

# 2002 Ten-Year Forecast



Institute for the Future  
Corporate Associates Program

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## Introduction

**W**elcome to the Institute for the Future's 24th annual Ten-Year Forecast!

For more than two decades, our members have used the Ten-Year Forecast as a series of strategic windows into the future, allowing them to glimpse likely changes in the business landscape and anticipate the threats or opportunities that might result from them. Each year, the Ten-Year Forecast focuses on a fresh set of trends relevant for the coming decade. Even more valuable than these yearly

snapshots, however, is the accumulation of the Forecasts over the years. When our members look over several editions of the Ten-Year Forecast all at once, they can see the broader business landscape unfolding over time. In this way, our members are better able to make informed business decisions about the future.



After two years of special themes, we have returned to our traditional format with three sections: Key Forecasts of the Business Landscape, Issues, and Strategic Directions.

While we have returned to the traditional structure, however, this edition is unique in its own way. The tragic events of September 11, 2001, unfolded while we were writing this year's Forecast. The occurrence of such a wild card forced us to step back and rethink our forecasts and shift our focus in a good number of cases.

And while it is still far too early to know what the long-term impacts of September 11 will be, all of our forecasts take into account the terrorist attacks and subsequent events.

This introduction provides a brief description of the forecasts, issues, and strategies covered in the 2002 Ten-Year Forecast.

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## KEY FORECASTS OF THE BUSINESS LANDSCAPE

**O**ur key forecasts this year focus on economics, politics, labor, and energy. In light of the market bust at the turn of the century and the current recession, we pay special attention to economic matters, with three articles on that topic.

- *A Shift in Political Parameters.* In the past decade, there have been clear indications that the issues that divided the internal politics of western democracies since just after World War II no longer do so to any great degree. The old issues of great intensity—a social safety net, a respect for diverse rights, a competitive economy, and a less intrusive government—have not died, but they are not as divisive as they once were. This is largely because most political parties and the people who elect them now agree at a fundamental level that these are worthy goals of any government. As a result, we are likely to be coming into a period of political redefinition, in which we must discover the new issues that will define the boundaries of political discourse in western democracies for the next 50 years.

- *Worldwide Economic Recovery Will Take Time.* After a decade of rapid growth, the world economy has met with troubled times. During 2001, and for the first time in 30 years, each of the three largest engines of economic growth in the world—Germany, Japan, and the United States—experienced a decline of real GDP during at least one quarter. Despite the downturn, the world economy has many long-term underlying strengths. As a result, look for the global economy to bounce back during the next decade and achieve a longer-term growth rate that, while not as long as the expansion of the 1990s, will look very much like it.

- *Where Will the Next U.S. Boom Come From?* The end of the long economic boom of the 1990s, and with it the promise of a new economy built on the promise of higher long-term sustainable growth rates, came as a

shock to many. But dreams die hard, and it took the events of September 11, 2001, to finally convince a broad range of consumers in the United States that the boom had truly ended. Rising in its place is the challenge of recovery—renewing the drivers of growth to mend the tattered confidence of businesses and consumers. Important indicators suggest that the next phase of growth will follow the pattern of the previous one, although, as with the world economy, it won't be quite as deep or as long.

- *The Future of Household Savings.* The economic boom of the 1990s was at least partially fueled by confident and equity-wealthy consumers on a spending spree. Growth in consumption outpaced growth in income throughout most of the 1990s, and significantly outpaced GDP growth in the last two years of the decade. This increase in consumption, however, came at the expense of consumer savings. In fact, the consumer population overall was spending as much as it was earning by the end of the decade. With less foreign investment likely to come into the United States in the next several years, and businesses more hesitant to invest, consumer savings may be the key to the economy's health. Given current economic drivers, the economy should see enough spending and enough saving in the coming decade to remain healthy, though it will not re-create the boom of the 1990s.

- *Organizing Labor in the New Economy.* The proliferation of communications networks, the ubiquitous availability of information, and the increased capacity to process that information are breaking down the rigid hierarchies, processes, and structures that defined the industrial age. What is emerging in their place is more fluid, distributed, and weblike—with organizational structures evolving to mirror the very networks that enable their existence. Under these changing circumstances, long-term employment relationships—in which loyal employees work for a single company for most of their careers—have become the exception rather than the rule. This phenomenon is having great effects at oppo-

site ends of the labor spectrum—organized union labor and flexible contingent labor. To succeed in the new world, businesses must understand the role of organized labor in a networked economy and the new ways of structuring employer–employee relationships.

- *The Rise of Distributed Power.* After decades of false promises, distributed electricity generation looks like it's ready to become a viable consumer product in the next ten years. The convergence of more sophisticated consumers, industry deregulation, and efficient small-scale generating technology provides powerful new forces that will drive household adoption and create an alternative to the traditional electricity grid. As a result, households will become more significant players in the industry as their members gain control over the ways they use, purchase, and produce electricity. These changes will create a new energy supply chain that will redefine the industry, encouraging entrepreneurs to build new companies and sending incumbents scrambling for new roles.

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## ISSUES

The trends described in the key forecasts create issues for businesses to consider as they think strategically about the future. In this section, we explore this year's important issues: the communication of product and marketing information in new ways, the challenges of intellectual property protection and new R&D findings, the intersection of environmentalism and economics, and the importance of infrastructure and network security.

- *Providing Information: Future Trends in Package Information.* Consumers are increasingly interested in the information behind products—not just the characteristics of the products themselves, but their origins, their manufacturing and labor processes, and the specific ingredients or materials used to make the products. Such information is becoming more valuable to consumers, which creates new opportunities for companies to sell products that incorporate this information as a value-added service. Despite the promise of these opportunities, packaged goods manufacturers have had a hard time actually getting this information to their customers. Fortunately, several new technologies will reach the market in the next decade that will allow product manufacturers to efficiently and inexpensively convey large amounts of information just in time to motivated consumers.

- *Turning Customers into Advertisers.* Social network marketing—so-called “viral marketing,” because it spreads so fast and spontaneously—is becoming a holy grail for many companies. This is because of its tremendous power to get the attention of consumers and to sell products in today's crowded marketplace, oversaturated as it is with advertising messages. But viral marketing is not for every company or product. This article explores what is driving its adoption, the situations where it is most effective, and the issues surrounding its use.

- *The Challenge to Intellectual Property.* The United States' expertise in innovation has produced a wealth of benefits to society. Yet the tools we have forged to foster

innovation—the patent system and its rules of enforcement—are growing increasingly complex and have never been so open to social criticism. It will take the flexibility of a new and adaptable response by patent holders, as well as legal and political changes, to retain the widespread public support necessary for the system of intellectual property protection to function efficiently in the future.

- *The Nutrigenomics Revolution.* The genomics revolution will forever transform the impact of food on health by changing the way we produce and purchase food and nutritional supplements. Specifically, advances in the emerging field of nutrigenomics promise a new understanding of the connections between food and human health at the molecular level. This new knowledge will give a growing number of sophisticated consumers the know-how to mitigate or even prevent the onset of diseases to which they may be predisposed. In response, companies in the food industry will produce and sell a whole new range of value-added products to an increasing number of concerned consumers.

- *Environmentalism and Economics Partner Up.* Proponents of environmental protection and economic growth, long perceived as mutually exclusive, are coming to an agreement about the use of markets as tools for protecting and improving the environment. But don't worry. Environmentalists haven't abandoned Rachel Carson for Adam Smith, nor have businesses forsaken profits for good works. Instead, intellectual changes within the business, environmentalist, and policymaker communities have produced an unprecedented convergence. The result is a new business-environmentalist partnership whereby corporations and activists are cooperating in developing systems and practices that not only achieve economic and ecological goals but also reinforce each other.

- *Reducing the Costs of Infrastructure Risk.* The changes that have created today's global networked economy have made businesses increasingly dependent on the smooth functioning of the underlying infrastructure. In fact, the

infrastructure sectors themselves are highly dependent on each other. A series of events in the past decade, culminating in the terrorist attacks of September 11, 2001, have clearly demonstrated the vulnerability of these fundamental infrastructure sectors. What's clear from all the after-effects is that the future growth and productivity of the global networked economy depends on innovative ways of managing risks at lower costs.

- *Network Security: Maintaining Trust in Interconnection.* In the past decade, corporations have expanded their use of public and private information networks tremendously, enjoying increased productivity, access to new markets, and greater efficiencies with partners and suppliers as a result. More recently, however, the growing occurrences of malicious code infection, hacker attacks, and terrorist activity have heightened concerns about the vulnerability of such vast interconnected networks in general and the security of networked information in particular. As a result, corporations now face difficult technical and strategic decisions about the secure management of their internal networks and outside access to them. Such business decisions—and consumer reactions to them—will determine the evolutionary path of global computer networks for at least the next decade.

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## STRATEGIC DIRECTIONS

The ultimate goal of the *Ten-Year Forecast* is to help our members think strategically about the future. To do this, we provide valuable information upon which sound decisions can be made. In the Strategic Directions section, we offer ideas on how companies can think strategically about managing innovation and increasing corporate responsibility. Finally, we end this year's *Forecast* with a look at companies that have been doing particularly well in these troubled times, with an eye toward identifying the strategies they have employed to keep them successful.

- *The Continuing Pursuit of Innovation.* Business innovation is about putting new ideas into practice and responding to change in creative ways. For managers who have spent the past decade confronting a confusing world of rapid and disruptive change, innovation is increasingly seen as the key to successful adaptation and the main source of competitive advantage across a wide range of industries. Unfortunately, innovation is also a messy and unpredictable process that defies conventional management approaches, and leaves managers shaking their heads. Managers want answers, and all they seem to get are questions. This article tackles the three key questions: Why is innovation still so urgently needed today? Why is innovation so hard to manage? How can managers help their organizations become more innovative?

- *Doing Well by Doing Good: Corporations Respond to Activist Consumers.* In the last few years, widely publicized protests have been aimed at international organizations that conduct and support the current system of global trade. From the World Trade Organization meeting in Seattle in late 1999 to the annual meeting of the G8 nations in Genoa, Italy, in 2001, thousands of people with a variety of causes have turned up in protest. Although the protesters are small in number, and their roles as consumers play only a part in their agendas, they are the more vocal subset of a much larger group of consumers

who are acting more often on their social and environmental values these days, even when making purchases. In response to this growing cadre of what we can call “activist consumers,” multinational corporations will need to engage in socially and environmentally responsible business practices. Otherwise, they risk alienating a significant portion of their customers in the next decade.

- *Strategies That Make a Difference.* Each year in the *Ten-Year Forecast*, we highlight company strategies that can be held up as models for others. This year, the examples are a little different—they come from companies that have succeeded when all the world has fallen apart around them. These hardier, more recession-resistant strategies meet two criteria—first, as always, they take into account the underlying trends touched on in the *Ten-Year Forecast*; second, they are robust enough both to fare well through troubled times and to fuel the company's longer-term growth. We have identified six companies whose strategies meet these criteria: AOL Time Warner, eBay, GlaxoSmithKline, IBM, Target, and Tesco.

We hope you enjoy the *2002 Ten-Year Forecast*, and we look forward to working with you this year.

Greg Schmid, Director  
Maureen Davis, Program Manager

Corporate Associates Program  
Institute for the Future (ITF)  
Menlo Park, CA



# Key Forecasts of the Business Landscape





## A Shift in Political Parameters

*We have come to a major divide in the political history of the western democracies. For the past 50 years, political ideologies in the major democracies have been set by the fundamental choices made in the years immediately after World War II—choices that created institutions for mutual security and encouraged relatively open international exchange, competitive markets, and shared benefits at home. By means of transnational or-*

*ganizations such as the Bank for International Settlement (and its monthly central bank meetings), Bretton Woods, the International Monetary Fund, the North Atlantic Treaty Organization (NATO), and the World Trade Organization, the stable democracies in the richer regions of the world have supported each other and thrived.*

*In many of these democracies, the political system is based on periodic elections in which two large political par-*

*ties or coalitions of relatively equal size face off against each other and provide the electorate with opposing viewpoints on critical issues. The periodic shifts engendered by such elections have constantly renewed the ideological divide between left and right (or conservative and liberal) over the decades. But since the end of World War II, none of the ideological divisions has challenged the basic parameters put in place by the accords of the late 1940s.*

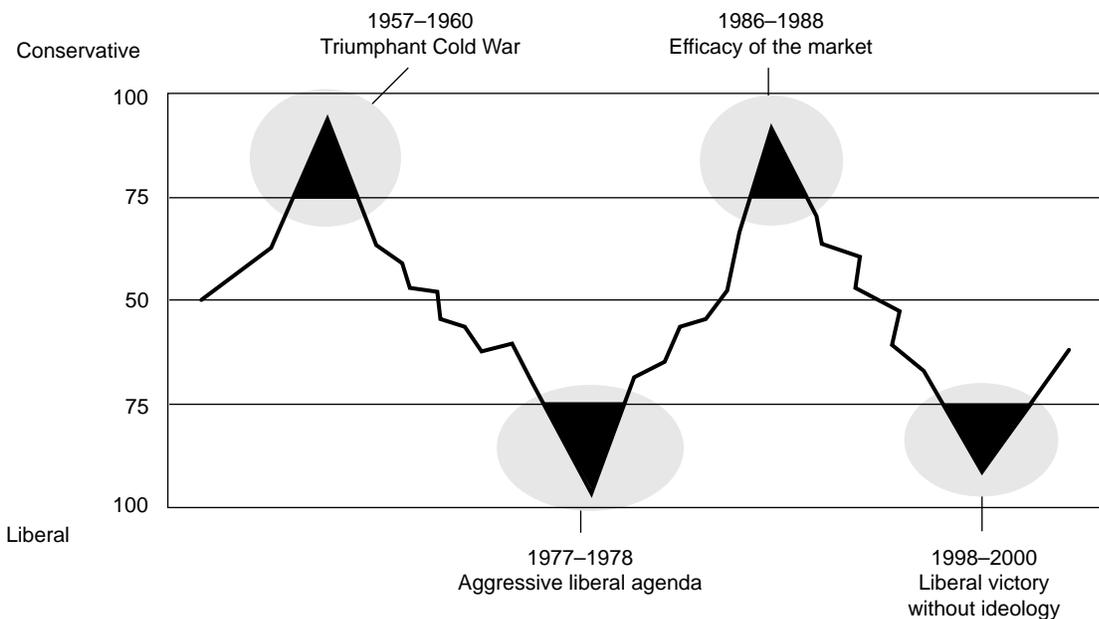
In the past decade, however, there have been fairly clear indications that the issues that divide society within these parameters have converged markedly. The old issues of great intensity—a social safety net, a respect for diverse rights, a competitive economy, and a less intrusive government—have not died, but they are not as divisive as they once were. This is largely because most political parties and the people who elect them now agree at a fundamental level that these are worthy goals of any government. As a result, with the help of unparalleled prosperity and the advent of a global economy, we are likely to be coming into a period of political redefinition. Because the old parameters no longer provide a fruitful clash of ideologies, we have to find the new issues—the new parameters—that will define the boundaries of political discourse in the western democracies for the next 50 years.

**INTERNATIONAL POLITICAL CONSENSUS:  
RARE AND NOTABLE**

In the past 50 years, international political consensus—that is, when the political parties in power in the western countries shared similar ideas—has not been the norm. In fact, there are only a few short periods in the past 50 years when the majority of these countries voted for parties that represented the same ideological position, either left or right (see Figure 1). These periods of international ideological accord are so brief and so striking that they stand out in the political history landscape. Such periods almost always signal major ideological shifts, and that’s why they deserve special attention.

Based on the criteria presented in the text box on page 6, “Measuring Politics: Finding a Methodology,” we have noted only four periods in the second half of the

Figure 1  
Convergence in the Political Landscape Is Rare



Source: Institute for the Future

20th century, of only two or three years' duration, in which parties of the same clear ideological persuasion won control of at least 75% of the decision-making institutions in the six major western democracies. Each of the first three periods signaled the rise of a clear ideology that crossed borders and brought about significant and dramatic policy changes in the countries involved. The fourth is a major anomaly and bears closer scrutiny.

### 1957–1960: Triumphant Cold War

#### *Conservative Leaders:*

John George Diefenbaker (Canada)  
 Charles de Gaulle (France)  
 Konrad Adenauer (Germany)  
 Harold Macmillan (United Kingdom)  
 Dwight D. Eisenhower (United States)

Immediately after World War II, the countries devastated by the war needed stability. With this in mind, they constructed the formal institutions of economic and political life designed to get them back on their feet economically and provide for mutual protection in the event of external attack. In this climate, conservative parties won elections by stressing stability at home; the build-up of a strong Western European defense system (NATO); and the evolution of international commerce built on a strong dollar, relatively open trade, and intra-European cooperation. The North Atlantic countries supported the formation of practical international institutions like the Bank for International Settlements, the International Monetary Fund, the Organisation for Economic Co-operation and Development, and the World Bank.

Indeed, in keeping with the Cold War theme, a generation of World War II leaders dominated domestic politics in many of the major countries of the North Atlantic throughout most of the 1950s—Winston Churchill, Anthony Eden, and Harold Macmillan in the United Kingdom from the early 1950s on; Dwight D. Eisenhower in the United States by the mid-1950s; and Charles de Gaulle in France after 1958. In addition, strong conserva-

tive allies Konrad Adenauer and Ludwig Erhard were in power in West Germany. These leaders supported the institutional apparatus of free-market economies at home, worked for the support of NATO and mutual security, and began the negotiation of accords that dropped trade and tariff barriers among their nations.

### 1977–1978: Aggressive Liberal Agenda

#### *Liberal Leaders:*

Pierre Trudeau (Canada)  
 Helmut Schmidt (Germany)  
 Harold Wilson (United Kingdom)  
 Jimmy Carter (United States)

During the 1960s, liberals were frequently found in governments (beginning with John F. Kennedy and Lyndon B. Johnson in the United States in the early 1960s and Harold Wilson in the United Kingdom in the mid-1960s), but a series of crises, sparked by the erecting of the Berlin Wall, decolonization around the world, the Vietnam War, and the OPEC oil crisis, kept domestic politics from truly dominating the political scene for a decade or more. By the late 1970s, however, two decades of relative prosperity pushed a whole new set of domestic concerns to the fore, and liberal candidates urged governments to share the benefits of prosperity as broadly as possible.

As a result, public expenditures for pensions, health care, education, child care, and aid programs for the poor all grew substantially. In the United States, such programs included Medicare and a basic national welfare act (Aid to Families with Dependent Children). In Europe, the entitlements of the national health services, unemployment insurance, and worker disability and training were all expanded substantially. There was also a growing demand for more open access to education. Government-funded universities doubled in enrollment in both Europe and the United States during this period. In addition, a spate of new legislation and litigation designed to guarantee equal rights for women, minorities, and the disabled gained mo-

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## Measuring Politics: Finding a Methodology

To measure changes in the flow of ideologies across the developed countries of the North Atlantic, we tracked the single most powerful measure of political trends—votes for major parties in national elections over a long period of time. To ensure that we captured a truly sensitive indicator of international ideological shifts, we examined votes in all the democratic countries that meet the following criteria:

- They are mature democracies, with at least 50 years of active and open voting systems.
- They have two major political parties or forces that compete in elections for effective control of government, and thus are able to articulate in their campaigns the critical ideological differences between left and right.
- They are large enough and rich enough that they are likely to influence political, economic, and social changes in other countries, and be influenced by them in turn.

Guided by these ground rules, we examined election data from Canada, France (since the formation of the Fifth Republic in 1958), Germany (West Germany until 1991), Italy (since the constitutional reforms of 1992 that fostered a direct vote for prime minister), the United Kingdom, and the United States. This essentially is the “Group of Seven” (the leading industrial countries of the world) minus Japan. Japan isn’t in-

cluded because, even though it is a large and developed country with a long history of open elections, it does not have two parties at the critical ideological divide, but rather has had effective rule by a single party with factional divisions.

Elections contested between two major parties force both parties toward the center, so ideological differences are not always sharp. Still, it is easy to identify major parties as coming from the right or the left (terms that reflect the seating in the French Assembly during the days of the revolution). The right (or conservative view) usually stands for an emphasis on stability, a slower pace of change, stronger nationalism, more economic freedom, lower taxes, and less government intervention. The left (or liberal view) usually stands for a more activist government that intervenes in economic activity to promote social goals, works to provide a safety net, and pushes for laws and regulations promoting a more egalitarian society.

We measure political change by the party in control of the significant national centers of political decision making—the parliaments in Canada, Germany, Italy (after 1992), and the United Kingdom; the parliament and the presidency in France (after 1958); and the House, Senate, and presidency in the United States. For the purposes of this argument, we concentrated on identifying major shifts in ideology across the majority of these countries at the same time.

mentum. Many laws were also enacted to protect the environment—air, water, and land.

In support of these more activist public interests, the regulatory apparatus of the government grew accordingly. In the six countries under analysis, the combination of domestic and defense expenditures, for example, pushed total government spending up dramatically between 1960 and 1980 (see Figure 2).

### 1986–1988: Efficacy of the Market

#### *Conservative Leaders:*

Brian Mulroney (Canada)

Jacques Chirac (France)

Helmut Kohl (Germany)

Margaret Thatcher (United Kingdom)

Ronald Reagan (United States)

The conservative political revolution began with the election of Margaret Thatcher in the United Kingdom in 1979 and Ronald Reagan in the United States in 1980. This revolution was built on the idea that more open markets were the key to the efficient distribution of resources, and that unfettered markets would almost always do a better job than markets burdened by government controls.

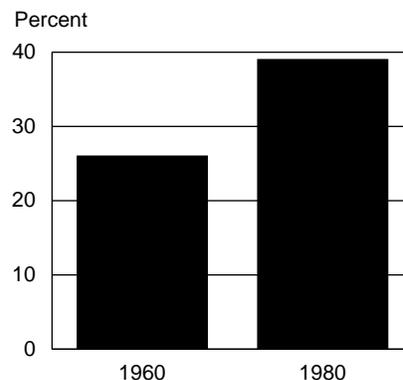
After 30 years of prosperity, the memory of the bad times of the 1930s and the 1940s had faded, and the middle class had become the largest class in society. They were more comfortable with the risks of the marketplace, and felt less need for the safety net. Indeed, many voters came to feel that effective government spending had reached its limits, and could now be slowed or even cut back. There was also an increased stress on labor market flexibility, with public discouragement of strikes and labor actions, a restriction of benefits for the unemployed, and a call for less spending on the safety net.

Although the important social programs were not dismantled completely, major efforts were made to cut the burden of taxation by limiting the government's share of GDP and reducing the role of government in other areas

by means of deregulation, privatization, and limiting expenditures on the safety net. As a result, the share of GDP going to tax receipts peaked in the mid-1980s for the countries of the Organisation for Economic Co-operation and Development and fell slightly by the end of the decade (see Figure 3 on page 8).

Many of the symbols of the old activist governments were dismantled across the North Atlantic countries. Industries crucial to the infrastructure—airlines, banks, railroads, telecoms, trucking, and utilities—that had been directly owned by the government or were closely regulated by government agencies went through profound transformations. Banks, utility companies, airlines, and railroads throughout Europe were privatized, with shares sold to the public. In the United States, rates and schedules for airlines, railroads, and pipelines were deregulated. The jobs of regulatory agencies shifted from setting rates and standards of service to encouraging new entrants into the market and pushing for lower rates for consumers. Antitrust regulations were changed

*Figure 2*  
1960s and 1970s: Activist Policies Lead to Increasing Government Role  
(Percent of GDP allocated by the government in six North Atlantic countries)



Source: Organisation for Economic Co-operation and Development, *Economic Outlook*.

to focus on competition in the wider global economy rather than just within each country.

**1998–2000:  
Liberal Victory Without Ideology**

*Liberal Leaders:*

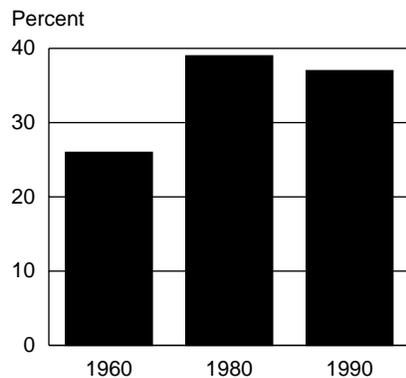
- Jean Chretien (Canada)
- Lionel Jospin (France)
- Gerhard Schroeder (Germany)
- Romano Prodi and Massimo D'Alema of the Olive Tree (Italy)
- Tony Blair (United Kingdom)
- Bill Clinton (United States)

By the late 1990s, the six countries showed a pronounced swing back to the left, or to liberal parties. In virtually every country, voters switched their allegiances. In contrast to each of the other brief periods of dominance by one of the ideological parties, however, in this shift there was no clear indication of a correspon-

ding shift in policy. Indeed, this was the only time in the post–World War II period when a major shift in votes from one side of the divide to the other did not indicate a clear shift in major ideology.

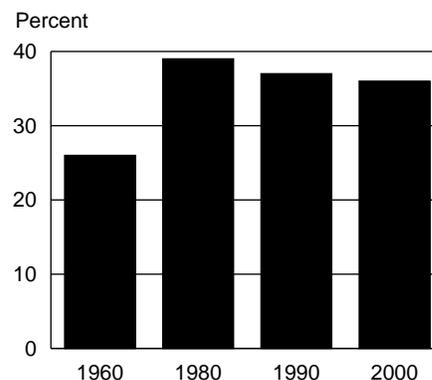
The ascension of the “new liberals” was led by Bill Clinton’s victory in the 1992 U.S. presidential election. But after the failure of his attempt to reform health care in 1993 and the Republican victories in the mid-term elections of 1994, Clinton tried something new—doing a better job than the Republicans in lowering the tax burden and pushing economic policies that promoted stable growth. Jean Chretien in Canada, Tony Blair in the United Kingdom, Romano Prodi and the Olive Tree coalition in Italy, and Gerhard Schroeder in Germany followed in Clinton’s steps by outdoing the conservatives in managing the new policy of “less government done well.” As evidence that the shift in parties was not a shift in ideology, the coming to power of this group of liberal governments had no net impact on government share of GDP (see Figure 4). Indeed, deregulation and privatization continued, and welfare reform passed.

*Figure 3*  
1980s: Returning to the Market  
(Percent of GDP allocated by the government in six North Atlantic countries)



Source: Organisation for Economic Co-operation and Development, *Economic Outlook*.

*Figure 4*  
1990s: No Noticeable Policy Change  
(Percent of GDP allocated by the government in six North Atlantic countries)



Source: Organisation for Economic Co-operation and Development, *Economic Outlook*.

### WHY IS THIS SHIFT DIFFERENT?

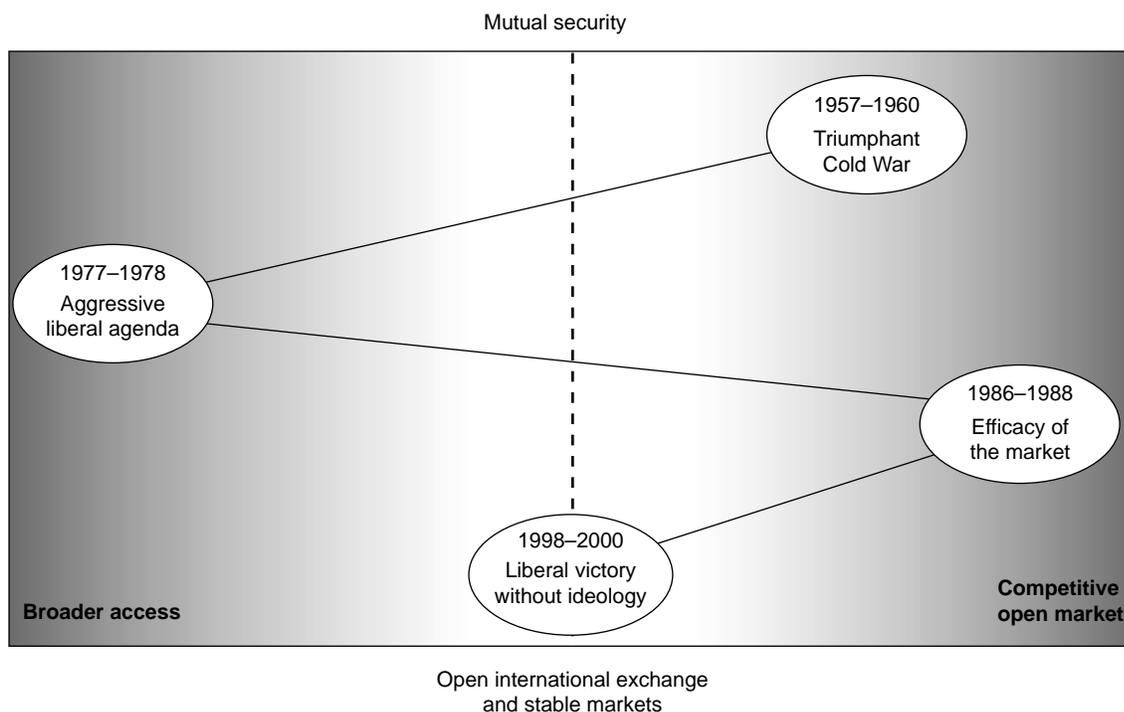
Each of the four major shifts in party ideology in the past 50 years was made within the broad parameters agreed on by the major democracies after World War II. The three tenets of the western democracies were the agreement to provide mutual protection; the establishment of the institutions that provided stability to domestic market economies; and the continual push for the expansion of open international exchange, what we've come to call globalization. The ideological disputes of the past 50 years all came within a framework in which the countries agreed on these parameters, and moved back and forth between the poles of the conservative view and the liberal view—between more competitive

markets and broader access for all to the fruits of prosperity (see Figure 5).

The first three periods of dominance by one party or another across the North Atlantic countries clearly emphasize one side of the parameters or the other—reinforcing the institutional structure for markets or broader access. The fourth and most recent period seems to have no clear point of view, a striking difference from the other three. What does this mean? In fact, it might indicate a loss of clarity in defining the ideological divide itself.

The issues that defined the divide until now—broader access and open markets—are important. But there were also a number of other potentially divisive, seminal issues that never panned out as such—for example, leaders from both sides supported containment of

Figure 5  
Ideological Conflicts Within the Agreed-On Parameters



Source: Institute for the Future

the Soviet Union (Harry S. Truman and Eisenhower, Adenauer and Johnson), decolonization (Macmillan and de Gaulle as well as Kennedy and Wilson), the formation of the European Union (Edward Heath and Schmidt), international financial deregulation (Erhard and Francois Mitterand), and central bank independence (Willy Brandt and Reagan). These issues never defined the parameters of the ideological divide because there was no debate. The answers were obvious—most people agreed on what needed to be done.

Similarly, the lack of a clear dividing issue for conservatives and liberals within the current parameters is an important signal. It indicates that there is an emerging consensus around the issues of competitive markets and the safety net; not complete agreement, necessarily, but the arguments on where trade-offs should be are becoming narrower and thus less ideologically divisive.

In this way, the liberal victories at the end of the 1990s indicate a major shift away from the old-party ideologies. The old rivalries within the parameters of the 50-year accord no longer reflect the important issues they once did. If both sides essentially agree on the issues, the debate's over. This means that active parties from left and right—liberal and conservative—have nothing to hang their ideological hats on. In fact, they must find a new debate, new sets of issues that can woo the electorate from the center. They must redefine the parameters of conservative-liberal discourse.

### POLITICS IN THE NEXT FEW YEARS

What, then, will be the new defining issues? The most likely one is a reassessment of the parameters themselves. And the most vulnerable parameter might be the one that hasn't been challenged to date—the efficacy of globalization. Indeed, a number of current issues, though not creating deep division as yet, could come to define the new political parameters around the issue of globalization. This would be the first ideological issue that would threaten the parameters of the fundamental accords the western democracies defined more than half a century ago.

Some form of the following issues may well become the defining parameters of the next 50 years of conservative-liberal debate:

- *Disagreement on the goals and means of waging contemporary war.* In the past five years we have experienced a series of wars in the Balkans, in the Caucasus, and in central Africa, as well as the recent active fight against terrorism in the United States. These battles show the vulnerability of the Atlantic Alliance to small-scale wars against forces that do not represent existing states and that fight irregular or terrorist campaigns. This type of warfare means that the opportunities for significant victories are slim, casualties may be high, and victory is poorly defined. Domestic political parties may split dramatically on how to respond to such dirty wars.

- *Disagreement on the benefits of international trade.* One of the universal truisms of the past 50 years has been the strong support for open world trade by both the left and the right. The recent demonstrations against the World Bank and the World Trade Organization, however, indicate a growing disaffection of a vocal minority with the benefits of world trade—benefits, they argue, that are not being evenly distributed among the participants, especially the poorest. Some critics also argue that economic and cultural globalization is destroying the biological and cultural diversity of the planet. (For more on this issue, see “Environmentalism and Economics Partner Up: Emerging Paradigms and Strategies.”) One of the political parties may define a new activist role that critiques the international system and either pushes for a tempering of internationalism or seeks to redistribute its benefits.

- *A revival of the natural resources issue.* Energy in general and oil in particular will continue to be important for the long-term prosperity of the western democracies for decades to come. The continual involvement of these large countries in the conflicts of the Middle East date back to the end of the 19th century, when oil was first discovered in the region. While oil is important to the west, how to maintain access to it is not clear, with tac-

tics often vacillating between cooperation and confrontation with the oil-rich countries and their neighbors.

• *Losing control of immigration.* All the western democracies have for the most part accepted immigration as a means of bringing new talent into the domestic labor market and propping up aging societies. But the pressure for an even greater movement of immigrants is strong, and the capacity to restrict such movement, even when it is illegal, is weak. As a result, there are breaking points where the negative impacts of immigration come to outweigh the benefits. In stressful times, open immigration can seem to threaten existing social order or provide support for domestic terrorism. The ideal size and scale of immigration could become a real dividing issue between political parties.

Some combination of these issues—waging war on domestic revolutionaries and terrorism, assessing the allocation of the benefits of trade, adjusting to a growing dependence on oil, and facing the consequences of high rates of immigration—could well be the source of the next big ideological divide within the western democracies. These issues would also be the first to challenge the parameters of widening international exchanges within which the liberal democracies have prospered throughout the last half-century.

### CONCLUSION: WHAT DO THE NEW PARAMETERS MEAN FOR BUSINESSES?

A challenge to the basic assumptions of the fundamental principles of western democracies will have significant implications for businesses. Indeed, much of the prosperity of the liberal democracies has been generated by the transnational companies that have built the global economy. These companies have fostered the trade, the financial flows, the exchange of ideas and intellectual property, and the flow of people across borders that have driven the rapid expansion of the economies of the developed world. From this expansion

came relative prosperity and a degree of peace, at least among the global powers.

Virtually all businesses benefit from this global economy. At some level, almost all firms either buy from international companies or sell to them. Consumers, too, rely on the products of these companies, sometimes without even knowing they are “global”—Bayer, Coca-Cola, Nestlé, and Shell Oil, for example. In the financial realm, the big banks and brokers borrow or lend to international firms; the smaller ones provide services to those that do.

If globalization becomes a divisive political issue, it will have major repercussions for the business world. A reassessment of the benefits of globalization will slow the expansion of international exchange. It will raise the cost of exchanging goods across borders, slow the movement of business people from country to country, narrow the exchange of ideas and innovation, and increase the cost of borrowing and lending money across borders.

In short, any of these developments will slow the growth of the global economy. Such a slowing of growth could well mean that the clear benefits that have flowed from an open world economy—the dynamic economic engine growing 50 to 60% faster than the economies of the individual countries, and in this way pulling those economies along with it—will be lost. Once their economies slow down, the western democracies may face even greater internal strife and larger political divides. The relative peace of the last 50 years may even come under threat.

Every company will have to think about the consequences of that loss and how to operate in a less dynamic, more dangerous, and perhaps even recessionary marketplace. Companies will have to run global networks when travel is more time-consuming and more expensive. Tight labor markets for technical expertise will be harder to overcome. And the service sector will find it harder to locate acceptable and flexible workers to keep the new economy going. Security will come with a cost.

—Gregory Schmid



## Worldwide Economic Recovery Will Take Time



*After a decade of rapid growth, the world economy has met with troubled times. During 2001, each of the three largest engines of economic growth in the world—Germany, Japan, and the United States—experienced a decline of real GDP during at least one quarter. This is the first time that has happened in 30 years.*

*The likely explanation is that the generating power of technology has dried up, at least temporarily. At the same time, consumer and business confidence in technology and the benefits of globalization have taken a series of hits from plummeting share prices, oversold visions, and the realization of the United States' vulnerability to terrorists.*

*The world economy has many long-term underlying strengths, however. As a result, look for the global economy to bounce back during the next decade and to achieve a longer-term growth rate that, while not as long as the expansion of the 1990s, will look very much like it. Specifically, the world economy will bounce back from a very low growth rate of less than 2% per year over the next few years to average 3.5% throughout the decade.*

### PATTERNS OF GROWTH

In the past decade, the world economy attained a very high rate of growth. The engines of that growth were the extraordinary surge in the absorption of foreign goods in the United States and Western Europe and the spread of new information and communications technologies across borders.

#### Growth Spread Across the World

During the 1990s, the world economy experienced its highest decade-long rate of growth in some time (see Table 1). This was true despite the sharp fall in real income in the countries of the former Soviet Union.

#### The Role of Trade

Growth around the world has been fostered by the growth in trade and investment. Exports are the simplest way of passing on the specialized products of one country to another. In the past three decades, the volume of trade has consistently contributed to world growth, having increased about 33% faster than overall world GDP (see Figure 6). Such exports bring high-quality products at relatively low cost to the world market.

### The Role of Transnational Firms

But exports don't move by themselves. It takes a huge and complex system of companies and suppliers to move raw materials and parts around the world to assembly points, and from there to final markets. Transnational companies (TNCs), originating mainly in the European Union (EU), Japan, and the United States, are the main means of organizing the infrastructure to do this. They are the engines that move operations across borders, invest in local infrastructure and transportation systems, develop patented ideas and products, and hire technical and sales people around the world.

TNCs are very practical. They do whatever works—investing money across borders, hiring local workers, purchasing local goods, manufacturing key parts, transporting partially finished products across borders, bringing them to a final assembly area, and then selling them to consumer markets nearby. Gateway, for example, one of the world's largest PC makers, purchases inputs from other TNCs like Intel, makes parts throughout Asia, and assembles and sells PCs in the United States and Western Europe.

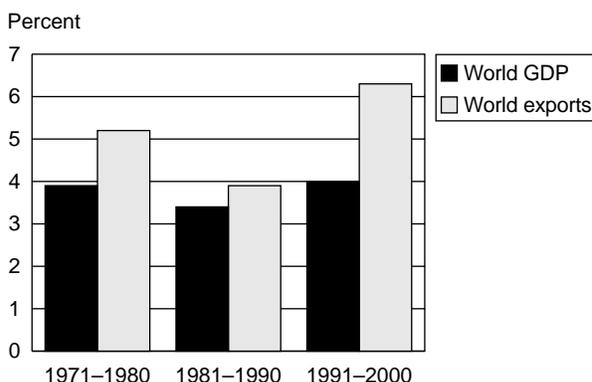
*Table 1  
Patterns of GDP Growth  
(Average annual percent increases in real GDP)*

	1971–1980	1981–1990	1991–2000
Advanced countries	3.3	3.0	2.6
Developing countries	5.1	4.1	5.4
Countries in transition*	4.0	1.8	-3.0
<b>World total</b>	<b>3.9</b>	<b>3.4</b>	<b>4.0</b>

\*Countries in transition include the countries of the former Soviet Union and the Eastern European socialist states.

Source: International Monetary Fund, *International Financial Statistics*.

*Figure 6  
World Trade Is a Solid Foundation  
(Average annual percent increase in volume)*



Source: International Monetary Fund; World Trade Organization.

By every measure, TNCs have been expanding their size and influence much faster than the overall growth of populations or world GDP (see Figure 7).

### A United States–Centered Boom

In the past decade, the United States became the center of the world economic boom. In the developed world, the United States' economy grew twice as fast as Japan's and almost 40% faster than those of the countries of the EU (see Table 2). The prime beneficiaries of the rapid growth of the last decade, however, were the economies of developing Asia.

The United States played a key role in two ways—it generated growth for other regions by absorbing goods from these other countries; and, by means of the world trade network, it spread the new information and communications technologies that drove much of the increases in productivity around the world.

#### *The United States as Importer*

The United States is the quintessential consumer nation. It is the world's largest exporter of goods, selling almost

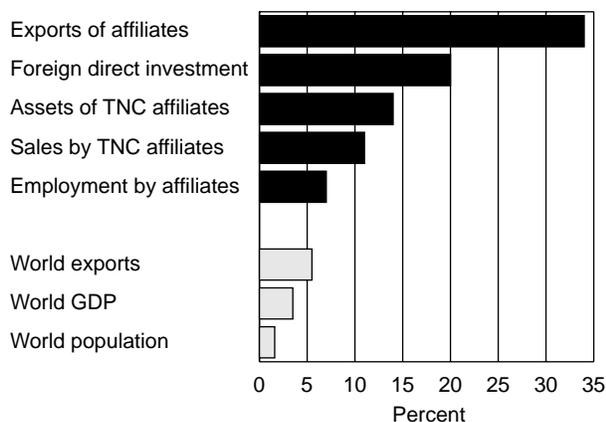
\$800 billion worth of goods abroad. But that pales beside its import bill of almost \$1.25 trillion per year.

The 15 countries of the EU together import more than the United States, but much of their trade is with each other (see Figure 8 on page 16). If we exclude intra-EU trade and look at imports from the rest of the world, the United States accounts for 26% more imports than the EU. As a result, the United States came to dominate world markets quite dramatically in the past decade, accounting for an ever increasing share of imports in that time (see Figure 9 on page 16).

#### *Technology as Leader*

The past decade saw a tremendous expansion of the role of information and communications technologies in fueling economic growth. In fact, information and communications technologies grew as a share of total world trade, from 9% in 1990 to 15% in 2000. High-tech firms specializing in information and communications were the fastest growing component of this growth, and these firms increased their share of assets, sales, and employment in foreign countries.

**Figure 7**  
*Role of TNCs Is Growing Rapidly*  
(Average annual percent increase, 1990–2000)



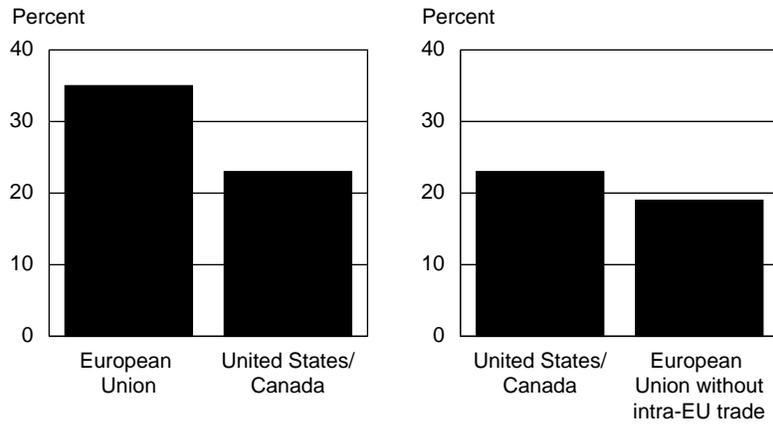
Source: United Nations Conference on Trade and Development, *World Investment Report, 2000*.

**Table 2**  
*The United States as the Center*  
(Average annual percent change in real GDP)

	1971–1980	1981–1990	1991–2000
United States	3.2	3.2	3.3
European Union	2.9	2.4	2.1
Japan	4.6	4.1	1.5
Developing Asia	5.4	7.0	7.3
Developing Western Hemisphere	6.0	1.6	2.8
Eastern Europe/former Soviet Union	3.9	3.4	4.0

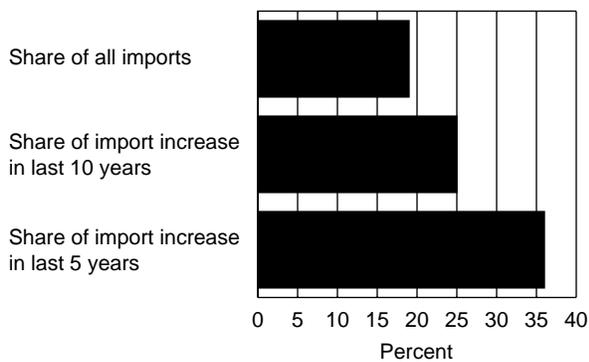
Source: International Monetary Fund, *International Financial Statistics*.

**Figure 8**  
*United States Leads World Imports*  
*(Percent of world imports)*



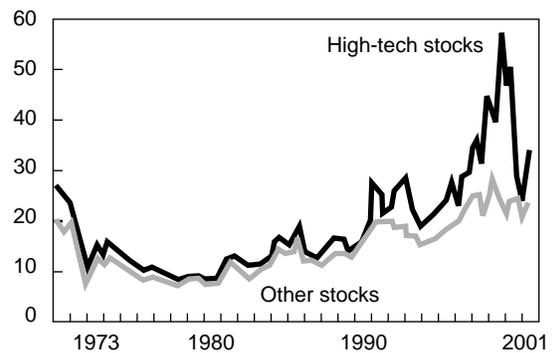
Source: International Monetary Fund, *International Financial Statistics*.

**Figure 9**  
*United States' Share of Imports Has Increased*  
*(Percent of the increase in world imports)*



Source: International Monetary Fund, *International Financial Statistics*.

**Figure 10**  
*Price-to-Earnings Ratios of High-Tech Stocks Went Through the Roof*  
*(PE ratios for U.S. equities)*



Source: *Financial Times*

The investment market jumped on the technology boom. Equity share prices of high-tech firms shot up on almost all the stock markets of the world in the late 1990s, as indicated by the huge jump of values in those markets heavily weighted by high-tech stocks, like the Nasdaq in the United States and the Neuer Market in Germany. In most cases, the value of the shares rose much faster than earnings, pushing the price-to-earnings ratio for new tech stocks to unsustainable levels (see Figure 10).

The amount of investment funds flowing into these markets was enormous. The market capitalization of information and communications companies' shares rose rapidly relative to all other shares (see Table 3).

The United States, with the world's largest share markets, the largest number of TNCs, the largest venture markets, and the highest level of R&D expenditure, was at the center of the investment boom in information technology. Through its TNCs, the United States played a key role in dispersing high-tech production around the globe and in absorbing high-tech imports. In fact, the United States annually absorbs more than 50% of developing Asia's information and communications telecom exports and more than 70% of those from Latin America. It also absorbs 36% of Japan's and 27% of the EU's exports.

## THE BIG BUST

That was then. Now we are in the midst of a major economic slowdown around the world, driven by three key trends: the end of the information technology boom, the bursting of the world share market bubble, and the worldwide crisis in consumer confidence.

### The Information Technology Bust

At the heart of the economic growth of the past ten years was a very decided boom in information and communications technology. The boom had different phases, as the flow of new products or applications continually built on previous successes—the PC, the Internet, dot-coms, mobile phones, system upgrades in light of Y2K,

consumer direct sales, and open markets for supplier contracts, among others.

But information technology investment reached its peak in the spring of 2000. The problems of implementing many of the new business models ran aground on such practical issues as logistics, customer service, delivery, cost, and limited applications for customers. As consumer interest in broadband and sophisticated mobile applications slowed, the race to build an information technology infrastructure to meet every potential need slowed down. While the failure of many dot-com startups marked the beginning of the bust, the real economic problems emerged in the PC and telecom industries.

The telecommunications industry experienced the biggest bubble and the biggest burst. As telecom companies rushed to build the infrastructure for the Internet age, they spent \$4 trillion on equipment and associated services between 1997 and 2001 in Europe and the United States. Fiber-optic lines were laid under oceans, connecting major cities around the world. New technologies were implemented that increased the capacity of existing lines. Wireless companies built separate infrastructures. Traditional, national telecom companies and newer market entrants built competing systems. The biggest task, connecting the final mile (or kilometer) to the end user, was the most expensive of all, and local

**Table 3**  
*Market Capitalization of High-Tech Companies Increased Rapidly*  
(Information technology capitalization as a share of total market capitalization)

	1990	1999
United States	18	33
Japan	11	24
Europe	9	19

Source: International Monetary Fund, *World Economic Outlook*, October 2000.

phone companies with government protection never built that final link.

