

Managing Strategic Surprise by Response to Weak Signals

If we could first know where we are and whither we are tending, we could better judge what to do and how to do it.

Abraham Lincoln, 1858

Everything (before the Arab oil embargo) is history... The future is a whole new game.

Irving Shapiro, Du Pont Company, 1975

Neither past experience nor academic training has prepared many younger managers for such reversal in the approach to business planning and operation.

John T. Hackett, Cummings Engine Company, 1975

The paradox of strategic military surprise has been a familiar phenomenon throughout recorded human history. From the Trojan Horse to Pearl Harbor to the Yom Kippur war, nations and armies have been confronted with sudden crises, in spite of ample information about enemy intentions.

The Problem

The recent "petroleum crisis" was a comparable event in the industrial world: large and important firms were suddenly confronted with a major discontinuity, although advance forecasts of Arab action were not only publicly available, but on the day of the surprise, were to be found on the desks of some of the surprised managers. Because of its pervasive scope, the petroleum

crisis highlighted the danger of strategic business surprises. But such surprises had overtaken numerous firms, one by one, from the early 1950s—enough of them to provide material for a *Fortune* book titled *Corporations in Crisis*.

In the aftermath, it was argued that these corporations were caught unaware because they lacked modern forecasting and planning systems. But in the 1970s a majority of the firms caught by the petroleum crisis had such systems. In the mid-1960s, the management of one of the world's largest conglomerates proudly displayed its planning and control. A week after the public display, the same management made a red-faced admission of two multimillion-dollar surprises: a major overrun in its office furniture division and another in its shipbuilding division.

The American automotive industry, a leader in modern planning and control, was certainly unprepared for the forceful congressional position on automotive safety. And a bare four years later it was again "surprised" by the success of the small car. Such events need little support from the voluminous literature on futurology to predict that discontinuities and surprises will occur with increasing frequency. If, as experience suggests, modern planning technology does not insure against surprises, the technology needs to be extended to provide such insurance.

An exploration of such extension is the purpose of this article.

The Nature of Strategic Surprise

Figure 1 plots, against time, the growth of a firm which can be measured by any one of the common yardsticks, such as sales, profits, or rate of interest (ROI). The middle line shows smooth extrapolation of past experience into the future. The two branching curves, a threat and an opportunity, show a significant departure, a *strategic discontinuity* from the past. In principle, such discontinuities can be anticipated by available forecasting techniques. Given enough warning, the firm should be able to avert the threat or seize the opportunity.

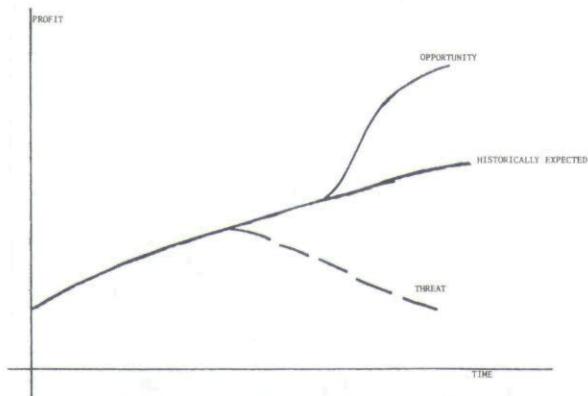


Figure 1. Impact of Threat/Opportunity

In fact, firms often fail to anticipate and suddenly discover that a fleeting opportunity has been missed or that survival of a product line is threatened. Typically, at the "moment of truth," neither the causes nor the possible responses are clear; the firm confronts an unfamiliar and often threatening event. Such events are *strategic surprises*: sudden, urgent, unfamiliar changes in the firm's perspective which threaten either a major profit reversal or loss of a major opportunity.

A firm that wishes to prepare for strategic surprises has two options. The first is to develop

a capability for effective *crisis management*—fast and efficient, *after-the-fact* responsiveness to sudden discontinuities. A useful prototype is a firefighting company; unable to predict or control occurrence of fires, it prepares itself, through repeated practice, to respond quickly and effectively to a whole range of different alarms. The second approach is to treat the problem *before the fact* and thereby minimize the probability of strategic surprises—to prepare in such a way that a strategic discontinuity loses its suddenness, urgency, and unfamiliarity.

Both approaches deserve management attention: before-the-fact strategic preparedness because it is the more efficient approach, crisis preparedness because even the best advance efforts do not assume immunity from surprises. Each approach deserves full treatment; in this article, however, we shall limit our attention to before-the-fact strategic preparedness.

Limitations of Environmental Information

There is now a well-developed technology, called *strategic planning*, for converting environmental information about strategic discontinuities into concrete action plans, programs, and budgets. But to date strategic planning has had little success in dealing with surprises. One major reason is that strategic planning is overly demanding for input information. To be useful in strategic planning, information must satisfy two conditions. First, it must be available early enough to permit time for preparation of plans and programs. For example, a firm that takes five years to develop a new product needs a forecasting horizon of seven to ten years. Second, if strategic plans and programs are to be made, the content of the forecast must be adequate to permit the planners to estimate the impact on the firm, to identify specific responses, and to estimate the potential profit impact of these responses.

