



INSTITUTE FOR THE FUTURE

2003

Ten-Year Forecast

2003

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Ten-Year Forecast

To Greg, our storyteller for 30 years

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About the ...

... BUSINESS HORIZONS PROGRAM

The Business Horizons Program is focused on the strategic planning needs of organizations worldwide. It offers an ongoing examination of the international and domestic business environment by looking at the most basic assumptions about future change—demographic, social, economic, political, technological, labor, and regulatory shifts—and identifies and evaluates key trends that are likely to have major impacts over the next decade.

Business Horizons offers an unparalleled opportunity for senior corporate planners and strategic thinkers to network with other Business Horizon colleagues from a broad range of industries, Institute for the Future researchers, and leading experts.

... INSTITUTE FOR THE FUTURE

Located in the heart of Silicon Valley, the Institute for the Future (ITF) is a not-for-profit research organization with over 30 years of experience in long-term data-based forecasting. ITF identifies future trends and key discontinuities that will transform the marketplace. We provide key foresights and guide our members in drawing insights as input to their strategy, as well as possible action steps. Through the exploration of possible futures, we help companies, government agencies, and private foundations make better decisions in today's uncertain world.

Table of Contents

| | |
|--|------------|
| INTRODUCTION | VII |
| KEY FORECASTS OF THE BUSINESS LANDSCAPE | 1 |
| Unlocking the Hispanic Market | 3 |
| American Workers Will Retire Later | 13 |
| Connectivity: Ten Technologies to Watch | 23 |
| Connectivity: Ten Key Innovations | 37 |
| Food and Energy: The Ties That Bind | 51 |
| A Force to Be Reckoned With: The Chinese Middle Class Consumer | 63 |
| THE EMERGING HEALTH ECONOMY | 73 |
| I. Why Every Company Needs to Understand the Health Economy | 77 |
| II. The Impact Zones of the Emerging Health Economy | 87 |
| III. Top Opportunities in the Health Economy | 109 |
| ISSUES | 113 |
| Learning to Appreciate Social Capital | 115 |
| Who Is the Connected Consumer? | 125 |
| China and India: New Sources of Global Innovation | 137 |
| STRATEGIC DIRECTIONS | 147 |
| New Twists in the S-Curve | 149 |
| Professional Business Services: The Key to Innovation | 161 |
| Winning Strategies in a Weak Economy | 173 |
| APPENDIX: LIST OF FIGURES AND TABLES | 181 |



Introduction

Welcome to the Institute for the Future's 25th annual *Ten-Year Forecast!*

For 25 years, 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 these changes. 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 *Forecasts* over the years. When members look over several editions of the *Ten-Year Forecast* all at once, they can see a comprehensive picture of the context they operate in and how a broad set of key external drivers is changing that world. In this way, they are better able to make informed business decisions about the future.

The 2003 edition includes three major sections: Key Forecasts of the Business Landscape, Issues, and Strategic Directions. It also includes a special center section on the Emerging Health Economy. This introduction provides a brief description of each of the articles and the center section in the *2003 Ten-Year Forecast*.

KEY FORECASTS OF THE BUSINESS LANDSCAPE

Our forecasts this year focus on some critical drivers influencing consumer markets in the United States and China, labor, connective technologies, and two key resources, food and energy.

- *Unlocking the Hispanic Market.* Latinos have passed African-Americans as the largest minority group in the United States. As the Latino population continues to grow, Hispanics will get even more attention as a consumer market with more targeted communications and advertising from a range of companies. In turn, Hispanic consumers will expand their own market choices to encompass a wider selection of brands and offerings. To succeed in the evolving Latino markets, companies will need to understand the key characteristics and dynamics likely to shape these markets in the next decade.
- *American Workers Will Retire Later.* One of the most important factors slowing the growth of the labor force in the United States and other rich countries around the world is the decades-long trend for older workers to retire at younger ages. In recent years, however, the trend toward earlier retirement seems to be reversing itself in the United States. This new trend offers some hope that the aging of the population will not lead to as sharp a drop-off in experienced workers as expected when the baby boomers reach their 60s. A continuation of this trend could have beneficial impacts on economic growth and flexibility by increasing the share of the population in the labor force and decreasing the burden of support for the share that is retired. Given the current economic climate and the prospect for longer and healthier lives, we think that the average age of retirement will creep upward during the next decade.
- *Connectivity: Ten Technologies to Watch.* New technologies are driving the world toward greater connectivity. Since the basics of business are essentially about connecting—people with people, money with people, investment with companies, materials with processes and so on—increasing connectivity will fundamentally reshape the world of business. In this article, we identify ten key connective technologies that range from information technologies to innovations in energy, materials, and biology. Even more important than each individual technology, however, is how each technology builds on the others to tie the world ever more tightly—and intelligently—together.
- *Connectivity: Ten Key Innovations.* In “Connectivity: Ten Technologies to Watch,” we describe ten technologies that will connect our homes, workplaces, machines, and ideas. In this article, we present ten key innovations in which these technologies are combined in different ways to alter some of our basic assumptions about the world of business, including organizational infrastructure, ways of meeting workers’ needs, and opportunities for engaging consumers. In almost every case, a specific technological breakthrough holds the potential for broader technological and organizational change.

- *Food and Energy: The Ties That Bind.* Over the centuries, the need for food and energy resources have caused wars, international conflicts, ideological revolts, and social turmoil. While the context has changed as we enter the 21st century, the basic premise has not. Countries need assured access to food and energy resources, and conflicts arise when they feel they don't have it. Indeed, key foreign policy decisions of the 21st century are still more likely to be driven by the traditional sectors of energy and food than by the so-called new economy. Expanding demand in developing countries for food and fuel combined with the ongoing growth of the economies of the traditional economic superpowers will lead to new and shifting alliances in the next decade.
- *A Force to Be Reckoned With: The Chinese Middle Class Consumer.* Today, nearly all large businesses have introduced the growth of China into their strategic planning at some level. Whether considering the impact of low-cost Chinese labor on the global supply chain, tracking the increase of inexpensive Chinese exports in foreign markets, or trying to develop products and services for China's vaunted 1.3 billion-person consumer market, most companies have taken notice of the potential of China's vast marketplace. For businesses, the challenge is to avoid falling prey to the hype or giving in to the boom or bust scenarios while keeping a sharp focus on the critical implications of China's continued growth: the emergence of a powerful, several hundred million-strong middle-class market that may come to dwarf those in North America and Europe.

CENTER SECTION: THE EMERGING HEALTH ECONOMY

The frontier in economic growth is not wireless communication or biotechnology or even nanotechnology, although all of these will figure prominently in the next wave of growth. The real growth opportunity for the end of this decade is the health economy. Several trends—an aging population, the rise of active and engaged consumers, the emergence of new technologies, to name just a few—are converging to drive new perceptions of what individuals can do to lead healthier lives. By the time we reach 2010, these trends will reorient a number of markets and pose new challenges to traditional health care. A larger portion of disposable income will be spent on maintaining and improving health, and health management will be integrated into a much wider range of activities. In the emerging health economy, any tangible health benefit is a winning value proposition. And any company that ignores the meaning of health in its products does so at its own peril.

This special center section, The Emerging Health Economy, includes three sections:

- In the first, we explain why every company needs to understand the health economy.
- In the second, we explore the implications of the health economy in five key impact zones: households, communities, organizations, technology, and markets.
- And in the third, we identify the top eight business opportunities presented by the emerging health economy.

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 several important issues: the value of social capital and how business can leverage their customers' social capital to their advantage; who are "connected consumers" and how are they different from other consumers; and new roles that China and India will play in the world of innovation.

- *Learning to Appreciate Social Capital.* Social capital is the value of relationships a person accumulates in a lifetime, relationships that enable access to a wide range of resources. Along with physical and financial capital, social capital is an important asset, one not always appreciated or even recognized by traditional economic theory. Nevertheless, social capital often supplements or substitutes for money and other tangible resources in any person's portfolio of assets. In the new world of abundant connectivity, when their customers' social networks are more extensive and far reaching than ever before, companies must first recognize the power of social capital and then learn to segment consumers not only by means of their incomes and other demographic characteristics but also their social capital.
- *Who Is the Connected Consumer?* Social networks have been around forever and are formed well before we are aware that we have them. What's different today, however, is that the recent revolution in communications technologies has changed

how networks are formed and operate. Technology is facilitating new types of relationships, making social networks quite complex—increasing both their reach and depth. These social networks are important for all kinds of consumer decisions because they serve as filtering mechanisms that sort, analyze, and disseminate information. Companies that learn to tap into these expanding webs of "connected consumers" will do better in the next decade than those that ignore them.

- *China and India: New Sources of Global Innovation.* The economies of China and India have grown significantly in the past decade, and have gone a long way in contributing to the growth of the global economy. But so far, the strength of these economies has rested on their abilities as imitators rather than innovators. In other words, they have excelled at the production of low-margin export products such as toys, clothing, and electronic goods that have passed into the realm of commodities, while the high-margin gains for the design and innovation of these products have gone to others. If the economies of China and India are to continue their growth and become even bigger players on the world stage, they must step up to become innovators rather than imitators. The good news is that emerging market conditions in both China and India are ripe for such a step. The unique combination of large and expanding youth markets and high-tech know-how in both countries will generate significant innovation in the next decade and beyond.

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 on which sound decisions can be made. In the Strategic Directions section, we offer ideas on how companies can think strategically about the diffusion of their products or services and the role knowledge-intensive business services can play in innovation. Finally, we end this year's *Forecast* with a look at seven companies that have done well in this weak economy by maintaining a long-term perspective on their strategic decisions.

- *New Twists in the S-Curve.* New technology-enhanced products and the forms of communication they enable will change the way businesses think about diffusion. Companies have long used the traditional S-curve as a framework for anticipating the pace of adoption of new products or services. But the digital revolution has changed communication patterns, and our notion of how new ideas and products diffuse is changing as well. This new approach—one that includes a transformed S-curve—is likely to have significant impacts on how companies design products and services and work to spread them in the marketplace.
- *Professional Business Services: The Key to Innovation.* The continuous restructuring of the advanced technology sector puts a premium on getting critical information flows through firms, especially those operating in global markets. It's

very difficult for these firms to keep up with the whole range of changes that affect production, distribution, marketing, and operations on their own. A variety of firms in business services, also known as knowledge-intensive business services (KIBS), have come to play a major role in the innovation process. As key players in the diffusion of innovation throughout the marketplace, KIBS will play an increasingly important role in the next ten years in the success of companies of all kinds in both the United States and high-tech-oriented European countries such as Finland.

- *Winning Strategies in a Weak Economy.* Each year in the *Ten-Year Forecast* we highlight company strategies that might be used as models. This year we doubted we could find enough of them to write the article. Despite wave after wave of bad news, however, we still found seven companies that were able to maintain a long-term perspective on their strategic decisions in 2002, while building value for themselves and their customers in the near term—Wal-Mart, Amazon, Southwest Airlines, Wells Fargo, Pfizer, Vodafone, and Viacom.

We hope you enjoy the *2003 Ten-Year Forecast!*

—Greg Schmid, Director
Maureen Davis, Program Manager

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Unlocking the Hispanic Market

It's an early Saturday morning. You drive into the parking lot and notice a sign in bright letters, "*Tenemos camisas de fútbol en especial hoy! Compra una y llevate otra gratis!*" (Soccer jerseys on sale today! Buy one, get one free!) As you walk toward the entrance of the *supermercado*, the smell of tamales and posole draw you into the store. Celia Cruz's "*La Negra Tiene Tumbao*" is playing in the background. The place is buzzing, and the first thing you notice is that people are not shopping alone; whole families—moms, dads, kids, and even grandmas—are shopping together. One family is picking out a piñata for their daughter's birthday party. Another is picking up the week's groceries. Off to the right, a crowd is forming; a store clerk has just brought out fresh, warm tortillas. The produce section is huge! You pick up some ripe *avocates*, *tomate*, and *chile*. At the *carnicería*, you notice the wide selection of meats and a line for *carnitas* is already forming. You head over to the *panadería* and it has plenty of your favorite *pan dulce*. The store has all the familiar brands you'd expect in an average grocery as well as many of the brands that others don't carry—Goya, Jumex, Ariel, Jarritos, Fanta, and Peñafiel (see Figure 1 on page 4). The advertisements and promotions are bilingual, and more importantly, the employees speak Spanish.

If you ever have the chance to experience one of the growing number of Hispanic grocery stores throughout the United States, you'll understand why the grocery business and the food industry are moving quickly to respond to the Hispanic market. Companies like Albertsons and Safeway are expanding their Hispanic food sections, and rightly so. Hispanic households spend an average of \$117 a week on groceries compared with \$87 for the average U.S. household. Larger families, less of a tendency to eat out, and a preference for fresh produce and meats all result in more spent on groceries each week. And the grocery business is not alone.

Consumer product companies, telecommunications providers, automobile manufacturers, media, and retailers are all responding

as well. For example, increasingly Procter & Gamble's products, from Tide to Febreze, have Spanish labeling; AOL Time Warner's America Online and Univision Communications have a content and marketing alliance to help both companies reach more Hispanic Internet users; KMart, with more than 55% of Hispanics living within 15 minutes of one of its 1,800 stores, is branding a line of products around the Mexican pop-star Thalía; Blockbuster has increased its selection of Spanish-language movies; Nickelodeon's animated series, "Dora the Explorer," features a character who is Latina and bilingual; Pepsi launched Sierra Mist primarily for Hispanic consumers, and Yahoo!, *People*, and HBO all have Spanish-language versions.

Figure 1
Hispanic Brands Are Increasingly Available in the United States



Source: www.mexgrocer.com

As the Latino population continues to grow, Hispanics will get even more attention as a consumer market with more targeted communications and advertising from a range of companies. In turn, Hispanic consumers will become aware of more products and services and purchase a wider selection of brands and offerings. To succeed in the evolving Latino markets, companies will need to understand the key characteristics and dynamics likely to shape these markets in the next decade.

DEFINING THE MARKET

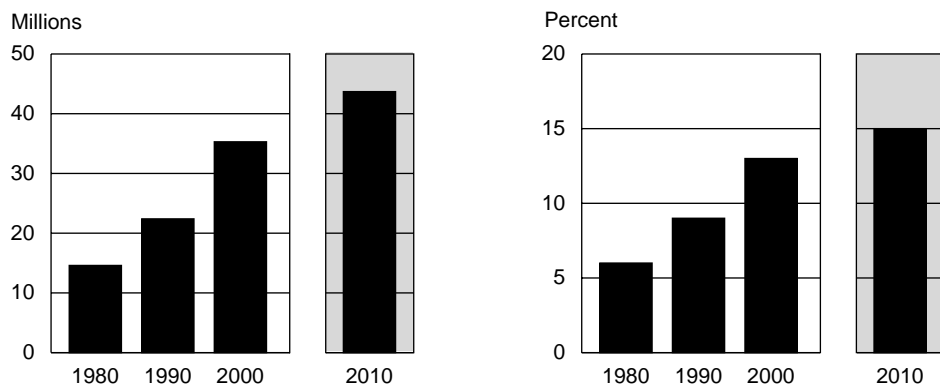
Latinos—persons who identify themselves as having Spanish, Hispanic, or Latino origin on the 2000 census—share a common linguistic heritage, namely Spanish. In fact, 75% of all Latinos are Spanish-dominant or bilingual. This characteristic alone goes far in defining Hispanics as a distinct consumer market in the United States.

By definition, however, the Hispanic or Latino population (terms now used interchangeably) is quite diverse. In fact, the Hispanic population shows a wide range of national origin, birthplace, legal status, socioeconomic status, immigration experience, acculturation, and number of generations in the United States. Hispanic also includes people of any race and religion—there are black, Asian, and white Hispanics as well as Catholic, Protestant, and Jewish Hispanics.

SIZING THE MARKET

Fueled by immigration and higher fertility rates than other populations in the United States, the Hispanic population grew quickly in the last two decades. In fact, the Latino population more than doubled, from 15 million in 1980 to 35 million in 2000 (see Figure 2). The number of Hispanics will continue to grow, reaching nearly 44 mil-

Figure 2
The Expanding Hispanic Population
(Hispanic population in the United States, in millions, and as a percent of total population)



Source: U.S. Census Bureau

lion—15% of the U.S. population—by 2010. Although immigration will continue to increase the number of Latinos in the United States, internal growth (caused by the higher fertility rates) will become a larger factor in overall population growth.

The Hispanic population also increased its share of overall regional populations during the 1990s (see Table 1). Though growth in share will likely level off in the South and Midwest through 2010, it will likely continue to increase in the West and Northeast.

UNLOCKING THE MARKET

In the world of fragmenting consumer markets, the Hispanic population represents a sizeable and distinct market. Companies need to understand the key characteristics

and dynamics that will shape this market in the next decade: Hispanic purchasing power, regional markets, and acculturation.

Purchasing Power and Spending Priorities

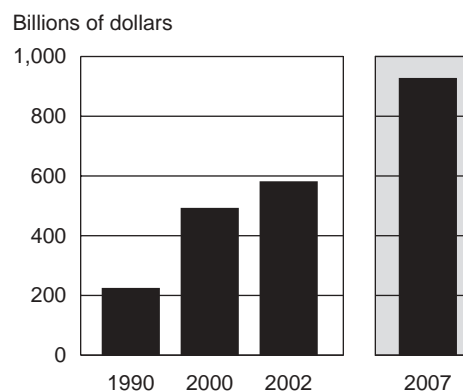
The Hispanic population is not only increasing in size, but now holds a significant aggregate share of the nation’s purchasing power. This means that in the never-ending search for new markets and profit, the Hispanic market can no longer be ignored. A Selig Center for Economic Growth study reports that Hispanic purchasing power increased from \$223 billion in 1990 to \$491 billion in 2000, and is forecasted to increase to \$926 billion by 2007 (see Figure 3). What’s more, Hispanics and their purchasing power are

*Table 1
Regional Presence of Hispanic Population
(Hispanic population as a percent of total regional population)*

| | 1990 | 2000 | 2010 |
|-----------|------|------|------|
| West | 19 | 24 | 27 |
| South | 8 | 12 | 12 |
| Northeast | 7 | 10 | 12 |
| Midwest | 3 | 5 | 5 |

Source: U.S. Census Bureau

*Figure 3
Hispanic Purchasing Power on the Rise
(Purchasing power of the Hispanic population)*



Source: University of Georgia, Selig Center for Economic Growth, *The Multicultural Economy 2002: Minority Buying Power in the New Century*.

highly geographically concentrated. In 2002, the five largest Hispanic markets were: California (\$171 billion), Texas (\$94 billion), Florida (\$52 billion), New York (\$48 billion), and Illinois (\$26 billion), accounting for over 67% of Hispanic purchasing power.

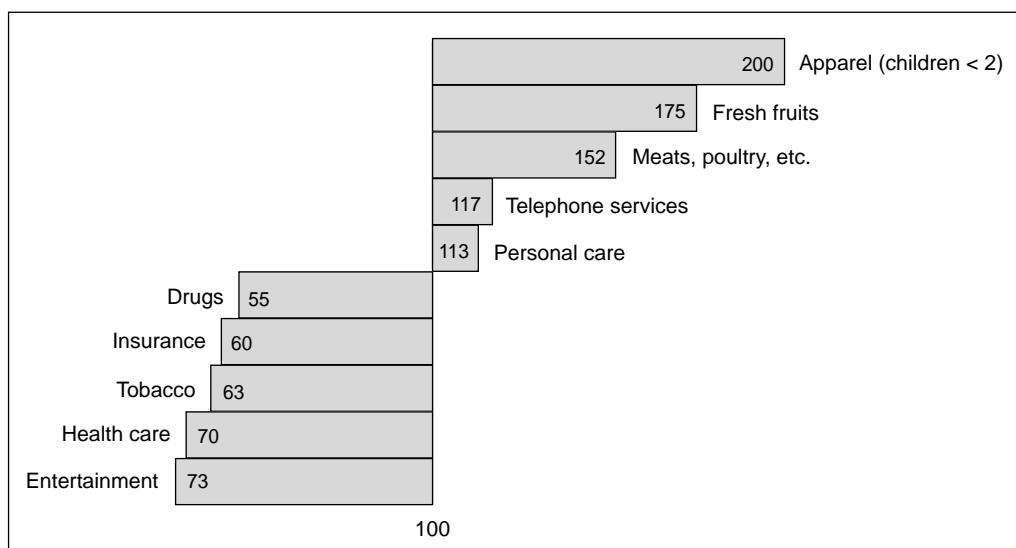
Differences in income, education, and culture shape the spending patterns of Hispanics. In fact, Latinos as a group are not the same as the average U.S. consumer. Data from the most recent Department of Labor Consumer Expenditure Survey show that Hispanic consumers spend only about 86% as much as the average non-Hispanic household. However, despite differences in income, Hispanic households spend more on certain categories such as groceries, telephone services, chil-

dren’s apparel, and others (see Figure 4). This reflects their younger, family-oriented focus.

Regional Markets and Distinct Latino Audiences

Hispanic population growth and dispersion are transforming existing markets and defining those of the future. Hispanics are now a big presence in the largest urban metropolitan areas in the United States. In fact, over 30% of the nation’s 35 million Hispanics live in five metros across the United States—in what has been called the Hispanic Heartland (see Table 2 on page 8). These metros are also among the top media markets in the country. In fact, the concentration of the Latino population in these metros makes

Figure 4
Spending Priorities of Hispanic Consumers
 (Spending by Hispanics on ... compared to average spending in category where the average is equal to 100)



Source: U. S. Bureau of Labor Statistics, *Consumer Expenditure Survey*, 2000.

targeting this consumer market all the more feasible.

These metros and their Hispanic populations show distinct migration and settlement patterns by Latinos of different countries of origin. For example, metros near the southern U.S. border and in California have traditionally been magnets for Mexican migration, while Miami has been the destination for Cubans, New York for Puerto Ricans and Dominicans, and so on. Although these patterns are beginning to change somewhat as a result of population dispersion, they remain important factors in marketing strategies targeted at the Hispanic population. For example, *People en Español*, with the help of variable printing technologies, changes the cover and targets content depending on the region where the magazine is being sold. In New York, the magazine features more Puerto Rican and Caribbean themes and

celebrities, while in Los Angeles the magazine takes on a more Mexican flavor, featuring Mexican artists and performers.

Hispanic population dispersion in the next decade will change the relationship between distinct Latino audiences and certain geographies in the United States, but such distinctions won't go away. Indeed, new patterns are likely to emerge. An analysis of U.S. census data by the Brookings Institution has found that Latinos have dispersed faster (geographically) than any previous immigrant group or internal migration wave—including the migration of African-Americans from the South.

Latinos increased their presence in the most unlikely places and communities during the 1980s and 1990s. Metros in North and South Carolina, Tennessee, Georgia, and Alabama were among those with the fastest growing Hispanic populations (see Table 3).

Table 2
The Hispanic Heartland—Five Metros Areas
(Hispanic population of ... metropolitan area, 2000)

| | Population in millions | Percent of metro population |
|-------------|---------------------------|-----------------------------------|
| Los Angeles | 4.2 | 45 |
| New York | 2.3 | 25 |
| Chicago | 1.4 | 17 |
| Miami | 1.3 | 57 |
| Houston | 1.2 | 30 |

Source: The Brookings Institution, *Latino Growth in Metropolitan America: Changing Patterns, New Locations*, July 2002.

Table 3
New Latino Destinations
(Hispanic population of ... metropolitan area, 2000)

| | Total population in thousands | Percent of metro area | Percent growth 1990-2000 |
|----------------------------------|-------------------------------------|-----------------------------|--------------------------------|
| Atlanta, GA | 269 | 7 | 388 |
| Charlotte, NC | 77 | 5 | 685 |
| Raleigh-Durham, NC | 73 | 6 | 631 |
| Greensboro- Winston Salem, NC | 62 | 5 | 809 |
| Nashville, TN | 40 | 3 | 454 |
| Memphis, TN-AR-MS | 28 | 2 | 265 |
| Greenville, SC | 27 | 3 | 358 |
| Birmingham, AL | 17 | 2 | 372 |

Source: The Brookings Institution, *Latino Growth in Metropolitan America: Changing Patterns, New Locations*, July 2002.

For example, in Atlanta there were about 2,000 Latinos in 1980, and they made up just 1% of the population. But 20 years later, Atlanta’s Latino population reached 269,000 or 7% of the total. If dispersion rates continue for the next decade, many more metros like Atlanta will become important Latino destinations. Over time, new patterns of migration and settlement will continue to emerge, and these too will become important factors when targeting the Hispanic consumer market.

The Role of Acculturation

The Hispanic population can be segmented in a variety of ways. One of the most important dimensions on which to segment the population is level of acculturation and number of generations in the United States. Hispanics can be divided into three generations: the first generation is the foreign-born (64% of all Latinos in the United States); the second generation consists of those born in the United States whose parents are foreign-born (19%); and the third generation includes anyone

whose parents were born in the United States (17%). In fact, acculturation and number of generations in the United States are powerful forces shaping consumer preferences and shopping patterns. The effects can best be seen in the use of Spanish and media consumption, and in attitudes toward identity.

Language Preferences and Differences

Not surprisingly, Spanish is more dominant than English among Latinos overall. There are finer distinctions to keep in mind, however. As you might expect, native-born Latinos are much more likely than foreign-born Latinos to speak English as their primary language or to be bilingual, while foreign-born Latinos are more likely to be Spanish dominant (see Table 4).

The number of generations in the United States is not the only factor that shapes the use of English or Spanish. Latinos shift languages as they shift context. Use of Spanish and English depends on the whether Latinos are at home, at work, watching TV, or listening to the radio (see Table 5).

*Table 4
Spanish Dominates But Varies by Generation
(Dominant language for Hispanic population,
by generation)*

| | 1st Generation | 2nd Generation | 3rd Generation |
|-----------|-------------------|-------------------|-------------------|
| Spanish | 72 | 7 | — |
| Bilingual | 24 | 47 | 22 |
| English | 4 | 46 | 78 |

Source: Pew Hispanic Center & The Kaiser Family Foundation, National Survey of Latinos, December 2002.

*Table 5
Language Preferences Shift with Context and Media
(Percent of Hispanic population that speaks ...
predominantly when ...)*

| | Spanish | Both Equally | English |
|--|---------|--------------|---------|
| At home | 53 | 19 | 28 |
| At work | 26 | 26 | 48 |
| While watching TV or listening to radio | 38 | 26 | 36 |

Source: Pew Hispanic Center & The Kaiser Family Foundation, National Survey of Latinos, December 2002.

Attitudes Toward Identity

Latinos share similar attitudes toward identity—a characteristic that transcends demographic differences (that is, national origin, birthplace, generation, and so on). This phenomenon can be seen in the terms Hispanics use to describe themselves—as “Hispanic” or “Latino” in general, by “country of origin” (for example, Mexican, Cuban, Puerto Rican), and as “American.” These terms are all aspects of Latino identity and are important measures of how Hispanics see themselves in relationship to each other and to other groups in the United States.

A recent survey by the Pew Hispanic Center and the Kaiser Family Foundation found that, of the various terms Latinos have available to describe themselves, “country of origin” is generally preferred. The preference for “country of origin” underscores the Latino belief that Hispanics of different countries of origin have separate and distinct cultures rather than one unified culture, hence the importance of targeting communications to distinct Latino audiences. However, the broader terms “Hispanic and

Latino” are still relevant and important aspects of their complex identities, since they do consider themselves distinct from other groups in the United States in this more general way.

Latino identity is fluid and, like the use of Spanish, depends on context. For Latinos, there is no conflict between identifying themselves as American and affirming “foreign” heritage or links to “country of origin.” In fact, Latinos activate and shift identities as they shift contexts.

The Pew Hispanic Center and the Kaiser Family Foundation’s survey found that when Latinos are asked if they have ever used “country of origin,” “Hispanic or Latino,” or “American” to identify themselves, 88% said they have used country of origin, 81% have used Latino or Hispanic, and 53% have used American.

Although all of these terms represent aspects of Latino identity, preferences vary by generation in the United States. For example, the term “American” is used more widely among native-born Latinos, particularly those in the third generation (see Table 6).

*Table 6
Identity Is Contextual and Varies by Generation
(Terms Latinos have ever used to describe themselves, by generation)*

| | 1st Generation | 2nd Generation | 3rd Generation |
|--------------------|-------------------|-------------------|-------------------|
| Country of origin | 95 | 82 | 66 |
| Hispanic or Latino | 85 | 77 | 72 |
| American | 32 | 85 | 97 |

Source: Pew Hispanic Center & The Kaiser Family Foundation, National Survey of Latinos, December 2002.

