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THE SOCIETY FOR MANAGEMENT INFORMATION SYSTEMS
SMIS

The Society for Management Information Systems was founded in 1969 by a group of executives, information systems professionals, and academicians. Any nonmember interested in the goals and work of the Society or desirous of joining, please write to: The Society for Management Information Systems, 10 West 31st Street, Chicago, Illinois, 60616.

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PREFACE

The preparation of a Proceedings of this type is a challenging and
frustrating experience for the conference presenters as well as the editor
and supporting staff. The majority of the papers contained in these
Proceedings were created from transcripts of spoken presentations,
pasted and rewritten by the speakers, and re-edited several times.

This was an outstanding conference, representing a strong resurgence
of support by the business and academic communities for the Society for
Management Information Systems. Regrettably, not all of the presentations
could be completed for publication herein.

Production of this document was possible only through a large
cooperative effort involving many persons.

I thank the speakers, themselves, for the time they spent
laboring over transcripts and drafts, despite their heavy professional
schedules.

Thanks go to Lori Cushing and Sue Scanlan for helping supervise the
typing. A special additional thanks to Sue for spending many hours
proofing these precious pages with me. If any errors remain, they are
the fault of an anxious editor . . .

I gratefully acknowledge the support and encouragement extended by
Dick Mahin, Pat McEw, and Gary Dicken.

Most of all, I thank and applaud Mary Jo Barr for her patience and
fortitude in typing, re-typing, and re-re-typing these Proceedings. Her
skills and cooperative attitude made her contribution invaluable.

It is my sincerest hope that those who attended the conference will
find this volume representative of the outstanding quality of the
presentations they heard in Chicago, and that all who read it will gain
from its contents.

Neal E. Estes
Management Information Systems
Research Center
University of Minnesota
12 January 1977
MANAGING THE INFORMATION SYSTEMS FUNCTION
Current Issues and Formulating Strategy

OPENING SESSION

Introductions
Lieutenant Colonel Reed Phillips
Master of Ceremonies

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Dr. Daniel Tischman
President, SNIS

REQUIREMENTS FOR SURVIVAL OF THE FUTURE INFORMATION EXECUTIVE: A TOP MANAGEMENT PERSPECTIVE

Panel Chairman: Herbert Z. Halbrecht
President, Halbrecht Associates, Inc.

Panelists:
- Leonard Lieberman
  Senior Vice President
  Supermarkets General Corp.
- William H. Wilson
  Vice President-Manufacturing
  Inland Steel Company

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Daniel T. Carroll
President
Gould, Inc.

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Richard L. Nelson
Associate Professor
Harvard Business School

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John L. Hughes
Vice President
First National City Bank, New York City

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Charles Ferguson
Corporate Director of Management Information Systems
North American Phillips Corporation

* No materials available for publication.

THE FUTURE DIRECTION OF INFORMATION SERVICES TO IMPACT THE BOTTOM LINE

Panel Chairman: William E. Reedy
Vice President of Information Services
Kraftco Corporation

Panelists:
- Fred H. Lammon
  Director of Information Services
  General Foods Corporation
- Paul A. Straussmann
  Director of Information Services
  Xerox Corporation

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Director
McKinsey and Company, Inc.

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William Atkins
Partner
Touché Ross and Company, Washington, D.C.

John Shaw
Partner
Touché Ross and Company, New York City

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Panel Chairman: James L. McKenney
Professor
Harvard Business School

Panelists:
- Tom Ries
  President
  CINCOM Systems, Inc.
- Glen N. Roden
  President and Chief Executive Officer
  Computer and Communications Services Division
  United Airlines
- Howard Morgan
  Professor
  The Wharton School of Finance

* No materials available for publication.
PLANNING THE INFORMATION FUNCTION

Panel Chair: F. Warren McFarlan
Harvard Business School

Panelists: Paul D. Birkhahn
Managing Director, Systems
and Data Processing
American Can Company

John R. Leavens
Assistant Controller of Systems
Inland Steel Company

Robert A. Shafio
Senior Vice President
New England Life Insurance
Company

ROLE OF PROFESSIONAL ETHICS IN MIS

Dr. Thomas L. Martin, Jr.
President
Illinois Institute of Technology

REQUIREMENTS FOR SURVIVAL OF THE FUTURE INFORMATION EXECUTIVE: A TOP MANAGEMENT PERSPECTIVE

Leonard Lieberman
Senior Vice President
Supermarkets General Corp.

William R. Wilson
Vice President – Manufacturing
Inland Steel Company
WHAT SENIOR MANAGEMENT EXPECTS FROM THE MANAGER OF INFORMATION SYSTEMS

Leonard Lieberman
Supermarkets General Corp.

The Information Systems manager must possess the standard management attributes. These are operating and developing managerial skills, technical knowledge and competence, understanding of the specific and unique activities that the human beings in Information Systems have to be good at, knowledge of what the physical devices can and cannot do, and so forth. All of these competencies are necessary in the Information Systems manager, but they are not a sufficient description of what this manager has to be able to do.

There are three conditions which describe the situation of most business organizations today, and there are three tasks or roles, each of which is responsive to one of the conditions. All of these, accordingly, need to be performed by the ideal manager of Information Systems.

Condition I—The Revolution of Rising Expectations

The first condition is our collective version of what the sociologists have come to call the revolution of rising expectations. We might also label it, "Where are we going to keep them down on the farm after they've seen Pareto?"

The computer revolution has succeeded. The disruptive technology of the 50's has been absorbed into and accepted by our business organizations. Artfully, the Run, the Invasive Herbartian, has been civilized. The foreign body has become an integral part of its host.

All of us have some knowledge of the taxonomical reactions that all business organizations had to the advent of the computer and its peoples, yet etiologically and rapidly, the rejection mechanism have essentially stopped and computers are part of our business lives. The rate of the distraction has been remarkable. No other function has so quickly become a part of business, unless it be the growth of the great certified public accounting firms in the ten years after the Securities Acts of 1933 and 1934.

The very success of the computer revolution, however, has generated the rising expectations syndrome which bears worrying about. Rising expectations are used to denote the paradox that those to whom new benefits and goods and external satisfactions are delivered often are less satisfied than we expected. This happens because now they have learned that there are goods in the world which, under some set of circumstances, may become available to them, and their appetites get enlarged as a result. There is a high level of expectation relative to what there has been in the past in business organizations today. As a consequence, there are some pervasive aspirations for computer improvement in some chunks of the business than there were at an earlier time.

In the old days, the manager of Information Systems had to fight to extend the areas of computer utilization to the other parts of the company. To get computer systems in. In a sense, the prototypical activity of the DP manager used to be to persuade then that the machine could help them.

Today a significant part of the DP manager's activity is, and in the future will be, to review and find off and discourage proposals for computerization. Many proposals must be discouraged because many of those expectations should not be fulfilled. Many of these are irrational, or are grounded in misconceptions of the machine's capabilities, misconceptions of relative costs of incremental accomplishments on the machines, or misconceptions of the readiness of the user group to handle the system in question.

The computer manager must have the knowledge and the courage to say no, or not this year, to requests for service. This manager must so understand the other parts of the business-specifically those segments and functions which are demanding computerization—to effectively distinguish between the tasks which should be done and those which should not be done. He must be able to say go where that is the right response. He must see his job as maintained by appropriate levels and allocation of resources rather than extensiveness of resources. This is to say that the maturity of the computer function demands maturity and self-restraint on the part of the computer manager. This is no easy task. It is hard to keep them down on the farm after they've seen Pareto than it was to be the tour guide in Pareto.

Condition II—Inadequate Understanding of the Capabilities of Technology

This second condition creates a different set of demands on the manager. The technology has evolved even more rapidly and in more directions than has the level of outsider comprehension. Expectations have risen but neither qualitatively enough nor accurately enough to keep pace with the technology. As a consequence, a very large extent of what our businesses currently want from computers is based upon inadequate understanding of what computers and their people can really deliver.

It is a little bit like the problem of the Maginot Line. The French, between World War I and World War II, focused almost the whole of their military expenditure on fortifications along their border with Germany. Had the Maginot Line been in place in time for World War I, it would have been enormously useful to the French and their Allies. During World War II, by the time that it needed to be used, it was no longer appropriate to the light of the highly mobile warfare which technology had brought available. Modern technology evolves at an exponential rate, while outsider comprehension of the technology evolves very slowly. My generation still drinks that genetics has to do with the number of blue eyes among a family of white mice, even though the geneticists are busy breeding animal-vegetable hybrids by manipulating molecules.

The problem is that there continues to be a wide gap between what computer technology can do and what most of us in business think it can do. Computers can domagic—we don't know about this. It is to say that the DP manager still practices an exotic profession. Therefore, this manager still needs to be able to interpret this region of exotica to the
of us in the business world who, no matter how good we are, do not and should not be expected to understand this area as well as the manager.

The Information Systems manager has to be constantly aware that he stands at the border of his technology—the part at which his technology interfaces with the customer/client world outside. He needs to be hypersensitive to the challenges to wisely and patiently advise these outsiders using all his arcane knowledge. He is, consequently, under an obligation to educate his customers and clients: to make them aware of the ways in which computer use can help them and to betoken their reactivity to the potential of what the MIS manager can do for them. This manager must be an excellent marketer and perhaps, even harder: a marketer with a conscience. Demand must be created, and he must be ready to meet the right product. He must make his customers want his services, and these should be the right services.

Responsible to this second condition, therefore, the MIS manager must be a super-salesman who makes his customers say yes.

Condition III—Difficulty in Innovation for Changing Organizations

Many of us have heard the complaints: They are too stiff and too bound to become rigid, Bureaucracy has proliferated; firing and firing of people is surrounded by more law than it ever was. We have not gotten to the lifetime-employment concept of Japan and Europe, but we may well be moving in that direction in our own American way.

All of this suggests increasingly difficulty in innovation through significant change. In the way our organizations function will be required to more sophisticated computer systems and communication systems are installed, the relative hardness of the requirements of these organizations will be an extra burden on the innovators for these changes. We must consider the implications of installing an automated payroll system that displaces clerical people are child's play compared to the implementation problems of decision-oriented systems.

In the supermarket industry, it is one thing to install scanning systems that generate tremendous data; in our store it is quite another thing to profitably flow of potentially valuable information. In these situations, we cannot merely deliver a procedure manual to the existing line people who are likely to be phased out because of the innovation, "down-the-pants-to-the-mail" managers do not easily adapt to dealing with information they know how to live without. A vast amount of what our Information Systems managers can do for us will be, and should be, radically distractive. Meanwhile, we have become older days to which is still harder to teach new tricks.

The Information Systems manager must be a leader of radical change. He must be bold. In fact, a capable revolutionary. The premise of this technology is a promise of revolutionary change. Revolutionary systems are required to lead us on the route to the Promised Land. There are dangers in this promise. The physics of inertia apply to organizations; they do not like to be disturbed. It is often necessary to lie in the way that the Americans are reported to have dreamed the messenger carrying bad news. Nevertheless, we need the MIS manager to be willing to be a revolutionary.

By way of summary, the manager of Information Systems must have the strength to frustrate outsiders with inappropriate expectations; the marketing skills to effectively persuade us as to what our needs really are and as to the capability of the technology; and moreover, the political skills to lead us into profound change.

Phrased in slightly different terms, it turns out that the skills and attributes we need from our Information Systems manager are the skills and attributes of the divisional or corporate chief executive officer. Judgment, alertness at the art of frustration, skill at persuasion, insight and foresight as to needed change, and the talent to produce it—these are the crucial attributes of the general manager. The special demands of the Information Systems function are precisely the demands of general management leadership. Success at managing Information Systems, of course, producing, distribution, finance or marketing, will lead to promotion.

The "knowing more" that we need from our Information Systems managers is the same "knowing more" that we need from the other managers of the key areas of our business. It is the skill and personal characteristics which make a manager a CEO candidate.

The Forbes list of CEO's and their backgrounds begin in a very few years, to show CEO's who started as Data Processors. The computer revolution then will be truly complete. Atilla, the Hun, will become the Roman Emperor.

Inland Steel is not one of the giants of the steel industry. It is a company in one of the last steel making facilities in the New World. It occupies 240 acres, employs 2000 people, and produces a raw steel capacity of 6,200,000 tons annually.

Our data processing or Information Systems organization at Inland Steel is not part of the manufacturing organization, as is the case with many large, in fact, it is a part of the financial wing of the company. It must be pointed out that this attachment to the Finance Department is basically administrative in nature. The policy and direction of our Information Systems function is determined by the Systems Review Committee which is composed of the Vice President of Sales, Vice President of Finance, Vice President of Research, Vice President of Steel Manufacturing, Senior Vice President, Computer, and the President of Inland. There are those among you who oppose the committee approach, but we believe it has provided us with one of the finest Information Systems organizations in our industry.

Our data processing installation is centered around 250 IBM 370/168 computers. The workload on this system is comprised primarily of three major systems—a Production and Inventory Management System, an Order Entry and Production Scheduling System, and a Billing, invoice and Disbursement System. These three systems require about 80% of the manpower and 75% of the computer cycles. The remainder is spent on staff department systems for accounting, purchasing, personnel and other miscellaneous tasks.

The future workload and the requirements it imposes on management is of great concern. A large portion of our effort has been spent in the sales and production areas. It appears that future governmental reporting for the Equal Employment Opportunity Commission, Occupational Safety and Health Administration, Environmental Protection Agency, and other governmental agencies will place a substantial burden on our resources; some of this reporting can be automated but we feel the future will also require that we devote our resources to developing a broader efficient and more efficient data retrieval system, if we are to remain competitive.

Having established what I believe to be necessary background, I'll proceed with answering the question, 'What are the requirements for the survival of the MIS manager in the 80's?' The very outset, I run up against a troublesome dilemma, I asked myself, 'Who are the Information Executives?' This audience is mainly data processing oriented and many data processing executives consider themselves Information Executives, but that may not be a universal assessment. I have to differentiate between the collection, organization, and processing of information for middle managers, and the functional managers who are the sources of information to top management. When I need information I go to my middle manager, and the situation is worsened if the system under consideration really requires me to go directly to the data processing organization for information.

