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There has been a dramatic increase in the use of strategic planning tools in the past decade. Since the quality of strategic planning will be greatly impacted by the quality of the information inputs, increasing attention should be paid to the systematic development of strategic intelligence systems. Examples are drawn from a field research project on these systems.

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# TOWARD STRATEGIC INTELLIGENCE SYSTEMS

**I**N the past 10 years, there has been a dramatic increase in the use of strategic planning tools such as BCG's growth/share matrix, AD Little's life cycle strategy, Shell's Directional Policy Matrix, and GE's stoplight strategy matrix. This has resulted from the much-needed perception by management that projecting yesteryear's trends into the future and then concentrating on day-to-day operating decisions is not enough for success. Strategic planning is rapidly being included in the definition of essential managerial tasks, and a tremendous amount of managerial interest has been focused on the techniques outlined above.

While this focus has been and should continue to be of great value, a critical point is often overlooked. *A strategic plan can be no better than the information on which it is based.* There has been little focus on strategic intelligence systems, the selection, gathering, and analysis of information needed for strategic planning. Yet it is obvious that without good market share information, a growth/share matrix will be

unreliable, or that knowledge of a competitor's intentions can be the key determinant of a strategy.

This paper is designed first to present an overview of strategic intelligence systems (SIS)—their purpose and the kinds of information they gather. The second section discusses the collection of strategic intelligence. The final section provides a brief discussion of the analysis and processing of strategic intelligence.

Examples are provided describing different companies' approaches to SIS, based on a research project in which, in addition to an extensive literature review, more than 100 executives in over 30 companies were interviewed. Although corporate names need to be disguised, the firms interviewed come from a broad range of industries and in most cases had sales in excess of \$100 million. These examples are not intended to add up to "the" one complete, integrated approach to be copied, but rather are illustrations and stimuli for thought.

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## Strategic Intelligence Systems— An Overview

### Purposes

It is important that the design of a SIS consider the purposes for which it is intended. Some method is needed to avoid collecting vast quantities of meaning-

less data, while simultaneously preventing a focus so narrow that crucial information is missed. An understanding of the purposes of a SIS is helpful in achieving this aim.

*Defensive intelligence* is oriented towards avoiding surprises. A company plans and manages itself on the basis of certain implicit and explicit assumptions about the world. A properly designed SIS should monitor the world to make certain that these assumptions continue to hold and to send up a flag if a major change (usually a threat) occurs. In one company which desired to implement this mode of thinking, a policy was made that unanticipated "surprises" would not be accepted as a reason for not meeting a strategic business unit's (SBU) targets. The view taken was that if an event was potentially so important, the manager should have a SIS watching for it and would therefore be able to prepare contingency plans.

*Passive intelligence* is designed to provide benchmark data for objective evaluation. An example of this is Dayton-Hudson's gathering of competitive retailer performance in order to reward management performance on a basis relative to competition.

*Offensive intelligence* is designed to identify opportunities. Often opportunities that would not otherwise be discovered can be identified through a SIS. For example, one company's strategic intelligence indicated that a major competitor was laying off R&D people of a certain type during a recession. From this, the company knew that the competitor would be unable to respond on a timely basis to a certain class of research-generated product improvements. The company used this knowledge to justify current R&D expenditures which enabled it to capture market position when the competitor was weakest. Another example was when a company's intelligence system indicated that a competitor had a serious service problem. From its own previous experience, the company recognized this as an inventory investment problem and knew that it would take the competitor about two years to straighten out its problems. Armed with this knowledge, the company substantially increased its market share.

#### Areas of Focus

In order to accomplish the three purposes of defensive, passive, and offensive intelligence, a SIS should focus on the following environments.

#### I Competitive

The competitive environment is of critical importance. However, a firm should not simply monitor its current competitors, but should scan the environment for potential competitors. The price of ignoring potential

competitors and neglecting to take proactive steps to avoid or blunt their effect can be extremely high. For example, Scott Paper's preoccupation with acquisitions apparently diverted its attention from the threat posed by Proctor and Gamble's potential and actual emergence as a substantial force in Scott's major paper markets (Hyatt and Coonly 1971).

Customers may also be potential competitors. One company which was heavily dependent upon a large customer analyzed that customer's incentives for backward integration. This analysis, triggered by an explicit requirement for contingency plans, suggested that, from the customer's viewpoint, backward integration was not in the customer's best interest. The next year, when the company's intelligence agents—its salespeople—learned about the customer's plans to integrate backward, the previous analysis was used to dissuade the customer from that course of action.

#### II Technological

The technological environment is crucial not only because of its evolutionary impact on existing products but also because many innovations are introduced from outside a traditional industry—e.g., ball point pens, xerography, instant photography. Cooper and Schendel's (1976) study of 22 companies in seven industries (locomotives, vacuum receiving tubes, fountain pens, safety razors, fossil fuel boilers, propellers, and leather) found the first commercial introduction of an innovation occurred from outside the industry in four out of seven industries. The study further found that the old technologies did not decline immediately, but continued to expand in four out of the seven cases. In fact, it took anywhere from five to 14 years for the dollar volume of the new technology to exceed that of the old technology. The mode of penetration of the new technology tended to be the capturing of a series of submarkets. This study suggests that replacement technologies may emerge and develop even while companies engaged in the old technology are lulled into complacency by near term prosperity. From a strategic perspective, long-run survival requires at least a monitoring of emerging technology. In one company interviewed in our study, the corporate planning staff provides a list of emerging technologies and division managers then are required in their strategic plans to indicate the likely impact of these technologies upon their division. The purpose is not only to sensitize division managers, but the corporation as a whole to coming opportunities and threats.

