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The Middle Path: Dealing with Transformation in Asia's Information Technology Competitiveness Experience

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While the past two decades of literature have managed to establish reengineering and retention of the status quo as the two alternate poles for corporate strategic planning, the consideration of these 'All or Nothing' tactics have resulted in a dearth of research in interim or more controlled strategies for business change. The majority of companies in Asia do not have the resources for rapid information technology (IT) or structural change; nor do they have reasons to implement such changes. Though they are not necessarily market leaders they do have a mandate for change, but such a mandate demands a more conservative and evolutionary development methodology. This paper discusses the issues which must be considered by such companies, reasons for choosing an evolutionary, middle-path development methodology, and strategies for effecting changes with limited resources. The paper concludes with a case study of the XYZ Corporation, a composite of 30 different companies, which attempts to describe many of the successful strategies applied by these companies in an attempt to improve their IT structures, increase their market shares, and maintain the flexibility which companies will need in order to survive in the future. It is hoped that this paper will serve as a prelude to further discussion of alternative business growth models for resource-limited organizations. **Copyright © 1996 Elsevier Science Ltd**

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The changing features of the field

In his classic book *The Art of War* Sun Wu (also referred to as Sun Tzu), the famed fifth century BC Chinese general, spoke about the element of change and its effects on strategic planning. In chapter 6, 'The Void and the Solid', he says:

> And as water shapes its course in accordance with the ground, so an army forges its victory in accordance with the enemy conditions. Therefore, there are no constant patterns of war, just as water has no constant shape. He who can win victory by modifying his tactics in accordance with the changes in the enemy conditions is considered divine.[1]

This need for flexibility is no less important for the ancient military leader than it is for the modern business leaders of today.

This flexibility requires a great deal of information, understanding, and thought. When a leader is faced with a dilemma, there is seldom a completely right or wrong solution. Usually, the leader is faced with a series of options, some of which may be better than others. In order to determine the merits and failings of these various options one must first

have the information necessary to place these options in perspective. Second, one requires an understanding about how these options will affect and change both the internal and external conditions within which future decisions will have to be made. Finally, slow and careful thought is required. It is critical to consider the strengths and weaknesses of the people responsible for enacting new policies as well as the tools and methods they will use to enact those policies.

Radical reengineering and the conservative push to retain the status quo have become the two poles between which companies now set their strategies. 'All or Nothing' has become a catch-phrase which describes the two paths which companies are now told they must choose between.

While a great deal has been written about the value of radical reengineering, Michael Hammer has made it clear that success is a fairly rare prize earned by such efforts. He has indicated the belief that reengineering has failed in 70 per cent of cases, while some studies have cited failure rates ranging from as high as 84 per cent.[2] Whichever statistics one chooses to accept, one issue is clear, a large number of reengineering projects, both in the past and in the future, will fail.

Sticking with the status quo also seems to have a good many failings. As the world changes, a number of pressures are forcing many companies to radically change the way in which they traditionally did business. Two of the most important changes within the firm are the pressures to globalize operations and new competitive requirements such as product quality and decreasing time to market.[3] These, obviously, render the idea of 'sitting-back and waiting it out' tactically suicidal in many cases.

We believe that a middle path is needed. This middle path is a path of flexibility which winds between these two radically different poles, sometimes causing the company to make large-scale changes, at other times staying its hand, but *always* setting its directions based on a clear idea of the company's current capabilities and its internal and external environment. This Middle Path is the natural path; it is the one a plant takes as it grows, shooting up when the environment satisfies its needs, and lying dormant when the elements are inhospitable to growth. It is a path which bends when the winds blow hard; it can slowly shatter the hardest of stones. The Middle Path is the path of gradual reconstruction. William Passmore discusses the pioneering work written by Eric Trist in the 1960s. In this book Trist discussed successes and failures in organizations within the British coal mining industry. Passmore points out that Trist very carefully named his book *Organizational Choice*. Passmore discusses the importance of the title and the concept of organizational choice in the following terms:

> Organizational choice meant that the organization had many choices available to it in terms of how it arranged people, even around the same technology. Some choices were much more effective than others, but the real difference in effectiveness was not due to any single organization design characteristic. Rather, it was due to the way the entire system of people and technology functioned together. The best technology available could perform miserably if it didn't fit the social system; the best and smartest people couldn't make a poorly designed technical system competitive; and variations in span of control or number of management levels or the degree of work specialization in and of themselves would never make up for problems in the basic relationship between people and

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observe and learn from these organizations, it is the companies who have sacrificed their time, energy, resources, and wits to make such solutions a reality. The debt of posterity is not to historians but to those who made the history they record.

[1] LI, S, YANG, X AND QIN, J (1990) *Sun Wu's Art of War and the Art of Business Management* Hai Feng Publishing, Hong Kong
[2] MAGLITTA, J (1994) 'One on one, Michael Hammer' *ComputerWorld* 24 January
[3] ROCKART, J F AND SHORT, J E (1989) 'IT in the 1990s: managing organizational independence' *Sloan Management Review* Winter

> technology . . . There was no perfect organizational design. Each organization needed to find its own best design, based on an analysis of its people and technology working together in the context of a particular environment.[4]

How this path of gradual reconstruction will be achieved is the product of the interactions of each company's stakeholders, its strengths and weaknesses based on Porter's Five Forces, its current technical equipment and knowledge base, its economic strengths, and, most importantly, the environmental changes to which it must be prepared to respond.

The most critical of these changes, in our view, involve Technology, Government Regulations and Laws, Political Climate, Inter-industry and Intra-Industry changes, as well as Market Volatility.

Changes in technology

The nature of technology has been rapidly changing over the past three decades, and it appears this tendency towards rapid change will increase in the foreseeable future. Changes in the size, capacity, and cost of both hardware and software make it highly likely that companies hoping to succeed will need to pursue rapid upgrade paths for many years to come. At first glance the problem would seem to be one of choosing the right targets based on the following trends and their interactions: shrinking sizes, decreasing costs, increasing storage capacity, increasing processing/transmission speed, and increasingly sophisticated interfaces.[5]

Unfortunately, even these are not necessarily accurate benchmarks. Some technologies are changing at a rate almost too rapid to chart, and emergent technologies like the World Wide Web offer potential changes to information storage and handling which experts are only just beginning to consider. While information technology (IT) professionals clamor for their companies to 'get wired' they still lack hard figures to prove that getting wired will produce real value for the firm. Meanwhile other companies find themselves so far at the forefront of a technology that they have outstripped the customers they meant to serve; providing technological services that these customers are not yet ready to receive or cope with. Traditional channels of information and methods for acquiring and sharing technological information will have to be supplemented if firms are to ever keep up with this rapidly changing field.

On a field where the weapons of war are rapidly changing, what tactics must a wise leader use in order to effectively commit the vast resources required by large scale IT change while avoiding the pitfalls of technological obsolescence?

