STRATEGY FORMULATION METHODOLOGIES

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Premises

The topic of formulating a strategy is a hard one to address in a short space of time. Concepts that help with strategy formulation are evolving and information technology itself is changing, so the impact of one on the other is complex. As such, it seems important to be clear about the underlying assumptions before beginning to address the substance of the question. There are some basic beliefs about the world and the way it operates which underlie the arguments developed in this paper.

The first of premises is that information technology (I.T.) strategies are most effective when they are developed in the context of business and corporate strategies. Thus a critical first step is to know where the organization is headed before one begins to work on the question of what a sensible direction for the use of information technology should be.

Such an explicit statement of strategy assumes implicitly that the "rational actor" model of the organization is the most effective one to use. This model has been espoused by a series of authors over the years, perhaps one of the earliest was Herbert Simon in his New Science of Management Decision published in 1960. In this view decision making is thought of as falling into a series of phases. In Simons terms, "intelligence," "design" and "choice" being the three principle interactive phases. In light of work since Simon's publication it seems useful to add a fourth step namely "action." Thus in this model an organization, or an individual, first defines the problem, that is clarifies it, then creates alternatives that would solve that particular problem, then selects the best of these alternatives following which they go through implementation, that is, a set of actions are taken.

This "rational actor" paradigm implicitly underlies much of the work that is going on in corporate strategy and strategy formulation. The 'rational actor' paradigm dominates the writing and research, particularly in the area of methodologies and even more so as it relates to information technology since many who work in this area come out of an engineering and science background.

However, there are several alternative models which describe equally well the activity that takes place in organizations. For example, there is a large group of managers who seem to successfully follow a problem-solving process which basically acts first, based primarily on intuition, then examines the results in an intuitive way

and senses if the results seem to be good. They then cycle back through to a next set of actions. In this view of management decision making the action comes first and the analysis comes second. Such a view turns the standard methodologies for strategy formulation upside down and there is little prescriptive or normative writing for managers or academics with this view of the world to act on. In the comments that follow, the rational actor model is dominant but is not in any way meant to be exclusive.

The second premise that underlies this paper is that the need for an explicit view of the organization's strategy is necessary because of an increasingly turbulent external environment. The premise is that the next decade is more likely to be one of "economic war" than "economic peace". It seems that we are entering an era of discontinuities; overcapacity in industry, increasingly global competition, rising expectations both of the quality of products and services as well as expectations as to one's standard of living. If indeed we are entering a period of continuing economic change then the management systems and ways of doing business that will be successful in such a period of change will be different from those in the past. It is assumed that incremental "business as usual" will not be adequate in the years ahead.

Although the pace of change is assumed to be higher in the coming years than it was in the '60s and '70s, it is not assumed that most of these changes are I.T. related. In fact, quite the reverse; social, political, global economics, and technologies such as genetic

engineering are driving organizations. Information technology enables the organization to facilitate and mediate these changes as they occur and impact on the organization. As an aside, it could be argued that information technology facilitates a faster rate of change, for example, live television coverage in America on activities in South Africa has undoubtedly increased the awareness and added to the political pressure for America to respond in some way. However, by and large, information technology seems to be facilitating change or enabling it to happen rather than driving it in a causal way.

A third premise is that information technology is merely one of several levers by which an organization adjusts to changes in the external world and in management practices. As is suggested in the second premise, there is no assumption of a technological imperative. Strategy to be effective has to be driven by ideas as they occur to informed capable managers. On balance, it is unlikely that an effective strategy will be driven by the technology in a way that brooks no alternatives.

The fourth premise is that strategy formulation is more of an art than a science and to be effective it should be the province of line management. Hence, the built-in difficulty of I.T. strategy formulation. If corporate strategy formulation is an art practiced differently in different organizations by different managers and if the resulting strategy is articulated in some firms in great detail and others scarcely at all, then clearly there is no "science" of

strategy formulation! It is an observable fact that good strategic management is all too rare. On top of this scarcity of good strategic management is the lack of the knowledge of I.T. capabilities among general managers. Line managers have traditionally not come out of the information technology field. Hence, those who know their corporate strategy are often ignorant of information technology and correspondingly those who understand the information technology are often uninformed of the corporate strategy. Hence to be effective there needs to be a shared process of strategy formulation. This is hard since both bodies of knowledge are changing rapidly and to some extent one is asking art and science to mix constructively!