In attempting to develop the requirements for survival, consider the functions of the Information Executive:

- Plan systems
- Develop systems
- Implement systems
- Maintain systems
- Train personnel
- Estimate costs of potential systems.

Studying this list of functions suggests requirements for the survival of the future Information executive. The first area that should be considered is Internal Management. In this category, four requirements emerge for the future Information executive. He or she must:

1. Provide an organization that maintains a high service profile—one that is responsive and timely to requests for service by users.
2. Maintain an staff that is capable of adapting to continually changing Information system technology. Accordingly, the hardware and software have occurred in a very short time and the same is true for this person cannot afford to be left behind.
3. Maintain a staff that is capable of adapting to continuous change in business conditions. A good example might be the impact of micro-computers on the system. The impact of governmental reporting requirements and deadlines must be recognized.
4. Continuously retrain himself or herself so that a system is a means, not an end. Too often, all of us tend to lose sight of our overall objective and only focus on our own little world.
Many of you may disagree that plant size is a very significant factor, and you may be right, but I suspect those of you who work for large and small organizations would agree that size is a complicating factor.

One other concern must be made before addressing the new requirements. The planning function requires all of his responsibility in areas that do not have adequate pricing. There is little chance of the information system functioning effectively if those areas become confused. Which criteria should be used to judge overall performance? Are they subject to our usual subjective judgment? If that is the case, I would like to see some of the significant problems.

Now that some requirements have been developed, the logical question is: 'How do the information system fulfill these requirements?' Consider the function of the information executive in evaluating the performance of an information system. An exception may exist where a system performs well, but by large, if information systems are poorly designed, the manager is responsible.

Therefore, four criteria are being used to evaluate the performance of the information executive. Often, a system merely provides one view. Here, we may see some combination of the following criteria:

1. Cost over-runs for system design and implementation
2. Ability to deliver on schedule
3. Technical reliability
4. Comparison of promised versus actual performance

Many people evaluate performance strictly on the basis of cost over-runs for system design and implementation. Other people look at the cost of delivering the system on schedule no matter what the cost of achieving this delivery. For others, the overall acceptance of the system is based on software and hardware standards, which compares the system. For those who compare present system performance with promised results at the time of system conception.

At Inland Steel, cost is an important part of our cost benefit analysis, carefully monitor schedule performance, and performance of the executives of the system for future use. The four criteria suggested are at the micro level, while at the macro level the performance of the information executive is measured by how well system priorities are established in accord with the objectives of the firm.

In the final analysis of performance, one variable must be considered, and that is the user. Data processing organization can build a good system, but unless major users will work because the user is a prime factor in its success. The elimination of the user-effect from the performance analysis represents a challenge to the future information executive both from the standpoint of daily work with it, and from its potential system immune to it. This is not a call for running systems. The problem remains to be designed. Such a system can be built, but it will not be designed, because the marginal costs will drastically outweigh the marginal returns.

The building of an 'ideal' system brings to mind another series of problems that face the future information executive. Security is everywhere a key factor in the operation. The two key factors that present, and sometimes go wrong, the effect of the

In closing, allow me to emphasize one point that affects both the information executive and the management. While reading through some material in preparation for today's program, I ran across an interesting study which surveyed a large number of Chief Executive Officers in years of major U.S. corporations. The purpose of that survey was to determine the characteristics of these Chief Executive Officers perceived as the weaknesses of their data processing organizations. A summary of the results of that survey showed:

1. 22% of the respondents cited poor data planning and implementation.
2. 20% of the respondents cited inadequate project resources.
3. 10% of the respondents cited lack of understanding of the corporation too technical or orientation.

I must admit I was somewhat surprised by these results. It is my opinion that possibly the most important thing that must be recognized is the lack of understanding of the corporation too technical or orientation. I think in opinion is substantiated by recent literature on the subject. In fact, you may recall a recent Wall Street Journal article that indicated more and more data processing managers and executives have general business skills in addition to their data processing background.

My message to the information executive who wishes to survive is that he must develop a comprehensive function. In addition to technical and business skills, he must be aware of all technical and business skills which will allow him to bridge the technical environment of the computer to the business world of the firm. This is while his organization must continue the technical expertise of the computer, the system must be maintained to be an effective and efficient data processing center, the executive must be the bridge that ties together the world of the computer and the world of the business executive.

7. Educate management.
8. Provide analytical systems for problem solutions.

a very complete cost analysis and a good benefit analysis culminating in a high-performance system being installed to an operation whose product line is to be dropped in three years, and methods must be developed to assure systems installation will be a return to the firm, and not installed because it looks like a good idea today, but may not be tomorrow. Obviously the return to the question of immediate benefit analysis. Ideally one executive should be responsible for marketing the sales, but in this analysis, however, in many organizations, including our own, the information executive assesses the cost of a proposed system while the salesmen are bombarding the expected benefits. The difficulty can be alleviated if the salesmen are bombarding the expected benefits. The difficulty can be alleviated if

the user in the benefit analysis.
HOW THE CHIEF EXECUTIVE SATISFIES HIS INFORMATION REQUIREMENTS

Daniel T. Carroll
President
Gould, Inc.
Gould's history in a sense commences in 1967 when the Board of what was then Gould National Battery (GNB) determined to change the downward drift of its business. The Board sought out a new chief executive, Bill Tiviskar, who is now Chairman. He brought in a new team which drastically changed the nature of GNB's business. In the fiscal year 1968, the company had sales of $135 million. Today Gould has sales running at an annual rate of $1.4 billion. Profits have grown at an even faster rate.

In 1969, GNB made automotive batteries for the replacement market and industrial batteries for mining and railroads. These were far from 'boom' industries, and Gould was at best only fifth in the automotive replacement business. In 1969, Gould merged with the Cleveite Corporation of Cleveland, Ohio and began to expand its technological foundations. Since that year Gould has acquired twenty other businesses through mergers. The most recent addition was the T-T Imperial Corporation of Philadelphia, Pennsylvania.

Today, we are a company with 71 per cent of its sales in the electrical products. These products range from the small carbon rechargeable battery found in handheld calculators, to the much larger batteries used as standby power for the Bell Telephone System, and to circuit breakers and electric motors of all sizes, shapes, and description. The other 29 per cent of Gould's business comes from industrial products such as copper foil used for printed circuits, engine bearings and bushings and others. We also produce a line of undersea weapons under a sole source contract with the U.S. Navy. Our Nort 48 torpedo has never been fired in anger, but it did encourage the Russians in the SALT talks to think twice about our weapons arsenal.

This range of Gould business is organized into seven groups and 37 divisions, each of which is self-sufficient. Each division has its own general manager, controller, engineering staff, product development team, marketing personnel, and manufacturing capabilities. Every division is responsible for its own P & L statement.

Gould is a world-wide corporation with 106 plants in this country and 35 overseas. We service a variety of markets through many different distribution modes.

Gould has been said to have a three-pronged philosophy for managing its enterprises. First, we spend a large amount of money in product development. As a corer than a company that has arrived, Gould has to bring new products to the market place to get better price margins and to improve its market share. We have increased, in our eight-year history, product development expenditures from $8 million in 1968 to $55 million this year.

Second, Gould has a sizable commitment to management development. Since we are not in the same position as some of the corporate giants with whom we aspire to compete, we have to have even better management performance from the men and women who assume positions of responsibility. In consequence, we are devoting a lot of time, talent, and money to the management development process.

Incidentally, I urge any of you who have the time to visit our Management Education Center. It is small, unique and highly productive in terms of improving the management techniques of our people. Since some of you are educators, let me stress that we do not believe course work is the only, nor necessarily, the most productive part of management development.

The third and last part of our three-pronged philosophy concerns the fact that we are in the business of requiring performance. We reward those who perform.

I guess our MIS history would have to be charities called evolutionary. After all, the business of Gould in 1967 and 1968 was that of a one-division company. At that time, certain clerical functions were done on computers; basically, however, it was a business that was run by memorexas. A year later we decided that the monthly memorexas would be reduced to five pages in length and would have a standardized format. But then we began to acquire companies and it became impossible to adhere to that format even or to memorexas.

Im vagy, we jumped heavily in a standard chart of accounts around the world; we automated all of our accounting system and we created a document which is the first exhibit. This is called a Core Report.

There is a Core Report page for each of Gould's 37 divisions. The report originally provided 25 key operating numbers which were compared with prior year figures on a monthly and year-to-date basis. We keep over the report part extended the Core Report's "key numbers" from 25 to 39. You will see those in the exhibit. In addition to variance ratios and the like, we are about to add another key number, the monthly cash flow, making an even 40.

Through the use of computer technology, the Core Report, which used to be available 17 working days after the month-end closing, is now available in 1 working days. The Core Report is a remarkable document which has become, if you will, the universal language of Gould. When somebody speaks of a Core item, we know what he is talking about and what the intent of his question is likely to be.

As remarkable as the Core Report has been for Gould, however, we concluded about three years ago that we needed an even more rapidly available report. This need, incidentally, was brought about by the worsening economic conditions of 1974-5. We found that to wait for the month-end report, we were out of stop on some key decisions. Therefore, each Monday morning on the deals of big management, is a weekly report of 10 key financial and operational items. They include orders received for the previous week, as of the close of business Friday, plus shipments, backlog, accounts receivable, payables, inventories, employee counts, and part-time and overtime costs.
It may sound like a "labor of love" to have such a report deposited on your desk by 8:30 each Monday morning, nevertheless, it was on the basis of that document that Gould stayed on top of corporate costs through what was a rough economic period. If you will look at Gould's financial results, you will see an increase in earnings on a declining volume throughout the whole recession. It wasn't a pleasant management situation, which would have been an utterly impossible situation without the quality of data which we gleaned from the weekly task force reports.

As far as our computer activities are concerned, I suspect that our system is not terribly unique. We do, however, have a "warp room" as shown in Exhibits 2 and 5, a nomenclature which I detest, but which the Wall Street Journal and Business Week seem to prefer. We have in our board room a TDD/TEC high which in turn is tied to a microcomputer and then to a remote data frame. With this system we are able to call up a variety of data instantly in our board room and display it. We can also carry on various kinds of discussions and analyses with our own managers using this visual medium. The Wall Street Journal describes this effort as a $300,000 investment designed to "make our directors brighter." I think there were a lot of our directors who thought they were already bright and that didn't realize $300,000 would make them that much brighter.

Exhibit 4

Exhibit 5

One of the subtle dividends, which has come from this particular computer capability, has been a requirement of top management to take an overview of the total computer-based system. It has also forced us to face these questions: "Is this really what we want in terms of a top management system? Is it workable? Are we able to make decisions or get responses or are we, in fact, trapped by the sheer magnitude of the information system we created or perhaps unwittingly invented?"

My own judgment is that the so-called "war room" is a significant break-through for Gould. In the beginning, it looked like a lot of glitter and little if any gold, but now we have become familiar with it, the more confident we become that it would make us better, more timely and more cost-effective managers.

Now that we have done all these wonderful things, has Gould reached an "aloha" on the planet earth? I will assure you very quickly that we have not. We have still to face serious challenges as we move into the latter part of this decade and into the next. Let us also be thankful that there are sources of great concern to Gould, especially to those of us at the lonely top.
In the early 1950's when the MIS world was to fall of hope and promising goals by a budding (and brave) consultant, I can remember the promises of John Dief, Richt, Himmel, and others that the machinery would somehow work out. I can remember a supposedly landmark study for the U.S. At that time there were no adequate guidelines. The business leaders at the time were not too concerned about inadequacies. This was an optimistic view as it may sound, the promises of the 1950's were still valiant and I do not doubt the progress that has been made, but do not the progress of the early 1950's seem lacking in some particular way.

The first such progress was cost reduction and that just hasn't occurred. Even now hardware and a seeming indifference to systems standards and systems inte-

Second, we have not done the necessary job of correlating our own data with leading indicators. We need some type of information, perhaps from the Federal Reserve, the Conference Board, or others, for data, but we haven't done enough analysis to bring these types of financial and operational statistics. We have done too much watching, hoping and guessing. Great corporations are going to find correlations that give them predictions of future economic conditions, and we must do likewise.

Third, Gould has to get more actively into the business of performance measurement. Today our principal performance measures are prior year and budget norms. Our budgets are under continual stress and the challenge of proposed goals, but it would be much im-

A fourth challenge for Gould concerns the need to deal with our data more towards planning and less towards daily operating requirements. We have data that says something about our flavor, our staffing, our status, etc. We need data that can be used by top management to discover what we should be and how we should be heading and how we should be arming our resources. Our business is not only in the production of software and in effect influences to guess rather than know.

The fifth, we have been working ourselves for a long time and are falling short of our expectations. We have been falling short of our expectations. I do not know if this is because we are unprepared or if this is because we are unprepared.

The sixth, recognize that MIS development cannot be any way as a matter of architecture. It seems to me to be a question of whether our MIS and the other systems are set up to be able to communicate and to be able to work together. The frustration of these issues of the training and experience of both MIS professionals and top management is much more important than the activities of the other to construct a system that we think is the best interest of top management. I suggest to you that the teaching of the next generation takes a very high priority and I hope not be the same kind of games and be the same kind of games.

Finally, the challenge that troubles me as a great deal involves Gould's very sizable investment in libraries which are not as widely used as some would like. We need to make sure that the systems are set up to be able to communicate and to be able to work together. We need to make sure that the systems are set up to be able to communicate and to be able to work together. We need to make sure that the systems are set up to be able to communicate and to be able to work together.
THE FUTURE DIRECTION
OF INFORMATION
SERVICES TO IMPACT
THE BOTTOM LINE

Fred H. Lambrou
Director of Information Services
General Foods Corporation

Paul A. Strassmann
Director of Information Services
Xerox Corporation
THE FUTURE DIRECTION OF INFORMATION SERVICES

Fred H. Lambrou
General Foods Corporation

This presentation is my interpretation of the future direction of information services. I will be discussing a systems approach for managing more effectively in a constantly changing environment.

