SHARE SESSION REPORT

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The speaker described the corporate strategy that IBM has established for
internal use of Information Systems Technology. The strategy sets the overall
direction for the corporation and serves as the framework for the development of
more detailed, unit-specific strategies and implementation plans at Group and
Division levels. The text of the strategy document follows.

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IBM

INFORMATION SYSTEMS STRATEGY

JANUARY, 1983

This document describes the current (January, 1983) IBM Information Systems Strategy. It updates the June, 1982, version by incorporating minor revisions suggested by experience of the past six months.

The report consists of three sections:

- The BACKGROUND section begins with some necessary definitions of concepts and terminology. It then summarizes the general strategy followed during the 70's, some of the major environmental changes of the 80's, and outlines six major problems and opportunities that serve as the basis for the overall I/S corporate objectives and strategic direction of the 80's.

- The CORPORATE-LEVEL STRATEGY section describes the I/S support framework used to formulate the strategy. It presents detailed objectives and recommends strategies to achieve those objectives.

- The final section, HIERARCHY OF STRATEGIES, describes the process of cascading of the corporate strategic direction through the organizational structure to generate group, division/country, and site strategies.

IBM INFORMATION SYSTEMS STRATEGY

• BACKGROUND

- DEFINITIONS

- STRATEGY OF THE '70s

- ENVIRONMENT OF THE '80s

- PROBLEMS AND OPPORTUNITIES

- OBJECTIVES OF THE '80s

• CORPORATE-LEVEL I/S STRATEGY

- FRAMEWORK

- OBJECTIVES

- STRATEGIES

• HIERARCHY OF I/S STRATEGIES

- CASCADING PROCESS

- ROLES AND RESPONSIBILITIES

(2)

As a corporation, IBM is addressing the business environment of the 80's with a forceful strategy for growth and change that includes challenging business OBJECTIVES:

. Technology/product quality leader
. Lowest cost enterprise
. Complete in all major business areas
  and grow as fast as the industry

Further evidence of this dynamic thrust into the 80's is the focus on business area and functional strategies, the recent reorganization, and the new business planning process.

Considering, in addition, the rapid change in information system technology, it is appropriate to develop an I/S strategy that insures SUPPORT for the business GROWTH strategy while achieving FUNCTIONAL EXCELLENCE.

To formulate the I/S strategy, we look at the enterprise as consisting of four primary functions (Development, Manufacturing, Marketing and Service) and several support functions (e.g., Personnel, Finance, Administration). Further, there are three other support functions that are pervasive, in the sense that they underlie the primary as well as the support functions. They are Information Systems, Telecommunications, and Office Systems. This report describes the Information Systems strategy. Strategies for Telecommunications and Office Systems are addressed elsewhere.
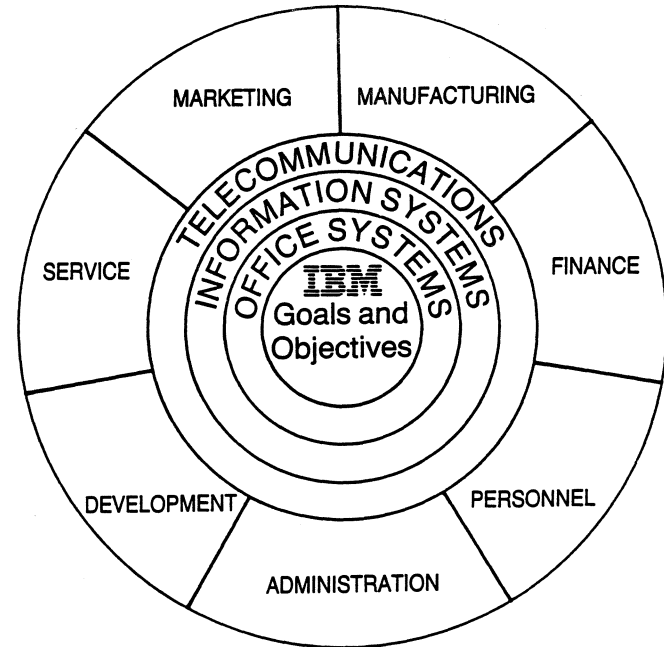
INFORMATION SYSTEMS STRATEGY

SUPPORT GROWTH

FUNCTIONAL EXCELLENCE

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It has been said that "the language of management is imprecise".
But since common understanding is prerequisite for effective
planning, we must start with the DEFINITION OF STRATEGY.

The dictionary provides a wide range of meanings, from the very
broad ("Science or art...") to the very narrow (another name for
a plan or a method).

For our purposes, we will follow the definition used by Corporate
Planning Systems to direct the preparation of IBM's business
strategies:

    "A DIRECTION OR COURSE OF ACTION TO BE TAKEN
     IN PURSUIT OF A BUSINESS OPPORTUNITY (OR PROBLEM)"

This definition is also useful because it aids in linking the I/S
strategy to the IBM business strategy. Further, it indicates
that a strategy should be directional in nature, as opposed to a
detailed implementation plan. It also suggests the nature of the
process needed to develop strategies. Specifically, it indicates
that the determination of business opportunities and problems is
an integral part of the strategy development process.

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STRATEGY DEFINITION

"SCIENCE OR ART OF EMPLOYING POLITICAL, ECONOMIC, PSYCHOLOGICAL, ... FORCES OF A GROUP TO AFFORD MAXIMUM SUPPORT TO ADOPTED POLICIES ..."

(WEBSTER 1)

DIRECTION OR COURSE OF ACTION TO BE TAKEN IN PURSUIT OF A BUSINESS OPPORTUNITY (OR PROBLEM).

"A CAREFUL PLAN OR METHOD"

(WEBSTER 2)

The preceding definition of a strategy leads to the following
outline for the strategy development process:

- The process has two starting points. One is a statement of
  GOALS and OBJECTIVES, which are of fundamental importance to
  strategy development, since, to paraphrase the Cat in Alice
  in Wonderland, "any strategy will do if you do not care where
  you are going".

- The other starting point is a description of the current and
  projected business and information systems ENVIRONMENT. Pre-
  paring such a description may be difficult in situations of
  rapid technological or business change. Its value, however,
  is particularly high in those situations, because it provides
  a common set of assumptions as a basis for strategy prepara-
  tion. All participants may not agree with the assumptions,
  but all parties share a common basis for departure.

- An analysis of the environment and of the goals and objec-
  tives will identify OPPORTUNITIES and PROBLEMS in achieving
  those objectives. They serve as the focal point to define
  possible ALTERNATIVE STRATEGIES, which then should undergo
  EVALUATION in terms of cost/benefits and risks. The process
  is iterative, since the evaluation of alternatives may lead
  to developing new alternatives, redefining opportunities and
  problems, or even the restating goals and objectives.

- Once a satisfactory alternative has been found, it becomes
  the selected STRATEGY. This strategy, in turn, provides the
  basis for developing the IMPLEMENTATION PLAN needed to carry
  out the strategy. This strategy implementation plan (often
  called the strategic plan) specifies the resources (people,
  dollars, facilities), technology, programs, and projects
  required to achieve the objectives. It is in this plan that
  we find specific quantitative targets and schedules.

One should be alert for two possible pitfalls. One is to bypass
the development of the strategy and, in the quest for results,
plunge directly into the formulation of a strategic (implementa-
tion) plan. The other pitfall is to stop the process at the
strategy level and not produce an implementation plan. The first
pitfall results in uncoordinated, ineffective action, the second
in no action at all. Therefore, the difference between a strate-
gy (directional statements) and a strategic plan (resources and
programs), and the need for both, must be kept in mind.

STRATEGY DEVELOPMENT

IMPLEMENTATION
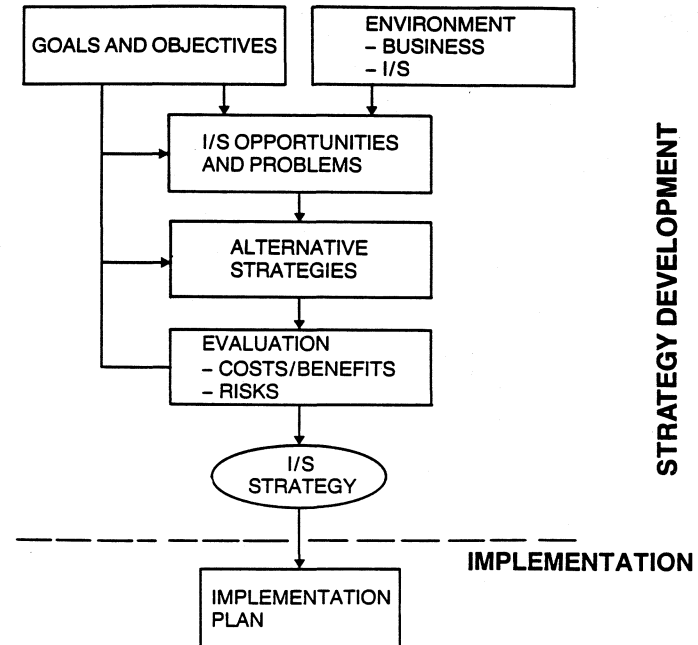
The strategy development process previously outlined also serves to explain the relationship between the formulation of strategies and the IBM business planning process, a relationship that tends to be obscured in the press of meeting plan deadlines.

Functional management (Development, Manufacturing, Marketing, Service) in an organizational unit develops strategies following a process similar to the one just described for information systems.

I/S and functional management then jointly determines the INFORMATION SYSTEMS SUPPORT STRATEGY that is to become an integral part of the FUNCTIONAL STRATEGY. During the Business Investment Cycle, in the Spring, the organizational units' functional strategies are reviewed across the corporation by the appropriate corporate functional staffs, including I/S. The I/S staff, in particular, will look at the information systems content of the functional strategies.

Once the information systems support strategy for the functions has been agreed upon, the implementation plan is formulated to carry out that support. During the Fall Commitment Plan Cycle, those implementation plans are reviewed across the Corporation by the appropriate corporate staffs.

Over time, a feedback loop is established since changes in the functional strategies will modify the goals and objectives as well as the business environment in which I/S operates.

The different nature of the strategy development and the business plan processes must be kept in mind. The Business Plan process is designed for STATUS REPORTING: it takes a snapshot in time of the status of strategies as they exist across the corporation in the Spring, and of their implementation plans in the Fall. It is driven by the calendar and orchestrated, corporate-wide, by Corporate Plan Management.

STRATEGY DEVELOPMENT, on the other hand, is not keyed to the calendar because it does not have to be done at the same time across the corporation. For any unit, strategy development should occur when there are changes in the objectives or in the environment significant enough to warrant a re-evaluation of the existing strategy. Those changes, being event driven, are not synchronized to any calendar and may occur at any time. They should, however, be changes of strategic significance, which, in general, occur infrequently, certainly not every month or even every quarter. Strategies that change frequently are suspect of being tactical or operational plans, and not true strategies.

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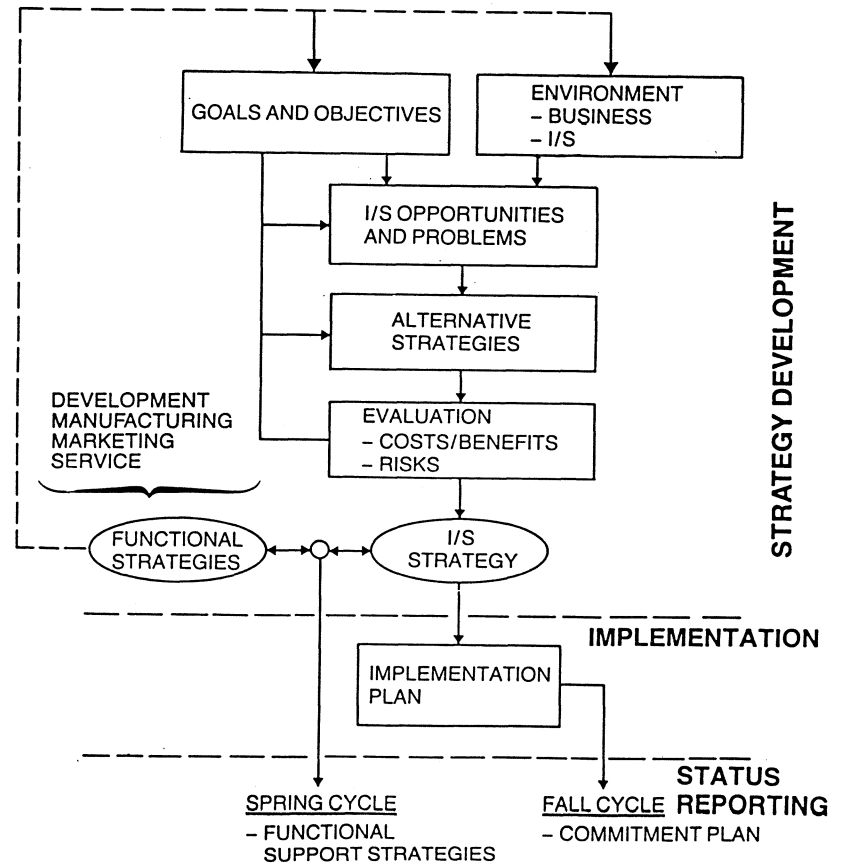
A corporate level strategy must consider the organizational structure that will implement the strategy. A schematic view of the IBM business structure is shown on the face of the pyramid. The four primary functions are performed, singly or in groups, at specific geographical locations. These sites report to divisions or countries, which in turn report to the groups. Corporate management is at the apex of the structure.

In this view, the great majority of the business activity takes place at the bottom rectangle. The triangle above it is the management system that allows a very complex business to operate worldwide as a single enterprise.

Within the base activity of the business, one can identify what may be called "FUNCTIONAL MEASUREMENT UNITS" (FMU's). They are the organizational elements upon which management focuses its basic PRODUCTIVITY MEASUREMENTS. They are generally associated with the intersection of primary functions and a geographical location (e.g., a plant, a lab, a marketing region), although in some cases, they may be a function as performed in a division, country, or even a group. The key determinant of an FMU is where the basic productivity measurements focus. Typically the output of an FMU can be readily measured (e.g., boxes shipped, dollars of sales), and the ratio of the factors of production (inputs) to that output becomes the productivity measurement (e.g., points per qualified sales rep, cost per box). As the emphasis on Return on Controllable Assets (ROCA) permeates the organization, it is also being keyed to the FMU's as part of the productivity measurements.

The I/S function structure shown on the side of the pyramid is analogous to the business structure. The "activities" of I/S, such as developing applications and operating computer centers, are conducted at geographical locations, with I/S management responsibilities at division/country, group, and corporate. The I/S activities are oriented to support the FMU's, whether I/S is organizationally an integral part of the FMU or not.

According to popular theory, "structure follows strategy". That is, once the strategy is set, the organization structure most suitable to carry out the strategy is selected. Accordingly, the structure of IBM is determined by the business strategy of the corporation. However, since I/S supports the primary business functions, the I/S strategy has to be developed recognizing the existing business structure. This facilitates the linkage between the I/S and business strategies.

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STRATEGY AND STRUCTURE
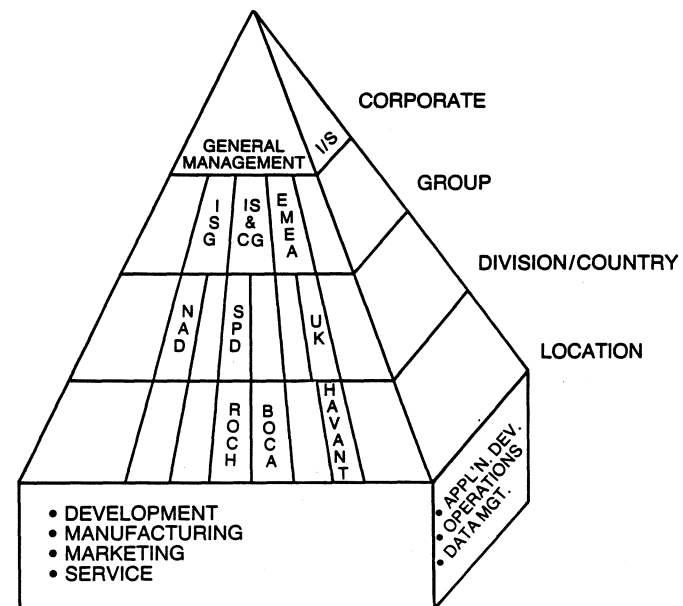
- FUNCTIONAL MEASUREMENT UNIT
  - FUNCTION WITHIN LOCATION, DIVISION, GROUP

- MEASUREMENTS
  - FOCUS ON FUNCTIONAL MEASUREMENT
  - PRODUCTIVITY $= \dfrac{\text{UNIT OUTPUT}}{\text{UNIT INPUT}}$
  - KEYED TO ROCA

- I/S SUPPORTS FUNCTIONAL MEASUREMENT UNITS

For perspective, it is useful to recall what our overall I/S strategy was during the 70's. While we had many specific operating unit strategies over the decade, we can summarize the fundamental strategic direction as being directed toward two basic objectives.

The first objective was to SUPPORT THE PRIMARY FUNCTIONS OF THE BUSINESS. This recognized that I/S in IBM is not an end in itself, but exists only to support the mainline business of the corporation. This is in contrast to other companies, where I/S both supports the business and sells its services outside the company.

A major strategy to achieve this first objective was to focus I/S support activities on the functional measurement units, independent of I/S organization structure. Information systems requirements were strongly user-driven, almost to a fault. Partially because user's visibility of their future business procedures was limited, I/S usually operated with an effective planning horizon of one or two years at best, despite the 5-year horizon of the formal plan process. Since developing new systems takes longer than one or two years, and user requirements were dynamic, flexibility was an essential element of the I/S response mechanism. Generally, this was achieved by keeping options open as long as possible.

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I/S OBJECTIVES IN THE '70s

- "SUPPORT THE PRIMARY FUNCTIONS OF THE BUSINESS .....

    - FUNCTIONAL MEASUREMENT

    - USER-DRIVEN REQUIREMENTS

    - 12/24 MONTH HORIZON

    - OPTIONS KEPT OPEN

The second objective was to provide the I/S support AS EFFICIENT-LY AS POSSIBLE. The cost of I/S was a significant part of the total cost of doing business and it was necessary to improve return per unit of I/S expense over time.