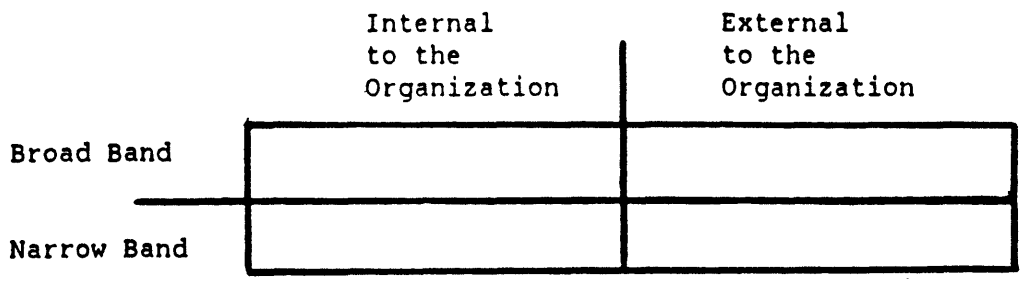
Definitions and History

Terminology in a field such as management is woefully undefined and it turns out that many management terms have widely different meanings to different people. There are two terms which require definition for the purpose of this paper. The first of these is information technology (I.T.) itself. The most important point is that I.T. is <u>not</u> only computers. There is no clean way of categorizing I.T. but it consists of at least of the following:

1. Computers - computers are of course a central component of information technology. There is a full smorgasbord of these [1] ranging from large mainframe computers all the way through to the recently arrived personal computers

and the even smaller, micro computers, that exist in chip form. Together with this spectrum of computers from mainframes to micros, exists the wealth of data and information that is available to an organization in an electronic form.

2. Telecoms - telecommunications has only recently begun to be recognized as a full partner with the computer itself as part of the main structure of information technology. The range of telecom options can be thought of as follows:



In addition to these four cells which are part of the telecommunications world an organization must deal with, there is the additional complexity of having both public and private networks available to fill each of these cells. It is hard to capture the powerful difference between a computer that is isolated, and what the computer becomes in the hands of the user when it is linked into a network and has flexible access to information, other computers and other organizations.

3. White Collar Productivity Tools - these are commonly known as office automation and clerical support and could be thought of as partial robotics for clerical workers. Here routine, well-structured tasks, such as writing paychecks and typing standard letters, are done with information technology tools such as a computer-based workstation for the clerical worker. Similarly, there are workstations for managerial workers in the form of computer-based terminals that deal with management support systems in various forms. Typically in 1986, these take the form of decision support systems and executive support systems [2, 3].

4. Blue Collar Productivity Tools - the most obvious case of blue collar productivity tools are robotics and related factory automation. However, it is interesting that a great many other professional workstations are now being installed where the prime purpose is for the production of the service itself. These workstations are used by humans not by machine tools and are closely related to the shop floor in terms of computer-aided design and computer-aided engineering. However there are other interesting examples such as loan officers in banks evaluating loan possibilities through the use of an interactive work station.

5. Smart Products - in addition to the above four categories of information technology there is also the inclusion of the technology into the product itself. Thus we have in a

modern car several computers in the car to control fuel, anti-skid brakes as well as information supposedly useful to the driver in terms of computed fuel consumption, etc.

The important point to make in the context of this paper is that information technology is only partially computers. Equally important are the other four categories of information technology that must be thought of when one thinks about formulating strategies for I.T. in the context of a corporate strategic move.

The second definition which is important to make for the purpose of this paper is that of strategy itself. There are literally hundreds of books on strategy and strategic management in the literature. Some examples are Strategic Management: A New View of Business Policy and Planning by Dan Schendel and Charles W. Hofer [4] or more recently Strategic Management: An Integrative Perspective by Arnoldo Hax and Nicolas Majluf [5]. This article assumes the content of these kinds of books is well understood to the reader. The central point is that strategy is not long range planning, if by long range planning we mean laying out the step by step path into the future, starting this from the present and assuming incremental progress of existing businesses and markets.

The original Greek word from which strategy comes means "the art of the (military) General."

For the purposes here, this can be translated into strategy formulation as being about how to create an appropriate mission, and to position the organization to accomplish this mission in light of the reality of its internal strengths and weaknesses, its customers and the external environment. Strategy formulation is concerned about the desired positioning of the firm and how to get there.

