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## Article

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# Information system strategy formulation: Some key issues

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Expert observers are predicting more turbulent times for the 1980's. This is having a major impact on the way senior management is approaching its task, which grows more difficult every year. Many information issues challenge top and information system (IS) management today and will continue to do so in ever-changing variety and ever-increasing numbers. In order to take advantage of the strategic opportunities presented by information systems, organizations will have to develop a 'strategic vision' of their IS destination; formulate a coherent IS strategy that supports the organization's corporate strategy; convert this into an action-oriented IS plan; and effectively implement that plan with all the human and organizational problems this presents. A number of interesting new ideas are emerging concerning the use of information technology as a competitive weapon in modern business, and organizations will have to take these into account in their strategic management. IS practitioners are likely to increase their effectiveness in this endeavour if they work with IS academics.

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Deskundiges voorspel nog meer onstuimige tye vir die tagtigerjare. Hierdie onstuimigheid oefen 'n belangrike invloed uit op die manier wat topbestuur hulle taak benader — 'n taak wat elke jaar moeiliker word. Baie inligtingvraagpunte daag top- en inligtingstelselbestuur vandag uit en sal voortgaan daarmee op 'n steeds veranderende en toenemende wyse. Om voordeel te trek uit die strategiese geleenthede wat inligtingstelsels bied moet ondernemings 'n strategiese toekomsblik van hul inligtingstelselbestemming ontwikkel; 'n samehangende inligtingstelselstrategie formuleer wat die ondernemingstrategie steun; hierdie inligtingstelselstrategie in 'n aksie-georiënteerde inligtingstelselplan omsit; en hierdie plan doelmatig implementeer ten spyte van al die menslike en organisatoriese probleme wat dit behels. 'n Aantal interessante nuwe idees kom nou na vore in verband met die gebruik van inligtingtegnologie as 'n mededingende wapen in die moderne sakewêreld, en ondernemings sal dit in ag moet neem in hul strategiese bestuur. Inligtingstelselpraktisyns sal waarskynlik hul doeltreffendheid in hierdie verband verhoog as hulle saam met IS-akademici werk.

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## Introduction

### Turbulence

More than a decade ago Toffler (1971) identified three characteristics of change — transience, novelty and diversity — and argued that the rate of change was accelerating. Today leading writers in the field are predicting yet greater diversity, novelty, and hence, greater change (Steiner, 1982:36–50; Toffler, 1980; Drucker, 1981). Naisbitt (1982) has identified 10 'megatrends' that are transforming American society.

To complete this look at the increasingly turbulent environment facing our present and future management, we need to consider some recent work in the field. A recent study (*International Management*, 1980) of 758 senior executives from 10 Western European countries disclosed that 46,2% of them expect to have the same, and 36,7% less, control over the factors on which their performance is rated during the 1980's. They further expect that the eight principle problems facing top management will be inflation, the availability and cost of labour, the availability and cost of energy, government intervention, labour relations, acquiring managerial talent, keeping pace with new technologies, and fluctuating exchange rates. Some senior European managers, at least, expect environmental turbulence to continue growing.

Hall (1980:2–22) expects the business environment in the United States to become increasingly hostile during the 1980's owing to the combined effects of:

- (i) Slower, erratic growth in domestic and world markets.
- (ii) Intensified inflationary pressures on manufacturing and distribution costs.
- (iii) Intensified regulatory pressures on business conduct and investment decisions.
- (iv) Intensified competition, both from traditional domestic competitors, and also from the new wave of foreign competitors entering US markets with different objectives and frequently lower ROI expectations.

This somewhat pessimistic note is echoed by Taylor (1982: 5–13) who also sees the 1980's as an era of hard times with low growth, intense competition, scarce resources, cutbacks in government expenditure and fewer jobs.

Against this background it is hardly surprising that management seems to become more difficult by the year.