BUSINESS STRATEGIES FOR THE NEXT DECADE

Many American businesses have been uncovering the nuances of Hispanic consumers and their behaviors. However, much more needs to be understood. As the Latino population continues to grow in the next decade, businesses wanting to respond to the Hispanic market should consider the following:

- *Understand the cultural context to find the best fit for your products.* Strategies for understanding consumers in the Hispanic market should emphasize the cultural context. This means uncovering local and regional domains of meaning, cultural affinities, core values, traditions, political nuances, and passions. Often the value of products and services is shaped by the cultural context in which they are consumed.
- *Market to identity.* Marketing to identity is a key Hispanic market strategy. Whether it's watching Univision's Don Francisco and his show, *Sábado Gigante*, or eating *pan dulce* on the weekends, Hispanic consumers look to the marketplace to live, revive, and identify with their Latino selves and values. Increasingly, the value of products lies in their emotional appeal, experiential value, social utility, or some combination of the three. In this way, consumers construct their own identities and distinguish themselves from others or communicate that they belong by what they purchase.
- *Watch the edges and evolve with the market.* Advertisements, products, and services geared for all Latino consumers will increasingly miss many potentially profitable market opportunities. Why? The boundaries of Latino and Hispanic identity are expanding, particularly among the third generation, and marketing strategies must evolve along with the market. The Hispanic market is not immune to fragmentation. In fact, Latino identity is in a constant process of reinvention as new dimensions of Latino experience and identity are folded into hybrids that live at the edges of the Latino community. Look for patterns that don't fit for clues to new directions of the market.
- *Don't rely only on traditional acculturation models.* Acculturation holds that Hispanics will simply blend into the mainstream American way of life. However, there is no conflict (or liability) for Hispanics to identify themselves as both American and Latino. The so-called "melting pot" vision of American society was a good metaphor for the era of the mass consumer because it rested on uniformity. However, we'll need new metaphors in the era of market fragmentation, particularly as the number of dimensions for differentiating consumers is increasing in the digital age. Companies will need to look at the expanding dimensions of Latino identity as the next unifying factor that will define the population as a distinct consumer market or set of markets.
- *Imbue your brands and products with culture.* Some brands and products, although not inherently Latino, are perceived as having a Latino cultural affinity. This is due in part to globalization, where many of the products once consumed in Mexico, for example, are now sought

after in the United States—from food to health and beauty products and household goods. Companies should leverage this product loyalty. The best examples belong to Coke and Procter & Gamble. Coke’s soft drink brand, Fanta, was pulled from the U.S. market in the late 1980s but was reintroduced in the United States in 2001 in response to demands from Latinos who had become loyal to the brand in Mexico and Latin America. According to any Hispanic or Latino, Fanta is a familiar Latino brand. Procter & Gamble’s laundry detergent Ariel holds the same distinction in the Hispanic market and though originally created for markets outside the United States, Ariel increasingly finds itself on shelves across retailers in the United States.

- *Become better at context sensing.* IFTF research has shown that consumers are becoming quite adept at constructing and managing a portfolio of identities and that they are good at multi-contexting—that is, shifting through these identities as they move in and out of various contexts or settings such as home, work, community, and stores. The Latino consumer is no exception. Latino identity (and the use of Spanish) is fluid and shifts as the person shifts context. Companies will need to become better at context sensing, that is, knowing when the consumer is in a Latino state of mind. Delivering targeted, tailored, timely, and trusted communications will depend on a company’s ability to sense that context.

—Rod Falcon



American Workers Will Retire Later

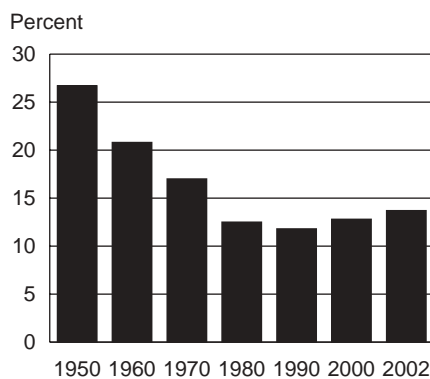
A number of key factors have slowed the growth of the labor force in the mature countries of the North Atlantic. The share of the population in their late teens is falling, the share of those older than 65 is growing, the dynamic social impulse that led to a sharp rise in the labor force participation of women has leveled off, and workers have been retiring earlier.

One of the most important factors slowing the growth of the labor force is the last one, earlier retirement. Indeed, in the last 50 years, people in the richer countries of the world have been retiring at an earlier and earlier age. This means that a declining share of the population in the workforce must now support this growing share of the dependent population (by means of current taxes to pay the costs of retirement and health and other social benefits).

In recent years, however, the trend toward earlier retirement seems to be reversing itself. This new trend offers some hope that the aging of the population will not lead to as sharp a drop-off in workers as expected. Especially in the United States, after decreasing for almost 30 years, the average age of retirement has stopped falling, and has even increased slightly in the last ten years. A continuation of this trend could have beneficial impacts on economic growth and flexibility by increasing the share of the population in the labor force and decreasing the burden of support for the share that is retired.

But the matter is not a simple one. The driving forces shortening work life will continue to contend with the forces extending work life. Given the current economic climate and the prospect for longer and healthier lives, however, we think that the average age of retirement will creep upward during the next decade.

Figure 5
After a Long Decline, Elderly Workforce Participation Rates Are Rising
(Percent of population over 65 years of age in the labor force)



Source: U.S. Bureau of Labor Statistics, *Monthly Labor Review*, Howard Fullerton and Mitra Toosi, "Labor Force Projections to 2010," November 2001.

THE CONTEXT: 1950–2000

The average retirement age has declined in the past 50 years. For one thing, Social Security, Medicare, and the spread of corporate pension plans after World War II improved the living standards for the elderly, making retirement more attractive. For another, aging workers were encouraged or forced to retire because of mandatory retirement rules, work disincentives built into Social Security, and defined-benefit pension plans that penalized workers who stayed on the payroll too long. Combined, these driving forces led to a precipitous decline in the workforce participation rates of those 65 and older (see Figure 5).

Over time, a distinct lifestyle emerged in the elderly population, a lifestyle often involving migration to the warmer climates of the Sunbelt, and lots of leisure activities and travel. With their improved economic and physical health, the elderly were less and less likely to be ill and dependent upon family, and more likely to be leading active, independent lives.

But the downward trend slowed in the 1980s and stopped during the 1990s, with the share of older workers reaching a low point of just over 10% in 1993—less than half of what it was in 1950. Since then, the share of older workers in the workforce has been increasing. In 2002, the share was up to 13%—a small but perceptible and important rise.

Will this increase continue? There are a number of labor market forces operating in the United States today that will influence retirement age in the decade ahead. Some are simple and obvious; others are more complicated. Some are encouraging older workers to stay in the workforce while others are encouraging them to drop out.

SOME DRIVERS WILL SHORTEN WORK LIFE

Will the age of retirement return to the downward trend of the second half of the 20th century? Recent research suggests that this may be so for several reasons:

- Pension funds are still up.
- Most retirees have adequate resources.
- People find pleasure in retirement.

Pension Funds Are Still Up

The pension funds of households rose dramatically during the 1990s. While they have fallen by 9% in the past two years, they remain 2.5 times higher than they were in 1990 (see Figure 6). The baby boomers will also be inheriting assets from their parents. The tremendous increase in the valuation of the U.S. housing stock, which took place as the boomers bid for houses during the

1980s and 1990s, will produce a legacy of some \$15 trillion over the next 15 years as the boomers move into retirement themselves.

Most Retirees Have Adequate Resources

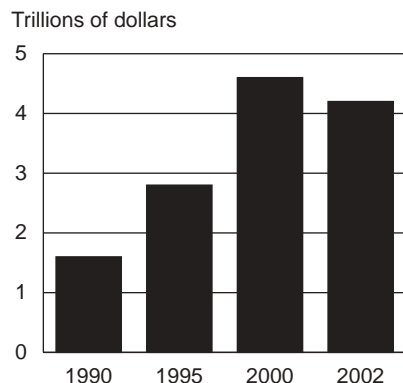
To work longer, people need inducements. A primary inducement, of course, is economic need. But a recent study by the U.S. Department of Labor indicates that, in general, the economic motivation for retirees to work may not be that strong. A close look at income and expenditures of recent retirees and those about to retire show that retirement does not mean the major break in expenditure patterns you might expect.

The study looked at a number of groups nearing and just entering retirement. It found one fairly obvious difference between pre-retiree and retiree households—pre-retiree households have much higher incomes. The difference in average income before taxes between the two groups is \$47,000.

The more interesting finding, however, concerns expenditures. The difference in expenditures between the two groups is \$11,000—a much smaller gap than the gap in income. The smaller gap in expenditures is accounted for by the fact that pre-retirees are laying out much more of their income for taxes, contributions to pensions and savings, mortgage payments, monetary gifts to family members, and so on. On the other side of retirement, retirees can draw on their accumulated savings to spend more than they take in any given year (see Figure 7 on page 16).

Expenditure patterns on individual items bear this out. Retirees spend a much smaller share of their income on housing (see Table 7 on page 16). Indeed, 78% of retirees own their own house with no outstanding mort-

Figure 6
Pension Assets Are Much Higher
(Accumulated pension assets for all households)



Source: Federal Reserve Board, Survey of Consumer Finances.

gages. Some of what they save here goes into other categories, since they spend a greater share of their income than pre-retirees on health care, as well as more on food at home and vacations. Discretionary spending on the “fun stuff” decreases only a little or not at all in retirement.

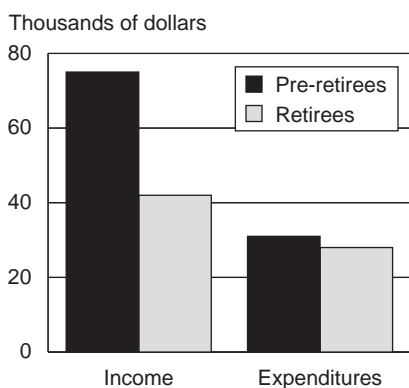
In a nutshell, while the income differential between the pre-retiree and retiree households is great (the pre-retirees’ income is 170% higher than that of the retirees), the difference in spending is much less dramatic (just 36%). The fact that the bulk of retirees have completed their mortgage payments saves a big portion of their cash, only part of which goes toward increased health care expenses. Altogether, the income gap creates some incentive to work, although a weak one for the average retired couple.

People Are Happier in Retirement

In the last decade, there has been a concerted effort to link economic analysis with psychology. (The most recent Nobel Prize in Economics, in fact, went to Daniel Kahneman for linking psychological research to economics in the study of the process of decision making over time.) Another important research area has been the relationship of economic decision making and well-being.

One interesting study by Kerwin Charles of the National Bureau of Economic Research examined the psychological well-being of retired workers. There have long been two theories on retirement—one suggests that what follows at the end of a long and productive work life is boring and somewhat depressing, that indeed, life is “over”; the other offers that, since retirement ends the

Figure 7
Gap for Retiree Expenditures Much Smaller Than for Income
(Average annual household income and expenditures, by work status)



Source: Geoffrey Paulin and Abby Duly, “Planning Ahead: Consumer Expenditures in Retirement,” *Monthly Labor Review*, July 2002.

Table 7
Retirement Spending Shifts Prominent in Four Areas
(Percent of expenditures for major spending categories, by work status)

| | Pre-retirees | Retirees |
|-----------------------|--------------|-----------|
| Shelter | 29 | 24 |
| Transportation | 16 | 15 |
| Food at home | 9 | 11 |
| Health care | 6 | 13 |
| Vacation | 6 | 8 |
| Entertainment/reading | 6 | 6 |
| Food away from home | 4 | 3 |
| Apparel and services | 4 | 3 |

Source: Geoffrey Paulin and Abby Duly, “Planning Ahead: Consumer Expenditures in Retirement,” *Monthly Labor Review*, July 2002.

routines and boredom of jobs and frees up time for other, more enjoyable activities, retirement actually increases well-being.

Charles combined data on retirement by age with measures of what he called subjective well-being, which he took from questions that are part of standardized tests measuring well-being. (Studies have shown that these tests are reliable; the responses by individuals tend to remain fairly constant over time, are very stable within a society, and tend to change for an individual in line with major life events.)

Charles tracked people before and after retirement, comparing their work activities, income status, and measures of well-being. He concludes that, after adjusting for the fact that some people who have low levels of well-being might retire early, retirement

appears to actually improve the sense of well-being of most people.

There is some evidence, then, to support the notion that people are happier after they retire. If so, then all things being equal many workers are likely to choose retirement as early as possible, thus limiting the potential participation of seniors in the economy.

SOME DRIVERS WILL EXTEND WORK LIFE

There are several other drivers, however, likely to extend work life. These include:

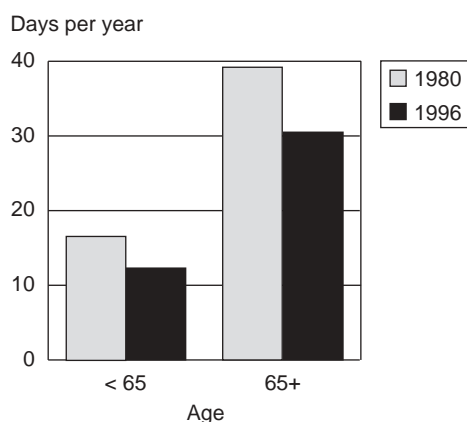
- Seniors are leading healthier and longer lives.
- More work is information-intensive.
- More seniors have to work.
- More people want to work in retirement.

Seniors Are Leading Healthier and Longer Lives

People are living longer, and they are living more days without disability. The average life expectancy has been going up about 0.2% per year for the past 30 years; in 1970, life expectancy at birth was 70 years, but today it is about 77 years. At the same time, people are staying healthier longer as they age. The share of restricted activity days—days in which a person cannot perform the normal activities of daily living such as dressing, getting around the house, or taking a bath or shower, to name a few—has decreased by 25% in the past two decades (see Figure 8). Longer and healthier lives mean that more people can work for a longer amount of time, if they wish.

The incidence of chronic health conditions is also falling, especially for those

Figure 8
Restricted Activity Days Are Down
(Days per year that a person cannot perform normal activities because of illness or injury)



Source: National Center for Health Statistics

nearing retirement. Chronic illnesses like arthritis, heart conditions, high blood pressure, and hearing impairments have fallen by 15% for those between 45 and 64 (see Figure 9). As a result, members of this group will enter their retirement years in far better shape than their predecessors.

More Work Is Information Intensive

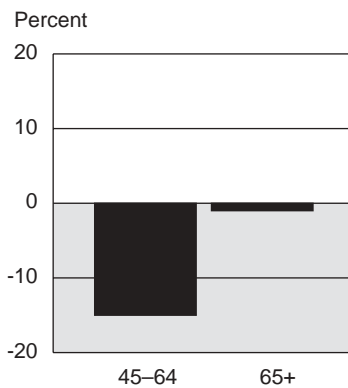
The baby boom generation is the first that went to college en masse. The rate of those going to college rose from about 35% during the 1940s to over 58% as the baby boomers came of age in the late 1960s. In turn, the share of those moving into knowledge-based jobs rose from 30% of all workers in 1970 to about 45% when all the boomers were integrated into the workplace by the 1990s (see Figure 10).

Information-intensive jobs such as these are less physical and often involve a variety of tasks and intellectual challenges, making them more interesting as well. As the boomers reach the traditional retirement age, many will find that their jobs are still enjoyable and will want to continue to do them in some capacity. In fact, a recent AARP survey of people 45-74 found that 34% plan to work part-time during retirement for “interest and enjoyment.”

More Seniors Have to Work

The recent economic troubles may keep more workers in the labor market. Participation rates of older workers began to rise in the boom years of the late 1990s, most likely because more workers were needed to keep the economy humming along at high capacity. As more workers were needed, rising wages and more flexible work condi-

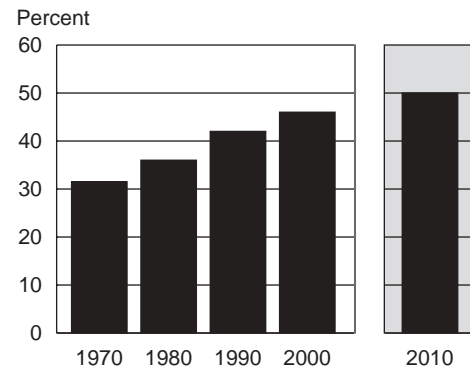
*Figure 9
Chronic Conditions Are Down for Those Aged 45-64
(Percent change in rates per thousand for a range of chronic illnesses, 1982-1996*)*



* Chronic illnesses included are arthritis, heart conditions, high blood pressure, and hearing impairments.

Source: National Center for Health Statistics

*Figure 10
More People Work in Knowledge-Based Activities
(Percent of all workers in information-intensive* jobs)*



* Includes managers, professionals, technicians, and business sales workers

Source: Institute for the Future; U.S. Department of Labor.

tions encouraged older workers to stay in the workforce voluntarily.

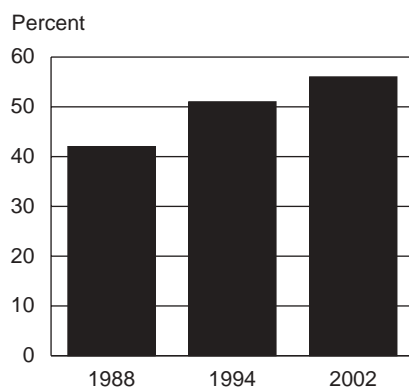
In the last two years, however, it may have been difficult times that kept people in the workforce. Specifically, the stock market crash may have kept workers in the labor market longer than they had planned, or forced some who had taken early retirement to re-enter the workforce. As the economy weakened even further last year, the labor force participation rate for those aged 55-64 (or those approaching retirement) increased 2 percentage points (about the same amount it did in the boom years of the late 1990s).

Why would a falling stock market keep more workers working past retirement? Since the 1980s, many workers' pensions have been converted from defined-benefit to defined-contribution plans (see Figure 11). Under the latter type of plan, workers directly bear the

burden of investment risk, as a significant portion of benefit is determined by earnings on the account's assets. Basically, when the markets are up at the time of retirement, retirees can reap handsome rewards. But when the markets are down, their assets can evaporate.

Indeed, those nearing retirement with substantial assets held in 401(k) plans, IRAs, and other similar vehicles have seen the value of their assets plummet in the last two years—between the market's peak in March 2000 and August 2002. For example, the Dow Jones lost 26% of its value, the S&P 500 lost 40%, and the Nasdaq lost 74% (although all the markets regained a chunk of those losses in the Fall 2002 rally). It is very likely that such large fluctuations in retirement savings will convince some workers to stay in the labor market longer and even encourage some newly retired people to rejoin the workforce. This uncertainty about retirement savings should continue for the next three to five years.

*Figure 11
Pensions Shift to Defined-Contribution Plans
(Percent of pension coverage in defined-contribution plans)*



Source: Federal Reserve Board, Survey of Consumer Finances.

More People Want to Work in Retirement

We have pointed out that about one-third of those over 45 plan to keep working at some level after retirement for interest and enjoyment. But there are other reasons people want to remain in the workforce beyond the traditional retirement age. The same AARP survey found that nearly 70% of those over 45 plan to work, for a variety of reasons, in some capacity after retirement (see Figure 12 on page 20).

WORKING LATER IN THE DECADE AHEAD

What’s the verdict? Since we have seen some small increases in older people’s labor force participation rates in both boom times and bust times, it seems safe to say that the participation in the labor force of older workers is likely to continue to rise.

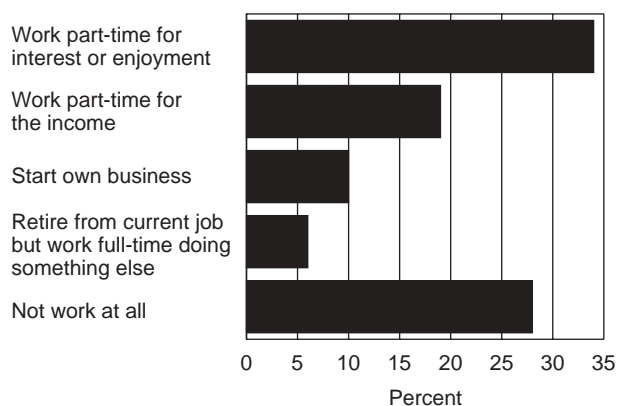
The underlying data bear this out. Indeed, in the last decade, older males (who account for 64% of all older workers and tend to have a much steadier participation rate in the labor force than their female counterparts in the last 40 years) show a slight increase in their participation in the labor market. In fact, there have been modest increases in participation rates in every age cohort among males over 55 years of age, though the trend is most pronounced in men between the ages of 65 and 69 (see Table 8). There is clear evidence that both the boom years of the 1990s and the years of recession and decline in the stock market in 2001–02

brought modest increases in the participation rates of older Americans, enough to identify this as a real trend.

Studies of what types of people are staying in the workforce show a surprising result—money does not seem to be the key motivator for many older workers. Those who tend to work later in life are those who have more education, more wealth, and better health. In fact, the participation gap depends primarily on education and increases with age. The ratio of workers with a postgraduate degree and those with less than a high school education is about 1.65:1 for those in their late 50s, but is 2.65:1 for those in their late 70s (see Figure 13). This is true despite the fact that the wages of older workers are much lower than those they earned in the prime of life—averaging out to about one-third of what they were paid in their 50s.

The causes of the increased participation of older workers reflect some deep-seated changes in the U.S. labor market. There are

Figure 12
Most Plan to Work After Retirement
(Percent with ... as a plan for retirement years)



Source: AARP, *Staying Ahead of the Curve*, September 2002.

Table 8
Slight Upward Shift in Older Working Men
(Percent of men, by age, in the labor force)

| | 55–59 | 60–64 | 65–69 | 70–74 |
|------|-------|-------|-------------|-------|
| 1996 | 78.0 | 55.4 | 27.2 | 18.5 |
| 1998 | 79.5 | 55.7 | 28.2 | 16.5 |
| 2000 | 76.1 | 55.8 | 30.7 | 18.7 |
| 2002 | 78.1 | 56.4 | 33.2 | 18.0 |

Source: U.S. Bureau of Labor Statistics, *Employment & Earnings*.

more older workers today who are well-educated and have worked in knowledge-based activities all their lives. They are interested in working in jobs in their retirement that give them flexible hours and high levels of responsibility and where the advantages of experience and accumulated knowledge offset potentially lower wages and the physical limitations on their ability to work. A large and growing share of these older participants will be well-educated, white-collar workers willing to do interesting work for lower wages on a flexible schedule that meets their needs.

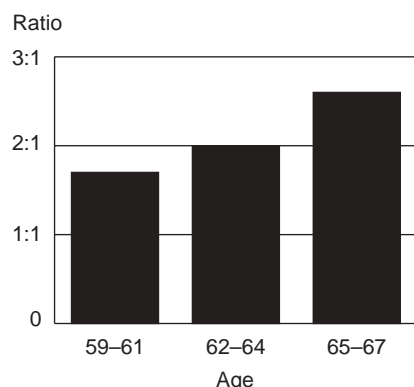
For the future this means that the rate of participation by older Americans in the labor market will increase slowly (see Figure 14). This will not be a sharp rise because there are clear economic and psychological reasons that continue to make retirement attractive. The upward trend in labor participation will add about 3 million people to the workforce by 2010 (and reduce the retirement burden by a significant amount).

IMPLICATIONS FOR THE FUTURE WORKFORCE

Older, well-educated workers are a key resource—they tend to have worked in important roles in the information economy, providing management or technical expertise. If jobs can be set up to utilize their skills in a flexible manner—flexible hours and days of work, long vacations, informal work rules, interesting and independent tasks—a number of workers will extend their working years beyond what has become the norm.

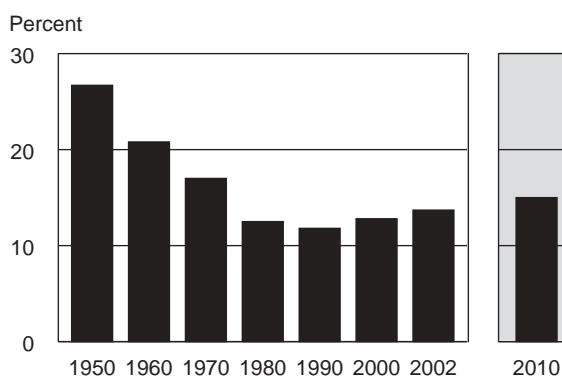
Many companies can set up programs to utilize these workers, some in “phased” retirement, which will allow workers to work part-time or seasonally before full retirement, others in job-sharing arrangements, and still others in new jobs with less strenuous requirements. Companies will need to make sure that the tasks assigned to these workers are semi-autonomous, interesting, and challenging. In return for this flexibility, these workers will be willing to work for less compensation. Any company that needs

Figure 13
It's the Educated That Work Longer
(Ratio of postgraduates to those with less than a high school education in the workforce, by age)



Source: Steve Haider and David Loughran, Center for Retirement Research, Boston College, September 2001.

Figure 14
More Older Workers in the Future
(Percent of those over 65 years old in the labor force)



Source: U.S. Bureau of Labor Statistics, *Monthly Labor Review*, Howard Fullerton and Mitra Toosi, “Labor Force Projections to 2010,” November 2001.

talented, knowledge-based workers and is willing to offer flexible work plans will find that these older knowledge workers are a great resource for filling critical needs.

But keep in mind that this refers to only a portion of all workers (though a decent-sized portion—about 45% of the current workforce are knowledge workers). Indeed, important groups of workers will not be extending their time at work. These will include blue-collar workers, as well as the bulk of service workers who provide the day-to-day services that consumers have come to rely on—restaurant and resort workers, retail and banking clerks, call center representatives, those who fill mail and e-commerce orders, those who solve billing problems, those who provide care and hot meals for the elderly or health care patients, those who run public transit, and those who deliver goods across the last mile.

Companies in the service sector will need to adapt their work patterns and offerings to keep some of their best and most experienced workers on the job by providing such things as better pay for experience, more flexibility in hours and place of work, more managerial or technical-expert slots for those that can handle more demanding consumers. If the service sector wants to create a real personal touch on top of the sophisticated data and information infrastructure it is building, it must begin by understanding and appreciating the work experience of the aging service worker and emulate the types of human resource programs that are keeping more knowledge workers in other areas in the labor force for longer periods of time.

—*Gregory Schmid*



Connectivity: Ten Technologies to Watch

Today, new technologies are driving the world toward greater connectivity. Since the basics of business are essentially about connecting—people with people, money with people, investment with companies, materials with processes and so on—increasing connectivity will fundamentally reshape the world of business.

In this article, we identify ten key connective technologies that range from information technologies to innovations in energy, materials, and biology (see Figure 15 on page 24). As these technologies mature and interact with one another, they will create the opportunity for basic changes in business processes—from self-configuring supply chains to desktop manufacturing and physical objects that collaborate with one another and with people to make decisions. As we tour these technologies, watch the way each builds upon the others tying the world ever more tightly, and intelligently together. In the next article, “Connectivity: Ten Key Innovations,” we to look at how these technologies might change the world of business.

**WIRELESS:
MORE THAN MOBILITY**

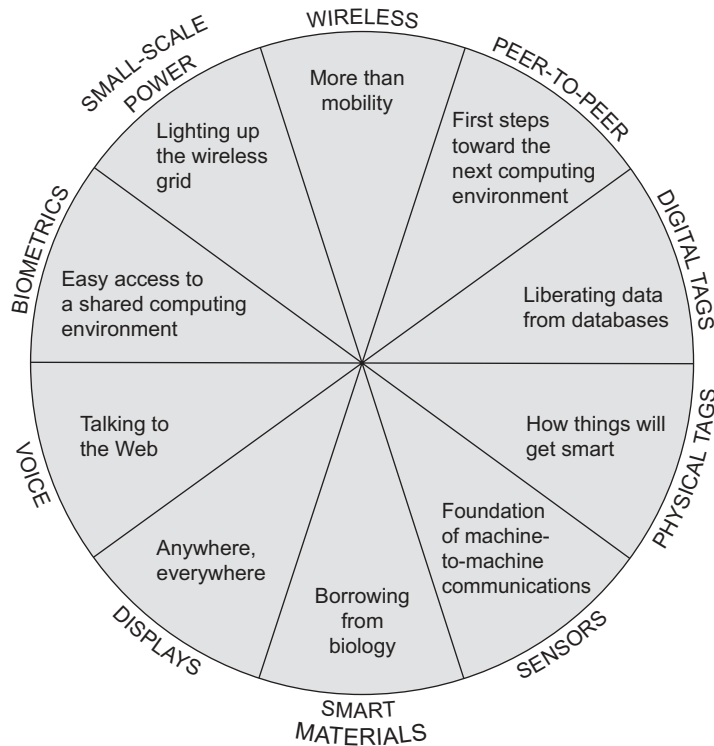
Wireless communication technology is the cornerstone of connectivity, and bandwidth is the key measure of success. A year or so ago, everyone thought that third-generation wireless (3G)—using a high-bandwidth, media-oriented standard known as wide-band code division multiple access (WCDMA) and built on the model of the existing cellular phone system—would create a future of ubiquitous broadband access to the Internet, with the cellphone as the central access device.