A basic strategy to achieve this second objective was to capitalize on the ECONOMIES OF SCALE of hardware BY CONSOLIDATING the equipment at every opportunity. This was a viable strategy during the 70's because the cost of computing was much less if done in a "slice" of a large CPU than if done in a small CPU. These economies of scale, which became a fundamental driving factor, were characterized as "Grosch's Law". It states that the cost per unit of computing power is _inversely_ proportional to the _square_ of the size of the computer. This "law", which applies to the hardware cost of computing, held true for years. It means that a CPU twice the size will decrease the cost per unit of computing by a factor of four; ten times as large by a factor of one hundred, etc.. Consolidating hardware naturally lead to consolidation of facilities to take advantage of cost savings in cooling, raised floor, power, etc. The result was the creation of the familiar large computing centers in the 70's.

This consolidation strategy also leads to centralizing the other information systems functions. For example, if all the equipment was in one center, it made sense to have all systems programmers there. Centralizing I/S resources had the additional advantage of providing flexibility and RESOURCE MOBILITY. For example, it was much easier to redeploy programmers to different projects if they were all physically located in the same site.

Finally, the rapid growth in information systems in the 70's brought about a compensating EMPHASIS ON CONTROL. This control was facilitated by having I/S plans integral to the business planning process, which also emphasized control during that period.

The control focused specially on hardware, with special attention given to maximizing its utilization. Investment in hardware required special reviews and approvals, over and above those required by the IBM management system for other capital investments. This was made easier because our single vendor and source of supply was internal, and therefore visible to the I/S control function.

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I/S OBJECTIVES IN THE '70s

... AS EFFICIENTLY AS POSSIBLE"

- CONSOLIDATION FOR ECONOMIES OF SCALE
  - HARDWARE
  - FACILITIES

- I/S FUNCTIONAL SPECIALIZATION FOR RESOURCE MOBILITY
  - SYSTEM SUPPORT
  - APPLICATIONS DEVELOPMENT
  - PLANS AND CONTROLS

- EMPHASIS ON CONTROL
  - IBM BUSINESS PLANNING PROCESS
  - EQUIPMENT ACQUISITION AND UTILIZATION

Before describing our new strategy, we should review some changes in the environment which are not sudden occurrences, but rather acceleration of trends already visible in the 70's.

We are all aware of the continuing RAPID BUSINESS GROWTH and CHANGES in our business, resulting in strategies that include an EVOLVING ORGANIZATION, with more responsibility being delegated to groups and independent business units.

Our traditional matrix management system (profitability by operating unit, functional excellence across units) has expanded to a third dimension: world-wide profit optimization by business area. This makes the management system an order of magnitude more complex, and gives information systems the special challenge of supporting this three-dimensional management system. The financial emphasis on return on controllable assets (ROCA) in addition to the traditional margin and revenue growth brings a whole new set of business challenges not present before.

The business is INCREASINGLY DEPENDENT ON INFORMATION SYSTEMS for its day-to-day operations. Years ago, only selected "showcase" type of functions (e.g., airline reservations) showed this dependency. Today, it is present in many of our basic functions, so that if systems fail, significant portions of our plant, labs, and offices are impacted.

At the same time, USER REQUIREMENTS ARE GROWING IN COMPLEXITY. This is due in part to having automated the more readily visible requirements, and in part to the increasing complexity of user functions and the business environment.

As a result, a NEW PARTNERSHIP is emerging between USER AND I/S, with neither able to operate without the other. I/S cannot design and implement systems without full user participation. The user cannot operate efficiently without the advantages of information systems technology. The partnership is encouraged by joint accountability for cost-versus-benefits. I/S focuses on the former and the user on the latter.

All of us are well aware of the impact of rapidly advancing TECHNOLOGY. To put it in perspective, just consider current development on hardware and software capabilities, and compare them with those available in the early 70's.

We also see a change in the basic cost equation of information systems, with hardware costs going down while people costs continue to rise. Even if one sets aside cost, availability of skilled people is limited, while hardware becomes increasingly available from a growing variety of channels.

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ENVIRONMENT OF THE '80s

- RAPID BUSINESS GROWTH AND CHANGE

- EVOLVING ORGANIZATION
  - INCREASING GROUP RESPONSIBILITY
  - EXPANDING MATRIX MANAGEMENT
    - OPERATING UNIT
    - FUNCTION
    - BUSINESS AREA
  - EMPHASIS ON ROCA

- INCREASING DEPENDENCE ON I/S

- GROWING COMPLEXITY OF USER REQUIREMENTS

- NEW USER-I/S PARTNERSHIP EMERGING
  - INCREASING MUTUAL DEPENDENCE
  - COST/BENEFIT ACCOUNTABILITY

- ADVANCING TECHNOLOGY
  - HARDWARE & SOFTWARE
  - CHANGING PEOPLE/HARDWARE RATIOS

Probably one of the most important environmental changes has been the technological advances that brought about new economics of computing and the apparent repeal of "Grosch's Law". The dashed curve in the graph represents a Grosch's Law era (cost per unit of computer power proportional to the inverse of the square of the size of the computer).

Obviously the 30XX family represents a new price/performance curve (the graph shows internal IBM rates for 1983). A straight line, almost horizontal, would be a better fit. The 4341 and the P/C confirm the change in the historical relationship. This all leads one to conclude that there is no longer an economic advantage to buying compute power in large blocks. It can be acquired at the same cost in increments required by the application.

These new economics of computing have a fundamental influence on the strategy. No longer are economies of scale a dominant factor that tend to overshadow most other business considerations. It is no longer an open-and-shut decision that "bigger is better". The decision to centralize or decentralize information systems has to undergo the same careful scrutiny and be subjected to the same disciplines that decide on centralizing or distributing such factors of production as purchasing, personnel, accounting, ware-houses, etc.

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ENVIRONMENT OF THE '80s

● NEW ECONOMICS OF COMPUTING

1983 INTERNAL RATES

K$/MIP

3031
4331
3032
3033
3081
4341
P/C

MIPS
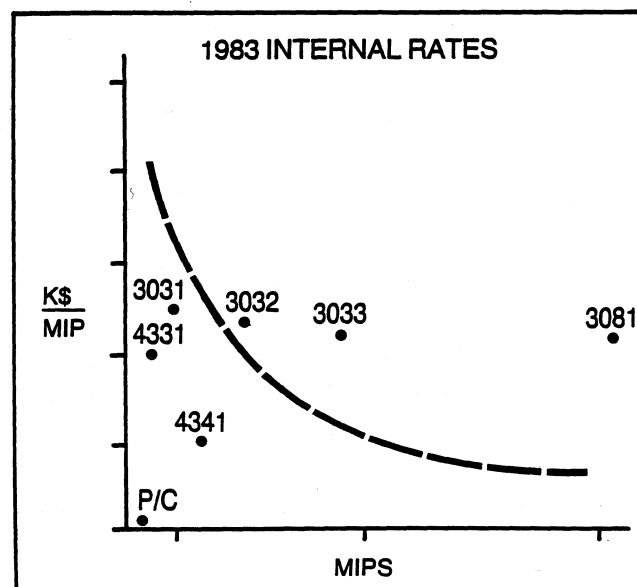
The changing environment has resulted in some opportunities and problems that provide the basis for the strategy for the 80's:

- Information systems technology is recognized as providing the key leverage for IMPROVING BUSINESS PRODUCTIVITY, which is essential to achieve our business objectives in a highly competitive environment.

- User needs are becoming INCREASINGLY DIFFICULT TO DETERMINE, partially due to a complex and rapidly changing environment and more sophisticated user functions. Moreover, the requirements are increasingly DIFFICULT TO MEET, with lead times getting longer and change coming more frequently.

- Information systems expense is growing significantly, yet there is NOT A COMMENSURATE INCREASE IN USER SATISFACTION. While there are many satisfied users, overall satisfaction does not seem to keep up with expenditure increases. This can be explained in part by the phenomenon of "rising expectations", where the major accomplishment of today becomes the norm for tomorrow, and the users are unsatisfied unless they experience continuing improvement.

- Also contributing to the lack of satisfaction is the fact that, in many cases, USER OPTIONS are CONSTRAINED by the consolidations of the 70's. Many users still have a single source of I/S support, which may even report through a separate management chain, making resource allocation and problem resolution difficult. The sources of I/S support tend to be configured for large and complex applications, which often makes good business sense for the primary applications but are seldom inviting to the small or beginning users.

- Partially because of the difficulty in accurately determining long-term user requirements, there is an INADEQUATE STRATEGIC OUTLOOK. I/S data in the out-years of the plan is often the result of extrapolation and trending, and not derived from analysis of strategic functional driving factors.

- Finally, it is difficult for user and I/S to share COMMON MEASURES OF SUCCESS. Existing measures apply either to the user or to I/S, but seldom jointly to both. Typically, the direction of 'goodness' in user measures is known and accepted, while in I/S growth is usually viewed as cause for concern without an appreciation for the compensating return in user factors of production.

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PROBLEMS/OPPORTUNITIES

- **IMPROVING BUSINESS PRODUCTIVITY REQUIRES INFORMATION SYSTEMS**

- **INCREASINGLY DIFFICULT TO DETERMINE AND MEET USER NEEDS**

- **I/S EXPENSE INCREASING WITHOUT COMMENSURATE INCREASE IN USER SATISFACTION**

- **USER OPTIONS CONSTRAINED**
  - DESIGNED I/S SERVICE
  - CONFIGURED FOR I/S ECONOMY TO SCALE

- **INADEQUATE STRATEGIC OUTLOOK**

- **INSUFFICIENT INTEGRATION OF USER – I/S MEASURES OF SUCCESS**

Given the foregoing assessment of the environment of the 80's, and related opportunities and problems, we can now set forth the I/S Strategy for the 80's. As before, the strategy is best viewed in relation to the objectives being addressed. The objectives for the 80's are an evolutionary change from the previous objectives.

The first objective, SUPPORT THE PRIMARY FUNCTIONS OF THE BUSINESS, remains the same, but with special emphasis. I/S should take an active LEADERSHIP role in the use of technology, since it has the expertise necessary to assess the potential capabilities and implications of the technology. This leadership role should extend to wherever INFORMATION SYSTEMS TECHNOLOGY is used in the corporation, and not be limited to its use in the formal I/S organizations. As before, the main purpose is to LEVER USER EFFECTIVENESS, EFFICIENCY and QUALITY in the four primary functions.

The second objective, as efficiently as possible, is still of key importance to meet our business targets. It has been expanded to include the concept of FUNCTIONAL EXCELLENCE. Efficiency, plus the dimension of quality in effectively meeting user expectations and requirements are the essential elements of functional excellence.

Besides providing support and ensuring functional excellence, the third objective is to ACHIEVE USER-I/S CONGRUENCE, which we will discuss further in the next foil.

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I/S OBJECTIVES IN THE '80s

- SUPPORT THE PRIMARY FUNCTIONS OF THE BUSINESS...

  - PROVIDE ACTIVE LEADERSHIP IN THE USE OF INFORMATION SYSTEMS TECHNOLOGY TO LEVER USER EFFECTIVENESS, EFFICIENCY, AND QUALITY

    - DEVELOPMENT

    - MANUFACTURING

    - MARKETING

    - SERVICE

- AS EFFICIENTLY AS POSSIBLE ...

  - I/S FUNCTIONAL EXCELLENCE

- AND ACHIEVE USER – I/S CONGRUENCE

The objective of ACHIEVING USER-I/S CONGRUENCE is addressed by
the strategy to SHAPE THE INFORMATION SYSTEMS FUNCTION so that it
is aligned with the USER LINE ORGANIZATION being served and the
WAY IT IS MEASURED. This alignment must give due consideration
to the ECONOMICS OF NEW TECHNOLOGY together with its inherent
advantages and constraints. The shaping of the function includes
analyzing how I/S is organized, how responsibilities are distrib-
uted, what practices and procedures exist, as well as how the
resources are distributed. These elements of I/S are then recast
to establish congruence between the objectives and measurements
of the I/S and user management teams involved.

User-I/S congruence can be achieved in two ways. The most direct
one is by making information systems resources an integral part
of the user organization. The other way is best described as
"virtual congruence": I/S preserves its own organizational struc-
ture but aligns itself with the user through the planning and
measurement systems. The "user of record" concept, where the
user "owns" the development headcount, and a detailed charge-out
system are two examples of virtual congruence.

Because of the centralizing forces in the 70's, reshaping the
information system function will often result in a distribution
of I/S resource with the attendant control exposures. This is
why the last part of the strategy, AND PROVIDE APPROPRIATE ARCHI-
TECTURAL GUIDANCE AND STANDARDIZATION, is of key importance.
Guidelines and standards are needed to avoid the fragmentation of
information systems, which would result in decreased effective-
ness and inefficiencies.

The architectural guidance and standards cover various areas.
Applications and data architecture are key to allow efficient
interaction among distributed or stand-alone systems, just as
network architecture is key for the information exchange among
those systems. Selection of standard product configurations,
where appropriate, could significantly increase overall produc-
tivity. The management system guidance (planning, measurement
and control) provides the tie that preserves the business integ-
rity of information systems activity.

The management system should pay focus on certain areas, such as
career planning and skills development, that are usually
well-covered by standard management practices in a centralized
I/S organization, but could be overlooked when I/S resources are
distributed to the user organizations. Explicit responsibilities
should be defined and assigned to ensure coverage of those areas,
as well as any other activities usually handled as an integral
part of a vertical I/S management structure (e.g., executive
interviews, phase reviews).

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ACHIEVE USER-I/S CONGRUENCE

STRATEGIC DIRECTION

- SHAPE THE INFORMATION SYSTEMS FUNCTION...
  - ORGANIZATION AND RESPONSIBILITIES
  - PRACTICES AND PROCEDURES
  - DISTRIBUTION OF RESOURCES

...CONSISTENT WITH ...
  - USER LINE ORGANIZATION AND THE WAY IT IS MEASURED
  - ECONOMICS OF NEW TECHNOLOGY

...AND PROVIDE APPROPRIATE ARCHITECTURAL GUIDANCE AND STANDARDIZATION
  - APPLICATIONS
  - DATA ADMINISTRATION
  - PRODUCT SELECTION
  - NETWORK
  - MANAGEMENT SYSTEM

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By establishing user-I/S congruence, the management responsible for the primary measurements of the business together with I/S management, are able to plan, measure, and control functional measurement unit activity so that NATURAL BUSINESS FORCES are brought to bear on the key I/S problems and opportunities of the 80's, with the following RESULTS:

1. The management of the functional measurement units will apply information technology to the essential business processes of those units since those managers are the ones who can best determine what is essential in light of their measurable goals and objectives.

2. Ownership, whether "real" or "virtual", of the information resources should temper the demand for services with realistic considerations of affordability and of availability of necessary resources and skills.

3. Trade-offs between I/S and non-I/S solutions to business problems will be made by the managers who are held accountable by the management system for the efficiency of those processes. The same management is responsible for the resources of automation as well as human endeavor. When selecting an I/S solution to a problem, the user manager will no longer need to "give up" ownership or stewardship of human resources as is the case when I/S operates as a separate management entity.

4. The investment in information technology, key to productivity, will be controlled commensurately with other investment decisions made at various levels of the business. A separate, additional control system need not apply to I/S investments, since the standard managerial and financial controls on investment decision will be in effect.

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RESULTS

PLAN, MEASURE, AND CONTROL FUNCTIONAL MEASUREMENT UNIT ACTIVITY SO THAT NATURAL BUSINESS FORCES:

1. BRING I/S RESOURCES TO BEAR ON ESSENTIAL BUSINESS PROCESSES.

2. CAUSE USER DEMAND TO BE TEMPERED BY AFFORDABILITY AND I/S RESOURCE AVAILABILITY.

3. ENCOURAGE RESOURCE TRADE-OFFS WITHIN THE LOWEST LEVEL PRODUCTIVITY REPORTING UNIT PRACTICAL.

4. CONTROL I/S RESOURCES COMMENSURATELY WITH MANAGEMENT ACCOUNTABILITY (ROCA) AT VARIOUS LEVELS OF THE BUSINESS.

At this point we have stated the overall Corporate objectives for information systems in the 80's, together with the strategic direction felt to be effective toward achieving user-I/S congruence. In this next section, we expand the objectives into a Corporate I/S Strategy that has sufficient specificity to serve as the basis for operating unit interpretation.

IBM INFORMATION SYSTEMS STRATEGY

- **BACKGROUND**
    - DEFINITIONS
    - STRATEGY OF THE '70s
    - ENVIRONMENT OF THE '80s
    - PROBLEMS AND OPPORTUNITIES
    - OBJECTIVES OF THE '80s

- **CORPORATE-LEVEL I/S STRATEGY**
    - FRAMEWORK
    - OBJECTIVES
    - STRATEGIES

- HIERARCHY OF I/S STRATEGIES
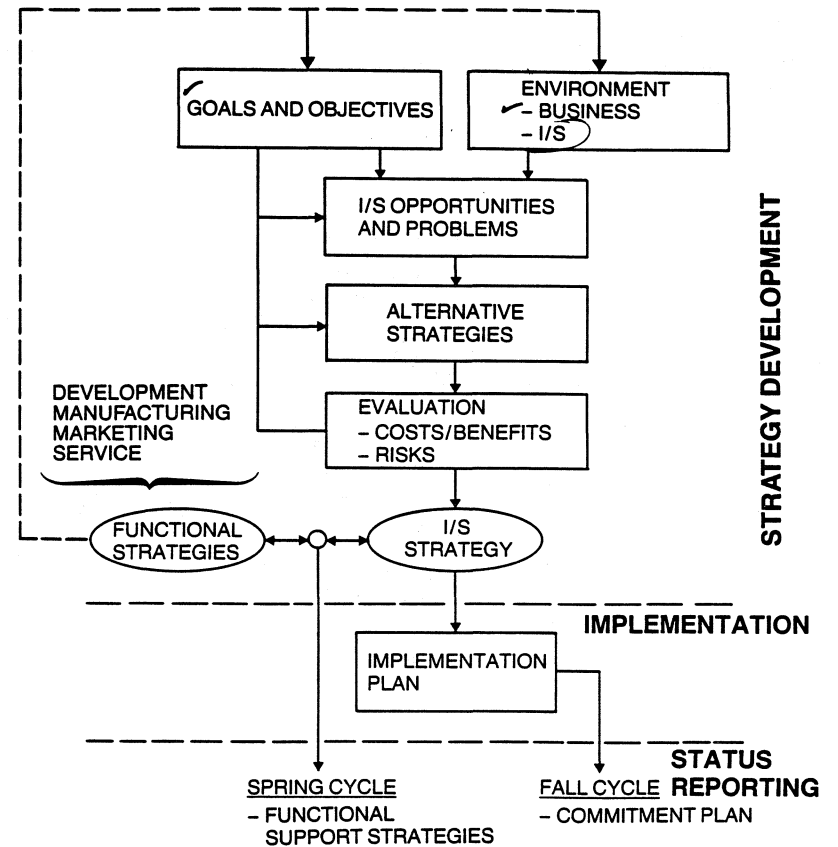   - CASCADING PROCESS
    - ROLES AND RESPONSIBILITIES

As previously described, the strategy development process starts by establishing objectives and describing the environment. The objectives for the Corporate I/S Strategy have been stated in the previous section.