Changes in government regulations and laws

In recent years laws governing domestic and international trade have been undergoing rapid revisions. Numerous changes in laws and regulations governing intellectual property rights, trade taxes and tariffs, and trading barriers have taken place. Companies which one day enjoyed the benefits of falling in a Category 'A' field, suddenly find themselves bankrupted by a clerical shift to some nation's Category 'B'. Corporations which enjoy the benefits of patent protection in one market, suddenly discover that they are infringing on the patents of others in another market. Even worse, some companies have found themselves

[4] PASSMORE, W A (1994) *Creating Strategic Change: Designing the Flexible, High-Performing Organization* John Wiley, New York

[5] NEUMANN, S (1994) *Strategic Information Systems: Competition Through Information Technologies* Macmillan College Publishing, New York, pp 227–228

being asked to surrender such things as trade secrets or management control in order to claim a share of some markets.

A growing number of examples show us countries like Brazil with its restrictions on imported technology, Singapore with its restrictions on the types of ideas which can be expressed over technology, and the EC with its growing restrictions on the forms and types of data which may be exported or exchanged.[6]

On a field where the terrain can unexpectedly change, what strategies must a wise leader use to effectively deploy troops and equipment in order to profit from these changes?

Changing political climate

One merely needs to look at the former Soviet Union to know that political stability is not guaranteed by size or military might. Internal political changes and international political changes constantly threaten to change the conditions for business. In some cases companies face the possibility of losing vast assets, in others they stand to gain tremendous new markets.

On a field where the weather or climate may change at any minute, what must a wise leader do in order to capitalize on these changes?

Changing industries and market volatility

Over the past few years technology has changed the size and scope of a large number of industries. Besides the changes in barriers exemplified by American Airlines Sabre system and American Hospital Supply Corporation's (later Baxter Healthcare's) ASAP system,[7] the current spate of corporate acquisitions and alliances (including players like IBM, Apple, AT&T, Sony, CBS, Turner Broadcasting, Times-Mirror, etc) attest to the rapidly changing forms of many industries. Rapidly fluctuating markets further complicate a tactical picture which already gave a fairly small window for strategic planning. With all of these changes in the form and stability of current industries and markets, business management will find themselves hard-pressed to follow and capitalize on such variations without in-depth insights into the workings of these swiftly shifting trends and the stakeholders which drive them.

On a field where both the alliances and the rules are rapidly changing, what tactics must a wise leader use in order to effectively chart a course for the future?

When the weapons, terrain, weather conditions, alliances and rules of war are constantly changing the wise leader cannot commit to any single, long-term strategy. A leader in an ever changing field of battle must be flexible. A leader in coping with a kaleidoscopic array of varying weapons and strategies must know the strengths and weaknesses of all the players on the field of battle. To succeed in the midst of chaotic variation and change the wise leader will need to devote greater resources to understanding and promoting change.

Charles Dickens once offered a stunning image by describing a teacher who taught his students in a fashion much like trying to crack open a walnut and pull out the tree. Health, growth and change, in almost every situation, must come from within. To understand the nature of flexibility and change, perhaps it is time for us to look back at nature and watch again how plants grow.

[6] DANIELS, N C (1994) *Information Technology: The Management Challenge* Addison-Wesley Publishing, Wokingham, p 12

[7] VENKATRAMAN, N AND SHORT, J E (1992) 'Baxter Healthcare: evolution from ASAP to ValueLink in the hospital supplies marketplace' *Proceedings of the Twenty-Fifth Annual Hawaii International Conference on System Sciences* IEEE Computer Society Press, California

The seedling and the stone

When Hammer and Champy define reengineering as 'the fundamental rethinking and redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service, and speed',[8] or when Davenport uses a term like 'process innovation' and defines it as '. . . stepping back from a process to inquire as to its overall business objective, and then effecting creative and radical change to realize orders-of-magnitude improvements in the way that objective is accomplished',[9] what they are talking about is strategies not options. They are neither the sole options available to business managers, nor are they, in many cases, the best options.

Growing up one of the authors had the unusual opportunity to observe a tree grow up. The tree started out in a rather unfortunate situation. The seed from which the seedling was sprouting was partially shaded by a large stone. The result was that for many months the seedling had to grow out from under the shade of the stone. It had an odd, curved shape as it molded itself out past the rocky outcrop. As it grew larger though, things began to change. As its roots took hold of the ground underneath, shoots began to pop out all around the stone. As these shoots grew larger they surrounded the stone. It took many years, but the last time, the author went to see that tree, it had not only grown around the stone, it had begun to crush it into dust!

The strategies of growth will vary over time. More importantly they will be determined by factors both internal and external to the organization. But they will be driven by the internal rules. A blade of grass or another type of plant would probably not have survived. This is because of a lack of the necessary flexibility to work around or through the barriers encountered.

In light of the current body of literature, it is easy to forget that not every company in the world has made IT a part of its existence. A good two-thirds of the world is *not* computerized, including vast tracts of the former Soviet Union, The People's Republic of China, huge portions of Africa and the Americas. Half of the people on Earth have still not even made a single phone call![10] High level IT technologies are still not common in many of the world's markets. Even advanced countries like the USA, Japan and Taiwan have many small and middle-sized companies which still continue to operate with little or no IT support.

The collective potential of these companies as new entrants in the marketplace of the future may have serious repercussions on the IT bases of today's leading market players. These new players have the advantage of starting off from scratch. J Raymond Caron has pointed out the importance of exploiting 'clean slate' opportunities in his analysis of CIGNA insurance's reengineering efforts.[11] John Hope of Nissan Europe further underscored the issue when he said '. . . The IT advantage of being a young company, established in 1984, is that we use new technology to develop new systems . . .'.[12]

This situation prompts two questions. One question is 'How can companies already in the field, build the necessary flexibility into their systems to be able to compete with these new players?' The other question is 'How can these new players hope to compete with companies which already have established wide-scale IT infrastructures?'

At first these two questions seem to be in opposition. Intuitively we might assume that the large player's and the small player's strategies might be radically different. This is not true, however, *when the playing*

[8] HAMMER, M AND CHAMPY, J (1993) *Reengineering the Corporation* Harper Collins Books, New York

[9] DAVENPORT, T H (1993) *Process Innovation* Harvard Business School Press, Boston, MA

[10] RICKARD, I W (1992) 'US regional holding companies reach out to the world' *IEEE Communications Magazine* October, 70–72; HEITZMAN, J (1990) 'Information systems and development in the third world' *Information Processing & Management* **26** (4) 489–502

[11] CARON, J R, JARVENPAA, S L AND STODDARD, D B (1994) 'Business reengineering at CIGNA Corporation: experiences and lessons learned from the first five years' *MIS Quarterly* September, 233–249

[12] DANIELS, N C (1994) *Information Technology: The Management Challenge* John Wiley, New York

field is constantly being leveled by technological innovation. In this type of environment, the only certain strategy is a highly flexible strategy.