### The impact on top management

Clearly the impact of increasing environmental turbulence is felt most strongly at the top management level of organizations. In his study of 50 chief executives Steiner (1982) found that chief executive officers (CEO's) were spending

more time dealing with environmental issues — in fact as much as 25% to 90% of their time. The most worrying and time-consuming of these issues he found to be government action and the effects of public opinion on public policy. The qualities the interviewed CEO's felt their successors should have to cope with the environment they will be facing are wide-ranging and challenging to say the least. As Steiner mentions, the CEO of the future is likely to have to be more of a strategist than his predecessors. This particular role requires closer examination.

Management systems, that is, planning and control systems, have mirrored the increasing tempo of environmental turbulence, from historical control at the beginning of the century, to long-range planning, strategic planning, and strategic management (Duffy, 1980). Although Ansoff (1978) has discussed the concept of strategic issue management to facilitate rapid response to trends inside and outside the organization, and strategic surprise management to deal with sudden, urgent and important developments, neither of these approaches seems to be widely used. On the other hand, strategic management has come in for a good deal of attention. In essence it concerns an internal analysis of an organization and an analysis of its environment as a base for the formulation and implementation of a strategy to achieve the corporate objectives. The importance of strategic management is that it provides a framework for dealing with escalating environmental turbulence (Bracker, 1980:219–224). It is a frame of mind rather than a set of methodologies, tools or systems (Gluck, 1983:2–17).

Kiesler & Sproull (1982:548–570) have observed that: 'A crucial component of managerial behavior in rapidly-changing environments is problem sensing, the cognitive processes of noticing and constructing meaning about environmental change so that organizations can take action.'

These writers point out the difficulties inherent in environmental scanning and problem-sensing — namely, misinterpreting stimuli, failing to notice or misinterpreting available information about problems, and having relevant information obscured by stronger signals. Needless to say, misinterpretation of crises may lead to inappropriate action by the organization (Kiesler & Sproull, 1982). A recent study of turnaround strategies in 54 companies (Schendel, Patten & Riggs, 1976) concluded that the original downturn was typically owing to the failure of the scanning mechanism to detect more than one or two of the major problems confronting the firm.

#### Turbulence in the financial services industry

A rather striking example of the impact of environmental turbulence is to be found in the once conservative banking industry. In the UK, part of the change has been due to increasing competition both within the industry itself and from without in the form of building societies, foreign retail banks, national savings banks and trustee savings banks (Crawley, 1982:71–79). In the United States, the blurring of boundaries between previously different types of financial institutions has developed to the extent that a Harvard Business School paper (1983) refers to the 'financial services industry' and names the leading institutions in it as American Express, Sears, CitiCorp, Merrill Lynch and Prudential Life Insurance Co.

The same paper pinpoints the major forces behind the rapid change in the financial services industry in the US as

technology, the prevailing economic conditions such as fluctuating interest rates, and deregulation. On the question of technology it quotes figures from the American Bankers Association in the following statement:

Other recent IT innovations are automated teller machines (ATMs) which allow a customer to automatically execute banking transactions and point-of-sale terminals (POS), which, when placed in a retail establishment, can eliminate the need for currency or check exchange by debiting the customer's account directly at the point of sale. Currently, there are over 10 000 ATM's in operation at an average cost of about \$30 000 each, which process over two billion financial transactions. By 1986, it is estimated that over sixteen billion electronic transactions will be initiated by Automated Clearinghouses (2 billion), by ATM's (6 billion), by POS (4 billion) and by home terminals (3 billion) (Harvard Business School, 1983:6).

Some information technology (IT) applications not mentioned so far include the use of computers in buying and selling stocks, financial information data bases, international cash management through computers, and home banking. The traditional roles of banks, savings and loan associations, and brokerage firms are disappearing, and competition has become global and real time. Like other industries, the financial services industry is busy reconceptualizing and developing a new strategic vision of its business.

#### Some reactions to environmental turbulence

Although a turbulent environment is not new some organizations have thrived in spite of it or because of it (Hall, 1980) and will probably continue to do so. The leading companies in this study all achieved, relative to the competition, one or both of the following:

- (i) Lowest delivered cost coupled with appropriate quality and pricing policies; and/or
- (ii) highest product/service/quality differentiation coupled with appropriate cost and pricing structures.