In both strategic planning literature and practice, an assumption is usually made that both timeliness and content conditions can be satisfied, that the forecaster can meet the needs of the planner. This expectation is not unreasonable when planning is concerned with "logical," incremental development of historical trends. Curves fitted to past experience can be smoothly extrapolated into a relatively distant future.

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But when a potential surprise originates in an alien technology, with a previously unknown competitor, with a new political coalition, or with a new economic phenomenon, simple extrapolation will not suffice. In such cases these will be either discontinuous departures from past growth trends or, at least, sharp changes in the curvature of past growth curves. The firm planners can have longer range forecasts from the forecasters, but they must be willing to put up with content that becomes increasingly vague as the time horizon is extended. Or they can wait for originally vague information to become specific.

Thus, the recent phenomenon of stagflation is still imperfectly understood. The workings of the economy appear to have undergone a structural change which the economists have so far failed to explain. The simple question of when and how the current recession will come to an end has become difficult to answer except in very general and contradictory terms. In responding, firms have a choice of either basing their plans and actions on these generalities or waiting until the mechanism of recovery becomes clearer. Acting now implies taking risks on imperfect knowledge; waiting courts the danger of being late in important decisions that have long lead times, such as diversification, geographic expansion, and capital investment.

The timeliness of the firm's response depends on two variables: the rapidity with which the threat/opportunity, such as stagflation, affects the firm's growth and profits, and the amount of time needed by the firm to plan and effect the response. Since the 1950s these two variables have been on a collision course. The rate of environmental change has accelerated, and the firm's response has been made slower by growing size, complexity, and geographic diversification.

Thus, there is an apparent paradox: if the firm waits until information is adequate for strategic planning, it will be increasingly surprised by crises; if it accepts vague information, the content will not be specific enough for thorough strategic planning. A solution to this paradox is to change the approach to the use of strategic information. Instead of letting the strategic planning technology determine the information

needs, a firm should determine what planning and action are *feasible* as strategic information becomes available in the course of the threat/opportunity. Early in the life of a threat, when the information is vague and its future course unclear, the responses will be correspondingly unfocused, aimed at increasing the strategic flexibility of the firm. As the information becomes more precise, so will the firm's response, eventually terminating in a direct attack on the threat or an opportunity. But the prior buildup of flexibility will make this attack or opportunity occur earlier, and the attack will be better planned and executed.

We might call this *graduated response through amplification and response to weak signals*,¹ in contrast to conventional strategic planning that depends on strong signals. Such a practical method for planning a graduated response can be developed. The first task is to explore the range of weak signals that can be typically expected from a strategic discontinuity.

States of Knowledge

The threat information typically required in strategic planning for evaluating the impact of threats/opportunities (TO's) gives the impression of being imperfect because of the uncertainties in both the occurrence and the probable course of the threat. A closer look shows that while uncertain, this is very *content-rich* information: the threat has to be well enough understood to compute the possible profit consequences, the responses well enough developed to estimate both their costs and their countereffects on the threat.

It is reasonable to expect this much knowledge from a threat/opportunity which arises from a familiar prior experience. This will be the case when a competitor introduces a new marketing approach, a new product, or a new pricing strategy. But when the T/O is discontinuous (such as the impact of laser technology on land surveying or of large-scale integration on electronic components), then in the early stages, the nature, impact, and possible responses are unclear. Frequently it is not even clear whether the discontinuity will develop into a threat or an opportunity.

Thus, when a threat/opportunity first appears on the horizon, we must be prepared for very vague information, which will progressively develop and improve with time. This progression may be characterized by successive *states of knowledge*.

These are illustrated in Table 1, where level five, the highest state of knowledge, contains exactly the information required for strategic planning. Enough is known to compute both the probable profit impact of the discontinuity and the profit impact of the response.

Table 1. States of Ignorance Under Discontinuity

States of Knowledge Info Content	(1) Sense of threat/ opportunity	(2) Source of threat/ opportunity	(3) T/O Concrete	(4) Response Concrete	(5) Outcome Concrete
Conviction that discontinuities are impending	YES	YES	YES	YES	YES
Source of discontinuity identified	NO	YES	YES	YES	YES
Characteristics, nature, gravity, and timing of impact understood	NO	NO	YES	YES	YES
Response identified timing, action, programs, budgets can be identified	NO	NO	NO	YES	YES
Profit impact and consequences of response are computable	NO	NO	NO	NO	YES

For those who wish to relate this table to the terminology of statistical decision theory, we should note that the information in each state of knowledge may be certain, uncertain, or risky in the sense of definitions commonly used in the theory. The focus in the table is on illustrating the variability of content and not in the state of uncertainty. The dimension of uncertainty can be easily added at right angles to the table, thus creating a cube of possible states of information. In this cube, the states of information, treated in statistical decision theory, would be included in slice number 5.

At the other extreme, level one is the highest state of ignorance that can be of use to management. As the "No's" show, all that is known is that some threats and opportunities will undoubtedly arise, but their shape and nature and source are not yet known. In today's "political and economic fog of uncertainty"² many firms find themselves in exactly such a state of ignorance. Having experienced shocks of change in the recent past, managers are convinced that new ones are coming, but they cannot identify the source.

States of knowledge on level two improve matters somewhat. For example, in the early 1940s, it was generally recognized by physicists that solid-state physics had great potential for the electronics industry. But the invention of the

specific discontinuity, the transistor, was still several years off. The source of the threat was clear, but not the threat itself. When the transistor was invented by Shockley and his team, the knowledge was raised to state three, but at the outset, the ramifications of the inventions were unclear, as were the defensive and aggressive responses that different firms were eventually to make.

