satisfaction will most assuredly increase an information manager's functions and influence in the organization. high user discontent will assure fast management action to replace the information manager with someone who can keep users happy. Favorable user feedback is still the most common method by which top management measures information management performance, though it is vital that information managers make sure their user satisfaction is high. This will not occur as long as there exists the "we-they" situation. There must be a joint management of information resources by information management and the users thus creating a "we" situation. Both parties will then be responsible for success or failure thus users will not complain to top management that "they" have failed. Joint management defuses the problem.

To increase its effectiveness in the organization, the information management function must finally close the communications gap with top management, demonstrate solid performance and begin to apply the power of computers to the managers of the firm instead of the clerks. The failure of data processing in the past to do something directly useful for chief executives is the reason for their low interest in data processing.

Now that we have automated the labor intensive functions we can concentrate on the needs of managers. If we are to be successful, however, we must improve the quality of information that managers

receive. This poses a problem of finding out what information the manager really needs. There are a number of techniques that are now in use: the by-product approach, the null approach and the key indicator approach are the most popular.

In the by-product approach the primary emphasis is on developing application systems. As a by-product of these systems, reports are made available to management. This is by far the most popular approach to management information's needs today.

The null approach suggests that since executives receive the bulk of their information informally and verbally from trusted advisors, no attempt should be made to provide computer based data to top management.

The key indicator system is based on the premise that a set of key indicators can be used to get a picture of the health of the business and that exception reports based on these indicators should be produced only when performance is significantly different from expected results.

The above methods, however, have their shortcomings. One is that they do not provide the full range of information needed by senior management. They may be limited to financial data or application systems data. Another shortcoming is that they are not tailored to the individual information needs of specific managers but are geared more to positions. To overcome these shortcomings, Rochart suggests the use of the "critical success factors method." "Critical success factors are, for any business, the limited number of areas in which satisfactory results will ensure successful competitive performance of the organization."[31]

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[31]John L. Kirkley, "Happiness is Distributed Processing," Datamation, March 1978, p79.

Critical success factors depend on the use of short interview sessions with top executives that focus on the few key areas of the business where things must go right. These areas will vary from organization to organization, from time period to time period and from manager to manager.

> The steps involved are: 1) identify the objectives of the organization 2) determine the few factors critical for accomplishing those objectives 3) determine the measurement of these objectives 4) develop appropriate management reports of those measurements and 5) provide follow-up activities to improve results.[32]

While the critical success factors analysis process should begin at the top of the organization, critical success factors can also be used to zero in on specific functions of the organization.

Another way to put the computer to work for the manager is through the development of a decision support system. A decision support system is an interactive computer system which is used directly by the manager to help improve his or her judgment and decision process. Developing such systems for management is a difficult task because it requires "two way" education. The information manager has to learn a great deal more about the business and the decision-making process of the managers, and the managers need a better understanding of how the computer can help them to do their job better. Another problem is the backlog of work in most organizations. Lack of resources often prevent experimentation and research into management decision systems. Cost justification concerns also work against experimentation with a high risk and not easily quantifiable benefits of a system, such as decision support systems.

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[32]Ibid.

Management graphics is another form of decision support systems. Executives today are overwhelmed in paper and detailed data. The problem is a shortage of information, not data. Graphics has the ability to synthesize data into powerful visual representation that conveys the value of data and is easily grasped. Valid, timely and concise information results in better decisions. Better decisions lead to increased executive productivity, thus increasing the effectiveness of the executive. Therefore, management graphics deserves careful consideration as a powerful new strategy for executive information systems for the 1980s.