If the massive retooling efforts of companies moving from mainframe to PC or workstation technology bases do not serve as a strong enough reminder of this fact; both scholars and business people would best look to the wide-scale implications of technologies like Sun Microsystems' Java. With a technology which allows massive applications to be used on a one-time basis over a network without the need for hard disks the shape of IT is almost certain to change. The nature of the computer industry is already in the midst of serious change. One merely needs to look at the latest developments at companies like Apple Computers, IBM, Sun, Netscape and Microsoft to see the truth of that.[13]

What adds to the beauty and danger of these new technologies, is their ephemeral nature. With technologies like Java or Blackbird, applications can be in a constant state of change. New versions of software can be available on a monthly basis; they may no longer be bound by upgrade schedules or many current hardware limitations. Consider again the amount of time, labor, and resources companies have recently devoted to moving their data from mainframe to PC or workstation technologies. If Client-Server style technologies move into a GII network setting the tools which companies use to handle their data from quarter to quarter may change. For organizations faced with continual, rather than incremental, growth organizational flexibility will be critical to survival.

This flexibility can only exist in a company which forms a partnership with all its members in forming a strong information infrastructure. Members must be able to communicate well both verbally and in writing. Managers must show an interest in sharing information long before IT can support this task. Most importantly, members of such organizations must be rewarded for creating and disseminating new ideas.[14]

Like cells sharing nourishment and information in a growing plant, the members of a growing organization surviving in a period of rapid change will need to efficiently share resources and information. This is only possible if the terms for such cooperation are set early in the game. Whether this will result in a flattened organization or one which is simply more 'egalitarian' will most likely depend on the nature of the individual organizations. But change of this sort is necessary if, and only if, the information infrastructure *needs* to be improved.

When raising a plant, or a business, one can prune or use a trellis to guide growth. By pruning you can eliminate growths which threaten to drain vital resources from the main body of the plant or to produce a plant with a certain aesthetic form. With a trellis you can provide a sturdy framework within which the plant can grow according to your whims. But the truth is pruning and trellises almost never work if you try to go against the basic nature of the plant.

It is easy to forget that the brain is not the entire body; to overreach one's physical abilities or ignore the natural impulses that are supposed to protect us in order to achieve some visualized goal. Although we all bear scars from times when we have allowed our 'eyes to be bigger than our stomachs' we often forget these lessons when viewing the macrocosm of human nature which the organization poses.[15]

Management should provide the guidance, leadership, and support for any evolutionary development within an organization, but it must be

[13] BANK, D (1995) 'The Java saga' *Wired* December, 166–246

[14] DAVENPORT, T H (1994) 'Saving IT's soul: human-centered information management' *Harvard Business Review* March–April, 119–131

[15] MARTINEZ, E V (1995) 'Successful reengineering demands IS/business partnerships' *Sloan Management Review* Summer, 51–60; BOYNTON, A C, JACOBS, G C AND ZMUD, R W (1992) 'Whose responsibility is IT management?' *Sloan Management Review* Summer, 32–38

done with a very clear idea of that organizational body's strengths and limitations. Like the black-belted martial artist or the Olympian athlete, a business gains control and power through a natural path of development. This is seldom the path of 'obliteration' or 'clean-slates'. Kotter and Schlesinger had a very clear understanding of this. When they analyzed strategies for change the use of manipulation and coercion were last on their list.[16] Education, participation and involvement, facilitation, or negotiation make more sense because for almost all businesses, an already trained workforce is a more effective workforce and that workforce works best if it is kept inside the circuit of communications.[17]

Like grafting a new branch onto a plant, only certain grafts will work. The nature of the plant and the grafted branch will be critical if such a graft is to succeed. In the same way, grafting on new staff, or even new subsidiaries, to an organization is a process which requires serious deliberation and can only be successfully achieved in a limited number of cases. In all successful cases change and growth will have to be the result of a concerted effort on the part of *all* stakeholders in the organization; from the individual worker up to the top management.

Although some organizations may have the ability to improve more quickly than others, that improvement is based on a strong knowledge of the individual organization's limitations; it is incremental and can only be as far-sighted as the management's and employee's vision. As Caron points out, business reengineering is almost never going to be a business-wide phenomenon that can be implemented, at the outset, business-wide, top to bottom.[18] Even Hammer's own examples at Ford Motor Company and Mutual Benefit Life Insurance are examples of companies which improved only certain processes and did this based on careful analysis and comparison with other competitors in the field.[19]

Ultimately, all reengineering efforts are limited by the technology available at the time they are implemented. Few of those projects are imbued with the flexibility to move easily to new technological or cultural platforms.

For Asian firms, the majority of which fall within the range of small to medium-sized companies, all of the above issues should suggest the need for alternative ways to promote growth and competitive strength. The above issues should point up a critical need for tactical alternatives which provide the needed flexibility to cope with competitors already in the field, to deal with the rapidly changing international playing field, and to respond to the abrupt changes which are constantly rocking the technological world of today.

Yet, even though it seems clear that reengineering is only one of a series of options which business managers and their staffs could resort to in an attempt to grow stronger, more competitive businesses, little effort seems to have been made in recent years to consider these other options. Yet there are businesses in the real world which do see the value and need for a more economically and culturally viable path for development, a path of evolutionary redesign; the middle path.

[16]KOTTER, J P AND SCHLESINGER, L A (1979) 'Choosing strategies for change' *Harvard Business Review* March–April, 106–114

[17]MARKUS, M L AND KEIL, M (1994) 'If we build it, they will come: designing information systems that people want to use' *Sloan Management Review* Summer, 11–25

[18]*Op cit*, Ref 11

[19]HAMMER, M (1990) 'Reengineering work: don't automate, obliterate' *Harvard Business Review* July–August, 104–112

Advance scouts: creating partnerships for strategic advantage

A great deal has already been said about forming strategic partnerships (or SIS alliances) with customers and/or suppliers. In addition, issues of

outsourcing have brought ideas of partnerships in technology management[20] to the fore. However, there still appears to have been no mention of another type of technological partnership which many companies have begun practicing. Both in Asia and abroad this strategy can be used to enhance flexibility.

As competition has heated up within the computer industry many computer software and hardware companies have begun to see the value of partnering with their clients. In the recent case of Microsoft this has resulted in a massive Beta program for Windows 95 which gave participants early, low-priced access to the software, and a certain amount of 'insider' information in exchange for assistance in testing out the viability of the product. Other companies, like Apple have opened up a wide variety of networked resources to enhance communications between themselves and customers. These enhanced lines of communication are aimed at improving everything from bug response time to future product design.

While viewed from the technology providers point-of-view, these programs may appear to be strategic partnerships that can help raise switching costs, many companies are now looking at it a different way. These companies are now realizing that they can leverage their cooperation with these companies to gain valuable levels of insider data which can help them in planning their future development path. Many have discovered that economies of scale do not just result in added value in the accounting department; they are discovering that by committing themselves to a specific technology providers solution they can demand (and receive) some control over the directions which that companies development may take.