#### III Customer

Thorough analysis of a firm's customers and non-

customers is possibly the most valuable and most neglected area of strategic intelligence. Customer analysis means more than figuring out how to get Customer X to repeat or expand an order. Good customer and noncustomer analysis should reveal emerging technologies, competitive advantages and disadvantages, and new product ideas. Von Hippel's (1977) study of technological innovation in two industries found that in 74% of the 137 innovations studied, the source of the innovation was the supplier's customers. In these two industries, customers provided about three times as many new ideas as the company research departments.

#### IV Economic

The economic environment is of overriding importance to a company's future. Issues such as GNP, inflation, the money market, and interest rates are of obvious importance. Changes in the price of raw materials (e.g., oil) significantly affect most companies. It is also important to try to determine the secondary implications of these benchmark indicators. For example, a move towards balancing the federal budget may lower the amount of government-sponsored R&D forthcoming in a particular field. Government responses to continuing inflation, such as price and wage guidelines, should be anticipated and contingency plans prepared.

Examination of the effects of these issues on suppliers is also crucial. For example, many institutional food services on long-term, fixed price contracts have had profits severely hurt due to very sharp increases which their suppliers have imposed on certain products due to worldwide shortages.

#### V Political and Regulatory

The political and regulatory environment is a difficult one as international companies are particularly aware. However, the increasing number of federal and state agencies which seek to impact on corporate policies, often with conflicting objectives, affects virtually all companies. In a recent survey of CEOs of the 1975 Fortune 500, government was cited as the number one area of concern (Burk 1976). Several companies such as Mobil and General Electric have adopted a proactive stance to try to improve the political climate within which private corporations must function (Ross 1976).

The fact that government agencies often do not correctly anticipate either the impact or the response to regulatory actions indicates the opportunity for a broadening of business/government contact. A recent example would be the FTC's de facto voiding (by unacceptable restrictions) the Bic purchase of Amer-

ican Safety Razor from Phillip Morris. The FTC rejected this acquisition on the grounds that it would be anticompetitive. This FTC action had been considered a remote possibility, and was apparently a surprise to the companies involved. Perhaps better intelligence would have identified the FTC as a potential major problem. Extensive advance briefing could have conceivably altered the outcome, or else the effort could have been abandoned before significant amounts of managerial time were expended.

#### VI Social

The final environment to be reviewed here relates to the rapidly changing social environment which has led to concerns with such issues as pollution control, conservation, and the rights of minorities. Again, appropriate intelligence may enable corporations to anticipate and react to such shifts in a more functional manner than has been typical of the past. As a case in point, GE claims that its environmental system led it to anticipate the emerging women's movement which enabled it to produce guidelines for women's employment one year ahead of the government (Wilson 1975). Anticipating social concerns generates a time advantage in which companies can provide positive, helpful input to government policy makers charged with establishing guidelines and regulations.

### Strategic Intelligence Systems in The Strategic Intelligence Cycle

Strategic intelligence systems can be seen as being part of the strategic intelligence cycle (see Figure 1). As mentioned above, most current work has been concerned with the latter stages of this cycle—processing and analysis, dissemination, and use. A SIS is essentially the feeder process to the analysis and use segments of the strategic intelligence cycle. The SIS performs two crucial functions, directing the intelligence function and collecting the information. This section will focus on these tasks.