Top management support is needed to obtain the necessary resource which are required toward the success of the information management function. Yet information managers spend only a handful of time in contact with the executive. This cannot be because the information management function is not significant or important enough to warrant their time. The amount of resources and budget consumed and the high dependence of most companies on their information management function will prove that point. Thus, this must be due to the fact that top management does not understand the information management function and they find it hard to communicate with the technically advanced individual. The chief executive officer cannot draw on his past experience in the field and understand the information management's problems. It is up to the information manager to educate the chief executive officer, and not with bits and bytes. The chief executive officer needs to know the business problems, the key decisions to be made, the issues, the trends and the impact of these decisions on the organization. One way to achieve these decisions is through CEO

briefings. CEO briefings are meetings with top management for the purpose of briefing them on what is happening in the world of information management. The meetings should be carefully planned presentations without the technical jargon. The quality of these presentations must be equal to the presentations received from other areas of the company. However, these meetings should not be scheduled just for the sake of having a meeting. Management's time is valuable, thus there must be something of importance to communicate. The benefits can be many: top management becomes better informed about information management's plans, decisions and issues. Information management gets management feedback as to directions, priorities and reactions to plans. Short, carefully prepared presentations by staff members crystalize their thinking as well as help management to get to know a number of their staff members; improved perception, understanding and involvement of top management can create support for the programs and resources required to support company needs.

CEO briefings are a relatively simple strategy, yet can be an effective way to get top management more involved, to help close the communications gap while demanding relatively little of their time.

CHAPTER 9

THE OFFICE AUTOMATION FRONTIER

The office will be one of the most exciting frontiers for major automation in the 1980s.

A good office information systems strategy would embody: leadership, organizational planning, and phased implementation.

Working with the stages-of-growth hypothesis (initiation, expansion, formalization and maturity), a four-phase approach to office information systems can serve as a useful background to planning for the office environment of the future. Each phase builds the former with the four phases being: distributed text processing, proliferation, integration and management functions.

Building efficient systems, which contain the logic of office processes and functions, in order to transfer work and control from people to technology, will be the challenge to information resource managers in the years ahead.

The real productivity gains in the office will come from the synergism of a total systems approach, rather than from individual solutions.

In summary, office automation will make the following happen:[33]

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[33] Ibid.

1) increase productivity - reduce and control office costs by getting more work done with fewer people
2) increase effectiveness - improve the work quality of the administrative staff, as well as work satisfaction, through increased emphasis on creative and innovative work and
3) integrate systems - unify multiple local systems into a single office management system.

CHAPTER 10

SUMMARY/CONCLUSION

The information management era is now a major factor in the practice of management. The revolution in information technology has created opportunities for improving the effectiveness of management. The computer era is over. Traditional data processing is now relegated to cost-effective transaction processing. The vision of information managers in the 1980s should be focused on executive information systems, office information systems, and the integration of information resources and corporate communications through teleprocessing.

Management in an era of revolutionary change requires strategic planning and a program of management by strategies.

The development of information management strategies as a way of coping with the rapid pace of change in the information revolution is a strategic planning process which we have dared to call management by strategies.

A program of management by strategies produces a synergistic effect that can greatly increase the overall effectiveness of individual management strategies. A management by strategies program of innovation in information management represents an investment to achieve more effective information resource management capabilities and utilization in the future. The stronger the capabilities, the less

prone a company will be to suffer through a management-by-crisis syndrome.

Each additional strategy implemented will increase data processing's effectiveness, thereby making further investment in the management program easier, as this commitment is reflected in the synergism of successfully implemented strategies. Commitment, careful planning, and follow-through on strategy implementation are the critical first steps in ending the vicious circle caused when management-by-crisis consumes much of a manager's time.

A portfolio of strategies for increased effectiveness can be built following a simple four-step process: 1) identify the problem 2) select problem-solving strategies 3) develop an action plan and 4) implement the management by strategy plan.

The following three case studies illustrate the effectiveness of a sound management by strategies program:

Case I - In this solution, a single strategy is applied to the problem in general.

One of the more successful techniques utilized by the First National Bank of Boston to achieve greater user penetration in the application of technology to business problems has been the Trojan horse strategy. Properly employed, this can be a most effective strategy for achieving user penetration for needed automation projects. Its success, in fact, has often resulted in the building of a small staff of system planners in the user area to carry on and support on-going automation planning.

Having a good success with this strategy in the early days of data processing, the data processing function at the bank in the early 1970s

resolved to use it in an attempt to bring the computer into service in some of the high-profit contribution areas of the bank where little technology was being employed. As in many institutions in the early 1970s, the computer had been successfully applied to the labor-intensive operational areas, but very little attention has been paid to other important areas of the bank. In fact, a comparison of the allocation of systems resources to the profit contributors of the bank showed that only 15% of the systems resources were devoted to divisions contributing 75% of the profits.

