# Strategy Under Uncertainty

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## Executive Summary

AT THE HEART OF THE TRADITIONAL APPROACH to strategy lies the assumption that by applying a set of powerful analytic tools, executives can predict the future of any business accurately enough to allow them to choose a clear strategic direction. But what happens when the environment is so uncertain that no amount of analysis will allow us to predict the future? What makes for a good strategy in highly uncertain business environments?

The authors, consultants at McKinsey & Company, argue that uncertainty requires a new way of thinking about strategy. All too often, they say, executives take a binary view: either they *underestimate uncertainty* to come up with the forecasts required by their companies' planning or capital-budgeting processes, or they overestimate it, abandon all analysis, and go with their gut instinct.

The authors outline a new approach that begins by making a crucial distinction among four discrete levels of uncertainty that any company might face. They then explain how a set of generic strategies—shaping the market, adapting to it, or reserving the right to play at a later time—can be used in each of the four levels. And they illustrate how these strategies can be implemented through a combination of three basic types of actions: big bets, options, and no-regrets moves.

The framework can help managers determine which analytic tools can inform decision making under uncertainty—and which cannot. At a broader level, it offers executives a discipline for thinking rigorously and systematically about uncertainty and its implications for strategy.

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WHAT MAKES FOR A GOOD STRATEGY in highly uncertain business environments? Some executives seek to shape the future with high-stakes bets. Eastman Kodak Company, for example, is spending $500 million per year to develop an array of digital photography products that it hopes will fundamentally change the way people create, store, and view pictures. Meanwhile, Hewlett-Packard Company is investing $50 million per year to pursue a rival vision centered around home-based photo printers. The business press loves to hype such industry-shaping strategies because of their potential to create enormous wealth, but the sober reality is that most companies lack the industry position, assets, or appetite for risk necessary to make such strategies work.

More risk-averse executives hedge their bets by making a number of smaller investments. In pursuit of



growth opportunities in emerging markets, for example, many consumer-product companies are forging limited operational or distribution alliances. But it's often difficult to determine if such limited investments truly reserve the right to play in these countries or just reserve the right to lose.

Alternatively, some executives favor investments in flexibility that allow their companies to adapt quickly as markets evolve. But the costs of establishing such flexibility can be high. Moreover, taking a wait-and-see strategy—postponing large investments until the future becomes clear—can create a window of opportunity for competitors.

***Under uncertainty, traditional approaches to strategic planning can be downright dangerous.***

How should executives facing great uncertainty decide whether to bet big, hedge, or wait and see? Chances are, traditional strategic-planning processes won't help much. The standard practice is to lay out a vision of future events precise enough to be captured in a discounted-cash-flow analysis. Of course, managers can discuss alternative scenarios and test how sensitive their forecasts are to changes in key variables, but the goal of such analysis is often to find the most likely outcome and create a strategy based on it. That approach serves companies well in relatively stable business environments. But when there is greater uncertainty about the future, it is at best marginally helpful and at worst downright dangerous.

One danger is that this traditional approach leads executives to view uncertainty in a binary way—to assume that the world is either certain, and therefore open to precise predictions about the future, or uncertain, and therefore completely unpredictable. Planning

or capital-budgeting processes that require point forecasts force managers to bury underlying uncertainties in their cash flows. Such systems clearly push managers to underestimate uncertainty in order to make a compelling case for their strategy.

Underestimating uncertainty can lead to strategies that neither defend against the threats nor take advantage of the opportunities that higher levels of uncertainty may provide. In one of the most colossal underestimations in business history, Kenneth H. Olsen, then president of Digital Equipment Corporation, announced in 1977 that "there is no reason for any individual to have a computer in their home." The explosion in the personal computer market was not inevitable in 1977, but it was certainly within the range of possibilities that industry experts were discussing at the time.

At the other extreme, assuming that the world is entirely unpredictable can lead managers to abandon the analytical rigor of their traditional planning processes altogether and base their strategic decisions primarily on gut instinct. This "just do it' approach to strategy can cause executives to place misinformed bets on emerging products or markets that result in record write-offs. Those who took the plunge and invested in home banking in the early 1980s immediately come to mind.

Risk-averse managers who think they are in very uncertain environments don't trust their gut instincts and suffer from decision paralysis. They avoid making critical strategic decisions about the products, markets, and technologies they should develop. They focus instead on reengineering, quality management, or internal cost-reduction programs. Although valuable, those programs are not substitutes for strategy.



Making systematically sound strategic decisions under uncertainty requires a different approach—one that avoids this dangerous binary view. It is rare that managers know absolutely nothing of strategic importance, even in the most uncertain environments. In fact, they usually can identify a range of potential outcomes or even a discrete set of scenarios. This simple insight is extremely powerful because determining which strategy is best, and what process should be used to develop it, depend vitally on the level of uncertainty a company faces.

What follows, then, is a framework for determining the level of uncertainty surrounding strategic decisions and for tailoring strategy to that uncertainty. No approach can make the challenges of uncertainty go away, but this one offers practical guidance that will lead to more informed and confident strategic decisions.