#### Directing the Intelligence Function

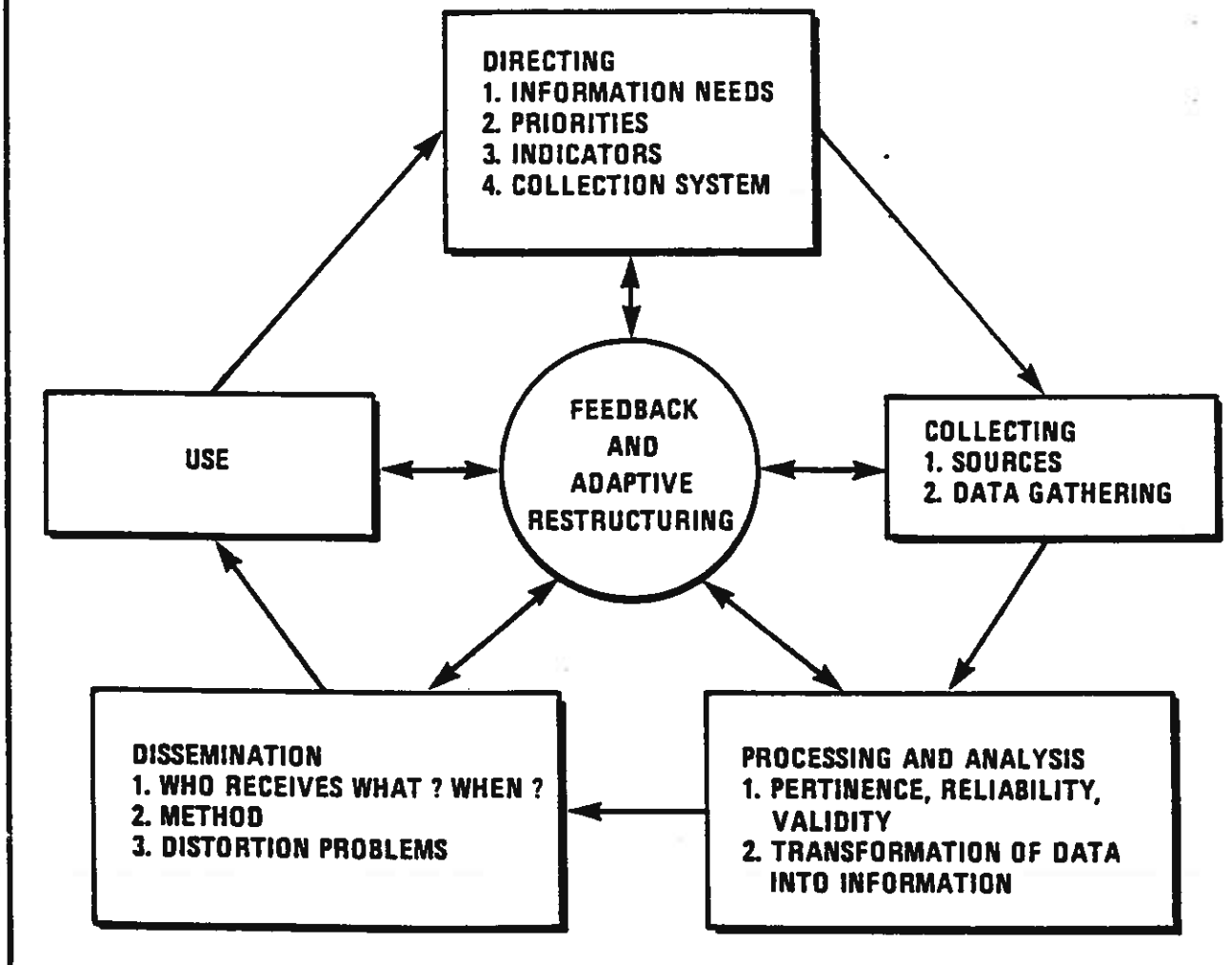
This first stage of the intelligence cycle is concerned with establishing parameters for what information is needed, what priorities should be established, and what indicators should be monitored. Since a specific corporate application must account for idiosyncracies in the company's situation and its management style, the discussion in this section will not prescribe a formula, but rather will provide a broad outline of the issues and offer several specific illustrations.

a) directing  
b) collecting

**FIGURE 1**  
The Intelligence Cycle

Areas of influence = firm's  
immediate zone = comp. activity

Analysis  
models



**Needs**

There has been a substantial and praiseworthy increase in management's desires for environmental information. However, a word of caution is in order. The problem is not to generate data, but to determine what information is relevant and actionable. The emerging tools of strategic planning and analysis—product portfolios, competitive audits, etc.—provide a framework for ascertaining what information is needed and how it might be used if obtained. As the USE portion of the strategic intelligence cycle has become more sophisticated, the need for focused information also has increased.

A potentially useful framework for specifying information needs can be generated from the tripartite military paradigm of (1) areas of influence, (2) immediate zone, and (3) area of interest. The areas of

influence would be the product/market segments which the company is currently engaged. The immediate zone represents areas of competitive activity which are close to, but not directly competitive with, the company's current operations. The area of interest represents areas of potential opportunity or threats in the longer term. Generally there is less need for detail and a longer time horizon as the focus shifts outward from areas of influence.

Many companies fail to utilize available opportunities due to their exclusive concentration on their immediate zone and consequent lack of attention to their area of interest. As an example of this kind of opportunity, Gillette noted that Bic, which had been a formidable competitor in the disposable lighter market, had pioneered disposable razors in Europe in 1975 (*Business Week* Feb.

1977). When Gillette learned that Bic had introduced the disposable razor in Canada in early 1976, it became clear that a major potential competitor was drawing near to the U.S. market. In response, Gillette rushed its "Good News" disposable razor into production and onto the national market in early 1976. Bic followed with U.S. test markets in mid-1976, but Gillette had apparently already paved the way for its dominance of this market. It is clear that by paying attention to its immediate zone and area of interest, Gillette was able to capitalize on an opportunity it would have lost had it only focused on its domestic markets.

### Priorities

A useful conceptual approach to establishing priorities may be stated as follows:

Importance of becoming aware of an event of interest = f(1. Importance of event to the organization.  
2. Speed with which the event can impact the organization.  
3. Speed with which the organization can react to the event.)

*cost/ben.*

Intelligence priorities should be established based upon (1) the importance of becoming aware of an event, (2) the likelihood the event will occur, and (3) the costs of anticipation and reaction. A SIS is justified if the costs of reacting to events exceed the costs of anticipating them and responding proactively. We believe that if companies were to carefully make such evaluations and trade-offs, then far more companies would attend to the development and nurturing of strategic intelligence systems.