When the firms developed and made the initial responses and knowledge was raised to level four, the eventual investments and profits were not yet visible. Pioneering firms were investing boldly into the new technology with little experience to guide them, in high hopes that their entrepreneurial risks would pay off. State five was not reached until knowledge of crystal yields and manufacturing process costs was sufficient to make reasonable predictions of the ultimate technology and its profitability. But by then the leaders were entrenched and those who originally held back had to pay a high cost of entry into the industry.

Practical Threat/Opportunity Analysis

As indicated by the growing number of "Yes's" in Table 1, ignorance is reduced and information is enriched as a threat/opportunity evolves from state one to state five. As this evolution takes place, and as the management is trying to decide when and how to respond, the question of crucial importance is the time remaining before the impact on the firm passes a critical profit benchmark. For a threat this benchmark may be the level of loss beyond which the firm's survival is threatened; for an opportunity the point beyond which the cost of "climbing on the bandwagon" can no longer be recovered through profits.

Each threat and opportunity will pass through the respective stages of Table 1, some more quickly than others. Furthermore, each T/O will impact on different parts of the firm with varying strength. Therefore, we need a process for a systematic examination of T/O's and their impacts on the firm. The process described here is an extension of a well-known technique called *impact analysis*.

The first step is to compile a list of *strategic issues*: major environmental trends and possible

events that may have a major and discontinuous impact on the firm. Today, most firms would list such issues as petroleum politics, stagflation, technology of energy generation, changing consumer attitudes, changing attitudes toward work, government regulation of business, and a growing demand for worker participation in decisions. Many of the strategic issues are shared by all firms, but each firm would find important issues which are specific to its industrial setting. Thus, firms in the automotive business would certainly add automotive safety legislation as a major strategic issue.

The second step is to estimate the impact of each issue on the firm. In the early days of strategic planning this was done by examining the impact on each self-contained organizational unit, division, or subsidiary. After a time it became apparent that unit-by-unit analysis gives a confusing picture of the future, particularly when a division has a number of product lines and operates in many markets.

Recently, an alternative approach has emerged which, instead of using an "inside out" organizational perspective on the firm's world, takes an "outside in" view. This is done by subdividing the environment into relatively independent *strategic business areas* (SBA's), each of which has distinctive trends, threats, and opportunities. (Recent strategic resource shortages, as well as sociopolitical pressures on the firm, focus attention on strategic resource areas and strategic influence areas. Thus, a complete analysis of threats and opportunities would include these two in addition to strategic business areas. However, we can illustrate the method of analysis by confirming our attention to the latter.)

For firms operating in a single homogeneous geographic area the SBA's will be synonymous with major product lines. But for geographically diversified firms, a geographic subdivision may be necessary. Thus, for example, a firm selling color television sets in North America, Europe, and South America would recognize three distinctive SBA's because of differences in the maturity of the markets, the political and competitive environments. For firms whose product line is based on different technologies, a technological subdivision may be further necessary. If television manufacturers make both tube and

integrated circuit sets, the respective products will have different growth prospects, stages of maturity, and strategic vulnerabilities in each of the geographic areas. Thus, to understand the future of the color television product line it may be necessary to construct as many as six significantly different SBA's.

Once the SBA's are identified, estimates are made of the impact of the strategic issues on each SBA. Four dimensions are: identification of the impact as a threat, or opportunity, or both; magnitude of the impact (measured by the probable range of loss or gain in the profit currently derived from the SBA); timing of the critical profit benchmark (using the range from the earliest to the latest possible moment); and identification of the present state of knowledge about the threat.

The precision and range of these estimates will depend on the state of knowledge. They will be more vague for emerging threats/opportunities and more precise for well-developed ones. Similarly, the methodology usable for estimation will vary. In lower levels of knowledge, simple judgment or expert opinion techniques such as Delphi will have to be used. In later stages, a variety of quantitative modeling and forecasting techniques become usable.

Table 2 shows the results of impact estimation through a simple example of a firm with one major threat/opportunity for each of its four SBA's. Immediately adjacent to the SBA column is the percentage of the firm's profit that it contributes.

Table 2. Threat/Opportunity Analysis

Strategic Business Area	Profit Contribution	State of Knowledge				
		Sense Threat/ Opportunity	Source of Threat/ Opportunity	T/O Concrete	Response Concrete	Outcome Concrete
SBA ₁	50%		Type of impact: Timing: Profit impact:	+ T + 3-5 yrs. + 0.2-0.5		
SBA ₂	30%	T/O 10-15 yrs. 0.0-0.2				
SBA ₃	15%					Opportunity generated by the firm: 1-2 yrs. Opportunity generated by the firm: 2.5-3.0
SBA ₄	5%	O 4-8 yrs. 2.0-5.0				
Status Environmental Awareness						

As seen in the table, the range of the timing and profit impact estimates becomes wider as ignorance increases. Thus, the impact on SBA₂, which is ten to fifteen years off, may turn into either a threat or an opportunity, but it is clear that the impact is likely to be very serious. Clearly this discontinuity needs close watching. On the other hand, the profit estimates for the opportunity in SBA₃ can be estimated within a narrow range of both occurrence and impact.