## Four Levels of Uncertainty

Even the most uncertain business environments contain a lot of strategically relevant information. First, it is often possible to identify clear trends, such as market demographics, that can help define potential demand for future products or services. Second, there is usually a host of factors that are currently *unknown* but that are in fact *knowable*—that could be known if the right analysis were done. Performance attributes for current technologies, elasticities of demand for certain stable categories of products, and competitors' capacity-expansion plans are variables that are often unknown, but not entirely unknowable.

The uncertainty that remains after the best possible analysis has been done is what we call *residual*

*uncertainty*—for example, the outcome of an ongoing regulatory debate or the performance attributes of a technology still in development. But often, quite a bit can be known about even those residual uncertainties. (See figure "How to Use the Four Levels of Uncertainty.") In practice, we have found that the residual uncertainty facing most strategic-decision makers falls into one of four broad levels:

### LEVEL 1: CLEAR-ENOUGH FUTURE

At level 1, managers can develop a single forecast of the future that is precise *enough* for strategy development. Although it will be inexact to the degree that all business environments are inherently uncertain, the forecast will be sufficiently narrow to point to a single strategic

***How to Use the Four Levels of Uncertainty***

| | A Clear-Enough Future | Alternate Futures |
|---|---|---|
| What Can Be Known? | • A single forecast precise enough for determining strategy | • A few discrete outcomes that define the future |
| Analytic Tools | • "Traditional" strategy tool kit | • Decision analysis<br>• Option valuation models<br>• Game theory |
| Examples | • Strategy against low-cost airline entrant | • Long-distance telephone carriers' strategy to enter deregulated local-service market<br>• Capacity strategies for chemical plants |



direction. In other words, at level 1, the residual uncertainty is irrelevant to making strategic decisions.

Consider a major airline trying to develop a strategic response to the entry of a low-cost, no-frills competitor into one of its hub airports. Should it respond with a low-cost service of its own? Should it cede the low-cost niche segments to the new entrant? Or should it compete aggressively on price and service in an attempt to drive the entrant out of the market?

To make that strategic decision, the airline's executives need market research on the size of different customer segments and the likely response of each segment to different combinations of pricing and service. They also need to know how much it costs the competitor to serve, and how much capacity the competitor has for, every route in question. Finally, the executives need to

| A Range of Futures | True Ambiguity |
|---|---|
| • A range of possible outcomes, but no natural scenarios | • No basis to forecast the future |
| • Latent-demand research<br>• Technology forecasting<br>• Scenario planning | • Analogies and pattern recognition<br>• Nonlinear dynamic models |
| • Entering emerging markets, such as India<br>• Developing or acquiring emerging technologies in consumer electronics | • Entering the market for consumer multimedia applications<br>• Entering the Russian market in 1992 |

know the new entrant's competitive objectives to anticipate how it would respond to any strategic moves their airline might make. In today's U.S. airline industry, such information is either known already or is possible to know. It might not be easy to obtain—it might require new market research, for example—but it is inherently knowable. And once that information is known, residual uncertainty would be limited, and the incumbent airline would be able to build a confident business case around its strategy.

## LEVEL 2: ALTERNATE FUTURES

At level 2, the future can be described as one of a few alternate outcomes, or *discrete scenarios*. Analysis cannot identify which outcome will occur, although it may help establish probabilities. Most important, some, if not all, elements of the strategy would change if the outcome were predictable.

Many businesses facing major regulatory or legislative change confront level 2 uncertainty. Consider U.S. long-distance telephone providers in late 1995, as they began developing strategies for entering local telephone markets. By late 1995, legislation that would fundamentally deregulate the industry was pending in Congress, and the broad form that new regulations would take was fairly clear to most industry observers. But whether or not the legislation was going to pass and how quickly it would be implemented in the event it did pass were uncertain. No amount of analysis would allow the long-distance carriers to predict those outcomes, and the correct course of action—for example, the timing of investments in network infrastructure—depended on which outcome occurred.



In another common level 2 situation, the value of a strategy depends mainly on competitors' strategies, and those cannot yet be observed or predicted. For example, in oligopoly markets, such as those for pulp and paper, chemicals, and basic raw materials, the primary uncertainty is often competitors' plans for expanding capacity: Will they build new plants or not? Economies of scale often dictate that any plant built would be quite large and would be likely to have a significant impact on industry prices and profitability. Therefore, any one company's decision to build a plant is often contingent on competitors' decisions. This is a classic level 2 situation: The possible outcomes are discrete and clear. It is difficult to predict which one will occur. And the best strategy depends on which one does occur.

## LEVEL 3: A RANGE OF FUTURES

At level 3, a range of potential futures can be identified. That range is defined by a limited number of key variables, but the actual outcome may lie anywhere along a continuum bounded by that range. There are no natural discrete scenarios. As in level 2, some, and possibly all, elements of the strategy would change if the outcome were predictable.