The lack of growth in the end market means that today only about 1 to 2% of total capacity—the actual fiber laid or the potential in the existing cable that could be enhanced—is being used. The telecom companies' heavy borrowing means that many of the newer companies have gone bankrupt, selling off assets for virtually nothing. The traditional national telecom companies have maintained a slowly growing cash flow from their traditional base, but meanwhile they are burdened with huge debts from their Internet infrastructure ventures.

The strongest symbol of failure is the disaster in the European mobile phone market. European telecom companies spent \$109 billion on wireless 3G licenses—the third generation, which would bring broader bandwidth and constant access to wireless devices. But few applications are ready that attract consumers, and the cost of developing and implanting a set of new applications would cost another \$100 billion. Meanwhile, a recent survey found that only 4% of mobile phone users are currently interested in one of the most important new applications of mobile devices—spending money online

(down from 12% in a survey just last year). What's worse, only 2% of consumers who own 2G phones have used them for transactions so far.

There is little surprise, then, that the share value of telecom companies is down by 60%. In the six months before September 2001, companies in the telecom equipment industry cut 350,000 jobs, and their suppliers cut another 200,000. Stock market value dropped from \$6.3 trillion in March 2000 to \$2.5 trillion in September 2001. It will take an estimated two to three years to shrink manufacturing capacity enough to see steady growth in this industry again.

Other new economy infrastructure companies suffered as well. For the first time in 15 years, the sales of chips dipped in late 2001 (see Figure 11). With the economic slowdown, chip orders fell dramatically as manufacturers adapted from expected double-digit growth to running off existing inventory. Sales fell from \$18 billion in October of 2000 to \$10.5 billion ten months later.

### The Share Market Bubble

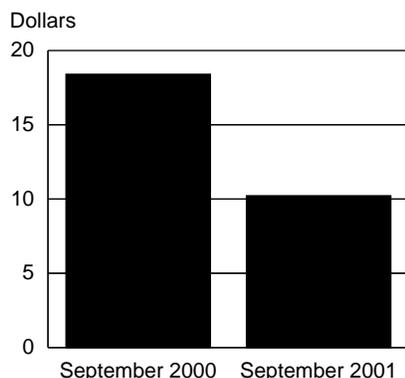
The high-tech boom had a big impact on investment, especially investment in information and communications technologies. Figure 12 shows the sharp drop in share indexes in the United States and Europe in the last year.

At the same time, investment levels fell dramatically. Those new markets that had supported the new economy—venture capital and the market for IPOs—fell the most (see Figure 13 and Table 4).

### Financial Issues

The investment market has been hit with sharp decreases in equity values. Expansion based on expected rising share prices and a more open bond and loan market for those with high share values has raised the debt burden substantially in many countries. With the coming of recession, there are fears of a growing number of bad loans and bankruptcies. Any market disturbances—such as the one we saw in the airline industry after September 11, 2001—mean that bankruptcies are even more likely.

*Figure 11*  
*Chip Sales Are Down for the First Time*  
*(Monthly sales in billions of dollars)*



Source: Semiconductor Industry Association

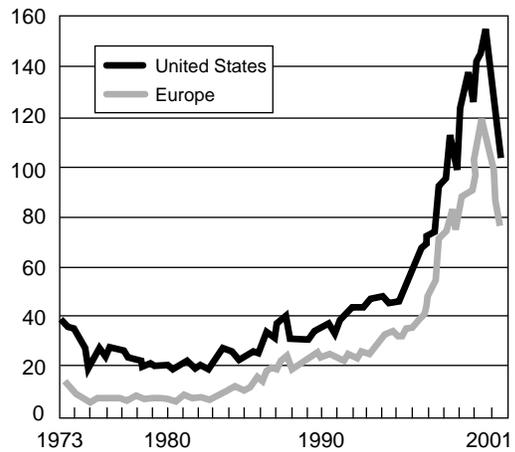
Consumers also borrowed heavily during the boom times, especially those who felt flush with wealth from equity investments. The decline in share prices has changed the longer-term expectations of many households, however, and they are beginning to lose the confidence to borrow.

### Falling Confidence

The heavy fall of the new economy was exacerbated by the terrorist attacks on September 11, 2001. Both consumer and business confidence took a dive as people waited to sort through the longer-term implications. The most grievous threat was an increased awareness of the vulnerability created by globalization—open borders and easily moved funds open countries to threats of terrorism. The large numbers of weak and impoverished states around the world provide safe havens for dissidents and terrorists.

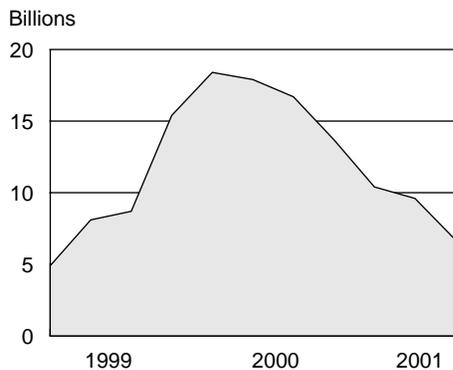
The combination of hard-hit confidence and a growing sense of the vulnerabilities of the West, particularly the United States, to terrorists may mark the biggest challenge to the continuing growth of the global economy.

**Figure 12**  
Share Prices Are Down  
(Equity market capitalization as a percent of GDP)



Source: *Financial Times*

**Figure 13**  
Venture Capital Funding Fell ...  
(Billions of dollars)



Source: PricewaterhouseCoopers Money Tree

**Table 4**  
... As Did IPOs  
(Billions of dollars)

1999	65
2000	66
2001	26

Source: Jay Ritter, University of Florida; Thompson Financial Securities.

## THE WORLD IN 2010

The global economy is threatened by the recent events for a very simple reason. The history of rapidly rising GDP around the world has been linked closely to the rise in cross-border activity. But today we live in a world

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**The sharp downturn in the stock markets of the rich countries has discouraged many of the more ambitious technical investments both in the domestic markets and across borders.**

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where the first doubts about the benefits of globalization are stirring. The very success of globalization has created problems—greater gaps between those who make it and those who don't; bitterness from those left out; the inability of weak states to maintain an environment of health and growth; deadly wars between and within weak states; and the spread of illegal immigration and even terrorism across open borders.

All of these can discourage the operation of a growing and evolving global system. There are numerous signs of friction: increasing protests at key meetings of global organizations (see “The Challenge to Intellectual Property”); persistent and deadly wars and terrorist activities in developing countries that few of the advantaged states want to participate in and that local authorities cannot control (e.g., Afghanistan, Bosnia, Chechnya, Congo, Kosovo, Liberia, Pakistan, Rwanda, Sri Lanka, and Sudan); and wider terrorist enterprises generated from the wreckage of these conflicts.

At the same time, the sharp downturn in the stock markets of the rich countries has discouraged many of the more ambitious technical investments both in the domestic markets and across borders. The slowdown will have deep implications for global trade as well. As consumers in the rich countries buy fewer things, the need

for parts and assembly plants in a variety of developing countries will decrease.

Finally, as production levels off in the rich countries, the need for new labor from other countries will fade. The sense of insecurity brought on by large numbers of visitors, students, and workers from other countries will provide some support to the slowing of more open movement across borders. Altogether, there will be less enthusiasm for global closeness.

## The Foundation for Recovery

Despite these challenges, seven positive factors remain at the core of the world economy; these will continue to provide incentives for growth in the next decade:

- *Economies of scale still matter.* Larger manufacturing enterprises can produce products more cheaply by making them in bigger batches. The ability to leverage market position through other aspects of the business, such as purchasing supplies, gaining access to capital, supporting R&D, building a brand, and distributing products, all give advantages to large enterprises. Operating across borders in multiple markets helps to build efficient scale.
- *Specialization makes sense.* For most manufacturing processes, production costs can be minimized if a company has the ability to draw on specialized resources in different parts of the world. Access to natural resources, plant sites, tax regimes, unique skill sets, and varied labor markets provide a wide range of choices in defining optimal production processes. The relatively low cost of transportation and the ease of transferring funds facilitate rational production choices as well.
- *Education and technical capacity still rising rapidly.* The levels of education in many developing countries are rising rapidly. In the developing countries of Asia, the average share of young people enrolled in secondary school has risen by almost 40% in the past 20 years. Furthermore, the number of Asian students enrolled in

colleges in the advanced countries is well over 600,000 today. Cadres of well-educated young people in the developing countries will make it easier to run domestic enterprises and easier to integrate these enterprises into the burgeoning global economy.

- *New technologies still spreading.* Global enterprises need to communicate. The rapid spread of fixed-line communications, mobile phones, PCs, and the Internet has opened the communication networks to people in a wide range of countries. In the advanced countries, about 50% of the total population are currently active users of the Internet and regular users of mobile devices. Although the gap is great, between 5 and 10% of the population in the rapidly developing countries of Asia and Latin America have access to mobile telephony or the Internet as well, and those numbers are growing. The benefits of communication are too large for these numbers not to continue to grow in the long run.

- *Global network of firms continuing to evolve.* As TNCs grow, they become more important centers of activity inside numerous countries around the world. The 100 largest TNCs, for example, account for \$4.3 trillion in sales and 13.3 million jobs, with about half of each of those in foreign countries. There has also been a rapid rise in the number of TNCs established in developing countries. They now account for a little under \$400 billion in sales and 1.1 million jobs, with about a third of each in foreign countries. These companies provide an infrastructure for continuing growth in the advantaged countries and for generating even more growth in key developing countries.

- *Numbers of sophisticated consumers growing.* Consumers in the advanced countries have become accustomed to products from around the world, whether they are American movies, Japanese electronics, Finnish mobile phones, Korean memory chips, or German automobiles. They look for brands from different countries, and they expect the cheaper prices of a global economy.

They will not be willing to give up these advantages any time soon.

- *Rapidly developing countries enjoying the benefits.* A number of foreign countries are committed to the expanding global economy and have benefited from it in

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**We expect world economic growth to dip to about 2% for two years—the first time that has happened since the early 1980s.**

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the last two decades. They include four of the largest countries in the world—Brazil, China, India, and Mexico. All will be strong supporters of the continuing spread of international trade and investment.

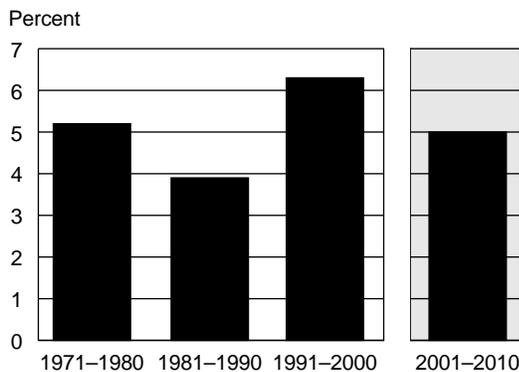
### Forecast

As we look to the future, we expect that it will take some time for the world to move through the recession of 2001–2002. With the simultaneous economic decline in the big three—Germany, Japan, and the United States—and some severe issues in key global industries like airlines and telecommunications, we expect world economic growth to dip to about 2% for two years—the first time that has happened since the early 1980s.

But growth will be strong in the long run. We expect to see the benefits of technology—especially the continuing spread of information and communications technologies and the emergence of a new biotech boom in pharmaceuticals and agriculture—continue to spread around the globe. Look for a key cadre of developing countries (including the big players of Brazil, China, and Mexico), the reviving countries of Southeast Asia, the Asian tigers, and newcomers from Eastern Europe, India, and Russia to help fuel this growth.

Trade will continue to drive the growth of the global economy. Three factors—trade, the expansion of TNCs,

**Figure 14**  
*World Trade Will Continue to Be the Foundation*  
 (Average annual percent increase)



Source: Institute for the Future; historical data from World Trade Organization, 2000.

and global financial flows—although not as buoyant as they were during the 1990s, will continue to transfer economic growth from the rich advantaged countries to the rapidly evolving developing countries (see Figure 14).

As a result, world GDP will bounce back from its slow start in the early 2000s to attain growth rates close to the average of the 1980s (see Table 5). The United States will continue to be the consumer center at the heart of the advanced countries, but developing Asia will continue to be the center of the fastest growing economies in the world.

—Gregory Schmid

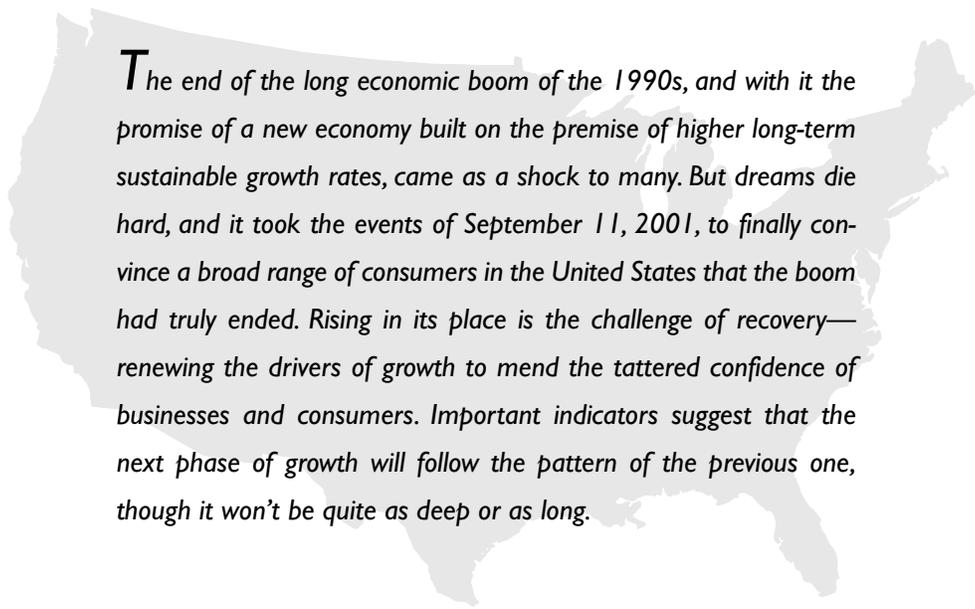
**Table 5**  
*A Revival of World Economic Growth*  
 (Average annual percent change in real GDP)

	1971-1980	1981-1990	1991-2000	2001-2010
United States	3.2	3.2	3.3	3.0
European Union	2.9	2.4	2.1	2.5
Japan	4.6	4.1	1.5	2.3
Developing Asia	5.4	7.0	7.3	6.0
Developing Western Hemisphere	6.0	1.6	2.8	3.5
Eastern Europe/former Soviet Union	4.0	1.8	-3.0	3.5
<b>World total</b>	<b>3.9</b>	<b>3.4</b>	<b>4.0</b>	<b>3.5</b>

Source: Institute for the Future; historical data from the International Monetary Fund.



## What Will Drive the Next U.S. Boom?

A light gray, semi-transparent map of the United States serves as a background for the text.

*The end of the long economic boom of the 1990s, and with it the promise of a new economy built on the premise of higher long-term sustainable growth rates, came as a shock to many. But dreams die hard, and it took the events of September 11, 2001, to finally convince a broad range of consumers in the United States that the boom had truly ended. Rising in its place is the challenge of recovery—renewing the drivers of growth to mend the tattered confidence of businesses and consumers. Important indicators suggest that the next phase of growth will follow the pattern of the previous one, though it won't be quite as deep or as long.*

**Table 6**  
*The 1990s Boom Was Fueled by Investment*  
(Average annual percent increase)

	<i>Real GDP</i>	<i>Labor Force</i>	<i>Investment</i>
1971–1980	3.2	2.4	4.2
1981–1990	3.2	1.8	3.3
1991–2000	3.2	1.3	6.9

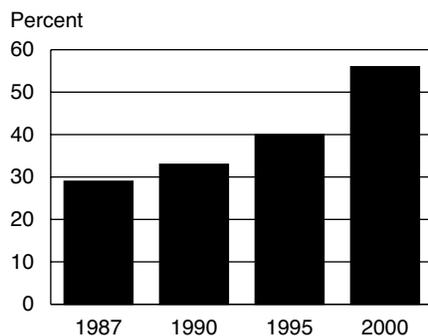
Source: Bureau of Economic Analysis, National Income Accounts; Bureau of Labor Statistics.

**Table 7**  
*Business Investment Rose Dramatically in the Last Decade*  
(Average annual percent increase in spending)

	<i>Structures</i>	<i>Equipment</i>
1988–1990	1.7	4.9
1991–1995	-2.3	7.9
1996–2000	5.4	12.3

Source: Bureau of Economic Analysis, National Income Accounts.

**Figure 15**  
*Information and Communications Technologies Were the Leaders*  
(Percent of all equipment investment in information and communications technologies, in constant dollars)



Source: Bureau of Economic Analysis, National Income Accounts.

### THE UNIQUENESS OF THE 1990s

In the 1990s, the pattern of economic growth in the United States was unique, and it therefore deserves attention for the lessons it offers. The boom lasted for ten and a half years, almost a year longer than the previous record in the 1960s.

In general, two major building blocks contribute to economic growth—labor and capital. Adding productive new workers to the economy increases real GDP; and increasing investment, either in workers’ education and training or in equipment that makes them more productive, also raises real GDP.

While the overall growth in the real economy in the 1990s was in line with the pattern of expansion of the past 30 years, the critical source of economic growth shifted from labor to capital investment (see Table 6).

A rapid increase in equipment spending fostered this unprecedented surge in investment (see Table 7). The key to that was the rapid diffusion of new information and communications technologies, the rapid expansion of R&D in these technologies, and the rapid growth of labor productivity spurred by these technologies. The growth in expenditures on information and communications equipment and software was particularly high (see Figure 15), accounting for more than 50% of all new investment, up from about 20% only 20 years before.

Although the information revolution had its roots in the 1960s, with the rapid increases in the processing power of large-scale computers, there was little notable increase in general productivity that could be tracked to that fact through the 1970s and the 1980s. It was only in the 1990s, when personal computers penetrated deeply into the workplace, were connected to each other by means of internal networks and the Internet, and were provided with a wealth of applications for both the workplace and the home, that organizations embraced the new technologies on a broad scale.

In this way, information technology became both the primary product of the expansion and the primary tool. Manufacturing firms in this sector produced hardware,

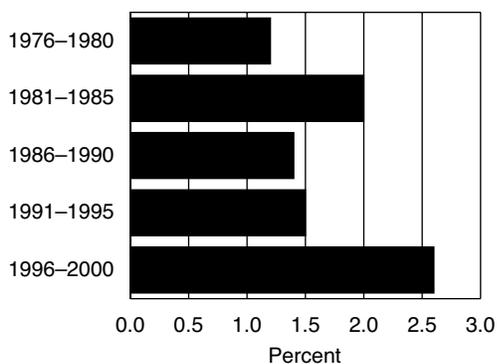
such as PCs, computer chips, routers, servers, printers, and so on, while software manufacturers produced the applications to run them and to be run by them. Operating systems, e-mail, document exchange, secure online transactions, data sharing with suppliers, customer databases, remote investments, online shopping, business auctions, logistics tracking, just-in-time delivery, marketing information centers, and online catalogs were some of the applications that helped companies conduct business in new ways. These new apps created new players up and down the supply chain, like Amazon, eBay, and E\*Trade. And they gave consumers more options for browsing, shopping, and purchasing goods and services. Thus, they speeded up the pace of economic activity overall.

As a result, information technology drove the acceleration of overall economic activity, and pundits began to talk of a new economic paradigm of unending growth. In fact, there was an extraordinary rise in productivity during the past five years that raised the average output per worker a full percentage point above the long-term average (see Figure 16). Labor productivity growth—the output per hour of all workers—jumped from a long-

term average of 1.5% per year from 1975 to 1995 to about 2.5% per year between 1996 and 2000. This means a full percentage point increase in the annual level of GDP if sustained, or more than \$90 billion in additional production each year.

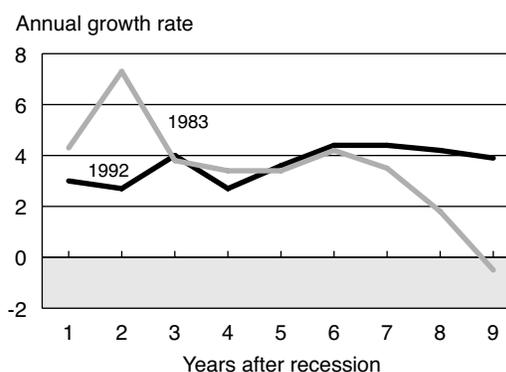
Such a shift in the productivity growth rates implied to many a permanent shift upward in the growth rate of real GDP. During the 1990s, however, it took some time for the surge in investment and productivity to have an impact on real GDP. Although the recession that started in the summer of 1990 lasted only nine months, the initial recovery from the downturn was modest at best. Usually, the economy comes roaring out of a recession to make up for lost time. From 1991 through 1995, however, the recovery was slow and hesitant, with growth on par with the long-term growth rate; in earlier boom periods, GDP would have averaged about 50% higher. It was only in 1996 that the real GDP growth increased above the longer-term average. These higher levels were sustained for the rest of the decade, creating America's longest running expansion without a recession (see Figure 17).

*Figure 16*  
*Productivity Growth Is High*  
*(Average annual percent increase)*



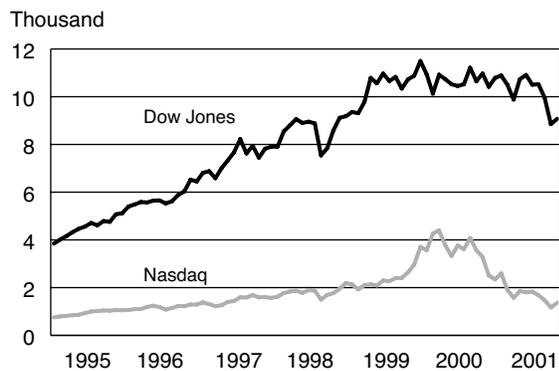
Source: Bureau of Labor Statistics

*Figure 17*  
*The Extraordinary Late Blooming Boom*  
*(Annual growth rate in real GDP)*



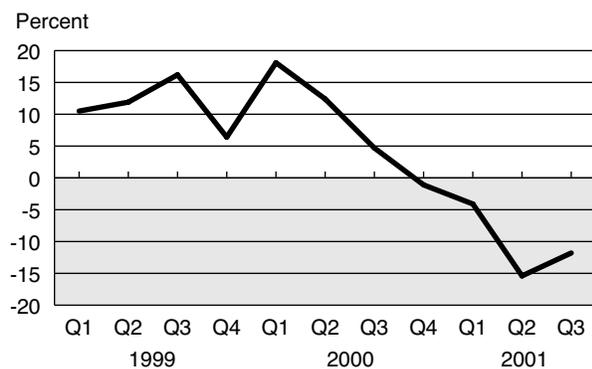
Source: Bureau of Economic Analysis, National Income Accounts.

*Figure 18  
Decline in the Nasdaq and the Dow Jones  
(Average value of indexes at end of the month)*



Source: Dow Jones; Nasdaq.

*Figure 19  
The Precipitous Fall in New Business Investment  
(Average percent change from previous period in investment in equipment and software)*



Source: Bureau of Economic Analysis, National Income Accounts.

This expansion was the foundation for the claim that we had reached a new plateau of economic growth—indeed, a new paradigm for the economy—that could be sustained indefinitely. The late arrival of the boom, the broad use of new technologies, and the rising rates of productivity created the impression that this was a new type of expansion—one that would never end.

### THE END OF THE GOOD TIMES

But they say all good things must come to an end, and the largest economic expansion in U.S. history came to its end at the turn of the millennium. The transformation of the economy into a fundamentally new paradigm was derailed when it became evident that the new technologies were not good substitutes for a host of essential business and consumer functions—logistics, travel, shopping behaviors, delivery, personal services, entertainment, and other person-to-person activities crucial to a strong economy. Consumers became frustrated by the broken promises of a better quality of life driven by the information technology engine, and the rapid gains in market share of many high-tech companies, especially dot-coms, took a nosedive.

The first real economic consequence was the collapse of high-flying technology companies—Akamai, Ask Jeeves, Boo.com, and FreeMarkets—whose business models were predicated on extremely rapid growth. When some high-growth stocks fell, the drop called into question a wide range of business models throughout the new economy. As a result, other high-tech shares fell, venture capitalists stopped putting money into new enterprises, investment banks slowed the rollout of IPOs, and business investment contracted sharply overall. By the end of 2000, the share markets had begun their long decline, and new business investment continued to fall (see Figures 18 and 19). Employment and profit growth soon followed (see Figures 20 and 21).

### A RECESSION AND THE FALL IN CONSUMER CONFIDENCE

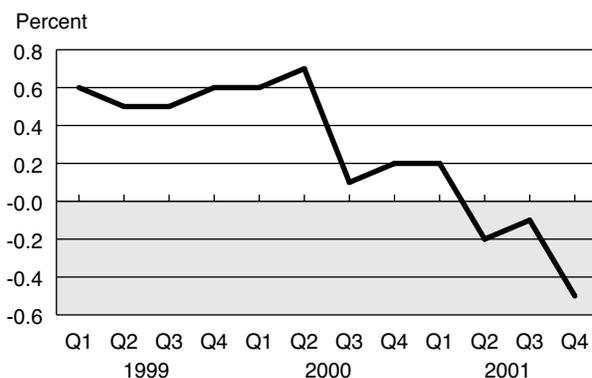
As might be expected, the result of the bursting dot-com bubble has been a recession and a big decrease in consumer confidence. The two are closely linked, as the economy runs on confidence. The tremendous surge in information technology–induced productivity, share prices, and investments throughout the 1990s had made it easier for both consumers and businesses to spend more and borrow more. Business investment is based on expectations of future sales and consumer responsiveness to new products and services. Consumer sales, the basic driver of the economy, are based on consumers' expectations about their personal financial position now and in the near term.

In the past five years, The Conference Board, a non-profit business research organization, has seen the results of its Consumer Confidence Index at or close to record levels. Consumer confidence gained ground over the course of the long boom of the 1990s and reached its peak during 2000 (see Figure 22 on page 28).

Still, while the confidence levels of the past few years were high, the average over the decade was close to the average of any decade in the past (see Figure 23 on page 28).

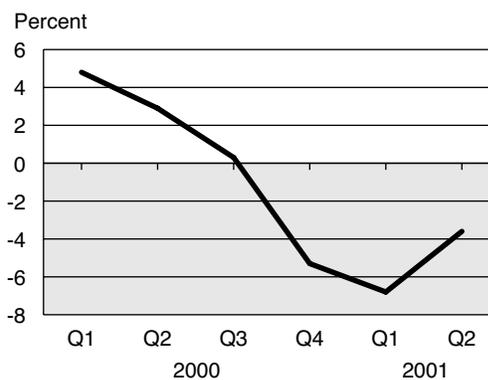
In the last quarter of 2001, however, the confidence index began to fall. It dropped from an average of 115 in the six months before September 2001 to 98 in September, and to 82 in November. Even taking into account the impact of the terrorist attacks on the World Trade Center and the Pentagon, plus the spread of anthrax, however, this level of consumer confidence is not that low by historical standards. It is far above the three-year average of 65 in the years following the Gulf War (1991–1993), for example. This suggests that consumer spending may be very resilient during the downturn and may keep sales from dropping very far in key markets

*Figure 20*  
*Job Growth Down as Well*  
*(Average percent change in employment)*



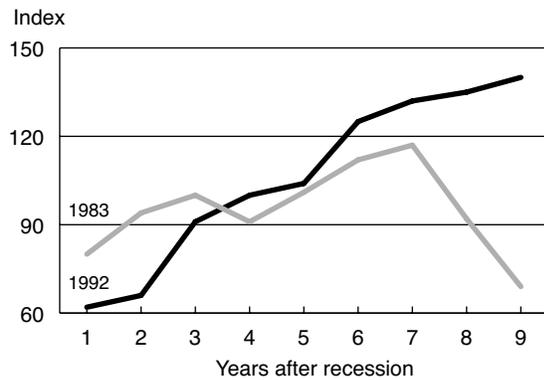
Source: Bureau of Labor Statistics

*Figure 21*  
*Profits Down, Too*  
*(Average percent change from previous period in corporate profits)*



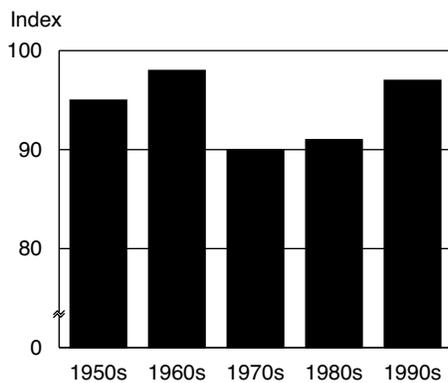
Source: Bureau of Economic Analysis, National Income Accounts.

**Figure 22**  
*Confidence Levels Take Off Slowly in the 1990s*  
 (Index 1985 = 100)



Source: The Conference Board

**Figure 23**  
*Consumer Confidence in the Last Decade Was Not*  
*Notably Higher on Average*  
 (Average for decade; index 1995 = 100)



Source: The Conference Board

like automobiles and housing. Consumer spending may be quick to rebound when unemployment fears fade and interest rates remain low.

### THE ENDURING CHARACTERISTICS OF GROWTH

The information technology bubble has burst, exacerbated by the sharp vulnerabilities and uncertainties exposed by the terrorist attacks of September 11. In determining the longer-term impact of the boom-and-bust period of the past six years, however, it is important to take a wider perspective. Broader analysis suggests that the 1990s expansion was not as revolutionary as it sometimes seemed, and that the vulnerability of the United States, as exposed by September 11, will not be as lasting as it first seemed.

In his assessment of the impact of the information technology revolution, Robert Gordon, in the *Journal of Economic Perspectives* (Fall 2000), takes just that type of a longer-term approach. Gordon points out that the overall productivity gains in the United States throughout the 1990s actually occurred in a very narrow sector—in the industries producing information technology goods for the world market.

For Gordon, the productivity gains in the late 1990s are nowhere near as broad-based as those between 1913 and 1970, when productivity rates averaged above 2% per year. During that period the economy felt the impact of a series of great inventions that truly transformed daily life (electric lights, electric motors, automobiles, airplanes, air conditioning, chemical industry products, the telephone, radio, television, and new health and sanitation technologies). These inventions fueled broad sectors of the economy in such a way that the growth couldn't be attributed to any innovation, no matter how critical.

The information technology revolution to date has not had such a striking impact on daily life and fundamental productivity outside of its own sector. Indeed, outside the durable goods manufacturing sector where information technology goods are produced, productiv-

ity gains were actually below their longer-term average. Gordon suggests that the gains in productivity were due to acceleration of the business cycle, higher investments in information technology, and improvements in durable manufacturing alone. This implies that the underlying productivity surge will stop with the bursting of the information technology bubble. Still, information technology spending will rebound and productivity growth will probably proceed at its more normal pace.

Yet, even if the recent information technology revolution was less pervasive than earlier thought, it has brought fundamental changes to the U.S. economy that will have lasting effects. Indeed, these fundamental shifts—sometimes forgotten in the fallout from the bursting dot-com bubble—will drive new products, new applications, and new markets in the future.

At least six powerful forces, which had their roots in the 1990s, will drive the next decade of technology and consumer-led growth in the United States:

- *Spending by new consumers.* Improvements in information technology have increased the share of information workers in our economy and the value of their work. Incomes of households at the upper end of the market have risen rapidly. In the past decade, average real dollar household income rose by 19%, and the share of households with incomes over \$75,000 in constant dollars rose by 37%. This trend isn't likely to change any time soon, because baby boomers are just entering their peak earning years. Those in the upper-income levels are investing a greater portion of their budgets on durable goods—like homes, automobiles, and information and communications equipment—and services, and a smaller portion on items of daily use. As incomes rise, these will be the industries that will drive longer-term growth.
- *Broad acceptance of technology.* In the past decade, and especially in the past five years, we have seen a wide acceptance of the value and usefulness of newer information technologies and their applications—mobile communications, the Internet, e-mail, and interactive entertainment, to name a few. Both workers and consumers

have come to accept these devices and the constant flow of new applications as a normal part of their lives. Indeed, using these technologies, consumers are gathering and processing more information to help them make all kinds of decisions in their daily lives. They will be looking for applications and devices that improve their lives and adapt quickly once they arrive. They will also be open to the new products of the biotech revolution—pharmaceuticals, foods, and nutritional supplements.

- *New financial markets supporting innovation.* Venture capital firms and IPOs created a new way to broaden the investment base of the high-risk capital market. Mutual funds provided an easily accessible way for institutional investors (like pension funds and insurance companies), as well as personal investors, to enter the market. These new sources of capital and the broader risks a large group of sophisticated consumers are willing to take support new, dynamic, and decentralized R&D players outside “Big R&D” that will become permanent parts of the economic landscape. There are clear indications in the continuing flow of new funds to the market that the market fall-off has not discouraged the baby boomers as they make longer-term investment decisions.
- *Flexible business responses.* The information technology innovations of the last decade have driven a marked improvement in the ability of companies to respond quickly and effectively to market signals. The labor market is more flexible, since there are fewer unionized workers and more workers are willing to work part-time and in other flexible arrangements. Retailers have better information about shelf needs and the status of goods as they move through the supply chain. Greater knowledge about the customer's experience allows better and more timely services. More responsive and faster logistics bring in-demand products to the market more quickly. Retailers have shifted space use by increasing customer space and reducing the storage space devoted to slow-moving inventories. Each of these factors contributes to a more responsive supply chain that is making consumer markets much more efficient.

- *Global network.* The ability to operate globally brings into play the comparative advantage of international markets—huge economies of scale, and a much greater pool of ideas, talents, and resources to apply to the manufacturing of products and services. Global trade has raised the level of capital available for productive ideas, has kept prices of traded goods down, and made talented workers available to those countries needing them most. All of these factors are likely to have great impacts in the coming decade as well.

- *Supportive saving.* Although personal savings dipped close to zero in the late 1990s, there should be a clear revival over the next decade in savings. Baby boomers, preparing for their retirement, will increase their savings and continue to provide funds for technology investments. (See “The Future of Household Savings: Baby Boomers Will Continue to Embrace Risk” for more on this topic.)

Each of these powerful forces will help bring us out of the recession and foster the next round of growth. While the next economic expansion of the 2000s will not be as big as the last, prosperous consumers will borrow and buy, and trade will grow.

**A MORE BALANCED GROWTH  
IN THE RECOVERY**

Once the six forces listed above kick in, they will jump-start the economy, putting it back on the road to recovery.

As mentioned previously, the key drivers of U.S. economic growth are labor, investment, and trade. In the next decade, labor will not grow as fast as it did in the 1970s and the 1980s, as the retirement of the baby boomers offsets the echo boom’s entry into the market, and the three-decade-long rise in women’s participation rates in the workforce slows down (see Table 8). Investment, however, will continue at a good pace as the promise of growth impulses in communications, health care, and even food products derived from technology resonate with the baby boomers. Still, we do foresee a less enthusiastic market, with investments falling short of the very high bubble levels of the late 1990s.

At the same time, the United States’ key role in the world economy will continue. Indeed, exports will lead the growth of the U.S. economy because an expanding world market will continue to value U.S. high-tech products, entertainment and media, and financial services. As a result, U.S. exports will continue to grow almost twice as fast as real GDP.

Given these economic drivers, look for the 2000s to echo the pattern of GDP growth of the 1990s. There will be a relatively slow recovery from the current recession

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*Table 8  
Capital and Exports Continue to Offset Some of the  
Labor Decline  
(Average annual percent increase)*

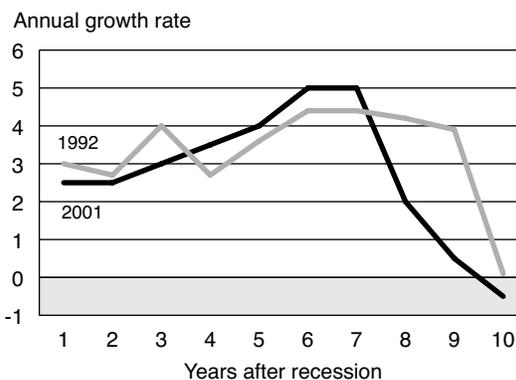
	<i>Labor Force</i>	<i>Investment</i>	<i>Exports</i>
1971–1980	2.4	4.2	7.7
1981–1990	1.8	3.3	5.6
1991–2000	1.3	6.9	7.0
2001–2010	1.0	5.8	6.5

Source: Institute for the Future; historical data from Bureau of Labor Statistics.

as confidence, consumer borrowing, and investment make hesitant comebacks. By mid-decade, however, there should be another period of rapid growth, driven by the second wave of the information technology revolution. The harbingers of this period will be the impacts of new consumers throughout the economy, the continuing spread of technology into everyday life, the biotech revolution in food and pharmaceuticals, new markets for funding the next round of innovation, flexible labor, and the growing efficiency of the world market. The expansion will not be as long-lived as that of the last decade, however, since investors won't be quite so irrationally exuberant and companies—even the next wave of innovative companies—will keep a much closer watch on the bottom line and be more sensitive to signs of excess (see Figure 24).

—Gregory Schmid

*Figure 24  
A Slow Recovery and a Shorter Cycle  
(Annual growth rate in real GDP)*



Source: Institute for the Future; Bureau of Economic Analysis, National Income Accounts.



## The Future of Household Savings: Baby Boomers Will Continue to Embrace Risk

*The economic boom of the 1990s was at least partially fueled by confident and equity-wealthy consumers on a spending spree. Growth in consumption outpaced growth in income throughout most of the 1990s, and significantly outpaced GDP growth in the last two years of the decade. This increase in consumption, however, came at the expense of consumer savings. In fact, the consumer population overall was spending as much as it was earning by the end of the decade.*

*With less foreign investment likely to come into the United States in the next several years and businesses more hesitant to invest, consumer savings may become the crux of the economy's health. It's a bit of a catch-22. If U.S. consumers see a long period of uncertainty on the economic horizon and start saving more to protect themselves, they could create a self-fulfilling prophecy and keep the economy in a long period of slow growth. But, if U.S. consumers don't curb expenditures, pay down debt burdens, and increase savings, the consequences may be even more dire: an insolvent consumer population that will not help fund needed investments.*

Given current economic drivers, what is likely to happen is this: Savings will rebound during the next few years of slow economic growth as the baby boomers belatedly prepare for retirement. At the same time, however, baby boomers are also likely to save less, maintain more debt, and hold more equity investments as they approach retirement than any other generation so far. Combined, these trends should provide enough spending and enough savings for the coming decade to keep the economy healthy, though it will not sustain the long boom we saw in the 1990s.

### AGGREGATE HOUSEHOLD SAVINGS HAVE DECLINED

The Federal Reserve calculates household savings as the difference between net acquisition of assets and net acquisition of liabilities; the savings rate, then, is savings as a percentage of disposable income. In the past decade, this measure of savings dropped sharply below its long-term trend of about 12% (see Figure 25). In fact, by 2000, the savings rate hovered near zero.

But this traditional method for measuring savings dramatically underestimates the financial health of the

consumer population, because it doesn't include capital gains from assets purchased previously. If one includes capital gains in the calculation of savings, the rate jumps to about 10% (instead of 5.3%) throughout the 1990s. In this way, the precipitous drop in savings that we've seen may actually reflect consumers' reliance on capital gains to function as savings instead of traditional income-based methods.

### HOUSEHOLDS BALANCE SHEET

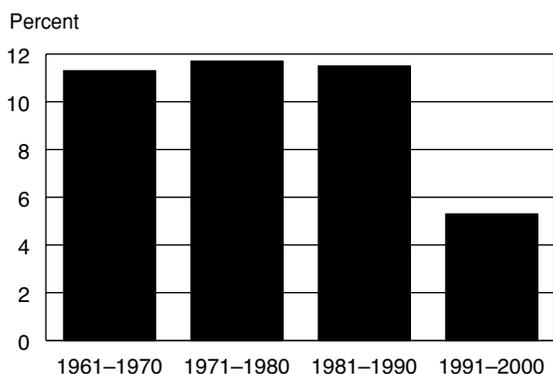
Overall, the U.S. consumers' balance sheet doesn't look as bad as one might think, given their lack of traditional savings. Indeed, households may not be saving precisely because their assets, such as houses and financial holdings, have soared in value throughout the 1990s with very little inflation, thus reducing their need to put away additional funds. And even though liabilities also increased in the 1990s, household net worth overall—total assets less liabilities—increased in that time as well, at least until the stock market lost value at the end of the decade.

### Household Assets

Financial assets held by households increased at a rate of 8.4% a year, while real estate holdings and other tangible assets increased at a rate of 5% a year in the 1990s. As consumers' coffers swelled with stock market gains, their portfolios became more heavily weighted toward volatile financial assets.

Wealthier U.S. consumers began to embrace riskier financial assets, such as equity stakes in companies, in the 1970s; easier access to retail brokers and the rise of mutual funds drove the expanding market. In the 1980s, with the advent of discount brokerages, the shift toward defined-contribution retirement plans, and the rise of the 401(k) deferred savings plans, middle-class consumers gained access to the stock market in a variety of new formats. As a result, there was a significant shift in the ratio between tangible and financial household assets (see Figure 26). As financial assets grew quickly, the

Figure 25  
Savings Rate Declined Significantly in the 1990s  
(Savings as a percent of disposable income, 1961–2000)



Source: Federal Reserve Board, data from "Flow of Funds Accounts of the United States."

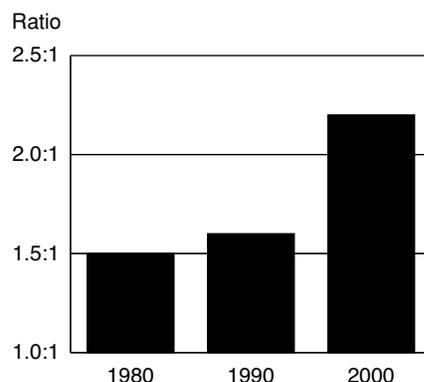
composition of assets held by households shifted to a riskier, more equity-based portfolio (see Figure 27).

### Household Liabilities

With assets rising so quickly, households felt comfortable borrowing more, and liabilities rose as a result. The baby boomers were especially aggressive. They had to pay high prices (and borrow heavily) for their homes; they were the first generation to aggressively use second mortgages to meet current needs; and they were the first generation to use credit cards daily. As a result, household liabilities—debt—increased from 70% of income in 1980 to more than 100% in 2000 (see Figure 28 on page 36).

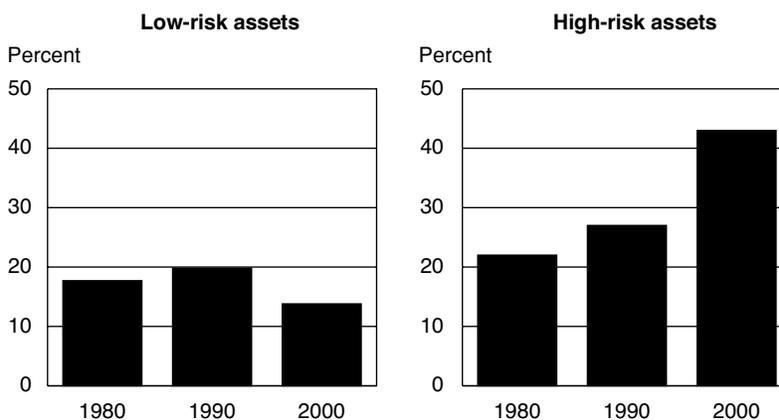
Total household debt has been rising rapidly for several decades, as the baby boomers found that they could leverage their assets to obtain housing, automobiles, furnishings, and vacations without saving the money first or dipping into their pensions or deferred savings. Like

**Figure 26**  
*Shift Toward Financial Assets*  
(Ratio of financial assets to tangible assets)



Source: Federal Reserve Board, data from “Flow of Funds Accounts of the United States.”

**Figure 27**  
*Riskier Financial Portfolios*  
(Percent of all household assets)



Note: Low-risk assets include deposits and credit market instruments. High-risk assets include directly held equities, mutual funds, life insurance and pension reserves, and bank trusts.

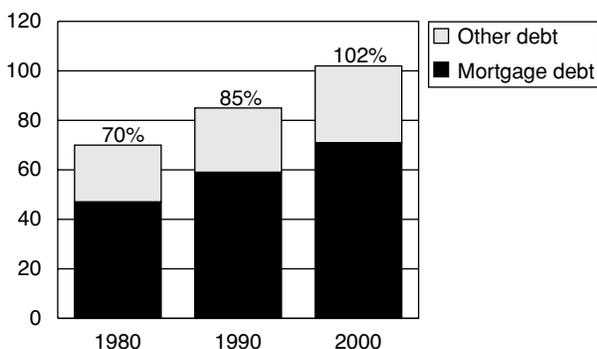
Source: Federal Reserve Board, data from “Flow of Funds Accounts of the United States.”

businesses, they found that they could use the resources as they paid for them.

By 2000, household debt actually surpassed disposable income. Housing financing was the critical component of the rising debt. Beginning in the early 1970s, the record number of baby boomers buying houses pushed housing prices up, forcing higher levels of borrowing; tax law changes limited deductibility of interest not tied to loans backed by home equity (such as credit card debt and education loans), so most people chose home equity loans to finance short-term needs; and low interest rates fueled remortgages.

As a result, consumers' debt service burden (debt payments as a percentage of disposable income) has increased with their growing liabilities. Currently, for every \$100 earned after taxes, consumers pay almost \$15 toward debt repayment. As the debt service burden grows, however, consumers become more vulnerable to economic downturns; while consumers can cut back on expenditures in the face of falling wealth, debt payments must continue through the downturns for consumers to remain solvent.

**Figure 28**  
*Total Debt Exceeds Income in 2000*  
(Debt as a percent of disposable income)



Source: Federal Reserve Board, data from "Flow of Funds Accounts of the United States."

## Household Net Worth

Despite declining savings rates and increasing liabilities, the household sector's net worth grew at an average annual rate of more than 7% from 1990 through 1999, due mainly to an increase in equity holdings. However, household net worth began to fall with the stock market in 2000. It was down 8% that year and another 10% in 2001.

The decrease in the net worth of households has significant consequences for the economy. Although consumers currently have very healthy nest eggs, the household sector's assets have proven vulnerable to swings in the stock market. Add to this the sector's increasing debt payment burden, and you have a consumer population whose financial health is increasingly dependent on the financial market's overall health. When the market is down, as it is going down now, consumers may try to regroup by tightening their purse strings and increasing their traditional savings, thus threatening to push the economy even further into recession. We think there are several important drivers that will work to increase the savings rate from its very low level in the 1990s, without carrying it dangerously high.

## DRIVERS AFFECTING THE SAVINGS RATE

The household savings rate and the overall financial health of consumers are very important drivers of the economy. Household consumption encourages and fuels business investment, while a contraction in spending signals to businesses that consumers are uncertain about their future—hence, the traditional economic worry that more savings will produce less investment. In the coming decade, several drivers will work on the savings rate, to push the savings rate up from its low point in the 1990s.

These are the important drivers that will influence the savings rate:

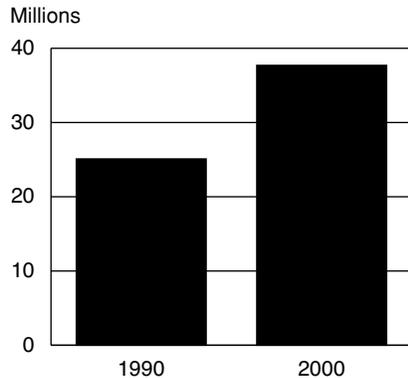
- As the baby boomers approach retirement, they will hold riskier assets later in life and will carry debt longer.
- In the short term, consumers will spend less as their net worth decreases.

### The “Typical” Household

The discussion thus far has focused on the household sector in the aggregate, which by definition weights the wealthiest households more heavily. If we look at the portfolio of the “typical household,” a household at the median, we find that such a household is not nearly as exposed to risk as the wealthiest households. However, we see the same shifts toward riskier investments taking place at the median as well. In other words, the portfolio of the median household is looking increasingly like the portfolio of the wealthier household, albeit a bit more conservative.