If one looks at business strategy historically one can see five phases in the development of the field up to the present time.

1. An early phase merely established for the first time the desirability of long range planning. Steiner [6] in his landmark book made a strong case for making explicit a functionally based (marketing, production, finance, etc.) plan that covered several years into the future.

2. By the early 1970s the interest had shifted to a focus on business planning [7]. To oversimplify this point of view, it was basically one of executives giving top down guidance to the organization and bottom up plans then coming from the division and functional levels. These were then put together for an overall corporate plan.

3. The third phase was that of portfolio planning as espoused by Bruce Henderson in his 1970s book on Portfolio Planning [8]. The essence of this approach was to see the corporation as a series of separate strategic business

units (SBUs) which by and large had independent products, markets and missions. These were looked at in terms of their cash needs and growth possibilities to identify an appropriate balance in the portfolio of SBU's given the reality of the maximum sustainable growth for the corporation. Important to this point of view was the relative market position vis-a-vis the competition and the growth potential of the markets served.

4. Industry structure and generic strategies [9] was the next stage in the evolution strategy formulation methodologies. Here the analysis was focused on the competitive position of the firm in the context of the infrastructure of its industry. The premise was that as industries have very different structures and dynamics it is important to understand these before identifying the possible generic strategy appropriate for the firm itself.

5. The fifth and most recent phase in the evolution of strategic planning is focused on a value chain [10] approach which turns the attention back to the inside of the organization. This technique analyses the internal steps by which an organization adds value to its product or service.

The point to note with all of these various approaches is that there has been a steady progression of ideas. There is no reason to suspect that we have reached any kind of end point in this

progression and indeed in light of the turbulent environment the purposes for which strategy formulation must be undertaken will change. This in turn will demand newer techniques and new concepts that will prove powerful in helping organizations to formulate their strategy in an effective way. Thus it can be seen that strategy formulation is a moving target, and this suggests that linking strategy formulation to changing information technology is going to require unusual effort and flexibility.

Conceptual Frameworks

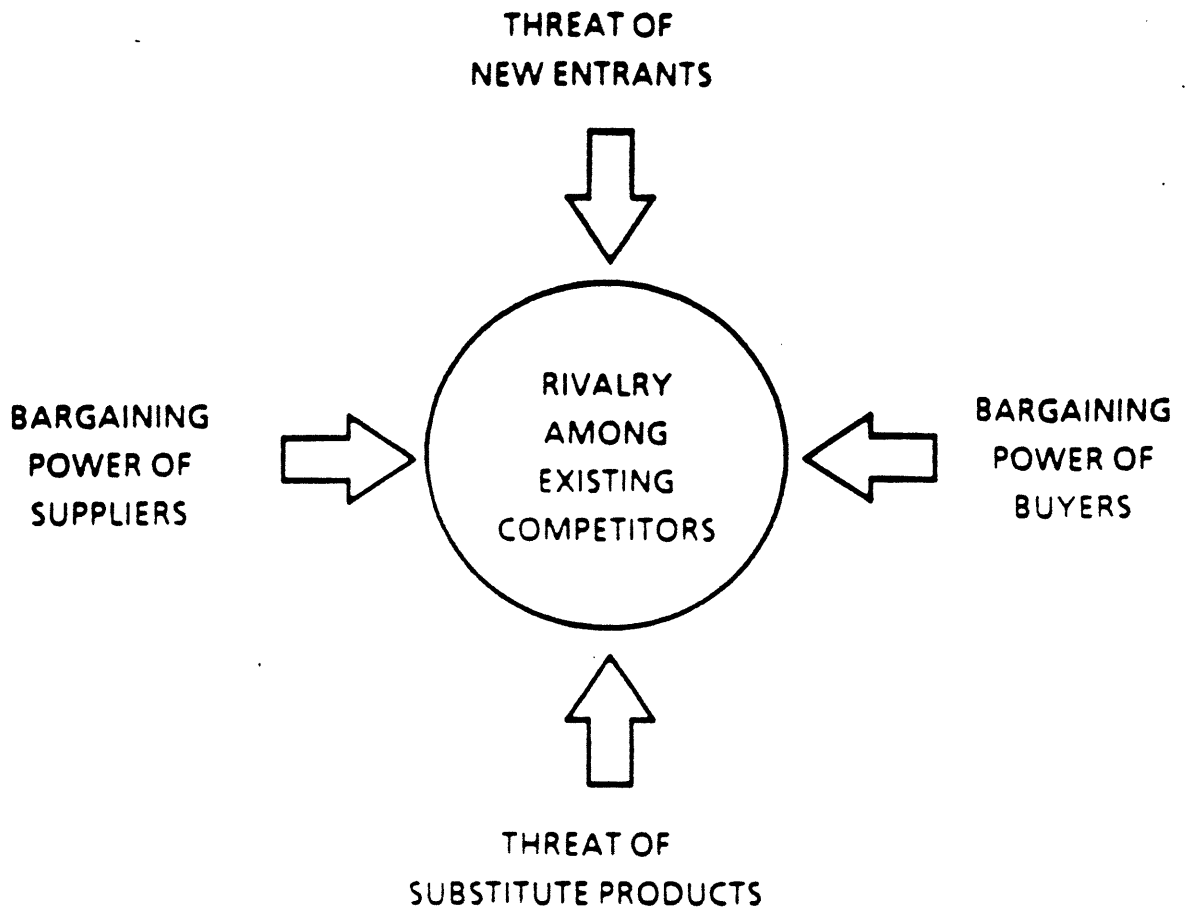
If strategy is indeed a creative line management task then it follows that there is no formula or technique that will produce an answer. However it is possible to use frameworks and methodologies as ways of stimulating ideas, aiding consensus among management, and generally helping to maintain perspective. It is frameworks from the last two of the phases mentioned above that appear to be particularly valuable as a way of stimulating powerful creative methods of linking IT use for the corporate strategic thrusts. There are a host of suggested ways of looking at the linkage that have come out of the major business schools of the last five years [11].