Alternative Response Strategies

Just as we have expanded the states of information to include poorer knowledge, we need to enlarge the repertoire of responses to permit weaker responses. This is shown in Table 3,

Table 3. Alternative Response Strategies

Domain of Response	Response Strategies	Direct Response	Flexibility	Awareness
Relationship to Environment	External action (strategic planning & implementation)	External flexibility	Environmental awareness	
Internal Configuration	Internal awareness (contingency planning)	Internal flexibility		Self-awareness

where management options are subdivided into two groups: responses that change the firm's relationship with the *environment* and responses that change the *internal dynamics and structure* of the firm. For each group there are three progressively stronger strategies: one that enhances the firm's *awareness and understanding*; one that *increases the firm's flexibility*; and one that directly *attacks the threat/opportunity*. Thus, the table provides a total of six response strategies.

The strongest *external action strategy*, as its name implies, mounts a direct counteraction against identified threats of opportunities. It proceeds through selection of the type of counteraction, preparation of programs and budgets, and implementation of the latter. The end result is a threat averted or an opportunity captured in the form of an enhanced potential for future

profits. Selection of the best counteraction is the object of strategic planning.³

Internal readiness strategy matches the skills, structure, and resources of the firm to the demands of specific counteraction, creating a state of preparedness for external action. In strategic planning internal readiness is commonly referred to as strategy implementation, implying that preparedness must await selection of the course of action that it will support. The prescribed sequence is: strategic planning to internal preparation to action in the environment. But many of the preparedness measures can be successfully carried out in state three, as soon as the shape of the impending T/O becomes concrete and before strategic planning and external action become possible. Thus, the firm's response can be accelerated by reversing the sequence to internal preparedness to strategic planning to action in the environment.

The earliest possible response to an opportunity/threat is offered by the pair of *awareness strategies*, shown in the right column of Table 3. In most firms a degree of environmental awareness is provided through economic forecasting, sales forecasting, and analysis of competitive behavior. But all of these measures are extrapolative, based on a smooth extension of the past into the future, and do not provide information about strategic discontinuities. To broaden the awareness to include discontinuities, the firm must add special types of environmental analysis, such as environmental monitoring, technological forecasting, sociopolitical forecasting, and threat/opportunity analysis. Starting all of these activities in the firm requires no concrete information about threats/opportunities. Thus, the highest state of ignorance, a sense of threat, is adequate to justify a program for enhancing the firm's environmental awareness. A sense of threat is also adequate for starting many of the self-awareness measures, such as capacity audits, strength/weakness analysis, and financial modeling of the firm.

The *flexibility strategy* shown in the middle column of Table 3 differs from the direct action strategies in that its end product is an enhanced potential for the firm's future, rather than tangible changes in profits and growth. The *external*

flexibility substrategy is concerned with positioning the firm in the environment in a way that satisfies two criteria: satisfactory *average potential* for profitability over the long term and adequate diversification of the firm's position to assure *coping with deviations* from the expected average—capture of attractive major opportunities and minimization of catastrophic reversals.

Formulation of the external flexibility strategy (commonly known as position strategy) is part of the strategic planning process, where it is usually assumed to require level-five information input. But measures such as balance of technological, business, and political-geographical risks can be substantially planned *and implemented* if the state of knowledge is no better than level two, long before the nature of the threat becomes concrete.

Logistic flexibility is concerned with configuring the resources and capabilities of the firm to permit quick and efficient repositioning to new products and new markets, whenever the need arises. One important element is the flexibility of the managers, including awareness of the environment, psychological readiness to face unpleasant and unfamiliar events, ability to solve unfamiliar problems, and creativity. Another element is the flexibility of the managerial systems and structure to permit expeditious and flexible response to change. A third element is the flexibility of logistic resources and systems—resource liquidity, diversification of work skills, modular capacities, and so forth.

Unlike external flexibility, **internal flexibility** received relatively little attention from strategic planners. But recent history shows it to be a crucial ingredient in strategic preparedness. In the area of managerial flexibility, the preparation of managers for strategic thinking and action is now recognized as essential and vital if the firm is to anticipate and deal with the growing turbulence of the environment. Without it, efforts to introduce strategic planning typically encounter strong resistance to planning.

Flexibility of the logistic resources has received even less attention than managerial flexibility. A major reason is the fact that the idea of flexibility runs contrary to the fundamental principle of the Industrial Age, which holds that maxi-

mum profitability is to be gained through the maximum possible specialization of facilities and machinery and through largest possible capacity, maximum capital-labor substitution, and longest possible production runs.