### Indicators

While a company might like to have some direct measures of a competitor's intentions, such measures are usually lacking. Hence firms must resort to using indicators or surrogate measures. For example, content analysis of corporate annual reports might be used in order to assess the extent to which a competitor's management is proactive or reactive in its approach to the world.

An indicator need not be unambiguous in its potential impact on the company. For example, if a competitor should make an unexpectedly low bid on a contract, this could be an indicator of one or more conditions such as: (1) the competitor's backlog is running dangerously low and he is getting desperate for work, (2) the persons in charge of the bid erred, or (3) the competitor has leap frogged existing technology. The indicator—an unusually low bid—may

therefore relate to a variety of true states, each of which has substantially different strategic implications for the company.

### Collecting Intelligence

Intelligence collection entails the notion of scanning the environments of a company in search of data which individually or collectively will provide decision relevant inputs to the firm.

Scanning can be subdivided into two subcomponents: surveillance and search. Surveillance is a viewing and monitoring function which does not focus upon a single target or objective, but rather observes multiple aspects of the environment being scanned in an effort to detect relevant changes. In contrast, search implies deliberate investigation and research. The detection of significant events in the environment by surveillance will often trigger a search for further answers. To illustrate, one of the companies interviewed learned, through its conventional competitive surveillance activities (e.g., attending to articles and announcements concerning competitors in the business press), that a major competitor had sold a particular manufacturing operation. Since the company knew from its own operations that this manufacturing activity was the most profitable portion of its own vertically integrated chain of activities, the question arose as to why the competitor had sold this operation. Two potential reasons seemed apparent: (1) the competitor, a closely held company, was in a serious cash bind and was forced to sell this profitable operation in order to improve its financial position or (2) the competitor had made a breakthrough that would render the sold technology either obsolete or at least substantially less valuable. Set against the background of data the company had, both answers seemed plausible. Learning the true answer had important strategic significance. If done for financial reasons, this could signal either competitor vulnerability or a reduction in his vulnerability depending upon the results of a further investigation. On the other hand, if the competitor had made some technological breakthroughs, then the company could no longer assume a stable environment. Clearly early resolution of these uncertainties was required. This example illustrates how a signal detected by the surveillance function of scanning can lead to questions which require search to answer.

There is some empirical evidence indicating that scanning can be beneficial. In his analysis of a contingency theory of strategy formulation, Miller (1975) concludes that successful firms tend to use more scanning. Or, to view the situation conversely, Schendel, Patten, and Riggs's (1976) study of corpo-

**TABLE 1**  
**Sources of Intelligence**

Source	Examples	Comment
Government	Freedom of Information Act Government Contract Administration	1974 amendments have led to accelerating use. Examination of competitor's bids and documentation may reveal competitor's technology and indicate his costs and bidding philosophy.
	Patent filings	Belgium and Italy publish patent applications shortly after they are filed. Some companies (e.g., pharmaceutical) patent their mistakes in order to confuse their competitors.
Competitors	Annual reports and 10Ks	FTC and SEC line of business reporting requirements will render this source more useful in the future.
	Speeches and public announcements of competitor's officers. Products	Reveal management philosophy, priorities, and self-evaluation systems.  Systematic analysis of a competitor's products via back engineering may reveal the competitor's technology and enable the company to monitor changes in the competitor's engineering and assembly operations. Forecasts of a competitor's sales may often be made from observing his serial numbers over time.
	Employment ads	May suggest the technical and marketing directions in which a competitor is headed.
	Consultants	For example, if a competitor has retained Boston Consulting, then portfolio management strategies become more likely.
Suppliers	Banks, advertising agencies, public relations firms, and direct mailers and cata- logers, as well as hard goods suppliers.	Have a tendency to be more talkative than competitors since the information transmitted may enhance supplier's business. Can be effective sources of information on such items as competitor's equipment installations and on what retail competitors are already carrying certain product lines. Suppliers biases can usually be recognized.
Customers	Purchasing Agents Customer engineers and corporate officers	Generally regarded as self serving. Low reliability as a source. Valued sources of intelligence. One company taught its salespersons to perform elementary service for customers in order to get the salespersons past the purchasing agent and on to the more valued sources of intelligence.
Professional Associations and Meetings	Scientific and technical society meetings, management association meetings	Examine competitor's products, research and development, and management approach as revealed in displays, brochures, scientific papers, and speeches.
Company Personnel	Executives, sales force, engineers and scientists, purchasing agents	Sensitize them to the need for intelligence and train them to recognize and transmit to the proper organizational location relevant intelligence which comes to their attention.
Other Sources	Consultants, management service companies, and the media	Wide variety of special purpose and syndicated reports available.

rate turn-around strategies in some 54 companies concluded that the original downturn typically resulted from the failure of the firm's scanning or management control procedure to identify more than one or two of the major problems confronting the firm. Thus, there can be both upscale reward and downside risk attached to environmental scanning. These results are consistent with Grinyer and Norburn's (1975) study which found that higher financial performance was positively associated with the use of more informal channels of communication and with the number of items of information used in reaching decisions.