The art of management has many facets. One important facet is the ability to ask the right questions. In order for information services to answer the questions of management, a structured approach is needed for asking and analyzing these questions.

Half of the problem is communication. Communication to corporate management today is the meaning and impact of future technical trends. The other half is understanding the impact of these trends on the corporate strategies and organization. Communicating is really language association—that is, the chaining of various words and terms to convey our thoughts on specific subjects. Understanding is being able to correctly associate familiar, visual images with the chosen vocabulary.

Let's position the information services function within the context of the total corporation. These subject categories are the concerns of business management; the EDP industry is the concern of the information services management.

A corporation must interface the business management with the technical management. First, we must identify the subject classifications for these management functions. These can be hierarchically positioned within the corporation. Corporate environmental analysis consists of these functions:

- corporate organization
- strategic approaches
- business opportunities
- future technologies

These functions ask the question, "What is feasible to do?"

Corporate planning logically follows the corporate environmental analysis:

- corporate planning models
- corporate planning process
- feedback and control.

Corporate planning asks the question, "What do I want to do?"

Next comes information planning. This deals with the distinction between:

- corporate and information planning
- internal functional interfaces
- informational flow analysis
- application development cycles.

Information planning asks the question, "What do I need to know to do it?"

Operations planning answers the question, "How am I going to do it?" It involves:

- business requirements
- information needs
- systems and procedures
- feedback and control.

EDP planning answers the question, "How am I going to support the operations plan?" It is concerned with:

- user requirements
- technical availability
- definition, design, development, and delivery of application systems
- feedback and control.

The communications vehicle among these functional areas are the interface activities—memos, documents, meetings, and telephone coverage.

I am discussing these three areas from the perspective of the information services function: corporate versus information planning, internal functional interfaces, and information flow analysis. The following will develop four primary visual aspects:

1. The difference between the corporate planning function and the information services planning function.
2. The relationship between the physical elements in a corporation and how they logically relate during each twenty-four hour day.
3. A geographic and time-related view of the physical elements of a corporation and their relationship to the information pipeline.
4. Some of the problems of successfully integrating and synchronizing corporate planning with information services planning.

Begin with a definition of the outside, external world from a corporate business planner's viewpoint. An organization today has to be aware of the external world framework and learn how to move in concert with it. Corporate business planners are interested in the outside world and are concerned with business trends. Information services EDP planners are interested in the outside world technical availability.

Consider the differences. The outside world's business trends deal on a global scope. At present, the outside world's technical trends deal on a U.S. scope. The business world is dealing with the people environment versus the manufacturing environment, people's self-interests versus product life cycle, and some events that occur as a result of nature (floods, droughts, earthquakes), international events (wars), government (price controls), and the business environment.

These are mostly unpredictable decisions, uncontrollable events, and reaction cycles as versus
physical lead time cycles, hardware/software specifications, and mostly a predictable sequence of events, which are the vendor environment: Installation and revenue recovery cycles, sales and marketing cycles, vendor support processes, manufacturing processes, and research and development. The major point here is that once the manufacturing cycle begins, we can predict and follow the rest of the cycles. The business world deals with "soft knowledge." Soft knowledge is people-oriented, decision-making. It has a short lead time and deals with random events in contrast to "hard knowledge." Hard knowledge has a physical foundation. It's industry-oriented, which has a longer lead time. The technical world is mostly confusing. Once the manufacturing process begins, a specific sequence of events occurs.

Consider how a corporation would fit between these two worlds, the outside business world and the outside technical world. (See Figure 1.)

First take the corporate business planner's viewpoint. His interest is in environmental analyses and business opportunities within that, he deals with corporate executives. This is contracted to the technical planners who look at environmental analyses and what technical capabilities will be in place for data processing use. Figure 2 shows how the physical elements of a corporation can be viewed logically to gain a better understanding of their relationship for one twenty-four hour period. This is the constant and functions in the base. It also gives us a proper perspective of today when viewed against the past and the future.

Since we are most concerned with today, we will look at a snapshot of how logical elements of a corporation interface and are positioned in relation to one another. Any large company has these basic elements at its core to determine the direction of the corporation. Any large corporation has these elements to conduct their own business. General Foods has these specific elements. The organizational structure described in this presentation to General Foods; however, it generally describes many corporations.

The two elements are the interface between the corporation and line functions. This is the "planning process" starts. It's a top-down direction. It begins with the future trends, business opportunities, strategic approaches, and organizations. Environmental input is consolidated and distributed at the beginning of the cycle. The line operations also have an environmental input and this is used in formulating plans. The line operations plans are fed back to corporate planning resulting in planning documents. The corporate planning process is both a top-down and bottom-up process.

The divisions have strategic business units (SBUs), which define the business's market requirements for their division. Some SBUs also have resource allocation units (RAUs).

At this point in history, until the 1980s, all corporate-time information dispensing was done for the most part manually. In the 1980s, business began to use computers to speed up the manual process. This introduced the need for advanced information planning and the information services function. This information services function deals with information needs and technical requirements.

This created the need for a second "planning process." The result was the creation of a technically-oriented planning document for the information services and EDI function together and notice that there was a distinction between them.

This still does not complete the interfacing of EDI with corporate users. This is shown logically as the systems planning unit (SPU) takes the business market requirements from the strategic business unit and prepares the "applications specifications" or the system specs. This brings us to the major interface point between the logical design of a corporate. This then creates an important set of interfaces. (See Figure 3.)

We have three analysts with different backgrounds and jargon. The strategic business unit analyst is marketing-oriented; the strategic planning analyst is applications-oriented, and the EDI analyst is technically-oriented. It is important that they communicate effectively.

All those interfaces are impacted by the accuracy of the information obtained from inside sources of a corporation. There is a lead time between receiving environmental information and reacting to it. The sources generate this environmental information also have to deal with lead times; in effect, we have double lead times. We must be aware of these lead times and consider them in our planning process.

This double lead time also applies to EDI environmental source information. In this discussion we have identified three production areas which need to be handled by our planning process.

1. The different analyst backgrounds among the strategic business unit, the systems planning unit, and EDI analyst.
2. The effectiveness of each interface between the logical functional elements.
3. The double lead times for environmental input.

Figure 4 shows the interface that is most often missed in large corporations today: getting information to the information services director at the start of the corporate planning cycle so he can anticipate "future corporate needs." The time to get EDI capacity and capability is built. In addition, the information services function can or not concurs with the applications development and facility planning. Without corporate planning information, it is difficult to perform this concurrence function. Also, the return path from the information services director to corporate management can't be completed if the first interface doesn't exist.

What is needed is to tie the four quadrants in a communications link executing daily, in some fashion. Identifying needs, planning, executing these plans in the real world, and with the support of systems. (See Figure 5.)

To do this, a modern corporation needs task processing, data processing, and word processing techniques to be interrelated throughout the corporation. These three terms require definition. Text processing handles sentences, phrases, and words, and is used in those application areas. Data processing uses numbers. Word processing uses alphabet, characters, and words. These are the usual application areas. Today, as a result of shorter business lead times, it is more important that these three processing techniques be interrelated.

People make things happen. Consider the key interface spots in a corporation. The three areas listed above must look in specific directions to do their jobs. The Chief Executive Officer looks at the future direction of the company, monitors its present status, and reviews its past position. The director of corporate planning looks to the future for impact on the business environment, administers the present planning process, and reviews past events. The division...
managers set the business goals, manage today's business, and plan tomorrow.

The next two interface spots began to be important in the 1980's. They are CEP managers who have to look in two main directions. The EDP operations supervisors provide today's information and plan tomorrow's facilities. The EDP application development managers provide today's applications and plan tomorrow's applications.

In the 1970's and 1980's these two will be most important because information is becoming more critical in running the company and, importantly, we are migrating from data to information to knowledge. They have to look in several directions. (See Figure 6.)

Systems planning and development managers manage today's planning process, plan for future facilities, and identify EDP industry trends. Directors of Information Services manage today's information needs, control the information services function, and plan tomorrow's information needs and facilities. These Directors of Information Services have to look in two additional directions toward projecting future corporate information requirements and anticipate the future EDP industry environment.

In summary, all the interfaces with the communications are:
- The sources for environmental input and their lead time for the corporate business planning line operations and EDP technical functions;
- The interface between all the functions which must be open and functioning;
- The missing interface between corporate planning and information services planning and, lastly,
- The business information communications which flows down all together.

Remember that business planning deals with different information than information services planning.

How take a look at the same problem areas from a different perspective--a time-related perspective. Figure 7 shows that a corporation has multiple division where people work together, yet all have twenty-four hours a day to perform. This is the way General Foods operates.

The same people are physically located at different stations geographically within the corporation's business. As an example, they begin to communicate when a purchase order is released to "trigger" a product cycle. From suppliers to supply plants, to processing plants, to distribution sales service centers, to customer outlets. This is the physical lead time. People have one product move through its cycle beginning with the purchase order and ending at a customer outlet.

Consider the specific elements with the production path. These organizational elements are most important in early development of the product until it goes to median. Thus, they must communicate about problems that occur as they move the product along. These line people are primarily interested in these three stages of the production path. These people are more interested in the product once it is ready to go to market. Thus, they are interested primarily in these two physical stages. The problems that occur here are in the final stages in distribution, sales, and customer service. Prior to 1950, this information flow was accomplished manually. In the 1950's and forward, automated information was used to manage this part of the business.

For all of these organizational elements to work successfully, we need to have a twenty-four hour "pipeline," as shown in Figure 8, open between these logical elements to alert management to and to solve problems on a timely basis.

The corporate planning process holds this framework together. The information services planning process in turn supports the corporate planning process. We have dealt with the internal processes of the corporation, but the corporation must be able to react to the outside world. For the corporate business planner this means those subjects defined earlier: environment, time, natural events, government, and business. These are random events which are unpredictable decisions, self-interests, uncontrollable events, people-oriented, and reaction cycles.

Information services planning has a different set of subjects, which are industrial environment, manufacturing technology, text processing, word processing, electronic data processing, and the semiconductor trends. Keep in mind that this function is characterized by its serial-thinking-oriented, because "serial thinking" has a predictable event sequence, physical load times, hardware/software specifications, is tangible, and is controllable.

This describes three areas shown in Figure 9 that impact the corporation and which must be maintained: the outside business world trends, the outside technical world trends, and the internal work-communications information flow. Remember, outside business events occur on a random basis and the information services activities are serial in nature. This communications flow must be understood and functionally be able to react to this environment and monitor plans versus the execution in line with the corporate goals and objectives.

Events in the real world trigger this sequence of events on a continuing basis during a product cycle. The decisions, problems, and communications don't occur only in the first quarter of a planning cycle; they occur every day in every quarter. So this twenty-four-hour pipeline must be open and properly functioning. It must be emphasized that each of the physical stages has interfaces that must be open and functioning during each twenty-four-hour day. The business world has different information to input to the pipeline than does the technical world, and the planning processes must be designed to recognize those differences and monitor actual happenings on plans on a timely basis.

The outside world environment must be evaluated to complete the picture. We can see how information services completes the picture between corporate business planning and EDP technical planners to keep the corporate communications circle moving. Today, corporations are more and more being compartmented by systems operations, application development, and EDP technical support functions. In conjunction with education and systems planning and development and information services activities.

This communication link ties the four quadrants together which we discussed earlier: identifying needs; preparing planning; executing plans in the real world; and the support of systems. These are the organizational elements that are primarily involved with the four quadrants.

These organizational elements need to be tied together with these three techniques. Problems occur in this communication link, however, because the common elements in the real world, productivity, and the support of systems. These organizational elements are primarily involved with the four quadrants.

These organizational elements need to be tied together with these three techniques. Problems occur in this communication link, however, the reason is that the business world changes rapidly and we don't have a clear picture of the future or as indicated by the dotted lines. As we look further into the future, as shown in Figure 10, it's even

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**Figure 6**

[Diagram showing interface between different organizational elements]
more unclear. The reason for this unclear future is that various decisions are made throughout the world each day that determine actions resulting in change. The world changes each day as a result of decisions, and corporations change each day as a result of decisions. Only people can make decisions. The decisions people make significantly determine the modern world environment. Timely information, therefore, results in accurate decisions producing accurate actions.

What happened in the world yesterday is reported to us in the U.S. today, but can't be acted upon by corporations until tomorrow. This gives us a physical lead time before we can determine what is happening now and when you can act on it. This occurs not only once each year, but every quarter. This impacts a company's long-range look as compared to the information services of the world which is primarily U.S. oriented. It has a better picture longer range. This is because the U.S. scope is easier to monitor than the worldwide scope, and because information services technology is concentrated into a few companies.

We, in information services, can project our physical environment for several years once it is annotated by the vendor. Look at the differences among IBM and other IBM systems. System 360 was revolutionary and had massive conversion activities; the operating system was introduced on a large scale the first time. System 370 was revolutionary but "incremental". The key words: "minimal conversion efforts were required and with the introduction of networking capabilities, the System 370 evolved from on-site to online.

The new future system will be revolutionary with the introduction of new programming technologies and satellite transmissions yet. It may not require massive conversions, but may also deal with the vendor marketing thrusts. Those thrusts start with your data, and move to your information and business by interpreting text, data, and word processing. In addition, the systems manufacturing cycle for their product line must be watched. This is a predictable sequence of events which can be tracked and influence the user and EDP planners.

Remember, however, that the user EDP planning cycle has a physical lead time and this should be matched to the vendor's product cycle so that conversion effort is scheduled. We know the vendor's physical lead time that took place with the System 360, and we can plan the user's lead time through the System 370 and future system generations. This is why we make vendor user development requests and define, design, develop, and deliver application systems focused on the existing and future facilities. These examples of our current applications need to be developed with these physical time frames in mind, while interfacing the changing business world requirements through the proper functioning of this communications link.