Application of this principle invariably leads to special-purpose, capital-intensive investments. In the recent past principle-maximum specialization has been repeatedly compromised when expensive specialized factories were made prematurely obsolete by unexpected technological changes or when the length of production runs was cut short by shrinking product life cycles. In the coming years, as strategic change accelerates, logistic flexibility will become increasingly important. As with external flexibility, the mere knowledge of the sources of threats/opportunities is sufficient to start a rigorous program of logistic preparedness.⁴

The preceding discussion shows that if management is receptive to weak signals, much can be done long before the threat becomes tangible and concrete. The possibilities are summarized in Figure 2, in which the shaded portions repre-

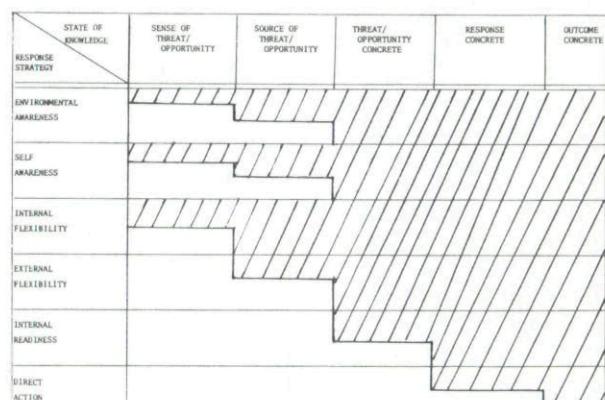


Figure 2. Feasible Ranges of Response Strategies

sent the areas of feasible response. As seen in the figure, all of environmental awareness measures, all of internal flexibility, and a substantial portion of external flexibility can be put in place before the threat becomes clear and definite. In our earlier example, this means that electronic component manufacturers could have attained a high state of readiness for coping with the transistor before the transistor was invented!

As Figure 2 shows, for direct response strategy it is necessary to have a good idea of the threats that one is proposing to attack. But even here, a sufficiently clear idea of the origin and shape of a threat is sufficient to launch a substantial percentage of internal readiness measures, including acquisition of necessary technological, production, and marketing skills, new product development, and development of sources of supply.

Even direct external action need not, and *in practice frequently does not*, await information that makes possible reliable cash- and profit-flow calculations. This is where entrepreneurial risk takers become differentiated from cautious followers. Adventurous firms will typically launch their entry into a new industry at level four, before the technology, market, and competition are well enough defined to permit such calculations. More conservative firms will prefer to wait on the sidelines until the “ball game” is better defined.

Dynamics of Response

Each of the six response strategies makes a complementary contribution to the firm’s ability to handle strategic discontinuities. Each requires a different length of time for implementation. The total length of time for mastering a particular threat/opportunity depends on the prior preparedness of the firm, the vigor with which the firm responds, and the sequence in which the respective strategies are put in place.

As mentioned previously, conventional strategic planning proceeds from direct response, to flexibility, to awareness. Figure 2 and preceding discussion suggest that the reverse sequence—awareness to flexibility to direct response—enables the firm to start response much earlier, and finish earlier, utilizing weak signals. Figure 3 illustrates the dynamics of the firm’s response, using this latter sequence. The vertical scale shows the time needed by the firm to complete the response, that is, to eliminate or stabilize operating losses or to make viable a new opportunity. The horizontal scale lists the states from which it may start. The curves show the obvious advantage of prior readiness: the better prepared the firm when it starts, the less time it will need to complete the response.

The upper curve of Figure 3 traces the *normal response* in which the threat/opportunity is treated routinely by existing processes, structure, systems, and procedures. The lower solid curve, the *ad hoc crash response*, shows the time savings that can be effected when everything possible is done to speed up the response—normal rules and procedures are suspended, other priorities are pushed into the background, organizational lines are crossed, activities are duplicated, overtime is incurred, and so forth.

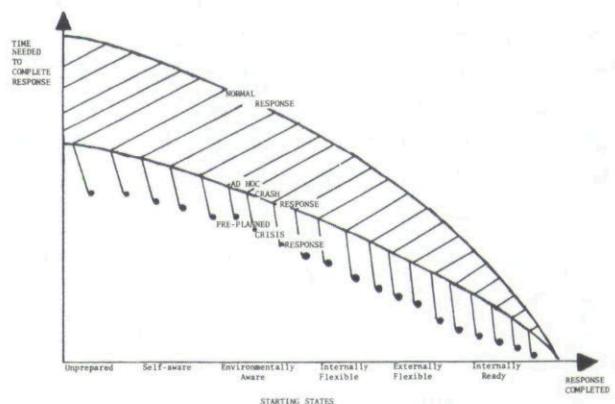


Figure 3. Dynamics of Internal Response

The mere “pulling out of the stops,” implying an ad hoc improvisation when a crisis looms, is not the only emergency procedure open to the firm. If, in spite of best efforts to anticipate threats/opportunities, the firm still expects to be confronted with sudden, fast-developing threats, investment in a program of training in *crisis management* is worthwhile in much the same way that a firefighting company invests in a capability to fight unexpected types of fires. The result will be to lower the response time required to the level labeled *preplanned crisis response*, thus increasing the capability for handling strategic surprises.

The envelope of response times defined by the three curves in Figure 3 will of course differ among firms and from one discontinuity to another. Size, complexity, and rigidity of structure will lengthen the response times, and the nature of the threat/opportunity will be equally influential. Important factors will be the size of the discontinuity as well as its degree of unfamiliarity, both of which determine the magnitude of the response effort. Thus, again, a

procedure is needed that will translate the theoretical curves of Figure 3 into practical application.

Practical Preparedness Diagnosis

Reference to Figure 2 shows that the respective states of knowledge will differ from SBA to SBA. Consequently, the range of possible responses will also differ. Thus, the first step is to determine the feasible responses for each SBA-threat/opportunity combination.