Steiner's study (1982) of 50 top US executives identified a number of ways of coping with a turbulent environment including a greater involvement in external affairs by CEO's; a deeper concern for the legitimate concerns of major stakeholders; more aggressive boards with more external directors and, sometimes, an externally oriented CEO and an internally oriented COO (Chief Operating Officer). He lays particular stress on the need to 'sensitize' staff to environmental forces in the belief that this will make their adaptation easier and their decisions better.

In turbulent times Drucker (1981) advises a return to the fundamentals of managing inflation, liquidity, productivity and the costs of staying in business, which, he stresses, is not the same thing as profit.

One of the most interesting studies in recent times of relevance to coping with turbulent environments is the one by Peters & Waterman (1982). Concerned about the mounting criticism of American management, they turned to successful US corporations such as Bechtel, Boeing, Caterpillar Tractor, Dana, Delta Airlines, Digital Equipment, Emerson Electric, Fluor, Hewlett-Packard, IBM, Johnson & Johnson, McDonald's, Procter & Gamble, and 3M to try to understand what made them excellent performers. The eight characteristics that emerged were as follows:

- (i) A bias for action.
- (ii) Closeness to the customer.

- (iii) Autonomy and entrepreneurship.
- (iv) Productivity through an exceptional concern for their people.
- (v) Strong values and corporate philosophies.
- (vi) Staying reasonably close to the business they know.
- (vii) Simple form and lean staff.
- (viii) The ability to accommodate a degree of structural 'looseness' simultaneously with a tight adherence to basic values.

It is, however, the rich anecdotal material that is the main strength of the study.

### Information issues

The information issues facing top and information systems management fully reflect the environmental turbulence that has been discussed above. The issues are diverse, often unstructured and rapidly changing. Some of the more challenging issues are set out below and discussed briefly.

### Integrative theory

Practitioners and academics alike need conceptual frameworks like Anthony's decision hierarchy (1965), Nolan's stages of growth (1983), and McFarlan & McKenney's strategic impact matrix (1983) to enable them to think more effectively about these complex and fast-changing information issues. Naisbitt (1982) expresses it like this:

'In a world where events and ideas are analyzed to the point of lifelessness, where complexity grows by quantum leaps, where the information din is so high we must shriek to be heard above it, we are hungry for structure.

With a simple framework we can begin to make sense of the world. And we can change that framework as the world itself changes.'

Integrative theory is in short supply and a primary source of it — business schools — will be hard put to keep up.

### Management support systems (MSS)

There is currently a good deal of interest in computer-based support for management decision-making. This may be provided by means of a microcomputer or through a terminal. At this stage it is not certain how effective MSS's are going to be and the decision support initiative is being inundated with new terminology such as MSS, Decision Support Systems (DSS), Executive Support System (ESS), and Intelligent Support System (ISS) (Scott Morton, 1983). The ISS category is of particular interest as it signals the arrival of artificial intelligence and expert systems as a field for study in DSS.

### Development life cycles

Any information system must go through a number of stages of development. In the past there has always seemed to be an assumption that there is one best sequence of steps for developing almost any information system. Even if this were true in the past it is increasingly less so. Clearly, different life cycles are required for building simple and complex systems, using fourth generation languages and implementing packages. Some application development, particularly in a data base environment, can be extremely complex. In a contingency approach such as is required today the problem is which life cycle to use in what circumstances. The dynamics of the situation become even more formidable when one recalls that economies, industries, organizations, and infor-

mation system units are themselves evolving through life cycles.

### Organizational information needs

The foundation of any information system strategy is an understanding of the information needs of the total organization together with an understanding of the organizational environment in which its information systems will have to function, namely, its culture, its propensity for change, and its power structure. In the management environment described earlier it is also going to be increasingly important to consider the information needs of the organization's stakeholders (Mendelow, 1983:70–76).