Today, a different picture is emerging—the Wi-Fi future. Short for “wireless fidelity,”

Wi-Fi uses the 802.11 standard for wireless communication through a variety of devices including laptops, PDAs, and game devices, with the Internet as the backbone, to provide connectivity. Wi-Fi offers several advantages over 3G.

- Wi-Fi uses free unlicensed spectrum rather than expensive licensed spectrum.
- Wi-Fi offers more bandwidth: at 10 Mbps, it’s a hundred times faster than 3G.
- The equipment is inexpensive: an 802.11 transmitter costs about \$50, Wi-Fi cards for computers cost about the same, and

Figure 15
Ten Connective Technologies



Source: Institute for the Future

many other devices have 802.11 connectivity built-in.

- The network is emergent; that is, it can be developed organically as needed by corporate and household users rather than requiring massive networks of expensive base stations controlled by large operators.

The limitation of Wi-Fi is the range of its transmitters. At present, most 802.11 transmitters have a maximum range of about 300 feet. However, several companies have developed a so-called mesh network technology that turns any 802.11 device into a repeater—in this way, a PDA can relay a signal to a laptop, which can relay it to another laptop, which can then relay it to a dedicated access point, and so on, thus extending the range of a Wi-Fi network.

Wi-Fi networks, unlike 3G networks, do not aim for ubiquitous coverage. Instead, they are being built out initially in commercial hot spots such as cafés, malls, and airports. Schlotzsky's Deli, for example, has installed its Cool Cloud Network to give its patrons free Internet access while they chow down. Starbucks also plans to provide Wi-Fi access in the majority of its locations worldwide. Meanwhile, individual householders are already beginning to create neighborhood grids of wireless access, using mesh Wi-Fi routers and access points. And savvy communicators with good antennas are finding ways to tap into private household Wi-Fi transmitters—whether they're in the house next door or parked at the curb outside, checking their e-mail en route to a business appointment or a soccer game.

Several big unknowns cloud this future, not the least of which is how to make money on an emergent network where there's no

one-to-one correspondence between the service provider and the service user. What's more, as networks are built out, they'll begin to compete with one another for airwaves, and new allocations of the radio spectrum are likely to be required. Large operators who have invested in licensed frequencies may also give Wi-Fi a run for its money by using the new all-IP standard based on Flarion's Flash-OFDM technology, which bypasses 3G technology to provide both voice and data over the Internet. Nokia, a big supporter of this technology, anticipates a 2004 rollout.

Regardless of the way the wireless marketplace evolves, the technology is following the same curve that wired bandwidth followed a decade ago. Figure 16, on page 26, shows the growth of wireless capacity—the ability of the technology to provide bandwidth—with a significant inflection point around 2005.

PEER-TO-PEER: TOWARD THE NEXT COMPUTING ENVIRONMENT

Peer-to-peer (P2P) computing, broadly speaking, is distributed network computing. It has many configurations and applications, but the key innovation in P2P is direct client-to-client communication, without a server as intermediary. Instead of a wheel with spokes connecting to central axle, P2P behaves more like living matter, where molecules find receptive sites on one another to connect and exchange ions. It's computing without central control.

Peer-to-peer made its noisy debut with music trading on the Internet, starting with Napster. Napster wasn't a true peer-to-peer architecture—it used a central server as an index—but the popular Gnutella software that took over when Napster was shut down

is truly peer-to-peer. Now P2P applications have extended well beyond swapping MP3s (compressed digital music files). For example, the biotech firm Incyte Genomics used a peer-to-peer architecture of desktop computers to do the massive computations involved in mapping the human genome, saving lots of money over rival firm Celera, which relied on supercomputers. Many networked computer users donate time on their machines to research projects that are computationally intensive—projects like breast cancer research or *seti@home* (the search for extraterrestrial intelligence). Also, new groupware tools such as Groove take peer-to-peer as their basic premise for sharing information and workspaces across distributed groups.

P2P will probably be slow to replace client-server networks in large organizations, but it will grow rapidly in the next generation of computing, in which glitter-sized tags and sensors replace PCs as processors in what we call very small-scale networks. Together with

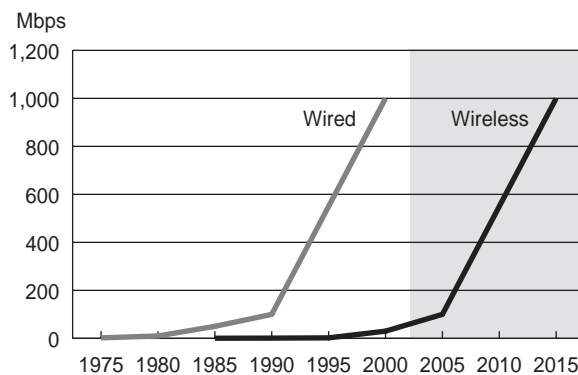
wireless technologies, P2P lays the architectural foundation for this new generation of ubiquitous computing—a world in which computing moves from the desktop into the very walls and furnishings of our daily lives.

DIGITAL TAGS: LIBERATING DATA FROM DATABASES

Digital tags label data. Think of them as the replacement for the traditional database. In its simplest form, a database is a spreadsheet of rows and columns. The data in the spreadsheet is meaningful only when you know the row and column labels that apply to it. Digital tags provide those labels independent of the database architecture. So tagged data can be used and reused in a variety of computations and settings without worrying about database compatibility. Data codes take the place of database architectures.

Digital tags do, however, require standards, and Extensible Markup Language (XML) is the standard to watch. Just as HTML ushered in the World Wide Web with

Figure 16
Wireless Bandwidth Capacity to Take Off in 2005
(Maximum wireless transmission speed)



Source: Institute for the Future; Intermecc.

standards for graphic display of Web pages, XML will usher in a new era of data sharing. There are already a host of sublanguages for sharing specialized data: Universal Business Language (UBL) for standard business documents such as invoices, purchase orders, and bills of lading, for example, or the E31.25 standards for health data.

As more and more Web documents become coded with XML data, we can expect to see a variety of software tools for accessing and processing these documents. Most important will be the so-called “web services”—tiny behind-the-scenes programs that do one or two key operations on data and then pass the results along to another web service. These web services will be the machine-to-machine interface for digitally tagged data.

As such, the growth of these programs is a reasonable proxy for the growth of digital tagging. Figure 17 shows that web services are likely to grow from virtually nothing to

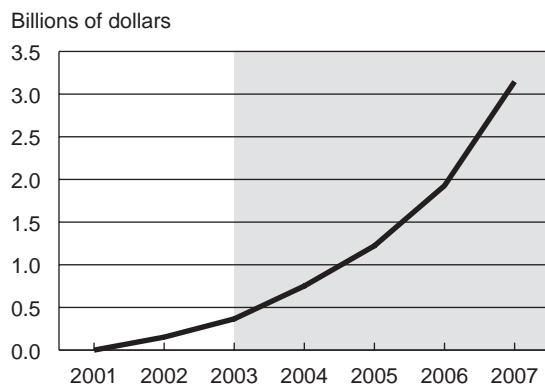
\$3.5 billion in 2007. This forecast only includes web services that are replacing existing computing services in application server, enterprise, and message brokering markets, not new markets. In the end, web services—using peer-to-peer architectures—will begin to create a truly distributed world of computing.

**PHYSICAL TAGS:
 HOW THINGS WILL GET SMART**

Where digital tags label data, physical tags embed intelligence in physical objects. Physical tags can be as simple as relays that just send out a signal saying, “I’m here and I’m switched on.” Or they can include sensors, processors, data, power, and communication capabilities, linked to objects in the real world.

Radio frequency identification (RFID) is the current proposed standard for communication via physical tags. RFID tags require no built-in power—the RFID reader emits radio waves to activate the tag, and gives it energy to communicate data to the reader.

*Figure 17
 Web Services Will Grow Rapidly
 (Worldwide spending on web services)*



Source: WinterGreen Research, Inc.

Using emerging electronic product code (EPC) standards, RFID tags will gradually replace the UPC bar codes that have dominated supply chain management and retail operations for the last 25 years. They will also give every product communication and processing capabilities. While product manufacturers and retailers are eager to use RFID tags to track products through the supply chain and into the consumer's home, these tags will eventually allow products to manage themselves—to specify which color coating they get, or which palette they should be stacked on for shipping.

Size and cost are the key enablers of this technology. The current benchmarks are those of Alien Technology, a company that is producing glitter-sized tags for about 10 cents per tag. Consumer product companies are beginning to implement the technology. In November 2002, Gillette announced that it would buy a half billion of these tags in 2003—by far the largest order ever and

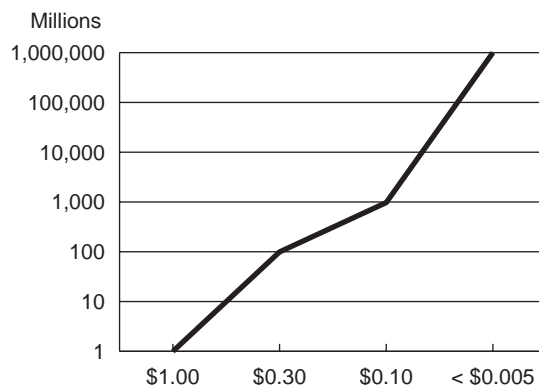
roughly equivalent to all RFID tags in operation today. As Figure 18 shows, as the price of RFID tags drop, deployment will rise rapidly.

Meanwhile, the race to push the price even lower will likely lead to new nanoscale manufacturing and labeling processes using organic polymers in place of silicon microcircuits. Such leading-edge work is underway by researcher Vivek Subramanian, in the labs of University of California, Berkeley, and could reach the marketplace before 2010. Subramanian's goal is a half-cent tag.

SENSORS: THE FOUNDATION OF MACHINE-TO-MACHINE COMMUNICATION

Sensors detect phenomena in the physical world. They can range from reactive materials that simply respond to environmental changes to complex structures like cameras and bio-analysis devices. Sensors have been with us for a long time. What's new is how small, smart, and communicative they're becoming.

Figure 18
RFID Tag Usage Will Reach the Trillion Mark by the End of the Decade
(RFID units deployed)



Source: Institute for the Future; IDTechE.

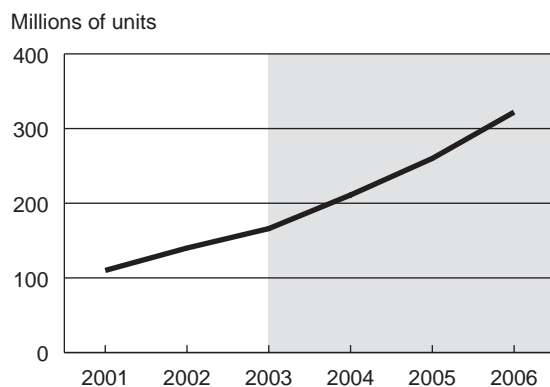
For example, Kris Pister at the University of California, Berkeley, is experimenting with what he calls “smart dust”—cubic-millimeter-sized particles that float in the air, take pictures or eavesdrop on a room, and communicate wirelessly. The Tiny OS®—an operating system designed especially for networked sensors—defines the standards for interacting with these tiny intelligent systems.

This operating system is the key to the evolution of sensor technology. Think of sensors as the input devices of the distributed computing environment. For much of future computing, the computer screen, the mouse, the keyboard—even the entrenched metaphor of windows—will be obsolete. These standard devices for the human-machine interface will be replaced by a multitude of interfaces, each drawing on different senses and used in different contexts. In other cases, there will be no human-machine interface at

all. Machines will talk to machines, and people will simply set the rules.

The big sensor story is: machine-to-machine communication, wireless and distributed, enabled by physical and digital tags. Two categories of sensors will have strong growth in the near term. First, a multitude of image sensors will be used in the next generation of cameras and monitors in both consumer and industrial markets (see Figure 19). Second, in the health arena, biochemical sensors will grow with the sales of diagnostic tests for cholesterol, cardiac risk, urinary tract infections, cancer, and a variety of blood tests, as well as the mainstay glucose monitoring tests (see Figure 20 on page 30). In addition to these biochemical sensors, biometric sensors (discussed in the section titled “Biometrics: Easy Access in a Shared Computing Environment”) are a key connective technology in their own right.

Figure 19
 Global Sales of Image Sensors Will More Than Double in Five Years
 (Units shipped annually)



Source: Institute for the Future; In-Stat/MDR.

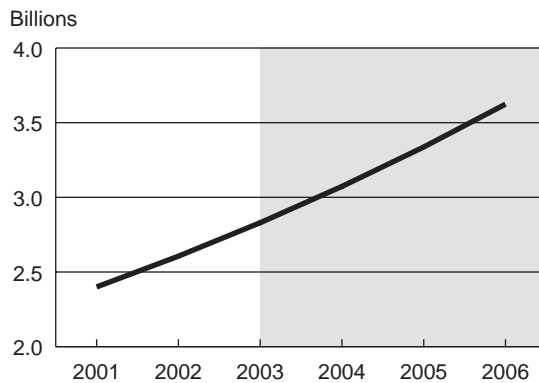
**SMART MATERIALS:
BORROWING FROM BIOLOGY**

Smart materials are engineered to perform specific tasks. Some are simply high-performance materials like the genetically-engineered dragline spider silk that Nexia Biotechnologies has demonstrated for making super-strong, super-light military uniforms. The smart materials that will change the world of connectivity, however, are those that function as both sensors and actuators, sensing changes in the environment, reacting to them, and even signaling their state.

Skin is a good example of a natural smart material. It senses the sunlight, changes pigmentation in response, and signals that tanning or burning is occurring. In fact, most biological materials are smart in some sense, and this is why organic templates are important both for designing and manufacturing smart materials.

The key to the development of smart materials is our growing understanding of, and ability to manipulate, the molecular world. For example, understanding how molecules cross porous membranes allows us to design materials that can function as delivery platforms or filters. A biofilter can protect a water or air supply from bacteria. Or a T-shirt can deliver vitamin C through the skin over an 8-hour period. Eventually, smart materials may be able to go as far as “sensing” our DNA and responding directly to our genotype—for both diagnoses and drug delivery. Other kinds of smart materials can be embedded with sensors. For example, they might be paints with millions of tiny sensors that respond to the environment and communicate with one another to strengthen the insulation in very cold or very muggy weather. Or they might be ink-jet fluids with organic molecules that respond to electrical signals;

*Figure 20
Biosensors Will Tap a Strong Market for Medical Devices
(Units shipped annually)*



Note: These include only biochemical sensors. Data on biometric sensors are shown in Figure 24.

Source: Institute for the Future; Freedonia.

such materials can be used to “print out” both sensor arrays and data displays. In short, they can become the output technology for the distributed computing of the future.

Investment in nanotechnology is a good proxy for the growth of smart materials (see Figure 21). Worldwide government spending on nanotechnology climbed steeply in 2001—90% over the previous year. Worldwide industrial production of nanotechnology is expected to reach \$1 trillion in 10 to 15 years.

**DISPLAYS:
 ANYWHERE, EVERYWHERE**

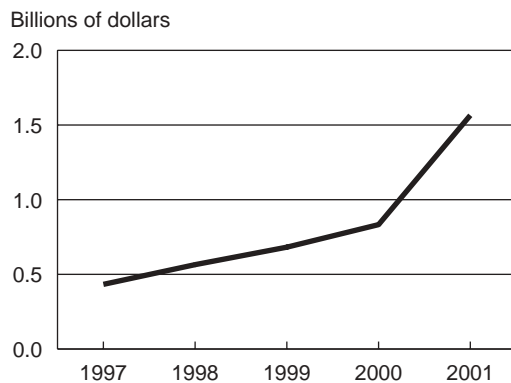
According to IFTF research, householders are constantly “searching for display.” They’re trying to move information, graphics, and other media from one display device to another. This is one of their primary motivations for setting up in-home networks, be they wired or wireless.

Display technology is poised to respond dramatically to this need. Two key technologies to watch are optical fibers, on one hand, and organic light-emitting diodes (LEDs) and light-emitting polymers (LEPs), on the other.

France Telecom, recently demonstrated the ability to weave optical fibers into a fabric display. The warp and weft of the fabric form a grid that functions much like a traditional grid of pixels on a computer screen to display anything a traditional screen can display—words, numbers, graphics, pictures, video. Because the display is literally a woven fabric, it can be sewn into clothing. France Telecom’s display made its debut on a T-shirt in 2002 (see Figure 22 on page 32).

Organic LEDs and LEPs are even more versatile. They can be manufactured using ink-jet technology to produce the equivalent of a computer screen on virtually any surface in any shape and size. Connected to RFID tags, these displays can turn any

Figure 21
 Worldwide Investment in Nanotechnology Rose Steeply in 2001
 (Investment in nanotechnology)



Source: National Science Foundation

object into an output device for an entire computing network—responding instantaneously to the universal “search for display.”

VOICE: TALKING TO THE WEB

Voice technology is not a single technology but a combination of technologies that deal with human speech and language—from voice recognition and voice synthesis to translation and speaker identification. The Holy Grail is voice searching—the ability to search streams of natural speech for key words and return meaningful syntheses. In other words, to converse.

Such a goal is still far off. Voice recognition remains most useful in limited and well-defined domains—either a limited set of people using standard vocabularies or a limited set of operations, also using standard vocabularies.

Figure 22
France Telecom's Optical Fiber Display Is a Fabric



Source: France Telecom

However, the combination of voice recognition and XML digital tagging is forging a new strategy for integrating voice applications with the Internet (see Figure 23). VoiceXML is a set of standards for building telephone-based speech recognition applications. These applications will typically act as “gateway” applications that interpret a caller’s questions and then search an intranet or the larger Internet for a response. The gateway application then reads the response to the caller. The combination of a limited domain—say, customer service for catalog orders—and data that is tagged for ready recognition by the VoiceXML application will provide an experience for users that sounds more and more like real conversation.

In theory, VoiceXML applications open the entire Web to the telephone caller—any page that’s appropriately tagged could be read aloud by the voice application. In reality, though, most Web pages are not written for the kinds of conversational exchanges voice applications are likely to support. So VoiceXML is likely to remain a technology for specialized domains, where content is developed specifically for phone access. At the same time, the relative ease of creating VoiceXML applications is likely to expand the number of domains where such content is available.

BIOMETRICS: EASY ACCESS IN A SHARED COMPUTING ENVIRONMENT

Biometrics is all about using distinctive human features—from fingerprints and retinal patterns to DNA—to identify individual people. The underlying technology has three basic components: a sensor device that scans the feature, a library of previously collected samples of these features, and a set of pat-

tern-matching algorithms that correlate the sensor data with the library. These components may communicate directly, but more typically, the sensor device is remote from either the pattern-matching software or the database or both. The patterns they match could be fingerprints, faces, irises, voices, signatures, or even keyboard dynamics.

How will the technology be applied? The headline-grabbing applications, like searching the crowd at the Super Bowl for the faces of known criminals using face recognition software, are certainly getting a boost from the war on terrorism. But the more pervasive use will focus on authenticating transactions—proving that a person is who she or he claims to be when making a purchase or boarding a plane, for example.

The leading edge of biometric technology is a process known as “dynamic thresholding.” This process recognizes that different transactions demand different levels of cer-

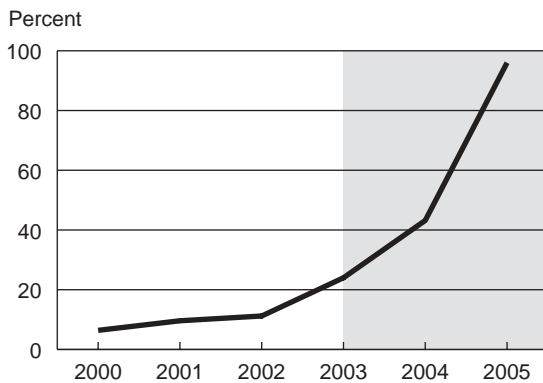
tainty of authentication. For example, a \$10 purchase in the grocery store probably doesn’t require the same certainty as a \$400,000 purchase in a jewelry store. Dynamic thresholding provides verification thresholds based on such factors—as well as the user profile.

In a connected world, embedded with sensors and displays, biometrics may be less a matter of security and more a matter of easy access. As the security applications drive the cost of biometric components down, biometrics could become the log-in method of choice—particularly in public or shared work and play spaces (see Figure 24 on page 34).

**SMALL-SCALE POWER:
 LIGHTING UP THE WIRELESS GRID**

Small-scale power is compact, lightweight, and long lasting. It is also premium power—power that people are willing to pay more for. The highest premiums go to mobility

Figure 23
 Almost All U.S. Households Will Use Voice-Activated Web Services by 2005
 (Percent of households with voice-activated web services)



Source: Verascape

applications like cellphones and laptops, the lowest to automobiles—which means that these small-scale power technologies will find their way into mobility applications before they are widely adopted for automobiles (see Figure 25).

The technologies of small-scale power range from nanoscale batteries that power medical and hand-held devices to fuel cells large enough to power remote wireless towers for extended periods of time. In between are micro-turbines and fuel cells for cars—especially cars with power-hungry electronics options, such as location tracking and Internet access.

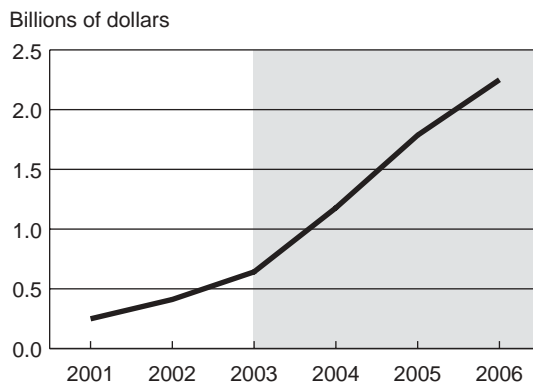
One of the most interesting developments in small-scale power is the printable battery. An Israeli company called Power Paper has developed a silk-screen process for printing zinc and manganese inks on paper to form 1.5 volt power circuits. These circuits can be used to power displays or packaging embedded with sensors.

Equally interesting are a handful of labs and startups, such as Bipolar Technologies (in cooperation with Brigham Young University), which have developed lithium ion microbatteries that can be printed using ink-jet technology. What makes these printable batteries interesting are the implications for manufacturing: printing technology, whether lithographic or ink-jet, offers the potential for integrating cheap, lightweight power into other components such as microcircuits or ink-jet printed displays. This integration, in turn, will drive down the cost and size of tags, sensors, displays, antennas, and other essential components of distributed computing.

CONCLUSION: UBIQUITOUS COMPUTING BECOMES A REALITY

In 1991, Mark Weiser, former Chief Technology Officer at Xerox PARC, coined the term “ubiquitous computing” and predicted that it would be the third wave of computing. He said that ubiquitous computing could be defined by what it is not:

Figure 24
Biometrics Revenue Will Grow Rapidly Over Next Few Years
(Worldwide revenue from sale of biometrics components)



Source: International Biometric Industry Association

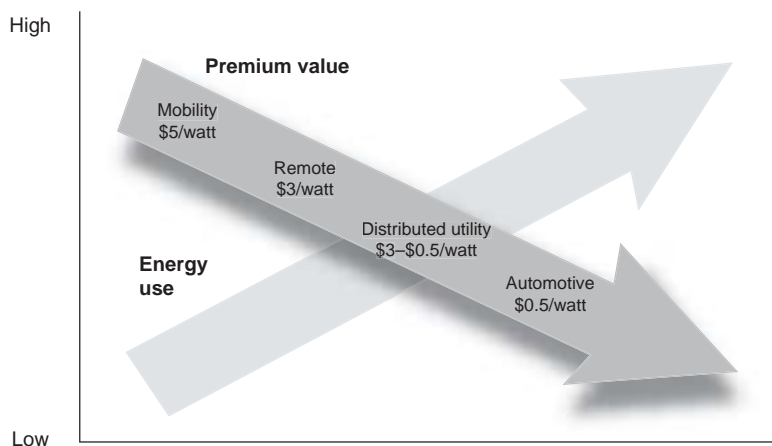
Ubiquitous computing is roughly the opposite of virtual reality. Where virtual reality puts people inside a computer-generated world, ubiquitous computing forces the computer to live out here in the world with people.

The ten connective technologies described in this article are the backbone of the computer that will “live out here in the world with people.” If they seem a little clumsy or unconvincing at the moment, it’s because we only have the past to measure them by. It’s hard to imagine their future form because we tend to view them through the lens of our existing tools and processes. What’s more, these new technologies will need to find their first applications in existing marketplaces, which means they need to meet the business demands of today while at the same time transforming the business world of tomorrow.

So where do we stand? Technologies usually take about 20 years to mature, from initial concept to “overnight success.” We are now halfway through the cycle of development for ubiquitous computing. By the end of the coming decade, we should see the technologies we’re talking about here in widespread use. Except we won’t really “see” them at all—and that’s part of the coming revolution. As Weiser said in his inaugural paper on ubiquitous computing: “The most profound technologies are those that disappear.” And the connective technologies will do just that. They will move off our desktops and into the fabric of our daily lives—sometimes literally. In so doing, they’ll reframe not only the world of computing but many of the basic processes of business as well.

—Kathi Vian
 with contributions from
 Frank Baitman, Howard Bornstein,
 Bill Cockayne, Harvey Lehtman,
 and Alex Soojung-Kim Pang

Figure 25
 As Power Premium Decreases, Energy Use Increases



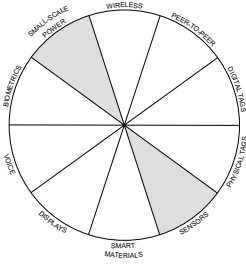
Source: Institute for the Future; National Institute of Standards and Technology.



Connectivity: Ten Key Innovations

In the article, “Connectivity: Ten Technologies to Watch,” we describe ten technologies that will connect our homes, workplaces, machines, and ideas more tightly together in the future. Each of the ten connective technologies is potentially world-changing in its own right. But when two or more of them are combined, they create rich platforms for innovation.

Here we present ten key innovations, each of which combines two or more of these technologies that will alter some of our basic assumptions about the world of business, including organizational infrastructure, ways of meeting workers’ needs, and opportunities for engaging consumers. In almost every case, a specific technological breakthrough holds the potential for broader technological and organizational change.



Sensors
Small-Scale Power

1. INTEGRATED POWER MANAGEMENT

At the intersection of sensors and small-scale power technologies are integrated power electronics modules (IPEMs). IPEMs are a way of packaging together semiconductor devices, power integrated circuits, sensors, and protection circuits to make electrical devices of all kinds more efficient. Essentially, IPEMs reprocess the power coming into the module so that the device uses only as much power as needed, when it is needed, as determined by the sensors. By responding more sensitively to the needs of the device and its environment, IPEMs can boost energy performance in everything from laptop computers to automobiles.

The leading proponent of IPEMs is the Center for Power Electronics Systems (CPES), which is an National Science Foundation Engineering Research Center distributed across five university campuses. CPES hopes to use IPEMs to reduce worldwide energy consumption by 35% by improving power electronics systems.

Today, approximately 40% of electric power generated is reprocessed through some form of electronics power system. With the introduction of IPEMs, that percentage could double by 2010.

IPEM technology is perhaps comparable to the very-large-scale integrated (VLSI) circuit technology that advanced computers and telecommunications so rapidly in the last few decades. The key to the success of VLSI was integrating components to produce circuits that could be mass produced much more cheaply than systems built of multiple custom circuits. In the same way, IPEMs will integrate the components of power electronics systems to make them suitable for automated manufacturing and mass production. While widespread commercial adoption is probably ten years away, IPEMs represent a paradigm shift for designers of all kinds of power-consuming devices, and will thus touch virtually every industry.