Continuing with the example of Table 2, we have chosen SBA₁, which had a single, clearly visible threat (T/O concrete stage). A reference to the feasibility table of Figure 2 shows that five of the six response strategies are feasible in this advanced stage of information. This is recorded as "F" or "I" (infeasible) in the second column of Figure 4.

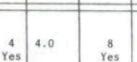
	Feasibility	Status	Relative import	Crash		Normal	
				Time	Cost	Time	Cost
Self-awareness	F		VH	3		6	
Environmental awareness	F		H	1		2	
Internal Flexibility	F		M	2		4	
External Flexibility	F		L	4		8	
Action Readiness	F		M	2		4	
Action	I		VH	2		4	
Completed Response				0%	100%	4 Yes	4.0
						8 Yes	1.0

Figure 4. Preparedness Diagnosis: SBA₁

The next step is to diagnose the firm's current state of readiness in each of the feasible strategies; the result is shown in column three of Figure 4. Letting 100 percent represent the maximum that can be done to respond to the T/O in the current state of ignorance, the entry is an estimate of the current readiness in each of the categories.

The roughly 15-percent entry for self-awareness suggests that, while the threat is concrete enough, the firm has done relatively little to determine the usefulness of its own capability for dealing with the threat. This might have been

the case in the example of a vacuum tube firm which, having learned about the existence of the transistor, has not made the effort to analyze that applicability of its technology and organization to the emerging transistor industry. On the other hand, that firm appears to be well advanced in understanding the market, the potential competition, and the future of the transistor.

To continue with the example, the low rating on the internal flexibility shows that the firm's resources and facilities are highly specialized, and external flexibility shows that the firm's profits are largely dependent on its vacuum tube business and that it is therefore threatened by new technology.

The next and critical step is to estimate the time the firm will need to carry the state of readiness to 100-percent level for each of the preparedness categories. The estimate is made category by category for both normal and crash responses. In the last line of Table 2 a summary estimate is made of four to eight years for completed responses. In our example this might have meant divesting from the vacuum tube SBA, narrowing to a market in which the tube will continue to be competitive, or making a successful entry into the transistor business.

The final step in readiness diagnosis is to estimate the cost-effectiveness of the total response. The cost of the response is shown in the last line of the table as a fraction of the percentage of current profits contributed by the SBA (see Table 2). If, as shown in Figure 4, a crash program will cost four times the current contributed profits, and if the response will prevent a loss of 0.2 to 0.5 of this profit, the investment will amortize itself in eight to twenty years. The cost-effectiveness is low, which suggests that the threat be written off and allowed to run its course. On the other hand, the normal response (if it turns out to be timely enough), costing 1.0, will be cost-effective, because the amortization period will be only two to five years.

Opportunity-Vulnerability Profile

The preceding discussion suggests two conclusions. First, the decision to respond should not be based on response costs alone, nor on the

amount of profit loss or gain that is at stake. Rather, it should be based on the return on the costs incurred. We used the simple but useful payback measure of this return. With better data (particularly in the advanced states of knowledge), other measures can be employed. By doing this, "throwing of good money after bad" is avoided, especially when the threat looms large and the temptation is to attack it, no matter what the costs.

Second, the selection of the counteraction, in the range between normal and crash response, cannot be made independently of the timing of the threat. A comparison of the timing is provided by the opportunity-vulnerability profile, shown in Figure 5, which combines the results

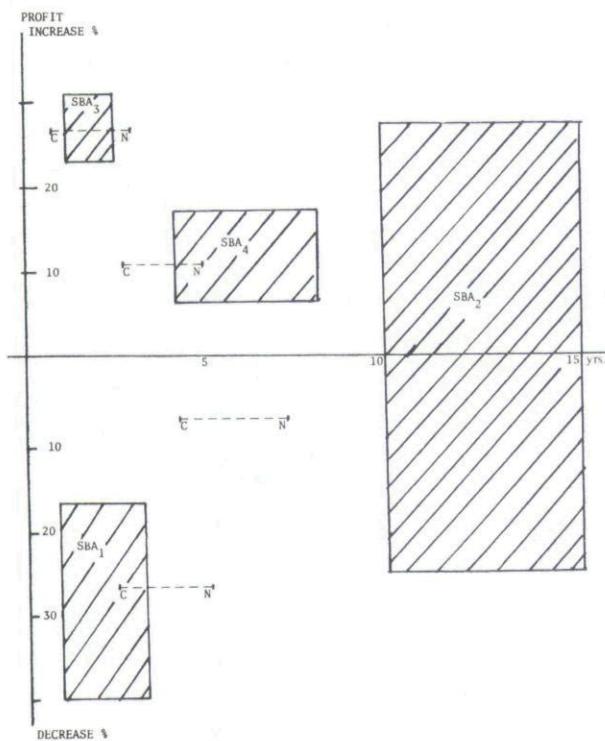


Figure 5. Opportunity-Vulnerability Profile

of the threat/opportunity analysis and the readiness diagnosis. The respective shaded rectangles enclose the "regions of probable impact" on the respective SBA's. Rectangles below the horizontal axis spell potential losses in profitability due to threats; those above indicate gains offered by opportunity. The height of the rectangle spans the probable range of loss/gain, the base spans the probable times when the discontinuity will

reach the critical benchmark level of the firm. Both dimensions are obtained from the threat/opportunity analysis in Table 2.