### Information system education

The educational needs of management, end-users, and information system specialists, in a world of bewildering information technology become more difficult too. Apart from the need for sensitization referred to above, there seems to be a need to move away from the 'one best way' approach to a more flexible contingency approach in our education. To further complicate the situation, the organizational roles of many of the people we wish to educate are changing — for example, what is happening to the job of the systems analyst, and of the programmer, with the advent of end-user computing? Further, just when many people have started to realize that professional management skills are preferable to technical skills in an information systems manager, it seems that general management skills are becoming more important. Rockart (1982:3–13) found that excellent IS managers see themselves as general business managers, as candidates for the top jobs, and are in the thick of corporate discussions.

### Strategic information systems

Strategic information systems can be addressed from three main points of view — environmental scanning, public information services, and industrial intelligence or espionage.

The importance of environmental scanning has been stressed in the previous section. The problem is how to do this in a practical way and in a way that is appropriate to the organization concerned — be it large or small, in a particularly turbulent environment or in a relatively stable environment. What is beyond doubt, however, is that managers are going to need more formalized approaches to environmental scanning to cope with the turbulent 80's.

The task of environmental scanning is being made somewhat easier by the emergence of public information services, computer-based scanning aids in the form of financial/statistical data bases and econometric models from banks and bureaux, and online data bases like ORBIT and DIALOG. Once again the difficulty is keeping abreast of these developments and knowing when and how to use them.

As the value of business intelligence comes to be better appreciated, more sophisticated means, both legal and illegal, are being used to acquire this intelligence. This presents many problems, practical and ethical, to managers.

### Forecasting new information technology

The question here is how to identify and interpret the significance of emerging information technology. Cases in point are the current speculation in the press about the use of molecules instead of silicon chips in computers and the potential of artificial intelligence and expert systems.

### The information industry

Managers would do well to keep an eye on developments in the computer industry, both world-wide and in specific countries. Considerations in this area include the apparently increasing dominance of IBM and the likelihood and implications of the Japanese 'fifth generation'.

### Information system strategy formulation

This topic will be dealt with in greater depth below but some key questions to consider in the mean time are:

- How can an organization link its IS (Information Systems) strategy to its corporate strategy?
- How strategically relevant is IT (Information Technology) to an organization?
- How can IT become part of a competitive strategy?

### Organization design

As organizations grow larger, with more subsidiaries and more divisions, it becomes increasingly difficult to decide whether to centralize or to decentralize computer hardware, software, and people, and where to locate them in the organizational structure. Indeed, how should one manage IT or information as a strategic corporate resource — often called 'information resource management'? The effects of information systems on organizations and vice versa are not well understood.

### Security and control

As IT becomes more sophisticated and information itself a valuable corporate asset, security and control considerations become more difficult. Criminals have proved to be surprisingly innovative in the use of IT. Issues include:

- How to allocate corporate resources to security and control areas in the most effective way since 100% security is impossible?
- The best security and control cannot prevent breaches by the organization's own staff. How does one minimize this risk?
- What impact is the proliferation of microcomputers in organizations likely to have on security and control?

### Information system manpower management

Some information system managers have difficulty dealing with issues such as ensuring a supply of scarce IS professionals, and then building their reward systems, their motivation, and their career paths. Further, in view of what has been said so far, what are the management and specialist needs likely to be in the 1980's and where are we to find the IS planning and implementation skills to make IS strategies work?

### Information system evaluation

The problem of evaluating information systems remains one of the most difficult facing management. Determining the value of information; measuring the effectiveness of information systems; measuring the increased productivity resulting from IT; whether and how to do a cost/benefit analysis; when to make or buy software; and the desirability and best method of charging out IS services, remain challenging problems for management.

### Information technology

It is steadily becoming more difficult to decide where computers, telecommunications and office automation begin and end in modern organizations. For this reason the term 'in-

formation technology' (IT) is more accurate to encompass the following: Computers (mainframes, minis and micros); telecommunications; office automation, videotex, graphics, robots, and CAD/CAM.

This list is illustrative rather than comprehensive. One of the key issues here is choosing between the increasing number of technological options available — not to mention keeping abreast of these options.