As the need for flexibility grows in all business sectors it seems very likely that such 'strange bedfellow' partnerships will become far more common. These 'advance scouts' relationships will allow companies to gain a strategic level of intelligence in fields where they cannot commit large amounts of resources but still require deep insight in order to function effectively.

The firm

Many small, middle-sized, and even large firms which operate as multinationals do not have the budgets to enact widespread changes to their IT structure over a short period of time. Neither do they see any economic advantage to follow the current trend of wildcat 'business reengineering'. They have infrastructures which are still highly effective and their operations, after careful analysis, will show only limited improvement after the addition of the improved IT infrastructure reengineering might provide.

It is for those individuals who are destined to work for or with such organizations that this paper is written. We now consider a case study of the XYZ Corporation. The XYZ Corporation is a composite of over 30 different organizations studied between January 1990 and September 1995. Approximately one-third of these companies were large corporations, with the other two-thirds equally divided between medium-sized firms and small-sized firms. These companies were intentionally selected for their placement in a wide number of different industries, including high technology, financial services, telecommunications, retailing, food manufacturing, and import-export. We drew examples of both successes and failures in reengineering efforts in hopes that we could identify the

[20] LACITY, M C, WILLCOCKS, L P AND FEENY, D F (1995) 'IT outsourcing: maximize flexibility and control' *Harvard Business Review* May–June, 84–93; WILLCOCKS, L, FITZGERALD, G AND FEENY, D (1995) 'Outsourcing IT: the strategic implications' *Long Range Planning* **29** (5) 59–70

practices that differentiated the former from the latter. This composite is result of hundreds of interviews with business executives, staff members, consultants, and IT professionals. In addition to interviews, documents were used. These documents included system analysis documents, reports on operating conditions and performance before and after reengineering efforts, and internal memos on design principles.

The company structure

The XYZ Corporation is a multinational corporation with many years in the service industry. As of early 1995, it had offices located in over 50 countries and employed a staff of less than 50 000 people. The size of these offices is quite varied. Some offices operate with only a handful of employees while others employ over a thousand people.

Because financial rules and regulations tend to vary a great deal from country to country, the individual operations of the XYZ Corporation often must act in a fairly autonomous fashion. In fact, these operations are run using a type of cost-center model which leaves them responsible for justifying any corporate expenditures to the corporation headquarters. This means that there is a significant difference in the level of technology investment among these corporate member firms.

For many of the smaller firms, technology investments are more difficult to justify, since fee revenue and labor costs are relatively low compared with the cost of technology. As a result, the rationale for selecting hardware and software products often varied among the various member firms. Local technological and economic restrictions have further complicated this picture, often forcing member firms to severely limit the range of technologies at their disposal.

The bulk of the information technology purchased by these member firms was traditionally used to facilitate the accumulation and assembly of information into work papers and reports. The primary users of these technologies were usually the secretarial, rather than the professional, staff. It is only recently that the firm has begun to consider other applications which might enable it to better serve its clients and employees.

The company functions

A great deal of the work performed by the professional staff of the XYZ Corporation is performed at client locations. This means that member firms are required to support a highly mobile work force. It is a company goal to increase its contact with its clients at their own premises in the future. The company believes that this will increase its knowledge of the client and the client's operations and will enhance the variety of possible service offerings which XYZ Corporation could provide in the future.

Operations within member firms tended to be broken up into highly flexible, mobile project teams. These groups were often changing in order to provide the best expertise needed to meet client demands. The members of these teams were expected to be well educated, highly motivated, and capable of accumulating, manipulating, interpreting, and communicating large amounts of highly specialized data.

Staff could be divided into junior and senior staff levels. Junior staff members were expected to be responsible for research, assembly, and generation of first level information and documentation. Meanwhile,

senior staff were generally responsible for taking on review or advisory roles. Hence, the tasks for these staff members often entailed information retrieval, analysis, and communication.

Within all levels of the firm, there was an extensive and constant level of communication, collaboration, and sharing of knowledge and information. This information covered a wide range of topics including such things as legal data, information regarding business practices, and experiential data. All of these was perceived to be more effectively shared by the implementation of a more advanced IT infrastructure.

At the time that the company began to review its operations and the potential for an improved information technology infrastructure, it was further believed that such an infrastructure might help to add value to their basic services. Furthermore, it was hoped that by implementing a clear international strategy for IT development the company could cut some of the overhead costs of technology acquisition.

The competitive environment

Before beginning its in-depth analysis of its own IT operations, the XYZ Corporation commissioned a competitive analysis study. The results of this study indicated that none of its competitors had yet managed to achieve IT coordination on a truly worldwide basis. The study further indicated that there would be a significant competitive advantage to the firms which achieved such a level of IT coordination.

In the case of the XYZ Corporation, and its competitors, the study indicated that such a coordination effort should be targeted at:

- minimizing the redundant costs between firms;
- minimizing country support costs;
- enabling joint development efforts and joint implementation efforts;
- improving the payback from any technology development efforts;
- maximizing global purchasing power.

It was believed that over the long term this strategy would also permit member firms to share a higher caliber of information amongst themselves.

Furthermore, it was concluded that by coordinating the establishment of more consistent IT hardware and software platforms the member firms could:

- improve communication between member firms;
- facilitate the movement of staff between firms;
- improve and increase the involvement of multi-national teams on specific cases;
- allow teams to make more immediate use of local technology resources;
- maximize the Corporation's opportunities for sharing its collective expertise;
- ensure a more coherent, one-firm image in the market place.

The current technological structure

At the beginning of 1995, an internal survey which covered approximately 90 per cent of the company's staff , was conducted to determine the corporate technology base. The survey estimated that approximately 30 000 microcomputers were in use giving the company an approximate 2:3 ratio between computers and staff.

Of the microcomputers in use, approximately 20 000 Apple Macintoshes were used. Twenty-five per cent of these Macintoshes CPUs were 68000 based, 50 per cent were 68030 based, 5 per cent were 68040 based, and the remaining 20 per cent were PowerBooks. (At the time of the survey few PowerPCs were in use, but that was expected to change within the company over the next few quarters.)

Intel CPU-based IBM-clone systems comprised only about a third of the company's computer base (approximately 10 000 systems). Of these systems 25 per cent were i286 based, 40 per cent were i386 based, and 35 per cent were i486 based. (At the time of this survey few i586 systems were in use, but that was expected to change within the company over the next few quarters.)

The survey indicated that approximately 70 per cent of the corporation's operating systems resided on Macintosh machines while only 30 per cent resided on IBM or IBM-clone systems. Of these IBM-style systems 85 per cent supported Windows while only 15 per cent were still limited to the support of DOS. However, many of these Windows-based systems still supported applications which were DOS-based. (It should be noted that i286 and earlier i386 do not support Windows.)

As was mentioned earlier, the most common applications programs were used for compiling documentation. Almost 100 per cent of the firms reported that they were using word processing applications. The most common of these were Microsoft Word. However, use of more elaborate Desk Top Publishing (DTP) software only resided on 4–5 per cent of the available machines. Presentation and Graphics software packages (particularly Microsoft PowerPoint) were used on only 15 per cent of the available systems.