Another view of the differences between corporate business planning and information services/EDP planning are the elements that concern a corporate business planner:

- EDP vendor marketing thrusts which take our data, to our information, to our business.
- EDP vendor product manufacturing cycle which is projectable and can be monitored to varying degrees of success.
- How a corporation interacts with the outside world through its planning cycle.
- Outside world events and customer and vendor marketing quals usually are set in January, in line with the calendar year.

General Foods's planning cycle starts in June and July. We are executing last year's plan today [September] and planning for next year. But how do today's problems and changing environments get fed into the planning cycle? Information services planning operates in the same way and must interface with the corporate planning cycle. It requires that the communication vehicles be maintained with corporate management. Information users historically have been reacting to present events when specifying information needs. Therefore, when we consider the lead times for planning and systems application development, we find we have dealt with today's problems tomorrow. This is how the problems have been defined with the hierarchically structured environment that modern corporations face today. [See Figure 11.]

In summary, there are two distinct worlds: the outside business world and the outside technical world. The corporation must identify, monitor and move in concert with the events in each of them. It is important to recognize that both these worlds are now in a transitional period. A corporation fits between these two worlds and relies on both for its existence. If a company loses track of either of these worlds, it may lose its competitive edge.

The information pipeline for your corporation must cut across both these worlds and through the internal functions of your corporation during each twenty-four hour day. Remember that the structure of the information pipeline determines the effectiveness of the information that is moved in that pipeline. Before the next set of information systems is developed, it is essential that the people be functioning properly. If it is not, the investment in information systems will be lost and the necessary lead times spent. This can be predicted because by the early 1980's all the corporate functional areas including the research and development, marketing, and executive areas will be heavily dependent upon data and data processing to capture, process, and disseminate information throughout the corporation. The future direction of information services is in understanding and communicating these concepts to the corporate management and being the agent of change to bring about an effective pipeline strategy. In the mid-80's the business structure will be concerned around information, and the information pipeline will be the heart of the system. It cannot be done without us, because no other function in the corporation understands the vocabulary of both worlds.

The challenge is ours.

Figure 9

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Figure 9
I will be describing lessons learned from managing the total functional cost of information processing that exceed half a billion dollars. This article is based on the broad concept we have at Xerox that the cost of the user cannot be separated from the cost of the technology.

We have developed the concept of total "back office" management at Xerox, in the last five years. Our total cost of information processing includes in addition to EDP, telecommunication, word processing, filing, and customer inquiry handling, also the expense of over twenty-thousand people engaged in all forms of administrative, executive, and clerical tasks.

We believe that we ought to look functionally at the entire process of managing the information resources, because this is increasingly becoming an enduring societal concern about the growth of bureaucracy. This concern is not only unique to private industry, but also to public services where the information function accounts for almost the entirety of expenditures.

We are continually confronted with having to arrive at trade-offs between current and future investment streams, short-term cost reductions, and performance improvement objectives while in the process of managing information. The options are getting tighter, the recycling period is less; therefore, the information function today has to account to top management for bottom line impact to a greater extent than ever before.

We have to weigh an increasingly larger number of options in making these assessments. We must consider centralization versus decentralization, locally developed technology versus centrally supplied technology, and, most importantly, the trade-offs between people and capital productivity. The latter is stressed because I view the systems professional as the successor to the functions previously done by industrial engineers when they increased the productivity of our production sectors of our industrial society. As we move towards an information-oriented society, our system's analysis will have the job of engineering improved productivity from our corporate and public enterprise bureaucracies by means of improved uses of capital to perform labor intensive functions.

One of the reasons this topic is so sharp at Xerox is because we are in the office information business. We are also an information intensive organization and, therefore, the focus of how we manage our information resources is very, very sharp.

My presentation will address the following main topics:

1. The concept of project profitability.
2. The concept of technical project profitability expanded to examine the aggregate organizational productivity. Most importantly, I will discuss an innovative source of productivity accounting at a top of track allowing the bottom line impact of technology on company profits.
3. A case study which examines the investment decision for a risky project.
4. The use of specific examples of how to look for new opportunities to improve our profitability.

As a result of all these, I will then redefine the objectives for management information systems activity.

It is my intent to try to answer the question on the limits on growth in the information systems function. Are we beginning to get to the top of an "S" curve which suggests the decline in the past rate of growth? Have we already reached maturity or are there great prospects for further increases in the scope of the information function before us? Can we understand what are the driving forces which will explain a particular "S" curve for a particular enterprise?

Let me begin with an "S" curve for EDP budget growth. If one has held a job long enough to analyze the development of EDP in a single organization over 10-20 years, he finds that budget increments that make up a five year smooth "S" curve history are actually made up of a multitude of individual learning curves as seen in Exhibit 1.

If projects are initiated in quick succession and they get completed successfully, EDP budgets rise rapidly. As a matter of fact, if the innovation rate stops altogether it is conceivable for the top of the "S" curve to decline as cost reduction activities drive overall expenditures down.

The key to the analysis is the growth in information systems budgets then falls in a careful examination of individual events causing project authorization as well as the overall timing of successive projects. Consider the cost curve generated by a typical computer project as shown in Exhibit 2. As a rule, the operating expense for a set of applications including maintenance and enhancements will equal or exceed the expenditure rates during development. This means that once an application is automated, it permanently adds to the fixed costs of the computerized or systemized sector of an organization. Technology improvements do not subsequently contribute much to cost reductions without involving further development funds, since technology "locks in" costs by tying in the application into a particular equipment configuration. Insular as labor constitutes a major part of the cost (typically 50-70 percent of any EDP budget), inflation guarantees that the costs of all computer applications will grow with time. This point is best illustrated by looking at the economics of a large EDP organization as shown in Exhibit 2.
I frequently hear what a great "buy" information processing is because of the fantastic improvements in computer technology. Despite these overwhelming arguments, when you look at the bottom line there is only about a 4 percent point difference between labor costs which you are trying to displace and the EDP costs which you are installing. Therefore, I don't think technology is really the most important element in profitability of EDP projects. Unless the labor contents of EDP budgets decreases materially, the cost factors of the EDP organization will be only moderately better than those it will try to substitute for by means of automation. Matching the cost curves by, therefore, not the most significant variable in judging the speed with which an organization evolves through stages of growth. Project profitability—the cost/benefit ratio—is more likely to give us a clue about the desirability of new EDP projects.

Project Profitability

The shape as well as the ultimate level of an organization's "S" curve will be the result of several conflicting forces. Exhibit 4 shows a characteristic pattern of cost/benefit relationships where the gain or loss is defined as the positive or negative cash flow resulting from computerization. Several rules can be gleaned from these relationships:

EXHIBIT 3

EXHIBIT 4
Auditing which justify doing a thorough job. This technique is productivity accounting.

Productivity Accounting

The following shows an application of this technique to management of an information system.

**PRODUCTIVITY TREND**

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<tr>
<th>QUALITY INDEX CURRENT</th>
<th>UNIT COST (PRIOR)</th>
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<td>100</td>
<td>90</td>
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The ratio of unit costs is the primary indicator of improvement. The ratio means that if the unit cost for performing a specified information-risk function (such as preparing a check, issuing a purchase order, processing a claim, handling an inquiry, etc.) is less currently than previously, then the productivity index will show an increase. The second ratio, Cost/Benefit, allows evaluation of productivity credits even if unit costs remain unchanged, if the qualitative aspects of the output of information services show improvement that has a direct influence on other trade-offs. An example of the quality relation to unit cost is shown in Exhibit 6.

Since unit costs can be tracked over an extended time period and can be generated as a by-product of a company's accounting system, it is then possible to make comparisons between planned and actual results without regard to volume or break-down components and it shows the track record. It should be emphasized that the improvements in a particular function or functions are merely for illustrative purposes. The actual productivity performance per invoice for 1978 was plus two-tenths of a percent productivity improvement. This is real productivity in constant unit cost terms. The performance was plus 3.4 percent in 1979, and something was happening against the plan in 1978. By this means you can then get operating management accustomed to the forecasts and functions, and then, you can look at the proposed automation investment programs for 1979, 1977, and 1979 projects and see what the productivity control targets are.

In the area of comparisons, we did not have the measures in 1974 and 1975, but your historical experience reflects negative productivity. When you start a productivity program, you should always compute historical productivity figures by doing cost analysis so that for planning purposes you can do better in the years to come.

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<th>COST/INCOME</th>
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<tr>
<td>PLAN</td>
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The budgeting process which uses these kinds of productivity projections is overriding gratifying. I don't want to dwell on the usual budgeting games that use headcount analysis and take an operating manager through an inspiration-like process: "Why do you need this office; why do you need that computer; why do you need that?" Productivity management takes the operating process more mature and very much bottom line-oriented.

Project Profitability

We have now in our possession the concepts that permit us to answer new questions concerning the dynamics of a "staged" solution in a specific organization.

1. Maturity in the introduction of computers occurs when the rate of innovation increases. This is equivalent to saying that if the return-on-investment for our high risk activities falls below the time the investment "hard" rate—about 20-30 percent—the innovation will not occur.

2. The rate of innovation for information systems projects is triggered by new projects having attractive cost/benefit ratios. Similar as technology succeeds in lowering the cost elements in the cost structure of projects previously deemed unaffordable. In other words, with new technological breakthroughs and stages of growth, all factors that have a bearing on a high project RDI (such as organizational) capabilities to assure the realization of benefits, cost displacement opportunities, development risks, project management and control, etc. have more or importance.

3. The overall strategy of project sequence and thus assuring positive cash flows is of paramount importance. Otherwise the organization will not be willing to engage in innovation on self-automated automation. Management planning and control is essential and management and graphics of information benefits projects will dictate the shape of an overall curve to a specific situation.

4. The primary concern of the top information systems executive is the management of ventures that improve organizational effectiveness and/or profitability.

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<th>COST/COMMISSIONS</th>
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<td>ACTUAL</td>
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**EXAMPLE OF QUALITY RELATIONSHIP TO UNIT COST**

<table>
<thead>
<tr>
<th>UNIT COST</th>
<th>KEY SERVICE _ QUALITY MEASURE</th>
<th>COST/BENEFIT</th>
</tr>
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<tr>
<td>CHECK PREPARATION</td>
<td>DAYS TO PREPARE</td>
<td>CASH FLOW</td>
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<td>CLAIM PROCESSING</td>
<td>ERROR RATE</td>
<td>COST OF CLAIMS</td>
</tr>
<tr>
<td>INQUIRY HANDLING</td>
<td>RESPONSE TIME</td>
<td>AVENUE LOSS</td>
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**EXAMPLE OF PRODUCTIVITY ACCOUNTING AND PLANNING**

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Example

Assuming a week of work as a "job," which can be defined as a task with specified inputs and outputs, the average U.S. current cost for performing the assigned functions will be about $15,000 per week, as demonstrated in Exhibit 8. The productivity improvement for a very successful automation application runs about 8 percent "real" change.

Eight percent is suggested because the aggregate productivity for the United States today is very low. It is one of the lowest of the western countries and hovers around 2 percent. I don't think we can afford to take our sector of the economy—information processing—which has the most advanced technology to move at the same speed as the rest of the country. When you look at a typical "rate" of how a company should become productive, it turns out that our function, which is the beneficiary of the most advanced technology that our society possesses, should be doing materially better than the average to compensate for those areas, such as government and social services, which so far achieve no gain in productivity improvement.

After allowing 7 percent for inflationary increases in unit costs, our target for improvement will be about 15 percent. Why an organization may not automatically claim inflation as an "allowance" is very difficult to realize. Because of risks, we need to be realistic in assigning a high discount rate of 30 percent and a relatively short project life of 5 years. Standard financial analysts tables will lead us to not to claim this as an inflation allowed to achieve the desired results.

Unfortunately, labor savings projects through office automation can be partially misleading. In many cases, I believe that any aggregate line can be composed of several related subprocesses. Nolan's "fifth stage" can be drawn as a new and major technology venture consisting of projects in assimilating database technology. This is illustrated in Exhibit 7.

Sample data shows that the "rate" of the "fifth stage" curve is very difficult to predict. It is unlikely that any aggregate line can be composed of several related subprocesses. Nolan's "fifth stage" can be drawn as a new and major technology venture consisting of projects in assimilating database technology. This is illustrated in Exhibit 7.

As a new and major technology venture consisting of projects in assimilating database technology, it is not sure that the "rate" of the "fifth stage" curve is very difficult to predict. It is unlikely that any aggregate line can be composed of several related subprocesses. Nolan's "fifth stage" can be drawn as a new and major technology venture consisting of projects in assimilating database technology. This is illustrated in Exhibit 7.

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percent range, per annum, in real terms) while the productivity of our economy at large hours whetted an unsatisfactory 2-3 percent range. The task of finding profitable and productive opportunities in information processing is not just a way of safeguarding job opportunities for computer people. It is an objective. Calling the real economic priority because our society is finding it increasingly desirable to migrate its labor force from highly productive agricultural and industrial sectors into low productivity information intensive occupations.

This is illustrated in Exhibit 10 by showing occupational trends for the United States population since 1850. This chart shows that we started migrating agricultural workers at the turn of the century from about 35 percent of the labor force to the current 5 percent plus, while we were building up our industry base. We passed our industrial employment just after the Korean War and have been declining this sector as the percentage of the total labor force ever since then. Cross-over took place quite recently. The information sector curve includes information rich occupations, such as clerical, administrative, and managerial jobs. It also includes teachers, accountants, auditors, EDP people, secretaries, and so forth. One of the reasons why the current real income per capita in the United States is flat is that we have been trading directly productive people for overhead people who do not necessarily contribute to output of the economy. This is why systems people— the industrial engineers of the information society—have huge responsibilities and opportunities to make sure that the nonproductive—overhead—sector of the economy is productively employed.