2. SELF-CONFIGURING NETWORKS

The key to success in the world of “smart stuff” will be self-configuring sensor networks. These networks will differ from today’s data networks. They will be denser. Their nodes will be more mutable and often less locatable. In many cases, sensor networks will be deployed in rugged or remote locations on a moment’s notice, sometimes dropped into an area from a plane, for example. It will be impossible to place sensors individually and precisely; it will be equally impossible to manage them by means of central control. All of these characteristics mean that these future networks will have to self-configure—they will have to create an ad hoc network structure on the fly and plug themselves into it autonomously.

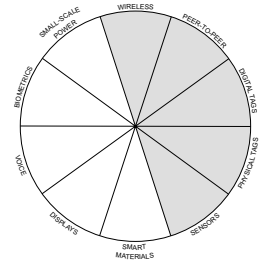
Deborah Estrin and her colleagues at University of California, Los Angeles and University of Southern California are currently tackling the problem of how to program thousands of low-power, wireless, physically embedded nodes to carry out autonomous tasks without global control, using new network algorithms that even go beyond peer-to-peer. They point to a number of shifts in the way such networks will be managed.

For example, today’s network managers are primarily concerned with optimizing the use of bandwidth and minimizing the num-

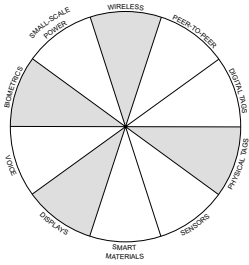
ber of nodes. In a world of self-configuring networks, however, IT managers will need to be more concerned with things like determining the optimum sensor density to create long-lived systems where individual nodes are prone to failure, or using sensors with multiple capabilities to increase the robustness of the network. The vagaries of timing and location in sensor networks will place more importance on naming the data than naming the nodes; digital tags will take the place of server addresses, for example.

Finally, tomorrow’s IT managers will require innovative ways to link local nodes to one another in real time for collaborative tasks—for example, to find all the sensors in a manufacturing plant that have some information about volatile compounds and use them to create an ad hoc safety profile or evaluate the exposure of employees.

While these innovations will drive the success of sensors and the world of embedded intelligence, they will also lay the groundwork for new ways of designing autonomous self-configuring distributed systems in general. These new designs will help IT managers solve problems with larger-scale systems, such as how to update data or applications on a variety of devices and platforms across an entire mobile workforce.



- Wireless
- Peer-to-Peer
- Digital Tags
- Physical Tags
- Sensors



Wireless
Physical Tags
Displays
Biometrics

3. HOT SPOT ACCESS

Cellular phones defined a world of *mobility* in which the objective was ubiquitous coverage. Wi-Fi will define a world of *connectivity*, in which the objective is rich connections in appropriate places. Rather than “everything, everywhere,” Wi-Fi connectivity is about “right stuff, right place.” Indeed, Wi-Fi is built around hot spots—places where people and information naturally come together to create an information- or media-rich experience.

Hot spots have a different imperative—and offer different opportunities—from ubiquitous mobile systems. First, because they are place-based, they offer not only a wireless connection, but also displays and input devices. For example, as displays break out of their small-screen format, they could show up in cafés as interactive tabletops or menus or even smart thermal mugs that both keep your drink warm and show you the latest stock prices. Biometric sensors could recognize regular customers from their touch, and turn any one of these displays into a window on the customer’s own information world. With this kind of connectivity, we will no longer need to carry handhelds everywhere we go.

The same strategy may ultimately replace the one-person/one-cubicle view of the corporate workspace. Rather than providing uniform connectivity and physical resources for lots of nearly identical cells, workspaces could be modeled after hot spots, with rich wireless connectivity in key gathering places and flexible use of the new types of displays and biometrics to provide ad hoc work surfaces, all linked to network data and services (using self-configuring network architectures).

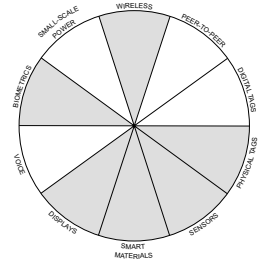
Of course, customers and workers alike will co-create their hot spot environments. Personal displays—whether handheld or woven into the fabric of workers’ clothes—might collaborate with group wall displays. For example, several workers could scribble on their pant legs—they’re handy, after all, if you’re sitting around on comfortable sofas—and their sketches would immediately show up on the group board. In commercial hot spots, patrons might “tag” physical places with information of their own—restaurant reviews, for example, or a thumbs up/thumbs down tag for the current flicks at the multiplex. All these innovations will add to the richness of the hot spot, so that it evolves in time to meet the needs and tastes of particular users, whether social or work related.

4. SMART UNIFORMS

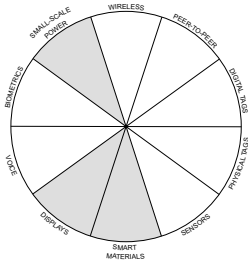
One of the most vibrant portals to the connected world of the future will be smart clothing. Indeed, the familiar blue workers' coveralls may be replaced in the not-too-distant future by smart uniforms.

Smart uniforms are enabled by smart materials. Smart clothing made from these materials will be able to do many things—regulate body temperature, act as delivery platforms for supplements and nutrients, or monitor exposure to toxins or radiation. For example, Mahmoud El-Sherif, one of America's leading inventors in the area of fiber optics, has developed techniques for manufacturing smart materials with fiber optic sensors that can detect a variety of chemical toxins, as well as monitor general health. These might not only alert the wearer with visual displays but also communicate the dangers to remote control centers (doing those ad-hoc sensor-based safety evaluations mentioned previously, for example).

While not every business needs to equip its workers with “costumes” of super-hero strength and endurance, smart uniforms might eventually become part of a company's brand. The National Textile Center has been working for the last few years on chameleon fibers that change color in response to electrical signals. The center foresees that these “color-tunable” fibers will be used not only for practical military fabrics, for example, but also for commercial and fashion designs. Imagine workers in large warehouse-style retail outlets who can change the color of their aprons at the flip of a switch to indicate when they are available to help customers and when they're busy helping others. Or perhaps they could become walking advertisements for specials in a given location in the store—the ad would change as they moved from aisle to aisle.



- Wireless
- Physical Tags
- Sensors
- Smart Material
- Displays
- Biometrics



Smart Materials
Displays
Small-Scale Power

5. DESKTOP MANUFACTURING

Smart materials and small-scale power change the scale of manufacturing dramatically. Often these technologies can be manipulated at the molecular level—that is, scientists can take advantage of molecular behavior to place small numbers of molecules precisely. This so-called nano-scale manufacturing will probably develop first in the world of electronics and photonics, where it could lead to a major revolution in how consumer products are produced—*on the desktop*.

The key technology for this paradigm shift is ink-jet printing. As advances in microfluidics allow increasing precision in the placement of molecules on a surface, ink-jet technology could become the basis of a new desktop manufacturing model. For example, in the future, workers might “print out” their own cellphones and PDAs. These disposable electronics would include not only the logic, but also the displays and battery power (both

capable of being printed by ink-jet technology). Just as desktop printers overcame the expense and expert knowledge required in the lithographic pressroom, ink-jet printers might ultimately package the materials for custom electronics in tidy plug-in modules that individual workers can use on their own.

Even if individual workers don’t manufacture their own equipment, electronics manufacturing may eventually look more like an office operation than a factory operation. At the same time, such processes will likely spawn a burst of innovation as the just-in-time nature of desktop manufacturing tools come to support the rapid prototyping of new products. The model will almost certainly spread to other smart materials as well. Eventually, it might even spread into the home, in the same way desktop printers made printing a pervasive consumer activity.

6. SELF-ANALYZING CALL CENTERS

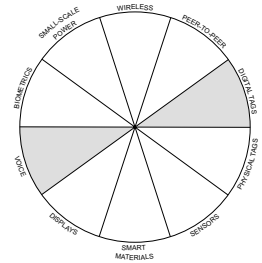
One of the most important applications of voice technology in the business world is likely to be in the design of better call centers. Currently, call centers are expensive operations, particularly when the interactions are more complex than simple catalog orders. New offerings, incorporating digital tagging, are beginning to streamline such operations by going beyond simple transactional calls to address informational calls as well.

For example, a company called TuVox has a conversational voice recognition system that it is using to automate call centers in two key areas: health applications for patients who need information, and technical support for business and consumer products. Rather than a menu system, the voice recognition technology allows the dialog to begin with the question “What are you calling about?” The system can then respond much more rapidly to the precise interest of the caller instead of forcing the caller through a predetermined script of choices that may or may not apply to the situation.

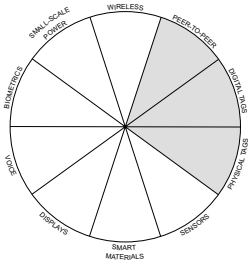
In addition to being more user-friendly, such systems create the opportunity for call centers to learn from customers. Combining speech recognition with digital tags—

remember VoiceXML?—call centers will be able to search any Web content in their domain to find the needed information. Their domain could be a preconfigured set of VoiceXML Web pages, or the call center could also have access to other Web domains, both within the organization and outside it. Such capabilities might be especially important for health applications in which the information could come from a variety of sources. Simple tools could allow the scripts themselves to evolve to take advantage of known pathways to information. In other words, they could self-analyze to find the most frequently asked questions and the shortest paths to a satisfying answer. This learning could then be automatically incorporated into their responses. They could even recognize individual callers and know what the caller has heard before.

Taking this vision to the next step, these systems can also be designed to provide statistics and maps of their activity. Just as Web pages are configured to count hits, VoiceXML content can be configured to do content analyses of customer interactions, for example.



Digital Tags
 Voice



Peer-to-Peer
Digital Tags
Physical Tags

7. SELF-CONFIGURING SUPPLY CHAINS

Supply chains shape today’s economy, and the new connected technologies could change the way they organize and operate.

The companies that have been most successful in recent years have been those who (like Wal-Mart) have been able to manage communication and coordination throughout their supply chains. These tasks have been aided by large investments in information technology that allows the exchange of data across several partner companies. The investments required, however, have been so large as to limit the number of partners who can participate. Often, only the largest companies can compete.

Digital tags—using basic XML standards—are likely to change all this. A number of initiatives are underway to create standards for supply chain communications that even medium and small firms can easily implement. For example, RosettaNet is a nonprofit organization that has developed Partner Interface Processes (PIPs), using XML as an underlying standard. Intel has recently introduced a software toolkit aimed at helping small- and medium-sized companies develop RosettaNet applications.

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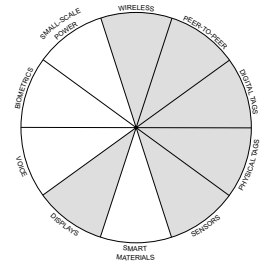
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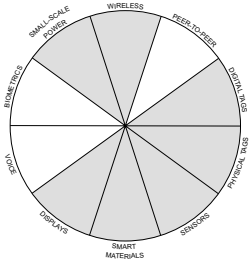
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- Wireless
- Peer-to-Peer
- Digital Tags
- Physical Tags
- Sensors
- Displays



Wireless
Digital Tags
Physical Tags
Sensors
Smart Materials
Displays
Small-Scale Power

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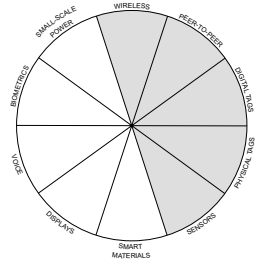
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IMPLICATIONS

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Cross-Organizational Communication Will Increase

The new trick that organizations, both large and small, will have to learn in the next couple years is how to take advantage of the new opportunities to communicate across organizational boundaries. As manufactured products talk to one another, as business documents automatically set up contracts with new partners in unusual places, as customers call in for product information that crosses brand or even corporate boundaries, the most successful companies will be those that are able to make a fleet-footed shift from firewalls to security-tagged data. Just as digital tags will liberate data from databases, they will free data—even highly restricted data—locked behind their firewalls. The security level and ownership of the data will travel with it, and only those who should have access will be able to use it. The technical linchpins of this shift will be XML and web services, but the change will re-tool the thinking of everyone from IT and operations managers to product managers and corporate legal analysts.

Integrated Design–Manufacture–Sales Cycles Will Speed Innovation

The innovative technologies we've discussed connect not only people and objects, but also processes through time. In particu-

lar, they provide the opportunity for greater integration of the design, manufacture, and sales cycles.

For example, with desktop manufacturing, rapid prototyping will become almost indistinguishable from initial product runs for early customers who provide immediate feedback to the design process. The world of software development provides the model, with its rapid iteration of versions made possible by the fact that the process to manufacture and distribute one version is virtually identical to the process for manufacturing all versions. Certain classes of physical goods, constructed molecularly rather than mechanically, will begin to follow a similar pattern. Even for products not amenable to nanoscale production methods, the more flexible coupling of these processes will provide more opportunities to experiment with product designs, try out a variety of manufacturing suppliers, and explore alternative distribution channels. All of this will lead to more rapid innovation throughout the business environment.

Material Again Will Become the Stuff of Business

The past half century has seen the continuous growth in the value of information in the business world. Material goods have become commodities, distinguished in large part by their information content—their brand, their service support, the ability of their manufacturers and retailers to trim costs by integrating operations with the help of information technology. Along with this trend, the value of office workers has grown tremendously, focusing organizational attention on how to support the all-important information worker.

This trend may be about to reverse itself for several reasons. First, information will increasingly be embedded in physical objects: that is, it will be manufactured right into the objects. Second, increasingly smart materials will be produced using processes that blur the boundary between design and manufacture. Finally, goods will increasingly use their own embedded intelligence to communicate with one another and make decisions about their own handling, performing functions that previously were managed by information workers. As a result, one of the most important strategic tasks for companies in the next decade will be to begin to re-imagine the workforce that will be required for this new world that is both material and infomated at the same time—and the infrastructure that will be required to support it.

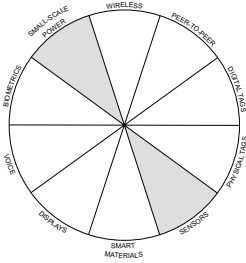
—Kathi Vian
with contributions from
Frank Baitman, Howard Bornstein,
Bill Cockayne, Harvey Lehtman,
and Alex Soojung-Kim Pang



Connectivity: Ten Key Innovations

In the article, “Connectivity: Ten Technologies to Watch,” we describe ten technologies that will connect our homes, workplaces, machines, and ideas more tightly together in the future. Each of the ten connective technologies is potentially world-changing in its own right. But when two or more of them are combined, they create rich platforms for innovation.

Here we present ten key innovations, each of which combines two or more of these technologies that will alter some of our basic assumptions about the world of business, including organizational infrastructure, ways of meeting workers’ needs, and opportunities for engaging consumers. In almost every case, a specific technological breakthrough holds the potential for broader technological and organizational change.



Sensors
Small-Scale Power

1. INTEGRATED POWER MANAGEMENT

At the intersection of sensors and small-scale power technologies are integrated power electronics modules (IPEMs). IPEMs are a way of packaging together semiconductor devices, power integrated circuits, sensors, and protection circuits to make electrical devices of all kinds more efficient. Essentially, IPEMs reprocess the power coming into the module so that the device uses only as much power as needed, when it is needed, as determined by the sensors. By responding more sensitively to the needs of the device and its environment, IPEMs can boost energy performance in everything from laptop computers to automobiles.

The leading proponent of IPEMs is the Center for Power Electronics Systems (CPES), which is an National Science Foundation Engineering Research Center distributed across five university campuses. CPES hopes to use IPEMs to reduce worldwide energy consumption by 35% by improving power electronics systems.

Today, approximately 40% of electric power generated is reprocessed through some form of electronics power system. With the introduction of IPEMs, that percentage could double by 2010.

IPEM technology is perhaps comparable to the very-large-scale integrated (VLSI) circuit technology that advanced computers and telecommunications so rapidly in the last few decades. The key to the success of VLSI was integrating components to produce circuits that could be mass produced much more cheaply than systems built of multiple custom circuits. In the same way, IPEMs will integrate the components of power electronics systems to make them suitable for automated manufacturing and mass production. While widespread commercial adoption is probably ten years away, IPEMs represent a paradigm shift for designers of all kinds of power-consuming devices, and will thus touch virtually every industry.

2. SELF-CONFIGURING NETWORKS

The key to success in the world of “smart stuff” will be self-configuring sensor networks. These networks will differ from today’s data networks. They will be denser. Their nodes will be more mutable and often less locatable. In many cases, sensor networks will be deployed in rugged or remote locations on a moment’s notice, sometimes dropped into an area from a plane, for example. It will be impossible to place sensors individually and precisely; it will be equally impossible to manage them by means of central control. All of these characteristics mean that these future networks will have to self-configure—they will have to create an ad hoc network structure on the fly and plug themselves into it autonomously.

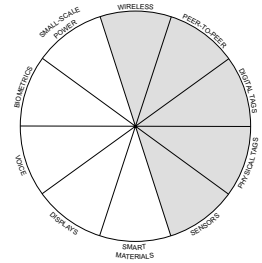
Deborah Estrin and her colleagues at University of California, Los Angeles and University of Southern California are currently tackling the problem of how to program thousands of low-power, wireless, physically embedded nodes to carry out autonomous tasks without global control, using new network algorithms that even go beyond peer-to-peer. They point to a number of shifts in the way such networks will be managed.

For example, today’s network managers are primarily concerned with optimizing the use of bandwidth and minimizing the num-

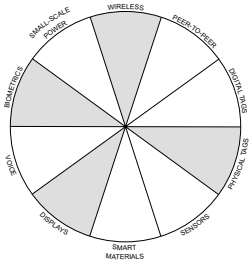
ber of nodes. In a world of self-configuring networks, however, IT managers will need to be more concerned with things like determining the optimum sensor density to create long-lived systems where individual nodes are prone to failure, or using sensors with multiple capabilities to increase the robustness of the network. The vagaries of timing and location in sensor networks will place more importance on naming the data than naming the nodes; digital tags will take the place of server addresses, for example.

Finally, tomorrow’s IT managers will require innovative ways to link local nodes to one another in real time for collaborative tasks—for example, to find all the sensors in a manufacturing plant that have some information about volatile compounds and use them to create an ad hoc safety profile or evaluate the exposure of employees.

While these innovations will drive the success of sensors and the world of embedded intelligence, they will also lay the groundwork for new ways of designing autonomous self-configuring distributed systems in general. These new designs will help IT managers solve problems with larger-scale systems, such as how to update data or applications on a variety of devices and platforms across an entire mobile workforce.



- Wireless
- Peer-to-Peer
- Digital Tags
- Physical Tags
- Sensors



Wireless
Physical Tags
Displays
Biometrics

3. HOT SPOT ACCESS

Cellular phones defined a world of *mobility* in which the objective was ubiquitous coverage. Wi-Fi will define a world of *connectivity*, in which the objective is rich connections in appropriate places. Rather than “everything, everywhere,” Wi-Fi connectivity is about “right stuff, right place.” Indeed, Wi-Fi is built around hot spots—places where people and information naturally come together to create an information- or media-rich experience.

Hot spots have a different imperative—and offer different opportunities—from ubiquitous mobile systems. First, because they are place-based, they offer not only a wireless connection, but also displays and input devices. For example, as displays break out of their small-screen format, they could show up in cafés as interactive tabletops or menus or even smart thermal mugs that both keep your drink warm and show you the latest stock prices. Biometric sensors could recognize regular customers from their touch, and turn any one of these displays into a window on the customer’s own information world. With this kind of connectivity, we will no longer need to carry handhelds everywhere we go.

The same strategy may ultimately replace the one-person/one-cubicle view of the corporate workspace. Rather than providing uniform connectivity and physical resources for lots of nearly identical cells, workspaces could be modeled after hot spots, with rich wireless connectivity in key gathering places and flexible use of the new types of displays and biometrics to provide ad hoc work surfaces, all linked to network data and services (using self-configuring network architectures).

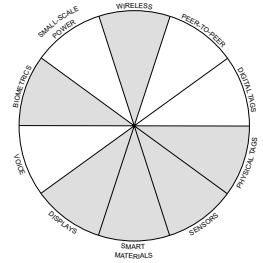
Of course, customers and workers alike will co-create their hot spot environments. Personal displays—whether handheld or woven into the fabric of workers’ clothes—might collaborate with group wall displays. For example, several workers could scribble on their pant legs—they’re handy, after all, if you’re sitting around on comfortable sofas—and their sketches would immediately show up on the group board. In commercial hot spots, patrons might “tag” physical places with information of their own—restaurant reviews, for example, or a thumbs up/thumbs down tag for the current flicks at the multiplex. All these innovations will add to the richness of the hot spot, so that it evolves in time to meet the needs and tastes of particular users, whether social or work related.

4. SMART UNIFORMS

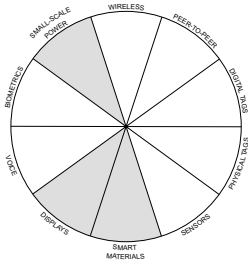
One of the most vibrant portals to the connected world of the future will be smart clothing. Indeed, the familiar blue workers' coveralls may be replaced in the not-too-distant future by smart uniforms.

Smart uniforms are enabled by smart materials. Smart clothing made from these materials will be able to do many things—regulate body temperature, act as delivery platforms for supplements and nutrients, or monitor exposure to toxins or radiation. For example, Mahmoud El-Sherif, one of America's leading inventors in the area of fiber optics, has developed techniques for manufacturing smart materials with fiber optic sensors that can detect a variety of chemical toxins, as well as monitor general health. These might not only alert the wearer with visual displays but also communicate the dangers to remote control centers (doing those ad-hoc sensor-based safety evaluations mentioned previously, for example).

While not every business needs to equip its workers with “costumes” of super-hero strength and endurance, smart uniforms might eventually become part of a company's brand. The National Textile Center has been working for the last few years on chameleon fibers that change color in response to electrical signals. The center foresees that these “color-tunable” fibers will be used not only for practical military fabrics, for example, but also for commercial and fashion designs. Imagine workers in large warehouse-style retail outlets who can change the color of their aprons at the flip of a switch to indicate when they are available to help customers and when they're busy helping others. Or perhaps they could become walking advertisements for specials in a given location in the store—the ad would change as they moved from aisle to aisle.



- Wireless
- Physical Tags
- Sensors
- Smart Material
- Displays
- Biometrics



Smart Materials
Displays
Small-Scale Power

5. DESKTOP MANUFACTURING

Smart materials and small-scale power change the scale of manufacturing dramatically. Often these technologies can be manipulated at the molecular level—that is, scientists can take advantage of molecular behavior to place small numbers of molecules precisely. This so-called nano-scale manufacturing will probably develop first in the world of electronics and photonics, where it could lead to a major revolution in how consumer products are produced—*on the desktop*.

The key technology for this paradigm shift is ink-jet printing. As advances in microfluidics allow increasing precision in the placement of molecules on a surface, ink-jet technology could become the basis of a new desktop manufacturing model. For example, in the future, workers might “print out” their own cellphones and PDAs. These disposable electronics would include not only the logic, but also the displays and battery power (both

capable of being printed by ink-jet technology). Just as desktop printers overcame the expense and expert knowledge required in the lithographic pressroom, ink-jet printers might ultimately package the materials for custom electronics in tidy plug-in modules that individual workers can use on their own.

Even if individual workers don’t manufacture their own equipment, electronics manufacturing may eventually look more like an office operation than a factory operation. At the same time, such processes will likely spawn a burst of innovation as the just-in-time nature of desktop manufacturing tools come to support the rapid prototyping of new products. The model will almost certainly spread to other smart materials as well. Eventually, it might even spread into the home, in the same way desktop printers made printing a pervasive consumer activity.

6. SELF-ANALYZING CALL CENTERS

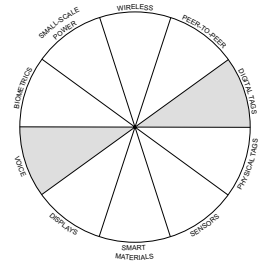
One of the most important applications of voice technology in the business world is likely to be in the design of better call centers. Currently, call centers are expensive operations, particularly when the interactions are more complex than simple catalog orders. New offerings, incorporating digital tagging, are beginning to streamline such operations by going beyond simple transactional calls to address informational calls as well.

For example, a company called TuVox has a conversational voice recognition system that it is using to automate call centers in two key areas: health applications for patients who need information, and technical support for business and consumer products. Rather than a menu system, the voice recognition technology allows the dialog to begin with the question “What are you calling about?” The system can then respond much more rapidly to the precise interest of the caller instead of forcing the caller through a predetermined script of choices that may or may not apply to the situation.

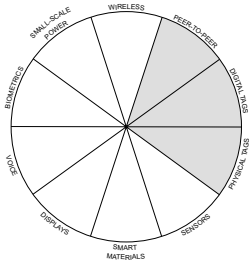
In addition to being more user-friendly, such systems create the opportunity for call centers to learn from customers. Combining speech recognition with digital tags—

remember VoiceXML?—call centers will be able to search any Web content in their domain to find the needed information. Their domain could be a preconfigured set of VoiceXML Web pages, or the call center could also have access to other Web domains, both within the organization and outside it. Such capabilities might be especially important for health applications in which the information could come from a variety of sources. Simple tools could allow the scripts themselves to evolve to take advantage of known pathways to information. In other words, they could self-analyze to find the most frequently asked questions and the shortest paths to a satisfying answer. This learning could then be automatically incorporated into their responses. They could even recognize individual callers and know what the caller has heard before.

Taking this vision to the next step, these systems can also be designed to provide statistics and maps of their activity. Just as Web pages are configured to count hits, VoiceXML content can be configured to do content analyses of customer interactions, for example.



Digital Tags
 Voice



Peer-to-Peer
Digital Tags
Physical Tags

7. SELF-CONFIGURING SUPPLY CHAINS

Supply chains shape today's economy, and the new connected technologies could change the way they organize and operate.

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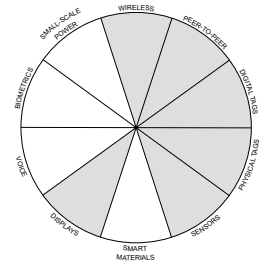
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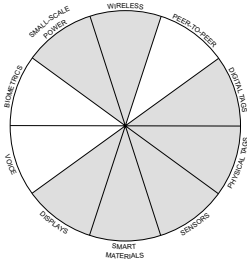
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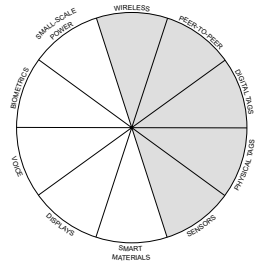
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The new trick that organizations, both large and small, will have to learn in the next couple years is how to take advantage of the new opportunities to communicate across organizational boundaries. As manufactured products talk to one another, as business documents automatically set up contracts with new partners in unusual places, as customers call in for product information that crosses brand or even corporate boundaries, the most successful companies will be those that are able to make a fleet-footed shift from firewalls to security-tagged data. Just as digital tags will liberate data from databases, they will free data—even highly restricted data—locked behind their firewalls. The security level and ownership of the data will travel with it, and only those who should have access will be able to use it. The technical linchpins of this shift will be XML and web services, but the change will re-tool the thinking of everyone from IT and operations managers to product managers and corporate legal analysts.

Integrated Design–Manufacture–Sales Cycles Will Speed Innovation

The innovative technologies we've discussed connect not only people and objects, but also processes through time. In particu-

lar, they provide the opportunity for greater integration of the design, manufacture, and sales cycles.

For example, with desktop manufacturing, rapid prototyping will become almost indistinguishable from initial product runs for early customers who provide immediate feedback to the design process. The world of software development provides the model, with its rapid iteration of versions made possible by the fact that the process to manufacture and distribute one version is virtually identical to the process for manufacturing all versions. Certain classes of physical goods, constructed molecularly rather than mechanically, will begin to follow a similar pattern. Even for products not amenable to nanoscale production methods, the more flexible coupling of these processes will provide more opportunities to experiment with product designs, try out a variety of manufacturing suppliers, and explore alternative distribution channels. All of this will lead to more rapid innovation throughout the business environment.

Material Again Will Become the Stuff of Business

The past half century has seen the continuous growth in the value of information in the business world. Material goods have become commodities, distinguished in large part by their information content—their brand, their service support, the ability of their manufacturers and retailers to trim costs by integrating operations with the help of information technology. Along with this trend, the value of office workers has grown tremendously, focusing organizational attention on how to support the all-important information worker.

This trend may be about to reverse itself for several reasons. First, information will increasingly be embedded in physical objects: that is, it will be manufactured right into the objects. Second, increasingly smart materials will be produced using processes that blur the boundary between design and manufacture. Finally, goods will increasingly use their own embedded intelligence to communicate with one another and make decisions about their own handling, performing functions that previously were managed by information workers. As a result, one of the most important strategic tasks for companies in the next decade will be to begin to re-imagine the workforce that will be required for this new world that is both material and infomated at the same time—and the infrastructure that will be required to support it.