At its core, strategy formulation inevitably involves analysis of internal strengths and weaknesses and external threats and opportunities. This is a fundamental equation in any strategic problem.

As an example of a framework being used to stimulate creativity it is possible to take the well known Porter framework that he developed in his book Competitive Strategy [12]. In this particular book he was focusing on the Industrial Organizations economic literature to establish the framework itself. He then proceeded to draw implications of the framework for corporate strategy. However, it can also be used to look at the implications for information technology. This has been done by a number of academic authors; perhaps the most visible article is by McFarlan in the Harvard Business Review. Arguably it is the process by which this framework is used within the firm that is its principle value. The framework is suggestive and has some useful categories but there is no way to generate "answers" unless it is creatively and knowledgeably used by experienced line managers.

Using Porter's basic diagram (Figure A) of the major categories of forces it is possible to go through the four areas and identify opportunities in each. In some organizations this is done formally with a small group of line managers including an I.T. person, in others by different combinations of the line and staff. Focusing on the "buyer" dimension of Porter's diagram, for example, the company might come up with an idea for an electronic linkage between its buyers (i.e., its customers) and itself. The linkage gives the customer an ability to directly choose items that most closely match their needs, the process also markedly speeds up delivery of the product to the customer.

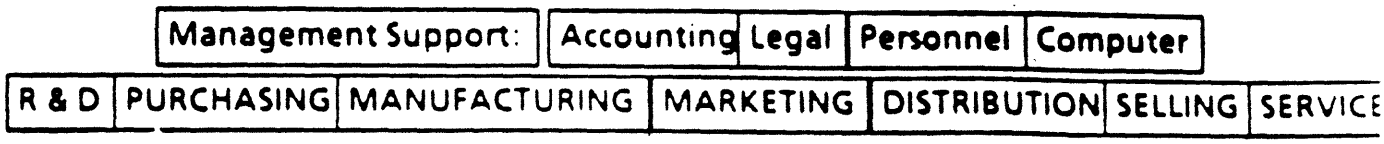
FIGURE A


THREAT OF
NEW ENTRANTS
BARGAINING
POWER OF
SUPPLIERS
RIVALRY
AMONG
EXISTING
COMPETITORS
BARGAINING
POWER OF
BUYERS
THREAT OF
SUBSTITUTE PRODUCTS

