INFORMATION AS A COMPETITIVE WEAPON

BY

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Introduction

This paper will evaluate the trend behind Mission Critical Systems (M.C.S.) also known as Strategic Information Systems (S.I.S.). We will see what the forces are behind the S.I.S., including the formulation of corporate strategies. After reviewing some definitions and examples we will explore how to look for and capitalize on opportunities for S.I.S. This will then bring us to evaluate the impact that S.I.S. will have on corporations and in the industry at large.

Although these are four phases to developing S.I.S. (Business strategic plan, Information Systems strategic plan, detailed systems analysis and file structures design), this paper will only address the first two stages. These stages differ the most from regular development process.

Historical Perspective

In the early years of data processing by computers, the limits imposed by hardware (mostly batch oriented main frames) and the software (sequentiale file systems and single tasking operating systems) made it hard to automate anything but very basic functions. So the original areas of automation were the easy ones to automate. We did not spend much time on cost benefits or economic justification analysis. The basis for automation was driven by some characteristics:

- Need to process large number of homogenous transactions
- Regular processing at pre-determined schedules
- Routine processing of highly repetitive transactions that could be collected in batches

By the 1960's, higher level languages like COBOL made programming easier. In addition many companies, having been successful at automating some repetitive paper crunching tasks, started to automate the balance of their back office applications. This expansion into new application areas still dealt mostly with back office operations that were not mission critical. The risks of implementation were still quite low.

During the 1970's, the trend to automation continued, as the costs of hardware kept dropping, while the power of computers increased. Most back office functions were automated one-at-a-time with little or no integration among them. Two significant trends of the 1970's were the mini-computers and the packaged software solutions.

The early 1980's saw tremendous advances in the industry. The hardware environment has seen 32 bit mini-computers and powerful micro-computers dramatically increasing the price/performance relationship. The software component has seen fourth generation languages and user driven tools for the managers. Also, advances in telecommunications and networking are now opening up databases to users at remote locations.

A New Era: Mission Critical Systems

The rapid evolution of our industry has increased the limits of what can be done. In the past decade, the raw power of computers has increased 18 fold. Between 1958 and 1980, the time to execute one electronic operation has decreased by a factor of 80,000,000. It is now 8,000 times less expensive to process information by computer than it was by manual operation 30 years ago. Through the use of 4GL's, it is 50 to 100 times faster to build applications than it was in the early 1960's.

As a result, we are now poised at the edge of a second, and ultimately more important, wave of automation that holds the promise of changing the way that business is conducted. We are now entering the phase of mission critical (or strategic) automation that will see Information Services (I.S.) evolve from the operational and tactical to the strategic level of corporations.

A mission critical (or strategic information) system (S.I.S.) is a system which directly supports the creation and implementation of an organization's strategic plan. If successfully implemented, an S.I.S. can provide significant competitive advantages through increased product differentiation, improved customer and supplier relationships, altered industry structures and even brand new business opportunities.

The classic case of a S.I.S. is American Airline's Sabre reservation system. When the system was started management decided to use it as a competitive tool. It was decided that Sabre should provide all airlines' schedules to make it more attractive to travel agents, who represent the distribution network for airline seats. As a result of this strategic decision, Sabre became a tool for travel agents. American Airlines listed their own flights first and many travel agents never went further, resulting in increased market share for them. Today, Sabre is used by 48 percent of the automated travel agents in the U.S. and it generates net earnings of over $170 million for it's parent company.

Formulation of the Corporate Strategy

Before we take a look at the M.I.S. component of Strategic Information Systems, let's discuss how a corporation sets up a strategy. The ideas for the formulation of a strategy came from Michael E. Porter's, " How Competitive Forces Shape Strategy" in the Harvard Business Review of March-April 1979.

Once a coporation's strategic planning team has assessed the forces affecting competition in their industry, they can identify their own strengths and weaknesses.

The action plan is then devised. It can include:

1) Positioning the company in a way that its capabilities provide the best defense against competitive forces;

2) Influencing the balance of the forces through strategic moves in order to improve the company's position;

3) Anticipate shifts in the market place and respond to them with a competition strategy before the competitors take action.