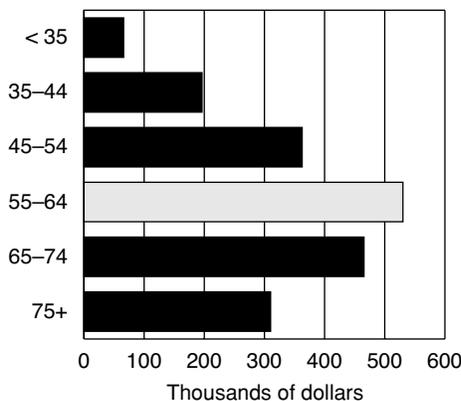
In 1989, the typical household owned only three types of financial assets—a checking account, a savings account, and a deferred-income retirement account. Less than one-third of households owned any type of company equity. Throughout the 1990s, however, asset ownership shifted away from many types of traditional investments—CDs, savings bonds, cash-value life insurance, and other bonds—as the returns on these investments became relatively less attractive than other readily available investments such as mutual funds. Indeed, mutual fund ownership, direct stock ownership, and tax-deferred retirement accounts all increased as a share of households financial assets. During the past decade the share of households that held a portion of their financial assets in stocks and mutual funds grew from 32% to 49%.

**Figure 29**  
*Big Wave of Boomers Is Approaching Retirement*  
 (Millions of people ages 45 to 54)



Source: U.S. Census Bureau

**Figure 30**  
*Net Worth Peaks Just Before Retirement*  
 (Total household net worth, in thousands of dollars, by age of head of household)



Source: Federal Reserve Board, Survey of Consumer Finances, 1998.

- Interest rates can't go much lower to stimulate the economy.
- Baby boomers will receive a “forced savings” in the form of houses and other wealth passed on to them by their parents.

**Baby Boomers Face Retirement**

The baby boomers have always handled money differently from their predecessors. They made more of it, invested more of it, borrowed more of it, and they are more highly leveraged. The baby boomers adopted credit cards en masse, invested directly and indirectly in the stock market, embraced defined-contribution versus defined-benefit retirement plans, and refinanced their homes to leverage equity. Because baby boomers make up such a large portion of the population, as they move through their highest earning years and into retirement, their behavior toward consumption and savings will have a significant effect on the economy overall (see Figure 29).

Typically, in the decade or so before retirement, consumers save more as they prepare for life without wage income. In fact, total net worth generally peaks in the years between 55 and 64 (see Figure 30). During these years, investment portfolios traditionally become more conservative as the time frame for savings shrinks and households start to liquidate their riskier assets. Consumers pay down the debts they accumulated earlier in life, such as mortgages, and use credit cards less often for big-ticket items like furnishings, appliances, and vacations.

But with a longer life expectancy, higher incomes, greater earning capacity for more years, and a higher tolerance of risk, baby boomers are likely to act differently from past generations as they approach retirement. They will continue to invest in the stock market instead of switching to more traditional, safe investments, for ex-

ample; they will continue to carry debt instead of paying it down; and they will continue to leverage their assets.

#### *Keeping Riskier Assets Later in Life*

Already, we've seen evidence that consumers are keeping riskier portfolios later in life. This will be especially important for the large number of baby boomers entering the years of maximum investment. First, we look at the share of households with riskier financial investments (directly held stock; stocks held in mutual funds; retirement accounts; trusts and other managed assets; and corporate, foreign, and mortgage-backed bonds) by age over the decade from 1989 to 1998. The share of households holding risky assets in both the 55-to-64 group and in the 65-to-74 group increased substantially in that time (see Table 9).

The total share of financial assets held in risky investments also shows a shift in the older age groups. In 1989, the 45-to-54 group was the most exposed to high-risk financial assets. By 1998, however, the 55-to-64 group was the most exposed, with these assets making up 60% of the group's total. Essentially, the share at risk in that age group doubled over the decade (see Table 10). Even the very old kept at least half their financial assets in shares and mutual funds. As the boomers enter this age bracket, their sheer numbers will have a big impact on the risk spread of household assets altogether.

#### *Continuing to Carry Debt*

In addition to investing in riskier assets, the older age groups also continue to leverage their assets and carry debt. Mortgages are especially significant because of their large sums, the rising costs of homes, and the pattern of settling down later in life that the baby boomers initiated. In 1989, only 37% of people ages 55 to 64 had an outstanding mortgage; by 1998, half of this age group still carried one (see Table 11 on page 40).

**Table 9**  
*Older Households Already Have Riskier Assets*  
(Percent of households holding risky financial assets, by age)

	1989	1998
Under 35	23	41
35-44	39	57
45-54	42	59
55-64	36	56
65-74	27	43
75+	26	31

Source: Federal Reserve Board, Survey of Consumer Finances.

**Table 10**  
*Older Households Are Growing More Exposed to Risky Assets*  
(Percent of financial assets held in risky financial assets, by age)

	1989	1998
Under 35	20	44
35-44	34	56
45-54	38	58
55-64	30	60
65-74	28	53
75+	29	50

Source: Federal Reserve Board, Survey of Consumer Finances.

As we've seen, the older age groups are maintaining riskier assets and a more leveraged portfolio than previous generations. As the baby boomers enter these age groups and approach their last decade or so of full-time work, they will face a different set of considerations than their predecessors.

For one, they have a realistic expectation of a longer and more active life in retirement, which both reduces the impact of short-term risks in equity stakes and increases the total dollar amount necessary for retirement. Having had children later in life, baby boomers may also have substantially higher financial obligations—that is, college tuition—as they near retirement.

To meet these greater needs, the baby boomers will have to do things differently once they reach retirement. Fortunately, they are equipped to do so. For example, in case of financial need, retired baby boomer workers—half of whom are knowledge workers—will have higher pensions and more financial assets than previous retirees to draw from. In addition, they will have better job prospects than blue-collar retirees, including part-time or consulting opportunities. Knowledge work typically is easier to do

physically and more enjoyable than other types of work, and is often more rewarding for the aging worker.

Baby boomers will also be more savvy in their investments, even as they age. They have experience with many financial instruments not available to the generations before them—IRAs, defined-contribution retirement plans, mutual funds, credit cards, and easy remortgaging. And overall, they have a higher level of comfort with financial risk. The trends toward carrying more debt later in life that we've seen already in the older age groups will be exacerbated as the baby boomers age.

### Consumers Experience the Downside of Risk

The recent downturn in the stock market has exposed consumers to the other side of high-return investments—high losses. This experience will lead them to raise their current savings slightly, but not to pre-1990 levels.

Typically, a consumer's wealth-to-income ratio follows the opposite path of the savings rate. It's generally agreed that a sustainable one-dollar increase in wealth boosts consumption by 3 to 5 cents over time. The opposite should hold true as well—if assets shrink and the change is believed to be fairly permanent, consumption may be cut by a similar amount. As household wealth is increasingly linked to the stock market, a downturn in the market should stimulate savings as households work to recover their wealth. While consumption is typically a bit “sticky downward”—that is, it takes a little while for consumers to taper off their expenditures when facing a decline in wealth—we expect consumers to begin to curb expenditures in favor of savings. During 2001, just months after the soaring stock market began to falter, in fact, the household savings rate already showed signs of a rebound, jumping to more than 4% by the middle of 2001, from almost zero in 2000. It remains well below trend lines, though, as consumers continue to keep one eye on their asset position and the other on the need to make debt payments.

*Table 11*  
*Carrying Debt Later in Life*  
*(Percent of households with outstanding mortgage debt, by age)*

	1989	1998
< 35	35	33
35–44	58	59
45–54	58	59
55–64	37	49
65–74	22	26
75+	6	12

Source: Federal Reserve Board, Survey of Consumer Finances.

### **Lower Interest Rates Can't Continue to Stimulate Spending**

Throughout the late 1990s, the Federal Reserve watched the economy very closely, raising interest rates when it felt that too much spending would stimulate inflation, and lowering interest rates when it sensed spending had slackened. Recently, the Federal Reserve has been particularly proactive, very aggressively moving interest rates lower as the economy cooled and the stock markets fell. As a consequence, interest rates are currently very low, designed to entice consumers and businesses to continue borrowing and spending.

But there are clear signs that the Federal Reserve has lowered interest rates as far as it can. If consumers see falling rates as a public sign of recession, will they further curb their expenditures and start saving more of their income in fear of worse to come? And can the Federal Reserve continue to lower short-term interest rates and risk higher inflation, or at least expectations of inflation that will keep longer-term rates and mortgages high? If current efforts backfire, the Federal Reserve may have run out of weapons with which to fight, and low interest rates will do little to stimulate more consumer borrowing.

### **Baby Boomers Benefit from "Forced Savings"**

Another interesting factor will increase baby boomers' assets and net worth overall. The baby boomers will benefit from a form of "forced savings" that the housing market has placed on them in the last few decades.

The baby boomers' eruption into the housing market since the early 1970s pushed up housing prices dramatically in high-employment metro areas. Of course, the houses of the parents of the baby boomers went up in value as well, though the parents who had purchased those houses earlier never had to pay the higher prices. It is estimated that as the parents of the baby boomers pass

away over the next 15 years, they will leave as a bequest to their children up to \$15 trillion in assets, much of it in the form of housing paid for long ago at much lower prices. This money will flow back to the baby boomers, who over the years have had to pay much higher costs for housing than their parents did—an intergenerational form of forced savings that will benefit the baby boomers in the years to come. This eventuality will also benefit the economy by allowing baby boomers to pay off some of their debt and to increase their savings without hindering their spending.

### **THE NEXT TEN YEARS**

**A**s the baby boomers look forward to their retirement, which should begin in earnest by 2005, we expect them to step up their overall savings. We do not expect baby boomers to act like traditional near-retirees, however. In general, they will continue to invest in the equity market, whether directly or indirectly, instead of relying exclusively on less risky alternatives, such as CDs, the bond market, or retirement annuities. Despite the recent volatility in the stock market, the long-term shift toward a riskier portfolio isn't going to reverse itself; rather, it is likely to increase as the reality of retirement approaches—the baby boomers will need more money for more years than previous generations.

Too much savings, or a jump in the savings ratio at the expense of purchases, would bring a sharp contraction in expenditures, such as the one that has bedeviled Japan for the past decade. This could push the economy into an extended period of slow growth. But some increase in savings is virtually a necessity for continued economic health, as the incredible stock market boom of the 1990s fades into memory. High spending levels funded by debt that is itself backed by volatile assets is not a sustainable situation for the economy, especially as a significant wave of consumers heads toward retirement.

It will take some years to completely restore confidence in the stock market as a steady provider of asset growth. As a result, the end of the market bubble (and its rapid asset increase without any contribution from savings) and the aging baby boomers (who will put aside a slightly larger portion of their income for personal retirement spending) will contribute to a rising savings rate overall (see Figure 31).

Savings will likely rise and savers will use traditional “safer” investments, such as money market funds, bonds, and blue chip stocks. At the same time, it also seems clear that the portfolio adjustments that have taken place over the past decade will continue. Most baby boomers, as they continue to invest, will keep a share of their portfolio in equity investments, and probably at least a portion of that equity in higher-risk investments, such as science and technology funds. As a

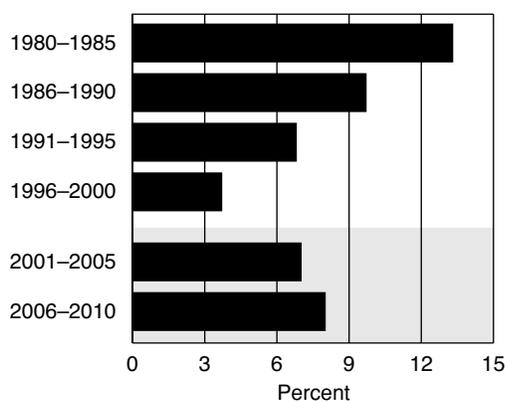
result, at least some risky assets (that have the potential for longer-term rapid growth) will be a part of the baby boomer portfolio even later in life.

For the economy, the higher savings rate will mean that more money is available for investing to offset some of the negative forces at play. A substantial amount of foreign investment flowed into the United States during the 1990s to take advantage of the equity market boom. Foreign investment is not likely to be as high during a period of more modest share market growth. The availability of funds generated by more savings will be good news for business investors in the United States. At the same time, baby boomer investors are not likely to pull as much of their money out of the stock market just as they retire, as previous generations would have, which should keep the stock market growing, albeit more slowly than in the 1990s.

It remains to be seen how well the baby boomers will fare in retirement. For the most part, they are a group of well-educated, sophisticated, and savvy consumers who have carved new paths through life, and financial planning has certainly been one of them. In retirement, they have certain luxuries not afforded previous generations, including higher earning potential and longer expected health, and many will receive significant inheritances from their parents. But they aren’t saving in the traditional manner for their years without wage income, and they will continue to keep a significant portion of their assets in riskier investments. This behavior will help support business investment over the next decade. Therefore, any negative effects on the economy of the growing savings rate will be largely ameliorated by a relatively strong stock market supported by baby boomers’ continuing investments.

—Harriet Ragozin

*Figure 31  
Household Savings Rebounds  
(Savings as a percent of disposable income)*



Source: Institute for the Future; Federal Reserve Board, data from “Flow of Funds Accounts of the United States.”



## Organizing Labor in the New Economy

*The proliferation of communications networks, the ubiquitous availability of information, and the increased capacity to process that information are breaking down the rigid hierarchies, processes, and structures that defined the industrial age. What is emerging in their place is more fluid, distributed, and weblike—with organizational structures evolving to mirror the very networks that enable their existence.*

*In these new organizations, the roles of workers are no longer fixed. Work is no longer limited to a physical place like an office or a plant, job descriptions change as projects come and go, and new skills must be acquired on an ongoing basis. Under these changing circumstances, long-term employment relationships—in which loyal employees work for a single company for most of their careers—have become the exception rather than the rule. Workers are becoming dynamic organisms that influence the shape of emerging organizational structures by their interactions with them.*

This phenomenon is having a great effect at opposite ends of the labor spectrum—organized union labor and flexible contingent labor. At one end, large numbers of individual workers are organized to bargain collectively to protect the group’s shared interests. At the other end, individuals act as independent agents providing services in temporary arrangements with no guarantee of benefits or job security. In the future, new arrangements and new rules for governing the employer–employee relationship will emerge to support emerging organizational models. To succeed in the new world, businesses must understand the role of organized labor in a networked economy and the new ways of structuring employer–employee relationships.

### DECLINE OF UNIONS, RISE OF INDIVIDUAL WORKERS

Two trends taking place at different ends of the U.S. labor market are indicative not only of the continuing transition from an industrial to an information-based economy but also of the new demands placed on work-

ers and the organizations that represent their interests in the new economy. The decline in union membership, in combination with the rise in the number of individual contingent workers (e.g., freelancers, contractors, and temporary workers), seems to mirror trends in the consumer and business markets. These trends reflect the growing importance of individuals as the locus of decision making. Indeed, whether consumer, client, or employee, it is the individual, as opposed to groups or the mass market, that is playing a much larger role in shaping marketplace dynamics.

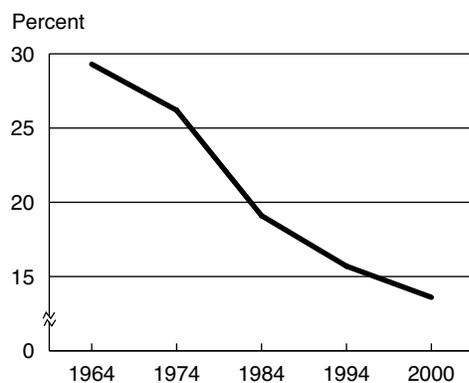
In the case of the labor market, this means that the terms of employment are increasingly negotiated at the level of individual workers rather than in collective bargaining arrangements. As a result, businesses have increased access to more flexible labor while workers are taking on more risk for the possibility of bigger rewards. But more risk means less job security, less protection of workers’ interests, and less access to employment benefits. That’s the thin line walked by labor in the new economy.

#### Unions: Losing Members, Losing Influence

In the past 40 years, there has been a slow yet steady decline in membership of labor unions in the United States. In fact, unionized workers now make up slightly less than 14% of all U.S. workers, down from nearly 30% in the 1960s (see Figure 32).

This decline may be attributed in part to significant job growth in mostly nonunionized sectors, particularly sales, services, and technical support (see Table 12). Indeed, the heaviest concentration in union membership is in industries in which employment growth has been slow—heavy manufacturing and government workers. Up to 40% of workers in these occupations are labor union members. In the fastest growing occupational groups, union membership remains low. Moreover, figures by major occupational categories mask differences in growth rates of specific occupations. For instance, although the data suggest that about 20% of workers in professional specialty occupations are unionized, a diverse array of workers is included in this group, from in-

Figure 32  
Union Membership in Decline  
(Percent of union participation in nonagricultural sectors)

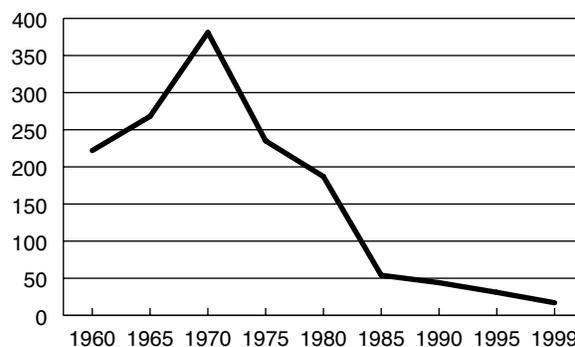


Source: Barry T. Hirsch, David A. Macpherson, and Wayne G. Vroman, “Estimate of Union Density by State,” *Monthly Labor Review*, July 2001.

formation technology professionals and engineers to lawyers and teachers. Thus, groups of workers that traditionally are highly unionized, such as teaching professionals, are grouped together with people in largely nonunionized professions that are experiencing rapid growth, such as information technology professionals.

Historically, the influence of labor unions in the marketplace could best be measured by the effective use of work stoppages as a means of gaining concessions. By this measure, there is evidence that the influence of unions is waning (see Figure 33). Although there still are a few high-profile labor disputes each year, such as the work stoppages in the last few years initiated by pilots against major airlines such as American, Delta, North-west, and United, or the 1997 UPS strike in which tens of thousands of workers walked out, it appears that unions are losing ground. For example, the 1999 dispute between the Allied Pilots Association and American Airlines resulted in one of the largest fines ever levied against a U.S. labor union. In February 2001, the Supreme Court refused to overturn

*Figure 33*  
*Unions Losing Influence*  
*(Number of work stoppages)*



Source: U.S. Census Bureau, *Statistical Abstract of the United States: 2000*.

*Table 12*  
*Job Growth Is Higher in Nonunionized Employment Sectors*

	<i>Percent Growth in Employees, 1988–1998</i>	<i>Members of Unions (Percent, 1999)</i>
Professional specialty	32	20
Technicians and related support	28	11
Marketing and sales	24	4
Services	22	13
Executive, administrative, and managerial	20	6
Government workers	14	37
Administrative support	10	12
Operators, fabricators, and laborers	9	21
Precision production, craft, and repair	9	22

Note: Service occupations not including protective services.

Source: Bureau of Labor Statistics

the \$45.5 million fine against the Allied Pilots Association for failing to end a pilot sick-out quickly, which resulted in an estimated \$250 million loss for the airline.

Many academics and labor market analysts have studied the effectiveness of unions and their relationship to businesses. Several suggest that, as unions make more aggressive demands in negotiations with management, they have more detrimental effects on the business. For instance, Harvard professors Michael Kremer and Benjamin Olken, in their paper, “A Biological Model of Unions,” maintain that unions with more moderate wage policies allow their firms to survive longer in the marketplace. They suggest that these moderate unions have a competitive advantage over unions that are more aggressive in their demands, since accommodating such demands can lead to increases in the failure of the unionized firms.

Take the Teamsters’ dispute with UPS in the summer of 1997, for example. Disagreements over the use of part-time labor shut down UPS’s delivery fleet for more than two weeks. The strike was considered a victory for the Teamsters, who drew concessions from UPS on virtually every one of its demands. However, over the

course of the following year, it is estimated that more than 10,000 union jobs were lost due to layoffs resulting from UPS’s attempts to recover its losses.

Perhaps as a result, unions are taking a more moderate stance in their negotiations in order to sustain union–firm relationships in the long-term. However, more moderate bargaining positions could make the option of joining a union less attractive for workers, fueling a further decline in membership. Labor unions facing this catch-22 situation must develop new strategies to remain relevant in the new economy. The good news is that opportunities may be emerging in unlikely places.

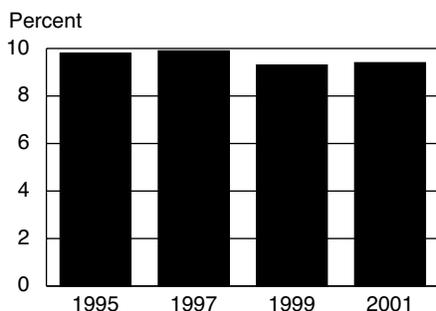
### Individual Workers: Masters or Servants?

In the past several years, there has been much discussion of the rise of flexible workers—individuals who are not dedicated to a specific employer but rather are independent agents who are self-employed, working on a contract basis, or engaged in temporary or on-call work. In 1995, researchers at the U.S. Bureau of Labor Statistics began tracking the number of workers engaged in such alternative arrangements—including independent contractors, company contract workers, on-call workers, and temporary-help agency workers. By the bureau’s estimates, almost 10% of U.S. workers are employed in such arrangements, with that number holding steady between 1995 and 2001 (see Figure 34).

Other analysts are much more optimistic, however. A recent *Financial Times* article reported, “One in four Americans is now employed as a freelancer.” Because of such discrepancies, researchers recognize the need for additional study. What they do know is that flexible alternative work arrangements are more common in industry sectors experiencing rapid growth, and that these arrangements are projected to continue to grow in the next decade, most notably in services (see Table 13).

Although the jury is still out on the prevalence of alternative work arrangements, there is significant evidence that individual workers are at a serious disadvantage in getting access to health insurance and pension coverage (see Figure 35). Flexible individual workers engaged in

Figure 34  
Alternative Work Arrangements: Holding Steady  
(Percent of total employment)



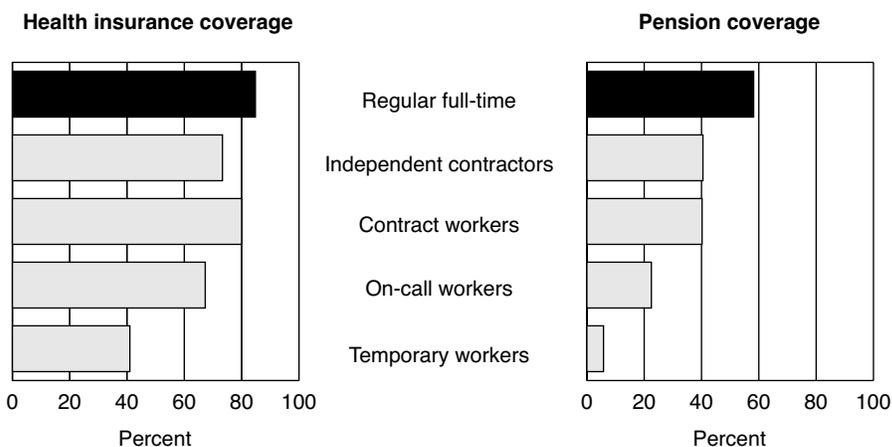
Source: Bureau of Labor Statistics, “Contingent and Alternative Employment Arrangements,” February 2001; Marisa Di Natale, “Characteristics of and Preference for Alternative Work Arrangements, 1999,” *Monthly Labor Review*, March 2001.

*Table 13  
Flexible Work Arrangements Meet Employment Challenges in High-Growth Industries*

	<i>Employment (Percent change, 1998–2008)</i>	<i>Flexible Work Arrangements (Percent, 2001)</i>
<b>Services</b>	<b>27</b>	<b>45</b>
Transportation and public utilities	14	7
Fire, insurance, and real estate	13	8
Wholesale and retail trade	12	11
Construction	9	16
Agriculture, forestry, and fishing	5	4
Manufacturing	-1	7
Mining	-19	<1

Source: Bureau of Labor Statistics

*Figure 35  
Individual Workers Have Limited Access to Health and Retirement Benefits  
(Percent of workers in each category with ...)*

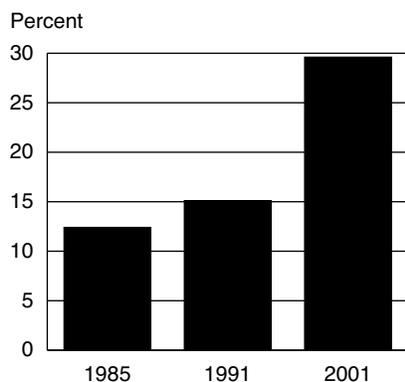


Source: Marisa Di Natale, "Characteristics of and Preference for Alternative Work Arrangements, 1999," *Monthly Labor Review*, March 2001.

alternative work arrangements are much less likely than regular full-time employees to participate in employer-sponsored benefits such as 401(k) plans, continuing education courses, and profit sharing. Indeed, temporary workers, who provide unskilled labor in mostly administrative support and manufacturing positions, are the least likely to have access to these benefits. Meanwhile, independent contractors and contract workers who provide firms with highly skilled labor at the professional or managerial levels are at only a slight disadvantage compared to full-time employees.

Despite these disadvantages, however, there is also evidence that workers in alternative arrangements prefer them. This preference to be one's own boss rather than a company's employee is strongest for independent contractors. When asked whether they preferred to be in flexible versus traditional work arrangements, nearly 84% of independent contractors preferred their current arrangement, compared to less than 9% who preferred to be in a traditional arrangement.

**Figure 36**  
*Traditional Workers Take Advantage of Flexible Work Schedules*  
(Percent of full-time wage and salary workers who work flexible schedules)



Source: Institute for the Future; Bureau of Labor Statistics; Thomas M. Beers, "Flexible Schedules and Shift Work: Replacing the '9-to-5' Workday?" *Monthly Labor Review*, June 2000.

Indeed, flexible work options appeal to a growing number of new economy workers who are time-stressed and looking for solutions to help them accommodate family and household responsibilities. Even traditional workers are negotiating for a more varied mix of flexible work options. Along with the 14% of workers employed part-time, nearly 30% of full-time workers have flexible work schedules. Responding to government incentives and the need to accommodate workers' requirements in a tight labor market, employers have created a much wider range of options for their employees. More workers are choosing to work at home, at least part of the time, or to vary the time of their arrival at and departure from work; others are opting to take advantage of flex-time benefits that allow them to choose the number of hours they wish to work per day, enabling them, for example, to work four ten-hour days and take one work day off each week (see Figure 36). More than ever, workers are playing a more active role in defining how, when, and where they work.

This collection of data provides strong indications that individual workers and their demand for more flexibility are reshaping the rules of the workplace. There are strong drivers in place that will contribute to the growth in the share of flexible contingent workers to about 17% in the next ten years (see Figure 37).

This increase will be driven in part by the development of new measures and definitions used to characterize this segment of workers, but also by workers' desire for arrangements that accommodate their personal needs, as well as their increased willingness to take on more personal risk for greater control over individual career development. Expect more traditional workers who are taking advantage of flexible work options today to move into alternative work arrangements for even more flexibility and control. In addition, business demands for more flexible labor resources, the emergence of more distributed networked business models, and rapid growth in particular industry sectors such as services and technology support will also be among the key drivers of growth.

At the same time, concern regarding the particular needs of flexible workers and their limited access to benefits also will grow, requiring responses from businesses, government, and organized labor. The interactions of these players will determine the nature of employer–employee relationships in the new economy.

### **TWO WORLDS COLLIDE: UNION ORGANIZING IN THE NEW ECONOMY**

The seeds of a labor movement already are planted in the heart of the new economy. Within the past year, there have been several examples of union activity penetrating the traditional resistance of high-tech companies to organized labor. Among the most notable are contract programmers at Microsoft banding together to form WashTech, a division of Communication Workers of America (CWA); an informal organization formed in 1999 in response to proposed changes to IBM’s pension plan; and last year’s attempt to organize customer service representatives at Amazon—the poster child of the new economy.

Many observers would argue that business interests have prevailed in these early disputes in that there are virtually no unions with collective bargaining power at any major high-tech firm to date. Others maintain that organizing around workers’ interests and providing a collective voice to workers is still playing an important role in the current economic climate. Although efforts to unionize customer service representatives failed at Amazon, for instance, when those same workers became subject to cost-cutting measures later on, they were able to pressure the company to provide ample severance packages to more than 400 laid-off employees.

Similarly, WashTech’s efforts to represent the interests of Microsoft’s contract workers in getting access to improved health benefits achieved some success when Microsoft told temporary agencies to improve benefits or lose the software giant’s business. In this way, the collective action organized by WashTech empowered hun-

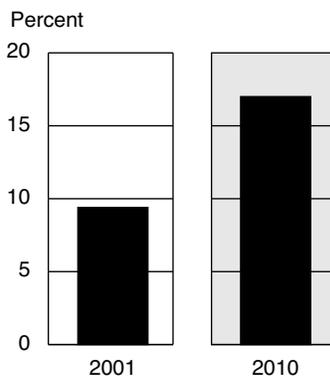
dreds of independent workers who previously had been unable to secure improvements on their own.

Other examples of cooperation between organized labor and new economy leaders also are emerging, providing hints of possible new directions for labor interests. For instance, in 1999 Cisco partnered with the CWA to offer Cisco’s networking academy training to military personnel preparing to leave active duty. The company recently opened the program to all members of the CWA.

### **JUST-IN-TIME EMPLOYEES: A NETWORKED MODEL OF EMPLOYMENT**

These early examples of organized labor activity in the high-tech sector may prove to be the test cases whereby the labor rules of the new economy are worked out. As we move past the heyday of dot-com mania and return to the reality of revenues and profits, workers who became comfortable with the strength of their negotiating position in a tight labor market are find-

*Figure 37*  
*2010 Forecast: A Growing Number of Flexible Individual Workers in Alternative Work Arrangements*  
*(Percent of workers who work in alternative work arrangements)*



Source: Institute for the Future; Bureau of Labor Statistics.

ing themselves at the mercy of economic cycles, facing company cutbacks and layoffs. Job security and access to benefits will continue to be an issue for workers in the new economy.

But the solutions for working out the employer–employee contract will not be settled as in times past—with strict rules governing work, benefits, and pay hammered out at the bargaining table. Instead, along with new business models, new economic measures, and new organizational structures, there will be new employment arrangements and new roles for collective bargaining that will emerge to meet both businesses’ changing needs and those of individual workers.

The notion of “just in time,” which describes many of the fundamental transformations taking place in the new economy, is synonymous with extreme flexibility—the flexibility needed to adjust quickly to changes occurring in the marketplace. The need for flexibility also applies to labor resources.

In his 1998 *Harvard Business Review* article, “The Dawn of the E-Lance Economy,” Thomas Malone, a professor at MIT, uses the notion of just-in-time employees as the foundation of his major theory, the “devolution of large, permanent corporations into flexible, temporary networks of individuals.” He points to the film industry as a classic example of the transformation of an entire industry from a centralized, big-company model revolving around huge studios to a networked structure built on individuals who come together in a “temporary company.” For a given film, individuals with different specialties—actors, artisans, craftspeople, technicians, professionals, producers, and so on—are brought together as needed day to day. Once a project is completed, the temporary company dissolves, and the various players form other combinations as new projects emerge.

Malone suggests that the Hollywood model might be one way to structure the networked industries of the new economy. The film-production model is one of the best examples of extreme flexibility in leveraging human resources to meet the specific needs of a project. But where do unions fit in? You might think that, with the need for

ultra-flexibility, unions wouldn’t play much of a role in this model. On the contrary, it is precisely because of the contingent nature of the work in this industry that unions have great influence. In fact, Hollywood is defined by its prominent labor unions and trade associations representing the interests of virtually every group of contributors to the film-production process (see Figure 38).

How likely is the film industry model to become the business model of the future?

### FORECAST:

#### A NEW ERA OF ORGANIZED LABOR

To answer this question, it is important to understand the role labor organizations can play in establishing the ground rules for individual workers acting as independent agents in a free labor market. It is clear that if there is to be any significant role for organized labor, such organizations must evolve to meet both businesses’ demand for flexibility and just-in-time resources and the needs of the sophisticated workers of the new economy, who prefer to have more control over their professional destiny.

To this end, the role of labor organizations in the professional lives of individual workers must be transformed to extend beyond an employee’s commitment to a particular unionized firm to represent the individual worker’s interest as he or she moves to different companies, fills different positions, and takes on different projects. For these independent agents, labor organizations, rather than full-time employers, can:

- Provide access to portable health benefits and retirement plans that workers can take with them as they move among projects with different companies.
- Offer skills certification, ongoing job training, and professional development, and guarantee that employers have access to a diverse pool of qualified workers.
- Negotiate standards in areas like contracts, transactions, and intellectual property issues, and dispute resolutions to create a level playing field for all workers.

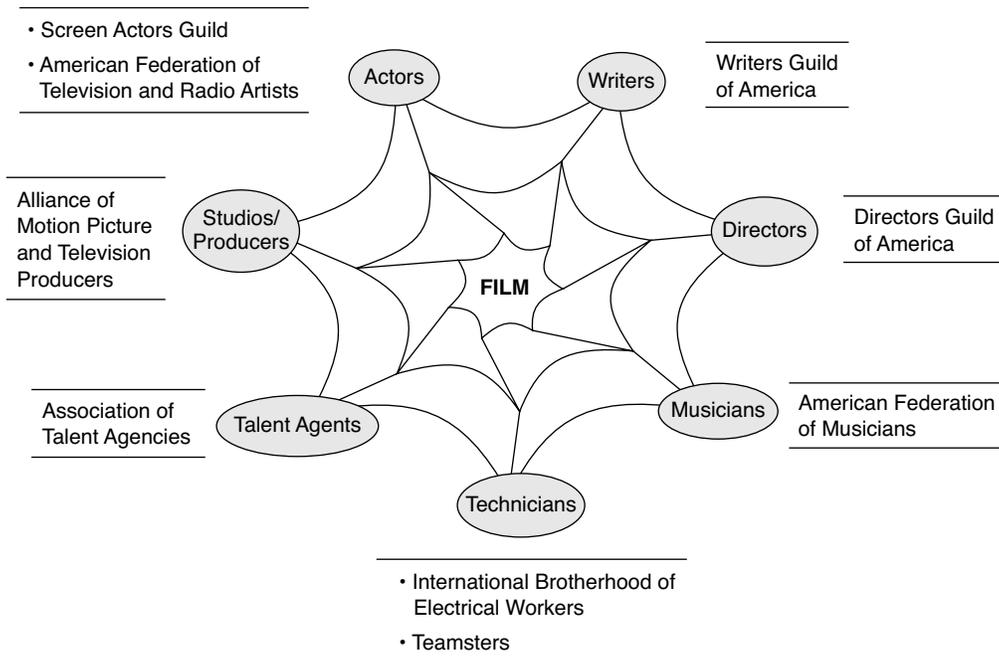
- Nurture employment opportunities for members by screening and assessing a worker’s skill level and suitability for different types of positions and matching them appropriately to an employer’s needs.

In some employment sectors—such as computer programming, Web and graphic design, writing and editing, and so on—that already have growing numbers of independent contractors and temporary workers, organizational structures are evolving to meet these needs. Agencies that specialize in providing businesses with access to specialized professionals on a temporary to permanent basis are proliferating (see text box, “Aquent: Representing Creative Professionals in the New Economy,” on page 52). Although not identified as unions as such, these types of talent brokers fill a role for professionals in much the same way the Screen Actors Guild

acts on behalf of actors in the film industry—setting minimum standards for employment, creating a work environment that empowers individuals to advance their careers on individual merit, offering tools to allow individuals to act independently, providing employee benefits, and supporting employment opportunities for all its members.

As the labor market becomes increasingly fluid, workers all along the employment spectrum will have different needs. Opportunities for different types of labor brokers will emerge to meet these needs (see Table 14 on page 53). On one hand, new labor brokers must provide a flexible pool of qualified labor to meet the demands of more distributed, networked business models that will rely on assembling temporary and virtual teams to meet project demands. Companies seeking to reduce costs by

Figure 38  
The Hollywood Ecology



Source: Institute for the Future

lowering overhead (i.e., full-time positions) will pay outside organizations that can guarantee qualified, just-in-time employees. Fees collected from businesses can be used to support portable benefits packages and job training for flexible workers.

On the other hand, brokers will need to provide individual workers with more opportunities to negotiate work arrangements that best address their individual needs. For instance, highly skilled independent professionals who already have client relationships may be willing to pay membership fees to professional guilds that offer business development services and infrastructure resources to support their client work. In this way, these professionals become part of a larger network managed by the guild, which can also represent them to employers. Other types of labor brokers might focus on offering flexible workers specialized training and access to positions in high-growth, high-demand professions. For example, customer services will be a growing sector of the economy that will require trained professionals who can effectively manage customer relationships.

## BUSINESS IMPLICATIONS

As organizations evolve to support the flexible workforce, as well as the networked firms of the new economy, businesses should be prepared to:

- *Learn to facilitate flexible work.* As more distributed businesses rely more often on flexible workers to meet changing needs, human resources will become a critical function at the company's core. Its focus will shift from identifying and retaining talented professionals and managing the workforce to building relationships and facilitating the supply of flexible workers to anticipate and meet company needs. Human resources professionals will become the producers under the film industry model, orchestrating resources to meet dynamic labor demands.
- *Create strategic relationships with labor brokers.* As more options become available for accessing portable benefits, job training, and flexible employment through nontraditional work arrangements, companies must build strategic relationships with key labor brokers to ensure access to different types of workers when they need them.

### Aquent: Representing Creative Professionals in the New Economy

Aquent is a staffing firm representing creative professionals such as freelance graphic and Web designers, writers, and editors. The firm provides the workers it represents access to comprehensive health and retirement benefits and to job and project listings. Aquent's worldwide network of talent agents matches workers with employment opportunities at client companies. Aquent provides companies with access to a screened and qualified pool of specialized talent, offers a broad range of flexible staffing solutions from contract and temporary workers to permanent placements, and stands behind the quality of its workers by offering a 110% money-back guarantee on the matches made by its agents.

Table 14  
*A Future View: Organizing Flexible Labor in 2010*  
 (Percent of flexible work arrangements in each category)

<i>Group</i>	<i>Labor Broker</i>	<i>Benefits</i>	<i>Forecast: Flexible Workers in 2010</i>
<b>High-Demand Professionals</b> (engineers, scientists, managers, marketers, lawyers, and doctors)	Professional guilds that provide for the particular needs of individuals with high-demand skills. Workers choose assignments and build client portfolios.	Guilds offer independent agents a full suite of benefits and resources, including billing and collection services, contract review, group health insurance and pension advice, professional development support, networking, and business development resources.	25%
<b>Skilled Independents</b> (information technology professionals, designers, media developers, accountants, financial analysts, and business consultants)	Talent agencies that provide skilled professionals to meet the demand for flexible skilled labor. Workers build skill portfolios based on a variety of work experiences.	Agencies provide comprehensive benefits, ongoing skill training, and access to diverse job opportunities.	34%
<b>Service Providers</b> (customer service agents, information technology support, sales, and account managers)	Specialized employment firms that provide workers dealing directly with clients and customers. Provides flexible human resources to firms that must respond to customer-driven market changes. Workers develop highly valued customer interaction skills.	Firms offer health and retirement benefits and specialized training for workers in customer-focused positions.	23%
<b>The Temporaries</b> (retail and sales clerks, administrative support staff, production, manufacturing, and construction workers)	Temporary-help agencies that supply unskilled labor to meet changes in seasonal demands.	Agencies offer limited health benefits based on tenure, job training as necessary to meet market demands, and job placement.	18%

Source: Institute for the Future

- *Invest in technology to support flexible work.* In order to reap the gains of increased labor flexibility, businesses must be prepared to support a more distributed workforce and a greater variety of virtual workplaces.

Boundaries between organizations will become less defined as information, resources, and workers flow freely. Success will rely on a dependable technology infrastructure that can support a complex and dynamic network.

—Liz Casals



## The Rise of Distributed Power

*A*fter decades of false promises, distributed electricity generation looks like it's ready to become a viable consumer product in the next ten years. The convergence of more sophisticated consumers, industry deregulation, and efficient small-scale generating technology provides powerful new forces that will drive household adoption and create an alternative to the traditional electricity grid. As a result, households will become more significant players in the industry as their members gain control over the ways they use, purchase, and produce electricity. These changes will create a new energy supply chain that will redefine the industry, encouraging entrepreneurs to build new companies and sending incumbents scrambling for new roles.

### THE SEEDS OF THE NEW REGIME

Thomas Edison launched the electric power industry in the United States in 1882 with the construction of a small generating station in New York City that powered streetlights on nearby Wall Street. Edison wanted to bring this type of system to the rest of the world, where he envisioned a myriad of decentralized electricity generation plants providing power to nearby residences and businesses.

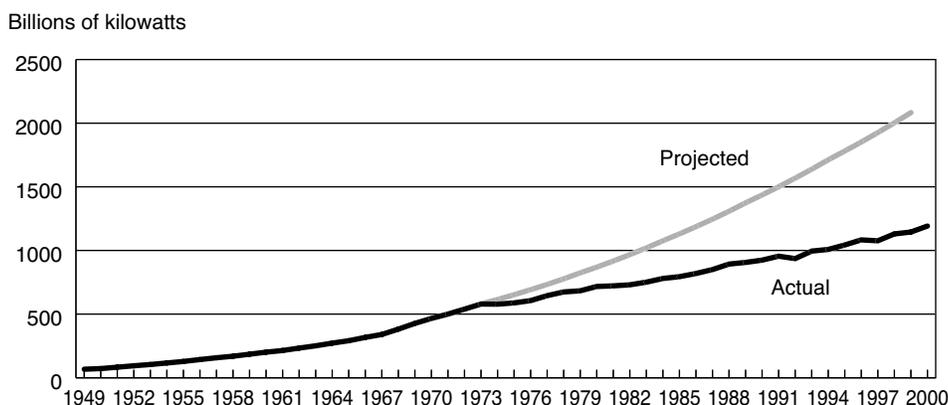
A few years later, the invention of alternating current, which could travel over longer distances, combined with the efficiencies of large-scale steam and hydroelectric power plants, changed all that. Power generation plants grew ever larger and came under the control of a small number of companies. Robust growth in demand, improvements in turbine technology, and the advent of nuclear power led to larger and larger plants throughout the middle of the 1900s.

As a result, the electricity industry essentially became a hub-and-spoke system, with large nodes of centralized

production filling a distant and varied demand. With efficient, centralized units being the most cost-effective producers, local monopolies over power generation and distribution were inevitable. The government came to play the role of price-setter and service standard monitor. When the largest of these regional nodes connected with each other, the electricity infrastructure became “the grid” we know today.

In the 1970s, however, the oil crisis, the rise of environmental legislation, slower economic growth, and safety concerns about nuclear power threatened the economic underpinnings of the grid. Rising prices shifted the rate of growth in energy demand on to a permanently lower trajectory (see Figure 39). Higher input prices fostered the rise of alternative energy sources that justified inputs from smaller units. The crisis led to a surge in alternative energy research and use. Yet once the oil crisis of the 1970s ended, the alternative energy industry crashed along with oil prices, and the large-scale centralized power system prevailed.

*Figure 39*  
*1973: An Inflection Point*  
*(Household electricity demand in the United States)*



Source: Energy Information Administration

### DRIVERS OF CHANGE

Until, the oil crisis of the 1970s set in motion a slow process of deregulation and investment in new technologies that is only now gathering critical momentum. These new technologies, coupled with the growing tendency of new consumers to take control and to experiment with a range of solutions to a given problem, will have important impacts on the power generating industry in the next ten years. Indeed, such developments will reshape the electricity supply chain.

#### Deregulation Is Just Taking Hold

The introduction of market-based mechanisms throughout the electricity industry will affect players throughout the energy supply chain—but it will take time.

Deregulation and the introduction of market forces into the U.S. electricity industry began with the federal Energy Policy Act of 1992, which required utilities to open their transmission lines to competition and encouraged states to deregulate their electric utilities. By the late 1990s, about half of the states had begun to do so.

Although the biggest initial impacts have been on the utilities themselves—opening the distribution network for alternative generators and bringing some price flexibility to the market—the more significant impacts in the future will be at the retail end of the supply chain. Consumers will find that they have many more choices concerning electricity consumption—choices about who they buy their electricity from, how much they pay, when they buy it, how it gets produced, and what additional services they buy as well.

Deregulation will of course foster more competition, forcing companies to offer broader incentives to people and companies, and it will also spur more flexible and effective methods of innovation. Entrepreneurs and venture capitalists will become much more active in the deregulated electricity marketplace.

Most states that deregulated their electricity industries in the late 1990s are still in a difficult transition pe-

riod. The experience of deregulation in the airline, telecom, and trucking industries suggests that the biggest impacts come five to ten years after deregulation goes into effect (see Table 15). Similarly, deregulation of electricity in the United Kingdom has only recently brought about robust competition, after nearly a decade. Deregulation is best viewed as a process rather than an event. As such, its most significant impacts will come in the next three to eight years.

#### More Sophisticated Consumers Look for More Choices

Empowered by information technologies, and used to being in control of their lives and especially their finances, the new, more sophisticated consumers look for a range of choices in everything they do. They are also willing to take on the responsibilities and risks associated with these choices. In the future, such responsibilities and risks are likely to include the latent effects of certain types of power usage and generation. A good segment of these consumers will take that kind of responsibility a step further as they become more concerned with environmental issues as well.

*Table 15*  
*The Benefits of Deregulation Take Time to Appear*  
*(Percentage reduction in prices, in real dollars)*

	Time After Deregulation		
	2 years	5 years	10 years
Gas	10–38	23–45	27–57
Long-distance telecom	5–16	23–41	40–47
Airlines	13	12	29
Trucking	–	3–17	28–58
Railroads	4	20	44

Source: George Mason University Center for Market Processes

**Consumers Are Embracing Choice and Risk**

Many consumers are embracing a wide range of choices and the risks associated with them in a way that suggests they will serve as the catalysts of change in the power generation industry. As consumers become better educated, more affluent, and more effective in using technology to gather information, they are gaining the confidence to assume greater risk in managing their lives. This has been a consistent pattern in a range of consumer behaviors: investing, managing careers, searching for health options, and so on. As new market structures for the selling of electricity and new technologies for the generation of electricity become available, new consumers are already embracing them, redefining them, and putting them to use in ways that best serve their interests.

**Consumers Are More Aware of Environmental Impacts**

Today’s consumers also demonstrate a higher tendency to consider the environmental impacts of their decisions

and activities in their daily lives. And more important, they are willing to pay for their concern. A survey by the Sustainable Energy Budget Coalition found that more than half of people polled are willing to pay 5% more on their energy bills for “green” power (see Figure 40).

There is also evidence from Europe that more and more households are not only willing to pay for their concerns but are doing so already. For example, in the Netherlands about 400,000 households have switched to electricity providers selling only green power, paying on average 10% more on their monthly electricity bills. In Germany, one regional provider of green power attracted 40,000 households within 12 months of its launch, even though it was selling green power at a 20% premium over traditional power. This growing niche has played a part in Germany’s becoming one of the world’s largest purchasers of wind turbines—wind generates almost a quarter of electricity in large parts of the country.

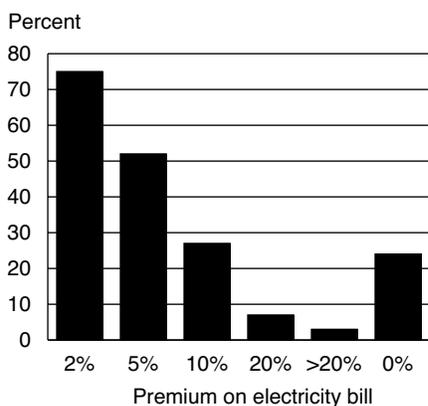
**Technologies Are Advancing**

A revolutionary set of technologies is poised to allow individuals and small groups of people to generate electrical power on their own. Distributed electrical generation—or “micropower”—technologies are small-scale power plants (generally defined as less than one megawatt) that produce electricity consumed close to where it is produced. These technologies include fuel cells, microturbines, and renewable energy devices such as wind turbines and photovoltaic cells for converting solar energy to electricity.