The business environment for the corporation is well described for us as a result of the IBM business plan process. It produces world-wide business area strategies and unit functional strategies that define, for planning purposes, the current and projected environment.

To describe adequately the information systems environment, however, it is first necessary to agree on a framework that defines the strategic elements of the I/S environment and lays the groundwork for the development of an effective strategy.

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STRATEGY DEVELOPMENT

GOALS AND OBJECTIVES

ENVIRONMENT
– BUSINESS
– I/S

I/S OPPORTUNITIES AND PROBLEMS

ALTERNATIVE STRATEGIES

EVALUATION
– COSTS/BENEFITS
– RISKS

DEVELOPMENT
MANUFACTURING
MARKETING
SERVICE

FUNCTIONAL STRATEGIES

I/S STRATEGY

IMPLEMENTATION

IMPLEMENTATION PLAN

STATUS REPORTING

SPRING CYCLE
– FUNCTIONAL SUPPORT STRATEGIES

FALL CYCLE
– COMMITMENT PLAN

In reviewing current literature, one finds that useful framework
has been developed by Richard Nolan in his 1979 Harvard Business
Review article and later refined in his book Managing the Data
Resource Function (West Publishing Co., St. Paul, Minn., 1982).
Nolan sees the I/S support process as being made up of four
growth processes: the APPLICATIONS PORTFOLIO (programs and data
to automate business processes); DP RESOURCES (personnel and
technology, including hardware and software); DP ORGANIZATION,
PLANNING AND CONTROL; and USER AWARENESS. The interaction among
these processes provides EDP support to the business. He has fur-
ther observed that the associated EDP expenses, when tracked over
time, show an S-shaped growth curve characteristic of the learn-
ing process.

One of the contributions made by Nolan with this model is the
concept of looking at informations systems support as a business.
In this view, the I/S "business" has "products" (the Applications
Portfolio), "resources" (DP resources), and a "process" (DP
Organization, Planning and Control) that transforms resources
into products. It also has what is essential to any business,
"consumers" (the Users).

To help general management better understand the function of I/S
support in the enterprise, without having to delve into the com-
plexities of technology, Nolan advocates they view I/S as simply
A BUSINESS THAT OPERATES WITHIN THEIR BUSINESS.

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NOLAN'S I/S SUPPORT PROCESS

"Process"

"Product"   **"Resources"**

DP ORGANIZATION PLANNING CONTROL

APPLICATIONS PORTFOLIO

EXPENSE

DP RESOURCES

USER AWARENESS

"Consumer"
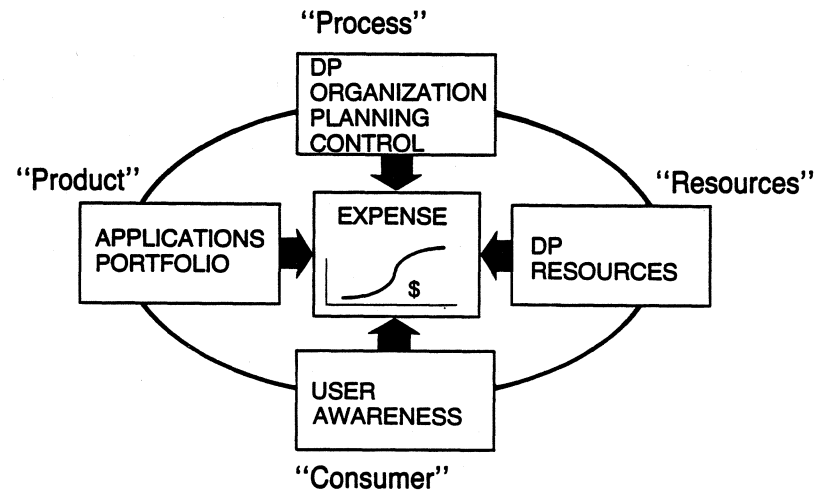
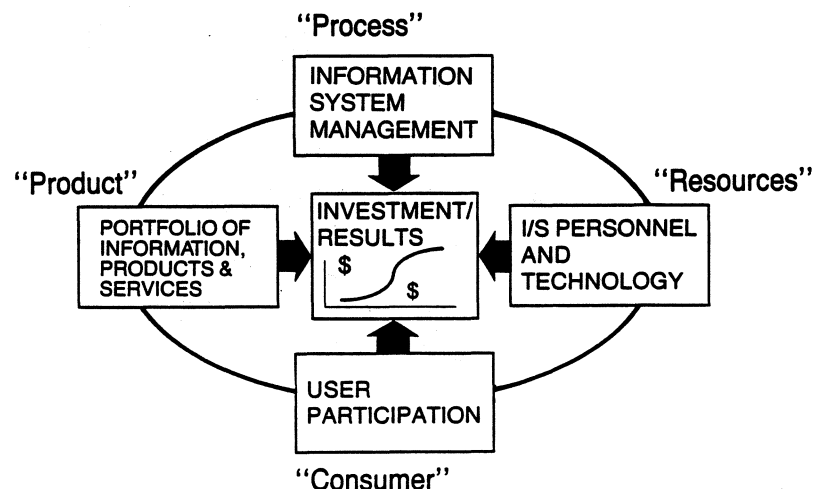## INFORMATION SYSTEMS IS A BUSINESS WITHIN A BUSINESS

While the Nolan model served well in the 70's, technological
advancement necessitates a revision for the 80's. Accordingly,
we have modified Nolan's model for use in IBM by expanding it as
follows:

- PORTFOLIO OF INFORMATION, PRODUCTS AND SERVICES: The programs
  and data of the Applications Portfolio plus the newer offer-
  ing of technology, such as personal computers, information
  centers, and application consultation services.

- INFORMATION SYSTEM MANAGEMENT: The full spectrum of responsi-
  bilities required for information systems support, whether
  discharged by I/S or User managers.

- I/S PERSONNEL AND TECHNOLOGY: Specifically excluding, for our
  particular case, telecommunications and office systems
  resources.

- USER PARTICIPATION: The active and essential role the user
  plays in information systems, whether through ownership of
  systems and data, definition of requirements, or contrib-
  utions to the applications portfolio through information cen-
  ters or personal computers.

- INVESTMENT/RESULTS: The concept of S-shaped I/S expenditure
  track reflecting learning is expanded to emphasize the "busi-
  ness within a business" viewpoint. Investments are made in a
  business with the expectation of obtaining results from those
  investments. Similarly, investments in the I/S business are
  made to obtain beneficial results in the main-line business.

In our revised model we also specify that I/S is a business with-
in a business, but NOT A BUSINESS UNTO ITSELF. That is, the pur-
pose of the I/S business in IBM is only to support the main-line
business of the corporation and not, as in other corporations,
produce a direct profit stream as if it were a business on its
own.

This qualification carries the implication that the I/S business
will not be optimized to its own efficiency advantage. Instead
the unit of the business being served by I/S is optimized, even
possibly at the expense of I/S efficiency. The final test of
optimization is that financial RESULTS achieved when compared to
the I/S INVESTMENT reflect an attractive return to the fundamen-
tal business.

I/S SUPPORT PROCESS IN THE '80s

INFORMATION SYSTEMS IS A BUSINESS
WITHIN A BUSINESS

....BUT NOT A BUSINESS UNTO ITSELF

The PORTFOLIO OF INFORMATION, PRODUCTS AND SERVICES element of
the I/S support process includes the programs and data (i.e.,
Nolan's Applications Portfolio) that automate portions of the
business processes of the organization. The concept of an Appli-
cations Portfolio, however, is suggestive of the era of large
centralized computer centers ("BIG BLUE") running programs pro-
duced by programmers in dedicated applications development
departments.

Technological advancement is introducing a number of alternatives
to the "BIG BLUE" approach. DISTRIBUTED DATA PROCESSING systems
are increasingly common, and PERSONAL COMPUTERS are becoming com-
monplace in the organization. Further, USER OPERATED STAND ALONE
SYSTEMS are becoming an attractive alternative with today's tech-
nology. For the casual user, INFORMATION CENTERS provide a
practical way to obtain the benefit of automation with
user-friendly system tools and components.

All these newer offerings naturally co-exist with the traditional
large computing centers in the corporation. The variety of pos-
sible approaches, however, transcends the earlier concept of an
Applications Portfolio. The expanded notion carried in the words
PORTFOLIO OF INFORMATION, PRODUCTS AND SERVICES better portrays
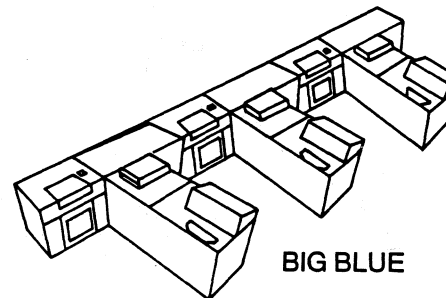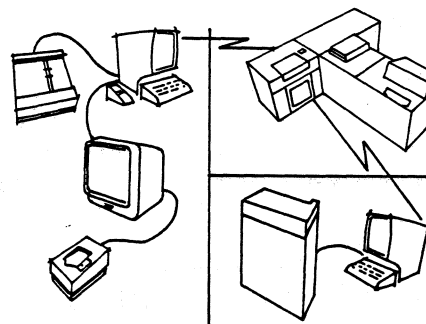the 'product' realized from today's information system
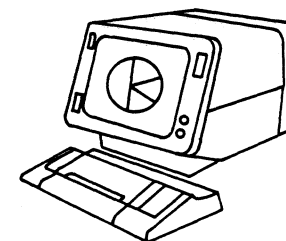activities.

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INFORMATION CENTER
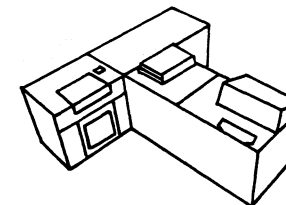
USER OPERATED STAND ALONE SYSTEMS

BIG BLUE

DISTRIBUTED DATA PROCESSING

PERSONAL COMPUTING

The framework we have used for I/S support is not a wide depar-
ture from the past but simply an evolution from the more clas-
sical representation of the information systems function. The
classical representation consists of a hierarchy of components
with business processes at the top. The next layer represents
the applications, the programs that automate some of those proc-
esses. The data required to run those programs make up the next
level. Systems Technology including both hardware and software,
is the delivery vehicle for the automated function. Finally, the
network provides communication between geographically dispersed
elements of the system.

In our framework, applications and data are included in PORTFOLIO
OF INFORMATION, PRODUCTS AND SERVICES. Hardware and software
systems are part of TECHNOLOGY. Networking is not addressed, as
explained earlier.

The comparison, then, shows that there are three new components
of the model of I/S support in the 80's. Two of them are the
INFORMATION SYSTEMS MANAGEMENT and the USER PARTICIPATION ele-
ments. They appear as an integral part of the support process,
with the same importance as application programs, data and system
technology. The third new component is the INVESTMENT in I/S and
attendant business RESULTS it yields.

I/S SUPPORT PROCESS
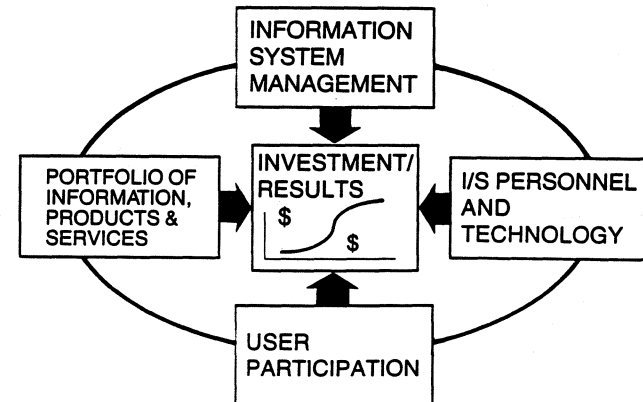
- MANAGE I/S AS A BUSINESS WITHIN THE BUSINESS

- DEVELOP STRATEGIES FOR THE FOUR ELEMENTS
  OF I/S SUPPORT

- EVALUATE PROGRESS IN TERMS OF
  INVESTMENT/RESULTS

The expanded model for information systems support in the 80's, can readily be used as a logical approach for developing the Corporate I/S Strategy. It also provides the basis for the following conclusions:

- We should manage the I/S support process as a BUSINESS WITHIN THE BUSINESS of the corporation. Decisions should be based on business analyses, and we should not overlook activities required of any successful business, such as (internal) market research, product planning, etc. We should keep in mind, however, that we are not a business unto ourselves, and optimization should be based on the business as a whole.

- To achieve the overall corporate objectives, we will proceed to develop specific STRATEGIES FOR EACH OF THE FOUR ELEMENTS of I/S support. This approach requires the establishment of specific objectives for each of the four elements.

- The strategic progress in the effective use of information systems technology in IBM should be evaluated in terms of the INVESTMENT made in information systems activity and the RESULTS obtained by the business from that investment.

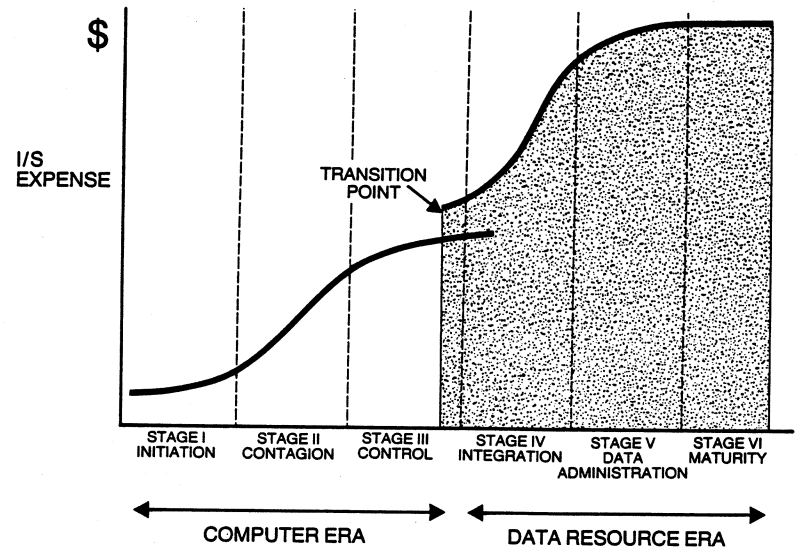## AAS BENEFIT – I/S INVESTMENT

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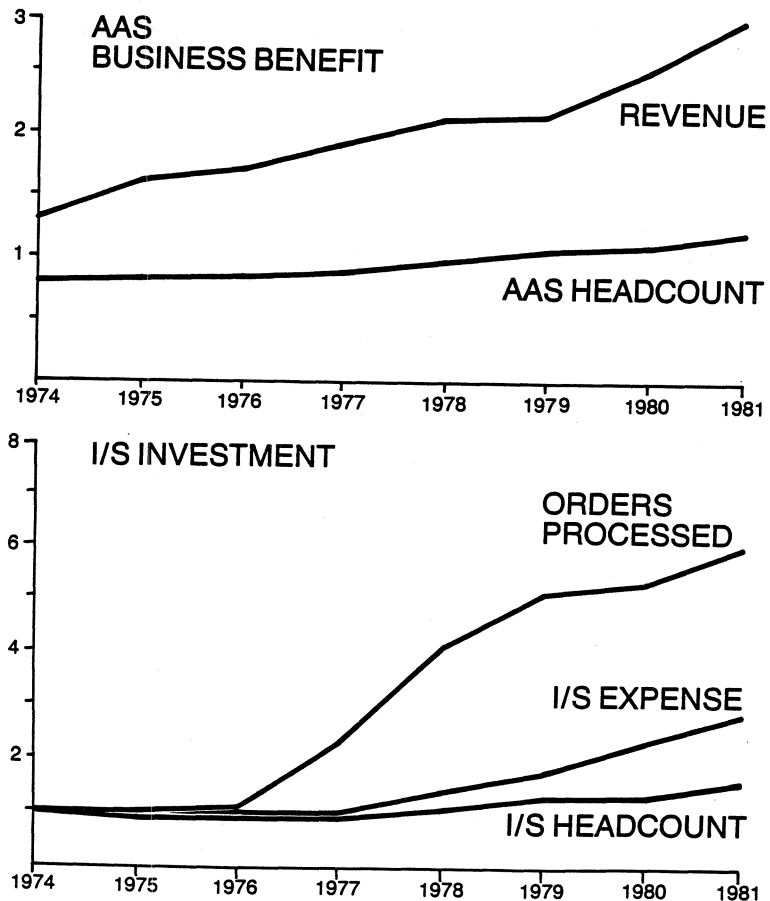
The time series shown illustrates the evaluation of progress by
comparing I/S INVESTMENT to business RESULTS. The graphs show
data for the functional measurement unit served by the Advanced
Administrative System (AAS), the system that does order entry and
supports marketing administration in the U.S.

The top graph shows business results for the 1970-74 period,
indexed so the base year 1.0. There is a three-fold increase in
revenue from orders processed by the system. Yet this increase
was handled with nearly the same number of administrative person-
nel.

The bottom graph, also indexed so that the base year is 1.0,
shows a nearly three-fold increase in I/S expense during the
1974-81 period. Yet, during this period, orders processed by the
system, a measure of I/S workload, increased by 600%, while I/S
personnel increased only by 50%.

This is a truly impressive productivity increase, that may not
have been evident in the traditional approach of viewing I/S as
an expense without focusing on the business results obtained.

$
I/S
EXPENSE

TRANSITION
POINT

STAGE I	STAGE II	STAGE III	STAGE IV	STAGE V	STAGE VI
INITIATION	CONTAGION	CONTROL	INTEGRATION	DATA ADMINISTRATION	MATURITY

COMPUTER ERA   DATA RESOURCE ERA

Before developing specific strategies for the four elements of
I/S, it is important to acknowledge another phenomenon observed
by Nolan about the absorption of I/S technology by an enterprise.
Specifically, the successful introduction of I/S technology is
accompanied by organizational learning. The expense track over
time has the characteristic shape of the "learning curve" and the
organization displays the distinct series of attributes as expe-
rience of individuals builds and the organization "learns".