—Kathi Vian
with contributions from
Frank Baitman, Howard Bornstein,
Bill Cockayne, Harvey Lehtman,
and Alex Soojung-Kim Pang



Food and Energy: The Ties That Bind

Over the centuries, competition for food and energy resources, and the land from which they come, have caused wars, international conflicts, ideological revolts, and social turmoil. Indeed, just about any dispute in history has some roots in the demand for one of these resources, including the fundamental conflicts in the Middle East today. Country A has the land that can grow the crops or provide fuel for itself and others. Country B does not. So Country B decides to expand its borders or to exert its influence over the resource-rich lands of Country A. Then perhaps Country C, a food- or energy-hungry trading partner of Country A, intervenes. The search for security of supply of these basic inputs remains a key focus on contention.

While the context has changed as we enter the 21st century, the basic premise has not. Countries need assured access to food and energy resources, and insecurities or conflicts arise when they feel they don't have it. Indeed, key foreign policy decisions of the 21st century are still more likely to be driven by the traditional sectors of energy and food than by the so-called new economy. Even in the new economy, assured supplies of food and fuel are more basic needs than the latest mobile communications device.

Today, the situation becomes even more complex as the increased populations and growing affluence of many rapidly developing nations increase the world demand for food and fuel. Look for the expanding demand of developing countries for food and fuel combined with the ongoing growth of the economies of the traditional economic superpowers to lead to new and shifting alliances in the next decade.

HISTORY: CONFLICTS COME DOWN TO FOOD AND FUEL

Food and fuel are at the heart of a prosperous and healthy life. And it is one of the imperatives of successful governments to ensure a secure supply of both to its citizens. In fact, historically, international relations have often come down to issues of access to food and fuel.

Conflicts over energy resources have been particularly important in the last century. The Persian Gulf has been the center of huge power struggles since the oil fields were opened there early in the 20th century. In Europe, the bitter rivalries that led to the great wars of the first half of the 20th century were exacerbated by the Franco-German borderlands dispute over the coal resources

of Alsace-Lorraine and the Saarland. Similarly, conflict over the Silesian coal fields (mostly in what is now Poland and the Czech Republic) set up a bitter rivalry among Germany, Russia, Poland, and Austria. Such conflicts are not just a western phenomenon. Japan's entry into World War II was driven, to some extent, by the oil embargo imposed by the western powers on Japan. Today, conflicts in Venezuela, Nigeria, and the Caucasus send tremors through the oil markets.

Access to adequate food resources has caused conflict much longer as countries have vied for centuries over borders that included rich and fertile land. The rich agricultural plains of North Europe that sweep through northern France, Belgium, and Germany are traditional areas of conflict and border change. Countries with rich agricultural lands like Poland, Hungary, and the Ukraine have been traditional areas of big power rivalries. England, long a grain deficit country, spent considerable national resources colonizing and defending grain-exporting areas like Canada, Australia, and South Africa.

For hundreds of years, the national policy of just about every country was to feed a rapidly growing domestic population from lands controlled by that country. But England redefined that principle in the 18th and 19th centuries by realizing that it would be more efficient to shift its own rural population into the rapidly growing manufacturing sector and to obtain food from foreign sources instead. England established free trade around the world and sold its manufactured goods in exchange for needed grain from its own colonies and from other agriculture-rich countries.

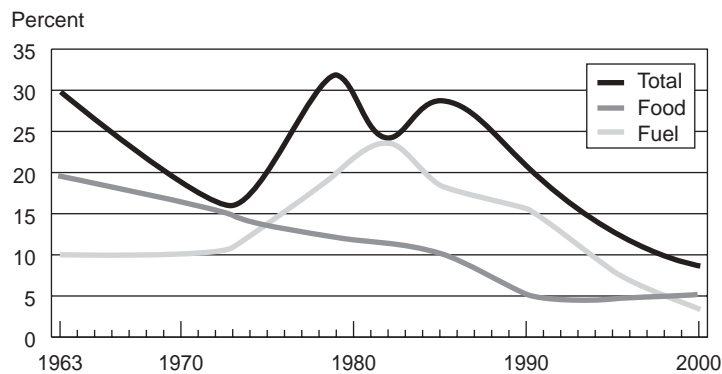
Two basic principles followed from this major step—one, England had to gain political control of colonies as a means of ensuring a regular supply of agricultural goods; and two, to make this system work, England had to guarantee the freedom of the seas to all nations. The push for colonies, the naval power required to keep the seas free, and the race for other countries to strengthen their own navies all contributed to the wars of the 20th century. Indeed, many of those wars were fought on the seas, with the blockades and embargoes on trade critical to the allied victories in both World Wars. And it didn't stop there. One of the classic confrontations of the Cold War—the Berlin Airlift in 1948-49—was conducted to guarantee the supply of food and fuel to West Berlin. Today, any conflict or dispute in the oil-rich Persian Gulf becomes an immediate international issue.

**THE EVOLUTION OF A NEW CONTEXT:
COOPERATION AND FREE TRADE**

Just as England changed the economic and political rules of the game for feeding its citizens in the 19th century, many countries, led by the United States, have taken a variety of steps in the last four decades that have changed the way countries deal with their dependencies on food and fuel today.

Indeed, as growth has become the primary measure of economic success, manufactured goods have replaced food and fuel as the largest single element of international trade. In the early 1960s, food and fuel added up to almost 30% of the value of world trade. But with tariff changes and the increasing value of manufactured goods, exports of manufactured products grew more than twice as fast as agricultural and mining exports—today fuel and food account for just under 10% of world trade (see Figure 26).

*Figure 26
Dependence on Food and Fuel for Trade Has Decreased
(Percent of world trade, by value)*



Note: "Total" data is the combination of food and fuel.

Source: World Trade Organization

But food and fuel continue to play a critical role in trade because they remain essential inputs into the daily operation of a modern economy. Although not as large a share of trade, food and fuel are worth increasingly more. Food and fuel exports were worth \$350 billion in 1973 and \$850 billion in 2000. The dependence of individual countries on food and fuel is still strong and continues to be of vital interest to each of these countries and the world economy as a whole.

Food and Fuel Dependencies of the 21st Century

Three countries or groups of countries stand out for their dependencies on food and fuel: Japan and those countries that have followed the Japanese growth model, Korea and

Taiwan; the 15 countries of the European Union (EU), especially Germany; and the United States (see Table 9). Some large countries are not dependent on other countries for either food or fuel—Russia, China, Brazil, and India, for example.

Just as several countries are major consumers of food and fuel, a few countries or groups of countries are major suppliers. The Middle East is the world's major supplier of oil, for example. And countries like Canada and Australia and regions like Latin America are net suppliers of both food and fuel (see Table 10).

The ability to supply a vital good such as food or fuel is of significant economic advantage, but it doesn't guarantee prosperity. In fact, while every one of the big importers

Table 9
The Wealthiest Nations Are Most Dependent
(Net trade balances, in billions of dollars, 2000)

| | <i>Food</i> | <i>Fuel</i> | <i>Net Trade Balance</i> |
|--------------------------------|-------------|-------------|------------------------------|
| East Asia (3) | -51 | -71 | -122 |
| Japan | -44 | -47 | -91 |
| Korea | -4 | -17 | -21 |
| Taiwan | -3 | -7 | -10 |
| European Union (15) | -15 | -61 | -76 |
| Germany | -13 | -21 | -34 |
| United Kingdom | -13 | 6 | -7 |
| France | 10 | -12 | -2 |
| United States | 3 | -70 | -67 |

Note: Numbers in parentheses indicate the number the countries included in the average figures.

Source: World Trade Organization

of food and fuel is a high-income country, among the exporters of food and fuel, only Canada, Australia, and New Zealand have comparable levels of prosperity. Still, the large net exporters do have incomes well above the low-income countries of the world (see Table 11).

Key Models for Dealing with Dependencies

Each of the big three dependent countries—Japan, Germany, and the United States—has taken a different approach in the last four decades to secure necessary food and fuel resources. Meanwhile, many oil-exporting countries of the Middle East and elsewhere formed the Organization of the Petroleum Exporting Countries (OPEC) to leverage their influence in the world markets.

Japan and the Asian Tigers: Exports as a National Policy

Japan identified itself early in its industrialization as a country that would depend on other countries for a range of food and energy products in order to achieve status as one of the premier industrialized countries of the world. As its population grew rapidly throughout the 20th century, and consumption rose with prosperity, Japan needed a constantly increasing supply of food and fuel for sustenance and could brook no cut-off in that supply. South Korea and Taiwan are other East Asian countries in much the same position.

In the last 50 years, these countries have committed to achieving these targets in the context of the open, peaceful, and stable

Table 10
The Middle East and Latin American Supply Food and Fuel
(Net trade balances, in billions of dollars, 2000)

| | <i>Food</i> | <i>Fuel</i> | <i>Net Trade Balance</i> |
|---------------------------|-------------|-------------|--------------------------|
| Middle East | -3 | 90 | 87 |
| Latin America | 30 | 17 | 47 |
| Australia and New Zealand | 9 | 10 | 19 |
| Canada | 5 | 13 | 18 |
| Russia | -6 | 12 | 6 |

Source: World Trade Organization

Table 11
Supplier Status Doesn't Guarantee Prosperity, But It Doesn't Hurt
(GDP per capita on purchasing power parity basis, in thousands of dollars, 2000)

| | |
|---------------------------|----|
| Net Importers | |
| United States | 29 |
| Japan | 23 |
| European Union | 20 |
| Net Exporters | |
| Canada | 24 |
| Australia and New Zealand | 19 |
| Latin America | 7 |
| Middle East | 4 |
| Russia | 4 |
| Low-income countries | 2 |

Source: World Bank

world trading system created after World War II. Indeed, they have accepted the 19th century British solution—exporting inexpensive but good quality manufactured goods that cover the rising costs of a huge inflow of basic goods. To do so, they have created a raft of government policies that support the export of domestic manufactured goods—strong support for technical and business education, incentives for both public and private R&D, legal codes and regulations that foster the growth of multinational firms, tax incentives for public and private financing, rules for corporate governance and competition that facilitate exports, and a structure of labor relationships that foster technical skills and cooperation and set wages based on the pricing of internationally traded goods.

In other words, these countries have followed a basic rule—export or die. They have been eminently successful. Japan is the world's third largest exporter, Korea the twelfth, and Taiwan the fourteenth. Combined they account for over 12% of world exports.

***Germany:
Building Ties to Its Neighbors***

Germany has always been a major exporter and it, too, has used the open rules of international trade to build and maintain its premier export position since the 1880s. As a result, Germany is today the second largest exporter in the world behind the United States, accounting for about 10% of the world's exports. But it has gone beyond reinventing its economy as an export machine. It has taken the further step of formulating long-term partnerships with neighboring countries that have complementary attributes.

Germany committed itself to the economic integration of the European Union as a

way of sharing resources rather than fighting over them. The precursor of the European Union, the European Common Market, was founded to share the coal and steel resources that stretched along the French and German borders. Agriculture was a second building block, specifically included to allow French agricultural products to flow into Germany's urban areas, thereby solving two issues at once—protecting French farmers and providing a relatively secure food supply for German cities.

In the 1970s, Germany entered a second groundbreaking partnership. At the height of the Cold War, Germany pushed through a long-term contract with the Soviet Union to supply a large portion of its natural gas and to be the conduit to the other fuel-deficit countries within the European Union. This became a fundamental connection of long-term interests between Russia and the West.

This permanent linking of German dependencies to its neighbors—traditional rivals and enemies—has become a major bulwark against war and international confrontations. It has also done much to eliminate German insecurity about its long-term shortages of food and fuel.

***The United States:
Keeping Trade Flowing at All Costs***

The United States is the largest economy in the world and the largest exporter and importer as well. It exports more food than it imports, but it has a voracious appetite for fuel. It has declared that the peaceful exchange of goods with the Middle East is a vital interest. As a result, just as Britain declared that it would guarantee free movement on the seas in the 19th century, the United States has taken on the role of ensuring the movement of goods in general and

oil from the Middle East in particular around the world.

As the world's largest importer, all kinds of goods flow into the United States—food makes up 8% of imports and fuel another 8%. While the United States is not unduly burdened financially to pay for these fuel imports, they are a necessary part of its energy resources. The long gas lines that emerged with the first Middle East oil crisis in 1973 and the Iranian cut-off of supplies in 1979 brought home to the American people the danger of losing a portion of their oil supplies. While the United States gets only 18% of its oil from the Middle East, its major trading partners Japan and the EU get 58% and 15%, respectively. In such an interconnected world, a decrease of supplies of oil from the Middle East would have a dramatic effect on world trade.

***The Middle East and OPEC:
Cooperation Leads to Success***

Many of the major oil-producing countries formed a cartel, OPEC, in 1973 to regulate the flow of oil to the world market in order to ensure a fair market price for their key resource. As a result, prices jumped from around \$2.50 a barrel in 1972 to \$11 per barrel in 1974 and up to as high as \$30 per barrel in 1980. But the gradual arrival of a plethora of new suppliers (engendered by those higher prices and increased investment from the dependent countries), and a slow down in demand from the consumer countries, lowered prices and increased competition for market share for OPEC countries and other oil exporters. Today, OPEC has a public price target of \$22 to \$28 per barrel.

With the exception of Saudi Arabia, no single country has the power to influence prices—note the minimal impact on the mar-

ket when Iraq, Iran, Kuwait, or Russia left the market temporarily or had major disruptions in their supply in the last decade. Still, recent political disruptions in supply flows from Iraq, Nigeria, and Venezuela have pushed prices up above \$28 per barrel and show the vulnerability of the market to uncertain supplies.

**Drivers for Change in Food
and Fuel Markets**

The total value of trade in manufactured goods has been growing faster than trade in food and fuel for the last five decades. This fundamental shift will make it easier for the world to absorb the higher costs of importing food and fuel. A number of other factors will affect the import and export of food and fuel in the next decade as well.

- *New petroleum and gas providers.* As has been the case in the last two decades, a substantial increase in gas and oil supplies will come into the world export markets from different sources in the next decade. New supplies will come from Russia and the Caspian Sea area, for example, which together are likely to increase production by 50% over the next decade; from the steady increase in supplies from the oil countries of West and North Africa, which will increase their production by 50%; and from several Latin American countries, with expected increases of 30%. These increases will add about 10% to the world oil supply and will help keep sustained price pressures off the petroleum market for at least the next decade, unless there are political factors that cause serious disruptions.
- *Prosperity and food.* As income goes up the demand for protein in the form of

grains and animals goes up, as does the demand for the livestock feed to produce the meat. As a result, rice and grains will be in heavy demand both for food and feed in a whole range of developing countries that will be moving more of their populations into higher protein diets.

- *China and India will consume more food and fuel.* China and India will be the two biggest consumers of new fuels and food in the next decade as their domestic markets grow. Much of their domestic demand will be supplied by domestic sources, however. China has substantial oil reserves and non-petroleum sources of energy—including coal and hydropower for electricity generation. Similarly, India has vast amounts of coal and the potential for further increases in hydropower.
- *Alternative sources of energy.* There will be a steady increase in renewable forms of energy in the next decade. The U. S. Energy Information Administration projects that alternative energy will increase globally by 25% in the next decade. Most of that increase will come in the form of new hydroelectric power in India and China. The use of wind power will also increase in the high-energy-using countries of the European Union and the United States. But the real promise of alternative fuels—fuel cells that don't use more energy than they supply, the increased use of nuclear power in light of a major breakthrough in the safer disposal methods for spent nuclear fuel rods, and new fusion reaction technologies—are still more than a decade away. As a result, for at least the next decade, increases in alternative

sources of energy will be modest against total world demand.

- *Supply disruptions.* The potential for supply disruptions is high. The Middle East remains a volatile region where a number of factors create the risk of at least some disruption of supply in the next decade—a war against Iraq; internal disruptions in Saudi Arabia or the United Arab Emirates; a spread of terrorism; violence in Israel and the West Bank that spills into neighboring states. Other regions have the potential for disruptions as well: major trouble in Pakistan; conflict in the Caucasus that disrupts the expansion of production or the shipment of oil; civil strife in Nigeria or Venezuela. The likelihood of at least one of these happening is very high. On the other hand, though some disruptions are sure to take place in these regions, they are likely to affect the markets for only a year or so and will not have a sustained impact on oil flows in general.
- *New alliances.* The German model—building a cooperative structure within the European Union while linking its energy future to a long-term natural gas pipeline with Russia—was an interesting innovation that broke a long-term cycle of violence and bitter feud among rivals for food and fuel sources. Look for new alliances that could help resolve underlying food and fuel tensions. We examine some of these partnerships in the next section.

KEY FORECASTS: THE NEW PARTNERSHIPS

Since countries and regions have different roles in food and fuel markets as well as different needs—some are net producers while others are net consumers; some are developed while others are developing—how the expected changes will impact them varies. Look for five key outcomes around the world in the next decade.

The U.S. Dilemma

The United States will continue to have its hands tied by both its reliance on external energy sources and its role as the world's free trade police. As the world's single military superpower, it will be the de facto enforcer of open trade. As England found out in the 19th century, however, that task becomes complicated as it gets confused and intertwined with a whole range of other strategic military-political activities.

The need to protect the free flow of fuel from exporting countries is likely to lead the United States to intervene actively in Persian Gulf politics, in Saudi politics, in mediating between Israel and the Palestinians, in the Caucasus, in Pakistan, and possibly in West Africa and Venezuela. This shifts the United States' role from being a guarantor of freedom of trade to being a meddler in political affairs in far too many countries. As the costs of these interventions rise and tensions with allies increase, a growing domestic movement will push for the United States to move away from leading the fight in every war, large and small, around the world. Look for the United States to face some serious questions about the extent of its commitments to the free flow of oil in the world; it may

indeed come to focus more of its own attention on building closer ties to Latin America and Russia instead of the Middle East.

The EU Will Continue to Look Eastward

The EU is nearly self-sufficient in food—its acceptance of various Eastern European countries as members should help in this regard, as they are net exporters of food products. But all of these countries are huge users of fuel as well. The Europeans get their external supply of fuel in about equal amounts from the Middle East, Africa, and Russia. In the long run, though, the EU has a real inducement to develop a more prominent partnership with Russia. As the eastern European countries are integrated into Europe, it makes more sense for the EU as a whole to develop a larger accord with Russia for the development of food and fuel resources. The expansion of oil and gas output in the Caucasus should benefit Europe; it could well be the basis of a longer-term agreement between Europe and Russia that helps integrate Russia into the wider economic activities of the new Europe.

Japan, Korea, and Taiwan Will Define the Export Market

Japan and its similarly dependent neighbors, Korea and Taiwan, will continue to rely on manufactured exports for survival. These countries (and a few others, like Germany) will continue to set the standard for competitive export products in world markets in the decade ahead. In essence, they must partner with the whole world for their economic success, selling high quality manufactured exports in the world market to be able to afford an absolutely secure supply of food and fuel.

China and India Will Look for Natural Partners

China and India—the two most populous countries in the world—will experience the fastest growth in the demand for food and fuel imports. They will work hard in the next decade to expand resources at home, but the world market should provide them with the chance to obtain cheaper supplies of both while they build up capacity. This will be their chance to look for natural partners. They, too, will find that Russia, Ukraine, and Kazakhstan may be key sources of food and fuel. If the southern agricultural regions of Russia and Ukraine can mobilize technology to substantially increase grain production while they are also increasing their oil and gas production in the east, they will have a natural point of access into the new and booming Chinese and Indian economies.

Table 12
Food and Fuel Dependencies in 2010
(Net trade balances, in billions of 2000
dollars)

| | 2000 | 2010 |
|------------------------------|------|------|
| East Asia (3) | -122 | -190 |
| United States | -67 | -110 |
| European Union (15) | -76 | -105 |
| Australia and New Zealand | 19 | 30 |
| Canada | 18 | 35 |
| Russia | 6 | 60 |
| Latin America | 47 | 65 |
| Middle East | 87 | 120 |

Note: Numbers in parentheses indicate the number the countries included in the average figures.

Source: Institute for the Future; U.S. Department of Agriculture; U.S. Energy Information Administration.

The Middle East Will Remain the Dominant Supplier of Fuel

There is no effective substitute for the Middle East as the major supplier of oil for the coming decade. On the other hand, there is enough new capacity coming online and enough competition among the exporters for market share (as well as enough of a need to raise income in each of the Middle East countries) that oil supplies should increase moderately.

The bottom line for a base forecast is this—don't look for the cheap oil prices we saw from 1986 to 1999 between \$15 and \$20 a barrel. However, the price should stabilize between \$22 and \$28 per barrel. This may constrain growth slightly, but also encourage an active market for finding new sources of energy and fostering conservation strategies. Still, by 2010 the circle of dependencies will grow with substantial increases in the deficits of the energy- and food-dependent regions and with substantial increases in the flows of food and fuel from Russia, Latin American, and especially the Middle East (see Table 12). For this reason, the Middle East will continue to be the locus of world instability.

WHAT IT MEANS FOR BUSINESS

The scale of the global economy has grown so vast that food and fuel together now make up a relatively small portion of it. But dependencies on these resources are still huge and vital as ever and will have the following impacts on business.

- *Disruptions.* Plan for at least one major disruption to the energy market in the next decade. Such disruptions will have impacts on the building of new produc-

tion sites in dispersed markets around the world.

- *New partnerships.* New partnerships will emerge in the next ten years, and they will offer new opportunities for business. Events of the last several decades show us that attempts to resolve historical conflicts over food and fuel have contributed to some very important international relationships—the emergence of the EU, détente between Eastern and Western Europe, the emergence of the North American Free Trade Agreement. In the future, increasing demands for food and fuel will forge new alliances—between China and India and the states in the Eurasian heartland; between West Africa and Europe; and between Brazil and western and southern Africa.
- *Focus on manufactured goods for trade.* Manufactured goods will continue to be the fastest growing part of the global economy and will drive the exchange of international services. Continue to pay attention to those countries like Japan, Korea, Taiwan, and Germany that are the most dependent on food and fuel imports. Their continued prosperity will depend on how well they are able to mobilize their highly technical societies to work cooperatively to produce the highest quality goods at the lowest prices. These countries offer lessons for success in many areas, including technical education and training, the organization of enterprises, and partnerships among finance, labor, universities, and government.
- *Opportunity for service sector players.* Service firms that provide the information and organizational infrastructure for

global cooperation will find huge opportunities in the food and fuel markets. Introducing new players to the world market, helping logistic firms design the necessary infrastructures, and coordinating the massive capital flows that will make long-term food and fuel partnerships work are challenging but will be an increasing source of profits in the years ahead. Those likely to benefit include banks, information technology and software firms, and global consultants.

CONCLUSION: FOOD AND FUEL STILL THE DRIVER

With all the talk of the new economy (though much of it has died down since the dot-com bust), companies should not lose sight of the importance of the traditional economic sectors—food and fuel. These sectors will offer many ongoing opportunities for growth, especially in production and infrastructure development. That said, companies should also be ready for major disruptions in the supply of food and fuel. Key foreign policy decisions in the next decade and beyond are still more likely to be driven by fuel and food issues than by the new economy. But the policies that have provided the most help to the new economy—the rules of international trade, the emergence of the European Union, and détente with the Soviet Union—had food and fuel issues at their heart. How we deal with food and fuel and the alliances that emerge may well be the key to understanding the direction of world trade in the next decade.

—Gregory Schmid



A Force to Be Reckoned With: The Chinese Middle Class Consumer

Today, nearly all large businesses have introduced the growth of China into their strategic planning at some level. Whether considering the impact of low-cost Chinese labor on the global supply chain, tracking the increase in inexpensive Chinese exports into foreign markets, or trying to develop products and services for China's vaunted 1.3 billion-person consumer market, most companies have taken notice of the potential of China's vast marketplace.

It would be hard not to: Since *Time* named Deng Xiaoping its 1985 Man of the Year, it seems that hardly a week goes by without the publication of a paean to China's impressive growth or a warning about the emergence of a Chinese superpower and the ensuing threats to global security. Pessimists predict that rapid economic changes will lead to social unrest and the imminent collapse of the Communist Party-led government, while optimists have already designated the next 100 years as the Pacific Century. One thing is for sure, hardly anyone views the changes in China with indifference. As Kenneth Curtis, Vice Chairman of Asia Goldman Sachs, said in a recent interview, "This is something that doesn't happen once or twice a generation, but something that happens once every 300 or 400 years."

For businesses, the challenge is to avoid falling prey to the hype or giving in to the boom or bust scenarios while keeping a sharp focus on the critical implication of China's continued growth: the emergence of a powerful, several hundred million-strong middle-class market that may come to dwarf those in North America and Europe. Despite the apocalyptic claims of recent titles such as *The China Dream: The Elusive Quest for the Greatest Untapped Market on Earth* and *The Coming Collapse of China*, Chinese middle-class consumer demands will become a major driver for the development of new products for global businesses in the next decade. At present, however, Chinese consumers are still bit players on the world stage, poorly understood and under-served. Businesses should begin to invest now in developing new tools for understanding everyday Chinese life, new business models to fit the complex Chinese regulatory envi-

ronment, and innovative pricing structures that attract the middle class.

THE EMERGING MIDDLE CLASS

Getting a handle on the emerging Chinese middle class is a formidable task—one with which even the Chinese government has difficulty. Accurate statistics on attitudes and income remain hard to collect given the size of the population, the mobility of rural laborers, and a reluctance to reveal (or pay taxes on) income derived from private business. Researchers at the Chinese Academy of Social Sciences have provided a reasonable estimate, however, pegging the middle class at approximately 200 million people, or 18% of the population.

While GDP per capita income for 2002 is around \$900 (roughly \$4,000 purchasing power parity, comparable to that of the Ukraine or Jordan), these consumers have from \$850 to \$1,500 in annual disposable income. Many live in large, eastern urban centers such as Shanghai, Canton, and Beijing, where it is relatively easy for global companies to reach them. But given China's demographic pattern, in which rural industrialization has outpaced urbanization, a good proportion of the middle class will emerge in towns and villages over the next ten years.

These consumers will be more difficult to reach. While China's precise rates of economic growth are also under debate (see text box, "Economists Debate China's Numbers," on page 66), the numbers show a steady rise in all of the major economic indicators in the past decade. Stanford economist Lawrence Lau believes China's aggregate GDP will surpass that of Japan by 2020, and that China will become the second largest economy in

the world. Already in May 2002, China outstripped Japan as the largest exporter to the United States. It is currently the sixth largest trading country in the world, and continues to be a magnet for foreign direct investment (FDI)—after the United States, it now ranks second—growing 15% per year during the 1990s (see Figure 27). What’s more, the nature of FDI has shifted to favor domestic markets rather than export-oriented markets, heavy industry, and high-tech, which suggests that foreign investors are viewing Chinese consumers as a powerful driver of future economic growth.

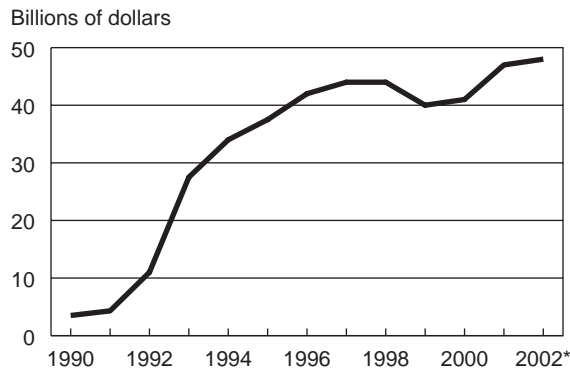
We do need to keep in mind, however, that many emerging countries do not always sustain the “catching up” phase China now seems to be undergoing—many economists saw the Soviet Union quickly overtaking the U.S. economy in the 1960s, for example, or

the Japanese passing U.S. per capita income levels in the 1980s, neither of which happened, of course. It remains to be seen how far China’s economy can really go.

**As Barriers Come Down,
Markets Go Up**

Perhaps an even more significant factor for global businesses in the next three to five years, is that the World Trade Organization (WTO) will mandate the dismantling of longstanding barriers to China’s distribution, banking, insurance, telecommunications, agriculture, and manufacturing sectors. Although WTO membership does not equal anything like a level playing field for foreign businesses, there will be plenty of opportunities for—as well as threats to—global companies in many economic sectors, especially manufacturing, R&D, and retail.

*Figure 27
Foreign Direct Investment into China Increasing Dramatically
(Foreign direct investment in China)*



* 2002 data is an estimate.