Companies in emerging industries or entering new geographic markets often face level 3 uncertainty. Consider a European consumer-goods company deciding whether to introduce its products to the Indian market. The best possible market research might identify only a broad range of potential customer-penetration rates—say, from 10% to 30%—and there would be no obvious scenarios within that range. Such a broad

range of estimates would be common when introducing completely new products and services to a market, and therefore determining the level of latent demand is very difficult. The company entering India would be likely to follow a very different and more aggressive entry strategy if it knew for certain that its customer penetration rates would be closer to 30% than to 10%.

Analogous problems exist for companies in fields driven by technological innovation, such as the semiconductor industry When deciding whether to invest in a new technology, producers can often estimate only a broad range of potential cost and performance attributes for the technology, and the overall profitability of the investment depends on those attributes.

### LEVEL 4: TRUE AMBIGUITY

At level 4, multiple dimensions of uncertainty interact to create an environment that is virtually impossible to predict. Unlike in level 3 situations, the range of potential outcomes cannot be identified, let alone scenarios within that range. It might not even be possible to identify, much less predict, all the relevant variables that will define the future.

Level 4 situations are quite rare, and they tend to migrate toward one of the other levels over time. Nevertheless, they do exist. Consider a telecommunications company deciding where and how to compete in the emerging consumer-multimedia market. It is confronting multiple uncertainties concerning technology, demand, and relationships between hardware and content providers, all of which may interact in ways so unpredictable that no plausible range of scenarios can be identified.



Companies considering making major entry investments in post-Communist Russia in 1992 faced level 4 uncertainty. They could not outline the potential laws or regulations that would govern property rights and transactions. That central uncertainty was compounded by additional uncertainty over the viability of supply chains and the demand for previously unavailable consumer goods and services. And shocks such as a political assassination or a currency default could have spun the whole system toward completely unforeseen outcomes.

Those examples illustrate how difficult strategic decisions can be at level 4, but they also underscore their transitory nature. Greater political and regulatory stability has turned decisions about whether to enter Russian markets into level 3 problems for the majority of industries today. Similarly, uncertainty about strategic decisions in the consumer multimedia market will migrate to level 3 or to level 2 as the industry begins to take shape over the next several years.

## Tailoring Strategic Analysis to the Four Levels of Uncertainty

Our experience suggests that at least half of all strategy problems fall into levels 2 or 3, while most of the rest are level 1 problems. But executives who think about uncertainty in a binary way tend to treat all strategy problems as if they fell into either level 1 or level 4. And when those executives base their strategies on rigorous analysis, they are most likely to apply the same set of analytic tools regardless of the level of residual uncertainty they face. For example, they might attempt to use standard, quantitative market-research techniques to forecast demand for data traffic over wireless communications networks as far out as ten years from now.

But, in fact, a different kind of analysis should be done to identify and evaluate strategy options at each level of uncertainty. All strategy making begins with some form of situation analysis—that is, a picture of what the world will look like today and what is likely to happen in the future. Identifying the levels of uncertainty thus helps define the best such an analysis can do to describe each possible future an industry faces.

To help generate level 1's usefully precise prediction of the future, managers can use the standard strategy tool kit—market research, analyses of competitors' costs and capacity, value chain analysis, Michael Porter's five-forces framework, and so on. A discounted-cash-flow model that incorporates those predictions can then be used to determine the value of various alternative strategies. It's not surprising that most managers feel extremely comfortable in level 1 situations—these are the tools and frameworks taught in every leading business program in the United States.

Level 2 situations are a bit more complex. First, managers must develop a set of discrete scenarios based on their understanding of how the key residual uncertainties might play out—for example, whether deregulation occurs or not, a competitor builds a new plant or not. Each scenario may require a different valuation model—general industry structure and conduct will often be fundamentally different depending on which scenario occurs, so alternative valuations can't be handled by performing sensitivity analyses around a single baseline model. Getting information that helps establish the relative probabilities of the alternative outcomes should be a high priority.

After establishing an appropriate valuation model for each possible outcome and determining how probable



each is likely to be, a classic decision-analysis framework can be used to evaluate the risks and returns inherent in alternative strategies. This process will identify the likely winners and losers in alternative scenarios, and perhaps more important, it will help quantify what's at stake for companies that follow status quo strategies. Such an analysis is often the key to making the case for strategic change.

In level 2 situations, it is important not only to identify the different possible future outcomes but also to think through the likely paths the industry might take to reach those alternative futures. Will change occur in major steps at some particular point in time, following, for example, a regulatory ruling or a competitor's decision to enter the market? Or will change occur in a more evolutionary fashion as often happens after a resolution of competing technology standards? This is vital information because it determines which market signals or trigger variables should be monitored closely. As events unfold and the relative probabilities of alternative scenarios change, it is likely that one's strategy will also need to be adapted to these changes.