Reframing the Future Objectives for EDP

Definition of the "stages of growth" for any organization must consider its total information processing expenses, including clerical and administrative labor, as the base against which progress should be measured. The big divide is then that portion of the total information processing expense that is subject to systematic control, measurement, and explicit capital investment management. If, for instance, an organization spends about 1 percent of its revenue for EDP, this will show only a relatively small penetration into areas referred to as "unsystematized." As a rule for every dollar of EDP expense at Holle's Stage II, there will be an additional $0.50-$1.00 falling into unsystematized activities, including the work of copyists, secretaries, under entry clerks, administrators, switchboard operators, accounting analysts, budget specialists, file clerks, claims examiners, credit specialists, and expediters, etc.

For a typical organization we will find coexistence of several technologies and of several investment opportunities simultaneously at various stages of development. EDP may be at Stage IV, telecommunications in Stage II, word processing in Stage I, and general administrative systems just beginning to emerge. That means that EDP, as it is currently defined, is only one facet of the information processing environment and that overlapping EDP are many other dimensions for tackling the overall problems of 'white collar' productivity shown in Exhibit 11, at various stages of their respective "S" curve development.

The purpose of this article is not to dwell on the attributes of the various "stages" that go beyond EDP. It is important to note that I see great opportunities for improved cost/benefit performance in those areas because of their latent potential originating in the fact that these sectors have been largely neglected in the last 10-20 years when most energies were diverted by the鲜花 of EDP. I can see how project development resources will be shifted where the potential is greatest, as increased understanding takes place concerning these opportunities. Exhibit 12 illustrates the result of a test of several word processing installations using a Rex word processing equipment. The financial results are dramatic and are substantially better than our expectations. The improvement ratios are certainly superior to just about every EDP project I have seen recently.

Before my colleagues in computer management abandon their EDP projects and shift their energies to word processing, I would like to warn them that success in this new field is hard to come by. Planning the human factors for successful processing is of substantially greater complexity than just about anything encountered in EDP even perhaps in large scale online terminal networks. The issues are socio-cultural—both on the part of the users
as well as by the word processing operators. Word processing requires a reorientation of job attitudes, improvement in career paths perceptions, changes in work habits, development of new measurements, and a redefinition of what is meant by secretarial service. In terms of organizational structures, the establishment of a network of word processing centers requires an approach that differs externally from the way we implement computer projects. It is a challenge that I recommend for each information processing executive to take up because it contains all of the elements of complexity that will be encountered sooner or later. More toward administrative systems which are also labeled as the "office of the future" environment.

One more remark about attractive cost/benefit opportunities outside of the conventional EDP sector: the involvement of this information systems executive in the telecommunications area. I consider the need for integrating telecommunications (voice, data, facsimile, administrative messages, teleconferencing) planning as an absolute requirement for achieving any semblance of cost effectiveness. Telecommunications systems management are broken down into small pockets of control, with no integrated planning, in most organizations. Advancing into future growth stages must be for managing profitable new projects in this area.

With regard to "decision systems," the best we can say is that this discipline can be expected to improve the productivity of management personnel in the same way as administrative systems are targeted at improving the productivity of clerical and administrative staffs. The theory of what constitutes the "stages of growth" in this area is yet to be written.

**Summary**

The investment in information systems for increased profitability relates to the systemization of all new investments needed to improve the productivity of people engaged in information processing. To understand this investment process requires insights that stretch beyond computer technology, telecommunications, word processing, administrative systems, decision systems, and some of the classifications that may become useful in comparing profitability in diverse organizations, at comparable stages of development.

We have pointed out that the driving force behind evolutionary growth is profitable innovation—the ability to find new project investments. An area that is becoming increasingly more difficult is to reach higher levels of growth with lower costs in organization and in work relationships. Attention to technology matters in this context will not be as important as the ability to secure the benefits arising from automation. As advanced stages of growth are attained, the EDP executive will be left to grapple with technology. His boss—the information systems executive—will manage the new investment opportunities leading to dramatic improvements in overall organizational profits and performance.
I'm not going to describe all of the horror stories of the past of EDP and why systems have failed. I hope, rather, to set the stage for some of the reasons why systems should succeed.

It's important to distinguish between the operational and the management control business. The following describes the bottom-up development of an operational control system which is built from transactions.

There is nothing new in this area. There is the implementation and the day-to-day practice of the fundamentals, and it's the practice of the fundamentals that gets ignored, while we look for the glittering insights.

There are five very fundamental reasons why systems fail or succeed.

1. **Constituent of Management**—This sounds platitudinous, but no system can succeed without this kind of support from the top.
2. **User Involvement**—This may seem obvious, but most of us have worked on projects without user involvement, and experienced the problem.
3. **Project Management**—Systems development, systems findings, and implementation profit all need careful management to aid in system success.
4. **Staff Quality**—Sophisticated operational systems cannot be developed without superior people. I believe that the idea of needing a few good people is a lot more important than the absence of systems development people we often see on projects.
5. **Management of Change**—All four points above can be in place and the system could still fail if the project manager cannot deal with the subject of change with users.

Reasons for systems failures are almost the reverse of reasons for successes.

1. Management abandonment, either on purpose or because they don't know what else to do.
2. We haven't solicited user commitment.
3. We didn't design it properly.
4. We've taken a technical versus business approach.
5. We haven't set very tough standards for ourselves.

Take each of those points and break them down a bit.

Management abandonment is seen in a number of situations. Technical disenchantment and the "delegation" of information processing to technical people are rather obvious cases. Less obvious is the failure of top management to educate EDP personnel in the general concepts and techniques of management. They have not tried to understand the business problems that EDP has been trying to solve. We need to encourage our managers to show us how to manage rather than allow them to give up.

User involvement has been discussed and written about at great length, yet it continues to be mismanaged. If a user doesn't feel like the system is his and he owns it, it isn't going to work. This relates to the theories of responsibility and accountability that psychologists and the human relations people talk about.

Many of the early systems designed were monsters. We seem to have gotten away from that pretty much. Some of the new topics in the technology, such as distributed processing, suggest some rethinking of the concepts of the "elegant simplicity" of systems and the fact that we just can't develop systems that are all things to all people, even in a transitional level.

Many of us in the early stages of our careers were guilty of taking the technocrature versus the business approach; it is easier to deal with things than with people. We've had to try a lot of approaches and management hasn't shown us the way to integrate business concepts into the management of EDP.

The environment that we began was quite interesting if we look back on it—very fragmented body of knowledge, if any. There wasn't a way to do it. We were artists as opposed to scientists and everybody saw the designer in his own right. We didn't want to take away the professional responsibility for design and tried to bend over backwards to not develop a body of knowledge of our business. We have been largely technique-oriented as opposed to looking at the process. We didn't consider much about the management itself and some of the special requirements that EDP management brings to us.

What we learned from this un-scallled "end of the beginning," is that the failures and successes of the past two years have been management failure or success, not technical. This isn't to place blame on the executive or the manager. It means that we have failed to manage the process. We have not gotten cut in front of it and have not tried to learn from other disciplines. Instead we have dug ourselves deeper into the ground as opposed to standing up and looking around to see where we are going.

The lessons of the past on the management problem are not being applied to the problems of the future. We are still dealing with techniques, hardware, communications, and software. All of a sudden we have things called distributed computing, databases, structured programming, or whatever the latest techniques are. We are still looking at these techniques for the solutions of the problems of the future. We are at the "end of the beginning." We have carried the technology way in excess of our ability to manage it. Now is the time to turn around and begin to deal with the question of management as opposed to continuing to deal with the question of technology.
Ways to Systems Failure—Part II
William Atkins
 Touche Ross and Company, New York City

Ours is a great technique industry. We are still all taken up with technology or we wouldn't be working with computers and we seem to want to apply that same desire to the process of management. We want to deal with it in a technical sense, so it makes sense that we develop a lot of techniques that are available today. Technology does not, however, address the key issue: the management process. The management process really deals with people, therefore, the techniques are based on dealing with people and leadership.

We can have a lot of techniques and impressive software in our shops, but if we can't manage the process of change, we are not going to be successful. When we analyze what we really do, it is clear that everything is pointed toward change—change in the operation of a department, division, or entire business. We implement change by using technology and people skills.

Of all the techniques we have available today, the one that is getting the most attention is databases. Today some of our vendors are really pushing the concept of acquiring every data element in the corporation, putting all of it in the database, then having someone like the user decide how to use it. That's one concept that causes a great many problems from a top management point of view. They believe we are so intent on collecting everything, we forget to define how it will be used. They conclude, therefore, that we are so absorbed in the technology that we forget the business process.

Going out and deciding what the business is all about today is definitely more important than worrying about the technology. When we first started with computers, the 1401 or the 650, we really had to worry about technical capability because we couldn't do everything. We had to sit around and say, 'Well, can I do that? Can I do that? Can I do that?' We thought of a payroll or an accounting system, and we had to be fairly selective in what operational areas of the business we attacked. Today we have the technology, so we can leave the CPU and go out and look at the business and develop a business system from a business point of view as opposed to the technical approach.

Many people have been exposed to standards for years; these standards are increasingly important. It is interesting to note we still find a number of our clients who are very concerned that if they try to implement the right measures, they should receive much more than they do. If you can think of your system in terms of growth potential, they'll be more successful.

Let's look at some of the requirements that make systems successful. The framework or key elements to be employed are: people, process, and technology. These three things must be working together to develop a successful system that meets the needs of the business process.

The reality of the management of change is to look at what we're trying to change as opposed to the technology we're replacing. We're looking at clients often in the last few years where they had business processes that have been loosely linked and included enormous amounts of paper. Whatever the business setting, we can step back and look at the processes and say, 'We can install integrated systems, but if we do, we'll probably fail because we won't bring the people along quickly enough to cope with the new approaches. We'll be trying to force them into an environment which they can't live in.' We have to understand the reality we are dealing with—the user's reality. We may not be able to go from the 30's to the 70's; we may have to look at it as the 30's to the 50's, and then, maybe a few years from now, to the 70's.

We must develop a relationship with the user who can influence the operation, historically, data processing started in the controller shop because the first business application was typically accounting-oriented: payroll, accounting, etc. The controller's influence in non-companies is not very influential in the operation, which makes it difficult to implement systems that reach into other areas of the company. The point here is that if we have an opportunity to deal with the users, we do have an influence on engineering, marketing, etc. All too often, however, we have tended to deal with the people who are not really influencing the shaping direction of the company itself.

We need to examine the idea of "commitment." Many companies use a Steering Committee which is a body of management outside of the data processing area which participates with data processing in defining the requirements, the sequence, and the dollars to be spent in developing a system. One thing to remember is that this management group, particularly in a complex enterprise, may not be able to adapt itself to this process. Key points are style, structure, and discipline. The Steering Committee employs a very structured approach to accomplish a task. Be advised that trying to place such a structure on a loose, standards committee, trying to decide what standards they should receive, would be a need to have some sort of methodology which is utilized closely with the user's understanding of what data processing is doing.

"The Omneble Bita" is a way of describing a segment or a phase of the implementation of a system. A lot of systems have started out to be very large, and ended up being very small but successful. No one views them as successful because everybody remembers that the systems started off to be large; if you can think of your systems in terms of growth potential, they'll be more successful.
IMPLEMENTING A DATABASE SYSTEM

Tom Nies
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President and Chief Executive Officer
Computer and Communication Systems Division
United Airlines
THOUGHTS ON IMPLEMENTING A DATABASE SYSTEM

Tom Has
CINCIN Systems, Inc.

One of the reasons we want to go to databases or information systems is that information is important when it comes from many different data files. Another reason is that historically it has been difficult to respond to change in the reports. Database, as originally presented, was supposed to be a panacea for the big, catastrophic problem. Another problem has been that the timely report says there always was last month's information and it is really like reading last month's Wall Street Journal. The fellow says, "Here's your information, sir, right on time—one month late." The fourth thing is that the result of our data processing dollar was good, especially for merchandising and also for the business form industry. Data processing wasn't, however, very helpful for management in supporting major decision-making activity or for people who were trying to just fill orders and get accounts payable or receivable orders instead. Finally, we reached the realization of the need for building an integrated information system. We continued to see problems like Mr. Smith who was dealing with one bank and had six different accounts within it, and we were redundantly entering Mr. Smith's name and address and city and state six different times, maintaining six different records for him. We had to find solutions to these problems.

Yet, in spite of all the potential and the opportunities, we are gathered together here and discussing problems. Why are these things going wrong? What are all these things? Perhaps there is more to it than a piece of software.

When we created our particular product in 1968-69, we named it TOTAL because we thought it did the total job. Looking back, that was naive. There is no one way to solve the total problem—no quick, easy solution. Database is not a panacea as we all well know. There are some things in organizing and implementing a database system that might serve as some guidelines.

Information is a critical company resource. It's a resource just as money, people, buildings, plant, equipment, and so forth are. As such, information needs to be managed, guided, and taken care of. It's important to every organization. How do we go about organizing, designing, implementing, and managing these projects to build information systems?

First of all, again, there is no easy answer. There are some considerations we are certain to many users we've surveyed who are having great success.

The first one is this business of managing information. We talk about the problem of trying to get a project schedule lined up, verifying, and these sort of issues. To have common, non-redundant data, projects must feed off the same type of data. For example, the order entry system, the accounts receivable system, the personnel information system, the sales analysis system, are being developed concurrently in a company. All of these systems are common data. There are forces at work outside of data processing, such as the push of the cash crunch that hit the companies a couple years ago. Upper management suddenly decides, "The accounts receivable system is critical." Data processing cannot say, "We run the company; we are setting the priorities." Top management says it, and data processing must respond to it. This is a real problem when we're committed into one, two, and three-year projects, modularized into chowderblitzes, and the requested system is not scheduled yet.

The second thing is that if we try to build these particular information systems as though everything were dependent on one critical brick in a brick wall, if one brick is changed or moved, the whole wall comes tumbling down. System design must be flexible.

The third consideration is that time is money. If we are planning to implement a system and it's going to be two or three years out, the payback for that which your company is paying for now will not begin for more than three years. If you can move that implementation date forward into two years or twelve months or eighteen months or six months, that moving forward can do two things for you. It hopefully will reduce your cost of development and it also should begin the payback to the company sooner. With the changes in technology and the national life cycles, there are increasingly critical factors.