**Fuel Cells**

Invented in the 19th century, fuel cells were first put to practical use by the U.S. space program in the 1960s for manned space missions. Fuel cells combine hydrogen and oxygen in a combustion-free chemical reaction to produce electricity and, as a by-product, water. They operate silently, have few moving parts, and are virtually pollution-free. Recent advances have enabled them to be built on a smaller scale. They have also become less expensive as scientists find ways to mass produce

*Figure 40  
Consumers Are Willing to Pay More for Green Electricity  
(Percent willing to pay a premium for green electricity)*



Source: Sustainable Energy Budget Coalition

them and minimize the amount of platinum necessary in their construction.

### *Microturbines*

Microturbines have made further in-roads than fuel cells and may have greater short- and medium-term impacts for household applications. These devices consist of small turbines that burn natural gas and operate at high speeds. Recent advances have made them smaller, quieter, and less expensive. Designers have made big advances in lowering the frequency with which they need maintenance—an important criterion for household adoption. Unlike fuel cells, however, microturbines do produce some carbon dioxide because they burn natural gas.

### *Wind*

Turbines that generate power from the wind are the fastest growing source of electricity in the world. Denmark, the world leader in wind-generated electricity, generates 13% of its electricity from wind power and plans to raise this level to 50% in the next three decades. In the United States, California generates two-thirds of the country's

wind power, though wind power's overall contribution to energy production is still modest at less than 1%. While large-scale windmill farms account for much of the production today, the falling price of individual turbines is driving the growth of small clusters of turbines for use on farms, as well as individual turbines. In the past ten years the cost of wind turbines has fallen by 75%.

### *Solar*

The price of photovoltaic cells used to generate electricity from sunlight has dropped by 80% in the past two decades. Large-scale production could drive these prices down a further 80% from current levels to close to \$1 per watt.

### *With a Few Breakthroughs ...*

Although each of these technologies has been around for decades, recent advances have brought both their purchase prices and operating costs down. Even though they still cannot compete with the efficiency of large-scale central power plants, they are getting closer (see Table 16). A few breakthroughs could bring them very close.

*Table 16*  
*Getting Closer, But Still a Ways to Go*  
*(Present and forecasted costs, in kilowatts per hour)*

	<i>Capital Cost (Dollars per kilowatt)</i>		<i>Operating Costs</i>
	<i>Present</i>	<i>4–6 years</i>	<i>(Per kilowatt-hour)</i>
Fuel cells	\$2,000–\$3,500	\$100–\$300	10–15 cents
Microturbines	\$600–\$1,100	\$200–\$400	7–10 cents
Wind	\$900–\$1,000	\$500	4–28 cents
Photovoltaics	\$5,000–\$10,000	\$1,000–\$2,000	22–40 cents
Traditional electric utility (coal)	\$1,000	\$1,000	8 cents*

\*Price of residential electricity from utilities includes capital cost of plants and transmission wires.

Note: The figures in this table do not include renewable energy subsidies and incentive programs, which would significantly drive down the capital and operating costs for residential purchasers.

Source: Department of Energy, National Renewable Energy Laboratory; The Worldwatch Institute; *Wall Street Journal*.

### FORECAST OF CHANGE

With a stronger appetite for decision making and a higher level of risk tolerance, household electricity consumers are set to take full advantage of the emerging market mechanisms and new technologies that will soon be at their disposal. The impacts of these changes could become significant enough to begin a virtuous cycle of investment in these technologies and set the distributed power industry on a new trajectory of growth.

The first sign of this change, and an important driver of it, will be the introduction of real-time price information into the home. This will lead to more active consumer management of power, a step that will lay the groundwork for the adoption of individual distributed power units in households.

### Accurate Price Information Enters the Home

One of the key drivers of distributed power will be the introduction of real-time pricing into the home. Residential electricity in the past has been primarily metered at a fixed rate throughout the day. However the real price varies wildly according to the time of year and day. As deregulation continues, efficient measuring systems that permit real-time monitoring of use by each node of a huge network can produce much more rational usage decisions. Electricity pricing will become much more transparent and more time-dependent—similar to the way telephone service is structured, with lower prices by time of day and when demand is low and supply is high, and vice versa.

#### Wild Card: More Expensive Traditional Energy

Although forecasting future energy prices is a notoriously difficult road paved with failure, there are several factors that could cause the price of traditional energy to rise, thereby making the cost of distributed energy relatively less expensive in comparison.

The widespread adoption of a “carbon tax,” Kyoto Protocol–like carbon dioxide reduction agreements, or other mechanisms for recapturing the negative externalities (wider social and environmental costs) of traditional energy production would raise the prices of electricity from traditional sources. Political instability in the major oil—and natural gas—producing regions of the world would also put upward pressure on the cost of traditional energy sources. Although we are not predicting higher prices for traditional forms of energy, the occurrence of any of these wild cards and the resulting rise in the costs of traditional energy would accelerate the adoption of distributed energy production.

Variable rates provide the most value, since they allow utilities to charge more as demand nears capacity. This incentive will tend to spread consumption more evenly over the day. Decreasing demand at peak times like this avoids the cost of carrying too much capacity through most of the day and of generating far more energy than is used at other times. It also allows the utility to make better use of its infrastructure to provide continuous capacity rather than focus primarily on peak capacity.

The California energy crisis of 2001 provides evidence that a significant amount of electricity use is discretionary and time-flexible. California residents reduced consumption by 10 to 15% in response to calls to conserve from political leaders and the media. Should future shortages keep prices high or power providers move to a time-dependent pricing structure, consumers are likely to make changes in consumption, which, for some, will inevitably mean moving away from the grid.

### **A CHANGE IN CONTROL: TOWARD A DISTRIBUTED POWER GRID**

**D**eregulation, improvements in micropower technologies, consumer desires for more control in their lives, and concerns about prices and shortages will drive an even more fundamental change in the way electricity is generated and distributed. In the next ten years, risk-taking early adopters will begin to produce power for themselves. At first they may have small fuel cells or microturbines on hand to power their households at times of peak demand, when energy from the grid is most expensive, or as backups in case of power failures. Once fuel cells become prevalent in cars, and the system is modified to provide a two-way flow of electricity, consumers may even be able to sell electricity back to the grid by running their cars at home when usage and prices spike on hot summer afternoons.

### **Do People Really Want to Generate Their Own Power?**

For several reasons, a segment of new consumers is likely to embrace distributed power technologies even before these technologies become as cheap as traditional centralized power.

#### *A Sustainability Premium*

A segment of consumers—especially of new consumers—is willing to pay a premium for electricity that comes from environmentally sustainable sources. Similar to the way that some new consumers pay a premium for organic foods, a portion may also pay a premium for green power. Survey data and the introduction of green power in Europe, especially in Germany and the Netherlands, suggest that a segment of consumers really will pay a premium to support sustainable resources.

#### *High Peak-Time Costs*

New energy technologies will make their first appearances at times of peak usage. When real-time prices come to the home and consumers see the price for energy from the grid at peak usage, that's when distributed energy will make the most sense to them economically.

#### *Reliability*

The turmoil of the deregulation process has led many consumers to grow concerned with the reliability of electric power. As homes become increasingly wired and consumers more dependent than ever on electrical and electronic devices, consumers may be willing to pay a premium for reliable power. Developers of planned communities may provide another entry point as they include distributed power as a value-added benefit of home ownership. Also, look for businesses to adopt these technologies early, since power shortages can be very costly for them (see Table 17 on page 62).

### Moving from Early Adopters to a Mass Market

Once these early adopters reach critical mass, they are likely to stimulate a virtuous cycle of investment. A similar burst in investment occurred in the 1970s during the oil crisis when the tripling of oil prices and subsidies for alternative energy jump-started the alternative power industry. That investment crashed when oil prices came down. However, three decades of technical advances, and the rise of sophisticated consumers and deregulation, have set the stage for permanent changes to take hold.

Increased investments will lead to rapid development in this fledgling industry. Bigger investments in R&D will drive prices down more quickly. And increases in government subsidies will speed adoption as well. The big breakthroughs will come when demand is large enough to support mass production, driving the per-unit cost of producing generators down significantly. Past examples of such “disruptive innovations”—revolutionary new technologies that create new markets and appeal to small but important niches of customers—suggest that it

takes ten years to move from product introduction to the beginning of mass-market adoption. In the intervening period, expect early adopters to begin using these new technologies in advance of everyone else. The early adopters are likely to play an important role in defining how these technologies are best used in that critical period. Variable rates and real-time pricing may well be the key milestones that boost the introduction of micro-turbines and fuel cells in businesses, among groups of homes, and eventually for individual consumers.

There is some evidence that the investment community already is moving in this direction. Venture capital investment in emerging energy technologies has grown rapidly in the past five years (see Figure 41).

### Widespread Adoption Faces Future Challenges

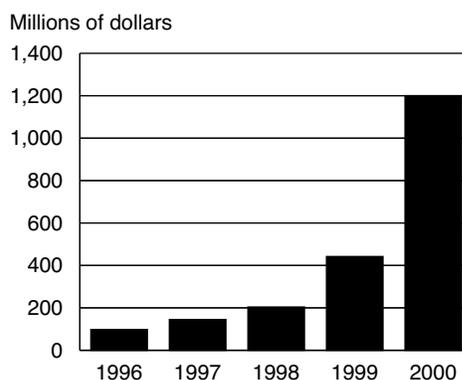
Aside from reducing capital and operating costs, there are two significant challenges to overcome in the infrastructure supporting distributed energy. First, fuel cells consume hydrogen to produce electricity. The distribu-

*Table 17  
Downtime Is Expensive  
(Average cost of an hour of downtime due to lack of electricity)*

Cellular communications	\$41,000
Telephone ticket sales	\$72,000
Airline reservations	\$90,000
Credit card operations	\$2,580,000
Brokerage operations	\$6,480,000

Source: Contingency Planning Research, Department of Energy.

*Figure 41  
Venture Capital Investment in Emerging Energy Technologies on the Rise  
(Venture capital investment in the U.S. electric power industry)*



Source: Venture Economics, Nth Power Technologies.

tion infrastructure for delivering hydrogen to people's homes does not exist today. While it may eventually look something like the home heating oil delivery system, getting that infrastructure to work smoothly and inexpensively in the early adoption period will be essential to the proliferation of the technology.

Second, for households to sell back excess power to the grid, the grid will have to become a two-way connection. This is not a technical problem, as residential wind power generators sell power back to the grid today. Rather, the challenge will be that—similar to broadband cable Internet connections—deploying the necessary hardware and software solutions on a large scale will take considerable time and expense.

### **BUSINESS IMPLICATIONS**

**B**ecause distributed energy requires the creation of an entirely new supply chain, there are plenty of opportunities for new players in the new world of energy generation as well as new roles for existing players.

The existing electric utilities are today in a strong position as the incumbents. The agility with which they adapt to the new power regime will be the key determinant of their success. Of course, they need to survive

the rocky period of deregulation first. That utilities have large investments in long-lived power plant assets suggests that they are unlikely to place large bets on these new unproven technologies at an early stage. And past disruptive technologies—such as the radial tire, the personal computer, and the small copier—have not been kind to large, established incumbents.

However, distributed electricity is more likely to complement the grid rather than to substitute for it. The more likely role for utilities, provided they survive long enough, is to evolve into electricity service providers selling grid power, establishing more efficient ways to measure uses, setting prices that foster individual responses, and overseeing leases and maintenance for energy devices once distributed energy reaches the mass market.

In the meantime, the stage is set for an exciting and chaotic period of high-risk early-stage investment, technological innovation, licensing of intellectual property, and battles over standards. The ultimate winners will likely be household consumers, who stand to gain from lower prices, increased choice, and, ultimately, more control over how they get and use electricity. Getting there, however, is not likely to be a very smooth ride.

—Greg Nemet



# Issues





## Providing Information: Future Trends in Package Technologies

*Manufacturers of packaged goods face an interesting problem in the next decade. Consumers are increasingly interested in the information behind their products—not just the characteristics of the products themselves, but their origins, their manufacturing and labor processes, and the specific ingredients or materials used to make the products. Such information is becoming more valuable to consumers, which creates new opportunities for companies to sell products that incorporate this information as a value-added service.*

*Despite the promise of these opportunities, packaged goods manufac-*

*turers have had a hard time actually getting this information to their customers. Companies just don't have good strategies for conveying this type of detailed information, and they have particularly limited opportunities to reveal it at the most important point—when the consumer is in the store deciding what to buy.*

*Fortunately, several new technologies will reach the market in the next decade that will allow product manufacturers to efficiently and inexpensively convey large amounts of information just in time to motivated consumers.*

### NEW CONSUMERS WANT MORE DETAILED INFORMATION

New consumers—those sophisticated consumers with more education, higher incomes, and greater access to technology than average consumers—have a growing influence on the U.S. marketplace, since they now make up nearly one-half of the population. One of their defining characteristics is their interest in information, which naturally leads to their ease in using information to make decisions about purchases. In our research, we have consistently found that these new consumers are more likely than other consumers to search for product and service information from a variety of sources before making purchases. For example, new consumers are about twice as likely as other consumers to gather information from at least four different channels before they make major buying decisions (see Figure 42). (For more information about this demographic group, see “New Consumers: Using More Information More Effectively” in the *2001 Ten-Year Forecast*.)

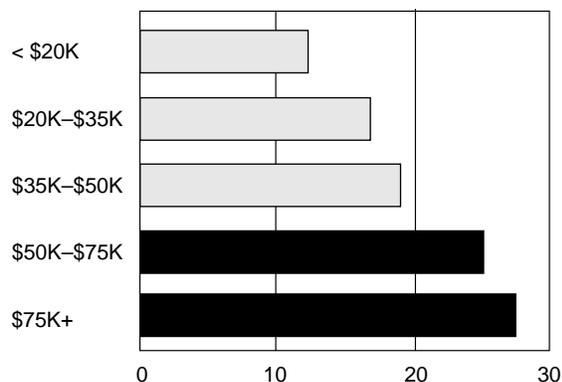
Given this thirst for information, in the past five years new consumers have learned more and more about the materials and processes used to create consumer products. Several factors are driving this increase in knowledge, but the most important probably is access to the Internet, where any motivated searcher can find reams of data about product ingredients and manufacturing processes. Indeed, when consumers shop online, they can get more information than they get in a store, in the form of detailed product descriptions, independent reviews, product comparisons, and so on. Other Web sites may provide information about how a product works, or how it is made, or any legal issues the product might be involved in. The truly diligent can even read up on the basic science behind the products in online journals and newsletters.

Another factor increasing consumer access to information is the role of the media in disseminating information about product safety in general and health and nutrition in particular. Indeed, safety, health, and nutrition are big news today. When the problems with Firestone tires surfaced, all the newspapers, news magazines, and TV news shows devoted weeks of coverage to the issue. Similarly, headline news stories and weekly columns link health outcomes to a range of food, supplement, cosmetic, and personal care products. Books and magazines about alternative medicine and healthful lifestyles are growing more popular as well. As the baby boomers age and grow more concerned with health issues, it seems information about the topic grows exponentially.

New consumers have responded to these opportunities by becoming more interested in product materials and ingredients, and using such information to decide what to buy. For example, our surveys have found that new consumers are almost twice as likely as other consumers to always read nutrition labels before they try a new food product (see Figure 43).

As consumers grow more interested in such information, companies are driven to disclose more and more information about their products. But what do consumers

*Figure 42  
Information Searching Increases with Income  
(Percent of consumers who search for information  
in four or more channels before making a major  
purchasing decision, by income)*



Source: Institute for the Future/Princeton Survey Research Associates, U.S. Household Survey, 1999.

want to know? In our research, we have found that consumers are interested in three forms of information about branded packaged goods: the source, the ethics, and the science. In response, product manufacturers are scrambling to provide this detailed information.

### The Source: Is It Genuine?

New consumers are interested in products that can claim a definite source. For example, new consumers are likely to be attracted to products with a unique and verifiable country of origin, or pure ingredients, or a distinctive manufacturing process. Although all consumers have at least some degree of interest in goods with these qualities, new consumers are particularly likely to be interested. Our surveys show that 86% of new consumers purchase organic foods at least occasionally, for example, compared to 74% of other consumers.

Companies catering to new consumers have tried to meet this interest in the last few years by promoting “authenticity.” This fad is all about the notion that a product with an identifiable source, a proud history, a “realness,” or a nostalgic simplicity is better than one that doesn’t have these qualities. This trend isn’t only relevant for packaged goods. Several popular books and magazines espouse a “simpler,” more authentic—although sometimes very expensive—lifestyle (see Table 18 on page 70). Many gourmet restaurants now use the lineage of their foods as a selling point—Nora in Washington, D.C., lists the names of its farmers and suppliers on the back of the menu, and at The Sea Grill in Manhattan, the waiters may even name the boat that caught the diners’ fish.

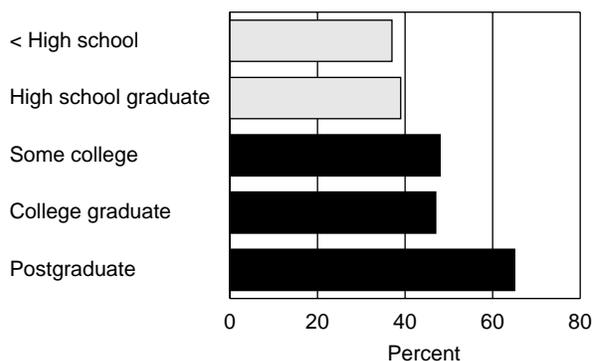
Retailers have capitalized on the authenticity craze. Restoration Hardware sells housewares reproduced from vintage styles, and grocery stores like Safeway, with its Safeway Select Primo Taglio, feature new products with European, Old World packaging. A range of popular television shows captures the (semi) spontaneous interactions of “real people” and packages them for our consumption. Table 18 lists cross-industry examples of the many products and offerings catering to consumers’ interest in genuine sources.

### The Ethics: Is It “Moral”?

Motivated consumers increasingly have the ability to evaluate which companies come closest to meeting their standards for ethical treatment of labor, protection of the environment, and involvement in activities promoting social justice. (See “Doing Well by Doing Good: Corporations Respond to Activist Consumers,” for more on this topic.)

In the past, making these ethical evaluations of companies would have been difficult. Before the information revolution, detailed information about companies’ labor and materials processing was just not widely available. But now it is much easier for the motivated consumer to find out more about companies and activist groups on the Web. The combination of prosperous, ethically concerned baby boomers and a growing anti-globalism movement suggests that the audience for information about businesses’ ethical practices will only grow in the future. Although only a small percentage of consumers is likely to continuously evaluate a wide range of companies in

**Figure 43**  
*New Consumers Are More Likely to Always Read Nutrition Labels*  
 (Percent of consumers who claim they always look at the nutrition label when deciding to try a new brand of food, by education)



Source: Institute for the Future, Household Survey, 2001.

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**Table 18**  
**Authenticity for Sale**  
*(Examples of branded offerings that claim ... characteristics)*

**Nostalgic Simplicity**

Popular books: *Chicken Soup for the Soul*  
 Magazines: *Real Simple*, *Martha Stewart Living*

**Proud Histories**

Resurgence of luxury brands with old-time cachet:  
 Burberry's, Bally, Rolex

Retailers repackaging old styles: Restoration  
 Hardware, The Museum Store

Store-brand foods with gourmet, "European" pack-  
 aging: Safeway Select Primo Taglio, Trader Joe's

**Realness**

The "collectibles craze": eBay, "The Antiques  
 Roadshow"

Reality TV: "The Real World," "Survivor," "Big  
 Brother"

Movie "mockumentaries": *This Is Spinal Tap*, *The  
 Blair Witch Project*

**The Identifiable Source**

Foods: organic foods, non-genetically modified  
 foods, farmers' markets

Source-identified foods: upscale gourmet restau-  
 rants (Nora, The Sea Grill)

Personal care products: products featuring botanical  
 ingredients

Source: Institute for the Future

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this way, large groups of consumers are likely to respond to popular media exposés by evaluating how particular companies are handling the current "hot-button" issues.

Several companies have already responded by using their ethical business practices as a key element of their brand—The Body Shop, for example, has successfully marketed its "Community Trade Programme" products by describing the ethics of its agreements with its suppliers (small labor collectives in developing countries like Ghana, Peru, and Sri Lanka). Smaller businesses also incorporate their ethics into their brand. For example, chocolate maker Cloud Nine focuses part of its advertising on its environmentally sound manufacturing procedures (using sustainable methods of cacao bean cultivation, 100% recycled papers for the wrappers, and soy-based vegetable inks for printing).

New online retailers like Ethicalshopper.com, Greenmarketplace.com, and Enviroshop.com are trying to succeed as "ethics agents" that verify the ethics of every product they offer. Josh Knauer, founder of Greenmarketplace.com, offers an example: "If an item is organic, does that mean it was harvested in a socially responsible way? Labeling laws won't protect you.... We try every product and investigate every claim." This policy seems to be quite successful so far—as of November 2001, Greenmarketplace.com was growing at 15% per month, and by the end of 2001 total estimated revenue was expected to top \$3 million. However, it is worth mentioning that the difficulty of verifying all product claims may make this strategy difficult to scale across a large number of offerings.

**The Science: Does It Work?**

New consumers are also interested in a third type of information: whether the products will have a healthy or beneficial effect—and why. Merely describing the potential benefits is not enough for these well-educated, skeptical new consumers. They want claims that can be backed up by science, and they are willing to go to extra trouble to get independent verification. For example, our

surveys have found that new consumers are twice as likely as others to find medical reference books, journals, and newsletters especially useful sources of nutrition information—despite (or perhaps because of) the fact that these sources may not be intended for a lay audience (see Figure 44).

Companies are responding to these demands by featuring science as a selling point for food, beverages, and cosmetics. For example, recent marketing campaigns by the Almond Board and the California Fluid Milk Processor Advisory Board featured the health benefits of these products. Several cosmetic companies go as far as using allusions to the medical profession in their branding strategies (e.g., Complexions Rx, Dr. Brandt Skincare, Osmotics, and Peter Thomas Roth Clinical Skin Care).

Important factors behind this type of marketing are the exciting developments in genetics and nutrigenomics (the study of the connections between food and health at the molecular level). The research demonstrating the health benefits of lycopene in tomatoes and antioxidants in carrots and oranges is a good example. IFTF forecasts that over the next decade scientists will continue to discover many other beneficial chemicals in common foods—and be increasingly able to link them with individual health outcomes based on genetic profiling. As scientific information proliferates and becomes increasingly more individualized, food manufacturers will be faced with an expanding list of chemicals and ingredients that will be important to consumers—and not enough space on the package to list them.

Packaged goods manufacturers are thus faced with the need to convey new, detailed information by means of their packaging. Their current communication solutions, although creative, are definitely not up to this task. However, several new technologies promise to create dramatic new solutions to the information problem. Best of all, these technologies have already been developed, with existing market applications. They need only be applied to packaged goods.

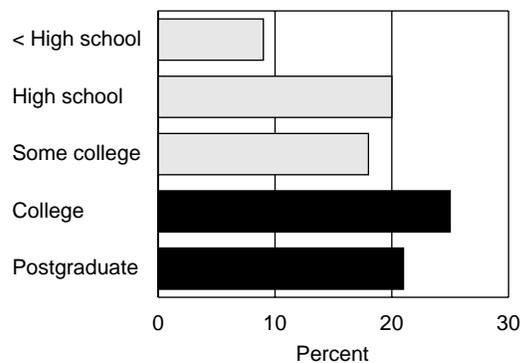
### BREAKTHROUGH TECHNOLOGY SOLUTIONS

As consumers become increasingly interested in all of this new information, companies are left with the problem of how to present it on packages that are unlikely to get any larger. Luckily, these problems may be solved in the next decade by advances in three existing technologies—digital paper, radio frequency identification (RFID) tags, and organic light-emitting diode (OLED) displays. These technologies can be used in new ways to create labels that will allow product manufacturers to convey dramatically detailed information about the source, ethics, and science behind their products.

#### Digital Paper: The Next “Paper” Package

Digital paper is a plastic display that seems like regular paper: it is thin, flexible, lightweight, viewable at any angle, and not illuminated. It also uses very little power. But

*Figure 44  
New Consumers Find Medical Reference Books, Journals, and Newsletters Useful  
(Percent of consumers who reported that medical reference books, journals, and newsletters were one of the two most useful sources for nutrition information, by education)*



Source: Institute for the Future, Household Survey, 2001.

like a computer display, digital paper electronically presents data received from a computer program. This makes digital paper writable and erasable—change the data entered into the program, and the change is shown on the digital paper. Or program the paper to cycle through a series of messages, and each message is displayed sequentially on the digital paper. One sheet of digital paper could conceivably be reused thousands of times. This can come in handy in retail stores and supermarkets for signs, displays, and, of course, product packaging.

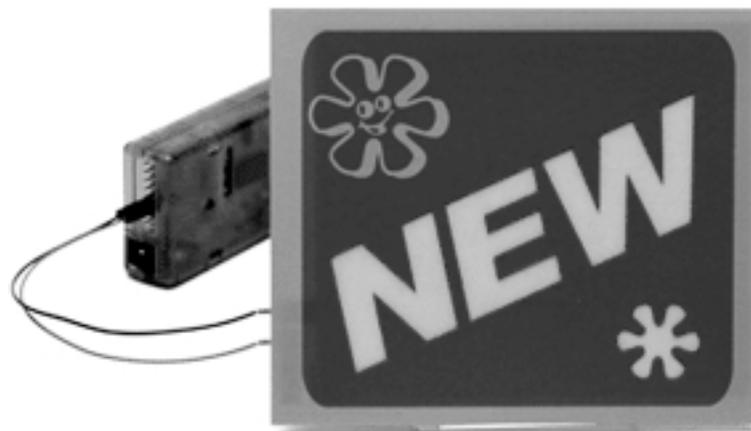
Two researchers have developed competing versions of digital paper. Nicholas Sheridon of Gyricon Media (formerly at the Xerox Palo Alto Research Center) has developed SmartPaper, while Joseph Jacobson from the MIT Media Laboratory and E Ink created electronic ink. Although each version of digital paper works differently, the base technology for both consists of tiny, multiple-toned elements. SmartPaper involves small, solid-plastic, multicolored beads embedded in a transparent film; electrical charges rotate the beads so the appropriate color faces the viewer. E Ink includes transparent polymer microcapsules containing multiple colors of elec-

tronically charged pigment chips; the chips move within the microcapsule either toward or away from the viewer when a voltage is applied, but the microcapsule itself does not move. In both cases, electronic charges from a programmable power source cause the digital paper to form images and text. Figure 45 shows a simple digital paper sign; although it is impossible to show it here, the text would repeatedly change colors between black and white to grab shoppers' attention.

Both Gyricon and E Ink are already selling retail signs, although E Ink has temporarily withdrawn from that market in order to work on portable device displays. But the basic technology applications have already been developed, and Macy's and JCPenney have already used digital paper in their retail displays. Within the next two to four years, both Gyricon and E Ink expect to improve their products by increasing the resolution, decreasing the cost, standardizing their ability to provide multiple colors, and creating the ability to update the signs via wireless networks.

So far, digital paper has not been used for packaging. But as it becomes more appealing and less expensive, it

*Figure 45*  
*Digital Paper*



Source: E Ink

will increase the incentives for product manufacturers to use it in that way. Digital paper will make it possible for package labels to cycle through a list of detailed information that would be far too overwhelming to present simultaneously. It can also be updated to show larger print—a nice assistance for the eyes of aging baby boomers (see text box, “Digital Paper at the Pharmacy,” on page 74). With the new advantages of digital paper, some packages that have already shifted from paper to plastic in the past few decades may return to paper in the next decade (e.g., milk and juice jugs).

### Radio Frequency Identification Tags: Providing Behind-the-Scenes Information

RFID tags are in the process of transforming supply chain logistics by improving the identification and tracking of individual items. These tags, also called smart tags, allow a reader to beam electricity toward the tag, which then transmits information back to the reader on a low-frequency radio wave (see Figure 46). Like bar codes, they can be placed on a package label. But in comparison to bar codes, smart tags are more durable, can function even in extreme weather conditions or out of line of sight, and several can be read simultaneously.

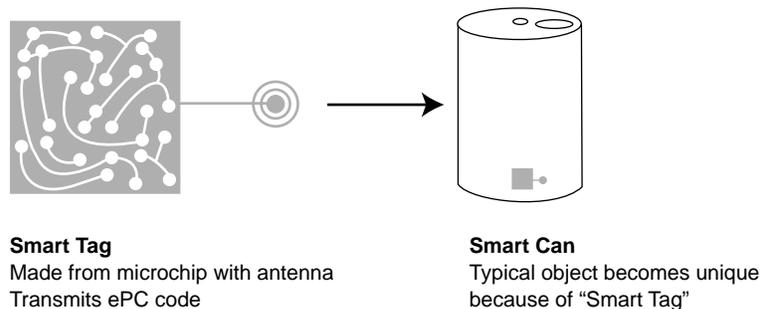
The two real breakthrough advantages of smart tags for the purpose of packaging are that they can store more

information than bar codes, and this information can be updated. This means that individually tagged materials or packages can be tracked through the manufacturing and distribution stages and updated at each step of the process to increase efficiency and inventory tracking. Once items are in a retail store, retailers can use the smart tags to control inventory, prevent theft, and monitor freshness.

A range of manufacturers, including Motorola, Philips, Texas Instruments, BiStar, Rafsec, and Tagsys all currently offer smart tags, and MIT is leading efforts to standardize identification systems. The tags are already used in a number of ways, including tracking durable and nondurable goods throughout the manufacturing process, tracking mail, tracking books and audiovisual materials in libraries, and identifying pets. More applications for the tags will be developed as cost per tag decreases and signal range increases.

Some technology researchers think that smart tags will be important in a future “networked home”; food products could be tagged for freshness and a “smart refrigerator” could identify spoiled food and alert householders, for example. However, the more interesting application of smart tags for consumers is actually back at the store. Equipped with the appropriate readers (probably as features in PDAs or mobile phones) and

Figure 46  
RFID Tags



Source: MIT Auto-ID Center

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### Digital Paper at the Pharmacy

Lou walked into his pharmacy and dropped off his prescription with the pharmacist, Stephanie. She smiled at him and said, "Hi Lou! How's Doris? I'll have this ready in a few minutes." Lou paused to tell her how his wife was doing, then wandered off to get the rest of the things on his list.

While Lou shopped, he remembered something else he wanted to look for. At work last week, he heard several friends joking about some herbs that improve sexual performance. They said one in particular had several scientific studies behind it. Lou couldn't remember exactly which herb it was—and there was no way he was going to ask Stephanie.

Instead, he walked into the herbal supplement aisle to look at the displays of a range of herbs—hopefully, by reading the labels, he could find the one he was looking for. He saw several that looked promising, but the digital labels were too small for him to read. "What the heck do these things say?" He took out his mobile phone and pressed a button to enlarge the print on the bottles. The labels responded by increasing the font size. Picking up two that looked reasonable, he pressed another button to return the font to its original size—no need to broadcast his business to everyone in the store—and decided to buy them from the cashier before he went back to pick up his prescription from Stephanie.

specific applications, motivated consumers can find out more information about a particular product—its origins, ingredients or materials, and manufacturing processes—all before making a purchasing decision.

Consumers can use this new, detailed information to make sound purchases, save money and time, protect their health, and even make political statements. Of course, the consumers may or may not always understand the information they receive; see text box, “Smart Tags on Vacation,” on page 76 for the purchasing behaviors of two consumers with very different levels of sophistication.

Manufacturers’ privacy concerns will be one important barrier to the consumer use of RFID technology—many companies will no doubt feel uncomfortable opening themselves to consumer scrutiny. The resulting information will be a double-edged sword, benefiting some companies with progressive business practices and quality ingredients, but hurting others. But manufacturers may not have a choice, if consumers demand this information and providing it becomes law. The most

difficult piece is likely to be the software applications that transform mobile devices into smart-tag readers. Development of these applications is likely to rely on complex partnerships between RFID companies, packaged goods manufacturers, retailers, and telecommunication providers.

Even when consumers are able to read these tags, scanning will not become ubiquitous. Most consumers will not take the time to scan every item, for every kind of purchase, and many consumers will not be able to afford the devices to read the smart tags. These types of information searches are only likely to happen when a motivated consumer is considering a new or expensive product, trying to manage allergies or other health conditions, or responding to a new piece of information about a product.

These occasions will be frequent enough, however, that packaged goods manufacturers will want to make sure that the data contained in the smart tags won’t hurt them at the point of purchase. Manufacturers also can use these tags to their advantage by including extra information to make the products more appealing to the new consumer—seals of approval from labor, health, and environmental groups; lists of important health benefits (e.g., the micronutrients and phytochemicals included in the product); educational materials about the “exotic” origins of the product; and so on.

### Organic Light-Emitting Diodes: The Next Display Paradigm

Packages will be changed forever with the introduction of OLEDs, a microdisplay technology that utilizes organic materials, some of them polymers, that emit light when a voltage passes through them. These displays are more lightweight, durable, thin, power efficient, and safe, and create higher-resolution images than active-matrix liquid crystal displays, today’s dominant flat-panel technology (see Figure 47 for an example of how OLED displays will look in consumer electronics).

The OLED technology itself has many proprietary variants. For example, Eastman Kodak invented the first

*Figure 47*  
*Consumer Electronics Will Use OLED Displays*  
*(OLED display in a watch)*



Source: eMagin Corporation

### Smart Tags on Vacation

Michelle sighed as she entered the supermarket. Even though she loved her family's annual Los Angeles vacation, it was just her luck that she had to take her little sister to the store to get more sunscreen. She trailed along behind Denise as they wandered around the supermarket looking for the sunscreen. Suddenly, Denise stopped in the jelly section. "Eww! Coconut jelly! That is SO gross!" Denise picked up a jar and made a face, then put it back down as she walked around the aisle.

"Coconut jelly? Wild! Let's see what's in it." Michelle dug her PDA from her purse, and then used it to scan the jelly jar. She loved being able to scan products to find out what they were really about. When her doctor told Michelle about the AllergScan software that scans the information in RFID tags to identify allergens, she had to

have it. It was finally a chance for her to control her allergies to gluten, dairy products, and mangoes! She always used it on all new foods that looked interesting, because it was much easier and safer than trying to read a long ingredients list.

Sure enough, her PDA screen flashed a warning that approximately 3 grams of mango pulp were in the jelly—definitely more than she should have. Michelle sighed and put the jelly back on the shelf as Denise came back around the corner holding a bottle of sunscreen. "Hey, Michelle, will you scan this thing for me? Last week, Suzie told me her cousin bought some sunscreen when they were in the Virgin Islands, and it had this stuff "hydroxybentol" in it, and he got REALLY sick, 'cause it's made from some gross chemicals, you know? And he had all these hives!"

Michelle rolled her eyes. She was not impressed by Suzie's overblown stories. Kids! She typed in "hydroxybentol" into her PDA and scanned the bottle. The PDA flashed another warning that about 100 milligrams of hydroxybentol were in the bottle. Michelle handed back the bottle. "Yeah, it has that stuff in there. But I don't even believe Suzie. You know she always makes things up!" Before Denise could start telling her how great Suzie was, Michelle quickly said, "Why don't you take my PDA and just wide-scan all the sunscreens? Do you remember how to do that?"

"Of course! I'll just grab some bottles and hit the repeat scan button, and it tells me which ones don't have that stuff. I'll be right back!" As Suzie sped off, Michelle yelled, "Be careful! You break my handheld, and I'll give you some hives!"

OLEDs in the early 1980s and uses “small molecules” in their displays, while Cambridge Display Technology uses organic light-emitting polymers and Opsys uses organolanthanide displays. IBM, Sony, Kodak Eastman, Hitachi, Siemens, and Philips have all developed prototype OLED displays suitable for wristwatches, mobile telephones, video cameras, televisions, and other consumer electronics; many of these devices have either reached the market or are very close.

There are still several hurdles to overcome with this technology, including the shorter life span of OLED displays compared to other technologies, the difficulty of displaying certain colors, and the complexity of the chemical processes involved in the displays. Whichever companies solve these problems first will undoubtedly get to set the standards for deployment. And because of these obstacles and the number of proprietary variants, this technology will probably be the last to appear on packaging.

Despite these obstacles, ongoing research activities will allow OLED displays to begin appearing in a wider range of consumer-oriented products within the next five years. In the United States, federal funds are being used to develop new OLED displays that are flexible or transparent; this will greatly expand the range of products that could use these displays. And Power Paper, an Israeli company, has already developed a battery that can be printed on paper and supply power for OLED displays.

Inexpensive printable batteries will permit OLED displays to appear on cheaper packaged products, such as food and personal care products. The displays can feature complex video and sound clips—series of still images, mini-movies, music videos, or detailed product information and comparisons, for example. Their low cost, flexibility, low power, high resolution, and durability will make them ideal devices to create the ultimate disposable, always-on information display on packages.

When practically any package can become a video display, packaging suddenly becomes a major push channel for advertising and entertainment at the point of sale. And both manufacturers and retailers can use the technology. Although many products will use OLED

displays primarily to promote brands and provide experiences, shoppers will also have opportunities to get just-in-time information about the source, ethics, and science of specific products (see text box, “Organic Light-Emitting Diodes at the Convenience Store,” on page 78 for examples of how this might happen in 2012).

### VALUE-ADDED OPPORTUNITIES CREATED BY NEW INFORMATION TECHNOLOGIES

Digital paper, RFID, and OLED technologies will not revolutionize each and every product or purchase. There will always be manufacturers, retailers, and consumers who focus strictly on price and downplay all other considerations. But these new technologies promise to create packages with value-added opportunities up and down the supply chain.

- Motivated consumers will have the opportunity to find out new information about the source, ethics, and science behind products. Even better, this information will be accessible just in time, at the point of sale.
- More consumers will be able to find out this information. Previously, only customers with Internet access and burning questions were likely to visit a company Web site. With these technologies, detailed information can be made available to a much larger consumer market.
- Consumer advocacy groups will have opportunities to become trusted agents by providing “seals of approval” on appropriate products. Furthermore, they can partner with other companies to create applications for consumers’ mobile devices to read smart tags, so that consumers can evaluate the source, ethics, and health benefits of tagged products.
- Graphic designers will be able to put their design skills to new use in the novel medium of OLED displays, bringing packaging to at least the level of sophistication and appeal of today’s better retail Web sites.
- Packaged goods manufacturers will be able to present complex information (e.g., federally regulated lists of ingredients, detailed instructions, and other “fine print”)

in interesting segments, through a variety of new channels. Their products will look more appealing when they can avoid cluttered, intimidating, and unappetizing lists of minutiae.

- All product manufacturers will benefit from the increased logistics efficiencies of smart tags, but product manufacturers with ethical manufacturing processes will

particularly benefit. They will have another channel for communicating their ethics to consumers, as well as another justification for higher prices.

- As packaging becomes more exciting and informative, bricks-and-mortar retailers that incorporate the new package technologies are likely to draw more consumers into an appealing and innovative shopping environment.

—Leah Spalding

### Organic Light-Emitting Diodes at the Convenience Store

Mike walked to the back of the convenience store to see what kinds of wine they had. He was on his way to dinner at a friend's house, and in the mood for something new. His attention was drawn to a bottle of Chardonnay with an interesting look about the label. As he examined it more closely, the images on the front label shifted to tell an animated story about the origins of the grapes used in the wine, the people who tended them, the vintners that created the wine, and so on. Another smaller label on the side cycled through a series of paragraphs, one describing how the wine meets organic standards, another describing the winery's progressive employment practices, and a third suggesting the best food pairings for the wine. Mike muttered to himself, "This one looks interesting," and grabbed the bottle.

On his way to the cash register, Mike maneuvered around a family looking at cookies. Two children were arguing over what type of cookies to buy, shouting in their excitement: "Dad, look! This one has the new Jamie Bryant video! Can we get it, Dad?" "No fair! She got to pick last time! I want the chocolate ones with Mickey dancing on the bag!" The hapless father exchanged looks with Mike. "What can you do when they're like this?" Grabbing both bags, the father moved to take his place in line behind Mike.



## Turning Consumers into Advertisers: Social Network Marketing in the World of Abundant Connectivity

*On Monday morning, Katie opened her e-mail and scanned the usual collection of about 70 messages. Katie's strategy for dealing with this morass was to see who the e-mail was from, delete all the advertising and list mailings as she scanned the inbox, read messages from her boss or her immediate team members, and then turn to e-mails from friends and family.*

*By 10 a.m., she finally got to friends and family. The first e-mail was from an old college roommate, Sarah, who lived in Boston. Katie had always looked up to*

*Sarah in their college days—Sarah had a great sense of style, seemed to know everyone, and often guided Katie to what was in and what was out. Katie looked forward to Sarah's e-mails, with their breezy and humorous depictions of Sarah's cast of numerous friends, family, and acquaintances. This Monday was no exception as Katie opened Sarah's e-mail, but to her surprise she found that it was addressed not just to her but to a whole list of people, many of whom Katie had never heard of before. She proceeded to read:*

Dear Friends,

I just wanted to share with you a great experience I had over the weekend. I was invited to try out a new day spa called Revive on Newbury Street. I spent 4 hours going from a consultation with a wellness specialist to a massage, healing baths, and various body treatments, ending with a complete makeover. This spa uses its own brand of completely natural products hand-picked by medical experts from places I never heard of. All I can say is that my skin is still glowing and I've never felt better. The experience was so incredible that I decided I had to share it with my friends. Not only that, but enclosed is a coupon giving you 20% off if you try their products by January 5. You can find the catalog with a description of products on the web at [www.revive.com](http://www.revive.com). You can order the products from there, and they will deliver them to your home. They are also planning to open spas in all the metropolitan areas, including San Francisco, New York, Los Angeles, and Chicago, in the next year. I hope you have a chance to try them and see for yourself how great the products and the services are. —Sarah

*Katie read the e-mail several times. She wasn't sure what to make of it. This was more than advice from a friend; this smelled of an advertisement, and it was addressed not just to Katie but to this long list of people, some of whom Katie recognized and others she had never heard of. "Who are these people?"*

*she wondered aloud. "And what does Sarah get out of this? Did she get this great day at Revive as a freebie for sending this to all her friends? Does she get paid for it?" Annoyed and baffled, Katie deleted the message and proceeded warily to the next e-mail, this one from her cousin just back from a trip to Italy.*

Welcome to the world of social network marketing, where roles, relationships, and boundaries are blurred—a friend is not just a friend but also an advertiser, a product endorser, and sometimes a salesperson—where the boundaries between private and commercial are porous, the roles of consumer and advertiser often merge, and social relationships become intertwined with commercial transactions.

Social network marketing—so-called “viral marketing,” because it spreads so fast and spontaneously—is becoming a holy grail for many companies. Why? Because of its tremendous power to get the attention of consumers and to sell products in today’s crowded marketplace, oversaturated as it is with advertising messages. After all, recommendations from a trusted friend or family member are the best way to convince potential customers to purchase a new product or service. According to Planetfeedback, 70% of consumers change their attitudes about products or services after reading opinions of others in their social networks.

Many companies have already witnessed the power of social networks—*The Blair Witch Project*, a low-budget movie produced by an unknown group of ama-

teurs, attracted millions of people exclusively by word of mouth spread mostly on the Web. Hotmail users grew in number to 10 million in less than a year by network marketing—by including “Get your private, free email from hotmail at [www.hotmail.com](http://www.hotmail.com)” at the foot of every message, alerting every recipient of the availability of the service. One of the most successful books of the last five years has been *Dr. Atkins New Diet Revolution*—it sold more than 7 million copies with almost no advertising. Beanie Babies, Pokémon cards, and Furbies are other good examples of products that have reached millions of consumers mostly by word of mouth in networks of friends and acquaintances.

The latest example is POX, an electronic game that Hasbro marketed deliberately through social networks. The company targeted a specific geographic area—Chicago—and selected a group of children who were considered “key influencers” or “alpha pups” among boys 8 to 13. Alpha pups were selected by going to video arcades, skateboarding parks, and streets and asking boys, “Who’s the coolest kid you know?” The researchers kept asking until they found boys who answered, “Me.” The coolest kids were selected as alpha

POX—Electronic game introduced by Hasbro. Pox players store a library of alien DNA in their \$25 POX Containment Unit. Using a combination of heads, bodies, and tails from different species, children try to build a powerful strain of warrior virus that will attack strains other players have stored in their containment units. The wireless game unit automatically detects any other unit within 30 feet and attacks, with the victor claiming the loser’s body parts for its own library. Such confrontations can take place even while the game is stashed in a backpack or a school locker. Thus, the more kids that have POX, the greater the chances of them finding opponents who they can play with (“attack”).

pups and were invited (with their parents' permission) to come to sessions in which the POX game was demonstrated. They left the sessions with bags of POX games they were encouraged to give out to friends. Very quickly, POX became a highly sought-after item on school playgrounds in Chicago, with children willing to trade almost anything for a set.

With such widely known successes, it's no wonder companies are interested in this form of marketing. But it's not for every company or product. Let's take a deeper look at this phenomenon, which is spreading through the marketplace today a bit like the products it advertises.

### WHY COMPANIES ARE TURNING TO SOCIAL NETWORK MARKETING

Companies are increasingly turning away from traditional advertising—that is, from sending mass messages into the marketplace and hoping their target audience receives them—to a newer type of marketing that involves facilitating conversations among their targets. The conversations (often about the benefits and val-

ues of a company's product or services) are seeded with a few leaders in the target market who start the conversation by telling a few more people, who tell a few more, and so on. In this way, companies are slipping into the conversational pathways of people who can influence their peers. Instead of coming from a faceless and mistrusted corporation, the marketing message seems to emanate from the most powerful endorser possible: a friend.

Word-of-mouth advertising is not new. You might say it's the oldest form of advertising, and likely predates written language. Even today, referrals are part of everyday conversation. Consumers themselves have consistently identified that friends and family are among the most useful information sources for making purchasing decisions (see Table 19). Indeed, social networks play a role across the purchasing cycle, from shaping the desire for new products and services, to serving as critical information channels, to influencing purchasing decisions and patterns of use (see Figure 48 on page 82).

If social network marketing has always been an option, why are companies turning more aggressively to these efforts today? Because the time is ripe for it,

*Table 19*  
*Friends and Family Are Among the Most Useful Information Sources*  
*(Percent of adults who chose ... as one of two most powerful)*

	Percent	
	North America	Northern Europe
Friends and family	43	30
Sales representatives	31	54
Store displays	28	37
Newspaper or magazine ads	26	14
Newspaper or magazine articles	21	15
Internet/online sites	21	8
Catalogs	12	15
Mail advertisements	10	12
Requested information	8	10

Source: Institute for the Future, International Household Survey, 2000.

with the convergence of a number of drivers: message saturation, increasing competition for attention, channel fragmentation, market fragmentation, and expanding technologies.

### Message Saturation

Advertising messages are everywhere—in school bathrooms, on friends’ clothing, on our own clothing, on coffee mugs, on billboards, on the Web, on the road, in the home, at work, on shopping bags, on receipts, on television and radio, on ATM screens, on movie screens, on buses and taxis, on the walls of elevators, on the grocery store floor, in newspapers, in magazines, and at public events. We are constantly bombarded with advertising messages. Some estimates claim that the average U.S. consumer receives anywhere from 1,000 to 1,500 such messages (in all forms) per day. The obvious challenge for businesses in this ad-saturated environment is simply to be noticed.

### Competition for Attention

What makes advertising today more complicated than before is that consumers are becoming adept at tuning

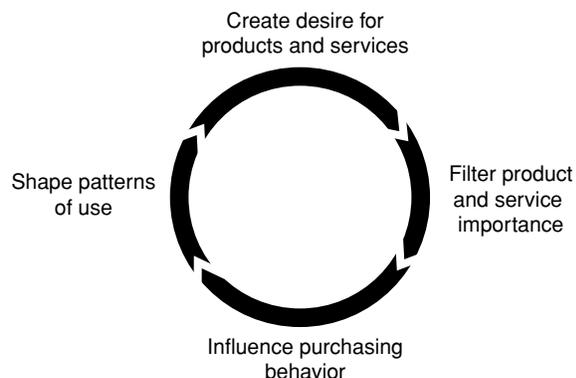
out communications—particularly marketing messages. For example, in 1965, a brand manager could reach 80% of women 18 to 49 with three prime-time commercials. Today, it takes 97 prime-time commercials to achieve the same result.

Attention is a valuable commodity, and consumers guard it carefully. In the context of a more sophisticated and intelligent consumer, messages (of all types) must be relevant if they are to be heard. But breaking through such strong defenses isn’t easy. Relevance is often determined by the degree of trust between sender and receiver, the kind of trust that exists in social networks.