Spreadsheet applications were also in use in approximately 100 per cent of the company's member firms. The most commonly used of these packages was Microsoft Excel. However only 15 per cent of the available machines supported personal databases and only 10 per cent were used to support work group databases (furthermore, it seemed possible from the survey results that the figures may have been blurred by 'double counting' between the two types of database systems).

The most surprising results of the survey showed that approximately 75 per cent of the available machines were already supporting some type of electronic mail system (email). Moreover, it was found that in almost all of those member firms where intra-office electronic mail was available there was virtually 100 per cent coverage.

At the time of the survey, XYZ Corporation had already put a number of years effort into the development of an X.25-based, international email system. It was believed that this system's development would provide further impetus to the penetration of email in member firms.

Beyond email, the survey showed that many of the corporation's larger member firms were in the process of linking their already existing local area networks (LANs) and nationwide (or region-wide) wide area networks (WANs) into a company-wide network. These larger firms had primarily implemented EtherNet networks. The majority of smaller member firms appeared to be in the process of implementing LAN facilities or trying to connect those LANs into national level WANs. It appeared that these smaller firms were primarily relying on AppleTalk-based networks. The survey estimated that at least 75 per cent of the corporation's personal computers had already been networked.

Table 1 *General software environment in larger versus smaller firms*

Software category	Larger firm	Smaller firm
Operating system	Mac: Apple System 7.1 PC: MS-Windows 3.1	Mac: Apple System 7.01 PC: MS-Windows 3.1
Word processing	Mac: MS-Word 5.1 PC: Word for Windows 6.0	Mac: MS-Word 4 PC: Word for Windows 2.0
Spreadsheet	Mac: MS-Excel 4 PC: Excel for Windows 5.0	Mac: MS-Excel 3 PC: Excel for Windows 3.0
Presentation	Mac: MS-PowerPoint 3 PC: PPT for Windows 3.0	Mac: MS-PowerPoint 2 PC: various products
Electronic mail	Mac: MS-Mail 3.0 or 3.1 PC: cc:Mail 2.01	N/A
Personal database	Mac: FileMaker Pro 2.1 PC: FileMaker Pro for Windows 2.1	Mac: FileMaker Pro 2.1 PC: FileMaker Pro for Windows 2.1
Corporate database	Both: ODBC Compliant DB's	Both: Oracle Release 7

Finally, a number of these larger firms had begun producing a number of specialized software applications which could be used to enhance their services. Some of these applications were for internal use while others were given to customers in order to facilitate information gathering functions.

As can be readily seen from these figures, the XYZ Corporation was quite unlike many of the more commonly discussed SIS models within the current literature. Its technology base was almost wholly established on low-end minicomputers. At the time that it began to consider further work on its IT infrastructure, the XYZ Corporation found many other organizations were having to downsize the mainframe IT infrastructures they had developed during the 70s and 80s. Meanwhile, the XYZ Corporation was having to upsize its minicomputer-based operations.

The company's limitations

The internal survey also showed the company's MIS managers another important company trend. They found that the 10 per cent of the corporation's top member firms were already approximately two years ahead of the rest of the corporation's other member firms in technology usage. These member firms represented approximately 80 per cent of the corporations global fee revenues and about 70 per cent of the corporations staff.

It was further concluded that many of the smaller member firms were making a concerted effort to catch up to these larger firms. The researchers believed that the more aggressive use of technology in these smaller firms might provide strategic advantages to those smaller firms. The researchers also thought that the use of technology might be helping to leverage existing staff in order to compensate somewhat for the high turnover and difficulty in recruiting qualified staff into these smaller firms.

An overview of the general software environment in the larger versus smaller firms is given in *Table 1*.

Having identified these basic system limitations, the researchers went on to identify major impediments to the achievement of increased IT infrastructure development. These impediments were:

- a lack of acceptance of corporate IT standards by member firms using technology;

- a lack of critical mass in individual countries for the support of IT initiatives;
- a general uncertainty of the technology industry and its future trends;
- a lack of understanding within individual functional and support areas as to how to utilize existing and emerging IT to meet business objectives;
- a lack of understanding amongst IT providers as to the business objectives of the functional and support areas;
- a reluctance to share details of knowledge and experience between and within member firms;
- legal and ethical restrictions to the sharing of knowledge due to issues like client confidentiality;
- difficulty in collecting, maintaining, and providing access to the knowledge and information;
- a lack of commitment from individual member firms to devote agreed resources at agreed levels to meet corporate timetables;
- difficulty in providing cost-benefit analysis for initiatives (both basic and ongoing support costs);
- a reluctance of member firms to comply with software copyright regulations and the making of unauthorized copies of software programs.

It was with these issues in mind that the XYZ Corporation's MIS management began to develop its new corporate-wide IT strategy.

The challenge

In line with XYZ Corporation's corporate vision, the MIS managers responsible for modifying the Corporation's IT infrastructure dedicated themselves to the following mission:

> . . . to assist XYZ Corporation in achieving its strategic vision by providing a coherent global technology framework which enables member firms to add value to their services by accessing the world-wide resources of XYZ Corporation. Giving added benefits to individual clients and improving the productivity of their people.

While such wide-reaching goals were commendable, it still remained for the coordinating Information Technology Committee to resolve a number of critical problems. The three most important of these problems were:

(1) What types of changes should be made to the existing IT infrastructure?
(2) How could those changes be implemented in the most effective, and acceptable fashion?
(3) How could the Committee insure 'buy-in' by the responsible parties in member firms?

Determining where changes should be made

Technology focus. While the responsible parties agreed that there were many changes to the existing IT infrastructure which could improve the Corporation's operations they quickly decided that many of them fell outside of the limits which they had set themselves in the mission statement quoted above. They therefore tried to limit the scope of their changes to those items which most directly improved their company's

operations, at local, national, and international level, in accordance with the already accepted practices of the business. In other words, they looked for ways to do what they were already doing better.

By reviewing their operations in this fashion they targeted four issues which they felt most critical. These issues were:

(1) The majority of their technological inventory was not portable. It was therefore not adequately suited to the needs of a mobile workforce.
(2) Even though networks were being implemented in member firms, the equipment being used in the field did not give staff access to those networks. So information could be used at client sites.
(3) The professional/senior staff were not the targeted users of the company's desktop technology. While staff could use technology to accumulate and collate information into work papers and reports, the current technology base was not conducive to the way in which senior staff carried out their roles as communicators, reviewers, and high level researcher/analyzers of information.
(4) The enterprise-wide technology infrastructure was unable to support the rapidly growing level of communication, collaboration, and information sharing that the company required in order to remain competitive.

Based on these issues, the MIS management was able to decide two things. First, they needed to work to make the corporation's staff more mobile. Second, they needed to provide greater access to electronic communications.