I've found some things that I think are most common among systems that have been successfully implemented.

First of all, the data processing or information system function must become more user-oriented. Today, seventy-five percent of all workers in America are in the service-oriented industry businesses. Peter Drucker, the high priest of management, education, and training in America, says, "The only purpose for any organization is to serve its users." Data processing says, "Users must become involved. The users have to be doing our way," and users reply, "Isn't a service organization supposed to serve our needs?" If Peter Drucker is right, then the data processing organization which really doesn't contribute revenue to the company must serve the needs of those within the departments which are the revenue generators, producing the merchandize, and so forth. Perhaps data processing now must become more user-oriented. The problem here is that there are very powerful forces at work that are conditioning data processors not to be user-oriented. Consider our basic training. We've all come up through the technological side of the business, and we are technocrats at heart. We might be several steps removed now from projection to managers through the ranks, but we are technicians and we're data processing men and women, and our orientation is there. How much time do we spend in evaluating database packages, evaluating American along-the-line control units, evaluating whether we should go from PS to RPS, evaluating whether we should convert from 800 to 80. Aren't all these things internal to data processing? Do any of these things really do anything for your external user's communication? If not, then it is no wonder that people are upset with data processing, while budgets increase all the time. This tends to be a non-satisfier.
There are many companies in SIS which have provided computer service to their organizations thinking that they were aware of their duties to serve and were quite uninvolved in the work that the organizations performed. There are many of these who are aware of their duties to serve and are aware of their duties to serve and are working at the new organization and are the same way. In fact, they are still the same way. In fact, they are still the same way. In fact, they are still the same way.

A second barrier to user orientation in data processing is that we are completely isolated with new machines, new computer systems, and new applications packages. We are surrounded by these applications packages, and we are isolated from all other work that is being done in the organization. Our work is completely isolated from the work that is being done in the organization.

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I'm the head of the Computer Services Division, which I believe to be as close to the business as it is possible to be. Although I now believe that the business as it is now the business as it is now the business as it is now. I am still the head of the company, and I am still the head of the company, and I am still the head of the company.

In parallel, we had to work on the top-down support, and, principally what we needed was a communications vehicle. The preceding focused on today's topic of databases. However, that can't really stand alone. We were doing a lot of other things at the same time. It is necessary to at least briefly cover some of these other things since they are necessary. The next step is a more detailed process in United Airlines. I don't want to talk about this one. This is a process that worked smoothly from beginning to end, that's not the way things were done in real life, however, looking back, what we are hearing are the major points which were successful in bringing us to our current state.

As we were attempting to implement the policy on computer data, United Airlines, as a corporation, was beginning to decentralize the organization. This decentralization made the Computer Services a "business within a business." One of the foundation stones of this organizational concept was the principle of transparency. This was the mechanism to have accountability and responsibility for the use of the Computer Services product rest with the end user of that product. Having a transfer price also produced "revenue" for Computer Services as a business and allowed for a realistic comparison of the cost of providing the service in relationship to the "revenue" gained. Each of these elements is a story in and of itself, but I think I will have covered them sufficiently for our purposes. For this reason, we have to begin with the way that we did with a dialogue with user organization management within the Computer Services organization.

Consider what a powerful tool transfer pricing is. If you are going to affect a management performance review, then you will need to affect a management performance review. With transfer pricing, the use of the Computer Services Division is going to impact their net contribution to this company, which, in turn, will affect their performance on, and, in some cases, the level of management is going to take may. Subjectivity in these areas should not be overlooked when it comes to non-technical issues, however, there may be other ways, but this is our approach.

We have completed a first look at a top-down definition of the corporate organization. IRD would view this as an asset. We had to try through the process, but it clearly showed us that IRD was helping us in the techniques called Business Systems Analysis and Business Systems Analysis and Business Systems Analysis. A portion of this JPD process, the so-called Phase I segment, which completes a description of today's condition. It was well-organized, and the report showed that we had a problem of an organizational nature. We paused and fixed these organizational problems.
The maintenance and engineering information system plan is very specific and does use the technical specifications for the SLS development process. It begins to define the data, as in the design level data, and planning level data to be used by all the employees. The company has different levels of data, and each level is used for different purposes. However, it has been implemented in 1970. In this section, we will discuss the way the company manages its data and the physical location of the data.

Next we need to set up the advantages that came out of these systems for the technical capability of the database management system of the batch computers. We picked our system, then SLS, which is supplied by Cullum. We looked at a number of database systems and most of them met the technical criteria; however, we wanted a standard product and IMS conforms to the COBOL standard. It operates for something less than $50,000 a transaction. This transaction cost is reasonable compared to anything else that is available on the market except our own two online systems, which are considerably cheaper.

I'll give you a quick example of why it paid off for us to choose a database management system that met the COBOL standard. We decided to implement IMS first in San Francisco, and it had a pair of IMS 3270's. We had converted to IBM's online applications and implemented new ones, when a very large increase in demand caused us to seek a faster database. After all things were considered, we elected to convert to a Unix TM TrademarK. Unix's database product, called RS/6000, allows IBM to take advantage of its Unix environment. However, we have not had to read all of our batch systems. It is not a one-to-one process, but it is very similar. We had chosen a system that did not return to its old version, and we also continued to match and, in spite of the conversion from IBM to Unix, the basic communications vehicle to the corporation remains the same. We had to sign a contract with Arthur Andersen and build a couple of bridges to make the connection to IMS 3270, but that's a small amount of money to pay in order to preserve the ability to communicate with corporate management. Consider what would have happened if we had not chosen to proceed with a single dictionary; we would have lost the communications vehicle; we would have used the old dictionary, which is inadequate compared to our requirements; and, in the end, management would have said again: "Non-reproducible!" - "Do we have to learn your business again?" - "I'm not going to do it!" Fortunately, we sent these messages.

That's where we stand today.

• We have completed the corporate information systems plan, at least in a first draft form.
• We have completed the maintenance and engineering mini-ISP project.
• We have started a mini-ISP project for personnel (or the management of human resources); and
• We have started a mini-ISP project to treat the marketing business process of the company.

Personally, I was surprised when the corporate information systems plan identified one of our problems that was not recognized in any other way. In particular, it indicated earlier, one of the advantages of this planning technique is that it provides the top-down view and not the bottom-up, or technically driven, view.

In closing, I add one caution. If you do not have an understanding and working relationship with suppliers, you do. This revised business management approach is concerned about information systems planning. I don't think it can be done. If it is attempted, it will be technically driven and doomed to become one of the dead ends which are shrouded by the curious mantle called MIS.
PLANNING THE INFORMATION FUNCTION

F. Warren McFarlan
Harvard Business School

There are two main points I would like to make. They are twined around an elaboration of an article that I wrote back in 1971 which appeared in the Harvard Business Review called, "Problems in Planning the Information System." That article described the structure of an ideal methodology for planning computer-based systems. It did not attempt to assess the different factors which would shape how this methodology should be applied in different situations. Subsequent work has led me to believe that, while there is no single right way to do information systems planning for all organizations, there is a right way for each organization to proceed.

The first task of importance is that the structure of the data processing planning process must be closely linked to the corporate planning process. In a real sense, it is a subsystem of the broader planning systems geared on inside your organization. This network of other planning systems and cultures inside the organization significantly affects the extent to which senior and middle management will involve themselves in a data processing planning process.

There is wide diversity in corporate formal planning procedures—ranging all the way from the world of ITI with its heavy emphasis on very detailed procedures to another organization similar to the one I worked with last summer, where the word "informality" best describes its planning process. This organization was a family-owned company which had no treasurer, no controller, and no budgeting process. My recommendation to their data processing staff was to spend no time on formal planning procedures but to concentrate their efforts on building stronger informal communication links with key members of senior management.

This observation does not imply that BDP planning is not terribly critical; indeed I believe it is the most critical of the management systems inside data processing. It tries to deal with the reality that each organization has a culture and a management style which will influence how planning can best be done.

My second major point is that the stage of development of the organization's data processing activity is terribly important in thinking about how to approach the planning task. Stage 2 companies should be approaching the planning task with a fundamentally different thrust, the horizon, and level of detail than Stage 4 companies. Carefully, it is often difficult to realistically assess an organization's development. Management tends to assess progress as being more favorable than is realistic.

Let me backtrack and develop these ideas a little further. First, let us turn to corporate planning. It in itself is a very new activity. Prior to 1960, only a handful of organizations had a corporate planning department and formal planning procedures. To many, the two major management developments of the 1960's were first, the enormous explosion of information systems technology implementation, of which SMS numbers are exponents; and second, the enormous revolution in thinking about the processes by which the organization should plan and look toward the future, Corporate Styles of Planning

There are several fundamental philosophical differences in how organizations do corporate planning which influence the art of the possible for data processing planning.

One critical dimension is whether an organization believes in tight planning or in loose planning. How does one characterize an organization which believes in tight planning at the corporate level?

- The plan itself is long with great detail, hundreds of pages, and numbers broken down to the nearest $10 or the nearest $.1

- There is detailed year-to-year analysis of how the plan for the next year changed from last year's version, with enormous detail by programs and responsibility centers.

- There is a very elaborate, time-consuming process which involves large numbers of individuals.

- The budget almost surely is the same as the first year of the plan.

- The same unit is responsible for both corporate planning and budget preparation.

- Planning has a short two- to three-year tactical horizon.

This approach can be contrasted with the loose approach to corporate planning. In this case, the corporate plan is a much smaller document dealing with sumary trends, aggregate data, numbers rounded off to the nearest million, or, for the large organizations, to the nearest $10 million. There's no attempt made to reconcile this year's plan with the numbers in last year's plan. It deals only with the major programs. This planning is deliberately done at a different time than budget preparation by a separate organization. There's no effort to reconcile the budget and the plan. Its horizon is five or more years.

What are some of the arguments that influence selection of a tight planning versus a loose planning approach?

1. When the first year of the plan is your budget, the first year of the corporate plan is highly realistic. Conversely, when the first year of the plan is the budget, a typical allocation of planning effort is 95% for year one, and 5% to all of the years beyond.

2. When you have a tight linkage between planning and budgeting, no one worries about the relevancy of the planning process. You have great commitment; it is a task which is taken seriously and there is no credibility gap. Yet, when the first year of the plan is linked tightly to the budget, there is great danger of planning myopia. We pay attention only on next year, and lose sight of the broader and longer term trends.
3. A major purpose of planning is to stimulate a creative vision of the world. Under the tight form, creativity may be pushed aside for most years' goals with emphasis on risk-seeking.

Corporate planning may legitimately vary from the tight to the loosely defined depending on your organization's needs and philosophy. For example, if you are trying to find corporate planning departments which believe that they don't need to worry about the data processing activity. Yet these organizations are so data processing oriented and so inflexible that many of their handwritten programs are held or dismissed at the corporate level. Hence, they are inflexible because they fail to recognize the influence of the data processing environment in the constraints of the ERP department, and where the corporation is moving.

Conversely, many organizations are legitimately constrained to plan the financial constraints in the ERP department's staffs, systems, hardware, etc. For example, if you are trying to find corporate planning departments which believe that they don't need to worry about the data processing activity. Yet these organizations are so data processing oriented and so inflexible that many of their handwritten programs are held or dismissed at the corporate level. Hence, they are inflexible because they fail to recognize the influence of the data processing environment in the constraints of the ERP department, and where the corporation is moving.

A second major dimension comes out of the question: Does your organizational size determine the importance of the tight form, or does the loose form determine the importance of the tight form? The tight form begins with the assumption that the world is a closed system, while the loose form begins with the assumption that the world is an open system. The tight form is often used by large organizations, while the loose form is often used by small organizations.

The second major dimension comes out of the question: Does your organizational size determine the importance of the tight form, or does the loose form determine the importance of the tight form? The tight form begins with the assumption that the world is a closed system, while the loose form begins with the assumption that the world is an open system. The tight form is often used by large organizations, while the loose form is often used by small organizations.

Another important issue is the size of a data processing budget. If budgets are set below the million-and-a-half dollar budget level, it becomes difficult to manage the execution of the data processing plan.

Finally, the quality of ERP planning depends in large part on whether the organization is willing to invest in the necessary data processing input from third, fourth, and fifth party vendors. The organization must understand the practical applications of ERP systems and the potential for effective planning processes. The planning process should be based on the combined efforts of these groups together to produce an effective ERP plan.

In closing, the question that I would like to leave for the reader is: How is the great flexibility of ERP planning, should be used to regularize or subdue? There is an informal alternative to try to do this, simply make a plan for the next three to five years. Should one be searching for a regular rhythm of input to the environment, or, given the difficulty of pulling resources available, how should ERP planning not be done episodically?

The entire process of planning today for tomorrow's new ERP system must be aligned with the business strategy. If the evaluation criteria are not aligned with the business strategy, the evaluation will be misdirected. The evaluation criteria must be related to the business strategy, and the business strategy must be related to the evaluation criteria. The entire process of planning today for tomorrow's new ERP system must be aligned with the business strategy. If the evaluation criteria are not aligned with the business strategy, the evaluation will be misdirected. The evaluation criteria must be related to the business strategy, and the business strategy must be related to the evaluation criteria.

We all agree that the ability to be able to adjust the strategic goal to the ERP system at different levels is an important part of ERP. We must be able to adjust the strategic goal to the ERP system at different levels. Therefore, we must be able to adjust the strategic goal to the ERP system at different levels.
database technology, model creation, and I/O structure definitions. We envision a phase of toward compatible information flows to management.

As information managers, we should be planning to promote the benefits of the business unit to which we belong. Having identified what information systems are required to provide that information, we must direct our attention to the resource requirements necessary to achieve our good intentions. These requirements are in three categories: document resources, which are the data processing hardware and software used to create the documents; and human resources, which are the people needed to process the information. The planning process is to identify the resources required to provide these documents and to coordinate the use of these resources with the needs of the business.