### Channel Fragmentation

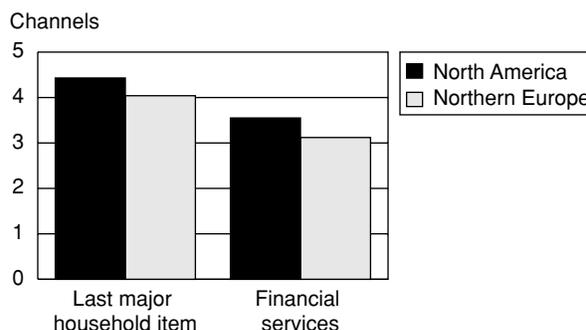
Not only is the volume of advertising messages incredibly high, but the number of communications channels is growing as well. Businesses can communicate with their customers in a variety of ways—direct mail, e-mail, telephone, television, radio, catalogs, Web sites, magazines, in-store promotions, sales representatives, and so on. As a result, consumers rely on a variety of channels for obtaining product and service information before buying something (see Figure 49 and Table 20).

Figure 48  
Social Networks Shape the Purchasing Cycle



Source: Institute for the Future

Figure 49  
Consumers Use Multiple Channels  
(Mean number of channels used before making purchase of ...)



Source: Institute for the Future, International Household Survey, 2000.

Consumers use these communication channels in ways that fit their idiosyncratic preferences. With further penetration of mobile devices and continuing technology evolution in communications, additional channels will no doubt emerge to create even more types of messages vying for the consumer's attention.

### Market Fragmentation

The entire consumer sector itself is also fragmenting into smaller niches. One explanation for this trend may be that different generations have different formative media experiences. For example, baby boomers' formative media experience was largely shaped by television with limited programming. The formative experiences of today's youths, in contrast, are channel fragmentation and diverse programming on network television, cable TV, videos and DVDs, radio, and the Internet. As a result, media experiences are even fragmented in the home, as different age groups are drawn to different media, and different content in the same media (see Table 21 on page 84). In such a climate, reaching a large consumer segment through any one channel becomes increasingly difficult.

### Expanding Technologies

Word of mouth becomes a much more powerful communication channel in the context of abundant connectivity. In the information age, the Internet broadens the reach of social networks and facilitates the fast diffusion of information within and among communities.

In fact, according to a recent study of online communities by the Pew Internet and American Life Project, the Internet enables people to build new ties and strengthen existing ones by helping them find others who share their passions, lifestyles, or professional interests while at the same time keeping them much more connected with people they already know. Unlike in the past when people could only manage a limited set of relationships, either face to face or by written correspondence—usually with family or people in their immediate geography—in the Internet age, people can include everyday acquaintances in their social network with the click of a mouse. Social networks are no longer limited to strong ties but now can include many more layers of relationships, including weaker ties that can be important in a variety of ways for everyday life.

*Table 20*

*Channel Preferences for Browsing*

*(Percent of respondents who reported using ... channel to shop for a major household purchase or financial service)*

<i>Channel</i>	<i>North America</i>	<i>Northern Europe</i>
Sales representatives	65	63
Bricks-and-mortar stores	64	72
Friends and family members	61	60
Consumer-requested information	50	41
Newspaper/magazine ads	49	41
TV programs and newspaper/magazine articles	45	35
Mail advertisements	39	37
Catalogs	35	42
Web sites/online services	27	10

Source: Institute for the Future, International Household Survey, 2000.

Social network marketing is much more powerful in the world of abundant connectivity. Given these drivers, this type of marketing is becoming necessary to capture consumers' attention. Technology not only makes word of mouth faster, but there are also few or no switching costs in electronic media. In digital formats like e-mail, messages can simply be forwarded to an entire e-mail or buddy list. Technology, then, is essentially acting as an amplifier—amplifying basic social processes that existed before the Internet. Only now, networks are broader, communication is faster, and relationships are (potentially) stronger.

### ISSUES WITH SOCIAL NETWORK MARKETING

While there are many advantages to social network marketing, among them the ability to break through message overload, the potential for rapid diffusion of a product or service message, and the power to reach a younger population, the practice also raises a number of societal and business issues. These include the possibility of conflict of interest, the potential for backlash, and the fact that such marketing efforts don't work for all products or locales, and they tend to be short-lived and can have limited reach.

*Table 21*  
*Fragmented Media Experiences in the Home*  
*(Top-rated shows among teenagers 12 to 17 and all viewers, March 2001)*

<i>Teenagers</i>	<i>All Viewers</i>
1. Malcolm in the Middle	1. Survivor
2. The Simpsons	2. E.R.
3. Temptation Island	3. Millionaire (Tuesday)
4. Survivor	4. Millionaire (Wednesday)
5. Grounded for Life	5. Friends

Source: Nielsen Media Research, *The New York Times*, March 13, 2001.

### Conflicts of Interest

As a society, we are growing accustomed to conflicts of interest inherent in many professional positions. Lately, there has been much publicity around the propriety and legality of stock analysts' work in large brokerage companies, for example. The analysts are supposed to provide their clients with an impartial analysis of companies in the sectors they cover; at the same time, they are working for companies underwriting the stock offerings they are supposed to analyze. In fact, the analysts are often rewarded for promoting such stocks. Are they really impartial advisors or simply promoters?

Social network marketing carries some of the same conflicts into social relations. Is Katie's friend Sarah giving her a great recommendation about Revive because she really likes the product and wants her friend to experience its benefits or is she only doing so because it's part of the exchange for Sarah's receiving free treatments and products? Will we have to start assessing our friends' and relatives' conflicts of interest when getting their recommendations? Will we have to start screening our friends and family for endorsements the way we screen our e-mail?

The question becomes even more important when applied to children. Is it appropriate to use this technique with children, who are particularly susceptible to peer pressure? According to *The New York Times*, the parents of Hasbro's alpha pups had conflicting feelings about their children's participation in the program. For lower-income parents, the prospect of their children earning some extra money was particularly attractive. Still, many parents weren't sure it was a good idea for their children to spread the product because the content was too violent—after all, the aim of the game is to destroy the other person's electronic creature.

With the POX game, manufacturers at least required parents' permission in order for children to participate as alpha pups. In other cases, children may become involved in social network marketing without knowing it, which raises ethical issues about consent and protection of children's privacy.

While exchanging product information and giving recommendations to friends is a natural part of many everyday conversations, social network marketing can be somewhat contrived. Such efforts often involve targeting certain groups, recruiting them into the ranks of product promoters, and offering them hidden payments (e.g., in-kind instead of explicit payments in exchange for spreading the word). These situations can bring numerous conflicts of interest into the personal sphere, truly blurring the line between business and private realms, friends and promoters.

How long can a friend be considered a source of unbiased advice before one realizes that he or she is simply another front for advertisers? The inevitable result is that the friend's recommendations are going to be filtered out the same way as thousands of other advertising messages are. Will Katie simply delete Sarah's e-mails from now on, the way she does with other promotions? More important, will Katie ever really trust Sarah again? It is easy to imagine that friends who turn into advertisers follow the fate of other advertisers—they will be filtered out, ignored, or worse, from both the personal and the business standpoint, ostracized by the very social network they are trying to influence.

### Potential for Backlash

As companies develop more and more sophisticated techniques for reaching consumers—moving from traditional mass advertising to social network marketing—consumers are growing increasingly adept at deconstructing advertising messages, wherever they originate. In our ethnographic research with young people in four regions—Japan, Nordic Europe, Silicon Valley, and the United Kingdom—we were surprised to find the wide diffusion of the “no-logo” ethic. This ethic was crystallized and articulated in a book by Naomi Klein, *No Logo: Taking Aim at the Brand Bullies*, that deconstructs the process of corporate marketing and the packaging of different products and decries deliberate efforts by companies to increase senseless consumption. The book found fertile ground in the growing anti-corporate and anti-glob-

alization movements around the world and in fact morphed into a movement in its own right.

Young people in our research have become very adept at deconstructing advertising messages to figure out who is behind them, who really benefits from selling the product, what its real impact on young people is, and what values the messages promote. In fact, we've found that deconstructing advertising messages was sometimes the subject of extensive conversations with parents, who regularly mentor their children on understanding what is behind the message.

Such behavior shows that there is a great potential for backlash to advertising, as with social network advertising that can be interpreted as “deceitful” or creating personal conflicts of interest on the part of the younger generation of consumers. People seen as promoting certain products or services may indeed become ostracized in some social networks.

### Social Network Marketing Does Not Work for All Products

While social network marketing may be extremely powerful in grabbing consumers' attention and increasing demand for some products, it clearly does not work for all products. In order to succeed with this approach, the product, service, or trend must have a high degree of “virality”; that is, it must be able to be spread easily throughout the population. The following characteristics increase the virality of a product or a service:

- *Visibility.* Products or services must be easily observable by members of the social network in order to get them interested. Fashion items and consumer electronics products, particularly portable ones such as cell phones, PDAs, or Game Boys, may be easily observed in public spaces, on playgrounds, or in offices. These items are easily displayed; their functionality and appearance can be easily observed by members of the social network. Thus, information about the product or service can be transmitted throughout the social network simply by observation.

- *Talk-ability.* Conversation, whether oral or by electronic media or print, is crucial to transmitting information and ideas. In order for a product, service, or idea to be highly transmittable, it has to be an important part of such conversations. It has to be something that is impor-

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**Social network marketing is best suited for geographic markets or locales where there is a good infrastructure for diffusion.**

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tant in many people's lives, something they are passionate about, and something they talk about with their peers or others in their social networks. Most teenagers, for example, are passionate about music—it is not only a subject of conversation but also a great differentiator and social organizer in many teen networks. What music you like, what band you listen to, and what concerts you go to connote much about who you are, whether you are “cool,” and whether others want to hang out with you. Music products, including various technologies for accessing and listening to music, are perfect candidates for social network marketing.

- *Functionality in a network setting.* Some products can only be used in a network setting—that is, they require a group of people to have a service or a product in order for it to be useful to any particular member of the group. Or else they derive particular value from greater network effects—that is, the larger the network of people using the product or service, the greater the benefits that accrue to each member of the network. Hasbro's POX, for example, requires the participation of many children, since it can be played with anyone in physical proximity of the device. In this case, children have an incentive to spread the word about the game and encourage their friends to buy it so they can play together. In some cases, certain devices or services not only work well in a network setting but also become imbued with special meaning and

are essential for belonging to the group. Our ethnographic research in Sweden, for example, discovered that it is simply not socially acceptable to not have a mobile phone, as not having a mobile phone connotes nonparticipation in the society and, in fact, rejection of the social norm (that is, to be accessible any time in any place).

### **Social Network Marketing Works Unevenly Across Locales**

Social network marketing is best suited for geographic markets or locales where there is a good infrastructure for diffusion. Such infrastructure includes several elements:

- *Social mobility.* In order for ideas to diffuse in a population, there has to be mobility of people among groups, organizations, and physical places. Annalee Saxenian, professor of regional economics at the University of California, Berkeley, has compared the economies of Silicon Valley and Route 128 around Boston. She notes that innovations spread faster and more widely in Silicon Valley because of the high degree of mobility of workers among companies, universities, venture capital firms, offices, the public and private sectors, and so on. By frequently moving from place to place, Silicon Valley workers spread ideas and innovations among different organizations much more quickly. The mobility and openness of social networks in the region result in high levels of innovation and quick diffusion of best practices. The same must be true for social network markets.

- *Communications infrastructure.* Geographic regions that have good physical infrastructure, including extensive roads and sophisticated transportation, telecommunications, and media networks, are able to provide the means to facilitate the mobility of people and ideas. Large metropolitan areas (like Chicago) are better suited for social network marketing because these areas usually provide better and more concentrated physical infrastructure for transmitting information and ideas. Although today a large degree of diffusion in networks takes place virtually in electronic chat rooms and various

other electronic forums, densely populated metropolitan areas provide the setting for observing the newest trends and products and transmitting these to larger groups in the immediate locale.

- *Homogeneity.* Diffusion is easier to achieve in homogeneous rather than highly heterogeneous populations. Diffusion takes place more rapidly if members of a group have similar values, share similar levels of income, live in similar circumstances, and share similar interests. Nordic Europe, for example, is ideally suited for social network marketing. The region has an excellent communications infrastructure, as evidenced by high penetration of Internet access and mobile phones (see Figure 50 on page 88). The market is fairly homogeneous, with most people sharing the same social and economic contexts—similar income levels, similar work experiences, similar levels of education, and so on. There is also a high mobility of people between different parts of Nordic Europe and between Nordic Europe and the rest of the world, giving Nordic Europeans exposure to ideas and trends from the outside and allowing them to bring these into their own countries. Not surprisingly, in Nordic Europe ideas and new products and services, once adopted, diffuse rapidly and reach wider portions of the population than anywhere else in the world.

### **Social Network Marketing Efforts Tend to Be Fast and Short-Lived**

Social network marketing campaigns, when successful, tend to be faddish. In many cases, companies and consumers are locked in a game of coevolution, whereby the fringes of the network generate the next cool thing and companies quickly package and commercialize it. But opinion leaders in networks, the innovators, quickly move on to the next trend, taking the network with them. Social networks can move quickly to a superior alternative that is offered or brought to their attention by an opinion leader. As a result, companies can find themselves always working a step or two behind the fleeting needs of such networks.

### **Limited Reach**

Many social networks tend to be local or issue specific—alumni networks from a school, followers of a certain music group or genre of music, or religious communities. In order to reach a wider audience, these

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**Social network marketing will become increasingly more attractive in the world of abundant connectivity.**

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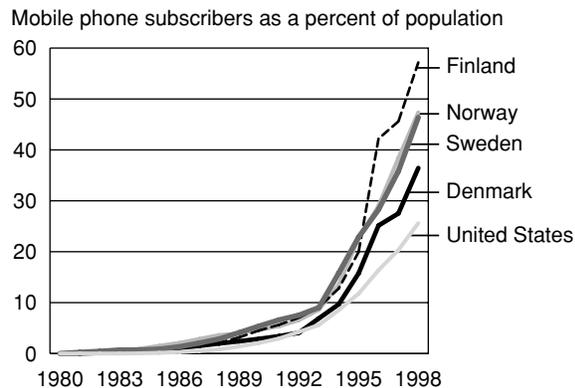
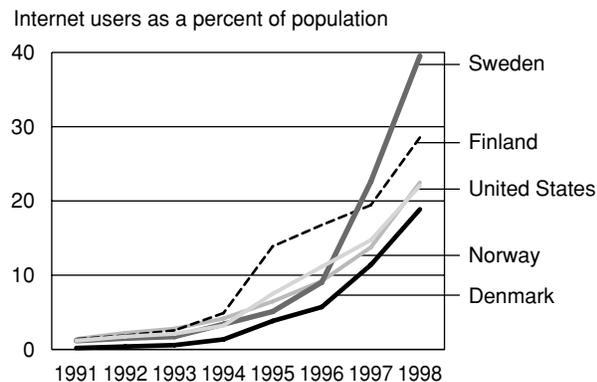
“small world” networks must have “long” connections, or weak ties, to other groups. In many cases, such long connections may not exist. Thus, social network marketing may in fact limit rather than extend the scope of the audience the company can reach.

### **FORECAST**

**A**dvances in technology will amplify the role of social networks in daily life and also make it easier for companies to reach potential customers through social networks. Given this type of symbiosis, social network marketing will become increasingly more attractive in the world of abundant connectivity. Several key trends are important to watch:

- *More experimentation will lead to growing capabilities.* Companies will continue to experiment with social network marketing, and in the process will improve the analytics and technological capabilities of this type of marketing.
- *Tagging will measure and facilitate network effects.* Tagging forges the link between information and the physical world. It binds data to time, place, and objects. Expect tags to measure and facilitate the diffusion of products and services across social networks. Tagging innovations will drive improvements in the analytics of social network marketing.
- *Wireless infrastructure is becoming the social infrastructure.* Advancements in wireless technologies and

Figure 50  
Nordic Europe Has the Infrastructure for Social  
Network Marketing



Source: Institute for the Future; Organisation for Economic Co-operation and Development, Telecommunications Database, 1999.

their adoption and diffusion will facilitate greater “social connectivity” and result in new social practices. Expect to see changes in the way people interact socially. Mobile phones, for example, are already essential tools for participating in everyday life in places like Helsinki, Stockholm, and Tokyo, creating new social practices. For example, scheduled social interactions are increasingly rare among young people in these regions, and there is a growing expectation and preference for just-in-time social interactions. Short-text messaging, or SMS, is already being used for “social surveillance” activities, such as tracking friends’ whereabouts in the urban landscape. As a result, many young people are just an SMS message away from reaching their social networks. Companies will be poised to leverage this social connectivity the wireless infrastructure is creating.

### IMPLICATIONS FOR BUSINESSES

Social networks are communication channels and markets all in one. To date, however, most social network marketing campaigns have leveraged only the inherent word-of-mouth capabilities of social markets, that is, their characteristics as a communication channel. Few companies have thought deeply about the needs and desires of the social networks themselves; they haven’t looked at social networks as markets in their own right. When social networks are analyzed as markets, several domains of need emerge:

- *Identity.* What is the identity of the social network? What sustains it? What reinforces it? What are its symbols of belonging? What products and services are vital to sustaining the identity of the network?
- *Infrastructure.* What is the infrastructure of the network? What are the necessary, and sometimes invisible, elements of the network that allow it to exist and endure? Parents are a vital but often invisible part of children’s networks. Children are often not conscious of multitudes of resources supplied by this invisible infrastructure—rides to schools, meeting places, sports activities, clean clothes, meals, and so forth. Although much

of the invisible infrastructure is not as exciting as more visible parts—trendy products, fashions, and music—they are just as vital to the healthy functioning of the social network.

- *Consumption.* What types of products and services does the network itself (not necessarily individual members of the network) need in order to exist? A particular music network may require a constant supply of new information on bands, singers, and performance venues in order to keep going. It might need physical spaces where members can meet face to face. Indeed, it might need a fresh supply of new bands and recordings. If one looks at the network rather than an individual as a market or a segment, a whole new array of product and service possibilities may become apparent. Because most experiments to date have leveraged social networks only as communication channels, which tap into the consump-

tion domain, most campaigns have been victims of the fad trap—where a marketing phenomenon is fast and short-lived. The consumption domain in social networks tends to change quickly and have short value cycles.

Products and services that appeal to the other two domains have the potential to last much longer because each taps into core components of social networks. In this way, products and services that build or facilitate the infrastructure of the network, such as technology, social venues, and activities, and those that facilitate identity or group meaning, such as key symbols of community membership, might have a more sustained role in the network than others. Tapping into these domains gives a company a better chance to create more lasting value for the network, and, of course, greater revenue for itself.

—Rod Falcon and Marina Gorbis



## The Challenge to Intellectual Property

*The United States' expertise in innovation has produced a wealth of benefits to society. Yet the tools we have forged to foster innovation—the patent system and its rules of enforcement—are growing increasingly complex and have never been so open to social criticism. Just at the time when the value of intellectual property is increasing in the marketplace, the patent system is undergoing subtle but important changes. Indeed, public opinion—a crucial element in society's support of the monopoly-like grant of power that patents represent—has increasingly called the patent system into question. It will take the flexibility of a new and adaptable response by patent holders, as well as legal and political changes, to retain the widespread public support necessary for the system of intellectual property protection to function efficiently in the future.*

## WHY INTELLECTUAL PROPERTY IS IMPORTANT

Society benefits from innovation. R&D-intensive industries contribute at least twice as much to the growth rate of GDP as do other industries, and they provide for an inordinately high share of the country's exports. They have also gone a long way toward raising our standard of living, by providing the ability to process data quickly; communicate more effectively; move

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**Even with the monopoly control given to patent holders, society benefits from innovation far more than the patent holder does, because the benefits continue to flow long after the patent has expired.**

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products around the globe more quickly at lower cost; make safer bridges and roads; build appliances that save time, effort, and energy in the home; develop improved entertainment technologies; and discover medicines that save lives or improve their quality.

For these reasons, the public has an enduring interest in fostering innovation—ensuring that there is as much as possible, that it happens quickly, and that it is disseminated widely. To this end, for centuries protecting the right of the inventor (or patent holder) to benefit from an invention has been at the core of intellectual property protection. In fact, international studies have shown that the countries with the highest standards of intellectual property protection have the highest economic growth rates.

In the United States, protection of inventors is embedded in the U.S. Constitution and manifested in the patent system. Even with the monopoly control given to patent holders, society benefits from innovation far more than the patent holder does, because the benefits continue to flow long after the patent has expired.

Still, to achieve and retain broad social support for the system of intellectual property protection, the bulk of

the public must see the grant of a time-limited monopoly over the use of an idea as fair and equitable. Patents ultimately restrict the use of an idea, and though in some cases aggressively suing and litigating to protect patents is the right approach, such actions lose moral legitimacy when, for example, because of patent protection, some people can't get the products they need to stay alive.

Part of the problem is that patents provide a form of monopoly power to the holder and thus run counter to the free-market system that has won so much confidence from consumers in the past 20 years and is so important to the functioning of today's relatively efficient economy. Patents seem to limit the free and uninhibited flow of ideas that are the basis of an open democratic society. Such interference has a clear downside—patents give monopoly power to the holder, oftentimes large corporations; the system favors those who already have large resources; it tends to discourage competition; and it forces up the price of the patented product for everyone, rich and poor.

In today's marketplace, where fairly free markets in the flow of finance, goods, and people are bringing the world ever closer, patents are becoming more valuable to their holders. For this reason, the stakes for intellectual property have been raised and there are now two specific threats to the intellectual property system as we know it: turmoil within an increasingly complex system and growing public concern about the boundaries and consequences of monopoly power.

## THE INTELLECTUAL PROPERTY SYSTEM IS GROWING INCREASINGLY MORE COMPLEX

Intellectual property is becoming more valuable to its holders. This is an important and beneficial development for society, since it increases the potential for innovation, new products, and higher productivity rates. But as the stakes have increased, the nature of the intellectual property market has changed as well, bringing about growing complexity, more litigation, and more bureaucracy, all factors that could inhibit innovation in the long run.

### **New Mechanisms and Markets for Rewarding Innovation**

The importance of patents can be traced directly to new forms of systematic rewards for intellectual property in the marketplace. In the past decade, business investment and R&D have grown tremendously, and both were at the heart of the extended economic boom of the 1990s. (For more on this phenomenon, see “What Will Drive the Next U.S. Boom?”) As technology innovation became the center of unprecedented stock market growth and the formation of thousands of new businesses, new types of financing emerged that channeled hundreds of billions of dollars to those who could identify a patented idea ready for commercialization.

The venture capital model that emerged provides seed funding from private investment funds for entrepreneurs with innovative ideas, venture funds for bridge loans as the idea is developed and tested, and investment banks to help entrepreneurial firms move toward an IPO. Meanwhile, large companies are ready to acquire or partner with firms that have products or services ready for the market. (See our theme report *The Transformation of R&D*, April 2001, for more on the nature of the venture capital system.) In 2000 alone, the venture capital market contributed \$70 billion to technology-based start-ups; start-ups issuing IPOs earned another \$70 billion. At the same time, stock exchanges like the Nasdaq provided the means for the public to participate in the longer-term growth of these firms with the purchase of mutual funds.

The flow of hundreds of billions of dollars into these markets for R&D-based activities has sharpened the public’s awareness of the rewards for people with good ideas that work. Everyone who participates in the intellectual supply chain—the academic researcher, the engineer who translates the idea into application, the entrepreneur who builds a business plan around an application, and the marketer who finds users willing to experiment with an idea—has an interest in partaking in the rewards.

The starting point for allocating rewards is listing all participating researchers on a patent that might be used

at some stage in the commercialization process. As engineers weave several different technical innovations together into a complex business application, the number of interested patent holders can increase exponentially. The reward system—which is based on a valuation set by a buyout, IPO, or licensing agreement—provides an easy way of measuring the ultimate value of the idea or invention. Everyone in the system can see both the size and scale of the rewards and can

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**The flow of hundreds of billions of dollars into markets for R&D-based activities has sharpened the public’s awareness of the rewards for people with good ideas that work.**

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identify what role they played in the process to achieve those rewards. In this way, more people are benefiting from intellectual property, but the system also is becoming increasingly more complex.

### **Patent Complexity**

The patent—which gives an invention with some public utility a grant of monopoly ownership for 20 years—is at the heart of the intellectual property system. But patenting policy has been changing in the past decade.

For one thing, more patents are filed each year. The number of new patents filed in the United States grew at an annual rate of more than 8% during the 1990s. What’s more, a growing body of literature shows that patent applications in the late 1990s were much more complex than patent applications as recently as the 1970s. The complexity can be measured in a number of ways. More claims are made for the potential application of the average patent. More prior art or background material that led to the invention is cited for each patent, which gives it more credibility in any future litigation. More time is spent on the patenting application and procedures, which in some cases involve refiling amended applications. More inventors are cited for each patent. And finally,

there is more litigation involving patents, and patent trials are taking longer.

### **New Actors, New Defensive Strategies**

Corporations account for 85% of patents, and the range of parties with interests in the patent system is growing.

### **Corporations are finding that patenting is growing increasingly expensive.**

Small companies are being set up every day to commercialize ideas. These are attracting disgruntled workers from large enterprises or researchers from universities to do focused research on a topic with commercial possibilities. Even research universities have found that they can benefit from the ideas generated in the university and are building their stocks of intellectual property, either directly through patents or by participating as venture firms in faculty start-ups.

In fact, some universities have set up organizations that manage the flow of new ideas. The Association of University Technology Managers has more than 2,000 representatives from 300 university and nonprofit research centers. Its main goals are to facilitate the commercialization of ideas for the public good; to build university ties to industry; to reward and retain faculty; and to build the economic base of the university community.

But as the stakes in intellectual property grow, corporations are finding that patenting is growing increasingly expensive. Since the cost of applying for international coverage for a patent is about \$20,000, many companies can't afford to patent every idea they come up with. Many of the activities in their research labs or in their various partnerships with other firms or with academics are not directly relevant to current activities or have no clear market applications—yet.

But many big corporations have been bitten by not pursuing so-called “peripheral patents.” IBM, for exam-

ple, did the groundbreaking research on the scanning tunneling microscope in the early 1980s, but didn't find it worth pursuing at the time. When IBM's interest rose again ten years later, it found that its work was surrounded by patents granted to other firms on incremental innovations that formed a fence around any further work IBM could do.

Corporations have found a solution to this problem without the expense of filing for a full patent. They take defensive actions around ideas of lesser interest by publishing articles describing their research. The act of publication forms a basis of prior art that keeps other businesses or individuals from patenting in that area (since, with the existence of that type of literature, the others cannot prove that they were the inventors of that work).

In fact, there are a number of new organizations that formally publish research at a company's behest and send it in electronic form to the world's patent offices. Examples are the journal *Research Disclosure* and the Web sites IP.com and Priorart.org. Along with providing sets of keywords that make it easy to find the research for relevant areas, these publications make it easy to show that other potential patentees cannot claim “first and original” work in a given area. Defensive publishing at \$109 an article is much more cost-effective than applying for a full patent, and it prevents the idea in the article from being picket-fenced by the incremental patents of others.

### **Consequences of Change**

In sum, patents are proliferating, growing more complex, and drawing an increasingly broad range of interests and actors. Their growing complexity has raised the cost of intellectual property, increased litigation, increased the amount of defensive activities, and raised the savviness of anyone who might be involved in a potentially patentable idea. The value of patents in the marketplace has also pushed universities to redefine their traditional role as the generators of open ideas, as uni-

versity departments now vie to patent their own findings. What's more, the rewards of patents have made it more difficult for universities to retain the "best and brightest" for the academic pursuit of excellence. As a result, the intellectual property process has grown more complex and costly and has threatened the kernel of open knowledge that has been the foundation of university research for hundreds of years.

Such a complex system is difficult to run, but it still works. A bigger threat to the foundation of the system is in the changing public attitude toward patents, as many entities and individuals are coming to question the efficacy of this type of protection in the face of public emergency.

### **PUBLIC CONCERN ABOUT THE MONOPOLY POWER OF INTELLECTUAL PROPERTY IS RISING**

Special treatment for intellectual property only works when there is broad public consensus for the concept behind patents—the monopoly grants. Quite recently, however, a number of tricky issues involving potential abuses of these patent monopolies has informed the public's view of intellectual property protection. Four cases in particular garnered wide attention.

#### **Intellectual Property in a Reluctant World: AIDS and Developing Countries**

The world system of open trade has benefited every country in the world, though not every industry or business. But liberalization took a new direction in the 1990s when the World Trade Organization (WTO) extended the general international agreement on trade and financial market regulation to intellectual property. The richer countries of the world pushed for an accord called the Trade-Related Aspects of Intellectual Property (TRIPs). It was accepted by the WTO in 1994.

TRIPs sets minimum standards for the legal protection of intellectual property. It calls on developing countries to introduce 20-year patent protection legislation (including protection for computer programs, integrated

circuits, plant varieties, and pharmaceuticals) and forced many of the mid-level-income countries to implement this protection by the beginning of 2000. (Poorer countries have until the end of 2005.) Safeguards were put in place to "protect public health and nutrition" through mechanisms like compulsory licensing, which allows

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**The goal of the TRIPs agreement was to respect the rights of patent holders in the global marketplace without adversely affecting the public good.**

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countries to force companies to grant a license to a local producer. In general, the goal of the agreement was to respect the rights of patent holders in the global marketplace without adversely affecting the public good.

Pharmaceutical products that treat AIDS became the first serious issue under the new agreement. Drug companies, especially those in the United States, where 13 of the 15 successful AIDS drugs were invented, spent huge amounts of R&D funds on a series of drugs that slowed and oftentimes stopped the progress of AIDS. These companies clearly had their eye on the potentially lucrative market in the United States. Today, a successful drug regime that puts AIDS in remission costs between \$5,000 and \$6,000 a year.

For the poor in countries like Brazil and those in sub-Saharan Africa, however, those prices essentially exclude most of the 25 million people infected with HIV from effective treatment. The issue has forced governments to question the system.

Brazil, for example, has boldly confronted the AIDS epidemic by approaching it as a public health issue. The Brazilian government offers free treatment to people with AIDS, in this way becoming a model for the developing world. To do so, it licenses local companies to make generic copies of many brand-name drugs (e.g., Stocrin and Viracept) that are patented elsewhere but not in Brazil.

Although South Africa worked hard to follow TRIPs rules at first, it eventually took a path similar to Brazil's for AIDS treatment. It, too, fostered the use of generic drugs by means of compulsory licensing programs, thereby earning the ire of the pharmaceutical companies holding patents on the originals.

In response to the two countries, the U.S. government brought a case against Brazil while 39 pharmaceutical firms challenged South Africa's challenge to the patent system through the WTO. After a year of litigation at the WTO (and a lot of bad publicity), the pharmaceutical industry players withdrew their case against South Africa, and the U.S. government also withdrew its case against Brazil. In both instances, accords were reached for patent recognition by the countries and discount pricing for the public dissemination of the drugs.

In the meantime, the more fundamental problem remains. Brazil, backed by 50 other developing countries, has approached the WTO about easing the application of patent rules on drugs deemed essential to public health. They want it clearly stated that the TRIPs agreement shall not "prevent members from taking measures to protect public health."

### **Cipro and the Anthrax Emergency**

The anthrax scare in the United States in October 2001 raised a major issue for the pharmaceutical firm Bayer, which has a patent on the most effective antidote to anthrax, Cipro. When the threat initially emerged, public health officials in the U.S. government realized that its stock of Cipro would not be enough to treat a general emergency. Bayer indicated that it could handle the increased demand for the drug, but would need some months to generate the right amount. Congressional hearings were called to discuss stripping Bayer of its patent or forcing generic production of the drug. In Canada, the government went as far as authorizing a local company to make a generic version of Cipro.

As it turned out, the immediate threat proved to be limited, and negotiations with Bayer eventually led to an

agreement for increased production and lower costs for emergency supplies. The issue left a bad taste in the mouth of many U.S. citizens, however, who had found that a patent monopoly had stood between them and security in a time of crisis. Canada also found itself in the unique position of claiming an emergency suspension of a patent on a drug to treat a disease with no reported cases within its borders, while at the same time denying African countries patent relief that could provide help for 25 million people with AIDS.

### **Digital Copying**

Duplicating copyrighted information in digital formats has also become a big intellectual property issue in the last few years. For many years, copying machines were used to reproduce articles and chapters from books, making it easier to distribute them widely. But the slow process of copying page by page and the overall costs of doing so kept the copyright issue relatively minor, except for those who published academic books in low volume but at high cost. To address the complaints of these academic publishers, accords were worked out that allowed the limited copying of such materials for classes and academic research, with some royalty payments in return.

But the invention of digital formats for music and movies and access to the Internet changed the nature and extent of the problem. Not only could almost anything on the Internet be copied with impunity, but also now at stake were millions of dollars of copyrighted material in the form of music, videos, and even freelance articles written for printed magazines and journals.

In response, the Digital Millennium Copyright Act (DMCA) of 2000 sought to regulate digital copying. It brought into question Internet sites that fostered the copying of materials. The most notable of these was Napster, which had allowed the free copying of music for several years, and had become a center for young people to find and make their own copies of the latest hits. The enforcement of the DMCA forced Napster to close and symbolically placed the music industry in conflict with

the Internet's traditional philosophy of open sharing. Many young people felt that the restriction was a real loss to a good to which they had become accustomed.

### Antitrust in the High-Tech Industry

In the past 40 years, the three most prominent antitrust suits have been brought against three icons of the information technology world—AT&T, IBM, and Microsoft. All the suits were associated with the use of quasi-monopoly powers—specifically, using network standards to keep competitors out of associated markets. In essence, the companies were bundling their standardized operating system with applications they or their partners controlled.

The Justice Department and many state trade commissions accused Microsoft, in the most famous of the cases, of abusing its monopoly position—that is, of building a wide-ranging commercial monopoly—by tying its own Internet browser to its Windows operating system. But after years in court, the Court of Appeals in the District of Columbia ruled that current law is not adequate to judge whether tying browsers to computer operating systems is bad or good for economic freedom. The court sought more guidance from the legislature. As the opinion put it: “Current monopolization doctrine should be amended to account for competition in technologically dynamic markets.” Tying other products to a patented product that is an industry standard should be judged by rule of reason (is it pro-competitive or anti-competitive) rather than just proof of a tie involving the dominant producer.

For much of the public, the issues were too arcane to make a judgment, but there is a long tradition of strong antitrust journalism and activities in the United States. This is a holdover from early in the 20th century when, led by trust-busting Teddy Roosevelt, the public in general was quick to jump on abuses of power by the railroad, meat, steel, tobacco, and sugar monopolies. To this day, consumers are very sensitive about issues of abuse of monopoly powers by large players. But that doesn't mean that consumers wouldn't prefer a clear standard (e.g., with

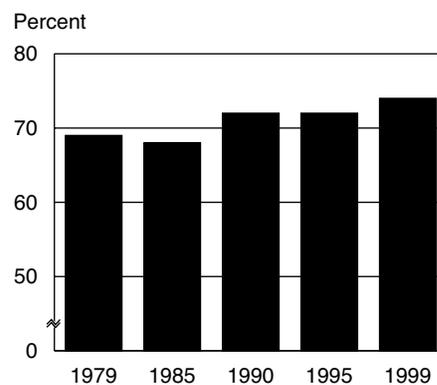
computer operating systems and browsers) for the sake of efficiency, especially in a dynamic market where network effects are important. That's why the courts and legislatures must make their way carefully through these issues—they are, indeed, breaking new ground.

### INTELLECTUAL PROPERTY IN THE DECADE AHEAD

U.S. citizens have long maintained a high regard for the benefits of science and technology. For the past 40 years, more than three-quarters of the U.S. population has consistently said that the benefits of science and technology clearly outweigh their harmful results or that science and technology make a positive contribution to their standard of living (see Figure 51).

With such continuing broad support for science and research and a positive outlook for business investment once we emerge from the current downturn, U.S. citizens are likely to continue to spend on innovation. (Our forecast for business investment can be found in “What Will Drive the Next U.S. Boom?”) As a result, we look

*Figure 51*  
*Popular Support for Science and Technology*  
*(Percent of people who say the benefits of science and technology outweigh the harmful effects)*



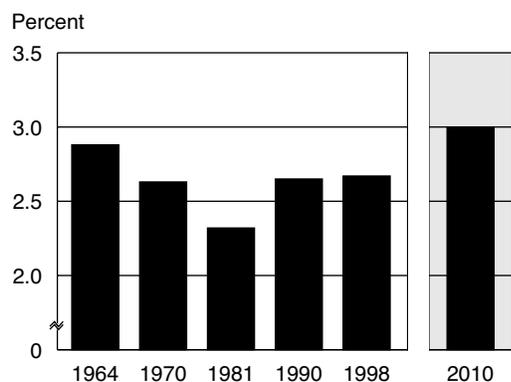
Source: National Science Foundation

for R&D expenditures to continue to grow slightly faster than GDP in the next decade and to bring total R&D up to 3% of GDP (see Figure 52).

While the overall market for R&D is bright, however, the growing complexity of intellectual property in general and patents in particular will mean that there are likely to be some subtle yet important shifts coming in the next decade in how we treat intellectual property. The changes will be modifications at the margins of the arrangements society already makes to support R&D, with the goal of limiting the impact of intellectual property protection on market forces.

- *Modification of the WTO accord.* We will see some modification of the WTO TRIPs accord, responding to the need of developing countries for access to patented pharmaceutical products with broad public health implications. Rates are likely to be negotiated for specific products, and an R&D reimbursement fund that rewards innovation is likely to emerge. Contributions to such a fund may come from a consortium of developed countries, developing countries, and international agencies.

Figure 52  
Spending on R&D Will Continue to Grow  
(Percent of total GDP)



Source: Institute for the Future; historical data from the National Science Foundation.

- *A new international policy player.* In the past 50 years, the president and the Treasury Department have led the United States in negotiating trade and economic agreements (including those affecting intellectual property). (For example, the Treasury led the United States through the Bretton Woods Agreement in the 1940s and the Kennedy and the Dillon rounds of trade agreements in the 1960s). This approach reflects the longer-term economic and business interests of the United States in the global economy. In the next decade, however, look for the secretary of state to have a larger role in identifying the more varied social, political, and defense needs that should be included in intellectual property agreements.

- *Standard setting.* As the Microsoft case demonstrates, when one company has patent control over key elements of industry standards, it creates a monopoly effect that could easily lead to potentially anti-competitive practices. In the future, public officials may take a more active role in some of the technology standard-setting bodies, in order to anticipate intellectual property issues that could be troublesome for competition down the line, especially in the fields of public health and security.

- *Antitrust.* Antitrust officials in both Europe and the United States will continue to seek out cases where patents give a company control over an industry technical standard and are used aggressively to block competition, especially by means of bundling other applications with that standard.

- *Compulsory licensing.* In many countries, the government has the right to issue compulsory licenses even when a patent is in force. The Canadians did that recently in the Cipro case. Look for a number of security or public health cases in the United States in the next decade for which the government uses the threat of compulsory licensing to move a public policy agenda forward.

- *More expertise in the Patent Office.* With intellectual property worth more in the marketplace, the Patent Office will be under pressure to do a more thorough job

of evaluation up front. Look for expanded staff and more emphasis on technical expertise in the major fields where patents are proliferating—software, information and communications technologies, biotech, and genomics.

- *Narrower purview in the Patent Office.* The Patent Office will gradually narrow the boundaries of the patents it grants. Broad patents in rapidly changing fields are dangerous because they can cut off valid lines of important new research. The current test for susceptibility to breast cancer, for example, is based on a patent on that gene—thus covering all new types of testing for that gene. There are some virtues to narrower patents for the patent holder as well—they are much easier to defend in court and thus less likely to be caught up in expensive litigation.

- *Higher costs in the Patent Office.* The greater expertise in the Patent Office will have costs attached, in terms of both money and time. As a result, look for patent fees to rise, especially for patents with a high number of claims or in areas that are breaking new ground. Corporations that want the process to move faster will have to pay for it.

All in all, the patent system and the intellectual property system it supports will not undergo a major transformation. But the steps described here will constrain the field a little more, bring slightly higher costs, and limit the monopoly power granted to patent holders by a small but perceptible amount. Intellectual property is worth more in the marketplace, but its protection will cost more and be harder to assert at the margins.

### LESSONS FOR BUSINESSES

The principle behind intellectual property protection is not so much the monopoly power over an idea but the benefit society receives in granting such a temporary monopoly. In other words, at its root, patent protection is for the benefit of society, not for the benefit of the patent holder. The patent holder benefits only as long as the

needs of society are met. This is not a principle with a clear boundary, but rather a principle that involves continually negotiating compromises and issues at the margin. As society comes to assert its interests in this regard, the support for patents and intellectual property is likely to slow down, but only slightly.

The main lesson for businesses is that intellectual property issues will become more political in the next decade. Negotiation and positioning will increase; there will be fewer arguments over pure principle. More boundaries and gray areas will be open for negotiation. The secretary of state will become as important a figure in defining international expectations as the lawyers reading the text of TRIPs. But, not to worry. U.S. Trade Representative Robert Zoellick has said recently that he would not pursue a trade policy that is “out of touch with our values.”

As a result, look for Congress to ask firms to outline their expectations for returns from intellectual property and to negotiate with them before going into international negotiations. However, also look for Congress to be sensitive about the monopoly powers patents give and how these powers are enforced. Despite the settlement at the national level, look for state governments to continue to litigate with Microsoft.

Despite the increasingly political nature of intellectual property protection, the basic lesson of managing intellectual property will stay the same—use it wisely or lose it. To this end, companies should look to lessons across the boundaries of the research-intensive industries. Rulings on pharmaceutical products may set a tone for policy actions on network standards, for example. State health departments will track the TRIPs discussion at the WTO. In a nutshell, companies should tread carefully in what they do, look carefully at what others do, be aware of public impacts, and be willing to negotiate away some of the peripheral benefits of their intellectual property while protecting the core.

For more modest intellectual property issues, there is likely to be more flexibility. Small firms in areas of dy-

dynamic technical change, for example, will find that they are given a much wider latitude in utilizing ideas close to ideas patented by others. The cost of litigation is way too high in gray areas at this level, and the pace of change too rapid to closely track markets that small and specialized. This flexibility provides an outlet for the rapid spread of incremental ideas in areas of dynamic technological change. As a result, it will pay to play in the gray areas, especially for those smaller companies for whom the gray areas are their *métier*.

Meanwhile, corporations will continue to find that they can use their capital and market clout to exert control over their intellectual property. Since it is these big companies that ultimately have to make the biggest investments in developing, producing, and marketing products on the global stage, they will find societal support for what they do. But, they will have to make sure that their policies are consistent with the values of the larger society.

—Gregory Schmid



## The Nutrigenomics Revolution

*The  
genomics revolution will forever transform  
the impact of food on health by  
changing the way we produce and purchase  
food and nutritional supplements. Specifically, advances in the emerging field of nutrigenomics promise a new understanding of the connections between food and human health at the molecular level. This new knowledge will give a growing number of sophisticated consumers the know-how to mitigate or even prevent the onset of diseases to which they may be predisposed. In response, companies in the food industry will produce and sell a whole new range of value-added products to an increasing number of concerned consumers.*

## THE REVOLUTION

**A** revolution in the life sciences is under way, with profound implications for the food industry. Indeed, rapid advances in the understanding of human genes have created the new science of nutrigenomics—the study of the relationship between what we eat and how our genes function, and thus how healthy we are.

This new science is based on the combination of human genomics (the study of how human genes function) and proteomics (the study of how proteins function). Together, these disciplines are developing much more detailed predictions of an individual's genetic propensity for certain diseases, as well as a deeper understanding of the role diet plays in suppressing or triggering these diseases.

This revolution is coming on faster than you'd think. We expect to see major scientific advances as early as 2003.

### From Genome Sequencing to Nutrigenomics

The past 40 years of advances in the human, animal, and agricultural sciences are finally paying off as they now enable scientists to understand the interactions of diet and genes and their relationship to diseases—even complex diseases such as cancer—at the molecular level. This has created the new field of nutritional genomics (nutrigenomics). The goal of nutrigenomics is to predict the interactions of micronutrients in individuals based on their unique genetic profiles.

Researchers at the Mayo Clinic, for example, recently discovered that the expression of genes that control androgen levels is inhibited by quercetin, a natural flavonoid compound found in many plants, including apples and onions, and in plant-derived beverages, such as tea and red wine. This is an important discovery for men with advanced prostate cancer. Presenting their results at the annual meeting of the American Association of Cancer Research, scientists argued that, by blocking androgen activity, quercetin actually impedes the growth of prostate cancer cells.

Why is this revolutionary? An understanding of plant biochemical conversion processes coupled with the knowledge of how humans metabolize food will bring prevention to the forefront of medicine in the future, shifting the emphasis from health care after the fact to healthy living through better nutrition. At the same time, in the food industry, accelerated breeding and genetic modification—coupled with improved fortification techniques and improvements in the absorption of nutrients in food products—will offer the potential for the quick development of a range of new foods and nutritional supplements.

Companies and institutions are already beginning to respond. For example, Myriad Proteomics, a newly formed genomics firm, recently announced a three-year plan to identify all the proteins in the human body and show how these proteins interact to cause illness or promote health. Furthermore, LifeSpring Nutrition was founded with the goal of serving the nutrition needs of consumers interested in health and wellness. The American Heart Association also recently changed its national dietary guidelines for healthy adults to recognize the importance of advances in nutrigenomics. The association is advocating more general diet recommendations today, focusing on overall eating patterns rather than a percentage of dietary fat or other nutrients, leaving open the possibility for individualized nutrigenomics-based diets in the future.

### The Rush Is On: Discoveries from 2001 to 2007

As a result of the nutrigenomics revolution, the extent of information relating diet to health is likely to grow rapidly. We expect to see a continuing flow of information from basic scientific studies in the next few years that track the connections between foods, phytochemicals (micronutrients, such as antioxidants, commonly found in fruits and vegetables that have important effects on gene expression), biochemical circuits, metabolism, and gene expression itself.

Look for major advances in the next few years in the ability of scientists to map complex gene interactions, in the cost-effectiveness of complex genetic tests, in the discovery of new classes of phytochemicals, and in the identification of the impact of environmental factors on human metabolism and gene expression.

### CONSUMERS ARE KEY TO THE REVOLUTION'S SUCCESS

The barriers to fundamental change in the food industry are formidable and have the potential to weaken the impact of the nutrigenomics revolution on the nutrition choices available to consumers. But in an increasingly consumer-driven global economy, consumers may be able to use their buying clout, as well as their growing determination to get what they want, to transform the food industry—once they have access to the right information. Understanding the way consumers acquire and use information is critical to understanding how the nutrigenomics revolution is likely to unfold.

#### Consumers and Nutrition Information

Consumers are showing an increasing interest in information about health and nutrition and are coming to see this information as an important factor in controlling their diets and health. For example, a recent survey by the American Dietetic Association (ADA) found that most consumers (85%) feel that diet and nutrition are important to them personally. The ADA also found that 40% of respondents state that they are either “very” or “somewhat” careful in selecting foods to achieve balanced nutrition and a healthy diet—up by six percentage points since 1997. In fact, when shopping, most consumers read nutrition labels on packaged foods.

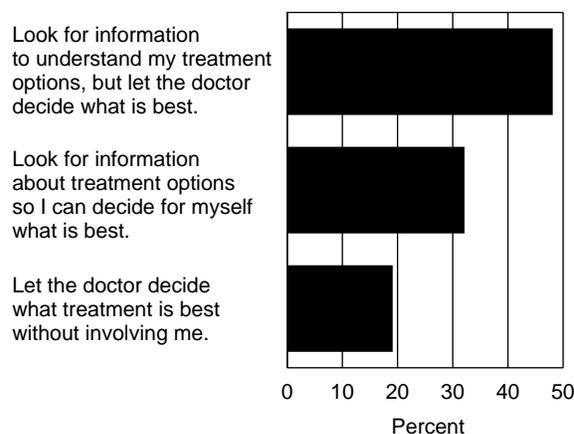
And it's not just any information they're looking for. Consumers report being very interested in obtaining the most up-to-date information possible to manage their diets. The ADA found that almost half (43%) of Americans say they like to hear about new studies on diet and health.