At one level, the analysis in level 3 is very similar to that in level 2. A set of scenarios needs to be identified that describes alternative future outcomes, and analysis should focus on the trigger events signaling that the market is moving toward one or another scenario. Developing a meaningful set of scenarios, however, is less straightforward in level 3. Scenarios that describe the extreme points in the range of possible outcomes are often relatively easy to develop, but these rarely provide much concrete guidance for current strategic decisions. Since there are no other natural discrete scenarios in level 3, deciding which possible outcomes should be fully

TRIGGER POINTS

developed into alternative scenarios is a real art. But there are a few general rules. First, develop only a limited number of alternative scenarios—the complexity of juggling more than four or five tends to hinder decision making. Second, avoid developing redundant scenarios that have no unique implications for strategic decision making; make sure each scenario offers a distinct picture of the industry's structure, conduct, and performance. Third, develop a set of scenarios that collectively account for the *probable* range of future outcomes and not necessarily the entire *possible* range.

① Limited # of scenarios ≤ 5

② Ensure uniqueness of scenarios.

③ Probable range not all possible.

Because it is impossible in level 3 to define a complete list of scenarios and related probabilities, it is impossible to calculate the expected value of different strategies. However, establishing the range of scenarios should allow managers to determine how robust their strategy is, identify likely winners and losers, and determine roughly the risk of following status quo strategies.

***At level 4, it is critical to avoid the urge to throw up your hands and act purely on gut instinct.***

Situation analysis at level 4 is even more qualitative. Still, it is critical to avoid the urge to throw one's hands up and act purely on gut instinct. Instead, managers need to catalog systematically what they know and what is possible to know. Even if it is impossible to develop a meaningful set of probable, or even possible, outcomes in level 4 situations, managers can gain valuable strategic perspective. Usually, they can identify at least a subset of the variables that will determine how the market will evolve over time—for example, customer penetration rates or technology performance attributes. And they can identify favorable and unfavorable indicators of these variables that will let them track the market's evolution over time and adapt their strategy as new information becomes available.



Managers can also identify patterns indicating possible ways the market may evolve by studying how analogous markets developed in other level 4 situations, determining the key attributes of the winners and losers in those situations and identifying the strategies they employed. Finally, although it will be impossible to quantify the risks and returns of different strategies, managers should be able to identify what information they would have to believe about the future to justify the investments they are considering. Early market indicators and analogies from similar markets will help sort out whether such beliefs are realistic or not.

***The old one-size-fits-all analytic approach to evaluating strategy options is simply inadequate.***

Uncertainty demands a more flexible approach to situation analysis. The old one-size-fits-all approach is simply inadequate. Over time, companies in most industries will face strategy problems that have varying levels of residual uncertainty, and it is vitally important that the strategic analysis be tailored to the level of uncertainty.

## Postures and Moves

Before we can talk about the dynamics of formulating strategy at each level of uncertainty, we need to introduce a basic vocabulary for talking about strategy. First, there are three *strategic postures* a company can choose to take vis-à-vis uncertainty: shaping, adapting, or reserving the right to play. Second, there are three types of moves in *the portfolio of actions* that can be used to implement that strategy: big bets, options, and no-regrets moves.

1) Shaping
2) Adapting
3) Reserve Right to play

1) BIG BETS
2) OPTIONS
3) NO-REGRET

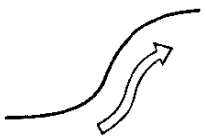
## STRATEGIC POSTURE

Any good strategy requires a choice about strategic posture. Fundamentally, *posture* defines the intent of a strategy relative to the current and future state of an industry. (See figure "The Three Strategic Postures.") *Shapers* aim to drive their industries toward a new structure of their own devising. Their strategies are about creating new opportunities in a market—either by shaking up relatively stable level 1 industries or by trying to control the direction of the market in industries with higher levels of uncertainty. Kodak, for example, through its investment in digital photography, is pursuing a shaping strategy in an effort to maintain its leadership position, as a new technology supersedes the one currently generating most of its earnings. Although its product technology is new, Kodak's strategy is still based on a traditional model in which the company provides digital cameras and film while photo-processing stores provide many of the photo-printing and storage functions for the consumer. Hewlett-Packard also seeks

***The Three Strategic Postures***

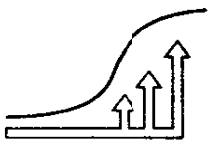
**Shape the future**

Play a leadership role in establishing how the industry operates, for example:
- setting standards
- creating demand



**Adapt to the future**

Win through speed, agility, and flexibility in recognizing and capturing opportunities in existing markets



**Reserve the right to play**

Invest sufficiently to stay in the game but avoid premature commitments



to be a shaper in this market, but it is pursuing a radically different model in which high-quality, low-cost photo printers shift photo processing from stores to the home.

In contrast, *adapters* take the current industry structure and its future evolution as givens, and they react to the opportunities the market offers. In environments with little uncertainty, adapters choose a strategic positioning—that is, where and how to compete—in the current industry. At higher levels of uncertainty, their strategies are predicated on the ability to recognize and respond quickly to market developments. In the highly volatile telecommunications-service industry, for example, service resellers are adapters. They buy and resell the latest products and services offered by the major telecom providers, relying on pricing and effective execution rather than on product innovation as their source of competitive advantage.