In Nolan's work, this phenomenon is called the 'stage theory of
EDP growth', and he describes how the organization experiences a
predictable evolution between the time I/S technology is first
introduced until it becomes an integral part of the business.

Nolan views this evolution as consisting of a series of stages.
The first stage is the INITIATION stage, triggered by the intro-
duction of the computer. It is followed by a period of rapid
expansion, when more and more applications are put on the comput-
er. This stage is called the CONTAGION stage. Stage III, CON-
TROL, is characterized by a slower growth of applications, and an
emphasis on efficiency and lower costs. During this "introduc-
tion-expansion-leveling" cycle, I/S expense follows the
characteristic S-shaped learning curve.

The Control stage ends when investments in technology have ele-
vated the operating data to the status of the other fundamental
resources of the enterprise. This event starts a second S-shape
expense curve, beginning with another period of rapid growth. A
second benefit of data resource management is pursued (the INTE-
GRATION stage). As the enterprise matures further, the growth
levels off in the DATA ADMINISTRATION stage, leading to a possi-
ble sixth stage, MATURITY. Nolan's thesis is that investment in
each new major technology triggers a subsequent expansion process
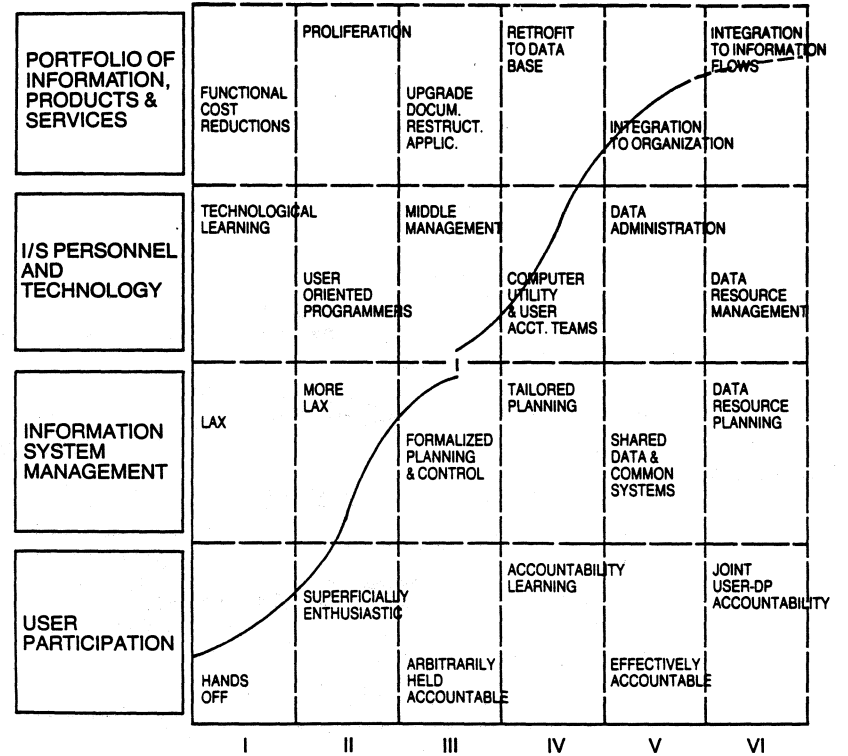with its associated S-shaped expense curve.
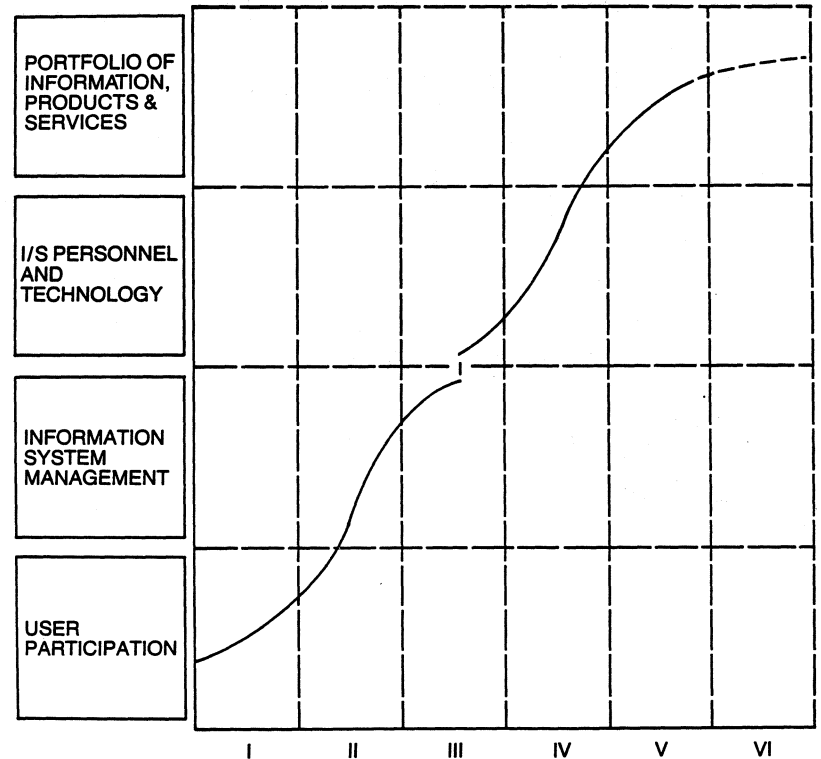
STAGES OF GROWTH

The concepts of the four elements of I/S support and the stages
of growth can be combined to produce a valuable analytical frame-
work for strategy development. Graphically, we can show the four
elements plotted against the six stages of growth.

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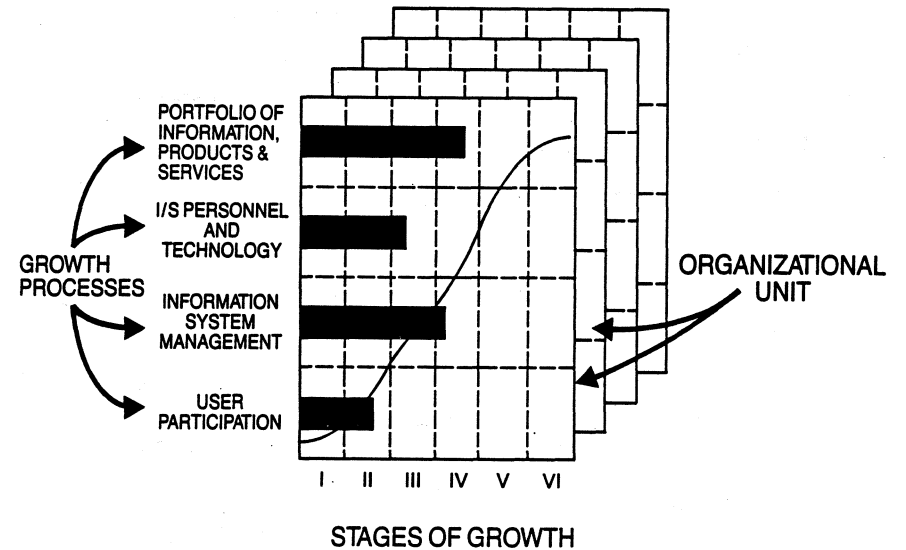|	I	II	III	IV	V	VI
PORTFOLIO OF INFORMATION, PRODUCTS & SERVICES	FUNCTIONAL COST REDUCTIONS	PROLIFERATION	UPGRADE DOCUM. RESTRUCT. APPLIC.	RETROFIT TO DATA BASE	INTEGRATION TO ORGANIZATION	INTEGRATION TO INFORMATION FLOWS
I/S PERSONNEL AND TECHNOLOGY	TECHNOLOGICAL LEARNING	USER ORIENTED PROGRAMMERS	MIDDLE MANAGEMENT	COMPUTER UTILITY & USER ACCT. TEAMS	DATA ADMINISTRATION	DATA RESOURCE MANAGEMENT
INFORMATION SYSTEM MANAGEMENT	LAX	MORE LAX	FORMALIZED PLANNING & CONTROL	TAILORED PLANNING	SHARED DATA & COMMON SYSTEMS	DATA RESOURCE PLANNING
USER PARTICIPATION	HANDS OFF	SUPERFICIALLY ENTHUSIASTIC	ARBITRARILY HELD ACCOUNTABLE	ACCOUNTABILITY LEARNING	EFFECTIVELY ACCOUNTABLE	JOINT USER-DP ACCOUNTABILITY

STAGES OF GROWTH

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Each of the four elements takes different characteristics as it
moves through the stages of growth. For example, during the Ini-
tiation stage, the emphasis for PORTFOLIO OF INFORMATION, PRO-
DUCTS AND SERVICES is on applications that result in functional
cost reductions. The second stage is marked by a proliferation
of applications in various functional areas. The Control stage
slows down the proliferation, and emphasis shifts to increased
operating efficiency through upgrading, documenting and restruc-
turing of the applications. In the fourth stage, those
applications are retrofitted to a data base. The last two stages
bring an integration of the applications to the organization,
such as would be made through a BSP (Business Systems Planning)
study, and later integration to the information flows.

The characteristics of USER PARTICIPATION are quite different.
The users initial hands-off attitude of the first stage is
replaced by a superficial enthusiasm when the applications start
to proliferate. The emphasis on cost reduction that character-
izes the Control stage usually results in the users being held
accountable for the expenditures, somewhat arbitrarily because
they have not really been involved. During the later stages,
users first learn how to be accountable, and then become effec-
tive with that responsibility. The final stage is when both the
user organization and Information Systems are held jointly
accountable for the use of technology in the enterprise.

A more detailed description of the evolution of the elements
through the stages can be found in Richard Nolan's references
cited previously.

GROWTH PROCESSES

PORTFOLIO OF INFORMATION, PRODUCTS & SERVICES

I/S PERSONNEL AND TECHNOLOGY

INFORMATION SYSTEM MANAGEMENT

USER PARTICIPATION

ORGANIZATIONAL UNIT

I   II   III   IV   V   VI

STAGES OF GROWTH

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A key consideration in developing and implementing I/S strategies is that the four elements of information systems support move through the stages at independent rates for a given organizational unit. Typically, one element will lead the others. Furthermore, the pattern of growth will be different from one organizational unit to another within the same corporation. Experience to date using the Stage Analysis methodology for strategy development within IBM confirms this phenomenon.

There are two major conclusions drawn from this that are of importance for strategy development. The first is that a balanced pattern is required to provide effective I/S support in any given stage. For this reason the organizational unit's top priority should be bringing up the lagging elements up to the level of the most advanced. This, unfortunately, cannot be done by executive dictum, because the elements' movement through the stages occurs by organizational learning. Therefore, an action plan to achieve the necessary learning for the lagging elements must be developed and executed as part of that unit's strategy.

The second conclusion is that because the pattern of growth is different from unit to unit, the strategy formulated at the corporate level will not apply equally to all the units in the organization. A unit must consider its business objectives and strategies as well as its particular pattern of growth when adapting and customizing the corporate strategy.

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CORPORATE I/S STRATEGY
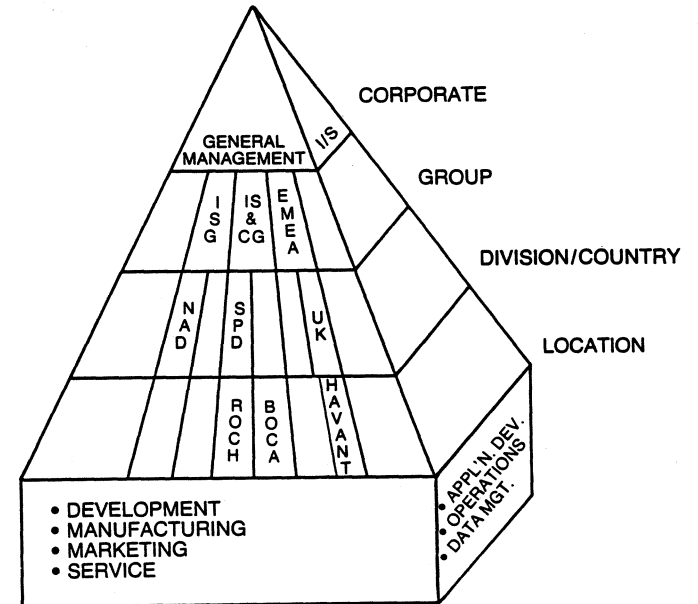
OVERALL OBJECTIVES:

- SUPPORT THE PRIMARY FUNCTIONS OF THE BUSINESS

- AS EFFICIENTLY AS POSSIBLE
  - I/S FUNCTIONAL EXCELLENCE

- AND ACHIEVE USER–I/S CONGRUENCE

Given the framework for I/S support previously described, togeth-
er with an acknowledgement of organizational learning, we can now
develop a corporate I/S strategy formulated to achieve the three
stated corporate objectives:

- SUPPORT THE PRIMARY FUNCTIONS
- AS EFFICIENTLY AS POSSIBLE
  . I/S FUNCTIONAL EXCELLENCE
- AND ACHIEVE USER-I/S CONGRUENCE

This corporate strategy, in turn, will provide the basis for
developing more specific strategies at the group,
division/country, and location levels.

As previously mentioned, the strategy will be divided into four
parts, one for each element of the I/S framework. The remainder
of this section describes specific objectives and strategies for
each one of the four elements.

CORPORATE I/S STRATEGY
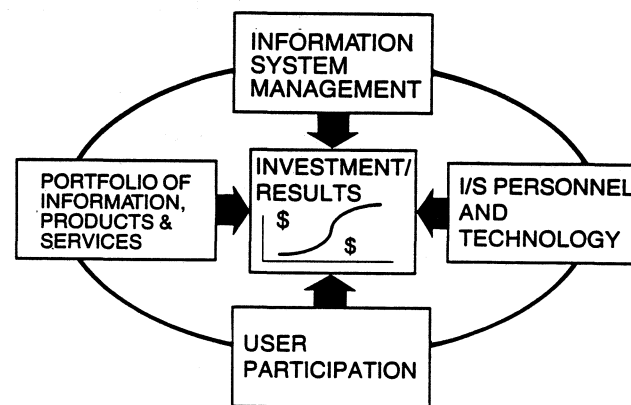
- PORTFOLIO OF INFORMATION,
  PRODUCTS & SERVICES
  - OBJECTIVES
  - STRATEGY

We start with the objectives and strategy for the PORTFOLIO OF
INFORMATION, PRODUCTS AND SERVICES.

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PORTFOLIO OF INFORMATION, PRODUCTS & SERVICES

OBJECTIVES

- PORTFOLIO CONTENT
  - DIRECTED TOWARD STRATEGIC BUSINESS
    AREA AND FUNCTIONAL REQUIREMENTS
  - REFLECTS LINE MANAGEMENT PRIORITIES
  - FACILITATES BUSINESS GROWTH AND
    ORGANIZATIONAL CHANGE

- SHARED USE OF APPLICATION SOFTWARE

- USER DIRECT INTERFACE TO BUSINESS DATA

Three objectives are addressed in the PORTFOLIO OF INFORMATION, PRODUCTS AND SERVICES strategy:

- The applications in the Portfolio should be directed towards the ROCA-based strategic requirements of the business areas and functions. In the final analysis, however, they should reflect the priorities of line management. Further, portfolio entries should be constructed so as to facilitate business growth and organizational change.

- Whenever possible, application software should be shared. Utilizing code already written is one of the most effective ways of increasing application development productivity.

- The user should interface directly to his business data wherever possible. This means that the user should be able to access and process his own data, without being required to go through an intermediary I/S organization. On the other hand, the I/S organization might well hold stewardship for data on behalf of several using organizations.

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PORTFOLIO OF INFORMATION, PRODUCT & SERVICES

STRATEGIES

- MANAGE APPLICATION PORTFOLIO AS AN INVESTMENT PORTFOLIO
  - ASSESS COVERAGE, QUALITY, AND PERFORMANCE
  - ADD/DELETE FUNCTION BASED ON:
    - STRATEGIC BUSINESS NEEDS
    - OPPORTUNITY-RETURN ON ALTERNATIVE USER INVESTMENTS
    - EXTENT AND QUALITY OF CURRENT APPLICATIONS
  - GROW THE PORTFOLIO
    - BUY, HELP, MAKE PRIORITIZATION
    - COMMON SYSTEMS WHERE CONSISTENT WITH BUSINESS PRACTICE

- FOSTER USER SELF-SUFFICIENCY BY PROVIDING INFORMATION CENTER SERVICES AND APPLICATION CONSULTATION
  - EDUCATION ON AN ACCESS TO USER-FRIENDLY TOOLS
  - DISTRIBUTION OF PROCESSING FUNCTION AND DATA

- EVOLVE TOWARD MANAGING DATA AS AN ASSET
  - DATA ADMINISTRATION
  - DATA DICTIONARY
  - COMMON DATA DISTRIBUTION
  - SYNCHRONIZED DATA ENVIRONMENT

There are tools available to help organizations (group, division/country, locations) develop implementation plans for the strategies described. The next three foils describe one set of tools that are part of the Stage Analysis methodology. The methodology was originally developed by Nolan Norton Co. but later adapted for IBM internal use by Corporate I/S Strategy Development working with Nolan Norton Co.

Assessing the Portfolio coverage and quality can be done by describing the business processes and sub-processes using the triangular representation developed by Robert Anthony of Harvard University. There are three levels in this triangle: operational control, management control, and, at the top, strategic planning. In each level, the major processes and sub-processes required to run the business, independent of organizational structure, are identified.

For each sub-process, the size of the rectangle equates to 100% of the automatable portion of the sub-process. The users then determine, in their judgement, what percent of the automatable portion has actually been automated. This is called the "attempted coverage". They also estimate the "functional quality" of the automated portion on a scale of 0-100%. Discounting the attempted coverage by the functional quality results in the "effective coverage".

This analysis, therefore, yields an organization-independent description of the attempted and effective coverage of the business, differentiated by operational control, management control, and strategic planning. Such a description provides a necessary base line to develop an effective applications strategy for the Portfolio element.