### The management of corporate data

Data analysis, data dictionary definition, and data base design have never been particularly easy things to do. Taken in context with records management, micrographics, electronic filing, information retrieval and similar things, the management of corporate data takes on new dimensions. In addition, the advent of end-user computing brings with it new issues.

### Software: Make, buy or delegate?

In the past it was a near automatic decision to build one's own system. Today the decision is more complex and shows every sign of becoming more so. Apart from deciding whether to pass the system through for end-user computing, to buy a package, or to build the system, there are the additional problems of overchoice, particularly with fourth generation languages and some types of packages; selecting the option that most nearly fits the needs of the organization; and, not least, integrating the software solution with the existing systems.

### Information system planning

Like IS strategy, IS planning will be discussed below. Suffice it to say that IS planning is becoming more difficult but more important.

### Information system project management

IS projects are notorious for being over time and over cost. The old idea that there should be one best way to develop an information system has given way to a contingency approach. McFarlan & McKenney (1983) developed a portfolio approach which illustrates the approach that different systems in different organizations have different risks. In particular, the point is made that the risk of a project depends on its size, its structure and the newness of the technology being used for that organization.

Other issues revolve around automated system development, system development methodologies, socio-technical system development, and how the whole system development process can be streamlined by an order of magnitude.

### Information analysis

More and more organizations that could be classified as mature computer users are shifting the emphasis of their computer support from relatively low-level data-processing systems to systems that support management decision-making (Alloway, 1983). Since these higher level information needs tend to be unstructured, it is necessary to have ways of assisting managers to define their information requirements. Furthermore, no single information analysis approach is suitable for all situations.

### End-user computing

More user-friendly software and more cost-effective hardware are leading to the growth of end-user computing — the development of information systems by end-users. The steadily

increasing computer literacy of end-users will no doubt add impetus to this trend. There are two aspects of end-user computing that require special consideration, namely fourth generation languages and information centres.

#### Fourth generation languages

Growing application development backlogs, unmaintainable systems, the shortage and cost of DP professionals, outdated and overlong information definition techniques, and the increasing strategic importance of information systems in many organizations are leading to the emergence of fourth generation languages (Duffy, Gibson, Bermeister & Morris, 1982). The objectives of these languages include minimal training requirements even for people without programming experience, the ability to be used by such people, and a reduction in system development time by an order of magnitude. There is little doubt that their impact on information processing, users and management will be far-reaching.

#### Information centres

Information centres are relatively new organizational units falling inside or outside DP that are designed to:

- Provide a source of expert advice to users about which information technology is best in the circumstances; and which suppliers should be considered.
- Assist users to do their own application development within a managed framework that ensures compliance with necessary organizational standards, but otherwise impose minimal control on them.
- Train the end-users. This involves both initial training in the use of the information tool and subsequent handholding.

Apart from the issue of making information centres effective, some organizations report an explosion of demand from end-users thus causing a whole new set of problems.

#### A marketing approach to information systems

It has been suggested that IS/DP people might benefit by adopting a 'marketing approach' towards their customers — the end-users. The thought here is that they need to understand their customers, their products, and their markets; they need to think in advertising terms; and they need to 'educate their customers'. In moderation this kind of approach could certainly do no harm to user/IS relations.

#### Information system implementation

An appreciable number of IS practitioners maintain that implementing IS and IT is the most difficult part of the whole process. Issues such as the following arise during the implementation phase:

- How can organizational learning be facilitated in this particular situation?
- Which organization design, such as information centres, will aid IS implementation?
- Which organizational factors will affect the adoption of IS?
- IS can increase control or work freedom in an organization. What balance do we wish to maintain?
- What are the implications of having our people work from home via terminals or micros (the so-called 'electronic cottage' or 'electronic workplace')?
- How can we improve our management of change to accommodate increasingly rapid change? How fast can we change if we have to?
- What are the likely impacts of proposed IS implementa-

tion on individuals, work processes, organization culture, and communications?

- Are we going to encounter resistance from staff, and, if so, how do we handle it?