### Information Means Control

This interest in nutrition and diet is part of a larger consumer movement to gain more control over their health. All in all, consumers want more input into their health care. Consumers report that they want more information about medical options, for example. And although they see doctors' input as an important resource, most want to be involved in making decisions about their treatment (see Figure 53).

In line with this trend toward taking greater responsibility for their own care, consumers have said they are willing to use new information—such as information derived from genetic testing—if it would help them get greater control of their health. Recent surveys by Yankelovich Partners and the *Los Angeles Times* found that 60 to 65% of respondents would be interested in taking tests that would reveal their genetic predispositions to disease, while only 24% of survey respondents reported being unlikely to take such a test. The respondents were interested primarily in getting more precise

*Figure 53  
Consumers Want More Information than Doctors' Recommendations  
(Percent reporting ... as the most likely action when seeking medical treatment)*



Source: Institute for the Future, Household Survey, 2001.

**Table 22**  
*Consumers Use Many Sources to Get Nutrition Information*  
*(Percent of consumers who use ... to obtain nutrition information)*

<b>Consumer Media</b>	
Popular magazines or books	65
TV programs	45
Health Web sites for consumers	25
<b>Traditional Health Care System</b>	
Doctors	57
Medical reference books, journals, or newsletters	51
Assistants (e.g., nurses or nurse practitioners)	38
<b>Food Industry</b>	
Supermarket displays, brochures, or employees	36
Major-brand food company advertisements or Web sites	30
<b>Other Sources</b>	
Friends and family members	62
Health or fitness clubs	17
Alternative medical practitioners (e.g., chiropractors, herbalists, or acupuncturists)	16

Source: Institute for the Future, Household Survey, 2001.

information about risks they already know about. About half (47%) of these consumers reported that they would take these tests because they have a family history of a disease and would like to find out more about their own or their children's risks of that disease.

### A Variety of Sources

In our surveys, we found that consumers search for nutrition information from a variety of sources. The survey found that 63% of consumers looked for nutrition information within the last five years, and these consumers consulted, on average, 4.4 different sources. Consumers are most likely to find their information from magazines, books, and friends and family members before doctors or other health personnel (see Table 22). Overall, consumers use a wide variety of sources, including health clubs and alternative health care providers, though the latter two are used less frequently.

### NEW INFORMATION WILL BUILD THE NUTRIGENOMICS MARKET

The nutrigenomics revolution will create vast new flows of information relevant—perhaps even crucial—to consumers. Sophisticated consumers are the most likely to realize that this information can make a big difference in their lives, and they will search for the information that will benefit them the most, use it, and pass it along. For these reasons, information about nutrigenomics will make it into the marketplace, albeit in nontraditional ways, and help revolutionize the food industry—but only if such information gets into the right hands.

### New Consumers Intensify the Search

We expect to see a wealth of information from the nutrigenomics revolution in the coming years. In particular, we'll see more detailed information about an individual's genetic makeup or what combinations of genetic characteristics he or she shares with others in smaller popula-

tion subgroups. This will enable people in these subgroups to identify particular micronutrients or phytochemicals that can have dramatic impacts on their health.

Many sophisticated consumers will find increasing value in learning how this information can improve their health and that of their families. As they find useful information, they are likely to search an ever wider range of sources. We expect to see the information-searching behaviors of new consumers expand dramatically in coming years as detailed nutrition information becomes available.

### Obstacles to Overcome

As information about food and supplements becomes more valuable to the sophisticated consumer, a range of companies will bring added value to the food chain. But this added value will only be realized if the sophisticated consumer can find—or can be provided—information about the products that will make a difference. It is difficult to do that, however, in today's supply chain, where two key players—the health care system and the food industry—don't yet have a clear interest in disseminating revolutionary information about nutrition.

Such information will flow only reluctantly through the regular health care system, since doctors and pharmaceutical firms have no monetary incentive to provide new information on nutrition. Some health care organizations do have dietitians on staff, but very few consumers interact personally and regularly with a dietitian. The food industry has a greater interest in providing such information and new food products based on that information, but new products will come slowly, since there is little incentive in the supply chain to introduce products that aren't likely to find a sizable market right away. In the end, consumers will have to do much of the information searching on their own. It behooves any company even remotely connected to nutrigenomics to get the information to these consumers in a way they are likely to receive it.

### FORECAST: THE SIZE OF THE REVOLUTION

Despite the obstacles, nutrigenomic information will capture consumer interest. A small group of consumers will immediately try the latest products that make a strong claim that seems relevant to them. But this group of early experimenters will be only around 5 to 10% of the population. Far more interesting will be the response of a whole range of sophisticated consumers who make up 40 to 50% of the population, and who have shown that they are interested in information gathering and analysis, including information about food and nutrition.

These sophisticated consumers will find themselves learning about the possibilities of nutrition through alternative sources. Indeed, many of these consumers will go back to primary sources—the more detailed articles in science journals and science-based Web sites. With this information, they will begin to accumulate their own body of knowledge about nutrition, food, and genetic testing. These are the consumers who are likely to pay for tests that will reveal some fundamental genetic data about themselves that they can connect with the nutrients they consume. They will use this information to find the products they need. Once they come to value these health-enhancing products, they will demand them from the marketplace.

From the other side of the cash register, businesses will meet these consumers on their own ground by using a variation of the pharmaceutical model, whereby drug companies advertise directly to consumers to persuade them to request a prescription from their doctor. Thus, consumers will move away from their traditional use of information, in which information flows to the consumer through brand-building marketing approaches, and toward a model in which the consumer becomes a more active participant in demanding goods by participating in the information-gathering process at an earlier stage.

This intersection of scientifically based information of real value and sophisticated consumers ready to act on

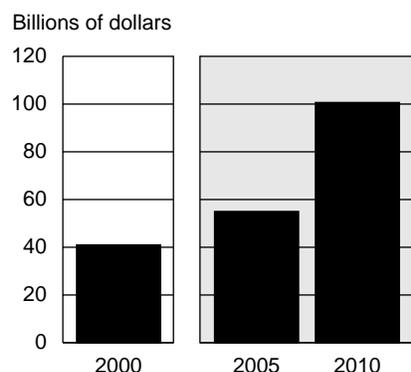
that information will transform the food industry. In 2010, about a third of the consumer population will be gathering information derived from advances in nutrigenomics—and because they will see the value of this information to their own lives, they will not only demand products derived from this information but also will be willing to pay more for them. (But not a lot more—sophisticated consumers are value conscious as well.)

In this way, the market for nutrigenomic foods or supplements will grow rapidly in the next ten years, driven by the following developments:

- Natural and organic foods will have the largest initial growth, as certain types of fruits and vegetables are identified to have properties that provide health benefits to people with certain characteristics.
- As knowledge of the efficacy of combinations of nutrients becomes more important, the value of fortified foods and supplements responsive to fairly large genetic subgroups will grow as well.
- Individual genetic testing, which will be essential for understanding the value of specific nutrients, will expand rapidly.
- As valuable combinations of nutrients are identified, there will be a growing demand for genetically modified products with specific amounts of nutrients.
- Nutrigenomics-savvy consumers will demand more informative packaging and information services to help them find what they need. (For more on the future of packaging, see “Providing Information: Future Trends in Package Technologies.”)
- By the end of the decade, there will be a growing battleground for nutrigenomic products that can replace some of today’s drug treatments for moderate cases of such conditions as obesity, high cholesterol, and high blood pressure.

In sum, the market for food purchased for health reasons will take off during the next decade. We anticipate that the total market for such foods and supplements will more than double in size from an estimated \$41 billion today to \$100 billion in 2010 (see Figure 54).

**Figure 54**  
*Focus on Food and Health Will Grow*  
(Billions of 2000 dollars spent on food and nutrition products bought for health reasons)



Source: Institute for the Future; historical data derived from *Nutrition Business Journal*.

## STRATEGIES FOR SUCCESS IN THE NUTRIGENOMICS MARKET

To take advantage of the nutrigenomics market likely to emerge in the next decade, companies along the food supply chain will have to respond to four strategic imperatives:

- *Research.* Successful companies will need to stay abreast of nutrigenomic research and be ready to respond quickly to the opportunities it provides. Brand manufacturers traditionally have focused on the “D” in R&D, leaving the “R” to universities and the agricultural sector. They spend significant resources on development—formulating and reformulating a new product until it has the right taste, texture, look, and convenience to be a hit. In the new world, brand manufacturers will have to provide products specifically configured for well-defined groups

of nutrigenomics consumers. Instead of focusing solely on marketing to the masses by enhancing brand recognition, the brand manufacturers will have to offer consumers the value-added choices that make that particular product work best for them. By embedding science in their products, brand manufacturers could market what is in the product—the value-added science—in addition to the brand name behind it.

- *Trusted information.* Successful companies will need to be, or at least stay close to, trusted information sources, so they can pass on helpful and thorough information about the science of nutrigenomics to their customers, and through several channels. One way of building trust is to increase transparency along the supply chain. New consumers assume that a company divulges only information that displays its products in a favorable light and keeps quiet about everything else. Companies should make clear what the new nutrigenomic products can do—and what they can't—and help consumers find the ones that best meet their needs.

- *Distribution.* Successful companies will need to change the way products are distributed. The information content of food stores will increase. For example, kiosks distributed throughout a store could offer up-to-date nutrition information about particular foods or supplements for specific population subgroups. The databases in these kiosks would be much richer than those offered today. When retailers receive new products, they could assemble the scientific research behind them and put together an information packet for the consumer, along with a description of the products and where to find them in the store.

- *Marketing.* Many so-called “functional” food products have failed thus far because companies forgot some of the marketing basics. Products were introduced before the nutrition research was complete, with medical-sounding names, confusing health benefits, poor product placement, and high prices. As companies consider offering new products, it is important to remember the basics of food development and marketing, while also

adapting to the new, fragmented market of likely nutrigenomics consumers. Consumers in the future, even nutrigenomics consumers, will still want taste, convenience, and good prices for their food, in addition to increased nutritional value.

## CONCLUSION:

### FROM COMMODITY TO VALUE-ADDED FOOD

The fundamental benefit of nutrigenomics is an improved understanding of the role diet plays in an individual's health. Based on the genetic profile of an individual, science eventually will be able to recommend a customized diet to maintain health and prevent disease. And it won't have to always be done with scientifically enhanced foods. Consumers in the future could take advantage of what nutrigenomics offers simply by adjusting their diets based on foods that are already available. If a particular phytochemical in mangoes, for example, is good for their genetic profile, they'll buy more mangoes—they won't have to be better, healthier, nutritionally enhanced mangoes.

But the supply chain is composed of a diverse set of players, and it is very likely that particular players will develop and offer improved foods or supplements based on scientific research. Already, scientists at the University of Newcastle in Australia have developed a pill made from broccoli's known cancer-fighting compound, indole-3-carbinol. Other examples using genetic modification will arrive rapidly as well—high-protein corn or soy oil with increased nutrients and decreased levels of saturated fat, for instance.

The food industry is in the midst of transformation from a low-margin, commodity market to one offering information-driven, differentiated products with high value-added potential. By understanding and working with those consumers interested in the connection between food and health, companies will be able to use nutrigenomics to create a market that offers a range of value-added products and services.

—Maureen Davis and Gregory Schmid



## Environmentalism and Economics Partner Up: Emerging Paradigms and Strategies



*Proponents of environmental protection and economic growth, long perceived as mutually exclusive, are coming to agreement about the use of markets as tools for protecting and improving the environment. But don't worry. Environmentalists haven't abandoned Rachel Carson for Adam Smith, nor have businesses forsaken profits for good works. Instead, intellectual changes within the business, environmentalist, and policymaker communities have produced an unprecedented convergence.*

*The convergence works like this. Businesses have learned to see strategic and practical virtues in thinking environmentally. Environmentalists have learned to make the case for the economic as well as ecological benefits of sustainable development. And finally, regulators in the United States, Europe, and nongovernmental organizations are embracing flexible, market-oriented systems for creating incentives to achieve environmental goals. The result is a new business-environmentalist partnership whereby corporations and activists are cooperating in developing systems and practices that not only achieve economic and ecological goals but also actually reinforce each other.*



## HISTORICAL BACKGROUND

The growth of market-based systems for environmental management and a broader integration of environmentalism and economics is the result of a convergence of several trends in business, the environmental movement, and government.

### Corporate Environmentalism

The growth of the environmental movement as a popular phenomenon has obscured the equally remarkable development of corporate environmentalism. In the 1960s and the 1970s, corporate environmentalism focused on fulfilling specific regulatory demands, mainly by taking technical steps at the end of the production process—adding scrubbers to smokestacks, for example—rather than fundamentally changing business practices.

In the 1980s and the 1990s, however, corporations began to internalize environmental norms. Companies looked to redesign production processes to improve efficiency and reduce pollution rather than rely solely on mitigation schemes. These and other projects showed

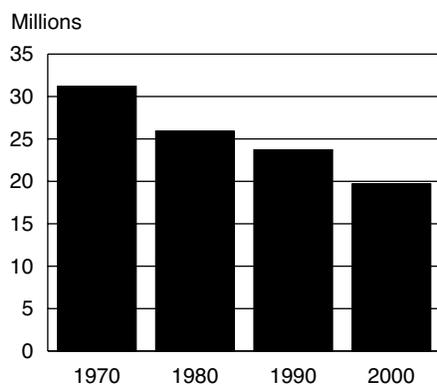
that properly designed environmental programs could yield cost savings as well. Experience with oil and chemical spills showed that the public relations cost of environmental accidents could be immense, and insurance companies' reluctance to include environmental disasters in general liability policies encouraged better risk management. Customers and shareholders, and even other companies, began demanding environmentally friendly policies. And the corporations took heed.

### The Rise of Emissions Trading

Changes in corporate attitudes were matched by a critical development in the mechanics of regulation. The Clean Air Act of 1990 created the first “cap-and-trade” market for sulfur dioxide (SO<sub>2</sub>), a by-product of coal-burning electricity generators that is responsible for acid rain. In this system, the Environmental Protection Agency (EPA) set an upper limit on the amount of SO<sub>2</sub> emissions permissible in a year (which it reduced each year), and distributed tradable credits to utilities. Companies that reduced their pollution levels could sell their unused credits to other utilities. This market-driven system gave companies a measure of flexibility in responding to environmental mandates, without reducing the government's ability to take action against polluters.

The experiment was considered a great success. Acid rain levels fell (see Figure 55), and the program was cheaper to administer than a traditional regulatory regime, a fact that won praise in a Clinton administration committed to reinventing government. Indeed, some two dozen bills dealing with carbon emissions trading systems were introduced during the 106th Congress (1999–2000), sponsored by such ideologically diverse bedfellows as Joseph Lieberman (D-CT), Bob Smith (R-NH), Ted Stevens (R-AK), and Henry Waxman (D-CA). Emissions trading stimulated development of new abatement technologies and also provided companies with considerable flexibility in meeting environmental goals: they could even pay to pollute if buying credits was cheaper than lowering their SO<sub>2</sub> output.

Figure 55  
Acid Rain Levels Fall  
(Million short tons of sulfur dioxide)



Source: U.S. Environmental Protection Agency, *National Air Pollutant Emission Trends: 1900–1998* (EPA-454/R-00-002), Table 4–45.

The public health community was also happy because sulfur abatement is estimated to have saved some \$10 billion in health costs over the last decade. And the Chicago Board of Trade (which manages the credit auctions) was even happier presiding over a \$2 billion market that has spun off another \$2 billion in derivatives and services.

### **Environmentalists Discover Markets**

The environmental movement likewise evolved in the 1980s and the 1990s, having won battles over pesticides, air pollution, and environmental regulation, and having converted much of the public to environmentalism in principal. The founding of the Rocky Mountain Institute in 1982, which sought to help corporations develop cost-effective, environmentally friendly products, encouraged a subtler, less antagonistic attitude toward business among environmentalists; so did the growth of the sustainable development movement, which sought to balance the demands of growing populations and the environment. These in turn led to the development of new economic metrics and methods for describing the value of ecological processes, the total costs of pollution, and the total savings from conservation and cleanup policies.

Cost-benefit analysis (in use since the 1960s) and environmental impact studies (required by the World Bank) were joined with new, more exotic tools like market valuation of physical effects, human capital valuation, and contingent valuation. All of these methods seek to assign economic value to ecologies rather than to place environmental values opposite economic ones; they also implicitly challenge classical economics' assumption that pollution is a "free" activity and conservation is a drain on economic actors. Finally, computer simulations showing the environmental effects of greenhouse gases have helped build scientific and popular consensus (though not unanimity) about the reality of global warming—and the need to do something about it.

All this has contributed to the growing interest among environmentalists of market mechanisms for

controlling pollution and encouraging sustainable economic activity. Indeed, for many, the notion of "balancing" economic and environmental aims has been replaced by the belief that they are compatible and even mutually reinforcing.

### **KYOTO AND THE FUTURE OF ENVIRONMENTAL MARKETS**

**T**he biggest experiment in marrying environmentalism and economics is greenhouse gas reduction. The Kyoto Protocol sets greenhouse gas emissions targets for nations, as well as mechanisms for reaching those targets.

The Kyoto Protocol endorses three mechanisms for reducing greenhouse gases: emissions-trading markets for developed nations, and two mechanisms for developing nations. Joint implementation encourages partnerships with advanced nations, and the clean development mechanism is designed to facilitate technology transfer from first to third world nations. The fate of market-based mechanisms for reducing greenhouse gases will play a large role in determining how important the new economics of environmentalism will be. A look at what early adopters are doing already, and likely scenarios for the future, give us a clue about what opportunities will exist for businesses, nonprofits, and governments.

### **2002–2007: Building Local Economies**

The next five years will see numerous experiments with market-based systems to reduce greenhouse gas emissions. At the forefront will be the European Union (EU) nations, a handful of major corporations, and some established commodities exchanges. The national bodies will set targets based on the Kyoto Protocol, while corporate efforts will seek to "turn back the emissions clock" to the lower levels of 1990. These will be matched by the efforts of regional energy producers, utilities, and smaller corporations to either reduce their own greenhouse gas levels or to support companies that enact voluntary programs.

### *Thinking Globally, Acting Locally*

Emissions-trading systems are either in place or will shortly be implemented in a number of countries. Denmark, France, the Netherlands, Sweden, and the United Kingdom all have greenhouse emissions limits and trading systems in place or scheduled for operation. These systems are structured in a variety of ways, and should provide useful empirical information on how difficult issues like the initial allocation levels and costs can best be addressed for large-scale projects.

Multinational oil companies have begun their own internal markets for greenhouse gas emissions. BP Amoco implemented a cap-and-trade system on January 1, 2000. It aims to reduce carbon dioxide (CO<sub>2</sub>) emissions throughout the conglomerate by some 30 million tons by 2010 (to 10% below 1990 levels). Three weeks later, Royal Dutch Shell's trading subsidiary opened Shell Tradable Emission Permit System, with emissions reduction goals similar to those of BP Amoco. Given that each is a multibillion-dollar company, each employs more than 100,000 people, and each operates around the world, these are trading systems of considerable size and import.

Some commodities traders are developing early expertise in managing emissions-trading markets. The Chicago Board of Trade, which pioneered SO<sub>2</sub> credits trading, will open a greenhouse gas trading system in 2002, with participants drawn from the American Midwest. Other entities are creating branches to advise companies in this new market. Financial services firms in the United States and Europe, most notably Cantor Fitzgerald and Environmental Financial Products, have already created divisions specializing in "environmental brokerage services." Strategic consulting and accounting firms, including PricewaterhouseCoopers and Arthur Andersen, already have environmental corporate strategy and environmental risk management practices, and are moving into global emissions trading. (One sign of the rapidly approaching maturity of the field is that Andersen's group is led by the former director of emissions trading with the United Nations—the type of private-public movement one normally sees in well-developed industries.)

One disincentive to implementing company pollution-reduction plans is that currently there is no mecha-

### **Europe Moves Forward**

Denmark's Energy 21 program created a cap-and-trade system to reduce greenhouse gas emissions in its newly privatized and rapidly expanding electric utility industry. France is implementing a mixed system of taxes and emissions trading to reduce its greenhouse gases. The United Kingdom will have an upstream emissions trading system in place by 2002, and the EU plans to have a Union-wide trading market by 2005, though it is still in the early planning stages. Other countries are joining the ranks of these European nations. For example, Australia and Canada have also launched pilot programs for nitrogen oxides and greenhouse gas credits trading.

nism to recognize efforts put in place prior to government-mandated reductions. Early-moving companies can actually be penalized in emissions markets if reduction targets or initial credit allocations are based on the latest pollution levels.

In response, several nonprofit organizations, including Environmental Resources Trust, Canada's Voluntary Challenge and Registry, and the California Climate Action Registry, have established registries to record emissions reductions made by companies outside government-mandated programs. In Europe, 3Emi, a joint venture of Eurométaux and PricewaterhouseCoopers, has been created to consolidate emissions information gathering for the European nonferrous industries. These registries effectively create a credit system for ecologically advanced companies, something that is doubly important while the U.S. position toward the Kyoto Protocol creates uncertainty about the future of American policy, and, hence, the future economic value of reduction efforts undertaken now.

Finally, a number of carbon sequestration schemes are in development. In carbon sequestration, companies partner with forest management groups to plant new forests and maintain them for a set number of years, the trees capture atmospheric carbon, and the companies receive credits for carbon reduction.

The Sydney Futures Exchange and its subsidiary, the New Zealand Futures and Options Exchange, have opened a market for carbon sequestration credits. One of the market's first deals was carried out between Japan's Tokyo Electric Power Company and Australia's New South Wales State Forestry. Tokyo Electric Power Company plans to contract for up to 40,000 hectares of forest plantings by 2010, while the State Forestry is branching into other environmental credit services. The Dutch Electricity Generation Board established a foundation to support forestation projects in Africa, Asia, Central Europe, and Latin America.

These early movers are not acting solely out of concern for the environment. All are gambling that their early efforts will yield economic dividends, in the form

of emissions credits that can be traded later, abatement technologies that can be resold, corporate goodwill that can win over customers, or expertise that can be packaged in new environmental services. BP Amoco's program, for example, will give its trading arm, Oil Trading International, experience in developing and managing such markets, and the Sydney and Chicago exchanges are vying to become centers for future markets.

### *Identifying Stumbling Blocks*

But getting a jump on meeting the Kyoto Protocol carries risks. Behind all these efforts is the assumption that a global market for greenhouse gas emissions will eventually develop, and that reductions can be achieved without hurting national industrial competitiveness. The failure of national markets or the collapse of the Kyoto Protocol could prevent a global market from developing. And even if both hurdles are cleared, market-builders will face other challenges.

Supporters of emission trading schemes contend that greenhouse gas reductions can be achieved without substantial economic damage, and can even stimulate the development of new abatement technologies and opportunities for managing those markets. This optimism could falter on several grounds. If the costs of abatement prove too great, either in lost jobs or higher energy prices, business support for cap-and-trade markets will disappear. If national systems lead to reduced industrial competitiveness, or create an uneven playing field in which businesses operating in nations without greenhouse gas reduction efforts can gain advantages over environmentally responsible companies, nations will face pressure to either abandon their programs or make them voluntary. One or two spectacular failures might also be enough to make new entrants think twice about starting their own programs. Finally, a sustained global recession would almost certainly make emissions reductions seem like an unaffordable luxury.

The Bush administration's decision not to ratify the Kyoto Protocol also raises concerns that international efforts to reduce greenhouse gases will be derailed. The

### **Rio Bravo Conservation and Management Area Welcome Center, 2006**

Welcome, everyone, to the Rio Bravo Conservation and Management Area. Rio Bravo is managed jointly by Winrock International, a nonprofit conservation group based in the United States, and the Centro Agronomico Tropical de Investigación y Enseñanza. It was founded in 1998 as a sequestration forest. As you know, during photosynthesis trees and plants take in carbon dioxide and release oxygen; the carbon is held by the plant, and used to help it grow. This process of retaining carbon is called sequestration. In the late 1990s, people working on plans to reduce global warming realized that by planting more trees we could reduce the level of greenhouse gases that cause global warming. We could also slow down deforestation, which is another big environmental problem.

Rio Bravo began as an experimental project with a few hundred hectares; we're now up to 25,000 hectares, and have contracts to plant another 40,000 over the next 20 years. Our money comes from contracts with companies that pay us to plant and maintain a certain amount of forest; in exchange, the companies receive credits for the greenhouse gases their section of forest absorbs. Some companies use those credits in meeting their own conservation goals, while others sell them on the open market. Right now we have contracts with companies in Canada, Denmark, Japan, Sweden, and the United States.

A sequestration forest is like any forest, except we know a lot more about it. We use a GPS system to measure exactly how large the forest is, and we know the age and species of almost every tree. We take extra precautions against wildfires, since trees release their carbon when they burn. We conduct lots of experiments. A few hundred meters down the trail, for example, we're measuring how much carbon trees absorb at different ages, and how microclimates affect sequestration. Finally, in our greenhouse, we're engineering new lines of trees that consume even more carbon and are more resistant to fire and insects. Also, you may see a United Nations certification team on the trail, one of the many that now monitor dozens of sequestration forests on every continent except Antarctica.

United States is a key player in efforts to implement greenhouse gas reduction plans because of its status as a world power and as a significant contributor to global warming. Ratification without the United States is mathematically possible, but politically very unlikely. The Kyoto Protocol must be ratified by countries producing 55% of the developed world's CO<sub>2</sub> for its targets to become binding. The United States produces 36% of those emissions; the EU, which favors ratification, produces 25%; the remainder is produced by countries that may or may not ratify without the United States (see Figure 56).

The U.S. position has not yet noticeably slowed implementation efforts internationally. Significantly, no EU members and multinational corporations that had previously scheduled implementation of their own internal cap-and-trade markets announced delays after the U.S. declaration. Most of these systems have been in the works for several years. On a fundamental level, many business leaders and governments have accepted global warming as a fact, and expect that the United States eventually will fall in line with its European allies. As Steve Drummond, managing director of one emissions trading company, explained, "Everyone knows that a carbon-constrained future is inevitable. Whether or not the United States signs up for Kyoto, multinationals know that emissions legislation will affect them in some market." Even within the United States, one Washington, DC-based economist who specializes in emissions permit issues reports that analysts in the nation's capital are continuing to work on the details of carbon trading permit systems, and numerous American utilities and companies are moving ahead with their own reduction efforts.

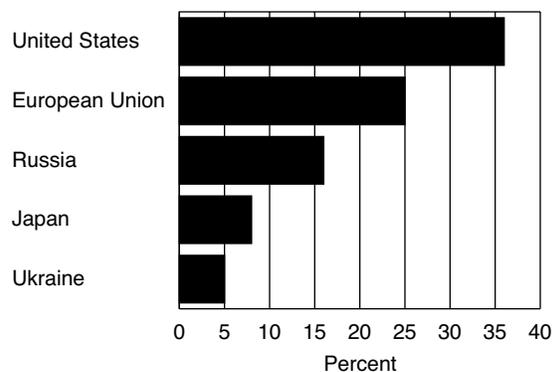
But leaving the Kyoto Protocol unratified will have serious effects in the longer term. Many nations consider their emissions markets to be experiments, with timelines extending to about 2010. If the Kyoto Protocol dies, the value of early investments (particularly in carbon banking) will drop sharply, momentum behind national and multinational corporate programs will be sapped, and the absence of enforceable national emis-

sions limits will remove an important incentive for companies to develop reduction strategies. National and multinational corporate markets will serve as the foundation for an international emissions trading market, but their independent evolution will also create obstacles to integration that will be difficult to iron out in the absence of a global framework. By way of comparison, the General Agreement on Tariffs and Trade took decades to negotiate, and didn't require breaking new ground in economics or business, as emissions trading does.

### 2008–2012: Kyoto and Global Markets

The emissions reductions specified in the Kyoto Protocol are scheduled to be implemented between 2008 and 2012. By then, experts believe that the national and corporate emissions markets currently in development will have matured, and efforts will turn to creating new national markets in developing nations, to building regional and global markets, and to handling the volume of trading—about 1 billion tons of carbon per year from 2008—mandated by the Kyoto Protocol. Such efforts would be greatly aided by U.S. ratification of the Kyoto Protocol, but the market's potential size may attract in-

Figure 56  
Global Emissions Production  
(Percent of worldwide total emissions)



Source: World Resource Institute, *World Resources 2000–2001*, Table 16.2, "Inventories of National Greenhouse Gas Emissions, 1989–94."

vestors even without ratification. Richard Sandor, the father of emissions trading and author of a recent article, “Kyoto or Not, Opportunities for Carbon Trading Are Here,” says, “Sometime during this first decade of the 21st century we hope to see a truly international greenhouse gas market that is as efficient as those of other internationally traded commodities.”

### *Realizing the Potential of Emissions Trading*

The greenhouse gas market has the potential to be genuinely international: utilities in New Jersey or South Korea could purchase contracts with national forest services or commercial plantations in Gambia or Indonesia, or undertake joint projects with developing nations. Such global trades already have begun on a small scale. The Japanese company Sumitomo, for example, is converting Russian coal-fired electricity generators to natural gas in exchange for offset credits it could trade in Japan. London’s Sustainable Forestry Management has contracted with the Salish and Kootenai tribes in Montana to manage 50,000 acres of new forest in exchange for credits it hopes to sell to industry.

Linking national markets and incorporating players from the developing world will require the development of a technical and organizational infrastructure. Commodities exchanges and oil company trading groups, based on their early actions, will compete to provide that infrastructure. The former believe that their expertise in trading and futures is directly applicable to greenhouse gases: as one trader put it, “If you can trade soybeans, you can trade carbon.” Other early entrants will seek to act as brokers and intermediaries between utilities and manufacturers on one side, and “offset providers” (e.g., forestry services and agribusinesses) on the other. But such trades (like those described above) have high transaction costs; to lower those costs, and to create a global market in emissions trading, it will be necessary to develop uniform monitoring and accounting standards, international legal agreements defining ownership of emissions, markets and exchanges, and futures and derivatives based on emissions trading. Building these will

require negotiation between nations and collaboration between businesses, environmental groups, and nonprofits.

### *Creating Standards*

The consensus among stakeholders on the need for global emissions trading should not blind us to the fact that the underlying conceptual and commercial tools needed to make such programs viable—and more broadly, to give environmental trading the same degree of certainty as accounting or finance—still need to be crafted. As one think tank explains, “Building a trading market for greenhouse gas emissions is a very significant undertaking; after all, it took hundreds of years to create generally accepted standards for financial accounting, auditing and reporting, and that was after the concept of a standard currency had already been developed.” The basic unit of tradable greenhouse gas emissions—a ton of CO<sub>2</sub>—has won general acceptance, but almost everything else is up for grabs. The construction of trustworthy standards will be complicated by the fact that many decisions combine science, policy, and politics.

Indeed, many different techniques exist for estimating historical levels of CO<sub>2</sub> output and the quantity of CO<sub>2</sub> produced by an industrial process. The former are used for setting national reductions targets, and the latter for determining how far an industry has come in meeting its goals. Likewise, no consensus exists on how the initial assignment of credits should be made, the rate at which banked credits earned in early conservation efforts are to be counted in later programs, the amount of carbon sequestered by various species of trees, or the thousands of small decisions that market actors need to make—to say nothing of allowing the market for emissions trading to grow, and for other players to develop subsidiary services and instruments.

Cooperative ventures between companies, industry associations, and environmental groups can be crucial in creating that infrastructure of measurement and conceptual tools. The process of building standards needs to be as transparent and unbiased as possible, for standards are by their nature both scientific/technical artifacts and po-

litical instruments: they can be used by industry leaders to lock in advantages, forcing others to standardize around existing technologies, or they can privilege the interests of some groups over others.

Several nonprofits are already working on these issues. The International Emissions Trading Association was founded in 1999 to develop a framework for greenhouse gas emissions trading; likewise, the Global Reporting Initiative and the Environmental Resources Trust are developing frameworks for the reporting, monitoring, and accounting of greenhouse gas emissions and savings. Not only can these groups serve as relatively neutral arbiters of standards, they will also be able to smooth out variations between national and multinational trading systems that would otherwise hinder creation of a global market for greenhouse gas trading.

### *Complicating Growth*

In the longer term, two factors could complicate the growth of global markets: a backlash against market-based environmental measures, and new energy technologies that hold the potential to complicate the traditional division between energy producers and consumers.

The virtues of markets are widely but not universally accepted by environmentalists. Some argue that buying and selling pollution simply is immoral: as Harvard government professor Michael Sandel put it, "Turning pollution into a commodity to be bought and sold removes the moral stigma that is properly associated with it." More radical critics, like Earth First! and the Earth Liberation Front, contend that capitalism by nature is ecologically destructive and can never be reformed. That line of argument has been taken up by opponents of globalization like International Forum on Globalization head Jerry Mander, who declares, "Economic globalization ... is an assault on biological diversity, democracy, community ... and the natural world." Deforestation, declining biodiversity, the displacement of subsistence agriculture for cash crops, and biological invasions, they argue, prove that globalization poses special threats to environmental stability.

The mainstream impact of these ideas has been small, and the September 11, 2001, terrorist actions likely will drive them further into the margins as any extant tolerance for eco-terrorism in America and Europe is likely to evaporate. The anti-globalization movement's credibility will also be sharply reduced for a time. However, the movement has shown great adaptability over the last several years, and it is possible that it could eventually reclaim its lost stature, and an ecological crisis or prolonged war could provide a new rallying point for critics of the established order.

New technology may also make these markets far harder to manage. Existing cap-and-trade systems have a relatively small number of participants, and even proposals to create greenhouse gas emissions-trading markets assume that the bulk of participants will be concentrated in extractive and utilities industries. "Off-the-grid" power technologies like fuel cells could make such markets vastly more complex, by fostering the growth of power sources outside conventional administrative and monitoring channels, and by creating the energy equivalent of an underground economy. This could be balanced, however, by the growth of sensors and more intensive information-gathering and -reporting technologies attached to distributed power sources. Furthermore, by generating more precise information about emissions by energy producers, sensors could improve the efficiency and scope of emissions-trading markets by pushing them downstream toward consumers.

### **IMPLICATIONS**

- *Companies have more choices.* The move to a market-based system for reducing pollution will give companies more flexibility in meeting both mandated and self-imposed goals. The U.S. experience with SO<sub>2</sub> reductions also indicates that such reductions can be achieved less expensively and more efficiently with emissions markets than with state mandates.

## ECO-TERRORISTS' NEW TARGET: NATURE

*From The Economist, 12 January 2011*

In one of the stranger twists in the history of eco-terrorism, four members of the Earth Liberation Maquis, or ELM, went on trial today—on charges of burning down a forest.

The case, which is being tried in a Laramie, Wyoming, courthouse, pits two sides of the environmental movement against each other. “It wasn’t a real forest,” ELM spokesman Jeremy Goldman declared at an impromptu press conference at a local restaurant, the Eager Vegan. “A true forest is a place of mystery, a place of chaos and wildness. It is not a commodity. It is not a tool to be used by multinationals to make themselves look green.”

The burning of the Salish Carbon Sequestration Area is the latest in several well-publicized acts by ELM and other groups that see globalization as the latest threat to the environment.

“The idea that you can buy and sell pollution like Big Macs and Gap sweaters is so sick,” an ELM supporter, who gave her name as Stellaluna, declared. “But it’s just totally con-

sistent with the corporate mind-set. Even Mother Nature must be for sale.”

Such programs have drawn the wrath of both anti-globalization and radical environmentalists, who argue that emissions trading allows wealthy countries and companies to buy their way out of meaningful environmental and economic reform. “The marketization of pollution controls is the latest attempt by multinationals and their subservient client states to obscure the fundamental conflict between capitalism and nature,” argues Valerie Melli, professor of History of Consciousness at the University of California-Santa Cruz. “It creates the illusion that the solution to global ecological problems is more globalization, more capitalism.”

Ending ecological destruction, these critics contend, requires nothing less than dismantling the instruments of globalization.

Supporters of emissions trading argue that these programs are more efficient than direct government intervention, and have wider benefits.

Gerald Grant, chief forester for the Salish tribe, whose people manage the forest, points out that both the tribe and tribal lands benefit from such programs. “This work heals our lands, and helps the whole world,” he said. Many sequestration projects, including the vast Planta Amazonas, have been directed by or involved the participation of indigenous groups.

The market for emissions trading has grown dramatically in recent years. Sandor Consulting, a Chicago-based environmental marketing company, estimates that \$200 billion in direct trading will take place this year. “It’s come a long way in a very short time,” said Paul Saffo, a director of the Institute for the Future, a nonprofit research and forecasting organization. “The unification of national emissions markets into a true global market is for this decade what the Internet was for the 1990s.” The market also encourages new clean technologies and investments in restoration and remediation projects.

The debate sometimes sounds less like a policy disagreement than a clash of world-views.

“They’re nuts,” declared Lawrence Black, head of WorldFund, an environmental think tank. “It’s anti-capitalism dressed up as anti-environmentalism—green on the outside and red on the inside. The last decade has shown time and again that conservation, economic performance, and sustainability are not mutually exclusive, but mutually reinforcing. The idea that environmental measures have to be painful to companies—that they should be punished for being businesses—is completely outmoded.”

“Destroying a forest to save nature shows the corner radical environmentalists have painted themselves into,” a press release from the Sierra Club said. “Punitive measures are emotionally satisfying to a tiny fringe, but they don’t stimulate clean technologies, new businesses, or global trade.” Both WorldFund and the Sierra Club have worked with corporations and governments to develop a framework for global trade in emissions credits.

The trial is expected to last two weeks.

- *Markets create incentives for innovation.* The growth of emissions markets will stimulate new technologies and services. Watch for accelerated development and marketing of cleaner fuels, green manufacturing processes, and certification programs for ecologically friendly products. Keep an eye out for new environmental services, ranging from financial services (e.g., emissions credit futures trading and derivatives), to corporate risk management, to environmentally friendly industrial engineering and architecture. Finally, agribusiness, paper and timber companies, and indigenous groups can develop carbon sequestration programs.

- *Environment brought into the market.* Underlying the growth of emissions trading is a broader paradigm shift in economic and environmental thinking, which sees

economic opportunities in conservation and environmental protection in markets. This will bring about changes in business practices from the bottom up, not just in public relations campaigns, but in everything from accounting to cost-benefit analysis. Examples of win-win strategies will also increase shareholder pressure on companies to both turn a profit and realize environmental goals.

- *Public perception shifts.* Consumers are already demanding that companies maintain high standards in the treatment of workers and environmental awareness. Such demands will only become more extensive, forcing even companies that contribute little to global warming or deforestation to create environmental portfolios.

—Alex Soojung-Kim Pang



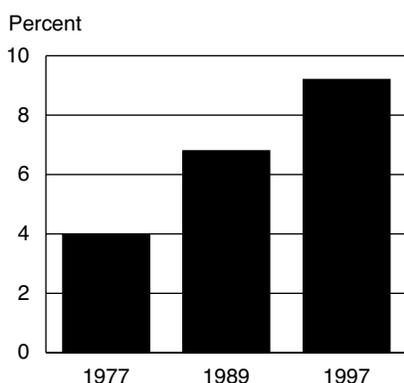
## Reducing the Costs of Infrastructure Risk

*The future growth of the global networked economy will rely heavily on innovative and less expensive ways of reducing risks to critical infrastructure sectors.*

*The changes that have created today's global networked economy have made businesses increasingly dependent on the smooth functioning of the underlying infrastructure. In fact, the infrastructure sectors themselves—communications, energy, transportation, finance, and essential human services—are highly dependent on each other.*

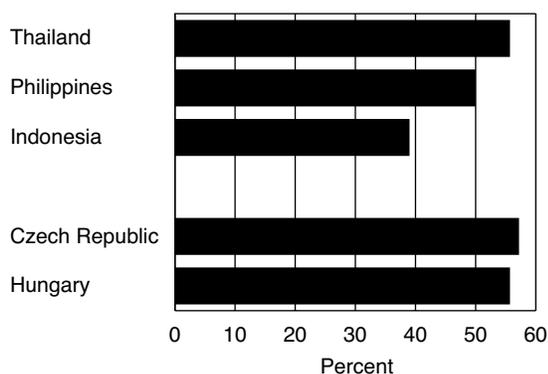
*A series of events in the past decade, culminating in the terrorist attacks of September 11, 2001, have clearly demonstrated the vulnerability of these fundamental infrastructure sectors. September 11 in particular has quickly raised costs throughout the supply chain, as insurers have increased premiums, the travel industry has lost huge volumes of business, and financial firms must invest heavily in backup systems to keep their transactions secure. What's clear from all these aftereffects is that the future growth and productivity of the global networked economy depends on innovative ways of managing these new risks at lower costs.*

*Figure 57  
Sourcing Globally Is on the Increase  
(Percent of inputs to U.S. production sourced from abroad)*



Source: Bureau of Economic Analysis

*Figure 58  
Many Countries Are Dependent on Trade for Prosperity  
(Percent of GDP in trade)*



Source: International Monetary Fund

### GROWING INTERDEPENDENCE

The global economy relies on a highly interdependent international economic system. In an effort to become more efficient and continually increase shareholder value, firms have built operations of unprecedented scale in a world rich with talents and diverse markets. They have built operations and partnerships around the globe—including key component suppliers, R&D centers, manufacturing plants, and distribution networks. This decades-long evolution has led to a change not just in the size of firms but also in the way they operate as well.

In the second half of the 20th century, three critical changes took place that produced today’s complex and interdependent economy: transnational companies came to prominence and with them the flow of labor across borders; manufacturers turned to just-in-time production to streamline processes; and businesses became more specialized.

### Transnational Companies, Cross-Border Labor

Supported by long-term declines in communication and transportation costs, firms have set up sprawling networks across borders, extending their operations around the world in almost every conceivable way. They have found new markets in which to sell their products. They have found new sources for inputs that offer a wide variety of cheaper raw materials, manufactured components, and ideas for design and production (see Figure 57).

Transnational companies have especially affected the rapidly growing countries within Europe and Asia—they now have much larger shares of their income derived from trade (see Figure 58). For example, more than half of GDP in the Czech Republic, Hungary, and Thailand comes from trade, whereas only about 8% of GDP is generated by trade in the United States.

But the movement of material is only a part of the story. Finance, patents, and people are also moving as

never before. The globalization of commerce has been accompanied by a globalization of labor as firms draw on skilled and unskilled workers across borders. In fact, immigration in the United States has grown steadily in recent decades, approaching the levels of the last round of intensive immigration in the early 20th century (see Figure 59). Europe, too, has seen significant increases in immigration in the past decade (see Table 23). These global flows have redistributed people, ideas, and cultures across borders.

### Just-in-Time Production

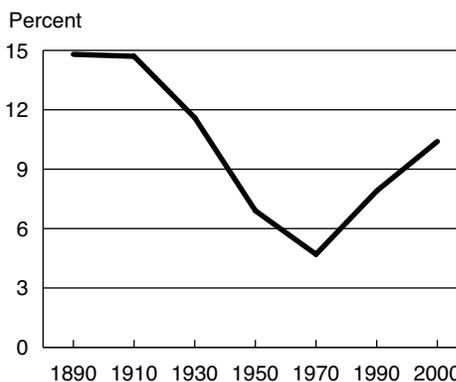
Another important change has been the rise of just-in-time manufacturing and, more generally, the tightening of slack in supply chains. The ability to respond quickly to market signals and to switch production schedules as the company learns what the market demands has been enormously important in building confidence in the new economy. U.S. data show a long-term decline in the amount of inventories businesses carry (see Figure 60 on page 124). This trend indicates that businesses are using information systems and more efficient logistics systems to reduce lags and slack in their supply chains.

### Specialization

In order for firms to take advantage of the economies of scale global markets offer, focus on those activities they do best, compete in a world with shortening product cycles, and take advantage of international opportunities, they have become more and more specialized. Successful firms have identified the critical activities they do well and have created strategic relationships with companies that can provide the other services and components cheaper than they can.

As a result, firms are developing a robust set of outsourcing relationships, partnerships, joint ventures, and alliances. These efforts have broadened the range of suppliers, changing supply relationships from linear production sequences involving a few firms into vast networks of players around the world contributing discrete chunks of competencies to multiple partners. As a

**Figure 59**  
*Rapid Growth in U.S. Immigrant Population in the Late 20th Century*  
(Percent foreign-born as a percent of total U.S. population)



Source: U.S. Census Bureau

**Table 23**  
*Europe Also Saw a Rise in Immigrants in the 1990s*  
(Percent foreign-born as a percent of total national population)

	1988	1998
Switzerland	15.2	19.0
Austria	4.5	9.1
Germany	7.3	8.9
United Kingdom	3.2	3.8
European Union	4.1	5.1

Source: Organisation for Economic Co-operation and Development

consequence, in many major industries, the share of components outsourced for production has risen dramatically (see Table 24).

**CRITICAL INFRASTRUCTURE SECTORS**

The highly interdependent international economy these long-term changes have produced relies more than ever on the existence of a smoothly functioning infrastructure with low transaction costs. This has made the infrastructure itself more valuable as it provides a foundation upon which high-value economic activity is based. What’s more, each of these infrastructure sectors increasingly depends on the other sectors as well. There are five critical, interdependent sectors to the global infrastructure: communications, energy, transportation, finance, and essential human services.

**Communications**

In the past three decades, the invention, implementation, and integration of information and communications technologies have been the most revolutionary enablers

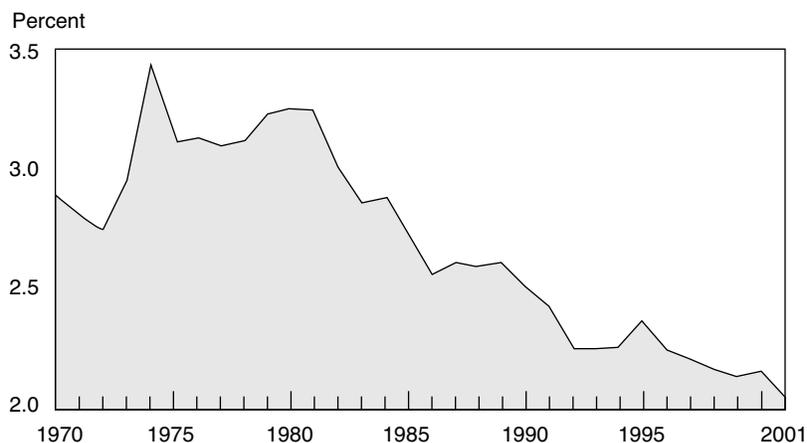
of an interdependent and international world economy. This sector includes the fixed-line public telephone networks, dedicated lines, undersea cables, copper wire, the huge new investments in fiber optics, and the antennas, switching stations, and handheld devices of mobile telephony. It also includes the routers and servers that drive the Internet.

The near-ubiquity of the communications infrastructure, and its inexpensive and declining cost, has made it essential to almost every business in the developed world. Yet the destruction of several key switching stations and the resulting overload of circuits in the immediate aftermath of the World Trade Center attack highlighted the vulnerability of this critical new infrastructure.

**Energy**

The electricity, oil, and gas industries together compose a \$600 billion sector upon which nearly every business and household depends. The refineries, power generation plants, transmission wires, pipelines, and control systems all exist in order to deliver reliable energy to homes and

*Figure 60  
Declining Inventories  
(Inventories as a percent of GDP)*



Source: Institute for the Future; Bureau of Economic Analysis.

businesses. The northeast blackout of 1965, the oil crises of the 1970s, and the rocky process of electricity deregulation in California, with its rolling blackouts, are examples of the distressing impact of disruptions in this sector.

**Transportation**

The network of highways, railroads, ports, waterways, and airports has provided the infrastructure for efficiently moving people and goods across space. The firms that use these networks to serve businesses and consumers—airlines, railroads, trucking, delivery services, and posts—have become important participants in almost every supply chain. The robustness of this system offers a high degree of choice in terms of speed, convenience, cost, and value-added services. Still, the halting of air traffic and the closing of tunnels and bridges into New York City in the days after September 11 underscored the vulnerability of any firm that relies on just-in-time delivery over great distances.

**Finance**

Banks, financial services companies, payment systems, and securities exchanges process about \$3 trillion in transactions each day. In the United States, this system is extremely well protected against disruption and shock, as the industry and its regulators have gone to great lengths to create and test backup systems. Still, the disruption to the financial markets after September 11 showed their dependence on other infrastructure sectors, in this case the communications infrastructure.