In summary, all of us are in business; we ought to be businesswise and make our first and technical management second. If we are in business, we should concentrate on becoming knowledgeable about both the business we're in and as well as those who may make the high level decisions that the business requires. This means that we should get to understand both the planning process as well as the information required to support these decisions. The planning we do should be directed toward providing that information in its useful form and on an as timely a schedule as we can develop. Our planning, therefore, should be a matter of: developing the systems that will provide management with the information they need to plan and control the constantly evolving business issues and opportunities as they face within appropriate time frames; and developing resources to build and operate these systems effectively, efficiently, and in concert with the business goals and objectives of our parent organization.

Introduction

The purpose of planning is to set forth future options and opportunities for MIS activity, so that management can consider these activities for the assignment of resources. As such, it is in competition with all the other uses of resources. MIS resources are, however, some of the others asking for resources are dirty empire-builders. This is really a quasipolitical activity in which the MIS manager is attempting to get control of resources which are desired by other managers and is attempting to do this through influencing top management. Top management can be influenced only by its perception of the reality of the business. MIS opportunities must be translated into business opportunities in the context of the particular firm and industry. Planning must be firmly rooted in hardware and software technologies with adequate personnel to bridge the technology with the application. However, it is the applications alone that will have meaning to top management and sell the feasibility of assigning resources to MIS. This dictates the organization of the MIS plan: applications up front and the supporting resources later. The order of these supporting resources is not of great importance and can be related to fit the immediate situation at the time of planning.

MIS planning is like spinning and maintaining a web. A pressure on any part of the web is felt throughout, and a break in any strand affects the whole structure. The requirement for management to assign resources in competitive demand to MIS cores through clear presentation of attractive business opportunities embodied in applications. The implementation of these plans imposes new, heavier requirements not only on analysts and programmers, but also on hardware, software, systems programmers, and operators. To avoid later sorrow, it is necessary that increased loads on any segment be translated back into increased strength throughout the entire network.

The planning horizon should be as far as can be clearly seen, and a little further. This works out as about five years—not of which is well structured and half as "through a glass, darkly." This is because the various elements can bear its own horizon, which will be considered later.

The five-year plan is the next common approach, which is increased every year, constantly with unexpected changes. This naturally raises the question of new life, definition, or rigid long-range plan should be. It shouldn't be a street-jacket, nor should it be a declaration of sense, amorphous sentiments. It must represent a realistic projection of the major implications for the next five years. In a sense, the approach to be defined; so that flexibilities can be made to meet new or changed conditions. However, too many things can change to be slavishly tied to post projections but, at the same time, too many things remain constant to have a complete about-face from year to year.

Applications

The nature of applications and the manner in which they are discovered and developed is a function of the nature of an industry and personality of a company. There is no value in attempting to discuss them here. At any given time, some applications are being considered for approval, others are approved but not yet started, some are being installed, and new concepts are being developed for future applications.

Since applications originate in the world outside data processing, this is the area that is most difficult to forecast. Competitive problems, new products, new facilities, new management, changed labor contracts, new legislation, actions of administrative agencies of government can cause a need for the development and installation of new applications. This gives a short horizon to applications planning, since demand can change rapidly. It dictates an increase in free development resources—analysts and programmers—in the latter years of the plan.

Considerable care must be taken to relate applications to the resources requested in the subsequent sections. This is the sales section of the plan. The rest of it is most likely to be increased or continuing cost, and will be favorably received only if clearly related to the benefits that will come from these applications. For this reason, any elements of cost that can be related to a project should be associated with its I/O peripherals, I/O, personnel, and man-hour or memory expansion, as required.

It is most important that the applications be put into the context of improving function of the business. Do not say: "...will permit random online inquiry into the database with minimal CPU load," but instead: "...will let us check the status of the customer's order while he is on the phone." Do not say: "...will permit the retrieval of data from separate files for processing by D/I and statistical packages," but instead: "...will let the Sales Product Manager quickly run analyses of the historical sales records when he wishes an answer to a competitive situation;" Cost reduction and elimination of personnel are real and worthwhile goals, but they are not real benefits. These goals do, however, have close parameters, and do have negative outcomes. They should be used freely where applicable, but other benefits should be emphasized where possible. Better service leading to increased sales is an open parameter. It must not be afraid of qualitative benefits, such as better information for sales, better control over expenditures, use in planning and controlling their operations.

This is not to advocate "blue sky" benefits. No benefits is communications, like others, is not individual, but to the user on firm proposals for implementation. Only the user will realize benefits, and only he can certify to them.
Hardware—CPU, Memory, EPROMs and Channels

Hardware is probably the most discussed of the three supports for applications, but it may be the least important. Even if you have a successful application because of application because of hardware, although it may have been more expensive than it should have been, or less effective or both, the emphasis on hardware appears to be based on one of the second least successful criteria of all time, which makes its living selling and leasing hardware. Also, hardware may not be as widely available or as widely known as it should be in order to forecast precisely.

Six months ago, the concept of competitive supplier evaluation seemed to be dead, killed by the popular Hurley Application programs, data, and databases. Last opportunity cost was very high, but on a much smaller scale with the disk-compatible types multiplying rapidly.

Hardware cycles have become very erratic, but it will not be the equipment planner a more continuous cycle. Hardware changes are too erratic for planning evaluations. This is often used with the assumption that two years is a minimum time for full management about additional capacity requirements.

When new hardware is required, there are five items to keep in mind.

1. Cycles of a CPU can be added. Memory and channels can also be increased. EPROMs can usually be increased. CPU cycles are fixed, unless on standby. The CPU cycle is usually too expensive, reliable enough, and cycles, and then the cost purchase.

2. Always get more main memory than anticipated. If you are short of main memory, you will find you are using your best programmers to get around using cycles instead of writing software. This wastes CPU time and accelerates the exhaustion of CPU cycles. Have the main memory-saving programs, and if you cannot use them, you will be more likely to use cycles, even in your next larger machine. The main feature of this is being too conservative on main memory and the cost of this is really quite cheap in almost all digital generation machines.

3. Do not buy an early model of anything. If you are going to do research and quality control, you should pay the price for the latest design, but not for the latest machine, because you may get one last design, and still not get converted to any machine.

4. Be very careful of the measure of value of the manufacturer’s last model is how much it will cost to do what you want done. It may cost less to do the job, but it will cost you more in the end. It may cost more to do the job, but you will have to change.

5. The measure of value of the manufacturer’s last model is how much it will cost to do what you want done. The problem is that the hardware is so fast plan accordingly.

No plan should be based on manufacturers' software that has not been out in the field. The manufacturer's software is not perfect, but only that they have shown it. The problem is that the software is so fast plan accordingly.

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At Inland Steel we are skeptical about our ability to expand work more than 100% per any extended periods. Without warning serious problems of productivity and quality as managerial attention is focused on recruiting and training staff. As a result we are not particular to have a large number of projects, and we do projects on a modular or departmental basis with our own staff. The largest project team we have ever used was 5 programmers and 4 analysts, along with 4 representatives from our department. It may take 5 to 10 years to extend a system throughout all the operating departments and only the top 5% of uniformaly and improved performance. During that time, we bring in segments of operation rather than the entire operation and get feedback by segments. There is a factor of safety to this approach in that refusals or errors in design or implementation will affect only limited segments of our steel operations at any one time.

Overall, this conservative, perhaps cowardly approach, is the system. This may be a function of the nature of our industry and the difficulty of the software development. This is true in a market where the global software development business will not be feasible, that is, they are finding new layers of layers, that it is impossible for software development should be dedicated to the development of market software. An obvious question emerges here. Will it become a deal as the manufacturer charges his software recompense and to suit us as much as possible from other software? Nothing is certain in this area. This involves a future decision to modify all of our software. So far we do not see that this occurs as difficult as the effort to modify a computer by a software company.

In this final analysis, the whole thing comes down to the software. This person must deliver the software in a routine, repetitive, reliable manner. If the software is inoperative, the time to software development must be extended. This is a difficult problem. Software development will not be feasible, that is, they are finding new layers of layers, that it is impossible for software development should be dedicated to the development of market software. An obvious question emerges here. Will it become a deal as the manufacturer charges his software recompense and to suit us as much as possible from other software? Nothing is certain in this area. This involves a future decision to modify all of our software. So far we do not see that this occurs as difficult as the effort to modify a computer by a software company.

To aid in this, we are careful to make our own software for the hardware. Our software has been developed for over 5 years of various hardware. It is inoperative, but we do not see that this occurs as difficult as the effort to modify a computer by a software company.

The personnel is not the hardware. The software furnished by the manufacturer is not the software. The software must be as good as the hardware, and the hardware is so fast plan accordingly.

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The personnel is not the hardware. The software furnished by the manufacturer is not the software. The software must be as good as the hardware, and the hardware is so fast plan accordingly.
In summary, then, we have looked at the purpose of the exercise, and the three kinds of resources you need to realize their benefits:

- The applications are the most important of the assets, and we pay the only price for supporting you in your extravagant demands.
- In terms of hardware, we have reviewed some simple principles, including escape routes and the use of spare parts.
- In terms of software, you should expect the worst from the manufacturers, and be willing to buy from specialists or to spin your own.
- In terms of personnel, recruit only the best. Do not let bodies before you lower quality standards and anticipate future needs by advanced training. Don’t forget that the project operator must be able to perform, or all your planning, design, and inspired programming will be wasted.

Plan "Practically" in terms of project scope and for quality and flexibility.

At New England Life we have a Systems Planning department. It’s a small group made up of a director and three planning analysts. They work on project requests prior to any implementation commitment. A very structured approach is followed in handling project requests as received. This approach is designed to produce meaningful deliverables at key points in the development process.

A "Product 3" is an extended statement of the project request definition and a list of individuals or areas of the company who should form a task force to define the scope and limitations to be applied to the project. This task force works under the direction of a systems planner to produce a "Product 2." This is a feasibility planning report and its outline generally goes something like this:

1. First is the statement of the need on the part of the user. This is followed by a statement of the goals and objectives. What are we trying to accomplish? Next is the statement of what the system will do—what specifically are we trying to do with this system? This is followed by a statement of the work to be performed, including response time, transaction volume, possible number of terminals, and the amount of work to be done, and an estimate of cost and elapsed time estimates. Last, we detail the technical feasibility, legal feasibility, and so forth down the line.

Product 2 is a gross overview which helps management to determine within projects should be committed to for development.

There are currently about seventy-five projects in various stages. We have meetings with the president to recommend priorities as to which ones are to be studied further and which ones are ready to move from systems planning into system development. We also structure the step-by-step process of developing systems. This becomes a "Product 3," which is the detailed specification to determine exactly what the desired inputs, transactions, and outputs of the system should be. "Product 3"s do not deal in how these will be provided, but are English-language descriptions of the "what?" in sufficient detail for the user to understand and approve the system.

Approved "Product 3"s are documented for data processing design in the form of a "Product 4." The coded modules of programs become our next product—each module unit tested by the programmer who wrote it before it is assembled into modules. Special areas outside of data processing prepare system test plans, user organization work flow procedures, and educational and operational documentation manuals, while the programs are unit tested.

Systems tests are begun to both quality and volume test the new programs as the programmers complete their unit testing of each module. This is followed by a Model-Office testing which tests a production-like test period in which the user work-flow, programs, and EDP operational procedures are all tested as an integrated whole. When the users, EDP, and programmers sign off, the new system is placed in Production.

We manage and control this process carefully. It is not possible to design all the tasks which must be performed to complete the project until all "Product 3"s are approved and the definition is complete. We control it at this stage by maintaining lists of all the "Product 3"s to be developed, their schedule dates, and whether they are approved or not. Any questions which develop while delaying a "Product 3" from being completed are immediately highlighted and forced up the management ladder to be resolved as quickly as possible.

Once the user definition is completed and approved, we develop a RCP chart which puts all the tasks together. This process is automated and allows us to have weekly meetings to review progress. RCP allows us to plan where resources should be allocated throughout the duration of the project by helping us project future activities. When a project enters system testing, we have found that RCP helps to limit its effectiveness in future projections. The system has been loaded with too many activities, and any questions at this point is the correction of errors and fine tuning. This is a period where we cannot afford to advance how many errors we will encounter. The process is controlled by recording each error encountered and following procedures to see that each is evaluated, corrected, and checked out. We are able to predict how long a test period will be required by monitoring the number of errors encountered and the rate at which they are repaired.

We have found this planning process effective for structuring the development of systems. We are getting our systems done on time and we are pleased with the results.

The data processing area has had to deal with new planning problems as online interactive systems are now installed. User departments are not organized to deal with these systems. Most user departments have been organized around key applications which are related to the key applications of the system. The new systems require the use of terminals and a much more functionally-oriented user organization. One individual often performs all of the above procedures. We have had to plan and implement major organization changes in our Policyholder Services Division and the Audit Accounting Department in order to be able to effectively use new computer systems installed in the past year.

We have not attempted to deal with long-range hardware planning. Today at New England Life our hardware plan is totally short-range in nature. We have a factor which coordinates our online systems. We have about 40,000 transactions a day, and about 100 terminals at present. Our driver allows us to stimulate the presence of more terminals and increased volumes. We can assume the operation of 200 terminals
These corporate plans could take the form of anything perceived as appropriate for the corporation or could be limited to specific areas of responsibility. There was no guidance provided as to its definition of corporate planning.

I organized a group within the Polychromatic and Computer Services Divisions. We sat down and asked, "What in the world are we going to do? What is corporate planning?" We didn't know what it was or what it was supposed to be. One year of our group was a Naval Academy graduate who had taken a strategic planning course. He had some course tests and used materials from the Harvard Library. The data processing, manufacturing and corporate planning are very similar. We did actually do it for a long time and didn't know it.