### Sources of Intelligence

Legitimate sources of intelligence are in abundant supply for the manager and company willing to apply imagination and effort in structuring a strategic intelligence system. Table 1 illustrates primary sources of intelligence along with selected examples of each. While it would be of doubtful value for any given company to pursue all sources on a continuing basis, a company should review a wide range of potential sources before choosing which one to use. The text will highlight some of the sources in Table 1 and examples of their use. Hopefully this will suggest the possibilities available to management.

*Federal Government.* A significant recent development has been the emergence of the federal government as a source of strategic intelligence.<sup>1</sup> While the government has long been a source of commercially relevant information, recent amendments to the Freedom of Information Act (FOIA) have greatly expanded the potential role of the government as an intelligence source. The 1966 FOIA was amended in 1974 in order to give it greater force. The amended Act provides that any person has the right of access to and can obtain copies of any document, file, or other record in the possession of any federal agency or department. To limit noncompliance by delay, the amended FOIA provides that requests must either be granted or denied within 10 working days in most cases. Nine specific discretionary exemptions are provided in the amended Act; exemption 4, which exempts "trade secrets and commercial or financial information obtained from a person and privileged or confidential," is of the greatest interest from the standpoint of corporate FOIA use.

It should be emphasized that the exemptions may be used at the discretion of the agency in question. Further, if the government is to use the exemptions to protect information, it must prove, if challenged, that the requested information is confidential and that its disclosure would result in substantial competitive injury to the company which originally supplied the information or would impair the agency's ability to obtain future information. Recent practice illustrates reluctance by some agencies to invoke the discretionary exemptions. For example, in response to FOIA requests, the Securities and Exchange Commission plans to release illegal or dubious payments information which had been voluntarily supplied by companies after a promise of confidentiality. Another example of this tendency to release information is the FTC's decision to make material submitted by a defendant publicly available whenever hearings are held on proposed consent decrees in antitrust or consumer protection actions.

In the years since the FOIA amendments have taken effect, business has made increasing use of the FOIA as an intelligence source. The experience of Air Cruisers Co. illustrates both the threats and opportunities provided by the amended FOIA. In August 1975, Air Cruisers received Federal Aviation Administration (FAA) approval of its design for a 42-person inflatable life raft for commercial aircraft. As the largest raft ever to gain FAA approval, it constituted a substantial competitive advantage to Air Cruisers. Six

months later, Air Cruisers learned that the FAA was about to release an 18-inch high stack of confidential technical documents to a competitor, Switlik Parachute Company, which had made an FOIA request for the documents. The material included results of performance tests and construction designs, which would enable Switlik to shortcut costly design, testing, and certification procedures. While Air Cruisers was able to block the FAA from releasing all of the data, it had to accept the release of some documents. This information helped Switlik design its own large raft with which it defeated Air Cruisers in a contest for an important European contract.

Additional examples abound. Consider the following which provide some notion of the breadth and type of competitive information potentially available from government agencies and departments under FOIA requests:

- A Washington, D.C. lawyer, presumably on behalf of a rival drug company, obtained an FDA inspector's report on conditions in the Midwestern plant of a large pharmaceutical company. It included such useful trade secrets as a description of proposed new products, manufacturing capabilities, and sterilization procedures at the inspected plant.
- Crown Zellerbach requested all FTC information on the Proctor & Gamble announcement that "New White Cloud bathroom tissue is the softest bathroom tissue on earth. We have been called on to prove this claim by the United States Government and have."
- Westinghouse received from the Department of Commerce 10 reports which had been paid for and submitted by other corporations on how Japanese nontariff barriers hurt sales in Japan.
- Both Honeywell and Burroughs requested details of an \$8 million Interior Department contract with Control Data Corporation.

Further evidence of substantial business use of FOIA may be found at the FTC and the FDA. In the nearly eight years between the July 1967 effective date of the original FOIA and the February 1975 effective date for the amendments, the FTC is estimated to have received less than 1,000 FOIA requests with 10% coming from business. Requests reached this same level, in the first 18 months after the amendments took effect, with almost 20% coming from business. To be sure, these figures understate total business use of FOIA because the original source of a request can often be masked by having attorneys and FOIA service companies make the direct request of a government

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<sup>1</sup>The following discussion of the Freedom of Information Act is based on Montgomery, Peters, and Weinberg (1978).

agency. Nevertheless, the above usage data underscore the impact of the 1974 amendments on the functioning of the FOIA.

The agency with one of the largest volumes of FOIA requests and a substantial share from business is the FDA. In 1974, 2,000 FOIA requests were received by the FDA. The volume exploded to 13,052 in 1975, the year in which the amendments took effect, and doubled in 1976 to nearly 22,000. Over 70% of all requests were from industry or FOI service companies. One reason for this rapid growth has been this agency's liberal interpretation of the FOIA.

While a substantial amount of business use has been made of the FOIA, the potential has just begun to be realized. Although corporate attorneys often claim that their managers know about the operation of the Act (usually because the attorneys had circulated a memo about it), field research indicated that only a tiny minority of managers were at all well informed about the Act and its managerial significance. Managers must be made aware of both the opportunities and inherent threats in the FOIA. The opportunities for learning about competitors are amply illustrated in the above examples. On the other hand, it is imperative that managers become aware of just how vulnerable their own confidential data are when in the hands of the government. Companies should plan in advance, as part of any submission of confidential data to the government, for the defense of such data against a FOIA request from a competitor for these data. Not to do so will increasingly expose a company to the prospect of meeting a 10 working day deadline in which it must convince an agency not to release the company's data. So whether for offensive or defensive purposes, companies must learn to live with and utilize the FOIA as a source of strategic intelligence.