Target divisions for Trojan horses were selected, and one by one were successfully moved into these divisions. Senior management support was enlisted, where necessary, to convince top user management of the value of adding a senior systems person to their staff if they were not convinced of the need themselves. Over time, 14 to 16 bank divisions have been staffed with one or more systems people. These people do no technical work as such, but they do systems planning for the users where computer systems can be intelligently applied to those business activities. In the process, the user management, and the bank, all benefit by the increased application of up-to-date technology for increased cost control; a no lose situation all the way around. The Trojan horse strategy is just another way of educating management to the promise of computers. But at the bank, it has proved to be a superior way to win friends and influence people in the corporation, and to achieve high user penetration with a minimum of consternation and political upheaval.

Case II - This solution is an example of the application of related strategies to a specific area of the company.

This bank also successfully applied the concept of Trojan horses in its commercial finance division, which resulted in early and heavy utilization of computer based systems. A strong integration between Information management and the commercial finance division soon developed. Among the strategies utilized to bring this about were heavy user involvement in the project life cycle and ongoing business information planning. Systems efforts resulting from these strategies led to the development of a leading edge, on-line, real-time factoring system led by a business manager from the commercial finance division. Together with a project leader from the Information resource division, was instrumental in leading the project to a successful conclusion, giving the bank one of its leading-edge computer-based systems, which has stood the test of time for a decade of industry leadership.

The resident systems planning group (Trojan horses) in the user division has continued over the years to plan new system features and additions through ongoing business information planning efforts with the systems people and by staying closely involved during systems development. Other strategies aided automation penetration in this case, but the key ones were the Trojan horses, user penetration, and extensive user involvement in the project life cycle of the projects. The user relations strategies were combined to produce high user automation penetration and a winning product that produces good market share, profits, and good customer satisfaction for this major bank division.

Case III - In this solution, unrelated strategies were applied to a specific area of the company.

In 1973, the Information management division made a comparison of the allocation of systems resources to the contributing profit sources

of the company. It discovered that the company's fastest growing area, the international division, was also one of the lowest users of the division's resources. Because of the far-flung nature of the company's banking activities achieving automation penetration here was going to require considerable advanced planning.

Adopting a pro-active change agent role, the information manager went to work to learn as much as possible about the bank's international operations. Interviews were conducted with senior management and visits were made to other major multinational banks to learn how they were managing their information resources overseas. As a result, a foot-in-the-door proposal was prepared and presented to senior management, outlining what was perceived to be a growing problem of expanding, splintered overseas operations with no standard plan to control redundancies, incompatabilites and inconsistencies. Minor funding for a feasibility study to address the problem further was sought from and approved by senior management. During the course of the study, technology forecasting was employed to match emerging technology with company needs. The result was a proposal to develop a distributed processing system which would use standard and common hardware and software as the system base in each remote facility, modified as necessary to fit local needs. The system would utilize an on-line, real-time processing minicomputer in each overseas location. The system proposed has since been installed in a number of overseas locations, and plans continue to automate the remaining facilities over the next few years.

Meanwhile, the need to control the rapid proliferation of minicomputers, both in the United States and abroad, was addressed

through the development and issuance of a corporate policy of distributed processing standards governing the user's responsibilities with regard to computer acquisitions, systems development constraints, major spending on hardware, operations, security and control, and many more.

A matrix management arrangement was also established between overseas data centers and the headquarters Information resource division. The result: A combination of diverse strategies applied to a single problem has brought the international operations of the bank to a high level of computerization, with increased control and productivity, with better and faster information throughout the firm, and most of all, with planned and controlled automation growth to handle the rapid expansion taking place in the company's global business activities.

The challenge of the 1980s! Today's data processing managers and directors do have a chance to get to the top, not by being EDP experts, but by becoming businessmen, learning the business, managing the information that is the life blood of the business, and becoming very much a part of the mainstream of the business instead of ancillary technicians.

Today's new information managers need to perceive coming changes, recognize the impact on their business and products and exploit these changes to their advantage.

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