**Essential Human Services**

Health care, emergency services, and water systems provide basic human necessities critical in enabling individuals to work productively each day. Furthermore, the flexibility of the labor market is highly dependent on a government-backed safety net (i.e., unemployment and disability insurance, workplace standards, and public health efforts) government-supported education, and government policy on cross-border work flows (immigration).

**THE INTERDEPENDENCIES OF THE INFRASTRUCTURE SECTORS**

Each of these infrastructure sectors is not only important to the businesses it serves directly but also to the other infrastructure sectors. For example, each of the infrastructure sectors depends heavily on uninterrupted electric power. This is such a basic need that we don't even think about it anymore—until it isn't available.

Likewise, the transportation and energy sectors are becoming increasingly reliant on information systems and real-time communications links. The communications sector has also leveraged the new personal relationships supported by the growth of the communications infrastructure. Development and engineering in the communications sector has relied heavily on talent from overseas. Even the financial system—of all infrastructure industries, the most prepared for crisis situations—relies heavily on the external communications system. For example, the U.S. stock markets were closed for five days after the September 11 terrorist attacks, not because their own systems couldn't be brought back online but because of the lack of telephony in lower Manhattan.

The importance of these infrastructure sectors has produced huge investments in recent decades, which has created a robust, low-cost, and flexible economic foun-

*Table 24  
Outsourcing on the Rise in Key Industries  
(Percentage of inputs to production sourced from outside the firm)*

	1987	1997
Computers	57	87
Apparel	58	70
Household appliances	57	69
Consumer electronics	50	63
Health and beauty	47	58
Drugs	38	51

Source: Bureau of Economic Analysis

dition in most rich or high-growth countries—a foundation on which businesses greatly depend. These interdependencies, however, do make the whole system more vulnerable to anything that goes wrong, either by chance or volition. Interruptions in one sector can have tidal-wave effects throughout the system. What can be done to protect these crucial sectors? And who is willing to pay for it?

### **A NEW WILLINGNESS TO PAY**

**T**he cataclysm of September 11 dramatically imposed a new recognition of the vulnerability, importance, and value of critical elements of infrastructure in a severe crisis at a key point. But September 11 was not an isolated instance: earthquakes in California have damaged key roads and bridges, tunnel closings in the Swiss Alps have choked off trucking routes, floods in Florida have crippled the tourist industry, breakdowns in the air traffic control computer system have threatened flights, strikes in public transport systems have shut down commuters, and even daily traffic accidents on major arteries during rush hour make it difficult for people (and goods) to get where they need to be to get their jobs done. All of these events have had wide social and economic repercussions.

Perhaps one of the most important results of these types of natural and man-made disruptions is an increase in public awareness of the costs of reducing the vulnerability of these key infrastructure sectors and maintaining confidence in their reliability. Greater airport security, for example, safer bridges, and better data system backups all have tremendous costs for implementation. As breakdowns at these crucial points have caused great disruptions, however, we have grown more willing to pay these costs.

### **Growing Recognition of Vulnerability**

Earlier, smaller events demonstrated the wide variety of threats to which these systems are vulnerable. For example, the 1997 strike against UPS disrupted shipping for weeks. The demise of the billion-dollar online grocer

Webvan was tied to problems of Bay Area traffic congestion at rush hour. The energy crisis in California in 2001 prompted a rush of out-of-state business relocations. In the mid-1990s, the introduction of terrorism to U.S. soil and the anticipation of cyberthreats led President Clinton to establish the President's Commission on Critical Infrastructure Protection.

Indeed, for at least the last decade, there has been a growing recognition of the risks to critical infrastructures, but perhaps the crisis of September 11 was necessary to inspire businesses, consumers, and taxpayers to be willing to pay the tremendous costs of increasing security and building adequate backup systems.

### **Distributed Vulnerabilities**

A crucial component of these tremendous costs is that the structural changes enabling the global economy have created a set of distributed vulnerabilities that seem much more difficult—and, as a result, more expensive—to shore up. The distributed control of the global, just-in-time, networked economy has created dispersed targets and more, albeit smaller, points of vulnerability to both natural and man-made disruptions. This ultimately makes the bigger system more dependent on small nodes, which gives small groups the opportunity to have a disproportionate amount of leverage.

### **FORECAST:**

### **WHO WILL PAY AND HOW MUCH?**

**S**horing up these points of vulnerability will impose costs throughout the global networked economy. In the next few years, corporations, governments, consumers, and taxpayers will all wrestle with the questions “Who will pay?” and “How much?” At the same time, a combination of new solutions will work to contain costs and perhaps even uncover unexpected benefits.

### **The Corporate Role**

Individual companies will pay for the additional costs of infrastructure risk in three ways: (1) they will pay higher

insurance premiums; (2) they will pay more for security services; and (3) they will invest more money in redundant systems and processes.

#### *Paying Through Insurance*

Higher insurance premiums will create the most immediate and pervasive new expense for companies. In settling claims associated with the collapse of the World Trade Center, insurance companies face by far their most expensive payouts ever (see Table 25).

Because the risk of terrorist acts on U.S. soil had been assumed to be low, coverage for such acts has generally been included in corporate insurance policies as a free “extra.” However, as of January 1, 2002, 70% of reinsurance policies—insurance that insurance companies buy to protect themselves against large payouts due to extreme events—are up for renewal. We can certainly expect future insurance policies to be much more expensive, as insurance companies pass on the costs of the payouts to their customers.

This possibility could cause the insurance premiums of companies to rise at twice their normal rate. As these costs inevitably increase, a growing number of companies will decide to decline coverage and implement other measures, such as increased security, to lower their exposure to risk.

#### *Paying for Security Services*

Prior to September 11, companies spent \$50 billion a year on security to protect their operations and employees. Private security firms such as Kroll-O’Gara, MPRI, and GlobalOptions have built themselves into large multinational businesses by providing background checks, investigations, and protection to such corporations. The corporate security industry had been growing at a robust 7% a year. As a result of the feelings of increasing vulnerability brought on by the World Trade Center attack, companies are extending the hours and intensity of their security. In the next few years, spending on security could easily double, rising by \$50 billion in the United States alone.

#### *Building Redundancy*

In the next few years businesses will build redundancies, backups, and new security mechanisms into their core processes in an effort to lower their insurance premiums and reduce risks for which they are not insured. These efforts, too, will add costs to the bottom line, but such actions will be less expensive than paying high insurance premiums or remaining vulnerable to risks insurers are unwilling to underwrite.

On a more positive note, investing in redundancy may play out similarly to companies’ preparations for

*Table 25*  
*Largest Insurance Losses*  
*(Damage costs in 2000 dollars)*

World Trade Center	United States	2001	\$50–\$70 billion
Hurricane Andrew	United States	1992	\$20 billion
Northridge earthquake	United States	1994	\$16 billion
Cyclone Mireille	Japan	1991	\$7 billion
Storm Daria	Europe	1990	\$6 billion
Storms Lothar and Martin	Europe	1999	\$6 billion

Source: Swiss Re

Y2K. In the late 1990s, organizations around the world spent about \$200 billion updating their software systems to prepare for the Millennium Bug, half of which was spent in the United States. After the three peak years of upgrading, companies not only reduced their exposure to chaos and crashes at the millennium, but they also had vastly improved their internal systems, which ultimately helped them operate more efficiently. We expect a round of investment in redundancy of similar magnitude in the next few years.

### Who Will Pay?

The industries most acutely affected by the rising costs of the growing risk to the basic infrastructure have been the airlines and the posts. Other critical infrastructure providers such as the transportation, travel, energy, and communications industries will pay a big share of these costs as well. However, the global networked economy means that a large portion of these costs will rapidly be shifted to the users of the at-risk infrastructures—which, as we have suggested above, include almost every large busi-

ness. Those businesses that depend most heavily on the infrastructure—those with complex supply chains, those that outsource a high percentage of their operations, and those with highly international operations—will pay the largest share of these new costs, both through insurance premiums and building redundancies.

### The Government Role

At the core of the issue of who pays for what is the question of how big a role federal, state, and local government will play in protecting the nation’s critical infrastructure. One argument for a strong government role sees infrastructure protection as an extension of national defense. A second, related argument sees a necessary role for the government in resolving an apparent market failure (the costs of preventing infrastructure failure at key nodes far outweigh the ability of the individual companies providing that part of the infrastructure to pay for them).

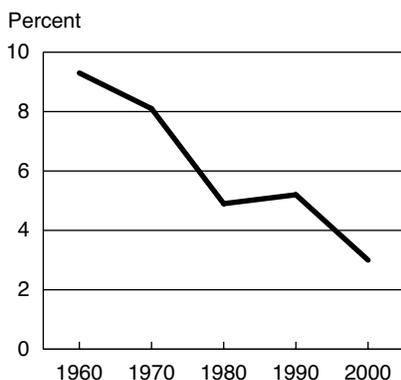
#### Government Role as Part of Defense Spending

There is a potent argument for the government to play a large role in protecting critical infrastructure as a function of defense spending. Defense spending as a share of national output has declined steadily since World War II, especially since the end of the Cold War (see Figure 61). If efforts to protect airline passengers, maintain the posts, and insure the insurers shift from an emergency basis to a more permanent function, however, that function is likely to fall under the rubric of national defense. If national defense is defined more broadly in this way, defense spending would move back to the levels of the early 1990s, at 4 to 5% of GDP, an increase in spending of \$100 to \$200 billion a year.

#### Government Role to Resolve Market Failure

The other way the federal government may become permanently involved in protecting the infrastructure is by being called in to address what seems to be a market failure. There is strong evidence that the risks of a disrupt-

Figure 61  
Steadily Decreasing Spending on Defense  
(Defense outlays as a percent of GDP)



Source: U.S. Office of Management and Budget

tion to the infrastructure go far beyond the ability of the individual company providing that piece of the infrastructure to cover those risks. As a result, that particular infrastructure company can't really afford to take the necessary actions to reduce the threat entirely—it's just not economically feasible.

For example, Verizon owns the telephone switching station in lower Manhattan whose interrupted service was primarily responsible for the delays in reopening the stock market after September 11. Even after the tragedy and ensuing disruption, Verizon maintains that it can't afford to invest in the backup systems required to prevent that type of disruption from occurring in a similar event. It has so many similar switching facilities throughout the country that it would take five years and billions of dollars to create secondary circuits that could bypass disabled switching stations.

At the bottom line, the cost to Verizon of losing its switching station paled in comparison to the cost to the global financial services industry in lower Manhattan of shutting down for a week. This is where, it is argued, the government should step in to prevent such catastrophic breakdowns in the future by subsidizing backup systems. The airlines are making the same type of argument in asking the federal government to take over airport security, as are the insurance companies in asking the government to limit their liability in the case of similar events in the future. Given what's at stake, the federal government is likely to accept some sort of role in cases like these, where it doesn't make business sense for the individual infrastructure providers to invest in sufficient security and redundant systems to protect everything and everyone who uses that infrastructure.

Even though the federal government is likely to play an increasingly larger role in protecting the infrastructure, it cannot continue to absorb the cost of such risk with huge Social Security and Medicare payouts looming at the end of the decade. Nor can anyone really afford to let the risks slide. What these coming expenses suggest is that new ways of reducing the costs of risk must be found.

### **The Longer-Term Outlook: Reducing Costs**

The longer-term solutions for protecting the infrastructure will be aimed at minimizing the additional costs that threaten to burden the global networked economy.

#### *Technological Solutions*

Although the advent of new technologies is not a panacea, technologies will certainly play a large role in reducing the cost of protection and security. Low-cost surveillance sensors, biometrics, and real-time querying of large databases seem likely to proliferate in the next few years, as does security for Internet-based systems. (For more information on the security of Internet systems, see "Network Security: Maintaining Trust in Interconnection.")

#### *New Consumers*

As the initial shock of uncertainty wears off, we expect consumers to reassert themselves and find ways to take control of and reduce their risks for usage of the infrastructure. We can expect these actions to take a wide range of forms—including installing firewalls for their connected homes, purchasing distributed electricity generation devices, and buying more personal insurance. Such a return to control may also affect consumers' mobility (some will travel less or change their mode of transport) and their attitudes toward privacy (they may be more willing to accept government background checks but less willing to share information with unfamiliar businesses).

#### *Supply Chains*

We expect some of the most significant changes to occur in the complex global supply chains, which rely so heavily on a smooth-functioning infrastructure. Companies that have outsourced essential processes to suppliers around the globe cannot easily retrench and bring their operations back in-house. Instead, they may try to reallocate operations to more secure locations. They may also lean heavily on public and perhaps even international organizations (e.g., the United Nations or the World Trade Organization) to provide protection.

### **The Danger of Quick Fixes**

Some apparently inexpensive solutions that would result in reduced costs for security could have seriously negative long-term consequences on the global networked economy.

For example, protecting against foreign threats by limiting immigration could be effectively accomplished relatively quickly and inexpensively. Even though reducing immigration seems a likely answer to dealing with increased risks of some forms of terrorist activities from outside the United States, the economic and social impact of this approach could far outweigh these risks. Immigration, for example, was an important driver of economic growth in the late 1990s.

Instead of limiting immigration, the federal government could employ technology to increase security while maintaining or even increasing immigration levels. Tools used widely in corporate America for background checks, databases, data mining, and even customer relationship management could be used to assess and manage risks of individual immigrants.

A similar argument could be made that wide restrictions on trade, cross-border investment, and cultural exchange could be relatively inexpensive means of establishing a measure of security. To do any of these, however, could have grave consequences for the long-term health of the global economy.

### *The Value of Information and Analysis*

Better information about what risks do exist will lead to improved contingency planning by allowing consumers and companies to anticipate a more exhaustive array of scenarios. This information, coupled with increasingly sophisticated software-based simulation tools, may enable companies (and governments) to better understand the implications of complex events—and to prepare for them more effectively.

### **WHO WILL BENEFIT?**

**T**he biggest winners from the reallocation of resources to protect the world infrastructure will be those companies that figure out ways to adapt new security-based innovations to their own particular needs. As might be expected, the security industry stands to gain from a huge increase in demand for its services. And perhaps led by a combination of venture capitalists and entrepreneurs, the businesses that design cheaper ways to enhance security are likely to be successful as well. As

for the insurers, provided they avoid another devastating loss like the World Trade Center in the next few years, they are also likely to gain significantly by raising premiums and increasing their profits by investing in this bigger pool.

Still, the biggest gains may be seen in the way that large companies employ the new security solutions. The challenge for these companies—as it was for Y2K—is to choose the right solutions, and to implement and integrate them into their operations seamlessly. The biggest winners will be those that find ways to use these solutions not only to reduce costs of security and insurance but also to positively affect their products and customer relationships. Perhaps companies can ultimately benefit from a challenging period of higher costs and uncertainty in much the same way that companies that implemented Y2K fixes used the opportunity to create more efficient business processes and to manufacture better products.

—Greg Nemet



## Network Security: Maintaining Trust in Interconnection

*In the past decade, corporations have expanded their use of public and private information networks tremendously, enjoying increased productivity, access to new markets, and greater efficiencies with partners and suppliers as a result. More recently, however, the growing occurrences of malicious code infection, hacker attacks, and terrorist activity have heightened concerns about the vulnerability of such vast interconnected networks in general and the security of networked information in particular.*

*As a result, corporations now face difficult technical and strategic decisions about the secure management of their internal net-*



*works and outside access to them. Such business decisions—and consumer reactions to them—will determine the evolutionary path of global computer networks for at least the next decade. As businesses rush to purchase technology and institute stronger policies to protect network integrity, they risk both overspending on quick fixes and stifling the growth of Internet usage, especially for commerce. Given the current drivers, however, we forecast that businesses will ultimately achieve a level of security that effectively mitigates such risks, thereby spurring even greater global interconnection by the end of the decade.*

## THE GROWTH OF INTERCONNECTED NETWORKS

Corporate networks and connection to public networks, such as the Internet, have become standard tools for conducting business. This was not always the case. A decade ago there were only about 100,000 computer network systems, according to the Center for Education and Research in Information Assurance and Security. As recently as 1994, the Internet just wasn't used for commercial traffic. Today, however, there are millions of computer networks across seven continents, and Internet traffic doubles every 90 days. The International Telecommunications Union estimated that the number of worldwide Internet users would reach 505 million in 2001. Donaldson, Lufkin & Jenrette estimates that the total number of online purchasers will increase from 48 million in 1999 to 183 million worldwide in 2003.

Even if they are not involved in e-commerce per se, most businesses today maintain distributed, client-server architectures in which workstations communicate with a central server through networks. Indeed, intranets have

increased the efficiency of many corporate departments, such as human resources and payroll, and connection to the public Internet and World Wide Web has fundamentally changed how, what, and when information is available to workers.

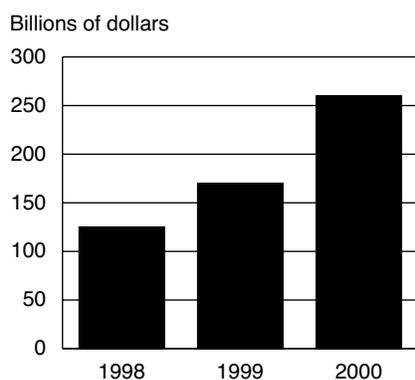
Furthermore, Web sites, extranets, and customer relationship management systems have emerged as important platforms for communication and transactions with customers, partners, and suppliers. According to International Data Corporation, U.S. corporate investments in Web infrastructure, including both technology and business infrastructures, more than doubled from \$125 billion in 1998 to \$260 billion in 2000 (see Figure 62). And this spending didn't come from now-defunct dot-coms, either. International Data Corporation estimates that 85% of e-business investment comes from traditional bricks-and-mortar corporations rather than venture investment in Internet companies.

Over the same period, there has been an increase in business productivity directly related to the adoption of information technology and networking technologies. Just-in-time delivery, to name one important example, has led to greater efficiencies in the supply chain, thereby reducing the need for warehoused inventory. In short, corporations in 2001 conducted business at least in part through interconnected information networks, and as a result, they have grown more productive, profitable, and adaptive.

In building these networks, corporations have calculated and knowingly incurred a level of security risk, whether manifested through loss of proprietary information, financial fraud, scheduled and unscheduled downtime, or physical damage to networks. Such risk is part of the cost of doing business. But in recent years, increases in the size, complexity, and importance of networks, combined with the greater sophistication of computer users, have compounded the potential for financial, personal, and physical damage.

To prevent such damage from reaching catastrophic levels, security technologies, such as firewalls, anti-viral software, and intrusion detection systems, offer corpora-

*Figure 62*  
*Investment in Web Infrastructure Is Up Sharply*  
*(Billions of dollars invested in Web technology and business infrastructures)*



Source: International Data Corporation

tions levels of protection from internal and external hacking, malicious code infection, denial-of-service attacks, and theft of proprietary information. Perhaps as a result, worldwide spending on security software reached \$5.1 billion in 2000, most of which was spent on firewall and virus software.

Despite this investment and the widespread adoption of basic security technologies, incidents of security breaches are on the rise, as are the costs of such breaches. Similar to its physical counterpart, information security technology acts as a hurdle and a deterrent to would-be miscreants, but technology itself provides only part of the solution. To tighten security and make the Internet safe for the expansion of e-commerce, security issues must be addressed by technology and policy changes all across the business landscape. The government and individual users will also play a role.

### DRIVERS FOR INCREASED FOCUS ON SECURITY

Spurred by the heightened state of concern for infrastructure and network security in the face of terrorist attacks, corporations will be forced to evaluate not only their purchases of security technology but also their organizational security and information-sharing policies as a whole in the near and long term. The main driving forces for faster growth in security technology and policy over the next decade are the increasing impact of security breaches, consumer demands for security assurance and new technologies and capabilities, growth in corporate responsibility for security, and the threat of terrorism.

#### Increasing Impact of Security Breaches

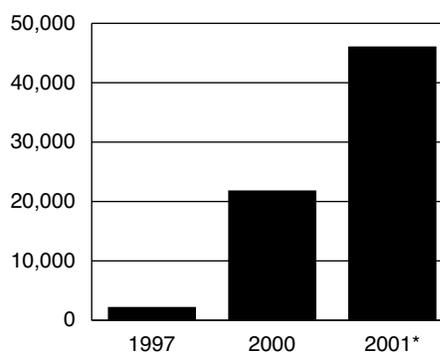
Compared to overall activity in corporate networks and the Internet, the number of malicious code, denial-of-service, and hacking incidents is small, but they are growing at a faster rate than overall Internet use. Such incidents are defined as “a collected set of events that violates a site’s (or sites’) security policy. Code Red, for

example, was a single incident that affected more than 8.5 million servers.

According to the Computer Emergency Response Team Coordination Center, a federally funded research center and security watchdog, the number of incidents reported in 2000 was ten times greater than in 1997, and the number was expected to more than double again in 2001 (see Figure 63). The rate may be even greater than it seems, however, since incidents are likely to go unreported due to ignorance about how to report them, desire to keep security breaches quiet, and an overall lack of confidence in prosecution. Last year, only 36% of corporations reported security breaches to the police, according to a survey conducted by the Computer Security Institute and the Federal Bureau of Investigation.

Similarly, corporate losses from the theft of financial assets, proprietary data, or damage done to networks are a small percentage of network-related transactions and productivity gains, but are rising and represent significant dollar amounts. Malicious code attacks (e.g., viruses,

*Figure 63*  
*Security Breaches on the Rise*  
*(Number of security breach incidents reported by corporations)*



\*Estimate; 36,000 incidents were reported through September 30, 2001.

Source: Computer Emergency Response Team Coordination Center

worms, and Trojan horses) have been the highest-profile and most costly network security problems. According to Computer Economics, an independent research firm, the Love Bug, Code Red, and Melissa viruses have caused damages totaling \$8.8 billion, \$2.6 billion, and \$1.1 billion, respectively. Since 1998, the estimated total cost of malicious code attacks has been \$41 billion.

Corporations also incur losses due to theft of proprietary information, internal misuse of information, and unauthorized access. Corporations are increasingly detecting security breaches and increasingly citing Internet connections as a point of attack (see Figure 64). Although detection of such breaches is rising, as well as the costs incurred by them, corporations know surprisingly little about how, when, by whom, and to what extent their networks are being attacked.

### Consumer Demands for Assurance

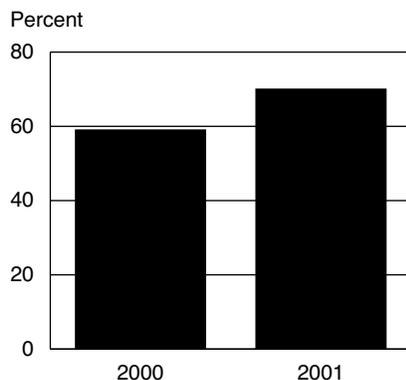
Consumer demands ultimately determine business actions. Therefore, maintaining consumer trust in both Internet and corporate network safety is essential if corporations want to continue to benefit from the efficien-

cies and expansion of markets that public and private networks have made possible. As evidenced in the case of e-commerce, consumer trust (in networks, technologies, and businesses) is essential for their participation in the electronic economy. For example, consumers are often initially hesitant to make purchases online, but once they try it and build up an element of trust in the process, they grow quite comfortable; indeed, they are likely to spend more money online as their online experience increases (see Figure 65).

As the networked economy grows, consumers will continue to demand reasonable security of personal and financial information. For example, online bill payment has not been widely adopted, due in part to consumer hesitation to link bank accounts to billing information, and a desire for ultimate control over cash flows. According to Jupiter, only 100,000 U.S. households, or less than 1%, paid any of their bills online in 2000.

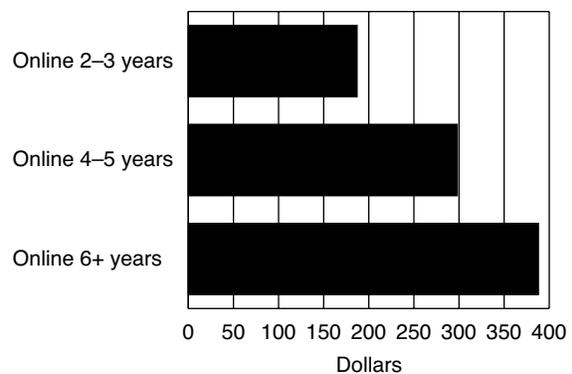
In this way, security, privacy, and convenience often conflict; a balance must be struck among them. If consumers are more concerned with security than privacy, for example, they are likely to trade some of the latter for

*Figure 64  
Internet Is Increasingly the Source of Attacks  
(Percent of company respondents that cited Internet as frequent point of attack)*



Source: Computer Security Institute/Federal Bureau of Investigation Survey

*Figure 65  
Development of Trust Increases Online Spending  
(Average annual online spending, by online experience)*



Source: ActivMedia

more of the former. In the case of online bill payment, security concerns outweigh convenience in consumers' risk-reward trade-off. As consumers demand sufficient proof of security before they trust networks and feel comfortable using them for financial transactions, any disintegration of trust in current networks will decrease their use of networks for financial transactions.

### **Broadband, Wireless, Convergence, and New Technologies**

Broadband, wireless, device convergence, and, eventually, the "next-generation Internet" are increasing connectivity options to public and private networks alike. As access points and always-on connections increase, so does the need for sophisticated security technologies, strategies, and policies to control that access across multiple devices. Demand will increase for both device-centric and network-centric technologies to secure information as it passes across different networks, access points, and hardware configurations.

For example, in October 2001, Handspring introduced a GSM phone and Palm OS organizer that combines mobile calling, wireless e-mail, personal data organization, messaging, and full Web browsing into one device. Multiplying the amount of data accessible through such converged-access devices requires more complicated security measures to be implemented. Broadband adoption will also drive demand for security technology as its always-on connectivity increases the ease of hacking into systems. Another point to consider is this: The next-generation Internet is currently in development, and developers have noted that security problems are likely to worsen as a direct result of increased bandwidth and new, more complex applications.

### **Increased Focus on Corporate Responsibility**

Corporations will increasingly be held accountable for the security of their information technology products and networks. Technology product and service companies always face hard choices juggling time to market, func-

tionality, and security, but in the past year they have faced increased media scrutiny and customer sensitivity to security problems. For example, Microsoft has created a new task force related to the security flaws in its software. Widespread publication of the security flaws of the company's Internet Information Services (IIS), a Web server software, has driven this endeavor. A published analyst report went as far as suggesting that IIS users migrate to a more secure software, and insurance companies are adding 15% premiums for Microsoft IIS users.

As a result of incidents like these, companies have become more willing to take on the responsibility for the security of their products. Indeed, Microsoft CEO Steve Ballmer commented that, in the face of software security concerns, Microsoft will become "less freewheeling and more sober" in its focus on security and product releases.

Corporations are also moving security issues higher up in their organizational structures. Recently, the number of chief security officers at larger enterprises increased. Of the 2,000 largest corporations in the United States, half currently employ chief security officers, up from only 100 a decade ago. This trend is likely to lead to increases in preventive security measures as well.

### **The Threat of Terrorism**

Although concern for the security of the information infrastructure was growing prior to September 11, 2001, fear of terrorist attacks and the national focus in the United States on protecting critical infrastructures will continue to pervade corporate, government, and public psyches, and therefore must be factored into any analysis of network security. The targeting of two public infrastructure systems, air travel and mail delivery, has triggered a heightened reassessment of vulnerability in public and private networks of all types, in addition to creating a greater perceived need to reassess information security needs and to implement fixes. The main areas of concern lie in: (1) the potential use of corporate networks to launch attacks on public infrastructures such as power plants; (2) the specific targeting of the public Internet and Web networks to diminish productivity and to hinder

communication; and (3) “hacktivism” and acts of defacement or sabotage, such as the recent attacks by the Pakistani group Gforce Pakistan that targeted both U.S. and U.S.-allied government and corporate Web sites, and which are sure to increase during political conflict.

Since the government is actively involved in fighting actual incidents of terrorism, the daunting and nearly impossible task of regulating network security is unlikely to take place in the near term. The current focus, led by the Office of Homeland Security, is to promote collaboration between private and public sectors to evaluate security needs and to develop solutions. This collaboration is extremely important in the next stage of security technology and practice development. Furthermore, partially driven by threats of terrorism, the National Science Foundation has created a new research program specifically designed to increase the basic security levels of commercial and government technologies.

Whether concerns about terrorism dissipate depends on factors such as additional attacks (specifically, cyberattacks), the extent of government regulation to preemptively protect the public information infrastructure, and

the long-term effects on consumers’ psychology and their need for increased assurance of network security. It is too early to determine whether the national psyche has fundamentally changed, but the length of the war on terrorism and the number of subsequent attacks will directly influence the network security measures adopted by government, businesses, and consumers.

### FORECAST

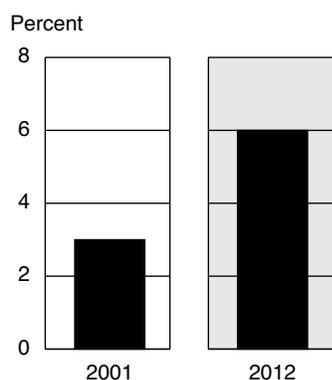
Even though technology spending has leveled off in the past year and is likely to remain stable or fall for the next two years, security technologies will remain near the top of corporate priorities and will be allocated a larger percentage of information technology budgets. Meanwhile, market demand for emerging security technologies and increasing investments in them will result in new product categories in the next ten years that will change how users access networks. Furthermore, as the number of cyberattacks goes up, government regulation and changes in organizational policy toward security issues will increase as well.

### Increased Spending

Security spending as a percentage of the information technology budget will increase. In the short term, due to concerns about terrorism and related hacktivism, security budgets are likely to maintain or increase levels of funding even as the economic downturn forces cuts in overall information technology budgets. Security spending makes up about 3% of a overall corporate spending on information technology. This will increase to about 6%, or nearly \$20 billion, by 2012 (see Figure 66).

Those technologies proven to reduce vulnerabilities will continue to see the biggest gains, such as virus software, firewalls, intrusion detection, and authentication products. Businesses are also likely to run multiple technologies at the same time. This layering of security technologies will make it more difficult to break into systems, and should give companies more time to react to threats. For example, two or three firewalls might be used to increase the complexity of security to an outside hacker.

*Figure 66  
Security’s Share of Information Technology Budgets  
Will Double in the Next Decade  
(Percent of overall corporate information technology  
budgets spent on security)*



Source: Information Security; Institute for the Future.

### New Technologies

In addition to increased investment in existing technologies, the horizon holds promising new technologies that will mature to adoption in the next decade.

First, security software will become increasingly decentralized, intelligent, and less reliant on human direction for action. For example, adaptive learning technologies, such as heuristics-based virus solutions, that proactively identify a potential virus without having encountered it before will grow more sophisticated and useful. Currently, heuristics-based technologies generate too many false positives and therefore are not yet cost-effective, but this is purely a matter of technology development that will be solved in the next five to seven years.

Second, biometrics will become widely adopted for access to private networks, specifically employee access to corporate networks. Biometrics enables the verification and control of network access based on personal attributes, such as voice, iris pattern, or fingerprints rather than PIN, password, or code. Already, one of the world’s busiest airports, Schiphol in Amsterdam, is using the unique characteristics of the human iris to verify the identity of frequent fliers at security gates.

In the future, corporations and government agencies will employ biometric verification technologies for access to their networks. For example, fingerprint scanners will replace PINs to control access to devices such as computers, PDAs, and Blackberry pagers—and therefore the networks they are connected to. Already, the city of Glendale, California, has replaced its employee password protection system with biometric fingerprint scanners, thereby heightening security and reducing the need for employees to remember complicated passwords that change quarterly. While understandable privacy concerns of Big Brother–type surveillance surround biometrics, verification technologies might elicit higher tolerance from employees as identity is confirmed, or verified, rather than used to establish a profile. In the right situation, people understand the need for technologies like fingerprint imaging. For example, most large

corporations already require employees to submit to fingerprinting at the beginning of their employment. Indeed, a study done by Columbia University reported that 83% of people approve of the use of fingerprint imaging in such instances.

As biometrics evolves, applications will extend beyond the corporation and offer consumers the ability to increase the security of credit cards, bank accounts, and their own personal information devices. The first “corporate” adopters of biometrics will be government and financial services. As prices fall and trust grows in the second half of the decade, widespread adoption will occur in midsize to large corporations that have large numbers of employees, partners, and customers accessing their networks, especially from remote locations.

### Number of Attacks and Their Effectiveness

The number of attacks on corporate networks will increase in the next decade, but the damage will decrease as both the technology and the personnel monitoring security become more sophisticated and adaptive. The number of attacks attempted will nearly triple for the next five years and then will stabilize near 4 million by 2012. Likewise, corporate dollar losses from security breaches or damage to networks will grow to \$30 billion per year by 2012, but 5 times this amount of potential damage will be averted (see Table 26).

*Table 26*  
*Security Spending Forecasts*  
*(Billions of dollars)*

	2000	2012
Security spending	5	20
Security losses	15	30
Potential losses saved	90	450

Source: Computer Economics; Computer Security Institute/Federal Bureau of Investigation Survey; Institute for the Future.

### Regulation

Once security standards are established, the feasibility and the likelihood of the government requiring a minimum level of network security before allowing companies to link to the public Internet will increase. In the same way that cars are inspected and auto insurance is required by the government, there will be a certification process for hardware, software, and network connections by 2012. Some of this is already in place. Since the Federal Communications Commission must approve all wireline and wireless appliances, computer manufacturers will have to submit products for government approval before market release. Corporations are also likely to face security audits to ensure that they are disclosing attacks and vulnerabilities to the proper authorities.

The Office of Homeland Security and the Federal Trade Commission are the most likely candidates for regulatory oversight of network security standards. If the Office of Homeland Security is legislated as an additional cabinet post with budget control, which is a matter currently under congressional debate and not likely to be decided before February 2002, then Internet network security is likely to fall under its domain as the organization becomes an umbrella for infrastructure security. As happened with radio and telecom, the onset of regulation will slow Internet development and increase costs of development and compliance in the short run, but will ultimately lead to further commercial expansion as users come to develop greater trust in the security of the networks.

### Organizational Changes

One of the most effective and likely developments of the surge in concerns about network security will be organizational changes, especially within information technology departments, that will contribute to better management of information security. Since the effective security of corporate networks is not a function of technology alone, companies will increase their focus on monitoring networks and building strategies to avoid, detect, and react to security breaches.

To this end, all large corporations and half of medium-size corporations will dedicate a chief security officer to the oversight of network security. In addition, physical and information technology will be increasingly yoked together, and these two seemingly polar corporate issues will be reorganized under the same umbrella, particularly as biometrics, smart cards, and storage issues cross the physical realm and cyberspace. While coordination of physical and information policies will prove difficult, ultimately it will enable a higher overall level of security than addressing issues separately.

### BUSINESS IMPLICATIONS

Concerns about the security of corporate networks and the introduction of technologies, internal policies, and government regulation to increase the security of these networks hold tremendous business implications. As with the growth of networks as business tools, issues concerning network security have the potential to alter the ways both businesses and consumers use these networks.

#### Pay Attention to Network Security

The one thing companies can't afford to do is nothing. Network security is a real issue that hits companies at the heart of their business—in their relationships with their customers. The problem will only grow more significant as more business communications and transactions are conducted on the Internet and the legal onus falls on companies to make sure their technologies and networks are secure. As a consequence, companies will have to spend more money on making their networks safe, and more time creating widespread security policies that protect their own businesses and those of their customers.

#### Don't Repeat Y2K Overspending

Yet, as happened with Y2K, it is possible for corporations to "invest" with too little knowledge, in the end, of whether the financial and man-hour expenditures truly solve problems. Especially with technology purchases,

there is the danger of overinvestment or at least running head-on into the law of diminishing returns. Will seven firewalls provide seven times the security of one? It will be easy to overspend with little effect on improving security, especially as it is likely that newer technology solutions will come to prove their worth over the next two to three years. Corporations should be careful to evaluate how money and time are best allocated, especially in the short term, where there is the greatest uncertainty regarding actual threats and best solutions.

### **Learn the Psychology of the Hacker**

Corporations must focus on why network hacking occurs and use this information to predict—and prevent—potential sources of attack. While disgruntled employees historically have been able to cause the greatest amount of physical and financial damage, outside attacks are growing in number and severity, a shift that is likely to continue. Corporations can anticipate when incidents caused by a disgruntled employee are likely to occur, such as following a layoff or a denial of promotion, and can better understand their employees' use, and misuse, of corporate networks. To understand outside attackers, corporations must understand the motivation for the attack and therefore be better able to anticipate the methodologies of subsequent attacks. For example, a hacker wanting to steal financial data will employ different techniques than a prankster attempting to post false information on a company intranet.

### **Anticipate Litigation**

Like prosecution of cybercrime, litigation aimed at businesses will increase, with the goal of seeking damages from security products that didn't work. Corporations will face increasing liability for distribution of "insecure" products or for "insecure" connections of private to public networks. The best way to combat the threat of litigation in the long run is for each company to take responsibility for the security of its own products and networks.

### **Don't Hinder Productivity**

Although there is currently a debate about the extent of real productivity gains from information technology in the past five years, it is generally accepted that network uses have triggered real gains by speeding industrial processes, facilitating inventory reduction, and better integrating retailers with manufacturers and suppliers. Corporations will have to balance the adoption of technologies that may reduce some of this productivity or factor in lost productivity for inevitable periodic security breaches. A competitive advantage will be gained by those businesses that strike the best balance between achieving security and forcing the adoption of productivity-reducing technologies and policies.

### **CONCLUSION:**

#### **BALANCE SECURITY AND OPENNESS**

Perhaps the biggest implications of these growing security issues are the direct and the indirect effects that will be exerted on societal use of the Internet and corporate networks. The Internet is seen as a cloud-like galaxy accessed through (nearly) freely accessible portals with users cruising an information superhighway. Even though these images have grown trite, the Internet has undeniably changed the way in which consumers, businesses, and government access information, make decisions, and communicate.

If heightened security concerns reduce the use or the amount of information and services accessible through both public and private networks, make entry and use more complicated and time-consuming, or raise the costs of using the Internet, much of the productivity and information flow that has been gained over the past decade will be lost. The challenge to corporations is to find the balance between security and openness that maintains enough trust in interconnected networks so that the use of these networks will continue to grow, especially for commerce.

—Ashley Manning



# Strategic Directions





## The Continuing Pursuit of Innovation

*It is commonly believed that innovations create changes—but very few do. Successful innovations exploit changes that have already happened. They exploit the time lag—in science, often twenty-five or thirty years—between the change itself and its perception and acceptance.... And once such a change has happened, it usually survives even extreme turbulence.*

*—Peter F. Drucker*

**B**usiness innovation is about putting new ideas into practice and responding to change in creative ways. For managers who have spent the past decade confronting a confusing world of rapid and disruptive change, innovation is increasingly seen as the key to successful adaptation and the main source of competitive advantage across a wide range of industries.

Unfortunately, innovation is also a messy and unpredictable process that defies conventional management approaches, and leaves managers shaking their heads. Managers want answers, and all they seem to get are questions. But questions often lead to answers, and in these times of vast, disruptive change, companies find themselves asking these three questions about the ongoing pursuit of innovation:

- *Why is innovation still so urgently needed today?*
- *Why is innovation so hard to manage?*
- *How can managers help their organizations become more innovative?*

### WHY IS INNOVATION IMPORTANT TODAY?

To understand the urgency of innovation, it is useful to think of companies as part of a larger business ecology. In “normal” times of relative stability, the advantage goes to the most highly adapted entities, to those who have discovered, whether by design or accident, how to survive and thrive in a particular ecosystem that is

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**The innovators aggressively explore the altered environment, seeking advantage in both the long-term changes and the short-term confusion of the other inhabitants.**

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known and predictable. They have developed and fine-tuned a set of stable characteristics, tools, structures, and strategies that work well in the known environment.

However, in times of rapid and disruptive change, when the environment becomes increasingly unpredictable, the advantage moves to the most adaptable—the most innovative—in both natural and human systems. The highly adaptable may not be as efficient or as disciplined as the adapted, but because they are always experimenting with new approaches, they are better able to respond quickly to new opportunities or challenges. The adaptable have a strong bias toward restless exploration of their surrounding landscape, while the adapted are much better at exploiting its already familiar features.

When the equilibrium is first disturbed, there is a period of tremendous instability as the inhabitants respond. Some disappear from the scene, unable to survive the immediate effects of the vast transformations. Others see the changes as a passing storm and hunker down to wait for the return of normalcy. Yet others—the innovators—aggressively explore the altered environment, seeking advantage in both the long-term changes and the short-term confusion of the other inhabitants. When the dust finally settles, a new round of adaptation begins, and eventually a level of equilibrium is restored to the system.

Currently, we are feeling the effects of just this type of massive transformation. Think of the Internet as an asteroid technology whose impact was so sudden and so far-reaching that it fundamentally altered the competitive landscape overnight. It didn’t determine the direction of change, but by altering the playing field, it exerted strong, new selection pressures on existing players. The technology itself was not that revolutionary—it had roots going back 30 years—but in less than a decade its rapid global diffusion has fundamentally changed the patterns of connection and interaction for both individuals and companies around the world. It’s as though the carefully controlled and physically limited exchanges between a group of island ecosystems was suddenly overthrown by the emergence of broad land bridges that supported unprecedented levels of exchange, migration, and interaction.

The information-rich and heavily interconnected landscape of the omnipresent Internet amplifies the importance of several key business drivers that will challenge companies for the next decade as the cycle of adaptation plays itself out. Globalization, electronic marketplaces, and networked organizational structures are forcing companies to rethink the ways they interact with customers, suppliers, competitors, and partners. At the same time, the knowledge economy, free-agent labor markets, and alternative work environments are dramatically changing the social contract between employer and employee. As for the customer, ready access to information, a greatly increased scope of personal connectivity, and the availability of more choices of products and services are rapidly shifting power to a new, more sophisticated consumer.

There is also a dark side to these changes. Global interconnection makes companies and individuals vulnerable to disruption, whether deliberate or accidental. Access to information, and to the ubiquitous digital trails of transactions, erodes privacy. Increased competition creates bigger winners and more numerous losers. Rapid technological and economic changes place enormous stress on social, political, and cultural institutions

that are designed to respond, not in months or years, but in decades or generations. These changes will require adaptive responses as well, but these responses are likely to come at social and political levels rather than at the level of individual companies.

Technology revolutions that restructure core infrastructures, such as communications, transportation, or energy, have particularly strong impacts on the business environment. Time-tested recipes for success may be vulnerable to new, unforeseen threats, while unprecedented opportunities are open to the swift, the imaginative, or the lucky. Fundamental shared assumptions about the appropriate size, location, pace, and scope of a business can be suddenly overthrown. We've seen it happen with the steam engine, the railroad, the telegraph, and the electric grid. But never has an infrastructure revolution been implemented as quickly and pervasively as the Internet, largely because the software catalyst driving the spread of the Internet rode on top of the existing physical infrastructures of the telecom and computing industries.

Confronted with such sudden changes, it is not surprising that many companies feel a compelling need to adapt, to respond to new threats, to explore new opportunities more aggressively, and to question old approaches more rigorously. In short, they feel an urgent need to become more innovative, without having a clear idea of how to pursue that goal.

### WHY INNOVATION IS HARD TO MANAGE

**Y**ou can attack efficiency and quality with methodical discipline. You can measure progress with reasonable accuracy and calibrate your relative position by benchmarking against competitors. You can set clear goals for efficiency and quality initiatives and reward those who help achieve them. These efforts are not easy, by any means, but they are “manageable” in the literal sense. The techniques are learnable and repeatable. The trail from decisions to actions to results is visible. Both the costs and the benefits are tangible and quantifiable.

Innovation is different. It defies objective measurement and resists methodical discipline. It doesn't respond to command-and-control directives from the top. Innovation is messy and unpredictable. To find and leverage a winning idea, you may have to explore hundreds of losing ideas, with no guarantee that you'll even recognize the winner when it's right in front of you. In fact, many

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**Many innovations appear in retrospect to be almost accidental achievements or opportunistic responses rather than the result of conscious, deliberate management.**

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innovations appear in retrospect to be almost accidental achievements or opportunistic responses rather than the result of conscious, deliberate management.

And yet, some organizations are clearly more innovative than others. In an effort to understand how innovation really works and what it looks like through the eyes of the key players within an organization, a group of IFTF researchers conducted in-depth case study interviews at a number of organizations struggling with the issue at the height of the Internet bubble in 2000. We found that innovation in a corporate environment is best understood as a product of the same three forces that drive the evolution of most complex adaptive systems: variation, selection, and replication and retention. From these studies, we devised a framework for understanding these three forces in the context of the most common organizational structures used by companies today.

### Variation

In biology, variation is a divergence in an organism from the characteristics of the larger population. Thousands of random variations may be generated, but only a few will actually improve the organism's chance of survival, and thus the variation's chance of being passed on to the next generation.

Variation in business is the process by which new, innovative ideas are generated. Some different-thinking individual asks the question “What if?” and follows a path no one has thought of before, and either finds gold at the end of the rainbow or a new path to explore. Some innovations are minor variations on existing practices, while others challenge the status quo and explore new, unfamiliar territory.

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**“The formal organization sends mixed messages. On the one hand, there is a lot of talk about the need to focus in order to win, about the need to eliminate waste and redundancy, and to move quickly. But this is in direct conflict with the way innovation happens. Innovations are ‘distractions’ to the focused organization.”**

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To be effective, variation needs to be somewhat random and uncontrolled. As in nature, most business variations fail because in the end they don’t improve the relative fitness of the organization. Though many have tried, it is impossible to create a process that generates only successful variations. Failure, in fact, is a key part of the process. Each failure generates a slew of other variations, of other new paths, any one of which may lead to the next big innovation.

In business, the innovator is the key player in the variation process, looking for new ideas in strange places or making insightful connections between seemingly unrelated, previously unconnected ideas. True innovators are relatively rare, and they cannot be identified by their job titles or academic degrees.

### **Selection**

In biology, selection is the process by which some organisms die while others survive—and thereby gain the opportunity to propagate. Businesses also need a way to separate winners from losers so that organizational attention and resources can be focused on the most prom-

ising ideas. In nature, simple “survival of the fittest” is the most basic form of selection, but in the world of business, most innovations have to pass through a more deliberate gatekeeping process that tries to determine the right balance of organizational objectives, resource availability, and the likelihood of success.

Managers who control the discretionary resources and priorities of the organization are the likely gatekeepers, although the approach may vary dramatically in different types of organizations and business ecologies. Command-and-control cultures, for example, may choose to exert strong selection pressure, ruthlessly eliminating even minor variations in the name of efficiency, focus, and “best-in-class” solutions. Other cultures may prefer weak selection pressure, tolerating significant variation and internal competition in the name of local autonomy, flexibility, and responsiveness.

### **Replication and Retention**

In nature, a selected variation is replicated, or retained, when it is passed on to the next generation. In business, an innovation is retained when others adopt it. The most successful innovations spread quickly through the environment, gaining widespread acceptance and often displacing older practices or products that no longer contribute to the fitness of the organization. This process of replication and retention is what produces significant business results and sometimes redirects the evolutionary path of the entire business by introducing a blockbuster product or transforming a critical process.

But even the most promising innovations do not always succeed in establishing a sustainable position within their business. Innovations may encounter resistance from those who do not want to change or competition from those who have a different change in mind. In a volatile environment, an innovation may simply fade away because there are too many other innovations competing for the scarce attention of its target audience. Change agents play the key role in managing the diffusion process by removing barriers and actively promoting acceptance of the best ideas.

### A Framework for Business Innovation

Although all three forces are needed for successful business innovation, they can operate in very different ways in different organizational structures. There is no single answer for how to manage the interplay of these forces, but there is much to be learned by looking at some of the different patterns that have emerged in the modern economy. In our case studies, we have found that at least three distinct organizational patterns coexist, and sometimes compete, within the current economy, each emphasizing a different aspect of the innovation process—variation, selection, or replication and retention. Table 27, on page 150, summarizes how the three forces for innovation play out in the different organizational structures.

All three structures can be successful. The key is to understand which one best fits the circumstances of your company, and then to consciously create an environment that effectively supports it.

### After the “Bubble”

The pursuit of innovation reached a fever pitch around the turn of the new century. In retrospect, it was another side effect of the Internet speculative bubble.