Sources: U.S. Department of Commerce, United Nations Conference on Trade and Development, China Ministry of Foreign Trade and Economic Cooperation.

■ Economists Debate China's Numbers

Statistics about China can be misleading. National statistical reporting is hampered by technological and political problems. As a result, businesses should take a very close look at leading economic indicators such as GDP. Published figures indicate solid and sustained growth: the Chinese newspaper *People's Daily* reported breathlessly on September 20, 2002, "Based on the 11 years ... from 1989 to 2001, China kept a 9.3% of growth rate in GDP. China had kept the fastest economic growth in the world irrespective of an adverse global economic environment, which is regarded [as] a miracle by [the] international community." The Chinese National Bureau of Statistics also cites continuing steep growth in both urban and rural incomes.

According to some economists, however, these claims are greatly exaggerated. Development economist, Thomas Rawski of the University of Pittsburgh, points to the slow growth of energy production and consumption (as compared to the reported rise in GDP), rising unemployment, sluggish demand, massive excess capacity, glutted commodity markets, low consumer expectations, and numerous inconsistencies in the statements of Chinese economists and officials to argue that China doesn't look like an economy growing at high speed. When economic performance becomes a political goal, just as it had been under the earlier period of Maoist socialism, local officials may respond to pressure from above by over-reporting production numbers. There is "no doubt," Rawski writes, "that intentional falsification of economic performance indicators is common throughout the business community and at every level of government." Others point to issues with continuing state control over key enterprises, bureaucratic decision making, and substantial problem loans that will never be collected throughout the banking system. Like telecom systems in the developed countries of the world, China has to worry about over expansion without a sustainable business model to support the infrastructure. Rawski's final evaluation: that Chinese GDP annual growth from 1998 to 2001 was closer to between 2% and 3% than the officially reported 8%.

We took a closer look at a range of data analyzed by economists such as Stanford's Lawrence Lau and the Brookings Institution's Nicholas Lardy, as well as BNP Paribas Peregrine financials for things like deposits and loan growth. We concluded that while there might be some exaggeration in official figures, they are likely to be off by to 1% to 2%, rather than the 4% to 5% that Rawski suggests. Given conflicting figures like these, one thing is clear. In seeking to better understand Chinese consumers, businesses will have to carefully evaluate the quality of economic data coming out of China.

Manufacturing

Often referred to as “the world’s factory floor,” China is the fourth largest industrial producer in the world in terms of the value of goods produced, after the United States, Germany, and Japan. China produces more than 50% of the cameras sold worldwide, 30% of the air conditioners and televisions, and a quarter of all washing machines. While traditionally strong in sectors such as textiles and toys, in the next decade, China will continue its move into higher-end products like computers, chips, and DVD players. In addition, global companies are increasingly focusing on export industries. Honda is set to establish China’s first export-focused auto factory, and Nissan hopes to export cars and trucks from a similar joint venture in the next two years. China’s manufacturing sector is well tied into the global economy.

R&D

Intel, IBM, Alcatel, and General Electric were some of the earliest R&D investors in the region, and in recent years the number of offshore R&D divisions established in China by multinationals has accelerated. Nokia, Microsoft, and Motorola have all aggressively expanded Chinese R&D functions in the last two years, with blue-chip Japanese and Taiwanese firms following suit. In a typical case, Japan’s NEC recently considered putting a software development center in India, but chose China instead to take advantage of a large labor pool, advances in China’s notoriously lax intellectual property protection, lower labor costs, and the growing Chinese consumer market.

Retail

The emerging middle class will drive growth in domestic consumer demand in the next ten years, which will have ripple effects for other sectors as well. Growth for global retailers like Carrefour has been strong in the last five years—the French giant has 31 stores in China and plans to double that number by 2004. After beginning slowly with four stores in southern China in 1996, Wal-Mart also accelerated its growth in 2002 to over 20 sites, opening stores in major urban centers like Shanghai and Beijing. The prospects for retail will only grow brighter through 2005 as the bulk of the restrictions against foreign investment in the retail and distribution sectors will be eliminated as a result of China’s accession to the WTO.

KEY DOMESTIC MARKETS: INFORMATION AND COMMUNICATIONS

For foreign businesses, perhaps the two most important sectors of China’s economy are telecommunications and the Internet. Because they are the sectors most closely tied to the world economy, they offer important lessons for how global companies can approach the emerging Chinese middle class consumer.

The Next 200 Million Mobile Customers

China entered the 1980s with a highly stratified communications sector. Only a handful of elites were able to have fixed phone lines in their homes—a mere 2 million people in 1979. Ordinary citizens had to make do with workplace or neighborhood phones, which had sporadic connections and calls often had to be routed through cranky operators. By the late 1980s, Motorola pagers were fueling the first personal communications revolution

for Chinese consumers. Both urban and rural consumers snapped up pagers and used them in combination with fixed-line phones that were quickly made available—for a small fee—in every mom and pop store, restaurant, and newsstand.

The 1990s saw the fastest increase in telephone subscribers in history. Mobile telephones came on strongly in the mid-1990s, while at the same time the state worked hard to make fixed lines available to average consumers in cities and rural areas alike. By the end of 2000, there were 200 million telephone subscribers in China, a figure that doubled to over 400 million in late 2002. Just over half of these are fixed line subscribers. With more than 200 million mobile subscribers and just under 4 million more signing up each month, China is by far the world's largest mobile phone market (see Figure 28). The price for a handset starts at about \$80 while the most advanced models can sell for \$800. This is not cheap in a country where the average disposable income in urban areas is about \$1,000, but Chinese consumers can't get enough of these devices.

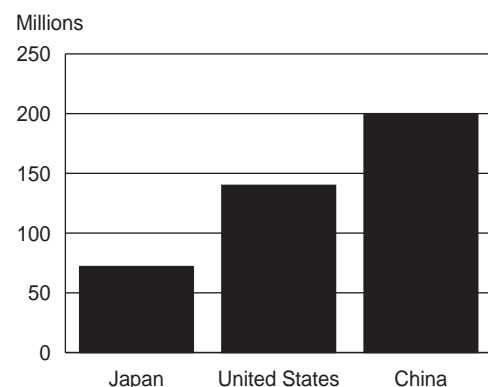
Against the backdrop of saturated telecom markets in North America and Europe, it's no surprise that the rapid growth of China's mobile market has attracted a lot of attention and investment in the past five years. Companies like Motorola and Ericsson are hoping that Chinese consumers will follow the path of their Japanese neighbors when it comes to mobile data services—and it looks like they may be in luck. China Mobile Group, the country's largest mobile phone service provider, anticipates its users will send 40 billion short message service (SMS) messages this year. If, as the latest International Telecommunications Union

report says, the epicenter of the telecom industry is shifting from North America and Europe to the Asia-Pacific, then the communication needs of Chinese consumers will be paramount.

The rosy outlook for China's telecom sector is being tempered by analysts who point to the slowing growth of subscribers in the summer of 2002, over competition, capacity gluts, price wars, cross-subsidies, and falling stocks for China's telephone duopoly, China Unicom and China Mobile. The most significant indicator of what it will take to meet the needs of Chinese consumers may be the rise of Xiaolingtong, or "Little Smart," a personal phone system introduced in the late 1990s from Japan.

Xiaolingtong looks like a mobile phone and has wireless communication functions inside city limits. It acts as a low-functioning mobile phone and rates for calls are much lower than those for fixed-line phone service. In addition, only the caller pays, where-

Figure 28
China Has the Largest Market for Mobile Phones
(Mobile phone subscriptions, 2002)



Source: ZDNet; CNET; Mobile Media Japan.

as with typical mobile services both caller and receiver pay. In many of China's second- and third-tier cities—from where much of the growing middle class will come in the next decade—Xiaolingtong has picked off a healthy share of the mobile phone market. For instance, in southwest China's Yunnan Province, 70% of new fixed-line telephone subscribers choose Xiaolingtong to meet their local daily communications needs, rather than using the more expensive fixed-line service. In sum, cost-conscious Chinese are willing to trade some of the benefits of mobile telephony for cheaper prices. "The next 100 or 200 million customers are there," says Duncan Clark of Beijing telecom consultancy BDA, "but at very different price points."

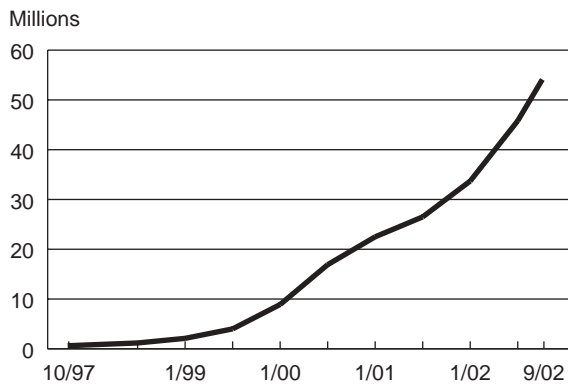
Internet Usage: New Middle-Class and Student Users

As with telecommunications, the growth of China's Internet sector has accelerated in the last five years. When official Web data col-

lection began in 1997, China had only half a million people online; by the end of September 2002, the Xinhua News Agency reported that the number of Internet users in China had reached 54 million—an impressive number, but still under 4% of the population (see Figure 29). By 2005, industry observers project that China will have the largest concentrated pool of Internet surfers in the world. What's more, the World Intellectual Property Organization forecasts that Chinese will become the most widely-used language on the Web as early as 2007.

Official 2002 government figures from the China Internet Network Information Center show an interesting snapshot of the emerging middle class Internet user. In general, the middle class users are young (82% are under 35), have high school or some junior college education, and earn monthly incomes that range from \$60 to \$120, or from slightly below the national average to 1.5 times the national average. About one-third have a university education, still unat-

*Figure 29
Online Population Is Increasing Rapidly in China
(Number of Internet users)*



Source: China Internet Network Information Center

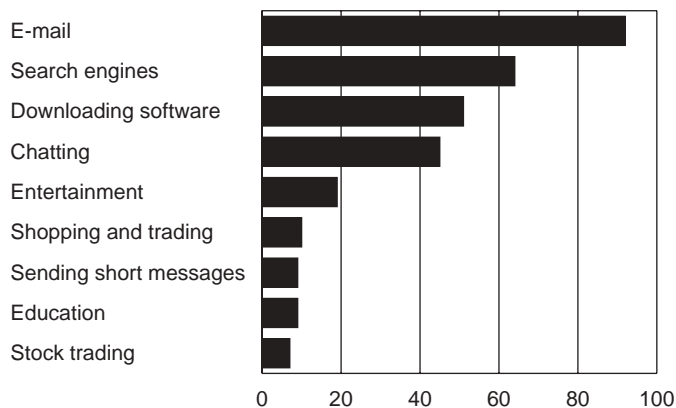
tainable for most Chinese, and 13% reported no income at all: presumably they are still in school. With the rise of personal computers in the home, more consumers are accessing the Internet from home than from work.

Despite the Chinese government's heavy-handed attempts to control access to sensitive Internet content, Chinese consumers have fairly easy access to the Web—somewhat easier, in fact, than in the United States. In many Chinese cities, users don't need to sign up with an Internet service provider or pay a monthly minimum. They simply hook up their modem to any telephone jack, dial a local number reserved by an Internet company, and receive the charges on their monthly telephone bills. In 2001, nearly 70% of Internet users reported paying the equivalent of \$12 per month for their service. Then there are China's infamous Internet cafés, estimated at about 200,000 and found across the country from Tibet to Shanghai, where

users can hop online with a high-speed connection for even cheaper rates. Once online, Chinese Internet users visit Chinese portals (or "chortals") like Sina.com, Sohu, and NetEase, where they read fast-breaking news, chat with other Chinese people on the mainland and abroad, and increasingly, download SMS games, ringtones, and photos to their mobile phones for a fee (see Figure 30).

On one hand, the explosive growth of both the telecom and Internet sectors in China is not all that surprising. The country was starting from a very low base in the late 1980s, and with such a huge population even small penetration rates add up to large aggregate numbers. On the other, if we look at how Chinese consumers are voting with their money, we find a strong and growing middle class that is becoming an increasingly important part of both the domestic and global economies.

Figure 30
E-Mail Is the Most Popular Online Activity in China
(Percent of Chinese Internet users that engaged in ... online, 2001)



Source: China Internet Network Information Center

LESSONS FOR BUSINESS: APPROACH WITH CARE

The Chinese consumer will increasingly become a force to reckon with in the next ten years. While China is not likely to be a “dream” market for any one sector, hundreds of millions of ordinary Chinese have already shown that it doesn’t take more than a few years to develop a new sense of their “basic” daily needs. Their rapid adoption of connective technologies and the large-scale changes wrought by WTO membership also make it unlikely that China will experience total economic collapse anytime soon. Therefore, businesses ought to begin now, if they haven’t already, to develop an approach to the Chinese middle class consumer. A few critical issues are worth highlighting.

Do Your Homework

Because official statistics can be inflated, companies have to make sure they get solid information and manage their expectations for success realistically. In order to track Chinese consumers, companies should look to market research firms that do primary research outside of Beijing and Shanghai rather than relying on official statistics and data that include only urban elites. They must also learn how to deal with the layers of regulatory bureaucracy necessary for getting things done in China. Still, the rapid growth of an urbanized middle class consumer will create huge opportunities for businesses that understand how to mix low prices with aspirations for better value.

Consumer Rights Are a Political Issue

Consumer rights are a fairly new concept in China. In fact, the word “consumer”

(*xiaofeizhe*) entered the daily lexicon less than ten years ago. Yet with a government that finds it more politically expedient to support consumer rights than democratic rights, consumer protection has emerged as an important area for the expression of social dissatisfaction.

For business, this means that it’s important to track Chinese consumer concerns carefully in order to avoid negative, politically charged press that can badly damage corporate reputations. Mitsubishi found this out the hard way in 2000 and 2001. In Japan it was discovered that the company had been hiding quality problems in some of its vehicles, a scandal that resulted in the resignation of Mitsubishi’s president. In China, Mitsubishi failed to respond effectively to the rising tide of resentment over Chinese deaths and injuries from faulty automobiles. Even worse, the company’s perceived disregard for Chinese consumers was tied into widespread media reports of the mistreatment of Chinese passengers on a Japan Airlines flight. The result was a national outpouring of consumer rage, targeted at Mitsubishi and scarring its reputation for years to come.

Authenticity Is a Business Problem

In a land of pirated goods, authenticity is a big deal. One of the reasons Chinese consumers are so protective of their rights is that they are inundated with fake products. In 2002, the top consumer dissatisfaction with online advertising was not the volume of ads, but the difficulty of verifying their authenticity. Fake medicines and consumer electronics products injure countless citizens each year, with horror stories described in

detail in the popular press. The good news is that Western brands and retailers have a real advantage over local brands, in that they are valued for their ability to ensure authenticity. Businesses will have to work hard to hold onto this advantage in the coming decade, as demanding middle class consumers come into more contact with a diverse range of foreign retailers and goods. Fighting piracy is one piece of this puzzle, but branding around authenticity is even more important.

Approach Chinese Consumers Outside China

The Chinese middle class is becoming increasingly visible not only in China itself but around the world as well, as skilled workers and tourists circumscribe the globe in unprecedented numbers. A rowdy crowd of 40,000 traveled to South Korea to see their team in the World Cup in June 2002, for instance. And the Houston Rockets are

leveraging their star rookie, Yao Ming—who hails from China—as a way of reaching the huge base of basketball fans in and from China. In the United States, the Rockets are now catering to Houston’s Chinese population with billboards, tickets, and statistical information in Mandarin, and the team is planning a weekly Mandarin radio show along with a weekly videotaped interview with Yao in both Chinese and English. To reach fans in China, the team has launched a Chinese Web site, while the NBA has more than doubled the number of games broadcast in China this season. Yao’s debut game with the Rockets reached 287 million Chinese households.

This is just one example of a marketing campaign that speaks to Chinese around the globe. Indeed, appealing to the Chinese diaspora community is a good way to reach into China itself.

—Lyn Jeffery

the emerging health economy

A health economy is one in which the value of health becomes a key driver for the growth of the whole economy, not just the health care sector. In such an economy, traditional health care continues its very strong expansion. But more importantly, a broad set of health values—including physical, emotional, and spiritual well-being—drive innovation and growth in markets for a wide range of products and services not traditionally associated with health. These include such disparate bedfellows as cosmetics, fashion, security, building supplies, wellness, and food.

In this way, health becomes an important brand message throughout the economy, a target for technological and social innovation, and a focus for consumer spending. This is the economy we are forecasting for the end of this decade, an innovative economy that demands innovative responses from all kinds of product and service companies.

Because this isn't a linear topic, we take a nonlinear view. The article is organized around three main clusters: why every company needs to understand the health economy, the impact zones of the emerging health economy, and top opportunities. It can be read from front to back, but it can also be browsed and read back and forth from any place in the article. The point is to take a bird's eye view of what a health-driven economy will look like in ten years, and then zero in on topics of special interest.

Figure 31
 The Emerging Health Economy



Source: Institute for the Future

I. why every company needs to understand the health economy

We offer a simple proposition: the frontier in economic growth is not wireless communication or biotechnology or even nanotechnology, although all of these will figure prominently in the next wave of growth. The real growth opportunity for the end of this decade is the emerging health economy.

Our argument is simple, too: several trends are converging to drive new health products and redefine existing markets in terms of health benefits. By the time we reach 2010, these trends will re-orient markets and pose new challenges to traditional health care. A larger portion of disposable income will be spent on maintaining and improving health, and health management will be integrated into a much wider range of activities.

This emerging health economy will include a vision of health that emphasizes maintenance and prevention rather than intervention. Health management will be pervasive and constant rather than episodic, and it will be information intensive. Big investments in new technology will line up behind this vision, and corporate brands will, too. Consumers will make it their own when making hundreds of daily decisions, both large and small.

In this emerging health economy, any tangible health benefit is a winning value proposition. And any company that ignores the meaning of health in its products does so at its own peril.

health spending increases

Take a look at the emerging health economy through the eyes of consumers. Whether they like it or not, consumers are more engaged with their health and health care than ever. They are being asked to pay more out of their own pockets for health care, and are spending more time, too, with health decision making. They are more actively making choices both inside and outside the traditional health care system, as traditional care is just one component of their individual ecologies of health resources and institutions. Finally, an aging population and a growth of chronic illnesses add up to more demands for health

products and services, without a clear strategy (at least within the United States) for meeting these increased demands.

A key shift in turning the traditional health care system into a consumer market is the new burden the consumer will assume for health costs. Health care purchasers, in the past, have been intermediaries such as employers and government programs like Medicare and Medicaid. Wanting value while maintaining financial viability, these purchasers have worked with insurers to create economic solutions such as prospective payment and managed care.

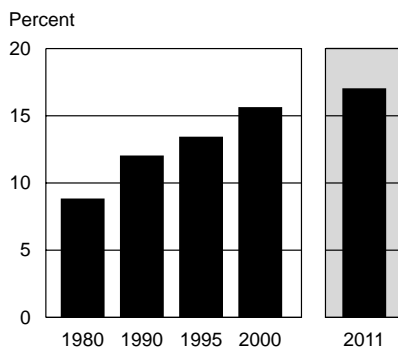
While these cost-cutting mechanisms worked for a while, health care costs are on the rise again. Traditional purchasers now say they will look to consumers to absorb a proportion of the cost increases. They will do so by:

- Introducing tiered benefits across services and products.
- Increasing deductibles and co-payments for services.
- Asking employees to share in the cost of insurance or care solutions.
- Requiring employees to play larger administrative and health management roles.

■ Traditional Health Care Sector

Traditional health care is already one of the largest industry sectors and will grow to \$2.8 trillion by 2011, up from \$1.3 trillion in 2001. It's expected to account for 17% of GDP by the end of the decade. For comparison, the entire computing industry is currently about \$1 trillion.

Figure 32
U.S. Health Care Expenditures' Share of GDP to Reach 17% in a Decade

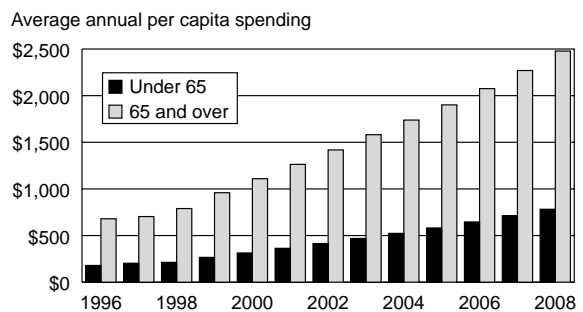


Source: Centers for Medicare and Medicaid Services, Office of the Actuary.

■ An Aging Population

As the baby boom generation begins to move into its senior years at the end of the decade, it will drive average health spending higher. Average per capita health care expenditures for those 65 and over are more than three times higher than for those under 65.

Figure 33
Seniors Spend Three Times More on Health Care



Source: Medical Expenditures Panel Survey, Agency for Healthcare Research and Quality, Department of Health and Human Services.

In this environment of increased personal financial responsibility, consumers (as employees) will be offered more health coverage choices. To make these choices, they will need more information, and to get access to this information, they will turn increasingly to the Internet for sophisticated clinical information.

Some consumers are exercising this access to information to make choices outside the traditional health care system. In spite of recent media attention that makes it sound like a brand new thing, the growth trend for complementary and alternative medicine (CAM) is

25 years old and steady. Unlike much of traditional health care, which is paid for indirectly in a third-party system, consumers typically pay for CAM directly. As consumers are asked to spend their own money for health coverage, they will weigh their CAM choices against traditional health care options.

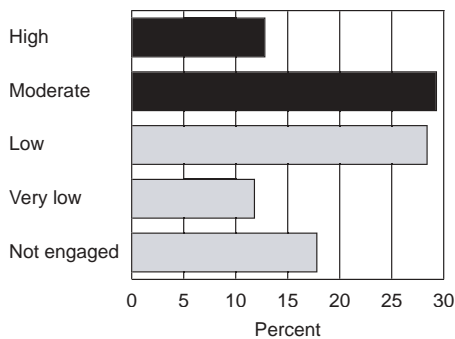
The increasing need for consumers to choose has the potential to open up a truly consumer-based health economy. When sick, consumers increase their interactions with the health care system. But for most healthy consumers, interactions with traditional health care are minimal—perhaps only once a year. On

a daily basis, consumers think in terms of health. They make many health choices as they go about their lives: whether to exercise, whether to put on sunscreen or have that second piece of cake, for example. Although traditional health care is the focus of the health-care industry and policy-makers, consumer's values and expectations are set in the much broader context of daily health.

■ More Chronic Illness

The number of people with chronic illnesses is expected to increase, from 125 million in 2000 to a projected 157 million in 2020. According to a recent IFTF survey, nearly half of these are already “engaged health consumers”—consumers who take active steps to manage their own health by changing their diets, taking vitamin supplements, actively looking for information on alternative treatments, and spending at least an hour on health each week. As the number of chronically ill grows, so will the number of engaged health consumers.

Figure 34
Nearly Half of Those with a Chronic Illness Are Engaged Health Consumers



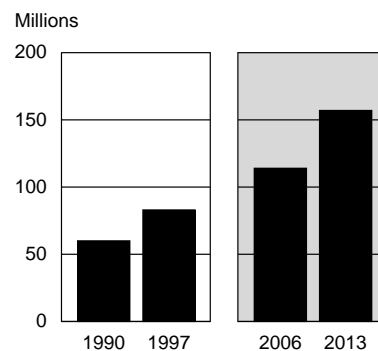
Source: Institute for the Future, Household Survey 2002.

■ Complementary and Alternative Medicine

As consumers spend more on their own health care, they make more of their own choices. And those choices will include spending more outside the bounds of traditional health care on things like complementary and alternative medicine.

The result of all of these trends is likely to be a larger share of household time and money on spent on health and health-related products.

Figure 35
More Than 150 Million Americans Will Be Using CAM Products in a Decade



Source: Eisenberg, D.M., et al. “Trends in Alternative Medicine Use in the United States, 1990-1997.” *Journal of the American Medical Association*. 280: 1569-1575, 1997.

more health investment, too

A more diverse set of health technology investors is spending more money to develop new kinds of health interventions.

The traditional investors here have been the pharmaceutical industry, on one hand, and public research agencies, like the National Institutes of Health (NIH), on the other. These players are well versed in the long development cycles and the slow penetration of new technologies into clinical practice.

The barriers to diffusion are numerous: disjointed information flows, variations in clinical practice, fragmenta-

tion of services, complex economic and financial incentives, and no overarching technology assessment processes. In the past ten years, however, “translational research” that brings the findings from scientists to patients in clinics has begun to chip away at these barriers. A larger portion of both public and private funding is earmarked for the clinical application of knowledge gained through basic research.

At the same time, a new class of investors—venture capitalists—has begun to pour money into health products. The most obvious group of new

investors includes those who are hoping that biotechnology will lead to breakthroughs in treatment and prevention. The primary target here is genetic research. Using information technology to model these products and targeting clinical populations more carefully to match the genetic profiles of the products, this research will shorten the cycle of clinical testing and new product introduction. The result: more health products will reach the marketplace faster.

Biotech investors are not the only new players in town, though. As the

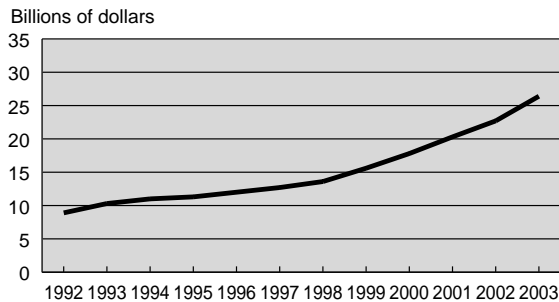
■ Public R&D Spending in Health

Both private and public R&D spending in traditional health is up. The National Institutes of Health budget has almost tripled since the early 1990s.

■ Pharmaceutical R&D Spending

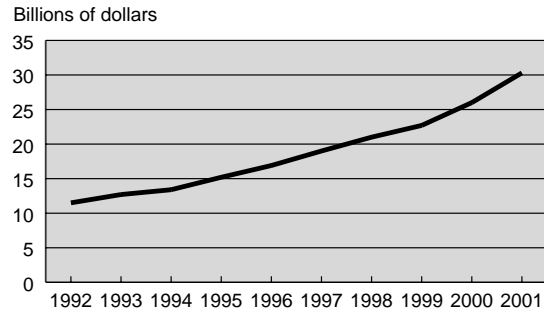
But pharmaceutical R&D investments have grown even faster, reaching \$30 billion in 2001.

Figure 36
NIH R&D Spending Tripled in a Decade



Source: National Institutes of Health

Figure 37
Pharmaceutical Industry R&D Spending Increased Even Faster



Source: Pharmaceutical Research and Manufacturers Association

information technology market dropped recently, venture capitalists began to look for more stable sectors to invest in. Health care has become very attractive: it's essentially inelastic and somewhat insulated from the larger economy. While investments in software and telecommunications still outpace medical devices, device investment has grown steadily for the last six years. And today, even as the telecom industry struggles to survive, medical device investments remain strong, if not quite as high as their 2000 peak.

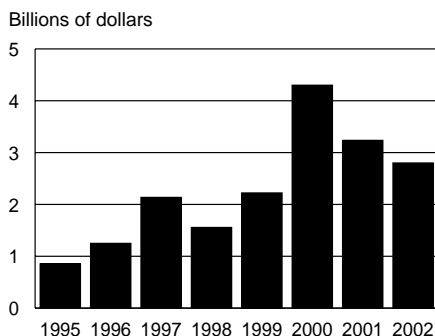
For this decade, a key venture strategy in all the technology sectors—from IT and energy to materials and life sciences—will be to target health applications. The leading sensor markets today are for biomedical devices. New micro- and nano-scale energy technologies are using medical implants as their test bed. And many new materials are finding their most compelling early applications in health products that range from monitoring to continuous low-dosage drug delivery.

What could tilt this picture of growth? Regulation remains a long, slow, and costly process, and it's not clear that venture investors will have the patience and risk-tolerance of the established pharmaceutical industry. On the other hand, the regulatory barriers could encourage these new investors to focus on products and services just beyond the regulatory boundary—new markets that are health-oriented but not subject to regulation.

■ Biotechnology Investment

Venture capital investors are the new players in the health economy. In the future, some biotech investors will target traditional health markets, but many of them will distinguish themselves with investments in health-related products beyond the boundaries of traditional health care. In spite of the recent weak economy, biotech investments remain strong.