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EXAMPLE OF AN APPLICATION PORTFOLIO

COVERAGE
QUALITY

■ ATTEMPTED COVERAGE
□ EFFECTIVE COVERAGE
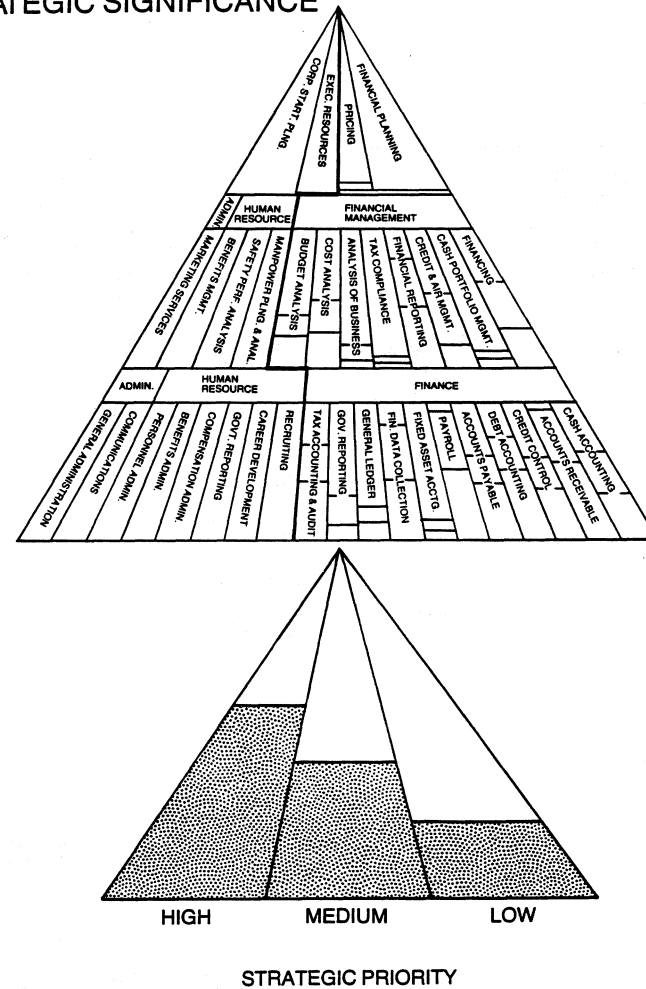
STRATEGIC PLANNING

MANAGEMENT CONTROL

OPERATIONAL CONTROL
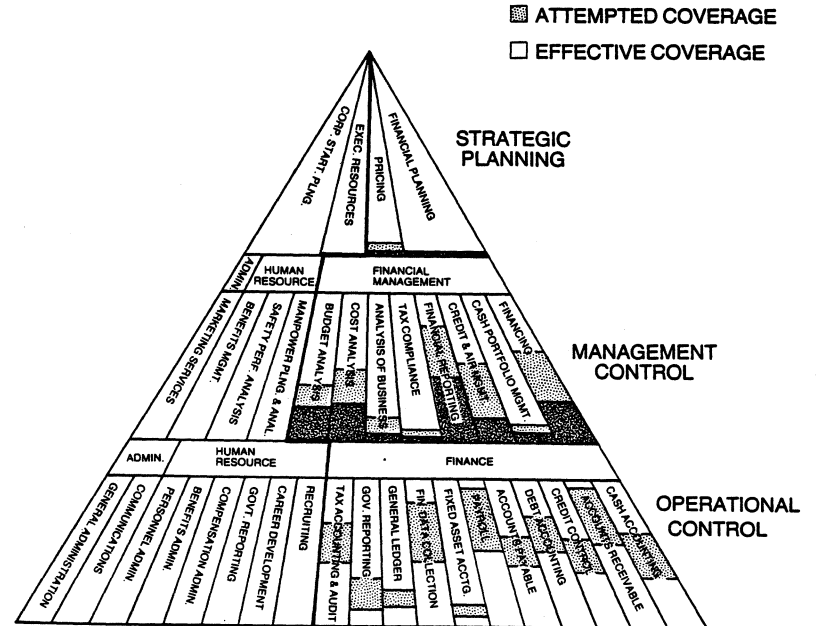
Once the coverage of processes and subprocesses has been determined, it can be used to see if the applications in the Portfolio are directed to the strategic requirements of the business.

A simple method of doing this is to have the user manager responsible for the function classify the processes and subprocess into three groups, corresponding to high, medium, and low STRATEGIC PRIORITIES.

When the coverage of each group is summed, a pattern like the one shown (high coverage for high priority processes, lower for medium priority, and lowest for low priority) indicates that the strategic objective has been met. As might be expected, such a pattern does not always exist. Due, in part, to the emphasis on return-on-investment business cases and to the fact that the lower priority processes tend to be more structured and easier to automate, the typical pattern found tends to be flat or dominant in the medium-and-low priority area.

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STRATEGIC SIGNIFICANCE

STRATEGIC PRIORITY

HIGH   MEDIUM   LOW

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The Stage Analysis methodology has another tool that assesses the quality of the current applications in the Portfolio, and thus aids in developing a maintenance/enhancement strategic plan.
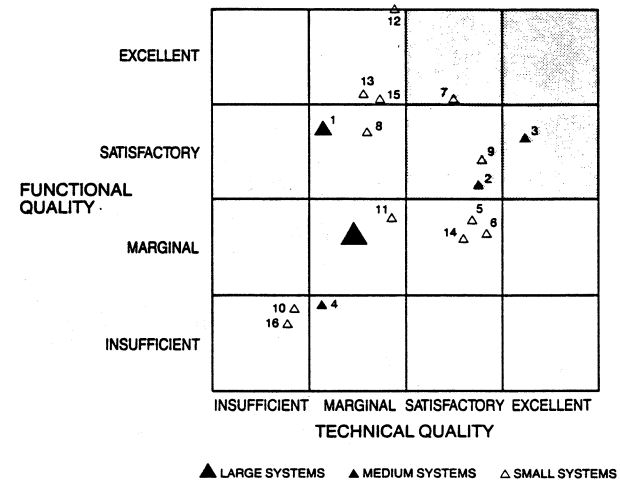
As mentioned when discussing effective coverage of the Portfolio, the users evaluate the FUNCTIONAL QUALITY of the applications systems. They do it through a questionnaire survey. Functional quality is defined as an aggregate measure of several variables such as data accuracy, accessibility, currency, security, ease of use, reliability, etc., as they pertain to the particular application. The composite evaluation yields a score on quality scale ranging from insufficient to excellent.

A survey of I/S personnel similarly determines the TECHNICAL QUALITY of the same applications. The aggregate measure of technical quality is portrayed on a similar scale. The score is based on the composite of the technical attributes of the applications.

Plotting functional versus technical quality results in the matrix like the one shown. Obviously the upper right hand quadrant is the desirable area to be in. By adding the dimension of the operating cost of each application (e.g., large, medium or small systems) a specific plan can be developed indicating what systems should be maintained, enhanced, or rewritten.

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APPLICATION QUALITY ANALYSIS

FUNCTIONAL QUALITY vs TECHNICAL QUALITY matrix. Vertical axis FUNCTIONAL QUALITY with levels EXCELLENT, SATISFACTORY, MARGINAL, INSUFFICIENT. Horizontal axis TECHNICAL QUALITY with levels INSUFFICIENT, MARGINAL, SATISFACTORY, EXCELLENT.
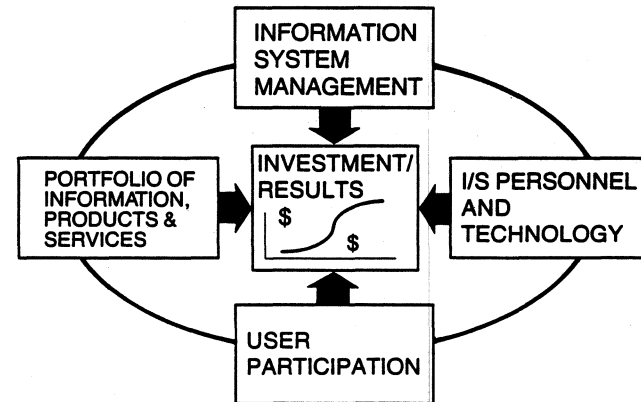
▲ LARGE SYSTEMS   ▲ MEDIUM SYSTEMS   △ SMALL SYSTEMS

- FUNCTIONAL QUALITY OF APPLICATIONS AS VIEWED BY USERS

- TECHNICAL QUALITY OF APPLICATIONS AS VIEWED BY I/S

- ANALYSIS OF QUALITY SETS ENHANCEMENT PRIORITIES

The next element that we will discuss is the INFORMATION SYSTEM
MANAGEMENT component.

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CORPORATE I/S STRATEGY

- **INFORMATION SYSTEM MANAGEMENT**
  - OBJECTIVES
  - STRATEGY

There are four objectives for the INFORMATION SYSTEM MANAGEMENT element:

- The plans for information systems should be CONSISTENT with the BUSINESS PLANS.

- The RESULTS OF INVESTMENTS made in information systems should be DEMONSTRATED AND QUANTIFIED to show how information systems resources are utilized to improve _user_ effectiveness and efficiency. The demonstrated/quantified results should also show information systems functional efficiency and quality.

- The RESPONSIBILITIES of information systems, user and financial management should be EXPLICITLY DELINEATED.

- USER-I/S CONGRUENCE should exist at the functional measurement unit level.

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INFORMATION SYSTEM MANAGEMENT

OBJECTIVES

- ● PLANS FOR INFORMATION SYSTEMS CONSISTENT WITH BUSINESS PLANS

- ● DEMONSTRATED/QUANTIFIED RESULTS FROM INFORMATION SYSTEMS INVESTMENTS
    - – INFORMATION SYSTEMS RESOURCES LEVERING USER EFFECTIVES AND EFFICIENCY
    - – I/S FUNCTIONAL EFFICIENCY AND QUALITY

- ● EXPLICIT DELINEATION OF RESPONSIBILITIES BETWEEN I/S, USER, AND FINANCIAL MANAGEMENT

- ● USER – I/S CONGRUENCE AT FUNCTIONAL MEASUREMENT UNIT LEVEL

There are seven strategies directed toward achieving the INFORMA-
TION SYSTEM MANAGEMENT objectives:

-   To achieve User-I/S congruence, user management should <u>evolve</u>
    to a stage of effective authority over and accountability for
    the information systems investment in the functional measure-
    ment units. The key word here is evolve, implying, as it
    does, the process of organizational learning. The users can-
    not assume their proper role until they have reached the
    state of involvement, knowledge, and maturity that allows
    them to be effective.

-   The responsibilities and resources for information systems
    activities should be aligned so they are consistent with user
    line organization accountability, measurements and
    capability. They should also consider the economics of cur-
    rent technology as well as meet necessary guidelines and con-
    trol requirements. This particular aspect of the strategy
    has been discussed earlier when the concept of user-I/S con-
    gruence was introduced.

-   The need to preserve the integrity of information flow in the
    business while distributing information systems resources
    makes it mandatory to have an architectural framework, guide-
    lines and standards. This guidance will facilitate business
    growth and change, the compatibility and transferability of
    systems and data, and the improvement of I/S functional pro-
    ductivity.

    This architectural guidance is of special importance because
    the realignment of I/S resources and responsibilities will
    result in an increasing number of persons with limited I/S
    experience making I/S type decisions.

-   An effective way to ensure consistency between I/S and busi-
    ness plans is to imbed the I/S plan process in the business
    plan process. This has been the case in the past, and we
    must make certain that it continues to be so. The process
    must provide for top-down strategic direction setting, with
    bottom-up integration of the strategy implementation plans.

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INFORMATION SYSTEM MANAGEMENT

STRATEGIES

- **EVOLVE TO A STAGE OF EFFECTIVE USER MANAGEMENT AUTHORITY OVER AND ACCOUNTABILITY FOR INFORMATION SYSTEMS INVESTMENT WITHIN FUNCTIONAL MEASUREMENT UNIT**

- **ALIGN RESPONSIBILITIES AND RESOURCES FOR INFORMATION SYSTEMS ACTIVITIES CONSISTENT WITH**
    - **USER LINE ORGANIZATION**
      - **ACCOUNTABILITY**
      - **MEASUREMENTS**
      - **CAPABILITY**
    - **CURRENT ECONOMICS OF TECHNOLOGY**
    - **APPROPRIATE GUIDELINES AND CONTROLS**

- **DEVELOP I/S ARCHITECTURAL FRAMEWORK, GUIDELINES, AND STANDARDS TO FACILITATE**
    - **BUSINESS GROWTH AND CHANGE**
    - **SYSTEM AND DATA COMPATIBILITY/TRANSFERABILITY**
    - **I/S FUNCTIONAL PRODUCTIVITY**

- **IMBED I/S PLAN DEVELOPMENT IN THE BUSINESS PLANNING PROCESS**
    - **TOP-DOWN STRATEGIC DIRECTION**
    - **BOTTOM-UP IMPLEMENTATION PLANNING**

Individual information systems projects should be planned, measured and controlled in a way that demonstrates <u>user</u> return on the investment. In the project justification process, the user should take the lead and drive the business case. I/S, however, should not fall into a passive role. Instead, I/S should exert active technical leadership in proposing and justifying new uses of information systems technology where it can contribute to the success of the business.

A key concept is that we should capture the benefits of the investment in information systems through the business planning discipline already in place, instead of creating new, add-on measurement systems. This can be achieved by adjusting the existing plan-of-record of the user to show the expected benefits of a proposed system. The user should then manage to the modified plan of record. This approach relies on proven management controls and avoids the additional cost of separately tracking the results of the new system. If the user successfully manages to his new plan, by implication the new system is successful.

We should develop and implement measurement techniques that track both the business achievements of the functional measurement units and the information systems resources applied. The relationship between business results and I/S investment is a key indicator of I/S effectiveness.

Finally, we should establish measurements that demonstrate the productivity and quality of information systems endeavor.

INFORMATION SYSTEM MANAGEMENT

STRATEGIES (cont'd)

- PLAN, MEASURE, AND CONTROL INDIVIDUAL PROJECTS TO DEMONSTRATE RETURN ON INFORMATION SYSTEM INVESTMENTS
  - USER-DRIVEN BUSINESS CASE
  - I/S TECHNICAL LEADERSHIP
  - CAPTURE BENEFITS THROUGH PLANNING DISCIPLINE

- ESTABLISH FINANCIAL AND FUNCTIONAL PERFORMANCE MEASUREMENT TOOLS AND TECHNIQUES THAT:
  - TRACK BUSINESS ACHIEVEMENT OF FUNCTIONAL MEASUREMENT UNIT
  - IDENTIFY INFORMATION SYSTEMS RESOURCES APPLIED
  - DISPLAY THE RELATIONSHIP BETWEEN INVESTMENT AND RESULTS

- ESTABLISH MEASUREMENTS TO DEMONSTRATE INFORMATION
  - PRODUCTIVITY
  - QUALITY

A very useful concept for defining user and I/S management
responsibilities was described by Dr. Jack R. Buchanan in his
1980 articles in the Harvard Business Review. He identified spe-
cific areas of responsibility for information systems activities.
Within each area, he defined a spectrum of responsibilities,
ranging from minimum user involvement and progressing through
explicitly described states of increasing user responsibility.

Using this concept we can build a user-I/S responsibility profile
for an application system. The illustration shows the
twenty-four separate areas of responsibilities that were defined
when Dr. Buchanan and Corporate I/S Strategy Development modified
the published methodology to adapt it for use within IBM. The
data shown, incidentally, is for an actual application system at
an IBM location. Notice the absence of user responsibility for
Workload/Capacity Planning and the very limited involvement in
Operations Budgeting and Performance Evaluation. It was not sur-
prising, therefore, to find response time and systems
availability problems in that location. These problems were sub-
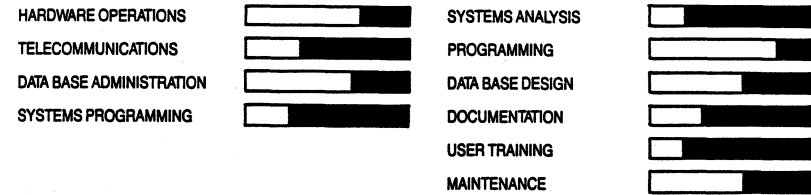sequently addressed by increasing user responsibilities in those
areas.

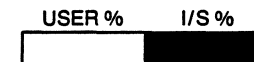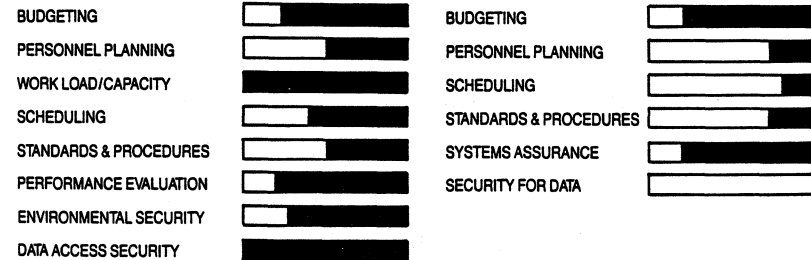# EXAMPLE OF RESPONSIBILITY PROFILE

OPERATIONS

EXECUTION

HARDWARE OPERATIONS

TELECOMMUNICATIONS

DATA BASE ADMINISTRATION

SYSTEMS PROGRAMMING

PLANNING AND CONTROL

BUDGETING

PERSONNEL PLANNING

WORK LOAD/CAPACITY

SCHEDULING

STANDARDS & PROCEDURES

PERFORMANCE EVALUATION

ENVIRONMENTAL SECURITY

DATA ACCESS SECURITY

APPLICATIONS DEVELOPMENT

EXECUTION

SYSTEMS ANALYSIS

PROGRAMMING

DATA BASE DESIGN

DOCUMENTATION

USER TRAINING

MAINTENANCE

PLANNING AND CONTROL

BUDGETING

PERSONNEL PLANNING

SCHEDULING

STANDARDS & PROCEDURES

SYSTEMS ASSURANCE

SECURITY FOR DATA

USER %   I/S %

Previously we mentioned the need for an I/S architectural framework with guidelines and standards to facilitate the achieving of business and I/S objectives. The word ARCHITECTURE has many meanings both inside and outside the I/S organization, so we need to define the word for the purposes of this discussion.

Architecture, as we are using it, defines what the pieces are, what each piece does, and how they fit together into a structure. The architecture also defines for each component the interfaces, attributes or characteristics, and the relationship with other components.

This definition is intentionally broad because it must apply in a variety of cases and yet be rendered specific by the addition of an adjective. For example, data architecture or system architecture.

The fundamental purpose of an I/S architecture is to help MANAGE THE I/S BUSINESS by segmenting it into meaningful pieces and defining the structure. For instance, information architecture provides the framework which is required to implement the business and I/S strategies. In addition, the architecture can provide the link between the I/S strategy and the I/S planning process. Too often this link is missing and it is difficult to establish a tie between the I/S plans and the I/S strategy.