The question of potential unemployment becomes a crucial issue especially when the use of robots has been expanding rapidly in countries such as Japan and the United States. The social implications of such a development in South Africa are far-reaching to say the least. On the other hand there is the vast potential of information technology for improving jobs (Canning, 1983:5).

#### Ways of thinking about information system strategy

##### Industrial society to information society

Naisbitt (1982), in his first chapter, makes the point that the United States has already passed from an industrial society to an information society. He bases this on the fact that in 1950 17% of the American labour force was employed in information jobs, while today more than 60% of the workforce is in information jobs and only 13% in industrial, and 3% in agricultural jobs. Of course this does not mean that these latter classes of jobs have diminished in importance. They still produce the US agricultural and industrial requirements plus some for export.

Whatever one may feel about this, it does highlight quite dramatically the increasing importance of IT, IS and IS strategy, to organizations of all kinds.

##### Information system strategy

The bare essentials of an information system strategy can be captured in the following four activities:

- (i) Developing a strategic vision of where the organization wishes to go. Crawford (1983) summarizes Digital Equipment Corporation (DEC)'s IS strategic vision as:
  - (a) Application development without programmers.
  - (b) 'Wiring up the Corporation'.
  - (c) Reducing the data and increasing the information.
 Without a strategic vision the organization has no direction.
- (ii) Strategy formulation. (This will be dealt with further below.)
- (iii) Information system planning. (This too will be discussed below.)
- (iv) Strategy implementation. (Although this is important it is not the main subject of this paper and will not be discussed further.)

##### IS strategy formulation

The initial task in formulating an IS strategy is to link it with the corporate strategy. What is required to identify an organization's information needs is an appreciation of its objectives, corporate strategy, strengths, weaknesses, opportunities and threats, and most important, its informal organization. This includes management style, organization culture, power and political realities, and propensity for changing, because these are the things that will mostly determine which information systems will be effective in that organization.

An approach that incorporates all of these factors is the 'preliminary analysis' (Duffy & Assad, 1980). The top management team of an organization identifies its areas of strategic concern, required information systems, the bottom line, and intangible benefits that would flow from the implementation of each system, and the order in which these information systems should be implemented. The preliminary

analysis, within the constraints of organizational realities, therefore provides the base for both a cost/benefit analysis and an information system plan. In this way organization objectives and information system objectives are directly linked.

Of course information systems do not have the same strategic impact in every organization. McFarlan & McKenney (1983:15) have developed a useful matrix for evaluating the strategic impact of existing and future information systems on strategic business units. It is a dynamic model and is readily understood by senior management who can plot the actual and perceived positions of their various business units on the grid. Furthermore it highlights the fact that different business units have information systems of differing strategic relevance at any point in time. This has far-reaching implications for resource allocation and organization design decisions.

On the question of information system strategy and corporate strategy, McFarlan, McKenney & Pyburn (1983) say:

'In thinking about the role IS should play in an organization, managers must understand the nature of the competitive position of the company or business unit and how it competes. The position and competitive weapons significantly influence the degree to which IS is strategically important to a unit, the way investments in IS technology should be considered, and the way IS planning should be executed.'

There are three ways in which a company can compete (Porter, 1980):

- (i) Be a low-cost producer;
- (ii) produce a differentiated product;
- (iii) operate in a specialized market.

In the context of competitive strategy, McFarlan (1983) poses a number of very relevant questions. He asks whether information technology can:

#### *Create a defensible industry barrier*

The American Hospital Supplies (AHS) saga (McFarlan, 1983) is an outstanding example of how this can be done. AHS located terminals, linked to their online order entry system at various hospitals in order to assist them with their urgent orders and trained their staff to use the system. The hospitals found the system convenient and increased the volume of orders to AHS. When AHS's competitors detected their declining market shares and attempted to install online order entry systems at the hospitals, they encountered considerable resistance from the hospitals to additional systems and training courses.

#### *Strengthen customer relations*

Tricker (1982) mentions the case of a car manufacturer in Europe who installed an online car inventory system linked to his main dealers. This led to both increased sales and to better inventory management.