Business focus. Having determined the company's technological focus, the Committee members then realized that the technology strategy should evolve so that it could respond to business requirements. There seemed no purpose for seeking to impose a technology requirement that would be difficult to meet, solely for the purpose of providing a business facility for which there would be little demand. Therefore, it seemed proper to develop reasonable business guidelines for the acceptance of any changes to the technological infrastructure. These guidelines broke into two basic sets, changes which add value and changes which reduce costs.

There were several specific ways in which value could be added:

(1) By using applications throughout the corporation which had been developed or enhanced by a member firm or a corporate development group.
(2) By increasing the ability of staff to work together. This would enhance service to clients.
(3) By enabling personnel to 'plug into' a familiar technology environment in any member firm anywhere in the world

Costs, on the other hand, could be reduced in several ways:

(1) By combining national buying requirements better prices could be obtained from vendors.
(2) By uniting to purchase products, the corporation could also form closer relationships with technology suppliers. These relationships could yield 'insider information' which could help cut future costs.
(3) By coordinating purchases, the corporation could cut down on the costs of duplicated effort in researching new products.

Fine Tuning. Based on the technological and business focuses, the Committee was then able to make some clearer targets for IT infrastructure development. These targets all met the need to enhance the staff's technical ability to 'work together' while also showing some clear business advantages as well.

(1) Improved ability to exchange electronic mail worldwide.
(2) The ability to exchange files, worldwide, which could be read and printed but not modified.
(3) The ability to exchange files, worldwide, which could be modified by the recipient.
(4) To allow staff to work interactively, on an international basis, as if they were all working locally. (This entailed the implementation of things like document management procedures.)
(5) The ability to coordinate and allow groups to work together, via a 'groupware' product like Lotus Notes or FirstClass.

To implement these changes the Committee realized that there existed two areas for international cooperation. One of these areas was the company's technology toolbase, the other area was the company's networking infrastructure.

The framework. Having a clearer idea of the direction for change, the corporation's MIS Managers were then able to develop a framework for selecting those applications, protocols and products which would need to be shared in the company toolbase. By developing a simple framework, they could then test the extent to which specific standards needed to be selected. This framework was as follows:

(I) *Selecting products*

Will the information need to be shared:
- Currently?
- In the foreseeable future?
- Ever?

Will there be a demonstrated payback in:
- Reduced complexity?
- Economies of scale?
- Reduced country support costs?

Will service delivery capability be enhanced?

(II) *Selecting vendors*

What is their current installed base in regards to:
- Product sales and revenue amounts?
- Market share?

What is does the product cost? For example:
- Base costs?
- Possibilities for cost-effective licensing arrangements?
- Training/conversion costs?

What will be the anticipated vendor's future direction and migration path?

What will the cost of conversion be for various countries? Consider issues like:
- Time over which a conversion will take place.
- Need for hardware and/or software replacement.
- Retraining of users and restructuring of support.

Table 2 *Predicted trends in networking infrastructure development*

1984–1988	1989–1992	1993–1995	1996–1999
Stand-alone use	Local area networks	Wide area networks	Global area network
Stand-alone use	E-mail	Bulletin boards	Full collaboration
Stand-alone use	City mail	National/global mail	Global messaging
Stand-alone databases	Local databases	National databases	Global databases
Centralized processing	Distributed servers	Networked servers	Intelligent global server

How practical will the solution be for our corporate practices? Consider issues like:
- Vendor support.
- Variations in cost infrastructures between countries.

(III) *Vendor and protocol risk factors*

What is their current share of the market? Consider issues like:
- Current market acceptance.
- Growing or declining in the marketplace.

How financially stable are they? Consider issues like:
- Past performance.
- Current status.
- Longer term viability.

How 'open' are their products? Consider product integration issues like:
- Integration with the company's own products.
- Integration with other company's products.
- How complex is it to integrate the products?

What is the current rate of change in the marketplace?
- Is it a stable or an emerging area?
- What is the timing for standards selection?

With this framework to provide a guideline for selecting technological tools for the company, the MIS Management was then able to move onto required modifications in the corporation's networking infrastructure.

In analyzing networking infrastructure development of both the XYZ Corporation and its competitors, the Committee concluded that there was a consistent trend from localized networking towards international networking. The nature of these trends (as predicted by the committee) is represented in *Table 2*.

The result of this potential trend indicated that greater planning and coordination would be required at national and international levels if the XYZ Corporation was to remain competitive. In order to implement broadly based, interconnected and integrated systems many different parties would need to agree on international standards and protocols to permit the exchange of information.

It then became clear that the next step in the development of the XYZ Corporation's new IT infrastructure would be determining the ground rules for working at all corporate levels to negotiate change.

Determining the approach

As mentioned earlier, since each member firm acted as a fairly autonomous 'cost-center' within the corporation, it was immediately

clear that mandating the use of specific hardware or software at every site would be difficult. However, regardless of whether such 'orders from the top' were even possible, it seemed highly unlikely that a restrictive set of rules would make sense for such a wide variety of different work environments. Besides the basic issues regarding office size or on-site technical 'know-how', many member firms would have found it difficult to adhere to specific technology requirements if they violated local laws or were not cost effective.

The Committee therefore decided to divide their IT strategy into two components. The first of these was the broader technology architecture, infrastructure and standards which would support the use of applications and tools. The responsibility for this component would reside with the International Committee of MIS Managers which would act solely in an advisory capacity. The second component was the set of specific applications, tools and systems which would be used by individuals in the performance of their work. The responsibility for managing this component would be handled by the management of the international functional divisions of the corporation (eg accounting, auditing, etc). These divisions could sponsor development of specific items and/or provide support for the technology for which they had been assigned responsibility. The international committee advised that the stress of this component should be on 'enabling' technologies.

Avoiding 'unacceptable' rules

One of the overwhelming factors influencing the decisions of the International Committee was the existence of a substantial investment in the Corporation's already extant technology base. The momentum that this factor created could not be ignored by those recommending global standards. Because the costs and disruptions that sudden, large-scale changes would create, the Committee feared (with good reason) that rules judged 'too aggressive' would be ignored by many of the member firms. Any solution, they concluded, would have to be scaleable to the needs of both the largest corporate offices as well as the smallest field groups.

It therefore seemed wisest for the Committee to develop a set of Standards, Guidelines, and Endorsed Products based upon the 'lowest common denominator' of software and/or hardware versions in use (ie MS-Word 5.0 would be the standard for word processing on the Macintosh rather than MS-Word 5.1).

The implementation of standards was intended to facilitate member firms in the exchanging of information. It seemed clear that common standards were needed in order to effectively exchange electronic mail, as well as to share documents using various file formats.

Guidelines were targeted at minimizing the variety of products used by member firms. This was done because a risk existed that the standards upon which these products were based might become critical over time. A good example of this threat was the area of video conferencing. While it was clear that a number of member firms were already experimenting with the technology, most still were not. In order to guarantee future compatibility between all member firms, guidelines outlining purchasing practices seemed warranted.