Since the architecture defines the pieces of the I/S business, including the boundaries, interfaces, and relationships, it can clarify the accountability and authority for each part or function.

One of the challenges we have in I/S is managing change and the related increase in program maintenance load. A good I/S architecture will segment applications so that changes will not cascade through the system. It will also help to structure the systems so that changes can be made easily by simply replacing modules or updating tables.

Facilitating changes to programs is also a means of aiding I/S productivity. But the architecture can also simplify development of new applications by allowing use of common functions and available tools.

Architecture can improve user productivity by simplifying the user interfaces and easing the implementation of required changes.

To accomplish the above, however, an I/S Architecture must coherently address the Business Processes, the I/S Application, the Data, the System Hardware and Software, and the Communications Network. We have established each of these categories as a class or type of I/S Architecture.

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ARCHITECTURE

"DEFINES COMPONENTS, FUNCTION, AND STRUCTURE INCLUDING INTERFACES, ATTRIBUTES AND RELATIONSHIP"

- SEGMENTS 'I/S BUSINESS' INTO MANAGEABLE COMPONENTS
  - PROVIDES FRAMEWORK FOR STRATEGY IMPLEMENTATION
  - ESTABLISHES SPHERES OF ACCOUNTABILITY/AUTHORITY
  - LOCALIZES AND FACILITATES CHANGE
  - AIDS USER AND I/S PRODUCTIVITY
- DIVIDES INTO FIVE CLASSES

BUSINESS PROCESSES

APPLICATIONS

DATA

SYSTEM TECHNOLOGY (HARDWARE/SOFTWARE)

NETWORK
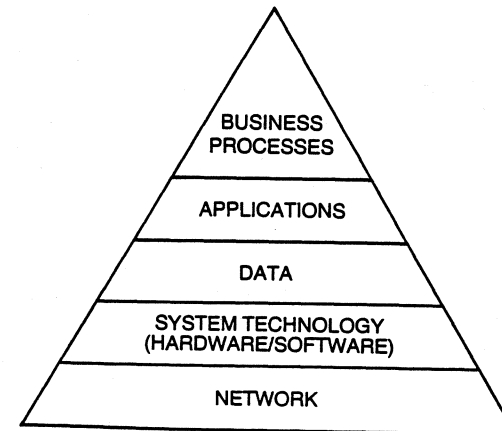
A complete I/S Architecture must address each of these five classes. The definitions of each class in the chart shows how the classes relate to each other.

The BUSINESS PROCESS ARCHITECTURE defines and structures the business function which are required to achieve the business objectives. There is no reference to computers or automation at this level of the architecture.

The APPLICATION ARCHITECTURE distinguishes the parts of the business process performed by computers from those performed manually.

The DATA ARCHITECTURE addresses the data which is required by the business processes and the applications.

The SYSTEM TECHNOLOGY ARCHITECTURE is the technical structure of the application, system, and support software required to implement the applications and deliver the required function to the user.

The NETWORK ARCHITECTURE specifies the structure and functions of the communication facilities required to move data and application function in response to business needs.

CLASSES OF ARCHITECTURE

- **BUSINESS PROCESS ARCHITECTURE:**
  - IDENTIFICATION AND DEFINITION OF THE BUSINESS PROCESSES (AND THEIR RELATIONSHIPS) AS REQUIRED TO PERFORM THE KEY FUNCTIONS OF THE BUSINESS

- **APPLICATION ARCHITECTURE:**
  - DEFINITION, STRUCTURE AND INFORMATION FLOW OF PORTIONS OF THE BUSINESS PROCESSES WHICH CAN BE AUTOMATED TO SUPPORT AND IMPROVE THE BUSINESS FUNCTIONS

- **DATA ARCHITECTURE:**
  - IDENTIFICATION, DEFINITION, RELATIONSHIP AND STRUCTURE OF DATA ELEMENTS INHERENT IN THE BUSINESS PROCESSES

- **SYSTEMS TECHNOLOGY ARCHITECTURE:**
  - DEFINES THE STRUCTURE AND RELATIONSHIPS OF THE APPLICATION PROGRAMS, INTERFACES, SUPPORT FUNCTIONS, AND SOFTWARE FACILITIES

- **NETWORK ARCHITECTURE:**
  - THE SPECIFICATION OF THE STRUCTURE AND RELATIONSHIPS OF THE COMMUNICATIONS AND COMPUTING FACILITIES, INCLUDING PROTOCOLS TO MEET TELECOMMUNICATIONS STRATEGY OBJECTIVES

Before discussing how I/S planning is integrated with the BUSINESS PLANNING SYSTEM, it is helpful to quickly review the new planning process designed by the Reorganization Task Force. An overview is shown in the chart.

The first half of the year, the BUSINESS INVESTMENT CYCLE, focuses on strategies. It has three parts, each one terminated with reviews and approvals, as appropriate, by the Corporate staffs and the Corporate Management Committee (CMC). The cycle starts with the WORLDWIDE STRATEGIES developed by the line executives responsible for each BUSINESS AREA. These strategies are market-driven, focusing on demand and designed to meet the revenue and profitability objectives of each area. They serve as the basis for the FUNCTIONAL STRATEGIES developed by various units to execute the business area strategies that correspond to their missions. These strategies focus on the primary functions and are designed to meet the objectives assigned by Corporate to each unit. The final part of this cycle are the STRATEGIC SIZINGS, top-level financial statements of the results of executing the financial strategies in each unit.

The second half of the year, the COMMITMENT CYCLE, focuses on the implementation plans required to execute the CMC-approved strategies. Each unit develops a two-year COMMITMENT PLAN plus a three-year LONG RANGE OUTLOOK (LRO). They are submitted for review and approval of the Corporate staffs and the CMC. Once approved, they become the basis for the Measurement Plan that will be used to track performance during the following year.

BUSINESS PROCESSES
MANUFACTURING

APPLICATION SUPPORT

MFG. PROCESSES	SUBPROCESSES	DP COMPLEX					GBGI	GTD	EWEA	AFE	ISD CPD	IS ASSESSMENT
		DSD	SPD	GPD	GSD	SCD						
PRODUCT LOGISTICS	CUSTOMER ORDER PROC.-MKT/MFG	CCOP	CCOP	CCOP	CCOP	CCOP	CCOP	-	CCOP	CCOP	(RITCE)	
	PLANT ORDER PROCESSING	•	•	PACE	PACE	PACE	(PACE)	-				
	MES PROCESSING	PACE	PACE	PACE	PACE	PACE	(PACE)	-	MESCP	MESCP	(PACE)	
	MACHINE LEVEL CONTROL	MLC	PACE	PACE	PACE	PACE	(PACE)	-	MLC	MLC	(PACE)	
MATERIAL LOGISTICS	PRODUCTION PLANNING	CWIS	CWIS	CWIS	PDMIL MIS	PACT LMF	•	•	•	(CWIS)	•	
	COMMODITY PLANNING & ALLOCATION	PPS	PPS	PPS	PPS	PPS		PPS	ICPS	PPS	PPS	
	INTERPLANT PARTS LOG.	IPR	IPR	IPR	IPR	IPR	IPR	IPR	IPR	IPR	IPR	
	MATERIAL DISTRIBUTION	CMIS	CMIS	CMIS	MLS	LMF	•	•	•	CMIS	•	
	PURCHASING	•	•	SPOC	CPAL	•	•	•	•	•	CAPRI	
	HYP MFG.	-	-	-	-	-	-		•	-	-	
ENG/MFG RELEASE	PRODUCT DESC. RECORDS CONTROL	DPRS	DPRS	DPRS	DPRS	DPRS	(DPRS)	DPRS	DPRS	DPRS	PRESS	
	TECHNICAL DATA INTERFACE	CRPS	CRPS	CRPS	CRPS	CRPS	(CRPS)	CRPS	CRPS	CRPS	CRPS	
MFG. LINE CONTROL	PROCESS CONTROL	PCIS	PCIS	PCIS	PCIS	PCIS	(PCIS)	PCIS	(PCIS)		(PCIS)	
	SHOP FLOOR CONTROL	X	X	X	X	X	X	X	X	X	X	
	MICROCODE/MEDIA WRITING	X	X	X	X	X	X	X	X	X	X	

- BUSINESS FUNCTION PERFORMED
• APPLICATION NOT IN PLACE

X UNKNOWN STRATEGY
• LOCAL APPLICATION SOLUTIONS

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With this framework for the business plan process, we can describe how I/S planning has been integrated into each component of the process.

- Business Area Strategies identify if the selected strategy has a major significant impact on information systems, or if information systems technology has a key role in the strategy. The "focus on change" approach of the plan process indicates that this be done for impacts and dependencies that are not part of the current strategies.

- Functional Strategies contain, as an integral part, the information systems strategies developed to support the primary function as well as the associated support functions in each unit.

- Strategic Sizings include all information systems resources anticipated in the units' functional strategies.

- Commitment Plans have a specific information systems section, detailing the commitment of I/S resources which is a part of the unit's plan.

For each of these four components, the Corporate I/S staff, through Corporate Plan Management, specifies the pro-forma data that should be submitted. It also reviews and takes a position on each of the submissions. Position taking is optional for the Business Area Strategies and Strategic Sizings, but mandatory for the Functional Strategies and Commitment Plans.
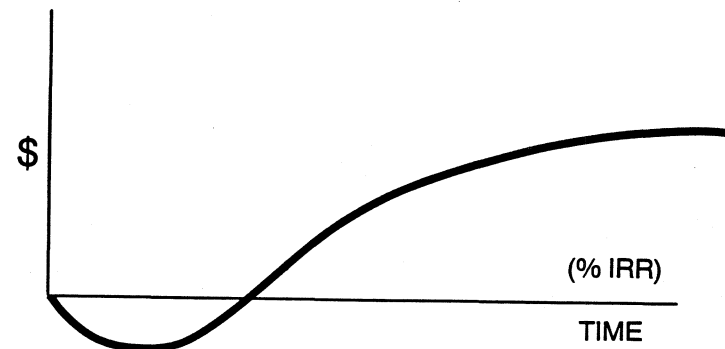
BUSINESS PLANNING SYSTEM
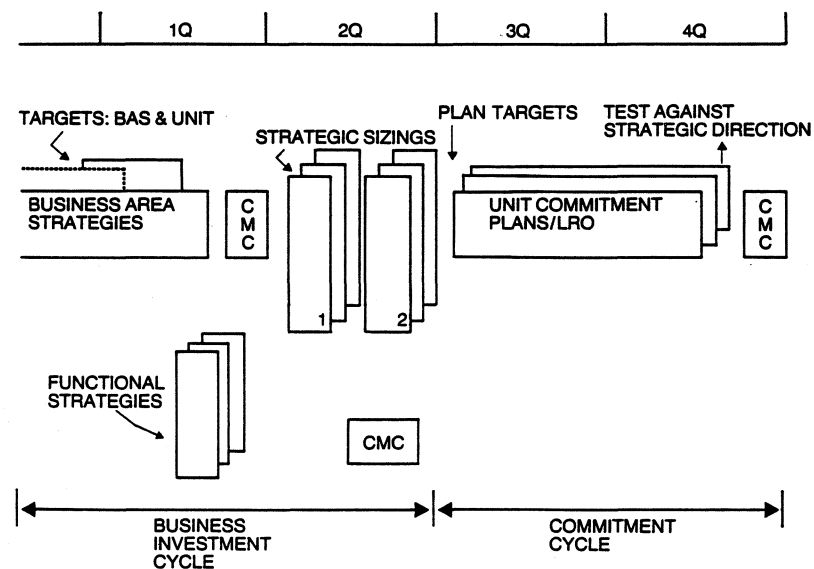
Relating user results to I/S investment is fundamental to the
effective utilization of information systems technology. As
important as it is, however, we still lack a well-accepted stand-
ard methodology to do so. Some progress has been made and is
illustrated in the general case on this chart.

The approach shown suggests that one first plot an accepted meas-
ure of productivity for the user function. Naturally this meas-
ure should be formulated by user management of the function
measurement unit. Examples of possible variables are cost per
point, expense to revenue ratio, revenue per qualified sales rep,
etc.

Investment of information resources (I/S expense) is then plotted
on the same graph, both curves being normalized to a base year
value of 1.0. If the gap between the two curves increases, it
indicates that business productivity is increasing faster than
I/S expense. In concept, this indicates positive leverage from
information technology. A decreasing gap, on the other hand, may
be a signal that information systems investment may not be con-
tributing to improved business productivity.

PROJECT JUSTIFICATION

$ ... (% IRR) ... TIME

- PROGRESSIVE REFINEMENT OF BUSINESS CASE
  - BUSINESS RATIONALE
  - PRELIMINARY CASE
  - HARDENED CASE

- PHASE REVIEW CONTROLLED

- INTERLOCK COSTS/BENEFITS

A planning and control tool for individual information systems projects is the classic return on investment analysis with the resulting time graph showing cumulative investment/return, break-even point, etc.
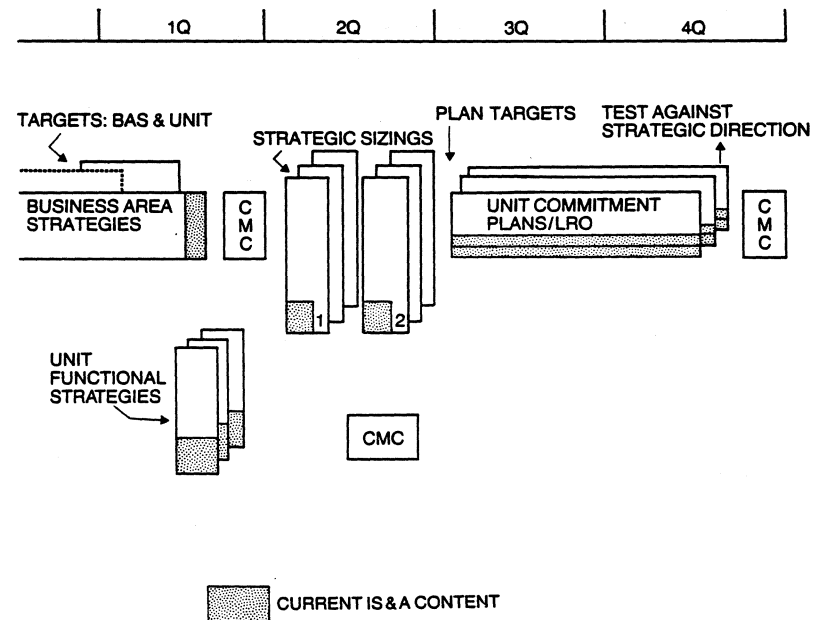
The return on investment is developed progressively by successive refinements of the business case for the project. It starts with a business rationale, that is, the outline of a good business proposal. As the project progresses, the rationale evolves into a preliminary business case with rough financial sizings. When the project specifications are finalized, the hardened business case can then be produced with a higher degree of financial precision.

This evolution of the business case is tied to the Phase Review process, as prescribed in the associated corporate guideline.

Interlocking of costs and benefits can best be achieved by using the plan-of-record mechanism, as was described earlier in this strategy.

BUSINESS PLANNING SYSTEM

	1Q	2Q	3Q	4Q

TARGETS: BAS & UNIT

STRATEGIC SIZINGS

PLAN TARGETS

TEST AGAINST STRATEGIC DIRECTION

BUSINESS AREA STRATEGIES

C M C

UNIT COMMITMENT PLANS/LRO

C M C

1 2

UNIT FUNCTIONAL STRATEGIES

CMC

CURRENT IS & A CONTENT

The emphasis on business productivity should be complemented by a necessary emphasis on I/S productivity, since I/S is a significant component of cost.

Supporting the I/S management strategy should, therefore, be tools to plan and measure I/S productivity improvements. An example of such a tool is the plot of the increase in function points per programming work hour over time. This plot can be used to plan productivity improvements in application development by assessing current productivity levels and establishing realistic targets.

PERFORMANCE TRACKING
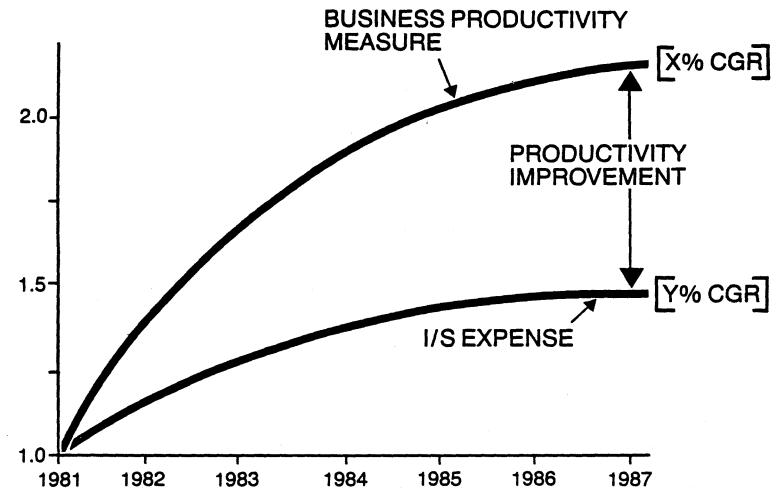
- ESTABLISH APPROPRIATE MEASURE OF BUSINESS PRODUCTIVITY FOR EACH PRIMARY FUNCTION (E.G., EXPENSE/REVENUE, COST/POINT)

- NORMALIZE TO BASE YEAR (E.G., 1981)

- TRACK PLANNED AND ACTUAL BUSINESS PRODUCTIVITY AND I/S EXPENSE

- BUSINESS PRODUCTIVITY IMPROVEMENT REFLECTS I/S CONTRIBUTIONS

Next, we will describe the objectives and strategies for the USER
PARTICIPATION component, as well as some suggested implementation
tools.