The horizontal dotted lines in Figure 5, obtained from the readiness diagnosis (Figure 4), span the time of probable completion of successful response. Thus, the normal response for SBA₃ would be late, but the firm can assure itself of capturing the opportunity through a crash program. SBA₂ is "safe"; normal response will capture it, provided the firm continues to monitor the development of the contingency. SBA₁ is in trouble because even a crash response may be late; it looks like a "surprise" in the making.

These examples show that timing of the threat does not by itself determine the priority of the respective responses. The priorities are determined in part by the *urgency* derived from comparing the timing of the threat with the time needed for response. Thus, in our example, both SBA₁ and SBA₃ are expected to reach critical impact at about the same time. But, because of the longer response time needed, SBA₁ must be handled on an all-out crisis-response basis, while a moderately urgent response will suffice for SBA₄. The priorities also are determined in part by the potential *cost-effectiveness* of the responses determined in the manner discussed in the preceding section.

The opportunity profile also provides an overall perspective of significant strategic changes in the firm's future. The firm needs to check the impact of SBA₁, because if unchecked, a minimum of 15 percent and a maximum of 40 percent of the profit will be lost. Since, at best, timely arresting of this threat will be difficult, the crash response must be used. The firm also must make an effort to capture the opportunity in SBA₃, as an offsetting insurance. Further, if the firm wishes to capture the attractive opportunity in SBA₄, it needs to start right away to avoid a crash response later. Only SBA₂ seems to call for no immediate aggressive action. But its potential impact is so great that a vigorous monitoring program should be spotlighted on the strategic issues that give rise to this T/O.

A System for Managing Strategic Issues

Selection of one response cannot be made independently of others, because they all lay claim

on the time, managerial energy, and financial, human, and physical resources of the firm. The totality of the T/O's must be considered, in light of the continual changes in the environmental challenges, threats, and opportunities. And, given the evolving state of knowledge in each of them, the totality must be considered in a dynamic, changing perspective. Consideration of this totality should be made a part of a flexible and responsive management system. Such a system, which we shall call a *strategic issue management system* (SIM), is shown in the somewhat complicated Figure 6.

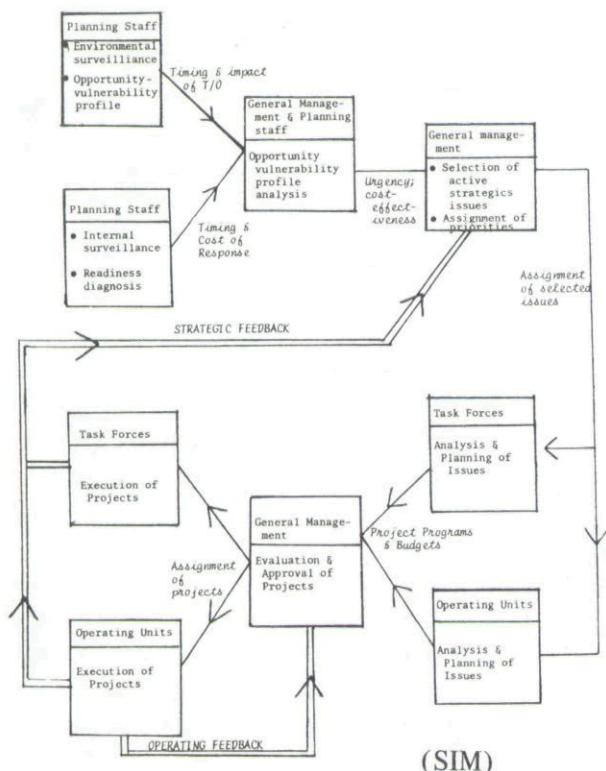


Figure 6. Strategic Issue Management System

The upper part of each box identifies the involvement by four groups of actors: the planning staff, general management, task forces (drawn, as necessary, from all parts of the firm), and operating units. The lower part of the box describes the function performed in the successive stages of the process: the planning staff detects, tracks, and analyzes strategic issues; general management keeps up to date the list of important strategic issues, assigns specific issues for planning, approves the plans, and monitors the execution; and task forces and/or operating

units plan and execute specific projects.

One distinctive feature of strategic issue management is its organizational flexibility. The general management groups involved may be the top management in small or medium-sized firms or several groups scattered through a large corporation. Both the planning and implementation of strategic issues are determined not by the organizational structure but by the nature of the problem involved. Whenever a problem cuts across organizational units or requires special attention, ad hoc task forces are set up. The same task force may plan and execute, or the executive may be assigned, in part or in whole, to the permanent organizational units.

Another distinctive feature, not readily evident from the figure, is the *real time* character of the process. It follows no fixed planning calendar; rather, the surveillance is continuous, strategic issue list updating is both periodic and triggered by appearance of major T/O's, and planning execution is ongoing throughout the year, with completed projects being succeeded by new ones.

A third distinctive feature, because the system responds to weak signals, is the special attention to the two different types of feedback shown in Figure 6—operating and strategic. The results obtained from executing the project are interpreted in two ways: first, to judge whether the programs and budgets are being followed (the operating feedback); and second, to determine whether the strategic issue has been well identified, whether it deserves the priority assigned to it, and whether the action strategy has been well chosen (strategic feedback).

When the issues arise from vague incipient trends, strategic feedback dominates and guides progressive redefinition of the response. In later stages of T/O, the focus naturally shifts to operating feedback. Thus, the gradual response permits gradual commitment on the part of the management.