Figure 38
Biotech Investments Remain Strong

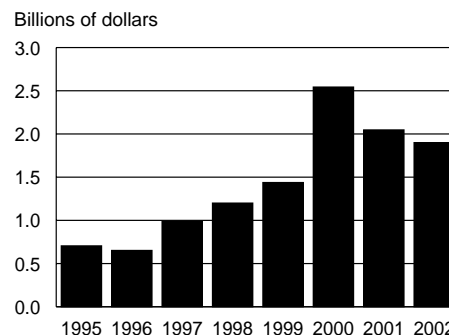


Source: PricewaterhouseCoopers/Venture Economics/National Venture Capital Association Money Tree Survey, 2002.

■ Medical Devices

Investors in other sectors—from IT to energy and materials—are also targeting health and health-related markets. Investments in medical devices, many of which draw on these other technologies, remain at twice the level of the mid-1990s despite the slow growth in overall business investment.

Figure 39
Investments in Medical Devices Still High, Despite Recent Decline in Overall Investment



Source: PricewaterhouseCoopers/Venture Economics/National Venture Capital Association Money Tree Survey, 2002.

health redefines markets

Health as a societal value is central to consumers' lives in the same way that "family values" are—and health issues are growing in consumer's minds. They are paying more attention to the health effects of aging, to the impact of environmental toxins on health, and to the threats of bio-terrorism. These concerns will turn health into a filter for each and every purchase. They will create a new health marketplace.

IFTF has developed a model for thinking about the dynamics of this marketplace: where companies will invest and where consumers will buy in the future. This model assumes that health spending will flow increasingly

to the industries that sit at the boundary of traditional health care and consumer products—and that this flow will create the growing edge of the economy.

So which are the leading edge industries of this new health economy? They are wellness, food, cosmetics, fashion, building materials, biosecurity, and health information. These industries all sell to consumers and are talented at getting to know their consumers, segmenting the market, and creating targeted information and messages that clearly express value to the consumer. They have also already begun to recognize the value of health in consumers' lives and

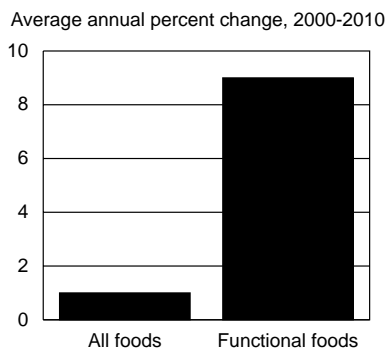
use health as a way to sell a broad range of products.

Each of these industries overlaps traditional health care in some way. For example, physical therapy could just as easily be part of the wellness industry. Special-needs sinks and toilets could just as easily be supplied by building suppliers as by medical supply companies. This overlap creates a porous boundary, and it's this boundary region—already primed for rapid growth—that makes the health economy potentially disruptive for both traditional health care and traditional players in the boundary industries.

■ Food Industry

As consumers spend more on health products and services, they will evaluate virtually every product and service in terms of their health benefits. Markets will respond with new technologies and new branding messages. Food markets, for example, are already increasing value by adding organics, supplements, and functional foods.

Figure 40
Functional Foods Market Will Grow Rapidly

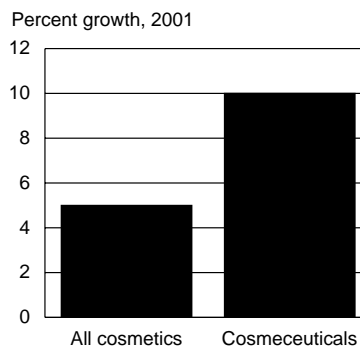


Source: Institute for the Future; U.S. Census Bureau.

■ Cosmetics Industry

Cosmetics are being redefined by many kinds of products including cosmeceuticals, which change the structure or functioning of the skin. Cosmeceuticals sales (including such products as kinetin, retinol, and co-enzyme Q10) are growing rapidly, especially compared to the overall cosmetics industry.

Figure 41
Cosmeceuticals Market Growing Faster Than Overall Cosmetics Market



Source: Burrill & Company, *Biotech* 2002.

■ **Fashion Industry**

Smart materials and sensors will turn part of the fashion industry into a health industry—with everything from stylish body monitors to clothing that delivers drugs and supplements in continuous low-level doses. Wearable medical devices, like Timex's Fitness Monitor, are expected to grow at a compound annual growth rate of 115%.

Figure 42
Timex's Fitness Monitor Is Just One Kind of Wearable Medical Device



Source: Timex Corporation

■ **Building Materials**

Building materials, too, will begin to be branded according to their health benefits. Already healthy lighting systems have demonstrated the ability to increase worker performance and increase sales per square foot in retail buildings. And products like low-volatility paints are entering consumer markets for building supplies.

Figure 43
Health-Friendly Building Materials Include Low-Volatility Paints

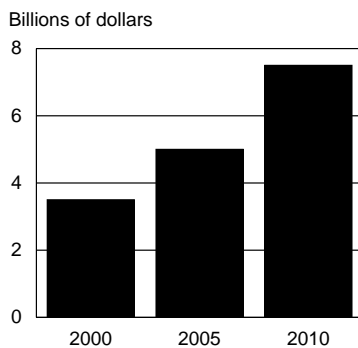


Source: Benjamin Moore & Co.

■ **Security Industry**

The security industry, boosted by terrorist fears, will become increasingly focused on biosecurity products to protect personal health, with products that include air and water filters; environmental monitoring systems; protective clothing and devices such as gas masks and respirators; and monitors that detect biological pathogens.

Figure 44
Biosecurity Needs Will Drive Doubling of Air Filtration Market

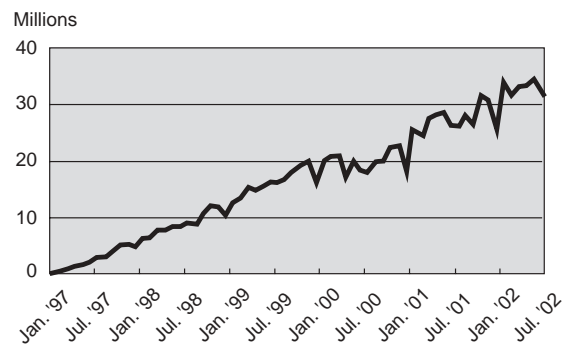


Source: Institute for the Future; McIlvaine Company.

■ **Health Information**

Highly engaged health consumers spend more time, as well as money, on their health. This increasing engagement is reflected in the amount of time people spend searching for health and medical information. Online searches for such information are growing by at least 50% per year.

Figure 45
Number of Health Information Searches Has Soared



Source: National Center for Biotechnology Information, National Library of Medicine.

new demands, new opportunities

Consumers define health broadly, focusing not just on the absence of illness but also on overall mental, physical, and spiritual well-being. Their definitions of health go well beyond their interactions with the health care industry. They point to multiple health-related domains in their daily life and draw on their unique health ecologies to get the products and services they need (see Figure 46).

For companies, understanding these ecologies is key to tapping into the growth of the new health economy. Remember, though, that health ecologies are not static. Underlying each ecology is a complex network of social connections that provides not only access to specific health care

resources but also an ever-changing perspective on what is healthy and who can help in achieving health. As health products and services are linked seamlessly into these social networks, they will begin to create network effects—the kind of market behaviors that drove the growth of information technology over the last 50 years.

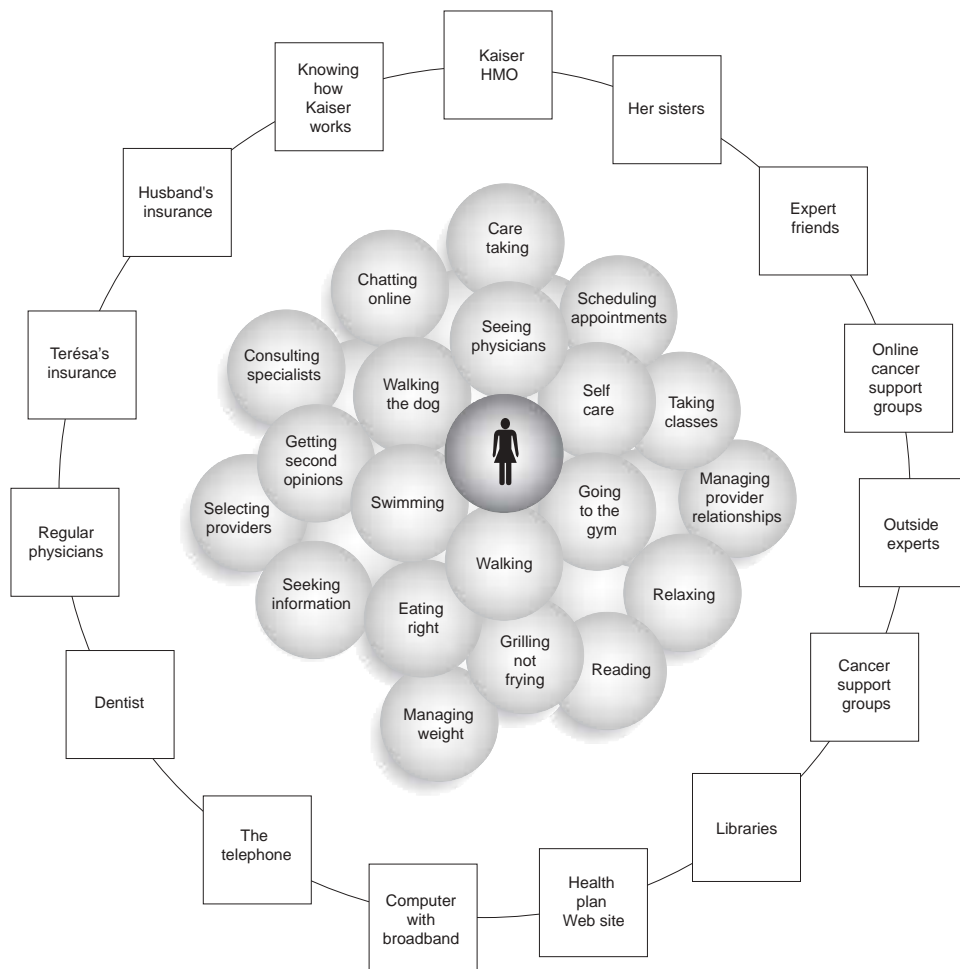
So herein lies the scope and scale of the emerging health economy: a broadly defined set of health values and activities, driven by an intensely connected social network that will be fed by growing health needs, growing consumer responsibility for their own health spending, and a technology-driven marketplace for ever more choices of health products and services.

■ **The Health Ecology Map**

Each individual views health and health care as a set of resources, institutions, products, and services that is organized into a unique personal health ecology. One way to engage with the new health consumer is to begin to map these personal health ecologies. Here we present a sample map for a 43-year-old woman, Terésa García. She is a composite character created from IFTF's research on the engaged health consumer.

Terésa is at the center of the map, surrounded by a set of behaviors that, in her mind, defines a healthy individual. Around the edge are the resources that uniquely match her core health activities. Such maps can serve as templates for understanding health consumers and as a starting place for assessing new product and service opportunities in the health economy.

Figure 46
Health Ecologies Include the Individual, Behaviors, and Resources



Source: Institute for the Future

II. the impact zones of the emerging health economy

As health ventures out of the hospitals and doctors' offices and into the broader economy, its markets become less monolithic, more part of other sectors and thus more scattered and elusive. Where do we find them? How do we approach them? How can we create innovative new products and make some money?

One place to begin is with what we call the impact zones—five key areas in which IFTF has been tracking changes. These zones provide a systematic way of examining the emerging health economy and its impacts.

In this section, then, we delve into five stories of the health economy, corresponding to the five impact zones below.

- Households: health in daily life
- Communities: the social face of health
- Organizations: the new culture of innovation
- Technology: a molecular lens on health
- Markets: the new value of shared information

By understanding these zones of critical impact, companies can gain a purchase in the new health economy, and begin to make headway against what will certainly be one of the most important economic developments of the 21st century.

households: health in daily life

The household—whether a traditional single family or a new configuration of shared living space—is ground zero for health choices. In the emerging health economy, these choices will proliferate across many domains of daily life, driving multiple health identities for household members, multiple health agents in the household, and more continuous communication with health helpers outside the household. All this engagement with health will, ironically, add up to more risk for householders.

Multiple Health Domains

Where health was perhaps once seen as a single domain of daily life, dominated by the health care system, household health decisions will be made in lots of different domains in the future—from entertainment and exercise to home improvement and self-improvement. When asked about their health activities in a recent IFTF study, householders pointed to a variety of lifestyle choices, including healthy cooking, massage and meditation, growing herbs and making herbal remedies, stretching and walking, and seeking out health information. All of these have obvious links to health.

But our householders also mentioned other less obvious activities that they considered part of their health regime: taking classes, chatting online, expressing oneself, living on a farm, attending conferences and gatherings, and spending time alone. Each of these activities could well be seen as part of a different domain of household life, and yet, each is part of the tableau of health decisions, suggesting opportunities for innovations in health-related offerings.

Zoom in on entertainment, for example. The words “health” and “video games” don’t usually appear together. But trends in gaming, computing, and communications could change that. Tie-ins between someone’s online character in a massive multi-player role-playing game and his real-life self might soon reinforce good health behaviors. For example, a Sims Online character might gain health points as the player loses weight or puts in time at a real-world gym—and then might lose points if he abandons his diet. Attempts to meld video games and exercise machines are also being revived. Sports equipment manufacturers have developed devices that connect exercise equipment to game consoles or PCs. Known as kinesthetic electronics, these devices allow users to link their physical workouts to game objectives in real-time, mixing and matching their own exercises and games to win at both.

Bottom line? There are lots of opportunities for adding premium value to products and services by linking them to health.

Multiple Health Identities

Along with multiple health domains come multiple health identities. As people navigate their health domains, they emphasize (or conceal) different facets of their health behavior. For example, in the kitchen, Frank might be a dedicated vegetarian. But at the gym, lifting weights with a bunch of hulking strangers, he might choose not to wear his *Vegetarian Times* T-shirt.

As more personal and household information is collected and shared among different

kinds of organizations, householders will give more thought—and more time—to managing their multiple health identities. As they link health to more of their daily activities, the complexity of this task will increase.

More Health Agents

As in other areas, householders are taking on health responsibilities they used to delegate to their employers, insurance agents, doctors, and pharmacists. Acting as their own agents, they are gathering more information about health and disease, treatments and prevention, and the health impacts of products. They are spending more time keeping family medical histories and sharing health information with friends and family. All these activities ultimately influence the health decisions they make.

Health decisions are sometimes made by an individual, sometimes by all members of the household. Even when decisions affect the entire household, householders may not agree with the decision. Furthermore, as information tasks get distributed more broadly across households, different members of the household (including extended members such as nannies, housekeepers, and even financial planners) may hold separate pieces of the health puzzle. For anyone offering health products and services, finding the right agent within the household will be an important task.

More Continuous Health Help

As health becomes an increasingly important value across all domains of daily life, householders expect more continuous communication

tion with their health helpers—whether it’s the doctor’s office or the customer representative for their new in-home sauna. With all the time they will be spending on managing their health identities, they will want their health helpers to recognize them and remember their health concerns and objectives.

For some households, some outside helpers will spend more time in the home. An aging population and an increase in chronic diseases mean that more households are likely to have members who need some form of home health care. People who fill this need will become part of the extended household, sometimes acting as health agents and decision makers themselves.

More Risk

With this increased engagement with health, householders will have more personal health information to sort through. Also, new diagnostic products—including genetic diagnosis—will add to their portfolio of personal information. Unfortunately, they will not necessarily have the skills or resources to interpret all this information. As decision making shifts to them, they will have to take on the substantial risks of making complex choices, without any unifying framework for achieving good personal health.

Implications

- Look for potential health benefits in all new products and services—a health message, an opportunity to use healthier materials, or an explicit health feature.
- Learn to recognize the health identities of your customers—that is, the different ways they perceive their own health interests in each interaction.
- Identify the right health agent for your products and services and their decision-making criteria; segment your market according to these agents.
- Expect more health concerns about your products and services and more discussions about their health effects.
- Don’t assume that health information alone adds value to a health product or service—focus on providing the information that householders need to make health decisions.

communities: the social face of health

The balance of power in health information has shifted. Once the exclusive purview of educated professionals, the science of health is now accessible to anyone with Internet access—at least in principle. In practice, the need to make sense of the science is driving new forms of community behavior: from new personal networks with health gurus to new forms of health advocacy and even new definitions of healthy spaces and places. Ultimately, the healthy communities of the future will use these innovations to ensure that information about health flows with minimal barriers to the right people at the right time.

New Health-Oriented Networks

As health becomes an increasingly important value in people's lives—due to aging, awareness of genetic predisposition to disease, or increased responsibility for one's own health care—individuals will re-orient their personal networks around health. The personal health ecologies we described earlier are one way to map these networks and understand how information, money, and health outcomes will flow through these future community structures.

The new health networks will also serve as maps for new health strategies: combinations of resources, behaviors, products, and therapies that define a health segment of the community. In general, social networks shape the purchasing cycle by filtering product and service information, influencing the final purchasing decision, and shaping the use of the product or service. Identifying types of health networks will allow companies and health care institutions alike to target particular clusters of health needs and preferences and to develop marketing strategies that take advantage of these network structures of influence.

New Expert Nodes

The most influential actors in a social network are the “hubs.” Hubs are the locus for communicating ideas and disseminating innovations. They typically have broad personal networks and can play an influential role in shaping the preferences and activities of the network. If you can effectively tap into a network hub, you can speak to the entire network. Many companies have created entire marketing programs based on this strategy.

As personal networks are redefined around health values, new hubs will emerge to provide health expertise. In a large extended family, such a hub might be a sibling who, as a registered nurse, serves as the first point of contact for the health care system. Or it might be a *curandera* who helps family members and friends navigate the growing stock of herbal remedies on store shelves. A hub might be a commercial Web site that provides information on how to build a healthy home or a Web personality who becomes the trusted source for a particular set of health issues, such as women’s menopausal health or alternative health.

In addition to these hubs, though, each person will likely cultivate their own health gurus. Like the technology guru who helps the uninitiated with their computers, the health guru will be an essential node in every personal health network—and will influence health behavior.

New Health Advocates

The sheer numbers of people and dollars involved in the health economy—not to men-

tion the volume of health information—will shift the role of health advocates as well. Up until now, health advocacy has typically focused on serious diseases such as AIDS or on issues of access to the health care system. But the new advocacy will turn its attention to issues of health as well as sickness and redefine access in some interesting ways.

For example, access to health might include access to a healthy pre-school, and health advocates might draw up universal pre-school health specifications. Or access to new non-prescription health-related products may take on the same imperative in communities as access to computers—does everyone have a right for calcium-enriched orange juice, for example? In the end, public health professionals will need to update their skills for a market-based health economy as they advocate for healthy cars, shoes, airplanes, and other consumer goods and services.

New Health Spots

Technological trends will redefine public spaces in terms of their health benefits (or detriments!). First among these are sensors and tags, which will begin to monitor health characteristics such as air quality and toxins in the materials and products used in public spaces. In much the way that second-hand smoke catalyzed a no-smoking movement in the workplace and other public facilities, sensor-based monitoring could begin to influence which kinds of cleaning products, building materials, and even cooking grease can be used in public spaces.

Some places will become targets of particular health concern. Airplanes are already high on the list, as worries about airborne disease and even drinking water on planes send alarms through the community of business travelers who have no choice but to spend hours at a time in these sealed capsules. On a more positive note, some places will recast their identities as places to improve one's health: at least one physical fitness company sponsors a program that encourages malls to open early for exercise walkers, for example.

Implications

- Use different types of consumer health networks as templates for new multi-organizational alliances to meet the needs of the health marketplace.
- Look for “early adopter” hubs and health gurus in today's market and use them as filters for new product and service ideas that aren't obviously health-related.
- Develop an explicit set of health criteria for all products and services, not only to add market value to the products but also to avoid future confrontations with health advocates.
- Look for opportunities to develop packaged solutions for “healthy places” such as pre-schools and airplanes.

organizations: the new culture of innovation

As the health economy unfolds, organizations will need to re-invent themselves around health values, both inside and out. The most striking innovations are likely to be in R&D, new product design, and regulation as the new players of the health economy interact with old organizational structures from the traditional health care industry to change the strategies of both. Here's what to watch for.

Innovation in R&D

In a health economy, the biotechnology and pharmaceutical industries set the pace and pattern for R&D. Starting in the 1990s, pharmaceutical companies began tapping into the patent-rich biotechnology sector to develop innovation networks. They have steadily increased their investment in contract research organizations, expanding their ability to cross disciplinary boundaries. One of the biggest challenges to innovation in the health economy will be drawing talent from a limited pool of cross-disciplinary experts in IT, biology, energy, and materials. The shortage of these kinds of hybrid workers will drive more collaborative efforts and new organizational forms to fill the gaps.

As for the pace of innovation, the pharmaceutical industry again provides a lead indicator. In the short term, drug approvals are expected to take longer as regulators reorganize to handle the new challenges of genomics-based products as well as the increased volume of new products and the blurring lines between drugs and devices and between medical devices and health information tools. In the long term, collaboration and technologies that speed the development process should shorten the time to market for new products. The near-term challenges of regulation will likely lead many players to focus on environmental health products rather than individual health products to by-pass the regulatory process altogether. Watch for this to be a major growth area.

Innovation in Design

Three trends are intersecting to increase the overall importance of design in the health economy. The first is the trend toward continuous health monitoring. Unlike the traditional tools used for episodic tests in doctor's offices, new monitoring tools will be kept close to the body at all times, and will need to be comfortable, convenient, and fashionable. All of these requirements up the premium on design.

Second, rapid prototyping and testing, made possible by new nano-scale manufacturing processes such as ink-jet printing of smart materials, will make it more economical to try out lots of design solutions as the product is being developed. They will also drive innovation in materials, which will, in turn, drive new design opportunities.

Finally, companies are already increasing their investments in design as a way to distinguish themselves in the marketplace. In traditional health care, the standard has been "one product fits all." In the health economy, there will be a richly differentiated marketplace, and design will be a key differentiator. Responding to different health demands for different age groups, different cultures, and different clusters of health values will all require design sensitivity.

The Regulation of Health Products

The parallel health and health care systems will create two kinds of decisions in the consumer marketplace: high-risk and low-risk. High-risk decisions will typically be associated with traditional health care, and will continue to be regulated by the Food and Drug Administration (FDA). Low-risk decisions will more often be made in the marketplace of healthy products and services, which will be less regulated. While this is where many new entrants will play, the porous boundary between the two will begin to blur, and more products and services are likely to fall in a gray zone.

For example, the distinction between an information technology and a medical device will be increasingly difficult to draw as body monitors become fashion statements and biochemical sensors become one of many inputs in distributed networks that can be re-purposed by software for multiple objectives.

Regardless of where they fall, companies on both sides of the blur will face an increasing burden of due diligence. The FDA is already

overloaded with new drugs and medical devices awaiting approval. As technology drives an explosion of new health products, the FDA will likely shift some of the burden of due diligence to companies, particularly regarding the collection of information throughout the life cycle of development through clinical trials and into market use. Companies in low-risk health markets will likewise need to invest greater effort in measuring and documenting quality and safety; in a highly infomated health marketplace, expectations of health information will be higher, health claims will be more easily evaluated, and injuries more publicly documented.

Implications

- Assess your role in emerging health R&D networks and develop strategies to strengthen your position as a hub.
- Develop strategies for access to cross-disciplinary talent in IT, biology, energy, and materials.
- Examine the role of design in your product and service offerings to see how you might increase its value in the health economy.
- Assess the talent and organizational changes you will need in order to respond quickly to an increased burden of due diligence for health-related products.

technology:

a molecular lens on health

Technology in the health economy will be small, pervasive, persistent, and highly individualized. The old categories of treatment and prevention will be replaced by new categories that have to do with the degree of contact with the body—intimate, peripheral, and environmental. Cutting across these categories will be the tools of individualization and monitoring, based primarily on genomics and a growing ability to measure and control molecular functions.

Intimate Health Technologies

The most intimate of the new technologies will be gene therapies that, for example, turn cancer into a chronic disease or prevent it from occurring in the first place. Working at the molecular level to change the body's response to its own genetic codes, these kinds of products will drive not only the world of individualized medicine, but also a market for nutraceuticals and cosmeceuticals that are tailored for one or more specific genetic characteristics. Many of these will be over-the-counter products.

But drugs, foods, and face creams will not be the only intimate health products in the new marketplace. Implants will become increasingly common as stimulants, drug delivery systems, monitors, and tissue replacements. For example, tiny pin-shaped batteries will be surgically implanted to stimulate the nervous system and correct problems ranging from stroke and palsy to incontinence. Smart materials, using organic tissues as scaffolding, will self-construct in situ to replace damaged tissue. Internal sensors will continuously monitor specific body processes, tissues, and fluids in real-time.

While not all of these intimate health technologies will be controlled by the traditional health care system, they will all require regulatory approval. They are the highest risk products.

Peripheral Health Technologies

The same kinds of innovations that enable intimate health technologies will spawn even more peripheral health technologies—materials and devices that interact with the body from the outside. Current examples are the vitamin C T-shirt; “watches” that monitor vital signs and even upload the results wirelessly to a personal Web site for tracking; and a variety of non-invasive diagnostic devices for everything from genotype to hormone levels.

Increasingly, these technologies will be linked into networks of communicating devices, so that personal health data can be tracked across several devices (not to mention several fashion ensembles). For example, that vitamin C T-shirt might monitor how much of it was actually absorbed and report it to the Web site that tracks your statistics for heart rate, sleep cycle, and other health determinants.

Many of these products will fall squarely in the gray zone for regulation and control. But many more will be treated as consumer health information products, with no real accountability for their actual health impact on the individual. Some will, of course, be closely controlled in clinical settings, providing growth markets within the traditional health care system.

Environmental Health Technologies

The third and least regulated set of health technologies are those that don't directly touch the human body but rather promise to improve health by improving the environment. These are extensions of existing products and services such as carbon monoxide detectors, air filters, and household fumigation services. As technologies shrink and become embedded in the physical world, these products and services will expand in both scope and scale.

New technologies will allow consumers, organizations, and government agencies to monitor a growing number of health factors with increasing precision. Everything from the presence of mold in walls, carpets, and bedding to bacteria in packaged foods will be on display. At the same time, embedded and networked sensors will allow tracking of these on a much greater scale—for example, to determine the overall pattern of air quality in a shopping mall or even the bacteria levels in water supplies across an entire watershed.

While these products will be the least regulated, they will require a host of new standards for minimum safe levels of exposure. They will also drive the market for products and services to remedy the problems they uncover.

Implications

- Consider your organizational strengths in terms of the three new categories of health technologies—intimate, peripheral, and environmental—and develop your health economy strategy around these.
- Examine the impact of genotyping on your product or service line: how might you adapt to gene-specific markets and where might you need to plug into the marketplace for genomic information?
- Promote the development of standards for safe levels of exposure and the technologies to measure and remediate them.
- Look for collateral uses of the new technologies that will get their start in the health marketplace but might later be adopted elsewhere.

markets:

the new value of shared information

The marketplace in the health economy will be a sometimes awkward mix of the third-party payer system of traditional health care and the burgeoning commercial marketplace for health-oriented products and services. The challenge of the health economy will be to integrate these two systems, and much of this burden will fall on consumers as they juggle the products and services of both to meet their needs. But strategic advantages will go to companies that succeed in crossing this boundary, and health information will be the key to their success.

The Boundary Market

As the boundary between the two health systems blurs, products and services on both sides will have consequences for the other. For example, a company like AmeriScan offers full body scans to the (well-to-do) public, but its customers will quickly show up in the offices of traditional health care providers looking for help with interpreting the results.

If commercial health markets drive more demand for health care services, both sides will have to reorganize to meet the demand. In addition, a boundary market may open up for information providers that are qualified to filter consumer demands in both directions. These may be narrowly focused—for example, a “first reading” service for both medical and commercial body scans—or they may provide a broad palette of services, such as matching a consumer’s profile to a host of commercial and medical products and services.

The B2B vs. B2C Markets

The health economy will also change the business-to-business (B2B) versus business-to-consumer (B2C) profiles of both systems. Health care has been largely a B2B business, with the patient sometimes not even recognized as the consumer. This is changing as more organizations—both commercial and traditional—are targeting consumers directly. Meanwhile, some consumer companies are targeting large health care organizations for what are traditionally consumer products—food companies that sell to health plans, for example.

An interesting form of integration may result from the increased ability to track health product purchases automatically: insurance companies could develop schemes for reducing premiums for those who routinely use such products, much the way that home insurance agents reduce rates for homes or buildings with smoke detectors.