The most forward thinking companies have already established the new function of Chief Information Officer who participates in the strategic planning process. Their role is to look for ways that the information technology can help meet the strategic plan. If there is no such person in an organization, it is the M.I.S. director's role to understand the corporate mission, it's business and the competitors. To help understand the business, the M.I.S. director might arrange to spend a few days on the road with one of the sales representatives, meeting customers and hearing them talk about their needs. Another way would be to spend a few days on the telephone, answering requests from customers and/or suppliers.

Next, the M.I.S. Managers need to understand how their senior executives think. It is important to understand the style as well as the vision of those executives. The M.I.S. Manager must then become creative in thinking about a way that Information Technology (I.T.) can serve. While dealing with the executives, it is important to remember that there are two distinct classes of executives: the administrator and the manager. An administrator believes that whatever is not specifically permitted is prohibited. A manager thinks that what is not forbidden must be permitted. It is usually the "manager" type that will drive new strategic applications.

How to look for S.I.S. Opportunities

We have seen that the new technology has opened up new opportunities for a company to re-deploy its assets and re-think its strategy. With a S.I.S., the stakes are so much higher than with regular back office applications that this must be a well-planned decision. When technology had limited function, you were not betting the company on it; with mission critical systems, you do.

In "Information Technology Changes the Way You Compete", Harvard Business Review May-June 1984, F. Warren McFarlane came up with a way to evaluate the ultimate impact of S.I.S. Companies must search answers to five questions.

1. Can we build barriers to entry with a S.I.S.?

   For example, a distributor built an on-line network allowing customers to enter orders directly in their computer. As a result, customers can get access to delivery dates and availability of stock, as well as suggested replacement items. This move was very successful and gained high acceptance by customers. It also built an entry barrier preventing other competitors to replicate the approach. Customers did not want computer equipment from several vendors on their premises.

2. Can switching costs be increased with a S.I.S.?

Can we encourage customers to rely increasingly on our electronic support? This is done by building the system into their operations to create increased operational dependency, making switching to a competitor more expensive. A kitchen cabinet manufacturer has built a system to help determine the materials needed to remodel or build a kitchen. Contractors can dial in, get a plan and quote for material that the cabinet maker sells. Switching to another supplier would be very difficult as this tool is saving time for contractors.

3. Can we change the basis of competition with a S.I.S.?

In a significant paper for Harvard Business Review of July-August 1985, M.E. Porter and V.E. Millar introduced the concept of the value chain to evaluate competitive moves. A company's value chain is a system of interdependent activities connected by linkages. To gain competitive advantage over competitors a company must perform those activities at a lower cost or in a way that leads to differenciation and a premium price (more value).

In the mid 1970's a major distributor of magazines concluded that they were in an industry segment dominated by cost driven competition. It changed the basis of competition by using I.S. to identify what was selling on the customer's newsstand and compared the profitability by square foot with data from other newsstands in similar socio-economic areas. It was able to improve the product mix of its customers, allowing the company to raise it's prices and shift the competitive nature of the segment from cost to product differentiation.

4. Can the S.I.S. change the balance of power in supplier relationships?

   A retailer has hooked his purchasing system to the order entry systems of his major suppliers. The result means that the retailer can monitor inventory levels of suppliers, alert them when they expect to place a large order and shop for best prices all around. In a cost competitive segment like retailing, a system that supports better, more reliable and cheaper buying activities is viewed as strategic.

5. Can the S.I.S. generate a new business?

   Could the computer systems' extra capacity or the company's corporate data be turned into a product?

   For example, Citibank, which offers financial data and services has teamed up with McGraw-Hill, which collected data on commodities. They created a joint venture called Global Electronic Markets Co. that allows traders to get information instantly, 24-hours per day, and to make deals and transfer money.

How to Capitalize on the Opportunities

Now that we have discovered S.I.S. opportunities, how do we start capitalizing on them?