When your business environment is hit by an asteroid technology, it’s often difficult to separate the short-term impact effects from the long-term transformations. During the early years of Web-mania, for example, the rewards seemed to flow effortlessly and overwhelmingly to innovators and would-be innovators. Well-established companies found themselves besieged by new entrants who could print their own money and use it to hire the best talent, to buy market share, or to acquire competitors. The conventional wisdom about first-mover advantage encouraged reckless expansion and overextension. The perceived need to “move at Internet speed” strained conventional organizational structures to the limit.

Looking back, we can see that many of the people interviewed for our case studies were overreacting, trying too hard, and ignoring the downside risks of innovation.

Some of the once-proud mavericks, who scoffed at their more cautious colleagues, turned out to be loose cannons. The high-tech company that took partial payment in stock for equipment sold to Internet start-ups wound up with large paper losses, while its “innovative” financial executive left in disgrace. The business-to-consumer Web site spun off by a traditional publishing company crashed into bankruptcy after burning its way through

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**“Innovations just sit there if you don’t have someone ‘moving the baby along’ and ‘fighting the bureaucracy’ along the way.”**

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\$200 million of funding. The engineer who left a career at a large computer company to join a high-flying start-up lost all of his stock options, most of his savings, and his job when the start-up went out of business.

Such cautionary tales abound after the bursting of the high-tech stock bubble. By the end of 2000, Michael Schrage was writing about an “innovation glut” in *Fortune*. “Innovation for the sake of innovation isn’t a core competence or even a key to competitiveness these days; it’s an indulgence. After the glut, there’s a new innovator’s dilemma: It’s the challenge of finding a balance between a culture that promotes innovation and one that builds a sustainable business.”

In spite of this much-needed reality check, it would be a mistake for large companies to conclude that innovation is becoming less important. The dust from the initial impact of the Internet revolution has settled and the extraordinary distortions of valuation that seemed so threatening a year or two ago have been largely corrected, but the more fundamental changes in the patterns of internal and external connectivity and interaction brought on by the Internet revolution are irreversible. The business and economic drivers gaining strength from the new information infrastructure will continue to challenge companies for at least the next decade.

Table 27  
Business Innovation Framework

	<i>Entrepreneurial Start-Ups</i>	<i>Large Hierarchical Organizations</i>	<i>Networked Organizations</i>
<i>Organizational characteristics</i>	Small, focused, fast-moving companies with external funding and no legacy environment to support or protect. Speed and innovation are key.	Large, complex companies funded by returns from established businesses. There are large legacy investments to protect. Process discipline and efficiency are key.	Large, decentralized companies or extended enterprises with a web of complex external relationships to provide resources. Flexibility is key.
<i>Typical industries</i>	Biotech, software, and e-business.	Manufacturing, transportation, and distribution.	Computers, pharmaceuticals, and financial services.
<i>Variation</i>	<b>Main Focus</b> Key players are the innovators, inventors, and developers with a new idea and a passionate commitment to making it work. High risk/high reward.	Often hard to generate variation internally due to the efficiency bias of large companies. Need to create protected spaces for innovators or need to buy innovations from external sources. Bureaucracy smothers variation.	Freedom to experiment creates lots of local variation, but also confusion, redundancy, and inconsistency. Internal competition is widespread. There are more ideas than it's possible to implement effectively.
<i>Selection</i>	Often controlled by venture capitalists and other funding sources. Multiple rounds with incremental commitments. High failure rate (80%) accepted, but still important to identify failures early.	<b>Main Focus</b> Selection is usually formal, visible, and closely controlled. Significant resources are deployed to support winners, so relatively high success rate is expected.	Reluctant to exercise central management control. Lower-level managers act as gatekeepers, providing critical resources to nurture potential winners. Competing alternatives are tolerated.
<i>Replication</i>	Without established brands or channels, it is critical for these companies to compete creatively and aggressively for market attention and acceptance (or to sell out to established players) before the money runs out.	Enjoys management backing, financial resources, and leverage of existing brands and channels. With so much committed, failure can be slow and expensive (and embarrassing).	<b>Main Focus</b> Innovations are expected to compete for attention and resources in the internal and the external marketplaces. Success depends on committed change agents and champions.
<i>Key issues</i>	<ul style="list-style-type: none"> <li>• Attract top talent.</li> <li>• Reduce time to market.</li> <li>• Build market share.</li> <li>• Attract investment funds.</li> <li>• Find paying customers.</li> </ul>	<ul style="list-style-type: none"> <li>• Protect innovators.</li> <li>• Accept risk and failure.</li> <li>• Cultivate external relationships.</li> <li>• Manage internal and external people flows.</li> </ul>	<ul style="list-style-type: none"> <li>• Protect slack time and resources.</li> <li>• Limit damaging competition.</li> <li>• Establish short feedback loops for rapid learning.</li> <li>• Exploit winners and kill losers quickly.</li> </ul>

Source: Institute for the Future

In fact, we are still in the early stages of adapting our organizational structures, management practices, and business models to the new information infrastructure. Those companies that can nurture innovation while maintaining a sustainable business model will thrive. Those that pursue innovation at any price and those that erect barriers to change while waiting steadfastly for a return to “normalcy” will put themselves at risk.

### NURTURING INNOVATION

**H**ow can large companies do a better job of nurturing innovation? There is no magic formula, no right organizational structure, and no ten-step implementation plan. Innovation is a living system, not an engineered process, and traditional management practices, which emphasize predictability and control, may do more harm than good. Perhaps the best thing management can do under these circumstances is to cultivate the right environment for the living system rather than try to micromanage the fate of specific innovation efforts.

To this end, companies are likely to find some of the following approaches helpful, if not mandatory: finding the balance between exploration and exploitation, shaking up the patterns of interaction within the culture, and sheltering innovations in the early phases, then transplanting them into the company at large.

#### Finding the Right Balance Between Exploration and Exploitation

Most large companies are necessarily focused on running the business efficiently and profitably, on exploiting existing opportunities rather than exploring new ones. While paying lip service to the importance of exploration and innovation, the values that matter most to such companies are discipline, consistency, reliability, and the elimination of waste and duplication. But even big companies need real innovation to stay successful, and real innovation needs variety, experimentation, trial and error, and an opportunity to fail. Innovation needs spaces that are sheltered from the operational monoculture of big companies, without being completely isolated.

How does a company protect exploration activities without compromising operational excellence? Semi-autonomous R&D labs, with protected resources and a portfolio approach to managing risk by spreading it across multiple projects, are traditional solutions in many large companies, and can often be effective. In today’s environment, however, such efforts need to be

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**“No one openly resists changes, but large organizations can always find reasons not to act quickly enough or not to go far enough.”**

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supplemented by groups chartered to explore process innovation in addition to product innovation, since many of the adaptations to the new information infrastructure will require a fundamental rethinking of traditional business processes.

Decentralization and the creation of small business units can effectively stimulate variety as well, but better mechanisms are needed to weed out unnecessary or dysfunctional variations. Some companies are experimenting with internal “venture capital” processes, whereby innovators are encouraged to compete publicly for resources by pitching their ideas to a group of management gatekeepers who have discretionary resources at their disposal. These efforts are designed to encourage and support local innovations, while also making such innovations more visible and more subject to explicit gatekeeping decisions.

Partnering with, investing in, or acquiring outside firms more focused on innovation are other ways of compensating for a strong internal imbalance, but these steps require careful attention to the process of transferring intellectual capital into the mainstream of the organization. Again, the key is to balance the freedom and chaos of true innovation with the focus and discipline of product development.

### Changing the Patterns of Interaction

One of the most effective ways to stimulate variety and to encourage innovation is to orchestrate frequent collisions between people with different skills, experiences, and perspectives—the organizational equivalent of biological recombination. This can be done passively by creating inviting physical spaces (like cafeterias, court-

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**One way to stimulate variety and to encourage innovation is to orchestrate frequent collisions between people with different skills, experiences, and perspectives.**

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yards, and corridors) that make such collisions unavoidable. It can be done actively by deliberately organizing job rotation schemes and formal mentoring (and reverse-mentoring) programs. Such efforts are likely to involve the routine use of cross-functional teams and the support of social networks and communities of practice that may not be visible on an org chart.

These are all ways of investing in a company's social capital. The problem is that the returns on this type of investment are rarely measurable or even visible, so the investments usually are hard to justify. That's why travel, off-site meetings, and social events are often the first things to go when times get tough, as they are surely getting now, even though such cutbacks may smother the sparks of innovation just when they are most critically needed.

It's also important that the innovators be recognized and rewarded, and not just with money. Based on our interviews with ground-level innovators, to be effective, such rewards should have as much to do with peer interaction and recognition, with genuinely informed feedback, and, most of all, with the opportunity to make a visible difference by having an impact on the success of the organization.

### Sheltering, Then Transplanting, Innovations

Managing the level of selection pressure within an organization is a delicate balancing act. New ideas and immature innovations need to be sheltered from the full rigor of internal and external competitive pressure during their early stages to provide ample room for experimentation and exploration. Shelter can take many forms, such as protected budgets, organizational autonomy, flexible schedules, exemption from established standards and procedures, and even physical isolation. But if the innovations are sheltered too much or too long, they won't be forced to adapt, so eventually they need to be exposed to harsher selection pressures and transplanted into the organizational mainstream.

Large companies often have the luxury of subsidizing a new business and giving it privileged access to established brand equity, but successful transplanting may also require the careful use of human capital. Moving committed people along with their innovation as it goes from experiment to pilot to full implementation is a way of ensuring strong advocacy at every stage. Still, as venture capitalists learned long ago, it is often necessary to force a change in leadership at the transplant stage, since the skills required for broad implementation are so different from the skills needed at earlier stages.

### LOOKING AHEAD

**A**fter the roller-coaster ride of the last decade, what course will the pursuit of innovation take in the next decade? Some things are becoming clear.

- *Innovators will be held accountable for results.* Risk has resumed its normal place in the business equation, restoring some semblance of reason to the incredible valuation distortions that prevailed during the height of the Internet bubble. Having been burned once, this generation of investors is not likely to be so “irrationally exuberant” again, so the availability of venture capital will

return to pre-bubble norms, and innovators will likely be held more accountable for results rather than reap extravagant rewards for untested ideas.

- *Large companies must find a better balance between exploration and exploitation.* While the panic-driven responses to disruptive change will continue receding, the business opportunities created by lasting changes in infrastructure will continue rewarding aggressive exploration strategies for many years to come. Companies that create an operational monoculture in the name of efficiency will be particularly vulnerable. Companies that can nurture their innovations in the early stages and transplant them at the appropriate time will do better.

- *It's more important to be the best learner than to be the first mover.* One of the things that was supposed to make the “new economy” new was the power of network effects and the theoretical advantage these effects gave to first movers. But once everyone caught on and tried to play the same game, first-mover advantage became a rationale for suicidal business strategies that sacrificed profits, and even revenue, for market share and mind share. It now appears that the real advantage goes not to the first mover but to those who learn how to adapt quickly by means of observation, experimentation, simulation, market research, and a variety of other learning and feedback mechanisms. The successfully innovative company will have these mechanisms in place.

- *Power will shift to the customer.* The frantic jockeying for competitive advantage should not obscure a more fundamental change going on. As business becomes more globally competitive, markets more transparent, and information more accessible, customers are the ultimate beneficiaries. Companies that try to use innovation only to gain competitive advantage or to “manage” customers more effectively may find the new landscape increasingly hostile. Successful adaptation will require companies to give up some traditional notions of control by supporting innovations that help customers exercise their newfound power. It's an uncomfortable change for many companies to make, but unavoidable.

- *The biggest opportunities for innovation may be inside the company.* The first wave of innovation was all about e-business models of every imaginable sort. “If we don't do it, somebody else will beat us to it” was often the most compelling business case. But, for large companies in particular, the greatest opportunity presented by the Internet revolution is to fundamentally restructure the organization itself, streamlining internal processes, cutting costs, and changing the way people communicate both inside and outside the boundaries of the firm. Organizational and process innovation will become increasingly important as a source of competitive advantage.

—Chuck Sieloff



## Doing Well by Doing Good: Corporations Respond to Activist Consumers

*In the last few years, widely publicized protests have been aimed at international organizations that conduct and support the current system of global trade. From the World Trade Organization (WTO) meeting in Seattle in late 1999 to the meeting of the G8 nations in Genoa, Italy, in 2001, thousands of people with a variety of causes have turned up in protest.*

*Although the protesters are small in number, and their roles as consumers play only a part in their agendas, they are the more vocal subset of a much larger group of consumers who are acting more often on their social and environmental values these days—even when making purchases. In response to this growing cadre of what we can call “activist consumers,” multinational corporations increasingly will need to engage in socially and environmentally responsible business practices. Otherwise, they risk alienating a significant portion of their customers in the next decade.*

### THE PROTESTS AND THE ISSUES

The series of protests in the past four years aimed at international government, finance, and trade organizations has called into question the current state of globalization. Protesters argue that the benefits and burdens of globalization are not being shared equitably around the world. Indeed, nonviolent protestors have marched on streets, endured tear gas, and been arrested because they believe that the current world order is one in which inequality rises out of a free-trade system that protects corporate profit in a way that harms the public interest.

At issue are income inequality within and between nations, debt relief for the world’s poorest nations, and the apparent disregard by many multinationals for internationally accepted human rights protocols, to name just a few points. Many issues are directly related to the practices of multinational corporations, including labor and environmental issues, and the role of corporations in globalization (see Table 28). Without some attention to these issues, the groundswell of protest threatens the smooth expansion of global and local economies.

What can multinational corporations do to allay the fears of the protesters? The good news is that they have ample experience responding to such public cries for

change. Because of similar protests in the recent past, many multinational corporations already have learned how to change their business practices to meet the values of their customers. And those that haven’t been called on to do so yet can turn to these exemplars for best practices.

### PAST CORPORATE RESPONSES TO PROTEST

In the past 20 years, we have seen multinational corporations adopt socially responsible manufacturing and sourcing strategies in response to international and societal pressures. Perhaps one of the most notable instances was in the 1980s, when corporations began to adhere to the Sullivan Principles, which encouraged U.S. corporate divestment from South Africa because of international political pressures against apartheid. Such corporate sanctions weakened the South African economy and supported internal dissent. By 1991, the South African government moved relatively peacefully to create a more open political system, and apartheid was lifted.

As for individual companies, Gap, a major U.S. apparel manufacturer, was one of the first to change policies due to social pressure. In 1995, Gap had become the focus of an increasingly vocal movement against so-called “sweatshop” labor in developing countries, including Cambodia, China, El Salvador, and Honduras. In response, Gap adopted a code of vendor conduct, which is now displayed in many of its retail outlets as well as on its corporate Web site ([www.gapinc.com](http://www.gapinc.com)). The code reflects Gap’s commitment to social values by enforcing fair wages and safe working conditions at all factories and subsidiaries that produce goods for Gap. After adopting the code in late 1995, in 1996 Gap recorded its fourth largest trading year, by volume, since the company’s IPO 20 years earlier. While sales growth had averaged about 14% per year since the early 1990s, after the adoption of the corporate code, sales increased 20% from the previous year.

Other corporations followed suit throughout the late 1990s, including shoemaker giants Nike and Adidas, and apparel manufacturers Levi Strauss and Van Heusen—after similar media coverage of subpar labor

*Table 28*  
*Globalization Issues Directly Related to Multinational Corporations*

Unfair labor and wage standards
General working conditions (e.g., health and safety, number of hours worked)
Environmental degradation and excess waste
Economic sustainability in the global south
Perceived corporate and cultural colonialism
Nation-state subservience to corporate interests

Source: Institute for the Future

conditions. Van Heusen, in fact, had been suffering average annual sales decreases of 6.5% since 1997, and was hit with a class-action suit in 2000 concerning labor conditions on Saipan. After settling the case and adopting independent human rights monitoring of its factories, Van Heusen enjoyed its first revenue increase and strongest sales in five years in 2001, even with global and U.S. economic slowdowns.

Similarly, by 2001, at least 157 universities affiliated themselves with the Fair Labor Association in response to student protests. These schools signed a code of conduct ensuring that their sports and university apparel is manufactured in socially responsible ways.

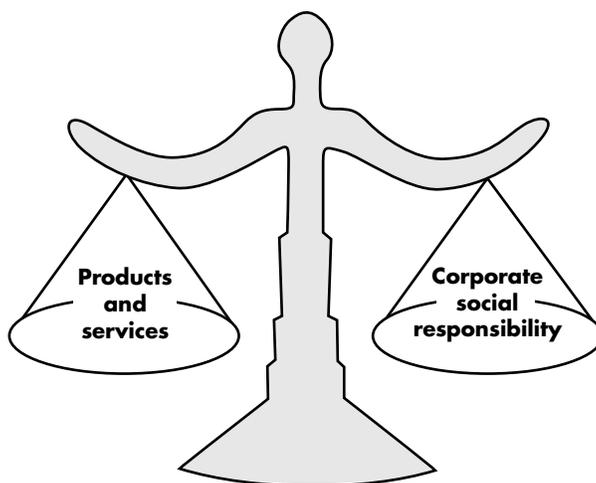
These are just a few examples of how corporations and other organizations have responded to public pressures in the past. Whereas these responses were initiated by organized and very public protest, companies in the future may find themselves having to respond to the more subtle cues of the individual activist consumer. Who are these activist consumers?

### ACTIVIST CONSUMERS

**M**ore consumers today are making purchasing decisions for some products and services based on their perception of the provider's social and environmental responsibility. These activist consumers are willing to act on their beliefs in the marketplace. They weigh information about the companies behind products and services against information about the social issues that matter most to them. This process informs the purchaser's ultimate decision to choose a new product, to discriminate between products, or to pay more for an alternative product (see Figure 67).

Activist consumers are hard to identify today, in part because they act alone—that is, they make an individual decision to make or not make a purchase, and they don't necessarily let the companies know what influenced that decision. In addition, for many of these consumers, corporate responsibility may play only a small role in the purchase of particular items. Determining how many consumers behave this way and how often is a complicated endeavor.

*Figure 67*  
*Balancing the Scale Between Products and Services*  
*and Corporate Social Responsibility*



Source: Institute for the Future

To get a sense of the extent of this type of consumer behavior, IFTF recently surveyed U.S. households on a variety of topics, including whether they were willing to spend more money on “responsible” food purchases. From these survey respondents, we have been able to identify a proxy for activist consumers. Based on responses to the survey, we define activist consumers as those who said that they are willing to spend significantly more (at least one dollar extra for a product that regularly costs two dollars) for a food product that was better for the environment than the one they would typically purchase. Three out of ten survey respondents fell into this category.

The 30% of the U.S. population who said they would pay more for more responsibly produced food have other traits in common as well: they are more likely to be new consumers, to be sophisticated adopters of information technology, and to use multiple sources of information when making important decisions (see Table 29). As sophisticated users of information, these activist consumers will be turning to socially responsible corporations they can trust over the next decade.

### Information Is the Key to Decision Making for Activist Consumers

Most people base purchasing decisions, especially for everyday items like food, on the product’s basic characteristics—price, quality, or taste, for instance. However, if presented with new information—for example, the fact that the manufacturing process is harmful to the environment—some consumers will add that piece of information to their decision-making process. In a recent round of focus groups, we asked consumers what they would do if they found out from a trusted source that their favorite cereal is good for their health but also is manufactured in a way that is harmful to the environment. Many consumers were reluctant to keep using a product that is in conflict with their environmental values.

*You could probably find something else that was equally beneficial, that wasn’t harmful to the environment. ... If it [is] harming the environment, that’s going to harm my health too, as well as everyone else’s.*

—Young Hispanic female

*Table 29  
Characteristics of Activist Consumers  
(Percent of group having the following characteristics)*

	<i>Activist Consumers</i>	<i>Total Population</i>
Has regular access to Internet (at least once per week)	61	55
Is a new consumer*	51	46
Uses five or more information sources (when making a major health decision or purchase)	47	38

\*New consumers are defined as having at least some college education, at least \$50,000 in household income, and owning a PC.

Source: Institute for the Future, Household Survey, 2001.

Another consumer noted that substitution of products would make it easier to purchase products based on environmental concerns.

*Well, if there are other choices available, then leave this controversial [food] aside and move on—I cannot live with [harming the environment].*

—Young Asian male

### Age May Make a Difference

Our survey found that nearly one-third of the total population is willing to pay more for a food product that is better for the environment. However, the rate of positive response was much higher among younger people. The survey found that 40% of consumers ages 18 to 24 are willing to pay more for such products (see Figure 68).

These younger people today are more likely to make purchasing decisions based on environmental responsibility, perhaps because they have grown up with access to more information in general (through the Internet and cable TV, among other sources)—which is the key to making such decisions—and more environmental information in particular. While attitudes and behaviors often change with life stage (e.g., marriage, having children, or retirement), it is likely that this generation will continue to base some of its purchases not only on environmental responsibility but also on other forms of corporate responsibility, such as fair working conditions or other reasonable labor standards.

### Other Indicators of Activist Consumers

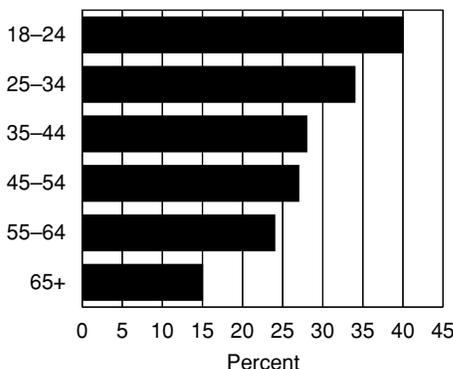
Other surveys have identified additional indicators of the presence of activist consumers in the marketplace. For example, a 1999 survey conducted by Environics International indicated that more than one in three (35%) in the world’s population—based on a representative sample of 25,000 citizens of 23 countries on six continents—believe that the social role of large companies is to set higher ethical standards and to help build better societies rather than just to make a profit, pay taxes,

and create jobs (Millennium Poll on Corporate Social Responsibility). In addition, this globally representative poll found that more than 20% of the world’s consumers indicated that they have already rewarded or punished a company based on perceived corporate social performance, and another 20% have at least considered doing so. Another survey, conducted in Europe by the Future Foundation, found that nearly 75% of respondents are willing to pay a small premium for products from a company they feel contributes to the greater good of society (see Figure 69 on page 160).

### Activist Consumers Not Just Willing but Also Able to Pay More

The problem with our proxy and some of these other indicators is that consumers are reporting what they are willing to do. We don’t have as much information on what consumers actually do when it comes to acting on their beliefs about corporate responsibility. Can these consumers afford to make such decisions? Do they have the means to pay for products and services that are produced or delivered in more responsible ways, but generally cost more? Are they doing so already?

Figure 68  
More, Younger Activist Consumers  
(Percent of age group that is “activist consumer”)



Source: Institute for the Future, Household Survey, 2001.

To examine Americans' abilities to purchase more expensive versions of similar products, we looked at trends in personal disposable income and, more closely, in personal consumption expenditures. Since 1970, real personal disposable income has been rising at approximately 2.1% per year in the United States, while real personal consumption expenditures have been rising at approximately 2.5% per year (see Figure 70). Over the next decade, we expect disposable income to continue to grow at a rate similar to the long-term trend and consumer expenditures to grow slightly faster than in the last decade. Consequently, by 2010, growing numbers of consumers will have discretionary funds to buy products or services made or delivered in socially or environmentally responsible ways.

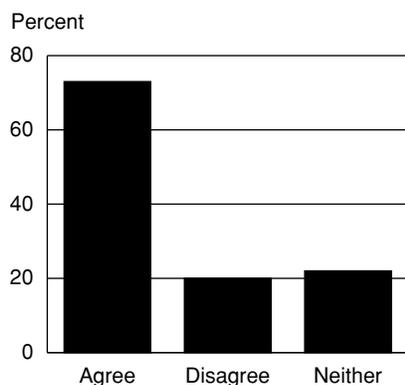
With higher levels of income and spending, consumers will be not only willing to spend more money on products that are socially responsible but also be able to do so. Already today, when given the chance, consumers are stepping up to pay more for socially responsible products. Over the last decade, U.S. sales of organic foods

have been increasing approximately 20% each year, to \$5.8 billion in 2000, and the *Nutrition Business Journal* forecasts sustained double-digit growth over the next decade as consumers continue to pay a premium for foods they see as environmentally friendlier. In Germany, a provider of green power attracted 40,000 households within 12 months of throwing the switch, even though it was charging a 20% premium.

### Activist Consumers Investing Responsibly

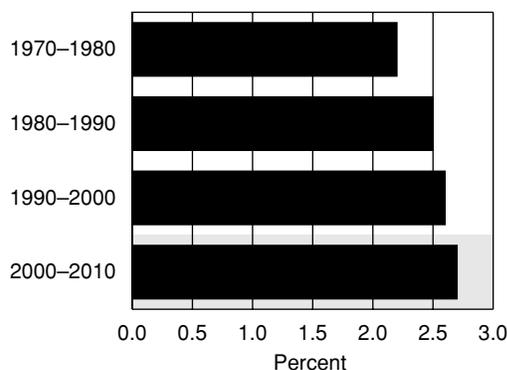
Some consumers are putting their money where their values are in another significant way—by making socially and environmentally responsible investments. In fact, the Social Investment Forum reports that socially responsible investors were the fastest growing group of U.S. investors between 1997 and 1999, with \$2.16 trillion in funds screened for social concerns in 1999. Nearly four-fifths of these were specifically channeled to firms that don't harm the environment. This total was equivalent to one out of every eight dollars invested.

**Figure 69**  
*Financial Support for Responsible Businesses*  
(Percent of respondents who say they would be willing to pay a little more for products from socially responsible companies)



Source: The Future Foundation/BT, 2000.

**Figure 70**  
*Personal Consumption Expenditures Rise to Highest Annual Levels*  
(Average annual percent change in personal consumption expenditures per capita)



Source: Institute for the Future; data derived from *Economic Report of the President*, 2000.

Because such investments are performing well, socially responsible investing is likely to grow over the next decade. Indeed, the Dow Jones, in collaboration with the Sustainability Asset Management group, created the first Dow Jones Sustainability Group Index (DJSGI) to track the performance of sustainability leaders worldwide. The index includes the top 10% of the companies that lead their industries based on economic, environmental, and social criteria. In fiscal year 1990–2000, the DJSGI outperformed the S&P 500 by about 15%. Another index, KLD's Domini 400 Social Index, outperformed the S&P 500 during the financial losses of the summer of 2001. Whereas the S&P 500 shed 1% in July 2001, for example, the Domini 400 lost only 0.02%.

#### WHY SHOULD CORPORATIONS RESPOND?

**O**n the company side of the ledger, corporations are increasingly finding loyal customers—and making good profits—by acting in a socially responsible and environmentally sustainable manner. Ikea, the furniture firm, and Patagonia, a privately owned company specializing in sportswear, are examples of companies that have taken strong stands for social responsibility. Ikea emphasizes the importance of social and environmental responsibility in its catalog (see Figure 71 on page 162). These companies obviously see a resonance of social issues with their clientele.

The Body Shop—with all but one of its mission statement's principles dealing with protecting the environment, preserving human rights, and promoting social justice—is another company that has done well by doing good. Indeed, it has experienced tremendous growth, with more than 1,700 retail operations in place today. In 2000, sales topped \$1 billion for the first time in its history. Profit also increased by 29%, and earnings per share by 53%. In a recent Financial Times survey of corporate executives, The Body Shop was rated the 27th most respected company in the world.

#### CORPORATE RESPONSE IN THE FUTURE

**O**ur survey and others have found that anywhere from 20 to 75% of consumers take corporate responsibility into account when making purchasing decisions. This is a very large range. While the number of activist consumers is small today, should those people who say they would take action against a company follow through, the impact on companies would be significant.

With ever increasing channels of communication and the free flow of information around the world, it seems likely that some products and services will be exposed publicly as “irresponsible” and, thus, a negative light will shine on the companies that produce or provide them. In the future, companies will act to keep themselves out of the spotlight—or, at least, as Patagonia, Ikea, and The Body Shop have done, to keep their spotlight “green.”

Protests against international organizations like the World Bank, the WTO, and the G8 are aimed directly at these international organizations and the governments behind them. However, many of the protesters also hold the wider entity of international trade at fault for many of the problems of globalization. This in turn puts responsibility on the multinational corporations engaged in international trade, as well, for these problems. The protesters have managed to gain the popular media's attention. As protests continue over the next few years, more consumers will become familiar with the myriad issues the protesters raise. This could provide fodder for even more consumer actions toward companies in the future.

As a result, by 2010, in order to stay out of the negative spotlight, respond to consumer and shareholder desires, and attract and retain loyal customers, more companies will be engaged in responsible corporate activities. They will actively promote these efforts by performing some or all of the following:

Figure 71  
 IKEA Sells Corporate Responsibility



Source: Ikea

- *Adopting codes of conduct.* Already, hundreds of companies have begun to adopt their own corporate codes of conduct. Many have chosen to adopt the United Nations Global Compact ([www.unglobalcompact.org](http://www.unglobalcompact.org)), including BP Amoco, Volvo, Ericsson, and Unilever. The U.N. Global Compact is built on a series of nine principles focused on human rights, labor, and the environment, intended for multinational corporations. The principles provide a direct opportunity for companies to demonstrate their levels of social responsibility voluntarily. Businesses that participate must post on the U.N. Web site their action steps and “good practices” on an annual basis. Expect more companies to adopt these principles and other codes of conduct and to be held publicly accountable for social responsibility in the future.

- *Increasing numbers of socially responsible products, services, and companies.* To attract and retain activist consumers, companies will increasingly promote the responsibility of their products and services, as well as their overall corporate efforts. Expect a growing number of companies to publicize their meetings with non-governmental organizations or activist groups, to write about social responsibility in their annual reports, and to create director- or vice president-level positions for human rights monitoring, labor standards, and ethics.

- *Embracing socially responsible investing.* Expect an increase in the number of individual and institutional investors putting money into socially responsible funds.

Consequently, corporations are going to change their practices to qualify for inclusion in those funds. For example, an independent rater of corporate social responsibility, KLD, removed Wal-Mart from the Domini 400 Social Index last year because of Wal-Mart’s vendor contracting policies and refusal to adopt independent human rights monitoring of its factories.

- *Responding to shareholder concerns.* A growing number of socially responsible proposals is being taken to shareholder meetings, and an increasing number is garnering at least 10% support. According to the Investor Responsibility Research Center, in the first six months of 2001, about one-quarter (27%) of socially responsible proposals garnered at least 10% of shareholder votes, compared to only 16% in 2000.

#### RESPONSIBLE COMPANIES SET THEMSELVES APART

Social and environmental responsibility will be another way for global corporations to compete with one another and to set themselves apart by 2010. Engaging in positive efforts in the areas of human rights, labor, and the environment will be an important component in the way companies attract and retain loyal customers. Activist consumers will act as the judges of this competition, and by their choices they will push corporations to conduct business in a more socially and environmentally responsible manner.

—Mark Massoud



## Strategies for Troubled Times

*Each year in the Ten-Year Forecast, we highlight company strategies that can be held up as models for others. This year, the examples are a little different—these strategies come from companies that succeeded as the world fell apart around them, with the bursting of the high-tech bubble, the sharp decrease in business investment, and the simultaneous decline of the world’s three biggest engines of growth—Germany, Japan, and the United States.*

*Despite the economic turmoil, some companies prevailed, because of well-grounded strategies and their sound implementation. The strategies of these hardier, more recession-resistant companies meet two criteria—first, as always, they take into account the underlying trends touched on in the Ten-Year Forecast; second, they are robust enough both to fare well in troubled times and to fuel the company’s longer-term growth. We have identified six companies that meet these criteria (see Table 30).*

*Table 30  
Six Companies with Recession-Resistant Strategies*

eBay	United States	A technology solution for expanding consumer choice
AOL Time Warner	United States	A new-style media megacompany reaching customers through multiple channels
Tesco	United Kingdom	A grocer smart enough to enter the Internet-connected global marketplace without risking the whole company
Target	United States	An upscale discounter that flourishes in troubled times by offering quality and value
GlaxoSmithKline	United Kingdom	A large drug manufacturer with global reach; a huge R&D operation creating its own drugs; joint ventures and licenses with smaller start-ups filling in the gaps; and a world-class distribution system moving the drugs around the world
IBM	United States	A traditional R&D leader that has learned new ways of doing business in the ever changing R&D world where companies innovate or fade away

Source: Institute for the Future

## I. EBAY

The world's most popular e-commerce site, eBay, is an Internet platform that offers online auctions for consumers to exchange goods. Buyers and sellers get together in a single forum to broker transactions, while eBay takes a percentage of the final price and charges fees for a variety of services it provides to sellers.

Users have come to trust eBay because the site sets clear rules about what can be listed and how the auction takes place. What's more, to ensure the security of transactions, it bans both buyers and sellers who abuse the system from future participation.

Most eBay transactions take place by auction, with sellers listing an item and its asking price and buyers bidding for it online. Recently, eBay's purview has expanded to include unsold or returned goods from large retailers. What's more, eBay is highly user-friendly, offering easy-to-locate categories of goods where buyers can find everything from Beanie Babies and other collectibles to fine art and vintage cars.

The site currently offers millions of items for sale and has more registered users than Amazon and three times the amount of business, with total sales likely to be in the billions of dollars in 2002. Online auctions account for about 10% of all e-commerce spending today, and eBay accounts for 64% of that total.

### Recent Moves

By means of recent accords with key technology infrastructure players like AOL, IBM, and Microsoft, eBay has aggressively pursued opportunities for growth and expansion. It offers a secure payment system in partnership with Wells Fargo, through a new e-check system. It has made key marketing alliances with big name brands, such as McDonald's, General Motors, Disney, and Starbucks. The company continues to enter international markets, with specific ventures in Austria, Italy, Japan

(with NEC), Korea, Latin America (with new partner Mercado Libre), and Switzerland. In other markets, eBay has made purchases of innovative players like iBazaar, the leading online auction site in Europe, and the U.S.-based Half.com, which sells used goods at fixed prices—the latter is the third most popular e-commerce destination for consumers.

### Strategic Strengths for the Future

eBay's success is based on six fundamental strategic insights likely to endure:

- *Consumer-focus.* eBay focuses on the consumer market, the bulwark of economic growth in the United States.
- *The Internet.* As an online auction site, the company is built on the Internet, of course, where sales continue to grow more rapidly than elsewhere.
- *Low costs.* eBay has established a business model that requires no inventory or fulfillment, the most costly and complex of retail activities.
- *Simplified complex transactions.* The company has established an innovative business model that makes full use of the virtues of the Internet to make millions of individualized transactions highly efficient.
- *Diversification.* eBay is moving away from dependence on low-priced auctions to fixed-price formats. The company is also turning to higher-value-added goods like houses and cars, and increasing its sales in foreign markets, which make up 16% of total sales now.
- *New products.* Unlike most service organizations, eBay is spending a good amount, about 10% of its revenue, on developing new products like its payments systems and used-goods sites, well above the U.S. average of 3.5%.

## 2. AOL TIME WARNER

The result of a series of megamergers, AOL Time Warner is a unique blend of traditional and online media channels. Indeed, the company's activities cover just about every channel you can imagine, including a large magazine base (*Fortune*, *People*, and *Time*); Turner's cable TV and professional sports franchises; Warner's movies, network TV, music business (including Atlantic, Elektra, and Warner Bros. Records), and book publishing interests (including Warner Books and Little, Brown and Company); and, of course, America Online, the world's largest Internet service provider and portal.

An important reason for AOL Time Warner's success is that it generates revenue from a range of businesses and sectors, from entertainment content to subscriptions and advertising. About half of its revenues derive from subscriptions (from a diverse set of markets, including online giant AOL, cable operations, and a stable of popular magazines); another quarter comes from content (e.g., books, movies, TV programming, and music); and the remaining quarter from advertising.

### Recent Moves

AOL Time Warner's revenue stream is doing well. Specifically, AOL's reliance on subscription income paid off during the 2001 recession; subscriptions continued to grow despite the tremendous drop in advertising revenues that year. This can be attributed to the fact that the growth of the core AOL subscriber base continues apace; a year ago it was 24 million, and today it stands at around 31 million. Ad and subscription revenues are also solid, up 13% from a year ago, despite the downturn in the online ad market. As AOL fights the threat of Microsoft's MSN service, it continues to give promotional free time to potential new subscribers. In fact, the

7 million increase in new subscribers is equivalent to the total number of MSN members altogether.

To keep growth on track, AOL Time Warner is moving its subscribers into higher-cost broadband services—like high-speed Internet connections and digital cable subscriptions. Even if there is some falloff in magazine subscriptions, AOL Time Warner is likely to show good performance through the slow economic times.

### Strategic Strengths for the Future

AOL Time Warner has four key strengths:

- *Solid income growth.* The company's revenue stream is well diversified across both new media and old—magazines and books, music and movies, cable channels and networks, and the world's largest and fastest growing Internet portal.
- *Solid subscriptions.* While subscriptions remain the basis of its national magazines like *People*, *Sports Illustrated*, and *Time*, the real growth in subscription income is in cable TV and online access. What's more, the movement into broadband services will be a rapidly growing source of income in the years to come.
- *Cross-selling.* The biggest opportunity for the combined company is its ability to leverage multichannel opportunities. The company is beginning to give discounts to online users who subscribe to *Time* or *People*, for example, and is selling online services to viewers of CNN. In addition, AOL's online services will be offered on Time Warner cable lines.
- *International growth.* AOL International (including AOL Europe and AOL Latin America), the company's fastest growing division, is currently up to 6.6 million members.

### 3. TESCO

With total revenues of about \$30 billion, Tesco is the largest grocery retailer in the United Kingdom and is now expanding into new product areas and other major markets around the world. A strong push to understand and respond to the consumer has driven Tesco's most recent success. The company has also developed strong relationships with suppliers, with which it controls the quality and supply of its key products. Because the company sells many of its own branded products, Tesco is a strong brand name that has earned great loyalty from its customers. The store also offers innovative new products—it was one of the first grocers to offer discount gasoline to its shoppers, for example, and full banking services under its own name.

#### Recent Moves

Tesco moved into the online grocery delivery market early, but it did so slowly and carefully. In this way, it ended up carving out a unique and valuable niche. Where many high fliers failed, Tesco's prudent strategies have made it the world's largest and most successful online grocer.

Tesco started a very modest experiment in online grocery delivery in 1996 by setting up a single store to take grocery orders by phone, fax, and Internet. It took until 1999 before the service was expanded to 100 stores. But the basic model stayed the same—orders came to the local store, items were picked from the shelf during the quietest time of day, and local deliveries were made. This helped bring traffic into local stores and made it inexpensive and easy to increase scale without large capital expenditures. Tesco's online service now covers 90% of the United Kingdom's population, sells \$450 million worth of groceries online per year, and shows an operating margin of 5%.

Tesco is also expanding its international operations—primarily in Eastern Europe and Asia, where it plans to start an online service in Korea, the country with

the world's largest penetration of residential broadband. As a result, in two years Tesco will control more market territory abroad than in the United Kingdom.

Another of Tesco's strengths is its environmental leadership. Recently, the company announced that it will recycle cucumber plants—a tough and fibrous plant that doesn't break down easily—into chipboard to be used in furniture and wallboards. “We will soon be growing our own furniture. It's the ultimate form of recycling,” said David Collins of Tesco.

#### Strategic Strengths for the Future

Tesco has several enduring strengths:

- *Consumers come first.* Tesco has worked to keep the consumer at the forefront of each initiative. Indeed, the company goes out of its way to start up a program that consumers seem to want—such as online grocery shopping—even if it doesn't make much business sense at first.
- *Always innovating, but carefully.* Tesco is always innovating—the store has a bank and an online grocery function, it sells gasoline, and it makes cucumber remnants into furniture. Indeed, its customers have come to expect such innovations. But it never goes too far, where an innovation can cost the company if it fails. This approach gives the grocer the cachet of an innovator, but the safety of strategic retreat if the innovation doesn't work out.
- *Keeping close to the core.* Tesco is a grocer. It will try new things, but the new things are always closely related to the store's core business. It placed gas pumps in its parking lots for the convenience of busy shoppers. It added banking services in the store, but only to make the store the key location of activity. All in all, the company has no desire to be anything but a retailer that meets its customers needs.

## 4. TARGET

A major discount store that sells more upscale merchandise than Wal-Mart or Kmart, Target offers the best retail products at affordable prices, using the slogan: “Expect more, pay less.” As a result, it has consistently performed better than other general retailers, and did especially well as the recession arrived. During troubled times, consumers look for value and quality; and Target, with its good prices for well-made goods with style and flair, meets that demand rather well.

### Recent Moves

Target has not strayed from its core interests during the economic slowdown. Rather, it has taken advantage of its position as the major discount chain that goes out of its way to attract upscale shoppers looking for value. To this end, the store offers exclusive designer products, its advertisements carry a flair for those with an interest in style, and it has wide aisles, clean stores, and centralized checkouts. Its most recent moves point to a continuation of this policy—that is, emphasizing value but packaging products and services that appeal to upscale consumers as well:

- Target announced an accord with Amazon to open a Target store online that could expand Amazon’s range of offerings in apparel, home furnishings, electronics, and jewelry and bring Target into the growing e-commerce market.
- Target started an energy savers program as energy prices rose. It now offers a range of energy-related prod-

ucts online to consumers, including such things as small wind turbines that can generate up to a thousand watts of power at winds as low as 7 mph for around \$2,000.

- Target was the first retailer in the United States to offer smart Visa cards—electronic payment cards with the capacity for making microchip payments. This innovative form of payment will allow greater convenience and make it easier to offer loyalty programs.

### Strategic Strengths for the Future

Target has done well, despite the recession. Or, rather, the store has a business model that is almost recession-proof, since all consumers look for value during troubled times. Three tenets of Target’s long-term strategy stand out:

- *Focus on value.* Target is a discount store that offers quality goods at low prices, which gives it a clear advantage among the major department store retailers. Its prices are slightly higher than Wal-Mart’s or Kmart’s, but its quality is better. At the same time, it definitely remains a discounter at its core.
- *Appeal to an upscale consumer.* Target does many of the little things necessary to attract the upscale consumer: it offers products with flair and style, clean stores, wide aisles, and easy checkout.
- *Be seen as an innovator.* Target is able to keep the pace of innovative products and services high with its new payment card and energy-savings departments, but it never pushes them so hard as to make them deal-breakers.

## 5. GLAXOSMITHKLINE

With the goal of becoming, in the words of its chairman Jean-Pierre Garnier, “the king of science,” GlaxoSmithKline (GSK) has become the world’s largest drug company by a series of megamergers. Based in the United Kingdom, it has global sales of \$26 billion and an annual research budget of \$4 billion. Its large scale allows the company to both develop and buy new drug research and to have the clout to distribute these products globally.

### Recent Moves

Glaxo Wellcome and SmithKline Beecham, themselves formed from mergers in the last decade, joined together in a \$195 billion merger in 2000 to form the world’s largest pharmaceutical manufacturing company. During the first year as the merged giant, GSK moved aggressively in three areas to enhance both its research and marketing strengths.

- *R&D investment.* GSK is spending \$4 billion a year on its own R&D, with 117 compounds currently in clinical trials. Fifty of these are new chemical entities, potentially the most profitable opportunities. GSK realizes that it will take years before these compounds become profitable products, however.
- *R&D joint ventures.* To fill in the gaps while waiting for its own research to come to fruition, GSK has signed on to approximately 200 joint ventures with firms in Europe, Japan, and the United States. The goal is to push the frontiers of new research in biotech. One example of these joint ventures is the recent \$50 million agreement with Cytokinetics of San Francisco to support research on enzymes that play essential roles in cell division. GSK hopes this will eventually help the company fill its biggest product gap, cancer drugs.

- *Marketing agreements.* GSK has signed some 20 agreements with other drug makers to market their products worldwide. The goal is to utilize GSK’s existing marketing infrastructure to get the best ideas on the market (and to pocket at least some of the profit from them while its own R&D pipeline grows). An example of this approach is the recent \$50 million accord with Corvas International to license a protein derived from hookworms that promises benefits in treating cardiovascular disease, GSK’s second major product gap.

### Strategic Strengths for the Future

GSK has four key strengths that will serve it well over the decade:

- *Health care expansion.* Health care is a prosperous and growing industry that will only get bigger as the baby boomers age in the rich industrial nations of the world.
- *R&D.* The large scale of GSK gives it the opportunity to run a huge basic research enterprise and to retain enough funds to carry out the necessary clinical trials on a wide range of products. It also has the resources to form a wide variety of joint ventures with small biotech firms in areas where they are otherwise weak.
- *Marketing clout.* GSK has the ability to bring to market any of the products it develops. In addition, it has enough funds to license new products from entrepreneurial firms; this wider portfolio will only enhance the productivity of GSK’s selling force, while allowing it to bid time for its own research to pay off.
- *Global reach.* GSK is a global player, combining large enterprises in the United Kingdom and the United States with very strong ties throughout Europe and in Japan and Asia. Its marketing clout covers all the markets of the rich consumer nations.

## 6. IBM

With \$80 billion in revenue, IBM remains one of the ten largest companies in the United States and the number one player in the computer world. Despite its size, it has moved with the times. While it continues to be the world's largest maker of computer equipment, it also has a huge software business and a large and growing service business, and it is carving out a niche in biotechnology, the most cutting-edge industry today.

### Recent Moves

IBM continues to diversify. It has almost equal emphasis on high-end computers, PCs, software, and computer services, and it generates about 60% of its revenue outside its largest single market, the United States.

As IBM plans for the future, it continues to run major research labs around the world. In addition, IBM has added a large program of joint ventures with start-up firms to bolster its own R&D activities. IBM currently has hundreds of such partnerships with small, innovative firms, to which it provides cash and technical assistance. IBM's deep pockets, technical expertise, and marketing clout make it an ideal partner for a start-up.

Biotech is one of IBM's major initiatives, undertaken to create new opportunities in growing market areas. IBM forecasts that a \$30 billion market for information technology will arise in the pharmaceutical and biotech industries in the next few years. This includes the burgeoning field of bioinformatics—the processing of information on the sequencing, structure, and function of

genes and proteins. In recent months, IBM has formed joint ventures or partnerships to bring its expertise in marketing and managing large information technology systems to innovative bioinformatics companies like Incyte, Lion Bioscience (Germany), MDS Proteomics, Nutec, and Structural Bioinformatics.

### Strategic Strengths for the Future

IBM has four critical strategic advantages that it uses well:

- *Size.* In an era where size is an advantage, IBM has more than most. It invests more in R&D than most other research-intensive companies, and it can use its marketing clout to bring ideas to the marketplace.
- *Global reach.* IBM is a world player; it continues to operate in all areas of the world and to set standards in many areas of operation like storage, security, and speed of access.
- *R&D.* IBM is a research leader in its own right, but the company has learned to reach out in order to channel the focus and excitement of new research in small entrepreneurial firms as well.
- *Innovation.* IBM has identified bioinformatics as a potential growth industry in the future and is building its own expertise and entering into a wave of partnerships and ventures to give itself a platform on which to build a critical role in that industry.

**CONCLUSION: THINK CONSUMER,  
THINK R&D, AND THINK GLOBAL MARKET**

It is not surprising that four of the recession-resistant companies we chose to highlight this year are consumer-oriented. Consumer spending did not cause the economic bust in the year 2000—business investment created a bubble economy and then ran when it burst. Companies that stuck by the consumer, in contrast—and provided good and innovative products and services—did well. AOL Time Warner, eBay, Target, and Tesco represent this core.

Still, basic research remained important despite the bursting high-tech bubble. Companies that found a role for technology in the consumer market, like eBay and Tesco, did particularly well, as did companies like GlaxoSmithKline and IBM that were able to leverage their advantages of scale in internal R&D with strategic

partnerships to fill in the gaps. These two companies made themselves available as the elder brothers of the R&D world, adopting their younger, smaller, more entrepreneurial counterparts, nurturing them with money and expertise, and then guiding them into the world marketplace in a mutually beneficial way.

In addition, IBM, GlaxoSmithKline, and Tesco have carved out huge roles in the expanding global market—at least half of their activities are now in foreign markets. This will stand them in good stead once the current recession ends, since the international markets will have the most room to grow.

In the end, these varied players all have one thing in common—they have been able to leverage their strengths to meet the complexities of the economic landscape, even as it was shifting beneath their feet. We wish you and your companies well in doing the same.

—Gregory Schmid



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