#### *Change the intra-industry competitive balance*

Some of the larger banks in the United States have developed sophisticated services for their clients. The software costs for doing this have been heavy but justified by the economies of scale of a large client base (McFarlan, 1983). The medium-sized and smaller banks found that the only way to compete was to develop equivalent software on a collective basis.

#### *Change to balance of power in supplier relationships*

By having online access to the stock and production systems

of major suppliers it becomes possible to identify the low-cost suppliers and exercise influence on the stockholding policies of the individual suppliers (McFarlan, 1983).

#### *Open up new markets or substitute existing products*

In Canada a debt collection and credit agency found its business threatened by the advent of electronic funds transfer. Financial institutions were able to build up their own credit records (Tricker, 1982). A number of financial institutions are reported to be offering clients access to corporate data bases of financial and statistical information and to econometric models. This is clearly a new product or service.

To conclude this section on information technology and corporate strategy a number of questions that senior managements need to ask themselves are listed below:

- (i) Are we going to be:
  - Leading edge?
  - Near leading edge?
  - Amongst the pack?
  - Trailing edge?
- (ii) If we are going to be leading edge:
  - How will we make strategic IT decisions when, by definition, there are no precedents?
  - How will we minimize the risk of being leading edge?
- (iii) If we are not going to be leading edge:
  - How will we react if pre-empted by our competitors?
  - Is it possible to catch up technologically if necessary?

Once the thorny issues discussed above have been addressed and some strategic decisions taken, some sort of information system plan must be developed.

#### *Information system planning*

Information system planning can be justified in the light of the rapid changes in technology that are occurring, the perennial shortage of corporate resources, the trend towards integrated systems, and the importance of IS to the attainment of corporate goals (McFarlan, McKenney & Pyburn, 1983).

Blumenthal (1969) gave the following reasons for IS planning:

- (i) To couple IS development to the overall corporate plan.
- (ii) To give direction to IS development.
- (iii) To record the resource allocation and priorities of IS development.
- (iv) To ensure the integration and co-ordination of IS development to avoid 'islands of mechanization', sub-optimization and unnecessary costs of integration at a later stage.
- (v) To provide a yardstick against which the performance of managers responsible for IS development can be measured. This includes line managers.
- (vi) To provide a basis for the acquisition and development of scarce IS personnel.
- (vii) To ensure the continued adaptability of, and support of the organization by, its information systems.

Although the structure of IS planning will depend on things such as the status of the IS manager, the proximity of the systems group and general management; the corporate culture and management style, and the organization's size and complexity (McFarlan, McKenney & Pyburn, 1983), and although there are many ways of undertaking IS planning (for example, see Bowman, Davis & Wetherbe, 1983:11-25), a single approach has been shown below (Duffy & Assad, 1980). It should also be borne in mind that IS plans vary in degree of formality and size for the reasons given below.



Prior to the development of the actual IS plan the IS strategy would have been integrated in some way with the outputs of the preliminary analysis — namely, the management concerns and the prioritized application development portfolio with benefits attached. Based on these foundations a suggested framework for the IS plan follows:

Summary of the corporate plan including:

- The environmental appraisal,
- the internal corporate appraisal,
- the organizational objectives, and
- the broad corporate plan.

This summary need not be more than a page or two in length.

IS planning prerequisites such as:

- A more in-depth environmental appraisal of IT and IS manpower,
- an internal IS appraisal,
- IS objectives, and
- IS planning assumptions.

The importance of recording and periodically reviewing the underlying IS planning assumptions cannot be over-emphasized.

At this stage the planning objectives have been established.

Current IS capabilities such as:

- Present hardware,
- current applications,
- present software,
- IS staff profiles,
- analysis of expenses,
- analysis of facilities utilization, and
- status of projects in progress.

By establishing where we wish to be and where we are now, a 'planning gap' has been determined.

Feasibility study review:

This may or may not be necessary now depending on whether additional information is at hand or whether the situation had changed in any significant way.