The third strategic posture, *reserving the right to play*, is a special form of adapting. This posture is relevant only in levels 2 through 4; it involves making incremental investments today that put a company in a privileged position, through either superior information, cost structures, or relationships between customers and suppliers. That allows the company to wait until the environment becomes less uncertain before formulating a strategy. Many pharmaceutical companies are reserving the right to play in the market for gene therapy applications by acquiring or allying with small biotech firms that have relevant expertise. Providing privileged access to the latest industry developments, these are low-cost investments compared with building a proprietary, internal gene-therapy R&D program.

## A PORTFOLIO OF ACTIONS

A posture is not a complete strategy. It clarifies strategic intent but not the actions required to fulfill that intent. Three types of moves are especially relevant to implementing strategy under conditions of uncertainty: big bets, options, and no-regrets moves. (See figure "What's in a Portfolio of Actions?")

*Big bets* are large commitments, such as major capital investments or acquisitions, that will result in large payoffs in some scenarios and large losses in others. Not surprisingly, shaping strategies usually involve big bets, whereas adapting and reserving the right to play do not.

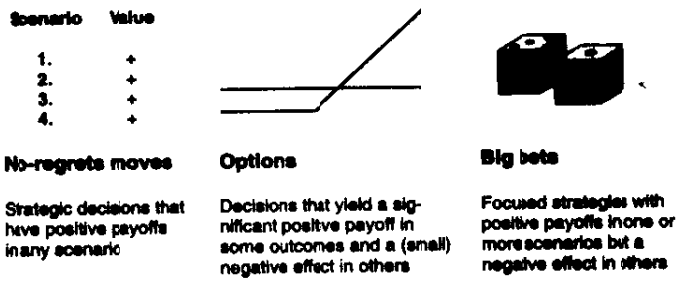
*Options* are designed to secure the big payoffs of the best-case scenarios while minimizing losses in the worst-case scenarios. This asymmetric payoff structure makes them resemble financial options. Most options involve making modest initial investments that will allow companies to ramp up or scale back the investment later as the market evolves. Classic examples include conducting pilot trials before the full-scale introduction of a new product, entering into limited joint ventures for distribution to minimize the risk of breaking into new markets, and licensing an alternative technology in case it proves to be superior to a current technology. Those reserving the right to play rely heavily on options, but shapers use them as well, either to shape an emerging but uncertain market as an early mover or to hedge their big bets.

Finally, *no-regrets moves* are just that—moves that will pay off no matter what happens. Managers often focus on obvious no-regrets moves like initiatives aimed at reducing costs, gathering competitive intelligence, or building skills. However, even in highly uncertain environments, strategic decisions like investing in capacity and entering certain markets can be no-regrets moves. Whether or not they put a name to them, most managers understand intuitively that no-regrets moves are an essential element of any strategy.

The choice of a strategic posture and an accompanying portfolio of actions sounds straightforward. But in practice, these decisions are highly dependent on the level of uncertainty facing a given business. Thus the four-level framework can help clarify the practical implications implicit in any choice of strategic posture and actions. The discussion that follows will demonstrate the different strategic challenges that each level of uncertainty poses and how the portfolio of actions may be applied.

### What's in a Portfolio of Actions?

*These building blocks are distinguished by three payoff profiles—that is, the amount of investment required up front and the conditions under which the investment will yield a positive return.*






## STRATEGY IN LEVEL 1'S CLEAR-ENOUGH FUTURE

In predictable business environments, most companies are adapters. Analysis is designed to predict an industry's future landscape, and strategy involves making

positioning choices about where and how to compete. When the underlying analysis is sound, such strategies are by definition made up of a series of no-regrets moves.

Adapter strategies in level 1 situations are not necessarily incremental or boring. For example, Southwest Airlines Company's no-frills, point-to-point service is a highly innovative, value-creating adapter strategy, as was Gateway 2000's low-cost assembly and direct-mail distribution strategy when it entered the personal computer market in the late 1980s. In both cases, managers were able to identify unexploited opportunities in relatively low-uncertainty environments within the existing market structure. The best level 1 adapters create value through innovations in their products or services or through improvements in their business systems without otherwise fundamentally changing the industry.

It is also possible to be a shaper in level 1 situations, but that is risky and rare, since level 1 shapers increase the amount of residual uncertainty in an otherwise predictable market—for themselves and their competitors—in an attempt to fundamentally alter long-standing industry structures and conduct. Consider Federal Express Corporation's overnight-delivery strategy. When it entered the mail-and-package delivery industry, a stable level 1 situation, FedEx's strategy in effect created level 3 uncertainty for itself. That is, even though CEO Frederick W. Smith commissioned detailed consulting reports that confirmed the feasibility of his business concept, only a broad range of potential demand for overnight services could be identified at the time. For the industry incumbents like United Parcel Service, FedEx created level 2 uncertainty. FedEx's move raised two questions for UPS: Will the overnight-delivery strategy succeed or not? and Will UPS have to offer a similar service to remain a viable competitor in the market?