Finally, in cases where certain hardware or software products were not considered critical to the Corporation's international strategy, it still made sense to take advantage of the knowledge of the Corporation's

general store of knowledge. If one or more member firms verified that a product was useful to their operations, then that product could be endorsed for use by other member firms. This endorsement procedure also produced a more effective process for using global purchasing leverage to gain more favorable pricing and/or insider information from vendors. These endorsements could cover a wide variety of products ranging from screen saving software to UPS hardware.

The Committee determined that the Corporation's technology would ultimately be 'owned' and delivered by the member firms that constituted the Corporation internationally. But it retained the right to monitor the levels of adherence to the IT Standards and to report to the Corporation's executive committee those member firms which failed to abide by those standards to the detriment of the global (or regional) operations. Therefore, the responsibility for enforcing the member firms' commitment to the new IT strategy ultimately lay with the Corporation's top management.

Grains of salt. In attempting to apply their system of Standards, Guidelines, and Product Recommendations, the Committee found it necessary to place an additional onus upon those IT professionals determining acceptable products for corporate use. These 'grains of salt' to be considered before selecting specific solutions covered a number of critical factors which continue to effect development within the computer industry.

(1) Comparing *Best of Breed* solutions with *Integrated* solutions. Decision makers were cautioned to carefully weigh the pros and cons of selecting *Best of Breed* solutions over *Integrated* solutions. *Best of Breed* products were certainly the best solution for a particular task (as the name implies). They would give the XYZ Corporation a modular approach with the flexibility to switch individual system parts, and dependence on any one vendor. It also had the shortcomings of requiring resources to integrate the varied applications, a greater system complexity (with its inherent time and resource costs), and a greater overall system cost due to the lower guaranteed volumes for individual components.

On the other hand, *Integrated* solutions would cut resources costs for integration and the overhead of system complexity, as well as lowering the overall system price because high purchase volumes would allow better prices to be negotiated. But such solutions might often fail to provide the best solution to a particular task(s). They also increased dependence on a specific vendor and might therefore limit the replacability of any, single component in the system.

(2) Selecting between *Protocols* and *Products*. While it was generally agreed upon that protocols and industry standards ought to guarantee that products could be chosen from a variety of vendors; it was clear to the Committee that there were business realities which must not be forgotten. What *should* be true and what *was* true were often not the same thing. While many companies offered products that claimed compliance to protocols like X.25, or ODBC, many of these products did not strictly adhere to these standards. There always exist the danger that like the case of the UNIX operating system, well-meaning vendors might find it necessary to make slight modifications to their products which would defeat the original intent of the standards.

It was also considered wise to remember that volume purchasing power came from agreeing upon a specific vendor, rather than a specific protocol.

(3) Selecting between *long shots* and *hot shots*. Finally, in order to provide scalability, backwards-compatibility, high functionality, and minimal risk, it appeared wise to the Committee to recommend that product selections be limited to a 'short-list' of technology providers. These providers should be able to demonstrate a history of success within the industry. It was believed that by selecting existing, stable, providers to provide solutions in emerging areas, the Corporation could minimize the complexity of the environment (hence minimizing conflicts and incompatibilities) while reducing the risk of getting stuck with unsupported products. It was also hoped that these companies, due to their economic stability, would be able to provide a strong upgrade path while simultaneously maintaining the backwards compatibility required by the smaller member firms which would upgrade their systems more slowly. By choosing a limited number of such industry *hot shots*, the Committee also hoped to gain long term savings by negotiating high-volume, long-term contracts which would give them not only cost benefits, but also the market benefits which might come from the 'insider information' which these industry leaders might share with their larger trading partners.

Special strategies

In addition to these basic IT Standards, Guidelines, and Product Recommendations, the Committee made a number of additional recommendations for accelerating the development of the company's IT infrastructure.

Joint work groups. The first of these recommendations was for the establishment of joint working groups which would be responsible for researching current and emerging technologies which might be of value to the Corporation. These joint working groups could then use this knowledge to support the development teams within the various corporate divisions.

Based on the corporate technology needs (outlined earlier), the Committee recommended the establishment of the following joint working groups:

- *Telecommunications standards*. This group would research topics like the implementation of wide area networks, uses of electronic messaging, video conferencing, etc.
- *Document management*. This group would research management of databases for internationally accessible information (proprietary and public), and knowledge management tools (including: BBSs, electronic news feeds, free format search tools, and workflow management software).
- *Software advisory*. This group would be responsible for researching new software trends and standards, as well as providing recommendations for specific products.
- *Security*. This group would be responsible for researching trends in system security. It would also be responsible for recommending products.

File sharing. While the International Committee had determined that the prime responsibility for enhancing or developing function specific applications should be with the relevant functional divisions of the Corporation (eg accounting, audit, etc), it still felt that it should retain the responsibility for enhancing or developing generic applications that could be of benefit to all functional divisions. They reserved the right to subcontract such to a specific member firm, but they felt that the responsibility for such development efforts should remain with the international committee.

CD-ROMs. Having completed the general survey of the corporation's technology base, the Committee realized that it already had a number of standards, guidelines, and product recommendations which it could begin offering to member firms. As a test it produced a number of CD-ROMs with these items and sent them to a number of member firms. The test was a great success.

As a result of this, the committee recommended that a similar CD-ROM disk be sent to all member firms on a semi-annual basis. These disks would contain not only the lists of standards, guidelines, and products, but they would also include copies of software products obtained from vendors (with contracts outlining and limiting use included) as well as other information pertinent to corporate activities.

Scheduling for change. Finally, the Committee recognized that technology both inside and outside the company would change rapidly. They therefore recommended an annual corporate review of the proposed IT strategy. In addition, they recommended that a new inventory of the corporation's technology hardware and software base be taken on a yearly basis.

The solutions

Ultimately, the solutions proposed by the International Committee could be broken up into three levels: Strategic, Tactical, and Operational.

The strategic recommendations were to utilize technology to improve the Corporation's competitive position by reducing the time required to complete tasks for clients. This was to be done while maintaining a high level of quality. To achieve these goals improvements needed to be made in the quality of communications and services that the member firms could make available. By giving member firms (and their staffs) access to the Corporation's worldwide resources clients could potentially benefit from a wide range of value added services.

Tactical recommendations included the forming of research and working groups to:

(1) Review the corporate IT standards.
(2) Work with the member firms and corporate divisions to research telecommunications tools, databases, knowledge management tools, software tools, security and specialized management systems.
(3) Develop IT standards and implementation plans to provide a framework for cost-benefit analysis for technology projects, and resolve legal or ethical restrictions.
(4) Enforce IT standards by reporting non-compliant member firms to the corporation's Executive Committee.