A second example of a conceptual framework that has proved to be very effective for understanding the strategic opportunities inherent in the internal aspects of the organization is the use of the "value chain." One of the first published references to its use occurred in 1980 as a result of some work that Strategic Planning Associates (SPA), a strategic consulting firm in Washington, DC, did with some of its clients [13]. In practical application, SPA found it effective to utilize both the analysis based on the "value added cost" (that is, on the cost of the value adding steps) and one based on "value added leverage." This latter analysis is management's judgement as to the most critical leverage points in the value chain. This early work by SPA was not followed up in the academic literature until Porter's book (Competitive Advantage, 1986) drew attention to the concept and expanded its application. The value chain is a pictorial representation of the sequence of activity the organization engages in, as it adds value to its product or service as it moves from the initial stages of what it does through to the delivery of a product to the customer. Figure B shows the two classes of activity, those directly associated with the process of "manufacturing" the goods and services and those that are necessary support to those direct steps. Organizing this "value chain" as a percent of cost leads to insights and provides a way of focusing on those steps that clearly account for a large proportion of the organization's cost structure. Such steps very often are the ones that offer the greatest potential for I.T. application. Such a view also makes it clear which steps might be linked to other

FIGURE B

INTERNAL: The Value Added Chain



organizations in joint ventures, or perhaps which piece of the value chain might be removed all together and contracted out to somebody else.

To repeat a point made above, the concepts are merely vehicles for management to discuss the potential of their businesses and hence where information technology might be used. The value added leverage step is one that is much less dependent on hard costs and much more dependent on management's informed judgement. Value added leverage refers to those steps in the "value chain" where management feels the organization has a unique advantage or where there is the most powerful form of leverage. For example, an oil company arguably gets its greatest leverage from finding oil in the first place. It is relatively unimportant how efficiently it manages the manufacturing and delivery process if it is in fact sitting on huge supplies of low cost oil. In this case, the exploration stage in the "value chain" is the one with the greatest leverage, although its costs may be proportionately small.

These two frameworks (industry structure and value chain) are particularly useful because together they force the organization to think about how it does its business and ways in which that could be changed, as well as explicitly forcing attention on the external variables which impact the firm.

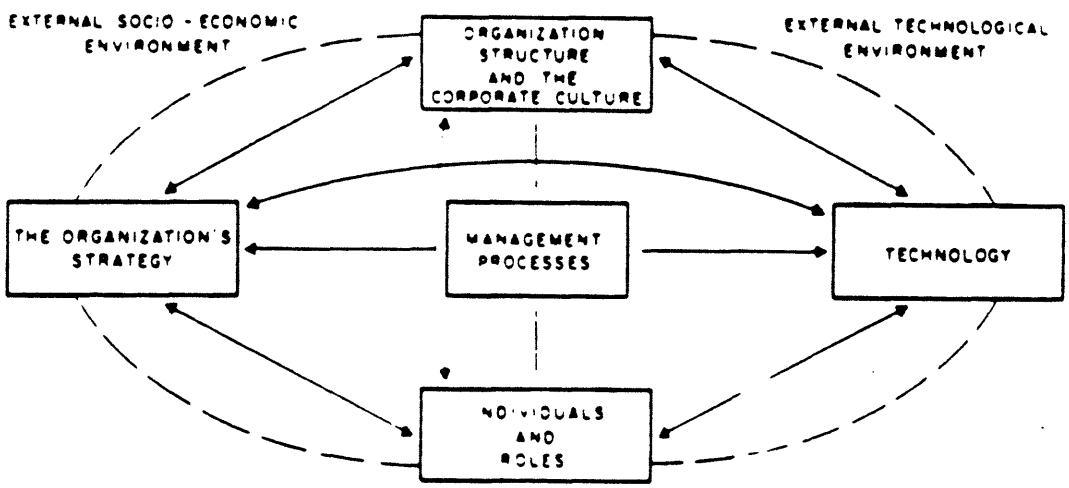
Both of these points of view, then, encourage thinking about "electronic integration" which seems to be one of the major ways which information technology is having an impact on corporate strategy. However, beyond frameworks that suggest particularly powerful points at which technology may be utilized there has also been some useful work on the process of thinking through strategy formulation itself. The most well known of these is Rockart's Critical Success Factors methodology which was developed initially for use by managers in planning their information needs [14]. Its initial success in the domain of information systems has been overshadowed by the use of the technique as a mechanism to get managers to think through what are the critical dimensions of their jobs, the ones to which they must pay undivided attention. Obviously, if an organization can agree on those things that must be done uniquely well for it to be successful it has gone a long way in identifying its strategic thrusts.