Over time, the industry returned to level 1 stability, but with a fundamentally new structure. FedEx's bet paid off, forcing the rest of the industry to adapt to the new demand for overnight services.

What portfolio of actions did it take to realize that strategy? Like most shaper strategies, even in level 1 situations, this one required some big bets. That said, it often makes sense to build options into a shaper strategy to hedge against bad bets. Smith might have hedged his bets by leasing existing cargo airplanes instead of purchasing and retrofitting his original fleet of Falcon "minifreighters," or he could have outsourced ground pickup and delivery services. Such moves would have limited the amount of capital he would have needed to sink into his new strategy and facilitated a graceful exit had his concept failed. However, that kind of insurance doesn't always come cheap. In FedEx's case, had Smith leased standard-size cargo planes, he would have come under the restrictive regulations of the Civil Aeronautics Board. And outsourcing local pickups and deliveries would have diluted FedEx's unique door-to-door value to customers. Thus Smith stuck mainly to big bets in implementing his strategy, which drove him to the brink of bankruptcy in his first two years of operation but ultimately reshaped an entire industry.

## STRATEGY IN LEVEL 2'S ALTERNATE FUTURES

If shapers in level 1 try to raise uncertainty, in levels 2 through 4 they try to lower uncertainty and create order out of chaos. In level 2, a shaping strategy is designed to

increase the probability that a favored industry scenario will occur. A shaper in a capital-intensive industry like pulp and paper, for example, wants to prevent competitors from creating excess capacity that would destroy the industry's profitability. Consequently, shapers in such cases might commit their companies to building new capacity far in advance of an upturn in demand to preempt the competition, or they might consolidate the industry through mergers and acquisitions.

Consider the Microsoft Network (MSN). A few years ago, one could identify a discrete set of possible ways in which transactions would be conducted between networked computers. Either proprietary networks such as MSN would become the standard, or open networks like the Internet would prevail. Uncertainty in this situation was thus at level 2, even though other related strategy issues—such as determining the level of consumer demand for networked applications—were level 3 problems.

Microsoft could reasonably expect to shape the way markets for electronic commerce evolved if it created the proprietary MSN network. It would, in effect, be building a commerce hub that would link both suppliers and consumers through the MSN gateway. The strategy was a big bet: the development costs were significant and, more important, involved an enormously high level of industry exposure and attention. In effect, for Microsoft, it constituted a big credibility bet. Microsoft's activities in other areas—such as including one-button access to MSN from Windows95—were designed to increase the probability that this shaping bet would pay off.

***Shaping strategies can fail, so the best companies supplement their shaping bets with options that let them change course quickly.***



But even the best shapers must be prepared to adapt. In the battle between proprietary and open networks, certain trigger variables—growth in the number of Internet and MSN subscribers, for example, or the activity profiles of early MSN subscribers—could provide valuable insight into how the market was evolving. When it became clear that open networks would prevail, Microsoft refocused the MSN concept around the Internet. Microsoft's shift illustrates that choices of strategic posture are not carved in stone, and it underscores the value of maintaining strategic flexibility under uncertainty. Shaping strategies can fail, so the best companies supplement their shaping bets with options that allow them to change course quickly if necessary. Microsoft was able to do just that because it remained flexible by being willing to cut its losses, by building a cadre of engineers who had a wide range of general-programming and product-development skills, and by closely monitoring key trigger variables. In uncertain environments, it is a mistake to let strategies run on autopilot, remaining content to update them only through standard year-end strategy reviews.

Because trigger variables are often relatively simple to monitor in level 2, it can be easy to adapt or reserve the right to play. For instance, companies that generate electricity—and others whose business depends on energy-intensive production processes—often face level 2 uncertainty in determining the relative cost of different fuel alternatives. Discrete scenarios can often be identified—for example, either natural gas or oil will be the low-cost fuel. Many companies thus choose an adapter strategy when building new plants: they

construct flexible manufacturing processes that can switch easily between different fuels.

Chemical companies often choose to reserve the right to play when facing level 2 uncertainty in predicting the performance of a new technology. If the technology performs well, companies will have to employ it to remain competitive in the market. But if it does not fulfill its promise, incumbents can compete effectively with existing technologies. Most companies are reluctant to bet several hundred million dollars on building new capacity and retrofitting old plants around a new technology until it is proven. But if they don't make at least incremental investments in the short run, they risk falling too far behind competitors should the technology succeed. Thus many will purchase options to license the new technology within a specified time frame or begin retrofitting a proportion of existing capacity around the new technology. In either case, small, up-front commitments give the companies privileged positions, but not obligations, to ramp up or discontinue development of the new technology as its performance attributes become clearer over time.