Finally, strategic issue management is an action, and not a purely planning, system. The results of implementation feed directly back to management groups that originally selected and authorized the issues. Planning and implementation are not separated. An issue is not "resolved"

until it is dropped from the list or concrete changes are produced in the profitability and growth of the firm.

Strategic Issues and Strategic Planning

Strategic issue management is an expansion and extension of a planning technique of strategic issue analysis, which has emerged in practice in the past few years. Our expansion has been to admit weak signals as a basis of decision making, and the extension was from a purely planning to a total action system.

Strategic issue management overcomes a basic shortcoming of the strategic planning technology which has become increasingly evident in practice—the inability of strategic planning to handle quickly and efficiently individual fast-developing threats and opportunities. The reasons for this are several: the dependence of strategic planning on strong signals, which delays the recognition of a strategic issue; the rigidity of the planning calendar, including six-to nine-month delays between initiation and completion of the planning cycle; and organizational inflexibility of the strategic planning system, which cannot effectively handle strategic issues that simultaneously affect more than planning units. When an issue fails to fit into the perspective of a single unit, both its planning and implementation tend to “fall between the chairs.”

In summary, preoccupation with system and organizational dynamics of the planning process leads to an inability to cope with the dynamics of rapidly developing threats and opportunities. In computer terminology, strategic planning is an off line process as compared to the real time character of strategic issue management. But in return for the real time responsiveness, strategic issue management incurs the penalty of lack of comprehensiveness. It is essentially an opportunistic approach that fails to capture the totality of the firm's future perspective. An examination of the strategic issue list reveals the potential threats and opportunities, but it offers little information about where the firm as a whole is headed.

If, for example, all of the firm's SBA's are in the state of maturity or decline, it is dangerous to

use strategic issue management without adjoining strategic planning to it. SIM will focus attention on dealing with contingencies, whereas the need is for a fundamental realignment of the firm's strategic thrust. Thus, strategic issue management is a complement, rather than a replacement for strategic planning. The salient features of each are summarized in Table 4, which shows that the choice of one or the other, or both, depends on the strategic environment of the firm.

Table 4. Comparison of Strategic Planning and Strategic Analysis

Strategic Planning	Strategic Issue Analysis
Deals with firm's total strategy	Deals with probable discontinuities
Focused on products-market-technology	Embraces discontinuities from all sources
Applicable when major strategic reorientation is desired	Applicable when insurance against surprises is desired
Responds to strong signals	Responds to weak signals
Strategic information needs derived from decisions	Feasible decisions determined by available information
Prepared periodically	A continuous process
Organization-focused	Problem-focused

1. A firm that is in a relatively surprise-free environment, but whose basic business prospects are unsatisfactory because of market saturation, technological obsolescence, or change in the structure of demand, needs to engage in comprehensive strategic planning. A firm that seeks large-scale diversification from a position of strength would do likewise; so would a firm that needs a fundamental rebalance of its strategic business areas.

2. A firm whose growth prospects appear satisfactory, but whose environment is strategically turbulent, may confine itself to strategic issue management. Today this would apply, for example, to the ball bearing industry, where Japanese competition is changing the market structure, the computer industry, where technology is changing rapidly, or the pharmaceutical industry, where both technology and societal relations are turbulent.

3. Firms that face both a fundamental realignment of the strategic thrusts and a turbulent, surpriseful environment would benefit from combining both strategic planning and strategic issue analysis into a comprehensive strategic management system.⁵

Anticipating Resistance to Planning

In the preceding pages we have developed a conceptual framework and a practical procedure by which a firm in a turbulent environment can cope with weak signals, thus minimizing the chances of surprise. The result is a new planning approach, which must be accepted and used by practicing managers to become effective. However persuasive and practical the approach, neither its acceptance nor its use can be taken for granted. To do so would be to disregard the numerous instances when similarly logical approaches encountered resistance to planning and were either rejected or emasculated by the using organizations.

To gain acceptance for this particular approach, it is necessary to assure within the firm a climate of openness to strategic risk and preparedness to face unfamiliar and threatening prospects. The creation of such a climate of strategic decisiveness is as complex and difficult a problem as the one discussed here. Therefore, we have explored decisiveness in two separate articles.^{6,7}

These articles argue that management in most firms lacks the necessary strategic decisiveness to accept a system such as strategic issue management or genuine strategic planning. An attempt to introduce such a system is highly likely to encounter resistance and possible rejection. In a strategic crisis, strategic thinking and action will be the last resort, after historically successful operating remedies have been exhausted.

Enhancing strategic decisiveness involves making changes in decision-making technology, systems, information, distribution of power, and above all, in the risk attitudes and values of managers who are key to the strategic response. Thus, strategic decisiveness is an organizational state of mind—a culture—as well as a distinctive com-

petence. The process of cultural change is difficult and requires special understanding and skills. But technology for inducing organizational change exists, has been described in voluminous literature, and has been successfully tested in practice.⁸

In the application of this technology, a typical “chicken and egg” problem arises: should strategic decisiveness be built up first, or should the new system be introduced? In most cases it is possible to join the two change processes in a single program of organizational transformation in which the new system and the new problem-solving skills are used as a vehicle for bringing about behavioral changes.⁹

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