Meanwhile, operational recommendations were broken into two phases. The first phase of operational recommendations called for the international committee and member firm MIS departments to:

(1) Agree upon standard definitions for common data elements, applications, and operating environments (both desktop and networks).
(2) Establish strong links between technology plans and business requirements:
    (a) establish joint working groups to research new technologies;
    (b) develop appropriate business cases for use of new technologies;
    (c) conduct small pilot projects to prove concepts;
    (d) prioritize programs for implementation;
    (e) develop realistic implementation plans.
(3) Review the current IT support infrastructure at local, national, and global levels in order to determine how to establish effective information bases like CD-ROMs, BBSs, knowledge management tools, and databases.
(4) Determine the work required to establish better technical support for the new IT strategy. This would include:
    (a) special technology or support training programs;
    (b) determining requirements for administrative personnel;
    (c) designing more effective office configurations.

The second phase of operational recommendations set expectations for the whole IT strategy:

(1) Achieve 80 per cent acceptance and implementation of standard definitions for common data elements, applications, and operating environments (both desktop and networks).
(2) Shift 100 per cent of technology ownership to the Corporation's divisional units and begin executing implementation plans under the guidance of those units.
(3) Completely establish the appropriate technology support infrastructure including:
    (a) a complete set of implementation targets for successfully completing technology programs;
    (b) determining the roles and responsibilities for the support of technology programs by member firms;
    (c) setting in motion the mechanisms necessary for measuring and rewarding exemplary performance by member firms (or corporate divisions) in meeting IT strategy goals.
(4) Implement revised training programs, organizational structures, and office configurations.
(5) Completely integrate technology with business processes.

Standards, guidelines, and endorsements

Based on the above criteria the Committee determined at the end of 1995 to create an initial technology matrix. The matrix was to cover the following areas:

Standards:
  Desktop operating systems
  Messaging and email systems
  Search engines

Database interchange facilities
Desktop applications
'Groupware' consisting of:
(1) workflow management tools
(2) document management tools
(3) knowledge management tools

Guidelines:
Databases (high end—eg Oracle Release 7)
Networking and communications protocols
Server and network operating systems
Workstation platforms

Endorsed Products:
Databases (low end—eg FileMaker Pro)

Beginning with this matrix the Committee then made a certain number of determinations regarding these various items.

- *Desktop operating systems*
  Because of the substantial functionality unique to both the current Macintosh and Windows platforms as well as the substantial investment that member firms had already made in both platforms, it was agreed that both platforms would continue to be supported . . . at least for a time. However, the Committee also believed that there were far too many factors which threatened Apple's future position within the desktop marketplace. It was therefore recommended that all decisions regarding new hardware and software be made with an eye towards eventually migrating all corporate functions to Microsoft Windows. This was to initially be done by guaranteeing that all new software and hardware was functionally compatible with both systems in a true, dual-system environment.
- *Messaging and email*
  The Committee decided that due to the disparity of systems used within the various member firms an X.25 backbone system/standard would be used for the transportation of all global email. Member firms were free to choose their own email systems provided that they could successfully work with the backbone system. However, the Committee also provided a short-list of 'guideline' products to which they hoped member firms would migrate. It was also hinted that the company might begin moving all operations to Microsoft's Enterprise Messaging Server 'Exchange' at some time in the near future. Provided that Microsoft's NT Server development continued to remain on-track.
- *Search engines*
  Although the Committee found that a number of products were already in use at member firms (eg PLS, FolioViews, and AppleSearch), no clear standard had yet emerged. Although a number of search engine tools are scheduled to be integrated into new versions of a number of operating systems, it was recommended that a standard be further considered before any official guidelines were offered.
- *Database connectivity standards*
  While the Committee admitted that little data was currently being shared between member firms, they believed it highly likely that information would be shared more often in the future. With the exception of one or two member firms using Sybase, the majority of the member firms were using Oracle systems. All seemed to be

moving towards large-scale relational databases using SQL. It was therefore recommended that whichever vendor was chosen, the system should be ODBC compliant.

The Committee then provided names for a number of systems which met their basic requirements. For high and mid-level systems they endorsed Oracle Release 7 and the Oracle Work Group Server. While at the low-end they endorsed Claris's FileMaker Pro.

- *Standard application tools*
  It was clear that a number of tools from Microsoft (including: Word, Excel, PowerPoint and Mail) had already established themselves as standards within the member firms. Therefore, it was only necessary to determine which versions of these products should be the baseline standard for file exchanges. Furthermore, other Microsoft products (eg Schedule Plus and Project) were endorsed by the Committee because of Microsoft's plans to integrate such tools with their other products.

The Committee decided that although many other software applications were in use none of these applications were critical to the sharing of information between member firms. Therefore, no guidelines for the choosing or use of these products were given.

- *Groupware*
  Although there has been some experimentation with the various products currently available for managing workflow, Documents, and Knowledge (eg Lotus Notes, First Class, Replica, Common Ground, and Acrobat) none of these products has managed to establish a clear standard. Nor is it clear which of these will be integrated with all of the necessary operating systems and systems applications. Therefore, the Committee decided to defer a final decision until further research could be performed.
- *Networking and communications protocols*
  As mentioned earlier, a separate task force was formed to investigate possible standards for this area. At the time of this writing those decisions had not yet been made public.
- *Server and network operating systems*
  Although it was still not clear whether such standards were really required, the committee felt that the potential benefits which the corporation gained by aligning its standards for connectivity and functionality warranted at least a set of guidelines by which the member firms might be able to synchronize their international directories in the future. While both Novell Netware and Microsoft NT were listed in the guidelines, it appeared that Microsoft NT was favored due to the Committee's intent to move the company towards the use of Microsoft Exchange in the future.

Conclusion

While it is impossible to guarantee the success or failure of any one tactic in the field of business, it is our belief that the strategic ideas and methodologies outlined above constitute a unique methodology for achieving success. Unlike the now common tactic of reengineering it uses evolutionary development to meet the current and future challenges of a rapidly changing market.

This middle path of evolutionary development calls for an organization to only use tactics of reengineering in certain (often extreme) cases. It requires that a company first assess its current technological and informational communications strengths. It then requires that a company exert efforts to insure strong information exchange between all members of the organization *without the aid of high technology*. Next, this path calls for the organization to assess the technological fields which promise to enhance its current and hoped-for strengths. This quest for technological insight can be helped by special 'advanced scout' partnerships with members of the high-tech industry. Finally, the middle path calls for companies to aim for flexibility. This flexibility may mean that technological solutions should be avoided at times when the market is changing too rapidly. At other times this flexibility may mean undertaking reengineering-type programs, though they will seldom (if ever) be of the wide-ranging nature proposed by the theory's original proponents.

If we consider the original goals laid out by the committee of the XYZ Corporation to:

- improve communication between member firms;
- facilitate the movement of staff between firms;
- improve and increase the involvement of multi-national teams on specific cases;
- allow teams to make more immediate use of local technology resources;
- ensure a more coherent, one-firm image in the market place;
- maximize the Corporation's opportunities for sharing its collective expertise.

We can see that the needs of this mythical organization are quite similar to many growing businesses in the Asia-Pacific region. These businesses will not have the vast resources of many companies now using reengineering to gear-up for international trade, but it is our belief that by traveling the middle path of evolutionary development these companies will be able to use more economically safe and reliable methods to compete.