First, we wrote up our view of the nature and content of the corporate planning process. Out of that, we wrote a position paper for our internal use which summarized how corporate planning should be done. I broke the process down, and assigned it to the appropriate people, each one had deliverables to predict their role in order to fulfill their place in our corporate plan. We eliminated the investment and marketing functions from our corporate plan because we didn't feel we had the proper background or expertise to deal with these subjects. We concentrated instead on all aspects of line office and field administration. Our final plan which was sent to the president contained one key recommendation. We proposed that a corporate planning organization be developed to maintain this planning on an ongoing basis.

We learned many things out of this corporate planning exercise. One is that this is a difficult process to be applied by a user line department. Most line departments are usually oriented to getting out the "daily wash" and have little experience in more than short-range planning. We found that they had tried goals, objectives, strategic planning, and assumption in one big paragraph when asked to write a planning proposal. We had to review their write-ups point by point with them to help them understand the difference between a corporate objective and a recommended course of action. They could listen to the theory of what we wanted to do, but for these users to put this into practice was very difficult. This was also true for some of the data processors who had spent their careers planning how to get things done rather than what should be done.

We have identified the following as problems, issues, and conclusions about planning with which we must deal:

1. Long-term data processing plan cannot be developed without relating it to the company's corporate plan. Without a corporate plan, data processing planning must be limited to the short-range.

2. The nature and content of planning is not as well understood at NL. We, as a company, just don't understand the characteristics of it.

3. Strategic planning to one person is tactful planning to another.

4. Corporate planning is a very complex process. There is a system of diverse decisions that must be integrated. The plan requires that the entire system be explored and studied as a whole rather than as a series of independent questions.

5. Very few people have the corporate or busineswise perspective that allows them to see all the interrelationships which are involved in developing a corporate or long-range plan. This perspective is, however, essential to effective corporate planning.

6. There are enormous conflicts of interest in a company that tend to make the planning process difficult. These are as basic as, who will receive the resources to implement recommended courses of action first? Just about everyone has a different perspective on what is the most critical corporate problem.

7. The external world is constantly creating a whole new set of problems for us to deal with. For example, the government is continually issuing new laws to regulate us, which force us into new activities for compliance.
ROLE OF PROFESSIONAL ETHICS IN MIS

Dr. Thomas L. Martin, Jr.
President
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I am a great admirer of the United States Military Academy at West Point, and I have been much disturbed by the recent difficulties that have surfaced there regarding the Honor Code. I have always believed that the West Point Honor Code was fundamental to the development of the integrity of the Officer Corps, and I still believe that. I also believe it is a code that must be used, and should, live by.

It is a simple code—"a cadet will not lie, cheat, nor steal—nor tolerate those who do."

Now I think that nearly everyone would agree that people, whether cadets, military officers, businesspeople or even politicians, should not lie, cheat, nor steal. A lawyer who lies to or about his client, an engineer or scientist who cheats on his experiments, or an architect who steals another's work are all people we deplore, while politicians too often lie, cheat and steal, and while some businesspeople, and some military people, and some newspaper and TV people and some clergymen, and some university people and some union leaders and some athletes and entertainers and some federal judges—in fact some people from every walk of life—have been caught lying, cheating and stealing, we are not usually surprised. But, as a people we do not condemn or accept such behavior. Instead, we expect professional people to practice their professions in ethical ways and, when they don't, we expect to punish them.

And therein lies one of the dilemmas of current society. Who is responsible for discovering who is the liar, the cheat, or the thief? And, once this person is discovered, what should the discoverer do? The West Point Honor Code is quite clear on this point. It says that a cadet will not tolerate one who lies, cheats or steals and the cadet is duty bound to turn such a malfeasant over to the authorities.

To identify such a person at West Point is to live by the Honor Code. To publicly identify such conduct in a President of the U.S., as John Dean did, is to become a public figure who earned $500,000 in payments advances in 1969. To some people, such action are no more than stool pigeoning. Is that right? Really, what are the ethics of the situation? Should we tolerate people who know to be liars, cheats and thieves? Are we ethical if we do? If not, what do we do? What is our professional and personal responsibility? What are our ethics?

It is easy to determine what is arbitrarily correct. When out and out lying, cheating and stealing are involved. However, most situations in real life are not that clear. It is not certain in most cases whether or not someone is actually doing something wrong. For example, let us assume that I am a manufacturer of air conditioners and I want to sell them in Saudi Arabia. I attempt to engage the services of an influential Saudi to help me. He says he will cooperate only if I promise to pay him 10% of the gross receipts on any sale he can negotiate. I agree because I view this as a commission, the same as any sales commission. However, a competitor charges that I am paying a bribe and engaged in unethical business practice. Am I? Is it really so clear? In fact, precisely when does a commission, or a reward become a bribe? Is fact is our free enterprise system of capitalism based upon a system of rewards and punishments? And exactly when is it a reward for a particular behavior not a bribe? Isn't the entire system of increasing salary levels for increased responsibility and performance nothing more than a system of bribes?

Life would be comparatively easy if we only had to consider the ethical implications of such gross activities as mere lying, cheating, or stealing. But, as life and society have grown progressively more complex and more intertwined, ethical concerns about what we do to the environment, to women and minorities, to the physically handicapped, the air traveler, the railroad, the radio and TV, to the unemployed, the unskilled, the disarmed, the aged, the privacy of individuals, and so on, all become elements affecting decisions in the professions. So ethical matters can be simple in the abstract perhaps, but real life situations can become extraordinarily complex and fuzzy. What appears superficially to be said spiritual ground, can become a shifting quicksand in different instances.

The October 1976 issue of Harper's included an "ethical attitude test." I think that it is instructive to raise some of the questions considered there. They suggest the difficulties involved in arriving at clear, black and white distinctions. For example:

1. The National Kidney Foundation has reported that many persons have offered to sell kidneys for transplantation.
   1.1 Would this be improper?
   1.2 Would it differ in principle from the common practice of selling blood?
   1.3 If it is not improper, how should the price of a kidney be determined—by direct negotiation, by medical administrators, by government regulation, or in some other manner?

2. "Many drugs of great lifetime saving value can be tested effectively only on human beings, but often with such risk to the subjects tested that only those who can afford to lose the time would willingly participate if they knew the dangers involved.
   2.1 In what circumstances, if any, would it be right to conduct such tests without ensuring that the persons tested had a clear and complete understanding of the risks they would be taking?

3. Before the establishment of the national 55 mph speed limit, automobile related deaths were running at the rate of 50,000 to 60,000 per year. Some studies indicate that a 20 mph speed limit would reduce this figure to 10,000 or less. Assume this estimate is correct; assume further that for each 10 mph the speed limit is set above 20 mph the death toll rises by 10,000.

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What is a reasonable national speed limit? I think it is clear that even superficially simple issues can become troublesome ethical dilemmas very quickly to resolve. When someone clearly breaches what we think is ethical behavior, what do we do? Do we "tolerate" those who do?

Do we depend upon ourselves to police our own professions, or do we depend upon some external coercion? Perhaps it appears that, unlike the West Point cadets, we have decided that we cannot depend upon ourselves, or our fellow professionals, to control our own conduct, to establish and enforce ethical behavior within the professions. Instead, we are using the power of the government. So, we have established an entirely new and rapidly growing branch of government called the "Regulatory Agencies" whose function it is to make sure that we behave in ethical ways.

- The Securities and Exchange Commission exists to make sure that businesses honestly represent their businesses to the public.
- The Federal Communications Commission acts to ensure the public's need for information does not abuse the privilege.
- The Environmental Protection Agency aims to prevent deterioration in the environment because of industrial or corporate actions.
- The Occupational Safety and Health Administration oversees the occupational welfare of the physically handicapped and protects all workers from exposure to unreasonable hazards.

And it goes on and on to include the Interstate Commerce Commission, the Federal Trade Commission, the Pure Food and Drug Administration, Federal Aviation Administration on endlessly. The cry is no longer "Is my brother's keeper?" Instead it has become "Is the corporation's regulator?" Am I a guardian of his ethics?

This brings us to a typical ethical dilemma. A young management trainee attended a party at the home of a wealthy oilman in Texas. The oilman had an olympic-size swimming pool in which he kept a large number of rain-eating sharks. During the poolside cocktail party, the oilman announced that if any unmarried young man would swim the length of the pool and survive the sharks, he would reward the victor with a choice of one of three prizes—a million dollars, a 10,000 acre ranch, or his beautiful daughter's hand in marriage. No sooner had the oilman made the announcement when the young management trainee beat the water. The churning between him and the sharks was spectacular and he was quickly surrounded at the other end of the pool without a scratch. "I don't believe it," cried the oilman. "You're a man of my word. Select your prize." Now, what does the young man say? He has to have one of the prizes and he did not take the 'bait'—but soon he realized he was the name of the s.h.o.b. who pushed him into the pool.

Now what should his ethical response be? Should he accept a prize which was fairly under the term offered? Or does he refuse because it was never his intention to be a contestant?

When faced with such ethical dilemmas, it is helpful to have a test of evaluating what to do. Dr. Harry LawsonFord developed a six point test for deciding what is right and what is wrong and which can be summarized as:

1. Does the course of action you plan to follow seem reasonable and honorable to you? Never mind what anybody else thinks. If you feel it is wrong, it is probably right.

2. Does it pass the test of patriotism? In other words, if everyone followed this course of action, would the results be beneficial for all?

3. Where will your plan of action lead? How will it affect others? Do you do to you?

4. Will you think well of yourself when you look back at what you have done?

5. Try to find a way out of the problem. Pretend for a moment that you are the person you want to become. Act yourself how that person would handle it.

6. Hold up the final decision to the glaring light of publicity. Would you want your family and friends to know what you have done? Doesn't this make the difference in the case where no one will find out are usually wrong.

To successfully execute these six steps requires a great deal of imagination, but for a large organization, such information can only come from those who design, control and service the corporate management information system. This raises some very interesting and difficult questions concerning the ethical responsibilities of the managers of corporate databases and systems. Such managers must see that all of the necessary and relevant information is available to top management so that ethical issues can be discerned, and outcomes can be avoided for organizations or corporations with ethical practice. If the managers of corporate information systems are responsible for ethical behavior in a better (or for that matter, a worse) world, then the ethical political contributions would have occurred. The role of the information system manager in ensuring ethical corporate behavior in the future will, in my opinion, be required by top management. Moreover, with the amount of corporate privileged information in such systems, there is a definite need for a code of ethics for managers of management information systems.

Indeed, the increasing use of computer-based data pools and computer-operated management information systems have made business and industry vulnerable to unethical conduct by information system specialists. As a result, while the white collar crime, particularly in those areas dependent upon computerized financial and operational, is the most rapidly increasing form of crime, the need for an enforceable code of ethics is nowhere more acute.

The cadets at West Point are not the only people with an Honor Code. Almost every professional group has its own code of some form or another and is an asset of allegiance. Specifically, such codes are published for physicians, engineers, lawyers, psychologists, journalists, military officers, the National Collegiate Athletic Association, the U.S. Congress, the Society of Real Estate Appraisers, College and University Business Officers, Public Accountants, Internal Auditors, and others. Where does the Society for Management Information System stand on this question?

But one of the very interesting things about all such codes, oaths, or pledges is that they are primarily at specifying a form of conduct within the profession which will protect the individual from unethical behavior by the members of the profession. In other words, they specify codes of ethics based upon the high level of loyalty to others, of absolute selflessness, which refer is then integrated into this system which ensures proper professional success for the individual because of ethical practice. This is critically important because too often financial success in a profession is achieved by those who cut the ethical corners. In short, any departure from ethical selflessness in most cases, is not the need for some degree of egotism to be felt.

This brings us to the central dilemma of ethics in the professions, a dilemma expressed most directly and most eloquently in a letter I received recently from Mr. Edgar J. Schuch, an attorney and a very thoughtful man.

According to Mr. Schuch, a scale of loyalty to others exists which runs from absolute selflessness at one extreme, as personified by Jesus, to absolute selfishness at the other. But remember, as the New Testament reveals, even Jesus cried out when he was being crucified. "My God, My God, why has thou forsaken me?" Or, in blatant terms, "My God, My God, in short, even for Jesus there were limits to selflessness.

The usual code of ethics demands a high level of selflessness, but does not address the question of "why me?" And there must be some answer to that, because if you do not feel that your actions are worthy, who will?

Hillsi, who was in the Sanhedrin, the supreme council of the Jews when Jesus was there, stated his guiding principle as follows:

"If it was not myself, who is there who will be for me? But if it is for others, what am I? And if not now, when?"

In quite Schuch, "We must be for ourselves in this business world. There is no better position in life. But at the same time we are not working for ourselves, but for others, and aiding in helping others to achieve.

To sum up, I have identified four questions which are critical to ethical behavior:

1. What are areas in which unethical behavior can be discouraged? Lying, cheating, stealing, misusing the environment, violating wage and price controls, killing the public and private interest in the public interest, violating the public interest in the private interest.

2. Who should blame the whistle on those who are acting unethically? Individuals, members of the profession, or government, or investigative reports in a free press, or who?

3. How do we secure the information about a situation so that we can take a decision with reasonable assurance that we have avoided the ethical considerations?

4. How do we live up to the selflessness required by our professional code of ethics while still "living for ourselves?"

I have specific answers to these questions; I have only raised them for your consideration.

As ITI has established a Center for the Study of Ethics in the Professions, we have plans to sponsor research programs, conferences and lectures, and to develop a resource center for service to faculty, students, the profession and the community at large. We are developing curricula for courses in ethics to be offered to undergraduate and graduate students.

In closing, I must comment that it's a tough life and we must not judge our colleagues and their ethics too harshly if they fall occasionally on the path of righteousness. It is too easy to judge and some advice about how to evaluate your colleagues from the ethical standpoint which is so often sorely lacking.

Each of us is a mixture of some good qualities and some, perhaps, not so good qualities. In considering our colleagues, we should not look for his good qualities and realize that his faults only prove that he is, after all, only a human being. We should refrain from making harsh judgments of a person just because he happens to be a dirty, rotten, no-good, unethical (s.h.o.b.).