## STRATEGY IN LEVEL 3'S RANGE OF FUTURES

Shaping takes a different form in level 3. If at level 2, shapers are trying to make a discrete outcome occur, at level 3, they are trying to move the market in a general direction because they can identify only a range of possible outcomes. Consider the battle over standards for electronic cash transactions, currently a level 3 problem since one can define a range of potential products and services that fall between purely paper-based and purely

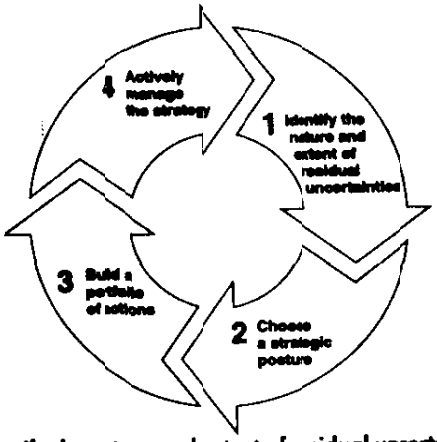


electronic cash transactions, but it is unclear today whether there are any natural discrete scenarios within that range. Mondex International, a consortium of financial services providers and technology companies, is attempting to shape the future by establishing what it hopes will become universal electronic-cash standards. Its shaping posture is backed by big-bet investments in product development, infrastructure, and pilot experiments to speed customer acceptance.

In contrast, regional banks are mainly choosing adapter strategies. An adapter posture at uncertainty levels 3 or 4 is often achieved primarily through investments in organizational capabilities designed to keep options open. Because they must make and implement strategy choices in real time, adapters need quick access to the best market information and the most flexible organizational structures. Many regional banks, for example, have put in place steering committees focused on electronic payments, R&D projects, and competitive-intelligence systems so that they can constantly monitor developments in electronic payment technology and markets. (See figure "How a Regional Bank Confronts the Uncertainties in Electronic Commerce.") In addition, many regional banks are making small investments in industry consortia as another way to monitor events. This adapter approach makes sense for most regional banks—they don't have the deep pockets and skills necessary to set standards for the electronic payment market, yet it is essential that they be able to offer the latest electronic services to their customers as such services become available.

Reserving the right to play is a common posture in level 3. Consider a telecommunications company trying to decide whether to make a $1 billion investment in

## How a Regional Bank Confronts the Uncertainties in Electronic Commerce




### 1. Identify the nature and extent of residual uncertainties

*Key areas of uncertainty include:*

- How much electronic commerce will occur on the Internet
- How quickly consumers will switch from paper-based to electronic payments
- Which specific instruments will become the primary payment vehicles (smart cards? E-cash?)
- What structure will emerge for the electronic commerce industry
- How vertically integrated most players will be
- What roles banks and nonbanks will play

The bank is facing level 3 uncertainty in some areas and level 4 in others

### 2. Choose a strategic posture

Objectives:

- Defend current customer franchise from attack by new technology-based competitors
- Capture new business opportunities in fast growing markets

Overall posture: reserve the right to play

### 3. Build a portfolio of actions

Near-term opportunities to offer more innovative products in specific areas where the bank is strong (for example, procurement cards, industry-specific payment products) represent no-regrets moves.

Offering leading-edge payment products to high-value customer segments that are most vulnerable to attackers is another no-regrets move.

Forming a small new-business unit is a growth option to:

- Conduct R&D for new payment ideas
- Monitor industry developments in the broad area of retail electronic payments

### 4. Actively manage the strategy

Monitor key trigger events such as adoption rates for emerging products and the behavior of nontraditional competitors such as telephone companies.

Establish a short-cycle review of the portfolio of options.

Participate in a number of industry consortia to reduce uncertainty.



broadband cable networks in the early 1990s. The decision hinged on level 3 uncertainties such as demand for interactive TV service. No amount of solid market research could precisely forecast consumer demand for services that didn't even exist yet. However, making incremental investments in broadband-network trials could provide useful information, and it would put the company in a privileged position to expand the business in the future should that prove attractive. By restructuring the broadband-investment decision from a big bet to a series of options, the company reserved the right to play in a potentially lucrative market without having to bet the farm or risk being preempted by a competitor.

## STRATEGY IN LEVEL 4'S TRUE AMBIGUITY

Paradoxically, even though level 4 situations contain the greatest uncertainty, they may offer higher returns and involve lower risks for companies seeking to shape the market than situations in either level 2 or 3. Recall that level 4 situations are transitional by nature, often occurring after a major technological, macroeconomic, or legislative shock. Since no player necessarily knows the best strategy in these environments, the shaper's role is to provide a vision of an industry structure and standards that will coordinate the strategies of other players and drive the market toward a more stable and favorable outcome.