CORPORATE I/S STRATEGY
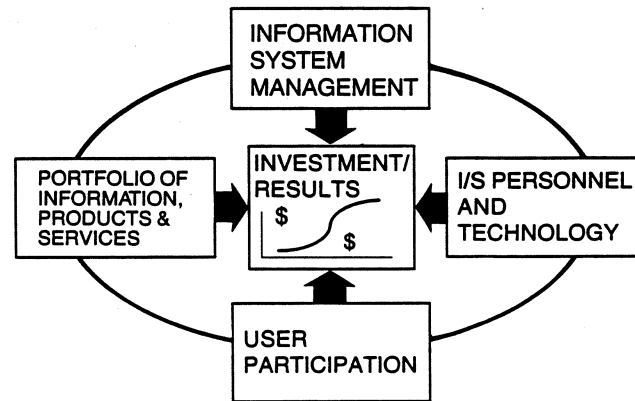
- USER PARTICIPATION
  - OBJECTIVES
  - STRATEGY

The three objectives of the USER PARTICIPATION strategy are:

- Establish an EFFECTIVE PARTNERSHIP between users and I/S. Specifically, the user should be responsible for establishing the business direction for the partnership, including functional goals, priorities, and business rationale. I/S should bring to this partnership the technological expertise required for successful implementation of I/S solutions. Both user and I/S should have mutually consistent goals that are supportive of the business direction. Information systems responsibilities should be distributed to the users in a manner commensurate with their experience and technical capability.

- Both PARTNERS should be KNOWLEDGEABLE about the user function and information systems technology. The dependence and the impact of the business strategy on information systems should be well understood. This should be complemented by an understanding and appreciation of the business potential and applicability of current and future information systems technology. With this mutual understanding, user and I/S can jointly focus on improving user functional productivity through the application of information systems technology.

- The third objective, USER SATISFACTION, should be pursued in a way that is keyed to a realistic appreciation of affordability, whether in the area of application specifications or in the determination of service levels.

USER PARTICIPATION

OBJECTIVES

- **EFFECTIVE USER – I/S PARTNERSHIP**
  - USER ESTABLISHED BUSINESS DIRECTION
  - FUNCTIONAL GOALS
  - BUSINESS RATIONALE
  - PRIORITY SETTING
  - I/S–PROVIDED IMPLEMENTATION EXPERTISE
  - CONSISTENT OBJECTIVES
  - DISTRIBUTION OF RESPONSIBILITIES COMMENSURATE WITH USER EXPERIENCE AND CAPABILITY

- **KNOWLEDGEABLE PARTNERS**
  - UNDERSTANDING OF BUSINESS STRATEGY DEPENDENCE AND IMPACT ON INFORMATION SYSTEMS
  - APPRECIATION OF BUSINESS POTENTIAL AND APPLICABILITY OF I/S TECHNOLOGY
  - JOINT FOCUS ON IMPROVED FUNCTIONAL PRODUCTIVITY THROUGH APPLIED TECHNOLOGY

- **USER SATISFACTION KEYED TO AFFORDABILITY**
  - APPLICATION SPECIFICATION
  - SERVICE LEVEL OBJECTIVES

A basic step in developing a USER PARTICIPATION strategy is to determine the <u>current</u> ORGANIZATIONAL ROLES AND RELATIONSHIPS, and how user and I/S management perceive information systems PRIORI-TIES and PERFORMANCE. Once determined, user-I/S priorities and performance perceptions should be analyzed for the functional measurement units, as well as for functional departments and business processes to establish action plans that will align priorities and achieve desired performance levels.

Key to achieving user-I/S congruence is a strategy that will result in the proper distribution of responsibilities between user and I/S management. Such a strategy should obviously start with the determination of the USER-I/S RESPONSIBILITY PROFILE that is appropriate for the CURRENT level of user and I/S experience and capability. This profile should eliminate gaps and overlaps in responsibility assignments that may exist in the organization.

The next step in the strategy is to identify the target RESPONSI-BILITY PROFILE that is required to achieve user-I/S congruence. In the case of advanced user and I/S organizations, the two profiles may be the same. More frequently, however, a PLAN TO EVOLVE FROM CURRENT TO TARGET PROFILES has to be developed, executed and tracked. Since the evolution to the target profile will require improving user and I/S capabilities, it will be highly dependent on the process of organizational learning. Therefore, the strategy should emphasize communication and under-standing, as well as user and I/S education and commitment.

Another strategy for user participation is one that is based on interaction and a negotiating process to establish and implement MUTUALLY AGREEABLE goals, priorities, service levels and controls for information systems support.

USER PARTICIPATION

STRATEGIES

- **DETERMINE CURRENT USER – I/S ORGANIZATIONAL ROLES AND RELATIONSHIPS, PRIORITIES AND PERFORMANCE PERCEPTIONS**
  - FUNCTIONAL MEASUREMENT UNIT
  - FUNCTIONAL DEPARTMENT
  - BUSINESS PROCESS

- **DEFINE USER–I/S RESPONSIBILITY PROFILE APPROPRIATE FOR CURRENT CAPABILITIES**

- **DEVELOP TARGET RESPONSIBILITY PROFILE THAT ACHIEVES USER – I/S CONGRUENCE**

- **PLAN, EXECUTE, AND TRACK EVOLUTION FROM CURRENT TO TARGET DISTRIBUTION OF RESPONSIBILITY**
  - COMMUNICATION AND UNDERSTANDING
  - USER AND I/S EDUCATION AND COMMITMENT

- **NEGOTIATE AND IMPLEMENT MUTUALLY AGREEABLE INFORMATION SYSTEMS GOALS, PRIORITIES, SERVICE LEVELS AND CONTROLS**

A useful technique to establish the current user and I/S management perception of priorities and I/S capability to perform is the User-I/S Priority Survey. This technique is based on the "User Needs Survey" developed by Dr. Robert M. Alloway of M.I.T. and has been adapted and modified for IBM internal use by Dr. Alloway and Corporate I/S Strategy Development.

The technique focuses on a series of key attributes of the I/S function, such as systems down time, timeliness of reports, attitude toward users, training programs, systems backlog, etc. A structured survey of a large sample of user and I/S managers in an organizational unit (e.g., site, division, country) is conducted to determine the managers perception of I/S performance and the priorities they assign to these attributes.

Because the responses are codified and a standard seven-point scale is used both for importance and performance measurement, the data can be analyzed for the organizational unit by function, management levels, user/non-user of systems, etc. The survey establishes whether agreement on priorities and performance perception exists among users and I/S. It also determines whether each group believes that current capability to perform is aligned with current priorities, that is, if we do well those items that are important.

Our experience using this technique within IBM has shown that it provides a good test to establish if there is user-I/S agreement, and identifies problems and opportunities that serve as a basis for a strategic and tactical action plan.

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USER – I/S PRIORITIES SURVEY
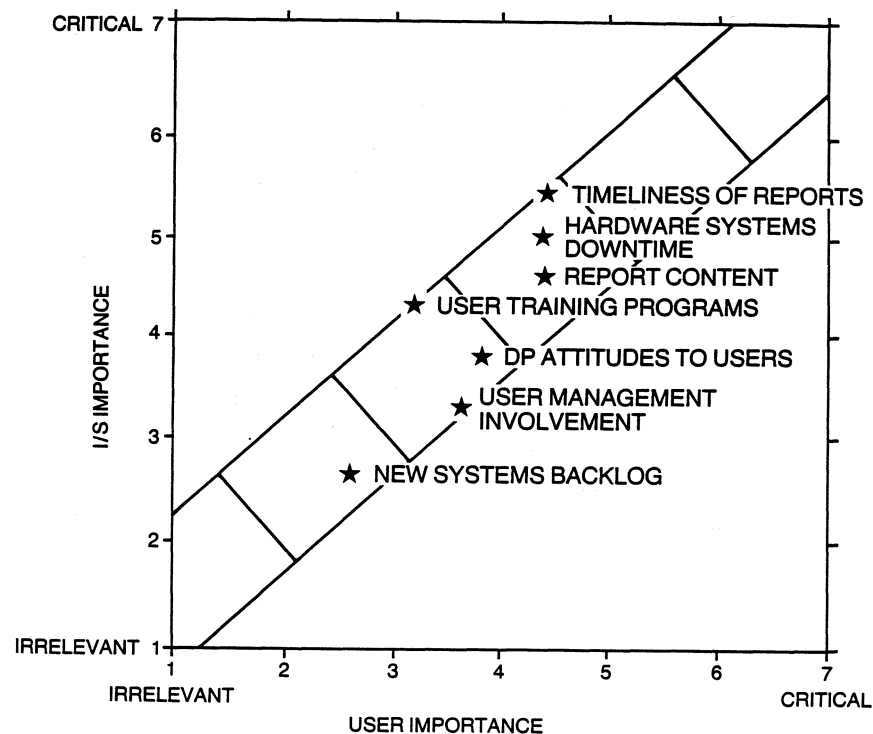
SAMPLE EXHIBIT

- **OTHER COMPARISONS**
  - USER–VS–I/S PERCEPTION OF PERFORMANCE
  - IMPORTANCE–VS–PERFORMANCE

As discussed earlier, we have worked with Dr. Jack R. Buchanan to adapt for use within IBM his concepts and techniques for the distribution of information systems responsibilities. The resultant methodology is called Management Responsibility Analysis. It can be very valuable to develop the User Participation strategy of establishing responsibility profiles commensurate with current capability and target profiles to achieve user-I/S concurrence.

The methodology consists of a questionnaire survey covering the user and I/S responsibilities for each major application system. Shown is a sample of the survey questionnaire with three out of the twenty-four areas of responsibility. User and I/S respondents, independently, indicate what is their understanding of who has current responsibility for the activities in each of the areas. They also indicate what are their recommended responsibility assignments.

This data is useful for problem determination because it identifies current gaps and overlaps in responsibilities between users and I/S personnel, and shows their desired shifts in responsibility. The data, combined with an analysis of the business objectives and key I/S-related success factors obtained through management interviews, becomes a very valuable basis to design the desired responsibility profile that will best support the business strategy and achieve user-I/S congruence.

One of the valuable insights provided by this methodology is that some problems that are typically solved by the user by requesting his own I/S resources can be more effectively addressed by distributing to the user I/S responsibilities instead of physical resources. The questionnaire illustrates one such case, where a user served by a central, consolidated site had response time and capacity problems. The solution being considered was to give the user his own system (i.e., decentralizing resources). Instead, the problem was addressed by decentralizing responsibilities by the shifts indicated in the questionnaire.

SAMPLE RESPONSIBILITY QUESTIONNAIRE

CODES: I = I/S, U = User, O = Other (Non-I/S), N = Not Applicable or None, ? = Don't Know

II. OPERATIONS (Planning and Control)

II-1 OPERATIONS-BUDGETING

	Specify operational needs in non-financial terms	Set upper bounds on I/S operations expenditures	Prepare detailed I/S operations budget	Obtain approval of complete I/S operations budget	Manage budget change process
CURRENT		* ⟶			
RECOMMENDED				△	

II-2 OPERATIONS-PERSONNEL-PLANNING

	Determine system's impact on user functional personnel	Make user functional personnel assignments	Determine system's impact on computer operations personnel	Make computer operations personnel assignments
CURRENT	* ⟶			
RECOMMENDED		△		

II-3 WORKLOAD-CAPACITY-PLANNING

	Project business levels	Convert business levels to user activity variables that relate to the amount of data processing work required	Translate values of user activity variables of I/S workload units	Determine I/S capacity required for projected workload given agreed upon service levels	Convert I/S capacity into hardware and software requirements
CURRENT	* ⟶				
RECOMMENDED			△		

INCREASING USER RESPONSIBILITY ⟶

The next section describes the strategy for the I/S PERSONNEL component.

CORPORATE I/S STRATEGY
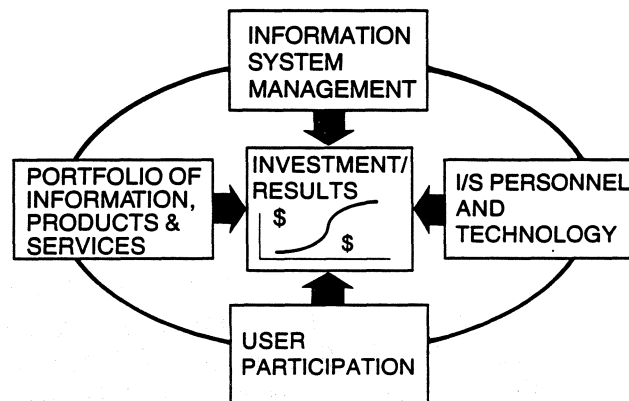
- I/S PERSONNEL
  - OBJECTIVES
  - STRATEGY

The objective of the INFORMATION SYSTEMS PERSONNEL strategy is to ensure the appropriate depth of information systems managerial and technical competence to meet the growing and changing needs of the primary business functions. This competence should be available wherever it is needed, whether in the user or in the I/S organizations.

I/S PERSONNEL

OBJECTIVE:

- APPROPRIATE DEPTH OF INFORMATION SYSTEMS MANAGERIAL AND TECHNICAL COMPETENCE TO MEET THE GROWING AND CHANGING INFORMATION PROCESSING REQUIREMENTS OF THE PRIMARY BUSINESS FUNCTIONS

The strategy to achieve the objective is to develop and implement human resource programs for professionals who deal with information systems technology in IBM. Three aspects of the human resource programs should be:

- CURRENCY, VITALITY, RELEVANCE. This will involve forecasting the skills required in the user and I/S organizations to meet the strategic needs in information systems technology. The required skills should be developed using existing internal and customer courses whenever possible. Unique I/S training requirements can be satisfied with centralized I/S education offerings.

- CROSS-FUNCTIONAL CAREER DEVELOPMENT can be achieved through participation in cross-unit and cross-functional programs designed to build understanding of user primary and support functions for I/S professionals, and of information systems management and technology for user personnel.

- REPLACEMENT PLANNING, should include identifying key positions and career path prerequisites as well as high potential candidates for technical and management assignments. Personal development activity should be tracked to ensure that qualified replacement candidates are available as needed.

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I/S PERSONNEL

STRATEGY

DEVELOP AND IMPLEMENT HUMAN RESOURCE PROGRAMS FOR PROFESSIONALS WHO DEAL WITH INFORMATION SYSTEMS TECHNOLOGY IN IBM

- CURRENCY, VITALITY, RELEVANCE
  - FORECAST SKILLS REQUIRED TO MEET STRATEGIC NEEDS
  - UTILIZE EXISTING INTERNAL AND CUSTOMER COURSES FOR SKILL DEVELOPMENT
  - USE CENTRALIZED I/S EDUCATION OFFERINGS TO SATISFY UNIQUE I/S TRAINING REQUIREMENTS

- CROSS FUNCTIONAL CAREER DEVELOPMENT
  - PARTICIPATE IN CROSS UNIT/CROSS FUNCTIONAL PROGRAM

- REPLACEMENT PLANNING

- IDENTIFY KEY POSITIONS AND CAREER PATH PREREQUISIT

- IDENTIFY HIGH POTENTIAL TECHNICAL/MANAGEMENT CANDIDATES

- PLAN AND TRACK PERSONAL DEVELOPMENT ACTIVITY REQUIRED TO ENSURE AVAILABILITY OF QUALIFIED REPLACEMENT CANDIDATES

This section describes objectives and strategies for the I/S
TECHNOLOGY component.

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CORPORATE I/S STRATEGY
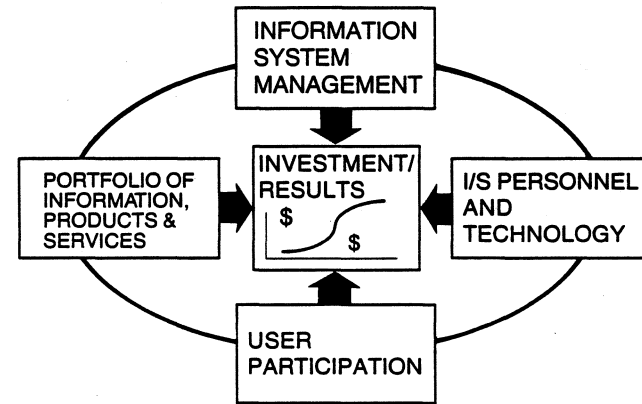
- I/S TECHNOLOGY
  - OBJECTIVES
  - STRATEGY

One of the two objectives of I/S TECHNOLOGY is to support early installations of selected new IBM products. In this way, I/S can assist in product evaluation and can take advantage of the improved technologies incorporated in the new products.

The second objective is to demonstrate a leadership position in applying information systems technology to the high-leverage and strategically significant business processes. This will improve user efficiency, effectiveness, and quality and contribute to I/S functional excellence.

I/S TECHNOLOGY

OBJECTIVES

- EARLY INTERNAL USE OF SELECTED IBM PRODUCTS

- LEADERSHIP IN APPLICATION OF INFORMATION SYSTEM TECHNOLOGY TO HIGH-LEVERAGE AND STRATEGICALLY SIGNIFICANT BUSINESS PROCESSES (I.E., IMPROVE USER AND I/S EFFECTIVENESSS, EFFICIENCY AND QUALITY)

The strategy to achieve the first objective is to continue to
install new IBM products within a parent division location to
provide the opportunity to evaluate the product. In addition to
demonstrating leadership and benefiting from the new technology,
this early installation of products will help to develop a work-
ing relationship with Product Development. In some cases, it may
be desirable to assign I/S personnel to Product Development prior
to the product's early installation at internal sites to facili-
tate the installation process.

Since we are the largest user of our own product line, I/S should
take an active role in making Product Development aware of our
requirements and in ensuring adequate "vendor" support of our
internal needs.

There is a great deal of knowledge in many locations of IBM on
various information systems technologies. There is a need to
develop a knowledge base of this information and to provide a
mechanism to disseminate it throughout the corporation. For
example, centers of knowledge or competence should be identified
to provide guidance to other locations for certain selected and
emerging information systems technologies. Technologies selected
should be those that can be used across the corporation on a gen-
eralized basis such as query and application generators. By
emphasizing these technologies, and disseminating information
about them, we have the potential of reducing redundant effort.

In addition to emphasizing technologies which can be applied
across the corporation, there is the need to explore emerging
technologies for potential value in areas such as knowledge base
systems, graphics, etc. Having determined the value of some of
these technologies, they would then be promulgated for broad sca-
le use.