1. Evaluate the information intensity of products

   A company's executives should start by evaluating the information content of their own products as well as the information intensity of the value chain. The degree to which information technology can be used to competitive advantage depends on actual and potential information intensity of the

business' products. As implied in Table 1, a high intensity in the value chain might include a large number of complex processes to build the product, a large number of customers or suppliers dealing directly with the company, products whose acquisition requires the customer to be extensively trained. The information intensity of the product would include products and/or services whose content is mostly information.

The most likely S.I.S. areas would be in the high product information and high intensity of the value chain.

2. Determine the role of I.T. in industry structure

The company's executives must understand how I.T. may structurally charge their industry and look for ways to lead the change. USA Today is an example of fundamental change to an industry's structure. This daily newspaper, with distributed printing facilities and with articles shipped by electronic transmission, changed the competition from a regional scope to a national one. They have also used technology to give a different look to the paper.

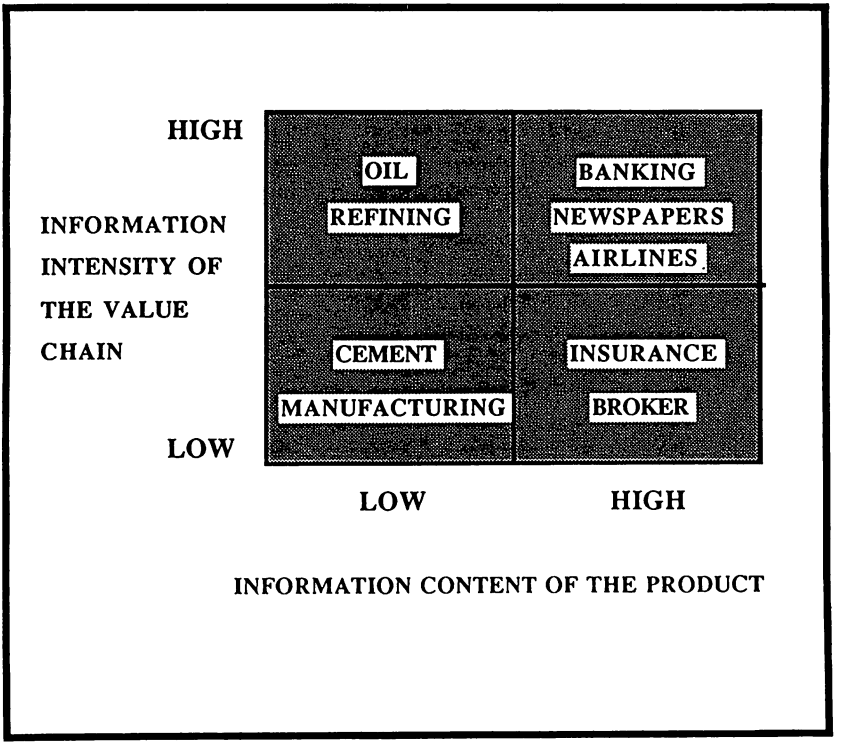
3. Find and rank potential competitive advantages for S.I.S.

Each product or service has both a physical and an information component. An Information Technology competitive advantage is created when the information component of the product is altered, resulting in an advantage over rival forces. The questions that executives must ask themselves is: what additional information could be bundled with the product? Will this result in a sustainable competitive advantage?

The activities of the value chain that represent a significant portion of the total cost or that could best be used for differenciation usually have the most potential for automation.

INFORMATION

INTENSITY MATRIX



4. Develop a S.I.S. plan

The action plan will have to include the investments required in hardware, software tools and development time. Any structural changes induced by the S.I.S. should also be documented and agreed upon. The impact on existing management processes and systems must also be evaluated, as some systems could become absolete with the implementation of the S.I.S.

Because of the complex nature of S.I.S., outside help may be needed to support the system. Finally, a realistic implementation plan must be drawn. The implementation schedule must include time for presentation to, and approval by, senior mangement as well as enough time to possibly change parts of the company's culture.

The S.I.S. plan should support the overall corporate strategic plan; it should not dominate it.