Mahathir bin Mohamad, Malaysia's prime minister, is trying to shape the future of the multimedia industry in the Asian Pacific Rim. This is truly a level 4 strategy problem at this point. Potential products are undefined, as are the players, the level of customer demand, and the technology standards, among other factors. The

government is trying to create order out of this chaos by investing at least $15 billion to create a so-called Multimedia Super Corridor (MSC) in Malaysia. The MSC is a 750-square-kilometer zone south of Kuala Lumpur that will include state-of-the-art "smart" buildings for software companies, regional headquarters for multinational corporations, a "Multimedia University," a paperless government center called Putrajaya, and a new city called Cyberjaya. By leveraging incentives like a ten-year exemption from the tax on profits, the MSC has received commitments from more than 40 Malaysian and foreign companies so far, including such powerhouses as Intel, Microsoft, Nippon Telegraph and Telephone, Oracle, and Sun Microsystems. Mahathir's shaping strategy is predicated on the notion that the MSC will create a web of relationships between content and hardware providers that will result in clear industry standards and a set of complementary multimedia products and services. Intel's Malaysia managing director, David B. Maising, recognized Mahathir's shaping aspirations when he noted, "If you're an evolutionist, it's strange. They're [the Malaysian government] trying to intervene instead of letting it evolve."

***Netscape relied on its credibility, rather than its deep pockets, to shape Internet browser standards.***

Shapers need not make enormous bets as the Malaysian government is doing to be successful in level 3 or 4 situations, however. All that is required is the credibility to coordinate the strategies of different players around the preferred outcome. Netscape Communications Corporation, for example, didn't rely on deep pockets to shape Internet browser standards. Instead, it leveraged the credibility of its leadership team in the



industry so that other industry players thought, "If these guys think this is the way to go, they must be right."

Reserving the right to play is common, but potentially dangerous, in level 4 situations. Oil companies believed they were reserving the right to compete in China by buying options to establish various beachheads there some 20 years ago. However, in such level 4 situations, it is extremely difficult to determine whether incremental investments are truly reserving the right to play or simply the right to lose. A few general rules apply. First, look for a high degree of leverage. If the choice of beachhead in China comes down to maintaining a small, but expensive, local operation or developing a limited joint venture with a local distributor, all else being equal, go for the low-cost option. Higher-cost options must be justified with explicit arguments for why they would put the company in a better position to ramp up over time. Second, don't get locked into one position through neglect. Options should be rigorously reevaluated whenever important uncertainties are clarified—at least every six months. Remember, level 4 situations are transitional, and most will quickly move toward levels 3 and 2.

The difficulty of managing options in level 4 situations often drives players toward adapter postures. As in level 3, an adapter posture in level 4 is frequently implemented by making investments in organizational capabilities. Most potential players in the multimedia industry are adopting that posture today but will soon be making bigger bets as the industry moves into level 3 and 2 uncertainty over time.

## A New Approach to Uncertainty

At the heart of the traditional approach to strategy lies the assumption that by applying a set of powerful

analytic tools, executives can predict the future of any business accurately enough to allow them to choose a clear strategic direction. In relatively stable businesses, that approach continues to work well. But it tends to break down when the environment is so uncertain that no amount of good analysis will allow them to predict the future.

Levels of uncertainty regularly confronting managers today are so high that they need a new way to think about strategy. (See "Needed: A More Comprehensive Strategy Tool Kit," below.) The approach we've outlined will help executives avoid dangerous binary views of uncertainty. It offers a discipline for thinking rigorously and systematically about uncertainty. On one plane, it is a guide to judging which analytic tools can help in making decisions at various levels of uncertainty and which cannot. On a broader plane, our framework is a way to tackle the most challenging decisions that executives have to make, offering a more complete and sophisticated understanding of the uncertainty they face and its implications for strategy.

## Needed: A More Comprehensive Strategy Tool Kit

IN ORDER TO PERFORM THE KINDS OF ANALYSES APPROPRIATE TO HIGH LEVELS OF UNCERTAINTY, many companies will need to supplement their standard strategy tool kit. Scenario-planning techniques are fundamental to determining strategy under conditions of uncertainty. Game theory will help managers understand uncertainties based on competitors' conduct. Systems dynamics and agent-based simulation models can help in understanding the complex interactions in the market. Real-options valuation models can help in correctly valuing investments in learning and flexibility. The following sources will help managers get started:

- **Scenario Planning.** Kees van der Heijden, *Scenarios: The Art of Strategic Conversation* (New York: John Wiley & Sons, 1996); Paul J.H. Schoemaker, "Scenario Planning: A New Tool for Strategic Thinking," *Sloan Management Review*, Winter 1995.
- **Game Theory.** Avinash K. Dixit and Barry J. Nalebuff, *Thinking Strategically: The Competitive Edge in Business, Politics, and Everyday Life* (New York: W.W. Norton, 1991); Adam M. Brandenburger and Barry J. Nalebuff, "The Right Game: Use Game Theory to Shape Strategy" HBR July-August 1995.
- **System Dynamics.** Peter N. Senge, *Fifth Discipline: The Art and Practice of the Learning Organization* (New York: Doubleday, 1990); Arie de Geus, "Planning as Learning," HBR March-April 1988.
- **Agent-Based Models.** John L. Casti, *Would-Be Worlds: How Simulation Is Changing the Frontiers of Science* (New York: John Wiley & Sons, 1997).
- **Real Options.** Avnash K. Dixit and Robert S. Pindyck, "The Options Approach to Capital Investment," HBR May-June 1995; Timothy A. Luehrman, "What's It Worth?" HBR May-June 1997.

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