The amended FOIA along with the Sunshine Laws which took effect in March 1977 have broader strategic implications than competitive intelligence. Together they have the potential to reduce the uncertainty which plagues business and government relations by more fully opening government decision processes to outside scrutiny. As discussed earlier, this potential is particularly important because the CEOs of Fortune's 500 indicated that government is their most troublesome area.

*Competitors.* A second major source of strategic intelligence is competitors themselves. Use of strategic planning tools such as one of the variants of product portfolio analysis helps management focus on critical strategy issues. Some of the most important of these issues relate to the incentives and opportunities facing various competitors and their financial and managerial capacities for carrying out alternative

strategies. In a very real sense, the introduction of these strategic planning tools has raised a host of questions relating to competitive response and reaction. A variety of intelligence sources are available for addressing such questions. Annual reports and 10Ks may provide considerable insight into the philosophy and management capability of a competitor as well as his financial capabilities and technological and production plans. For example, GE was stimulated to take a careful look at solid state controls on washers and dryers as a result of having seen both Whirlpool and Hitachi mention these devices in their annual report (Allen 1978). The FTC and SEC requirements for line of business reporting should greatly enrich annual reports and 10Ks as a source of intelligence. Further, careful perusal of the footnote to a competitor's annual report may reveal, for example, pension obligations which will drastically impact the ability of a competitor to respond flexibly.

The priorities and self-evaluation systems of a competitor may also be revealed by public announcements and speeches as well as in 10Ks and annual reports. Presidents often cannot resist the opportunity to "brag," and in so doing may reveal much about the firm's growth objectives, investment strategy, trade-offs between long-term and short-term results, and product/market policies. The advantage of knowing a competitor's personality was underlined in the field study at one company. This company knew that one of its major competitors tended to be extremely inconsistent in its marketing activities. This knowledge enabled the company to avoid overreaction to any one of the competitor's scattered moves.

Much valuable competitive intelligence may be gleaned from scanning a competitor's personnel activities. For example, if technical personnel of a given type are being laid off, this can be indicative of the competitor's intentions and capabilities in the technical area. A company who observes a competitor taking such action may have an excellent opportunity to gain a technical and marketing edge on the competitor, as was discussed earlier. On the other hand, analysis of a competitor's employment ads may tell a great deal about that competitor's future plans. There is some evidence that such an approach may be valuable. In one case, an outside team was assigned to monitor the personnel ads of a company for one month. At the end of the month, the team reported on what they thought was going on. Not only were they accurate in most cases, but they spotted three problems in production and quality control which the firm's own top management didn't even know existed.

*Own Personnel.* A company's own personnel can be invaluable sources of intelligence if they have been



trained to be receptive to intelligence and if they are encouraged to transmit the intelligence to appropriate organizational locations. Sales call reports which explicitly encourage reporting of intelligence and debriefing reports submitted by scientists and engineers upon return from professional meetings are two of the more common methods used. In many instances, a firm's purchasing agents may play a key role in intelligence acquisition. The key issue in tapping this internal source is to sensitize personnel to the need for intelligence, train them to recognize it, and reward them for transmitting it. In this area, the firm should bear in mind Pasteur's statement that "... chance favors the prepared mind."

In summary, most firms have a large number of potential intelligence sources. Some of these are common and widely used, such as trade association data, but others, such as studies of competitor's want ads, may be less so. The proper choice of intelligence sources depends not only upon the data that it provides, but also how it interrelates with other aspects of the company's strategic intelligence system.

## Analysis and Processing of Strategic Intelligence

A firm and its managers use a variety of approaches to combine, sort, and process the environmental *data* in order to produce timely and relevant *information* for forming, monitoring, evaluating, and modifying strategy. The strategic data management problem is complicated by the considerable emphasis placed on personal communications by senior managers. For example, Rohlif and Wish (1974) found that managers spend an average of six hours a day in personal or telephone communications. Further, the unstructured nature of many strategic decisions, especially in the problem finding state, increases the difficulty of transforming data into strategic information.

Despite these difficulties, the process of intelligence derivation is a critical one in the formulation of strategies. After data are generated or enter the system, they should be evaluated. The formal evaluation of data, although frequently carried out in military intelligence systems, appears to be rarely done by business.

### Evaluation of Data

Evaluation includes determining the pertinence, reliability, and validity (accuracy) of data obtained. Evaluation of pertinence can include pertinence to a number of people in the organization and specifically determines if the data are relevant to the company, if needed immediately, and, if so, by whom.

Reliability is an evaluation of the source or agency

by which the data are gathered or transmitted. The principal basis for judging reliability is previous experience with a source. This is particularly relevant for businesses which use such recurrent sources as the sales force, security analysts, and suppliers. Although it would seem that a "track record" of these sources can be built up over time, for example, to identify the biases of salesmen in reporting only certain events or in being overly optimistic, such practices were rarely observed in the field interviews. It should be noted that suppliers recognize that they are being used as a source of data and try to draw a line between "providing something of value, but not too much."