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I/S TECHNOLOGY

STRATEGIES

- INSTALL NEW PRODUCTS IN A PARENT DIVISION LOCATION FOR OPERATIONAL EVALUATION

- PLACE I/S REQUIREMENTS ON PRODUCT DEVELOPMENT AND ENSURE 'VENDOR' SUPPORT OF INTERNAL IBM NEEDS

- DEVELOPMENT AND DISSEMINATE A KNOWLEDGE BASE OF INFORMATION SYSTEMS TECHNOLOGY EXPERIENCE

- ESTABLISH CENTERS OF COMPETENCE FOR SELECTED/EMERGING INFORMATION SYSTEMS TECHNOLOGIES

- EMPHASIZE INFORMATION SYSTEMS TECHNOLOGIES (AND ARCHITECTURES) THAT FACILITATE USE OF GENERALIZED SOLUTIONS TO:
  - PROVIDE COMMONLY NEEDED FUNCTION
  - REDUCE REDUNDANT EFFORT
  - ALLOW BACK-UP FOR CRITICAL OPERATIONS

- EXPLORE EMERGING INFORMATION SYSTEMS TECHNOLOGIES FOR POTENTIAL VALUE TO USER AND I/S
  - PILOT TEST AND EVALUATE
  - COMMUNICATE EXPERIENCES TO DEVELOPMENT UNITS
  - PROMULGATE PROVEN TECHNOLOGIES FOR BROAD SCALE USE

Now that we have described the corporate information systems
strategy in detail, we will discuss briefly the process by which
supporting strategies can be formulated at different levels of
the organization to form a hierarchy of information systems stra-
tegies within IBM.

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IBM INFORMATION SYSTEMS STRATEGY

- ● BACKGROUND

    - – DEFINITIONS

    - – STRATEGY OF THE '70s

    - – ENVIRONMENT OF THE '80s

    - – PROBLEMS AND OPPORTUNITIES

    - – OBJECTIVES OF THE '80s

- ● CORPORATE-LEVEL I/S STRATEGY

    - – FRAMEWORK

    - – OBJECTIVES

    - – STRATEGIES

- ▶ ● HIERARCHY OF I/S STRATEGIES

    - – CASCADING PROCESS

    - – ROLES AND RESPONSIBILITIES

Since the corporate organization is a hierarchical structure, implementing a corporate strategy requires the development of supporting strategies at the various levels of the organization. The result is a hierarchy of strategies that, taken together, constitute the strategy of the enterprise. This concept applies to both the business and I/S strategy.

The development of that hierarchy of strategies is, of necessity, time consuming. It involves a large number of organizational units at different stages of advancement and with distinct and different business missions. Further, it involves organizational learning which, by its very nature, takes time and cannot be accelerated by management edict.

The process of developing that hierarchy is a "cascading" process. It flows from level to level. The basic mechanism for the process is that the strategy at a given level becomes part of the objectives for the next lower level. In other words, the objective of the strategy at one level is to implement the strategy at the higher level.

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STRATEGY AND STRUCTURE
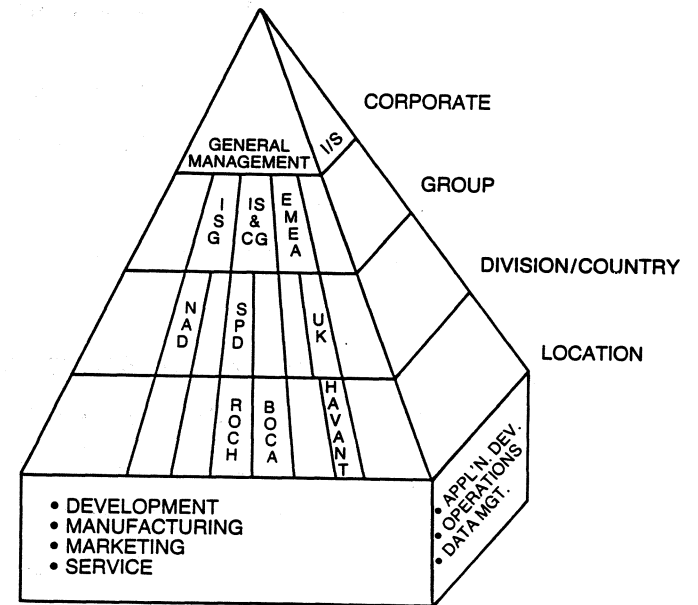
HIERARCHY OF STRATEGIES

- STRATEGY OF ONE LEVEL BECOMES NEXT LEVEL'S OBJECTIVES

This cascading process also applies to the business strategy of the corporation. Overall objectives are established at the corporate level. Acting on behalf of the corporation, the executives responsible for business areas develop world-wide business area strategies that are designed to meet those objectives. Corporate functional executives develop, as appropriate, corporate-wide functional strategies also designed to address the overall objectives. The PMC/PF (Production Management Center/Production Facility) strategy of Corporate Manufacturing is a good example of a world-wide corporate functional strategy.

Each operating group then uses the business area and functional strategies that apply to its organizational mission as the framework to formulate the business and functional strategies suitable to the specific characteristics and requirements of the group. Similarly, divisions/countries within each group use the group business and functional strategies to develop corresponding strategies for their own areas of responsibility. The process is repeated by the functional measurement units within division/country. As indicated earlier, for particular functions the FMU may be the division, country or even the groups itself.

Usually the FMU's have the additional task of formulating the strategic implementation plans to execute the strategies. Once those plans are developed, the plan process provides for their bottom-up integration. The FMU's plans are modified, approved and aggregated into the division/country plans. In turn, division/country plans are similarly integrated into the group plans, which then go to corporate for review and approval.

The complete process, therefore, requires a two-way flow. Strategic direction is given top-down, each strategy becoming more specific and reflecting the particular circumstances of each unit. At the proper level (FMU, in general) the implementation plan is developed, which is then integrated bottom-up for review and approval.

Both flows are needed for the business planning process to work effectively. The top-down process alone yields what may be good strategies, but with no follow-on action plans to implement them. A bottom-up process alone most likely results in plans that may be uncoordinated and at cross-purposes, since they lack the framework and discipline of an overall strategic direction.

Finally, both processes should focus on change, on what is new in the objectives and business environment. Comprehensive strategies, covering all aspects of the business, generally result in massive, unreadable documents. Focus on change is appropriate because it highlights strategically important "new news", instead of a repetition of "business as usual".
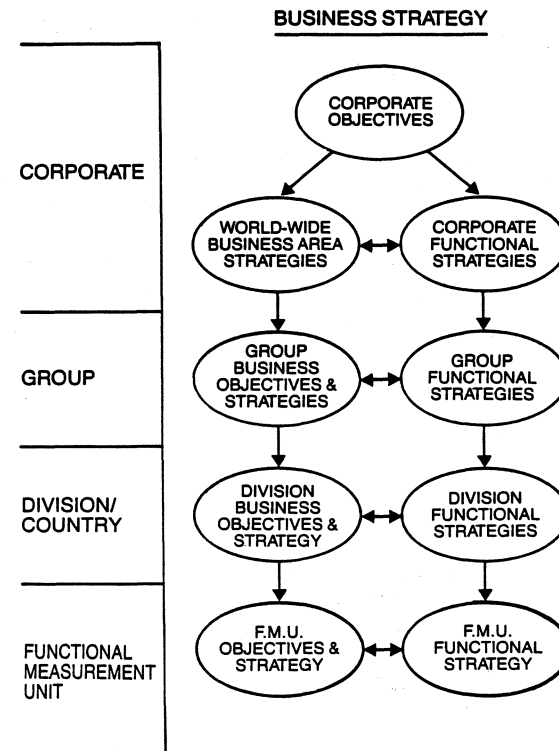
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CASCADING PROCESS

BUSINESS STRATEGY

- FOCUS ON CHANGE
- TOP-DOWN STRATEGIC DIRECTION
- BOTTOM-UP IMPLEMENTATION PLANNING

A similar cascading process will take place for the information systems strategy. The corporate objectives and the strategies for each of the four elements of information systems support described in this report will give group I/S management a framework to develop their own objectives and strategies. In doing so, they will take into account the business objectives, business strategies and functional strategies they will have to support. A similar process will then occur at division/country and FMU levels.

The information systems strategy at each level provides the guidance required by I/S management at that level to work with the functional managers to develop the I/S support strategy that will be an integral element of the functional strategies for that level.
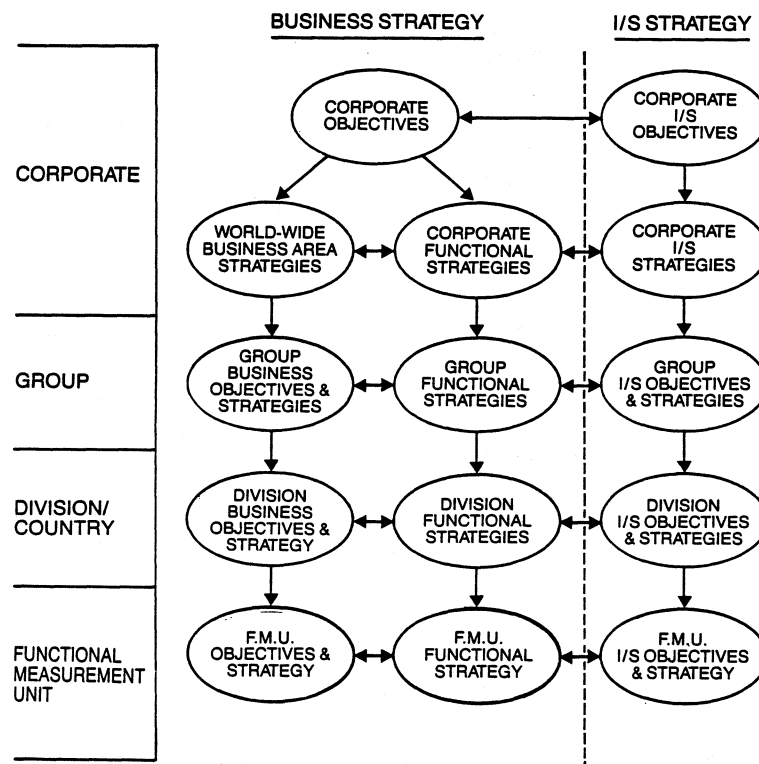
CASCADING PROCESS

- FOCUS ON CHANGE
- TOP-DOWN STRATEGIC DIRECTION
- BOTTOM-UP IMPLEMENTATION PLANNING

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To illustrate further the cascading process, we can describe some of the alternatives facing a level of management when it receives a strategy from the higher level in the organization.

We will assume that the receiving manager agrees with the strategy. If he does not, his options are covered by the management process and the rules of dissent. If in agreement, we can take one of several possible courses of action to cascade it to the next organizational level. Here are five of them:

- The "least involvement" option is simply to endorse the strategy and to pass it along as is to the next level of management.

- Management may increase their involvement by passing the strategy along to the next level but requiring review and approval of the specific strategies that are to be produced by that next level.

- A more participative course of action is for management to develop a strategy specific for its level, reflecting its own objectives and requirements, and then communicate this strategy to the next level. The next level, in turn, may want to customize the strategy further for its own use.

- Management may decide to preempt some of the next level options and develop a detailed strategy for the next level, and issue it as directive to be followed.

- Management may even develop a detailed strategy and actually execute it at that level, thus stopping the cascading process. The next level is, therefore, not involved in the strategy.

These five examples are obviously only points along a spectrum ranging from minimum to total involvement. They illustrate the wide range of options available. Since different levels will select different options for different elements of the corporate strategy, we expect to see significant variations in the specific contents of the strategies as they cascade down the organizational structure.

ALTERNATIVES FOR CASCADING A STRATEGY TO NEXT ORGANIZATIONAL LEVEL

- ENDORSE AND COMMUNICATE TO NEXT LEVEL

- ENDORSE AND COMMUNICATE TO NEXT LEVEL
  - REVIEW AND APPROVE SPECIFIC STRATEGY DEVELOPED BY NEXT LEVEL

- FORMULATE A MORE DETAILED STRATEGY
  - REVIEW AND APPROVE SPECIFIC STRATEGY DEVELOPED BY NEXT LEVEL

- DEVELOP AND ISSUE SPECIFIC STRATEGY FOR NEXT LEVEL TO EXECUTE

- DEVELOP AND EXECUTE DETAILED STRATEGY
  - NEXT LEVEL NOT INVOLVED

Some suggested overall roles and responsibilities in the cascading process are:

-   Using as a basis the corporate I/S strategy and the group business and functional strategyies, group I/S management develops the group-level I/S strategy and communicates it to their divisions/countries. Group also defines how the cascading process will occur within its group. The several possible options (e.g., strategy meetings, formal communications, task forces, etc.) should be evaluated in view of their particular requirements.

-   Division/country I/S management, based upon the group-level strategy, formulates its own I/S strategy and communicates it to the appropriate functional measurement units.

-   Similarly, the FMU in turn, develops its I/S strategy as well as the implementation plan to execute the strategy. Traditionally, the primary tools available to develop strategies and implementation plans are sound experience and business judgement. As indicated earlier, we have identified and modified for internal IBM use several methodologies that have proven valuable for that purpose. They are:

    .   User-I/S Priorities Survey, based on the methodology of Dr. Robert Alloway, MIT, and already used by IBM Canada, GPD Tucson plant and lab, CSD Administration and Service Planning, and CHQ I/S.

    .   Stage Analysis, based on the methodology developed by Nolan Norton Co., Lexington, Mass., and already applied in CHQ I/S Finance and Planning, FE Division and SRA.

    .   Management Responsibility Analysis, based on the methodology of Dr. Jack Buchanan, Decision Making Information Systems, McLean, Virginia, and utilized in SCD's Programming Development Services (Kingston, Raleigh and Gaithersburg), CPD Austin plant and lab, Corporate ITIRC, and DSD Poughkeepsie Lab Programming Development Services.

    .   Interpretive Structural Model (ISM), an interactive tool formulated by Prof. John Warfield, University of Virginia, to help task forces develop the structure of complex problems. It was modified and programmed for IBM use and is being supported by Corporate Planning Systems. It has been used in the GPD Tucson and the FE studies.

CASCADING ROLES AND RESPONSIBILITIES

GROUP

-   **FORMULATE GROUP I/S STRATEGY AND COMMUNICATE TO DIVISIONS/COUNTRIES**

-   **DEVELOP CASCADING PROCESS WITHIN GROUP**

DIVISION/COUNTRY

-   **FORMULATE DIVISION/COUNTRY I/S STRATEGY AND COMMUNICATE TO FUNCTIONAL MEASUREMENT UNITS**
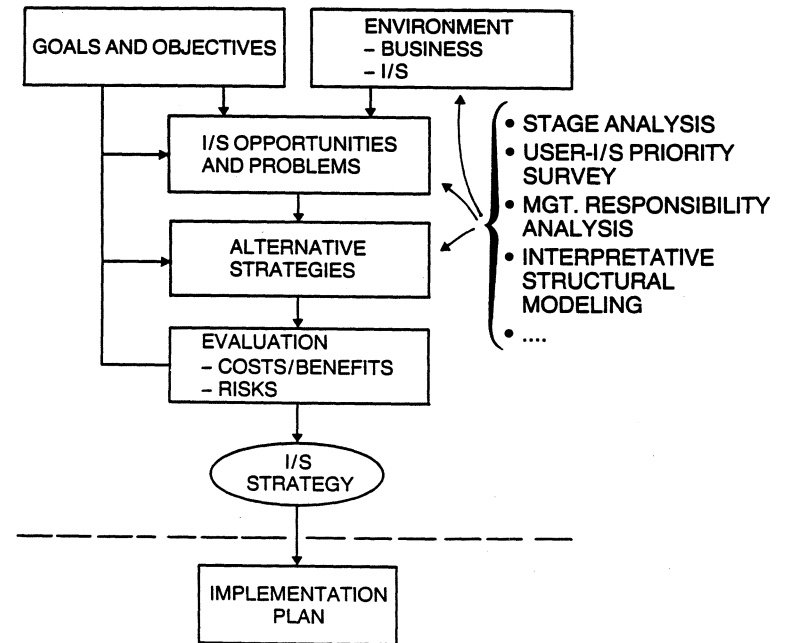
FUNCTIONAL MEASUREMENT UNIT

-   **FORMULATE FMU's I/S STRATEGY AND IMPLEMENT ACTION PLAN**

    -   AVAILABLE METHODOLOGIES
        -   USER – I/S PRIORITIES SURVEY (ALLOWAY)
        -   STAGE ANALYSIS (NOLAN-NORTON)
        -   MANAGEMENT RESPONSIBILITY PROFILE (BUCHANAN)
        -   ISM: INTERPRETIVE STRUCTURAL MODELING (WARFIELD)
        -   ......

The outline of the strategy development process shown earlier
helps define the role of these methodologies. None of them will
produce a complete strategy. They are, instead, tools that will
help develop strategies.

They are most valuable in providing a description of the user and
I/S environment that facilitates strategic analysis. They iden-
tify significant problems and opportunities not otherwise
evident. They also suggest alternative strategies that may be
considered. So, although they do not do the complete job, they
have proven to be very useful in our experience with them in IBM.
Corporate I/S Strategy Development offers internal support in the
utilization of these methodologies to interested units.

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┌─────────────────────┐   ┌──────────────────┐
│ GOALS AND OBJECTIVES│   │ ENVIRONMENT      │
│                     │   │ - BUSINESS       │
│                     │   │ - I/S            │
└─────────────────────┘   └──────────────────┘
        │                                        ⎧ • STAGE ANALYSIS
   ┌────────────────────┐                        │ • USER-I/S PRIORITY
   │ I/S OPPORTUNITIES  │                        │   SURVEY
   │ AND PROBLEMS       │                        ⎨ • MGT. RESPONSIBILITY
   └────────────────────┘                        │   ANALYSIS
   ┌────────────────────┐                        │ • INTERPRETATIVE
   │ ALTERNATIVE        │                        │   STRUCTURAL
   │ STRATEGIES         │                        │   MODELING
   └────────────────────┘                        ⎩ • ....
   ┌────────────────────┐
   │ EVALUATION         │
   │ - COSTS/BENEFITS   │
   │ - RISKS            │
   └────────────────────┘
        ┌─────────┐
        │  I/S    │
        │ STRATEGY│
        └─────────┘
   ┌────────────────────┐
   │ IMPLEMENTATION     │
   │ PLAN               │
   └────────────────────┘
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In summary, we have used a dual approach for developing an infor-
mation systems strategy in IBM. We have formulated overall cor-
porate objectives and a corporate strategy which is directional
in nature. It provides the framework for the formulation of more
specific group, division/country, and location strategies through
the cascading process. This approach parallels the one taken by
Corporate for the development of the business strategy.

The other approach has been to identify, evaluate and modify for
IBM use some externally-developed methodologies that facilitate
the process of strategy development at the operational level.
These methodologies were selected because they focus on key areas
of the corporate strategy, namely Information Systems Management
and User Participation. They are, therefore, compatible with and
complementary to the strategic direction. The full benefit of
this dual approach will be realized when the top-down cascading
process reaches the operational units employing the
methodologies.

STRATEGY DEVELOPMENT

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