The IS plan itself, made up of:

- An organization design,
- an application development schedule,
- hardware and software acquisition schedules,
- an IS manpower plan,
- a financial plan.

Special considerations for inclusion in the IS plan are:

- Evaluation mechanisms,
- security and control,
- standards, and
- flexibility.

### **Practitioner/Business school synergy**

Both IS practitioners and IS academics at business schools face problems in dealing with the turbulent business environment, and the information issues it has spawned.

The IS practitioner often has to undertake complex, urgent tasks in a context of political and management pressures. Furthermore, as Synnot (1983) points out, the IS manager has a responsibility to:

- (i) Alert the CEO to the 'chaos potential' of IS and its IT tool.

- (ii) Ensure the orderly development of IT contagion.

- (iii) Teach the end-users to 'drive' their IT.

Under the circumstances many IS practitioners will experience one or more of the following problems:

- (i) Keeping abreast of new developments in IS.
- (ii) Being able to recognize the 'wood' of strategic perspective, instead of the 'trees' of day-to-day operating tasks.
- (iii) Perceiving the strategic opportunities presented by the information issues discussed above.
- (iv) Having some uninvolved person with whom to test and exchange ideas.
- (v) Having the conceptual frameworks, such as those of Anthony, Nolan and McFarlan mentioned above, to aid strategic thinking about information issues.
- (vi) And, finally, being able to provide the education for management, end-users, and IS staff, to understand the information issues and then to participate in the formulation and implementation of IS strategies.

IS academics, on the other hand, have problems of their own in these turbulent times. These include:

- (i) Remaining relevant by keeping abreast of the IS literature and what is happening in the practice, which is increasingly ahead of the literature these days.
- (ii) Acquiring and developing appropriate conceptual frameworks, for if IS practitioners find it difficult to operate without them, IS academics will find it impossible.
- (iii) Developing material that reflects the needs of the times and attempts to equip the manager to cope with present and future information issues.
- (iv) Disseminating the material developed.
- (v) Finding ways and means of applying IS material, conceptual frameworks and methodologies in practical situations.

The IS academic has to deal with these problems by means of study, research and acquiring practical experience. It is precisely in this area of involving the IS academic in practical situations and interacting with him/her that the IS practitioner can assist most.

The IS academic can and does assist the IS practitioner in a number of ways which can be grouped under the headings of education, publication, and outside work.

### **Education**

- Offering degree courses in business administration with IS as an integral part of a general management-oriented programme.
- Offering business and management courses aimed at broadening IS specialists.
- Mounting public seminars in IS-related areas.
- Conducting in-house executive development programmes to alert them to the information issues and to equip them to address these issues. Other programmes update IS management and other IS staff.

### **Publication**

- Distributing relevant working and research papers.
- Publishing articles in journals.
- Publishing books.

### **Outside work**

- Functioning as a sounding board for leading-edge IS practitioners and senior management.
- Providing frameworks and methodologies for IS practitioners.



- Assisting IS practitioners to crystallize opportunities, define problems and develop solutions.

If the experts are right in their predictions of escalating environmental turbulence then both IS practitioners and IS academics will need all the help they can get in carrying out their respective tasks. Interacting more and building on their unique strengths can only be of immense assistance to both groups.

### Conclusion

Expert observers are predicting more turbulent times for the 1980's. This is having a major impact on the way in which senior management is approaching its task which grows more difficult by the year. The situation can also be viewed in a positive light, namely, as a fruitful source of business opportunities.

Many information issues challenge top and IS management today and will continue to do so in ever-changing variety and ever-increasing numbers. In order to take advantage of the strategic opportunities presented by information systems, organizations will have to develop a 'strategic vision' of their IS destination, formulate a coherent IS strategy that supports the organization's corporate strategy, convert this into an action-oriented IS plan and effectively implement that plan with all the human and organizational problems this presents.

A number of interesting new ideas are emerging concerning the use of information technology as a competitive weapon in modern business and organizations will have to take them into account in their strategic management. IS practitioners are likely to increase their effectiveness in this endeavour if they work with IS academics.

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