Recent work by Henderson [15] has built on the foundation that Rockart established by identifying the Critical Assumption Set that a group of managers share. He has shown it is important to get at the assumptions that underlie the critical success factors in order to get to the core of what really needs to be done to move the organization forward. These two conceptual frameworks are being used to stimulate thinking and creativity by managers. The CSF methodology adds a definitive process that results in articulating and sharing the organization's direction. These have been shown in numerous organizations to be analytically useful and to result in changed behavior [16, 17].

There is another perspective which is being explored and seems to yield a different set of insights that are in many ways wider and more pervasive than those in the first two analytical frameworks. This third framework arose out of two important streams of fundamental research that were done in the 1950s and 1960s. The first of these is the work done by Alfred Chandler, a business historian, who wrote an important book in the early '60s [18]. In this book he developed the thesis that an organization's strategy changes over time and, as it changes, the organization adjusts its structure to match the new strategy. Although this point is regarded as obvious today it is nonetheless a powerful point. At about the same time, Harold Leavit produced an article [19] based on an evaluation of the organizational behavior literature and studies that had been done to that point. In this article he established a case that an organization could be thought of as consisting of four important sets of forces. These were the tasks that the organization has to accomplish (in some ways its strategy), the organization structure it employs, the people in the organization and their skills, and the technology that is utilized. The technology in this case was not information technology so much as it was any of the technologies, e.g., telephone, materials, manufacturing process, etc. At the time, this was a novel and powerful way of viewing organizations and it had the added advantage of being well grounded in fundamental research.

In addition to Chandler and Leavit there was also at this period of time the development of the "scenario" school of corporate strategy [20]. This school developed both methodologies and check lists but at the heart of their work was the idea that the external environment could most usefully be examined in context of its social, political, economic and technical components. Their work had a big influence in the '60s but fell out of favour until its recent revival [21].

If these three streams of work are combined together one arrives at the diagram given below. This diagram [24] recognizes that an



organization can usefully be thought of as a set of forces existing in a state of dynamic equilibrium. On the one hand you have its strategy, the mission it wishes to accomplish, and all the tasks that make up that mission. You also have its organization structure and, more importantly perhaps, the corporate culture that makes the structure become alive and vibrant. You also have the people, and

not only the people themselves, but the roles they are being asked to play. For example, a person as head of marketing becomes a very different individual than when he/she becomes the head of manufacturing. The fourth major set of forces are the technologies that are available, particularly the information technologies as defined previously. Holding all these four forces together are the management processes; the planning, the budgeting, and the control systems as well as the informal processes that represent the way the organization does its business. All these sets of forces exist in an external environment which consists of the social, political, economic and technical factors. These changing factors can impact any one of the sets of organizational forces although principally of course they are reflected in the strategy of the organization.

In the context of this diagram then, information technology can be seen to be a force in its own right and it certainly has a direct impact on the strategies that are available to an organization. An example is American Hospital Supply (AHS) [22] and its choice of a mechanism to give them sustainable competitive advantage in the market place. AHS took information technology, gave its customers a terminal, and allowed the customers to order directly from AHS. This gave the customer cost savings and quicker response and higher quality and gave AHS the ability to know more about its customers, their ordering patterns and their tastes. The combination was a situation where both parties gained. It was also true that AHS's competitors had a hard time breaking through the barrier of installed terminal systems to sell to these customers. There are hundreds of

examples [23] of similar I.T. uses for competitive advantage. However, as this diagram suggests, the external environment is the major driving force for the strategy, the technology is merely enabling the strategy to be accomplished. In addition, there are three other sets of forces which clearly impact this technology strategy linkage. One can have the best idea in the world but if the organization structure and corporate culture are inconsistent with this idea then it is likely to come to nothing. Similarly, if the strategic vision of technology assumes a set of skills and attitudes of the people in the organization that is inconsistent with the culture and the reality of peoples' expectations then it is likely the whole experience will fail. Such an outcome is made even more likely if the management processes and reward schemes continue to reflect the old ways of doing business and not the new. Thus it can be seen that any attempt to formulate I.T. strategies without thinking very carefully about the implications that such a strategy would hold for the structure, the people, and the processes, is likely to fail.