Validity or accuracy means the probable truth of the data itself. Methods for assessing validity include comparison with other data which may be available from other sources, searching for associated indicators, and face validity. For example in a long-term policy study for the Environmental Protection Agency, 16 different futures studies were reviewed in a fixed format as one approach to convergent validity (Elgin, MacMichael, and Schwartz 1975).

## Transformation of Data into Information

The six transformation functions—transmission, accumulation, aggregation, analysis, pattern recognition, and mixing—by which data can become information vary considerably in complexity (See Table 2). Although the six functions overlap, each has at its core a distinctive transformation. Obviously, the functions do not necessarily occur sequentially and can occur at several levels in an organization.

### Transmission

Transmission, conceptually a very simple notion, is the movement of data from one point or person in the organization to another. Transmission can also occur simultaneously with some of the other processing functions. However, data which are received through many corporate entry points are often not communicated to those who can use them most effectively. In consequence, transmission should be at least conceptually considered as a separate function. Companies need to develop methods to facilitate ("force") the transmission of information by providing incentives for the reporting of certain types of information or by providing ways for a manager to know the information needs of others.

### Accumulation

Accumulation is the storage of data in such a way that it can be retrieved by the managers in a company. A substantial data base provides a source from which the organization can learn about itself and its environ-

**TABLE 2**  
**Six Transformation Functions**

Name	Description	Brief examples
1. Transmission	1. Moving data from one point to another	1a) Manager in one company who receives information personally or by telephone from line managers and distributes information personally or by weekly newsletters 1b) Highly mechanized interactive computer system to make data base reachable by numerous managers
2. Accumulation	2. Storing data in one place; implies some notion of retrievability	2a) Corporate libraries or computer systems 2b) Not frequently observed in practice, managers tend to keep data in their heads or in individualized data bases ("little black book")
3. Aggregation	3. Many data points brought together into a smaller set which is usually more easily accessed	3a) Use of computer program to reduce thick Nielsen reports to much shorter documents 3b) Page length limitation on planning documents
4. Analysis	4. The analysis, usually formal, of data in order to seek and measure relations	4a) Use of econometric consulting firms to provide forecasts of the economy 4b) Use of Shell's Directional Policy Matrix to locate businesses for a portfolio analysis
5. Mix	5. Passing of data around to a variety of managers looking for possible links. The data is often not well ordered	5a) CEO insists on plans which show multiple inputs at each phase 5b) Open planning meetings in which managers must give and defend plans before colleagues
6. Pattern Recognition	6. A more informal, less analytic process than analysis (4) in which patterns or relations are sought. Can be a result of the other five functions described	6a) Combining plant closing, financial and product change information to recognize a competitor is short of cash 6b) Special purpose competitor studies & role playing or the use of adversary teams

ment. This is particularly true when attempting to resolve unstructured strategic problems, for which information needs are difficult to define beforehand.

The field interviews revealed limited amounts of accumulation of strategic environmental data. Several reasons explain why this accumulation does not take place. First, because the data often originate from the personal sources of a manager, the effort required to record it and enter it into a more formal and permanent system may not seem worthwhile, especially for "soft data." The remedies would seem to be easing the transmission process and increasing the rewards. In one company, the central collector receives data varying from rumors to documented facts by telephone or in person. The central collector then alerts line managers on an individual basis of particularly significant events, publishes a weekly newsletter, prepares special reports, and maintains files on competitors. There are substantial behavioral advantages to this system. The managers do not fill out forms, they input data verbally and are rewarded, in turn, by receiving pertinent information.

Second, information accumulation may not take place because managers do not think the system works well. For instance, computer-based systems often concentrate on the easily quantified factors in formats which reflect the needs of accounting systems rather

than those of operating or strategy managers.

Third, managers may have incentives for not wanting others to have their full data set. In a corporate budgeting system, a manager may be able to present plans which maximize his or her capital allocation or limit his or her performance goals based on his or her unique knowledge of the data.

One consumer durables manufacturer has a particularly interesting central collection system based on a substantial disaggregated data base which includes such factors as factory shipments, survey data on consumer habits, and construction reports. The system is unique because rather than distribution of a large number of reports (as had been done in the past), the main way to use it is for managers to visit the central facility, which is located in the marketing department. The location was chosen to provide user access and the overall style is casual and user oriented to create an environment "painless and pleasant for the harried marketing executive" (from a company brochure).

#### Aggregation

Aggregation is the function in which many data points are collapsed into a smaller set of pertinent information. It is the first of the functions in which something is done to the data beyond making it available to managers. Summarization of environmental data

occurs in virtually all companies, although with various degrees of care and attention. Given the massive amounts of data potentially available and a manager's limited time for reviewing information, aggregation is a vital function.

Corporate staff groups are often responsible for the summarization of economic trends. In a relatively smaller number of companies, social, political, and regulatory factors are summarized as well. Thus, on a macro or corporate level, summarization or aggregation of data takes place. However, only limited aggregation of environmental data, especially competitive data, was observed on a SBU or product-market basis except as part of the annual planning process or, in a few cases, when special purpose competitive assessment reports were made.