The Challenge of S.I.S.: What Needs to Change Inside Companies.

In order to effectively make use of the new advances in information technology, corporations and their information services will need to make several changes:

1. Information Services Officers

It is important for companies to create a new function of Chief Information Officer (C.I.O.) reporting directly to the C.O.O (Chief Operation Officer). The C.I.O. must become part of the strategic planning team to ensure that information services are sought, understood and planned for within the executive committee. The presence of the C.I.O. will also bring options that otherwise would not be even dreamt of.

This also means that the traditional role of the M.I.S. manager will evolve. He/she will have to grow into a business strategist and problem solver. Rather than controlling the technology, the C.I.O. will be coordinating architectures and standards and provide coaching to several information systems units for their development needs.

2. Companies will need to increase I.S. spending

As mission critical systems become a competitive necessity, corporations will have to increase their expenditures on I.S. by a factor of two to three times over the next 5-10 years. This will be caused by the enormous complexity of S.I.S. as well as by the fact that many companies will have to replace or significantly upgrade their current systems in order to integrate them with the new S.I.S.

Companies that resist this increase will find themselves fighting competitors at a rapidly increasing disadvantage. Even companies that take a technology lead will have to keep investing to remain ahead of a reacting competition.

3. Simple rules guiding I.S. expenditures must disappear

Comparing I.S. costs to other companies' performance via a percentage of sales or profits is very dangerous and short sighted. The market leader of tomorrow may be the greatest spender of today. Then again, the spender of today may be dead tomorrow. The I.S. expenditures should be measured against the total strategic potential and appropriately funded.

This also means that systems justification should no longer be based on a R.O.I. (return on investment) or cost savings alone. This justification process is typically cost driven and made by a financial officer. It generally excludes the positive impact of a S.I.S. on revenues.

4. Corporations must learn to protect the confidentiality of their S.I.S. plans

   Nobody would think of discussing a new manufacturing process with a competitor. Yet when it comes to data processing, papers are presented at industry meetings discussing the corporation's strategic implementation of systems. This co-operation has been with the industry since its inception. It existed because no strategic advantages were derived from data processing. Co-operation helped solve computer/technical problems. Now that strategic advantages can be obtained from technology, companies must become more careful and protective of their I.S. plans.

5. Creativity must enhance logic

   Problems should be tackled with a new wave of creativity to complete the logic that has driven I.S. New technologies can now be incorporated into very creative solutions that may change the way that business is conducted, who the competition is and even what makes the product. The boundaries around the problem solving have expanded considerably. This new dimension must be included in the creation process of problem solving.

Impact of S.I.S. on the Industry

The whole data processing industry will feel the impact of strategic information systems being developed by more companies. The first impact will be an increase in spending that will create good opportunities for well positioned suppliers.

We can also expect more standards to be enforced by the vendors of hardware, software, and telecommunications. These will be required by companies as they try to integrate solutions from several sources.

The software tools and languages vendors in particular will be forced to view logical transactions in network environments and provide solutions for that new concept. The best positionned software tools vendors are those that already support complete logical transactions across different file structures. The logical transactions will be needed to ensure data integrity, rollback and recovery across several systems.

Companies will demand application solutions that have built-in logic and data exchange facilities to integrate with other systems. The corporations will also require that any application package be easily customizable to satisfy their strategic needs. This will favor solutions written with fourth generation languages.

We can also expect new methodologies and approaches to be built for developing and implementing S.I.S. Most likely these methodologies will be developed for fourth generation languages.

A new consulting/system integration industry segment will emerge to tackle S.I.S needs. Their main suppliers will be the leading edge and multi-environments hardware vendors, the fourth generation languages and associated methodologies creators and the packaged software developers using 4GL technology and open design architectures.

Conclusion

We are now entering the next era of data processing. Some have rightly called it the information age. Information systems are emerging as the critical next battle groud of corporate wars. Information is moving from being a defensive weapon to an offensive one that carries a lot of might. It will leave behind a lot of market leaders and create many new and exciting opportunities. Is your company ready for it?