An expanded version of this line of thinking was the conceptual origin of a project at the Sloan School of Management at MIT called Management in the 1990s [24]. This is a five year research program involving 15-20 faculty at the Sloan School together with ten corporate sponsors who are giving MIT $5 million to conduct research on the impact of information technology. Our concern is not with information technology per se but the impact it will have on the processes, strategy, structure, people, and human resource practices

in organizations. Our sponsors consist of three manufacturing firms, British Petroleum, General Motors, and Eastman Kodak, three service organizations, American Express, Arthur Young, and the Internal Revenue Service and four firms involved in information technology namely International Computers Ltd., Digital Equipment Corporation, BellSouth, and MCI. The research program is in its third year and is producing a whole series of papers and working conferences. The papers are in the public domain and are available from MIT* although the conferences remain limited to the sponsors until the ideas and conclusions become better formed. Already it is clear that there has been a major impact on organizations as a result of I.T. and in many of the most successful cases this impact has gone straight to the core of the way they do their basic business.

The Future

The impacts of information technology which the researchers in the 1990s program are finding would not be of such major significance if it were not for the fact that there is no indication that changes are slowing down. That is, the external environment shows every sign

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of continuing to experience major changes over the next several years. These changes will in turn demand that organizations adapt to them. Such adaptation can be facilitated by the creative use of information technology. This technology is itself continuing to change. Recent technological breakthroughs suggest that the changes will affect some areas in major ways.

The first of these is in the hardware/software domain. The continuing drop in hardware costs plus developments in software architecture have resulted in machines that have now fallen below a cost threshold. For example in 1986 it is possible to buy a "LISP" machine at around the $15,000 level which can deal with languages particularly suitable for qualitative knowledge and its manipulation and be coupled with a knowledge base of a usefully realistic size.

The second breakthrough is conceptual in nature. Herbert Simon in the 1950s first raised the idea of heuristics and its place in the field of Artificial Intelligence. Since then there has been a lot of work by many able researchers that have got us to the point [25] where it is possible to capture and work with judgemental qualitative knowledge of acknowledged experts. This has resulted in the so-called "expert systems" which are an interesting development in the field. But to the extent they replace human judgement they can do so only in very limited domains and therefore are of marginal importance to corporate strategy over the next ten years. However, the concept of "expert systems" and artificial intelligence can be used to build "expert support systems" (ESS). These take the concepts of "expert systems" but apply them to an interactive system

that leaves a manager very much in the loop in a crucial part of the decision making process.

The conceptual breakthroughs that allow one to build the software for an "expert support system" coupled with the enormous drop in cost of the hardware has resulted in an economically viable combination which for the first time gives us the tools to attack directly the challenge of working with qualitative judgemental information [26]. This passage from data in the early 1960s to information in the 1970s to knowledge in the 1980s is of fundamental significance and opens up another class of problems for which an organization must have an effective strategy.

This "knowledge era" matters since knowledge workers have scarcely been touched thus far. We have done a lot with computers over the last 25 years to help the well understood, routine, repetitive tasks that have to do with the transaction processing activities of an organization. More recently we have begun to work on the physical manufacturing process via robots. The advent of low cost viable telecommunications has allowed us to link remote sites together and capture transaction processing data closer to the source and integrate it more tightly with the organization. However, the tasks that have been affected have been largely clerical, such as payroll, order entry, inventory control and keeping track of the day-to-day routine things. More judgemental areas such as assessing the credit risk of a possible loan candidate or configuring the components of a complicated customer order do not yield to the old

concepts and "sequential" hardware architecture that we have had to work with thus far. The new science of knowledge engineering, capturing heuristics, and the availability of "parallel architectures" at reasonable prices offer the tools that will allow us to increasingly deal with these judgemental areas.

Given the continuous changes in the environment and in the technology the formulation of an I.T. strategy is tricky. It must involve line managers thinking creatively and it must involve dealing effectively with the management of change. In addition, it involves the challenge of getting both the I.T. professionals and the line managers to engage in a constructive dialogue. From the evidence we have collected thus far in the 1990s program, it would appear that the firms which have used I.T. successfully are the ones who have succeeded in starting such a dialogue. In order to get this effective dialogue it appears that one way to start, is to start. It certainly seems clear that the business world is not waiting for those who are slow to begin this process as is evident from the host of corporate takeovers. The 1990s it appears will continue to be a time of change.

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