### Analysis

The analysis of data is a formal process which attempts to find and measure relations among variables. Although at times it may draw heavily on mathematics and numeric procedures, it is a logical and not a mathematical process. A number of companies employ econometric consulting firms and others do similar work on their own. Many consumer goods companies employ analytical approaches to measure relationships between sales and marketing mix variables. In several companies, the main focus of analysis is on predicting industry capacity.

The level of analysis of environmental data varies extensively across companies. For example, in some companies, competitive balance sheets are used primarily as a benchmark or "scoreboard" to rate the company as compared to its competition. In others, it is used more aggressively to anticipate threats or provide opportunities. As an illustration, when one company noticed that a competitor was highly leveraged and consequently would be unable to finance new product development, it gained considerable market share by improving its own product.

### Pattern Recognition

Pattern recognition, although not as structured or formal as the analysis process just discussed, also attempts to find patterns or relations among variables. Human abilities to perceive and determine patterns among disparate sets of information and data are the critical distinctive elements in the process of pattern recognition. Although computerized systems can be of great assistance, in strategic analysis the "lack of simple alpha-numeric indicators, combined with enormous textural complexity, suggests that [pattern recognition] . . . will not be trivial or automatic in the foreseeable future" (Webb 1969, p. 10). An example of pattern recognition occurred in one company when

the information that a competitor was closing a plant and changing his product line was combined with balance sheet analysis to realize that the competitor was short of cash. This, of course, left the competitor vulnerable to a number of aggressive strategies. The generation and use of in-depth competitive assessment reports, the preparation of strategy documents from the viewpoint of a major competitor, and the formation of in-house competitor teams exemplify different organizational approaches to pattern recognition.

### Mixing

The unstructured and often unstable nature of strategic problems requires that an additional transformation function be defined which brings together the apparently unrelated data spread throughout an organization in order to identify linkages. This function is termed "mixing."

A somewhat analogous notion is Cohen, March, and Olsen's (1972) garbage can model. In that conceptualization, an organization is conceived of as a collection of problems and solutions in which organizational members find ways either to enrich the collection of problems and solutions or to find links between the problems and solutions. The approach formulated here emphasizes two major factors. First, problems and solutions are viewed as being dynamic so that "windows" as to when linkages can be established are limited. Thus, problems and opportunities should be viewed as moving through a container rather than residing in a collection. Second, an active approach can be taken to ensure that problems and solutions are actively interchanged or mixed within an organization.

Companies appear to use a variety of techniques to force mixing including participative planning meetings across divisions and organizational levels, weekly senior executive sessions with invited presentations, and rejection of plans which do not reflect mixing. For example, in one company, the CEO rejected divisional plans out of hand because they did not show any evidence of interaction across divisions. In another, marketing managers were asked to write the finance plan, financial managers were asked to write the production plan, etc. In large companies, facing a broad variety of strategic options, mixing can help the company to become aware of the range of opportunities and threats facing it and to develop synergistic responses.

### Summary and Perspectives

As more organizations implement strategic planning and management activities, there will be an increasing need for strategic intelligence systems which can help managers to learn about the important environments

with which their organization interrelates and to become aware of threats and opportunities that are posed.

The construction of viable strategic intelligence systems is exceedingly complex because of the unstructured nature of strategic decisions, the difficulty of separating out important and relevant information from the vast amounts of data accessible to the manager, and the reliance of managers on personal information sources. As would be expected, in most of the companies interviewed tactical information systems were better articulated than strategic ones. On the other hand, a number of companies have developed effective means of learning about their environments and, most importantly, have implemented strategic decision systems which allow them to capitalize on opportunities and to defend themselves against threats. This article has developed a framework for examining intelligence systems which is sensitive to the character of the strategic process.

For a strategic intelligence system to be useful, a company must have a real commitment to strategic planning. Otherwise, the planning process, if carried out at all, becomes only an exercise and managers appear to place limited effort towards gathering and communicating accurate, relevant intelligence. There are a number of different organizational policies which can be utilized to promote the transformation of data into information and the utilization of this information. Elaboration on this issue is beyond the scope of this article. However, only in rare circumstances do effective intelligence systems emerge without organizational incentives to encourage their operation.

There appear to be a number of asymmetries in

managers' perceptions about information collection. Four, in particular, stand out. (1) Companies tend to believe that their competitors nearly always detect and rapidly decide how to respond to company actions such as a price change. This perception persists in spite of knowledge of substantial delays in their own detection and response decision time in reacting to the competitors. This can lead a company to recind prematurely an effort to lead a price increase based upon a belief competitors won't follow, when in fact the lack of response by the competitor may merely be symptomatic of a poor and slow intelligence system. (2) The government is viewed as an extensive collector of information, but not as a source; the discussion of the FOIA indicated how companies could access data held by the government. (3) Conversely to the case of the government, suppliers are more often viewed as a source of information about competitors than as a source to the competitors. (4) Companies send engineers and managers to meetings with instructions to gather more information than they reveal; it would seem unlikely for this outcome to occur for all companies involved. These asymmetries, which obviously are not shared by all managers, suggest some of the potential available from a review of an organization's procedures to gather and process strategic data.

Information systems are a means to an end—decision making which leads to more profitable results. The concepts and structures for strategic intelligence systems discussed in this article are designed to help organizations make more profitable strategic decisions.

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