The Market for Health Information

Health information is the currency that will cross these dual systems, increasing the porosity of their borders and eventually linking them together. The strategic advantage in this new economy will go to the players who can best manage information across the boundaries. This will be no easy task, however. In traditional health care, information has historically been very fragmented, very protected, and not at all amenable to automation.

What could make a difference in the health economy are the engaged consumer and the use of embedded information technology, particu-

larly RFID and digital tags. Both of these are bottom-up phenomena, as opposed to the top-down efforts that have failed in the past. As consumers take over responsibility for integrating the information that's relevant to their medical history and health status, they are likely to demand the same ease of access they have in other arenas of their life, such as finance and banking or comparison shopping. This will create opportunities for innovators to work directly with health consumers to create new solutions. At the same time health tags, embedded in products and health documents, could lay the foundation for distributed health data network that could be increasingly self-managing.

Such a distributed data network will become increasingly valuable as genomics begins to link genetic information to specific products and people. This information can eventually provide individual point-of-care or point-of-purchase filters on treatments, products, and services. Plugging into this network early will give players—both commercial and traditional health organizations—a strategic advantage in the world of individualized health and health care.

The Tiering of Services

One undeniable result of the growth of commercial markets for health products and services will be the tiering of access. Those who can pay more will get the newest and best that the health economy has to offer. Others, who cannot afford it, simply won't. In fact, as consumers make choices to spend their health dollars in the commercial marketplace, the health

dollars available to the traditional health care system might actually decline—rendering it a system of last resort for the poor. Furthermore, if a lot of people exit the insurance risk pools to “buy” health in the commercial marketplace, the really sick, as well as the poor, may not be able to find affordable health care coverage.

Implications

- Assess the health information component of every product and service you offer for its potential value in the health economy—either as a link to markets and consumers or as an independent value center in your offerings.
- Track the various efforts to develop the standards for digital tagging of health information—such as those of the American Society of Testing and Materials (ASTM)—and develop strategies for integrating those standards into your product tags and business documents.
- Examine the ways that your customer-base might change as traditional health care adopts more B2C models and commercial players target the health care system for B2B services.
- Identify policy issues that will arise as access to health products becomes increasingly stratified and assess your options for responding to these issues.

III. top opportunities in the health economy

In this close-up look at the health economy, we have described a future in which health becomes a dominant value in the overall economy and shifts consumer spending to a wide range of health-oriented products and services. In this economy, the portion of household income spent on health increases, and much of that spending is outside the boundaries of traditional health care. This shift creates new market opportunities for all kinds of companies not traditionally associated with health care.

But which are the best of these new opportunities? We think a good way to pick winning value propositions in the health economy is to play the boundaries—to look for intersections where combining health and something else creates a strategic advantage for your company. Or you can make a platform play by bridging boundaries, providing the infrastructure that will allow others to play the boundaries better.

That said, we have identified eight opportunities that are particularly compelling.

1. Home Care

In the coming decade, more and more people will need health care in their homes. The drivers here are an aging population, an increase in chronic illness, and a trend toward reducing hospital care to a minimum. Home care services will take up the slack, ranging from skilled nursing services to all kinds of assistance for older adults who are caring for their even older parents. This assistance might include cooking and shopping for healthy foods, helping manage personal health information and communication with health resources, and maintaining in-home health technologies such as oxygen tanks, health monitors, and equipment that allow the ill to remain at home while coping with disabilities and disease. The best—and most successful—of these services will be those that can seamlessly cross the boundary between traditional health care institutions and marketplace health offerings, tailoring their services to the unique health ecologies of the people they serve. These services will also become new customers for many health-oriented consumer goods, providing a new market for those who know how to tap it.

2. Personal Health Security

Security and health come together in a world where bio-terrorism is a real threat. But bio-terrorism is only one instance of a larger concern about the impacts of environmental toxins on personal health, whether from contaminated water and air pollution or mold and mildew in the walls. The common characteristics of such threats are that they are largely invisible but potentially ubiquitous. They also seem out of the control of the individual. Giving control back to the individual by making environmental health dangers visible and providing quick ways to eliminate the threats is a great way to enter the health market. Products and services in this market address real consumer fears and are useful regardless of whether the threat is real or merely perceived. They are “peace-of-mind” products and services. At the same time, the growth of sensors and smart materials will provide very real solutions when the threat is actually present. The key here is turning environmental products into personal products. The guarantee to consumers is that no matter where they are, they can control their personal exposure to health threats.

3. Healthy Public Spaces

The flip side of the personal health security market is the market for environmental health and safety. As people become increasingly aware of the presence of environmental toxins and their impact on personal health, they will also demand more assurances that the public spaces they inhabit are healthy. Workplaces

will be a particular target. Studies in the United Kingdom have shown that worker productivity increased by as much as 30% after “sick buildings” were made healthy. (They even coined the term “sick building syndrome.”) This market has great potential for collaboration across sectors, including sensor-based monitoring products, health-oriented building materials, and even health-care insurers. Players who can bridge these sectors and offer packaged solutions will be in particular demand in the workplace where they can promise to improve the bottom line. But they will also have roles to play in other public spaces from restaurants and theaters to trains and airplanes, each of which will have its own set of health risks, solutions, regulations, and potential payoffs.

4. Health Games

On a lighter note, crossing the high-premium world of entertainment with a growing health-consciousness should provide a host of new opportunities for corporate growth. The online game economy, for example, is serious business; McDonald’s and Intel have each invested \$2 million in replicating their real world identities in the virtual world of Sims Online. Linking this high-potential market to health suggests all kinds of tie-ins, from fitness clothing to sports equipment. Just imagine that you could improve your virtual character’s superpowers by getting automatic credits for supplements you purchase at your local supermarket. Just imagine that you’re the company who makes that possible. And don’t forget about

kinesthetic electronics, which meld video games and physical exercise. Until now, this equipment has been limited by the cost of sensors and displays to high-end systems like Sportswall's computer-controlled backboards for training tennis players. But as these technologies become ubiquitous over the next few years, the market for game-based personal training equipment is likely to explode.

5. Health Tourism

Tourism has always had links to health, from ancient healing baths to modern health spas. And the tourist industry itself is notably health-conscious; there's even an International Association of Tourist Health to promote healthy practices in the industry. What's different today is the rapid growth of health tourism to include not only spa-style treatments but to provide alternatives to local health care—including less expensive doctors, better-trained doctors, doctors with unique expertise, cosmetic surgery, and access to drugs not approved in one's own country. In tourist countries like Malaysia, physical check-ups may come with basic room accommodations as hotels try to fashion themselves as more inviting venues for your annual checkup than the doctor's office back home. Cruise lines are even developing health-focused cruises. Another difference today: the costs for these health holidays are within the reach of ordinary people. Tourism is thus becoming another strong channel for health products and services.

6. Personal Health Information

Our survey research shows that engaged health consumers share a set of characteristics: they have a broad definition of health; they have complex health ecologies; they're socially connected; they spend a lot of time navigating health choices and doing health information work. These consumers are ripe for products and services that help them keep track of their personal and family health histories and to use this information to make better choices about their health care and the health products and services they use in their daily lives. Perhaps what they most need is the health equivalent of Quicken: a household health management tool that brings order to the chaotic streams of information, expenditures, and choices that constitute their health strategies. As personal health information and health behaviors are increasingly captured automatically, such tools will need to integrate that information across commercial markets and health-care institutions, much the way that Quicken can integrate banking, credit card, and investment transactions.

7. B2B Health Data

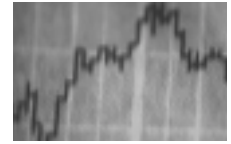
Perhaps the single most important requirement for a flourishing health economy is the growth of an infrastructure for sharing information about health care, health products, and health services across markets and organizations, while protecting the privacy of the individual. Fortunately, the kind of distributed computing environment that is emerging on the Web (with web services that use shared data for limited

purposes) offers solutions to this problem that previous top-down systems didn't. The market opportunity here is huge, and there can be many winners. Two factors will influence success: the first is a robust set of XML standards for health information; the second is putting the health consumer at the center of the solution—using consumer health ecologies as the templates for designing services.

8. Design for Health

As more products and services are redefined in terms of health—and as design becomes an increasingly important market differentiator—there's an opportunity for players who can provide the concepts, the tools, and the processes for incorporating health features, health values, and health metaphors into all kinds of products and services. This is design with a health filter. The filter will necessarily be the result of deep understanding of health consumers, much the way human-computer interface demands a deep understanding of computer users. In fact, we see the opportunity for an equally broad domain of human health design emerging in this economy. In fact, the ultimate health of the health economy may depend on skill and ingenuity of this new design discipline.

—Mary Cain and Kathi Vian
with contributions from Rod Falcon,
Susannah Kirsch, Alex Soojung-Kim Pang,
and Katherine Haynes Sanstad



Learning to Appreciate Social Capital

Social capital is the value of relationships a person accumulates in a lifetime, relationships that enable access to a wide range of resources. It is a resource of equity built from a person's entire social network over time, encompassing contacts, information, knowledge, and know-how. Along with physical and financial capital, social capital is an important asset, one not always appreciated or even recognized by traditional economic theory. Nevertheless, social capital often supplements or substitutes for money and other tangible resources in a person's portfolio of assets. Indeed, in some economies where modern economic and legal institutions are not well established, social capital is critical to survival.

IFTF's research shows that a high level of social capital gives people access to resources far beyond their financial means. This is nothing new. Use of social capital in this way goes back millennia. What is new is how people acquire and leverage social capital in the presence of vast new communications networks spanning the globe.

In the new world of abundant connectivity, when their customers' social networks are more extensive and far reaching than ever before, companies must first recognize the power of social capital and then learn to segment consumers not only by means of their incomes and other demographic characteristics but also their social capital. Just as some consumers have higher purchasing power, making them more valuable to companies, some consumers have more social capital, giving them greater power in the marketplace. It is wise for companies to search out such consumers, develop a good understanding of their needs and preferences, and tap into their economic influence.

THE INVISIBLE POWER OF SOCIAL CAPITAL

My mother knows well what social capital meant. Living in the Soviet Union in the 1960s and 1970s, it meant that despite being a widow with very little money, and not having a high position or a membership in the "privileged" class (the Communist Party), she was able to provide a good life for her family. We never worried about having enough food, my sister and I always wore fashionable clothes (by Soviet standards, at least), took music and dance classes, went to the best schools, spent summers by the shore, regularly went to the symphony, and otherwise took advantage of a lifestyle that seemed much beyond our means.

Our story is not unique. All around us, amid empty stores, low salaries, dismal productivity numbers, and fraying infrastructure, people seemed to live normal middle-class lives. This would be hard to explain by looking at simple economic statistics or by walking around the stores and markets in Russia. Visitors to Russia, in fact, were always amazed at the gap between what they saw in state stores (usually empty or filled with things no one wanted to buy) and what they saw in people's homes (tables filled with food, nice furnishings, and so on). How does one explain the gap?

The gap was bridged by the informal economy, driven by social rather than financial capital. This informal economy was deeply rooted in the myriad social relationships people used as another form of capital to acquire goods, services, information, and many other things necessary to live. Such social capital served a critical role in the economic life of the Soviet Union and continues to do so in many other countries today.

Teodor Shanin, an Israeli sociologist, has invented a field of study called "peasantology," which looks at how people survive in informal economies. The key, he found out, is the existence of dense and vibrant social and family networks that provide members access to necessary resources. In short, people in informal economies rely on social capital for their very survival.

Researchers observed the phenomenon first in Africa years ago where they could not find any economic explanation for how the majority of the population survived. They didn't own land. They didn't seem to have any assets. According to conventional economics, they should have died of hunger long before, but instead they survived. This

phenomenon could not be explained by any known economic models. The explanation lies in how people lived their daily lives. People in African villages had no jobs, pensions, steady places to work, or regular flows of income. Families held a range of occupations from farming and selling in the market to doing odd jobs or handicrafts. Rather than earn wages, labor was used within family enterprises, or shared out among the village, and the fruits of that common effort were distributed through the network. The same way of life can be found in Latin America, South Asia, Italy, Russia during the Soviet era, and many other places today.

SOCIAL CAPITAL IS VALUABLE CAPITAL

Much of contemporary economic and political theory focuses on the concept of capital—resources that are available for investment with the goal of providing profitable returns. A traditional economic definition of capital focuses on physical goods—“a stock of goods used for the purpose of producing other goods,” but it also can be used to include a talent or skill developed over time, such as education or work experience. Sociologist Nan Lin defines capital as the “investment of resources with expected returns in the marketplace.” Thus, capital constitutes resources when these resources are invested and mobilized in pursuit of profit.

For a company, capital resources include financial capital, fixed assets, intellectual property, and skilled labor. Similarly, for an individual, capital resources include money and other tangible assets (house, car, physical resources), as well as the individual’s level of education, knowledge, and accumulated skills. This includes all personal assets that increase one’s value and can be put to profitable use.

Viewed from this perspective, social capital is one of the most important forms of capital, equal to traditional capital resources. Like personal resources, social resources are built on social relationships and networks and can be put to profitable use in many ways, including access to material goods such as land, housing, cars, and money or symbolic goods such as education, club memberships, reputation, or fame. Social capital also represents portfolios or toolboxes of knowledge, expertise, and ideas that can be selectively activated and deployed for work, professional development, or learning, as well as profit.

In my mother’s case, a high level of social capital provided her with invisible but highly profitable resources which she used quite effectively to survive in the face of limited financial and tangible assets. Social capital built on networks of relationships with friends, acquaintances, and family is precisely what accounted for my mother’s ability to live comfortably on pitiful wages from her job as a physician in a state hospital. While there was no meat to be found in any store in the city, my mother got it regularly (along with other provisions) through the director of a supermarket, who was also a husband of a close colleague. I received music lessons in exchange for my mother treating the director of the music school. We acquired Western pharmaceuticals because my mother was friendly with the head of a large local clinic. Our apartment was always filled with people for whom my mother was diagnosing, advising, treating, and prescribing medicines. These were not mere friends, colleagues, patients—they were also her doors to all kinds of resources, from tangible commodities such as food, medicines, and clothes, to information, services, and emotional support.

In IFTF's ethnographic work on how young people form and use social networks today, we clearly see how extensive social networks are and how the social capital embedded in them gives young people the kind of freedom traditionally associated with the rich. In the realm of jobs, high levels of social capital enabled by the right networks gives individuals the freedom to take on projects they like rather than just anything that comes their way; and it gives them the freedom to take risks in a corporate environment that otherwise might not encourage such risks; and it gives them the freedom to simply quit when the work is no longer satisfying.

Even in Japan, where traditional career paths are predetermined once you join a large corporation, and where risk-taking opportunities are limited, particularly for women, social capital can be empowering. A 28-year old woman we interviewed has purposefully crafted an extensive network outside the large advertising company for which she works to increase her range of choices. She is keenly aware of the freedom her network gives her:

At my age, I can choose to stay on at this big corporation, but I can also choose to go somewhere else, start my own business perhaps. Or join someone else's business, or maybe I can move out of Tokyo. ... I have a better chance to enjoy what I'm doing, because I feel that I'm doing this out of choice. ... So, [my social network] gives me certain freedoms.

Social capital also represents access to knowledge, information, or expertise. Each person in a network represents resources or access to resources that can be tapped for work or personal use. This is evident in the same interview with the young Japanese woman.

To me, these people [in my social network] serve as doors to new worlds that I would not know otherwise. If I were just left on my own, my world would be small. But these people, they open the doors for me to a totally new world.

In this way, social capital represents a great economic asset—it increases one's choices in society and the marketplace. At the same time, it decreases transaction costs, allowing quick and efficient access to the required information, knowledge, expertise, and skills.

SOCIAL CAPITAL IN DEVELOPED ECONOMIES

If social capital is what enables people to survive in developing countries, what is its role in countries that are already developed? Indeed, in the industrialized world, many of the functions traditionally performed by family and social relations have been "professionalized"; that is, rather than meeting various needs through family or social "connections," people simply purchase the answers from professionals. In most developing countries, by contrast, many such services and goods are part of the informal economy and flow out of social connections between people. In many countries, for

example, the practice of paying money for psychotherapy is unheard of, even laughable. For this you go to friends and neighbors. The most extreme example of substituting economic transactions for personal relationships can be seen in Japan, where older people sometimes “rent a family for a day,” or where one often pays strangers to attend a wedding on their side of the family in order to improve social status. While in the industrialized countries medical advice is freely bought and sold in the marketplace, in the Soviet Union, medical advice was something my mother, exchanged for other goods and services. In this kind of informal economy, such transactions are hard to keep track of and hard to put a value on. In industrialized countries, social capital is often replaced by purely economic transactions that can be accounted for by collecting traditional economic data.

This became evident when my family emigrated from the Soviet Union in 1990 and came to live in the United States. For every problem they encountered here, they searched for a “social connection” to solve it, just as they would have—indeed had to—in the Soviet Union. If someone was ill, they turned to someone they knew, when a call to the medical clinic would have sufficed; when they needed information on a school, they would scan the network to search for someone who had a “connection” at the school when a simple call to the admissions office would have done just as well or better. Their process of acculturation involved accepting the idea that there are professional and payable substitutes for social connections that are available to them. More than a decade later, I am not sure this idea has fully sunk in.

SOCIAL CAPITAL IN THE WORLD OF ABUNDANT CONNECTIVITY

In his well-publicized book *Bowling Alone*, Harvard sociologist Robert Putnam decries the decline of social engagement and social connectedness on the part of the American populace. He cites various statistics to document this decline: the number of Americans who report that in the last year they have attended a public meeting on town or school affairs has declined by more than a third since 1973, and similar declines have occurred in attendance at political rallies, service on committees of local organizations, work for political parties, and participation in church-related groups, school-service groups (PTA), sports groups, professional and literary societies, unions, fraternal groups, veterans’ groups, service clubs, volunteer organizations, Boy Scouts, bowling leagues, and so on (see Table 13 on page 120). According to Putnam, among the college-educated, the average number of group memberships per person fell from 2.8 to 2.0 (a 26% decline) between 1967 and 1993. At all educational levels of American society, the average number of association memberships has fallen by about one-fourth in the last quarter century.

What’s more, the proportion of Americans who socialize with their neighbors more than once a year has also slowly but steadily declined in the last two decades, from 72% in 1974 to 61% in 1993. Putnam terms this phenomenon “social de-capitalization,” an alarming decline in the social fabric holding American society together. He offers several explanations for this decline, including the movement of women into the labor force, the greater mobility of families around the country, demographic transformations (fewer marriages, more

divorces, fewer children, and so on), and the technological transformation of leisure (computers, the Internet, video games, video and DVD players, cable TV) resulting in the “privatization” or “individualization” of leisure time, and thus the disruption of many opportunities for the formation of social capital. The picture Putnam paints is alarming, suggesting that the demise of civil society and vibrant democracy is at hand in the United States.

But is alarm really warranted? Are we truly witnessing the demise of social capital in American society and, by extension, other industrialized societies? On the face of it, it seems clear that reliance on traditional, face-to-face social capital is much lower in the industrial world, where many of the resources embedded in one’s social relations

have been “professionalized” and can be exchanged for money. In industrialized countries, people don’t need to rely on social capital alone for survival—they have other resources available. But while they don’t need it for survival, it is clear that they still use it to get ahead, to increase their opportunities, to pursue new ideas, and for many other more creative purposes. Indeed, social capital played a large hand in creating one of the most important economic phenomena in the 20th century—the growth of the high-tech industry in Silicon Valley. (See text box, “Social Capital and Success in Silicon Valley.”)

As shown by the example of Silicon Valley, even societies with the most sophisticated economies have informal economies that involve extremely valuable exchanges

Table 13
Americans Are Participating Less in Political and Community Activities
(Percent change in those people that have ... in the last 12 months, 1973–1994)

| | |
|--|------------|
| Participated in at least one of twelve activities | -25 |
| Served as an officer of some club or organization | -42 |
| Worked for a political party | -42 |
| Served on a committee for some local organization | -39 |
| Attended a public meeting on town or school affairs | -35 |
| Attended a political rally or speech | -34 |
| Made a speech | -24 |
| Wrote congressman or senator | -23 |
| Signed a petition | -22 |
| Been a member of some “better government” group | -19 |
| Held or ran for political office | -16 |
| Written a letter to the paper | -14 |
| Written an article for a magazine or newspaper | -10 |

Source: Roper, *Social and Political Trends Surveys, 1973-1994*.

without directly assigning them economic value. According to Shanin, such informal economies are a global phenomenon. In some places they take the form of a black market and merge into criminality. But most often, they are perfectly legal—just people working with family, friends, and colleagues to get by or in some cases achieve great things.

But what has really changed in the United States and many other industrialized societies is the way people are acquiring and putting to use their social capital. Advanced information and communication technologies have enabled these changes.

In the past ten years, industrialized countries have entered the world of abundant connectivity, enabled by the Internet, mobile communications devices, cheap air travel, and other communications technologies.

This has allowed people with access to such technologies to create and support many more social connections than ever before.

Based on extensive interviews and data on people's communication styles and preferences, we believe that in the age of abundant connectivity, people have more—and more extensive—social networks than ever before. How people put together such networks and how they use them, however, is vastly different from how previous generations did so. Today we are doing it less through the traditional institutions cited by Putnam, and more by means of the latest information technologies. Such technologies allow people to cross the boundaries of traditional institutions—neighborhood associations, schools, or local bowling alleys—to put together vastly larger, more global, more

■ Social Capital and Success in Silicon Valley

Many social scientists and observers of the Valley have documented the role social capital and networks have played in its success. In her book *Regional Advantage*, AnnaLee Saxenian, a professor of city and regional planning at the University of California, Berkeley, compares two regional economies—Silicon Valley and Boston's Route 128. Although both areas boast excellent universities and a highly skilled labor force, Silicon Valley has been much more successful in economic terms, producing a greater number of successful companies and innovative products.

This is largely due to the surprising strength of the social network system in Silicon Valley, where people build dense social relationships that transcend individual company affiliations. They use these social networks and the social capital embedded in them to build new companies, transfer ideas between organizations, and produce the next generations of products. Numerous Silicon Valley ventures have been built by "diasporas" of colleagues from Fairchild, Apple, Intel, and other companies, who carried their social networks with them to start new ventures and fuel innovation in the region. Even in the advanced economy of Silicon Valley, people rely extensively on social capital to increase the economic vitality of the region.

boundary-crossing networks that they use for fun, work, education, and other purposes.

The following are some distinct characteristics of today's social networks, and how they are used in a world of abundant connectivity.

Many More Weak and Specialized Ties

Connectivity allows people not only to reinforce deep ties (those with family members, school friends, and others with whom they have deep and long-standing relationships) but also to create portfolios of "weak ties," relationships with people with whom they connect only on a specific issue or for a limited period of time. Thus, one's social capital includes, not only deeply embedded ties based on long and deep relationships, but also many weak ties that can be called on as needed.

Social Relationships Are Just-in-Time

Abundant connectivity allows people to access the resources they need from such portfolios of relationships in a just-in-time manner. People don't need to bowl together or participate in clubs to help each other out. Of course, deeper, more all-encompassing relationships are still important and ever-present in their lives, but they can accomplish much through their extensive portfolios of just-in-time links, whether these are obtained through chat rooms, instant messaging, Web sites, or various interest-based groups. These portfolios of just-in-time relationships are used quite effectively to find jobs, pursue interests, learn new things, find places to stay when traveling, and so on. Someone who discovers that he has diabetes, for example, can turn to an online support group to share information about the latest

treatment options, obtain advice about doctors, and get emotional support for dealing with the disease.

Networks Cross Multiple Boundaries

In Putnam's analysis, the social networks people create through various civic organizations are local, for the most part. They include local bowling leagues, PTA, service organizations, clubs, and so on. Such local connections are still important today, but 21st-century networks increasingly incorporate global links and cross multiple boundaries of geography. This is partially the result of migration—immigrants from other countries maintain ties to their friends and relatives back home—but it is also driven by communications technologies. People engage in online interactions with others from many different places. A Hodgkin's disease support group, for example, may include patients and family from Australia, Russia, Netherlands, and the United States. Many young people see participation in such global networks as an asset and purposefully set out to establish these kinds of global ties. These efforts may include studying and traveling abroad, participating in global movements, and getting involved in online discussion groups with an international character.

It is important to remember that real-time, face-to-face activities and events are not going away. These are essential to the maintenance of social networks and the building of social capital. Even with abundant connectivity and the substantial growth of online interactions, much of people's lives take place in the real physical world, among their friends, family, acquaintances, and the general public. People are keenly aware of the different levels of closeness in their net-

works. They distinguish the levels of closeness by describing them in different ways—there are friends who “know everything about me” or “know me as a whole person,” or others “whom I can tell everything to.” Then there are friends who are “just my gaming friends,” “my windsurfing friends,” “my theater friends.” Face-to-face interactions, their length, depth, and duration, reinforce the depth of social relations. Abundant connectivity reinforces such deep ties by allowing people to maintain communications when they move away or change schools. At the same time, people have access to multitudes of other social connections, across geographies and traditional institutions. These connections are often narrow or weak in nature, but all of them increase an individual’s social resources and thus, an individual’s social capital as well.

All in all, social capital is not declining in the western industrial states, but the nature of what constitutes social capital, how people build it and use it, is changing dramatically.

IMPLICATIONS FOR BUSINESS

Companies know well that all consumers are not created equal. They carefully segment consumer groups on the basis of socioeconomic characteristics—age, income, geography, values, life stages, and other attributes—in the name of trying to understand consumers’ attitudes and product preferences. Rarely, however, do companies look at their customers’ social capital.

However, social capital is an important resource for consumers and ties directly to their ability to access goods, services, information, and knowledge. It is as important in a consumer’s portfolio of assets as money, home ownership, education, and important

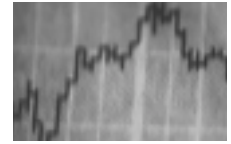
characteristics companies have traditionally tracked. Just as consumers with higher incomes and education constitute highly desirable customers for many companies, consumers with high levels of social capital should be highly sought after as well. Not only do they have access to more resources, they often exert greater-than-average influence in the marketplace. Because of their high connectivity, for example, they often serve as important communication channels. Their word about a product may rapidly reverberate through the marketplace, resulting in quick acceptance or rejection of a product. Whether it’s the *Atkins for Life* diet book, Pokémon games and cards, or the latest mobile phone fashions, socially affluent consumers are key drivers behind the meteoric success of these products.

Clearly social capital is an important personal resource. As such, it is an important metric for differentiating consumers and for understanding market dynamics in many countries, developed and developing. In the world of abundant connectivity, people are finding new ways of building and using social capital. Thus, it becomes even more important for companies to identify the “socially affluent” and target their product and service offerings to them in some of the following ways.

- *Companies need to develop metrics for measuring social connectivity.* Such metrics need to include both consumers’ face-to-face and online interactions, including their interactions with companies themselves. Such interactions may serve as proxies for highly connected consumers.

- *Companies must distinguish different types of socially connected individuals.* Some people may have a multitude of face-to-face interactions but not highly connected online, others may be just the opposite, and yet others may combine the two. Companies need to understand different types of connectedness and target their messages and offerings with this in mind. Just because you've identified individuals who are highly connected online (which is easy given today's data mining and Web crawling technologies) doesn't mean you've uncovered the most valuable and socially affluent consumers. There are still influential consumers who are not participating in chat rooms but are highly engaged socially through bowling leagues, PTAs, environmental clubs, and many other face-to-face connections.
- *Once identified, socially connected people need to be treated as important customers.* They ought to try to get products to them early, give them preferential access to new products, give them extra reward points, make more personal contact with them, make them feel special. This is precisely the strategy of Procter & Gamble's spin-off Tremor, which identifies highly socially connected teenagers and tries to develop relationships with them, giving them advance product information, sending them coupons and incentives for purchasing products, and engaging them in online discussions.
- *Social capital is even more important for companies marketing in developing countries.* Identifying consumers with high levels of social capital is particularly important in developing countries, where, as Shanin points out, traditional economic metrics do not work. Many of the economic exchanges in these societies are invisible and not captured by market statistics. Looking at the social capital of consumers in developing countries may help companies uncover these hidden resources and point to successful ways of not only disseminating information but also selling goods. The success of "Avon ladies" in selling products in China is largely attributable to their ability to tap into dense social networks to introduce and create demand for new western cosmetics.

—Marina Gorbis



Who Is the Connected Consumer?

Just about every human being is a member of many social networks. Social networks are webs of relationships based on interests, values, friendship, family, and community. And these social networks have a significant impact on purchasing behavior. In fact, consumer purchases depend to a large degree on how well they are tied into these large webs of social connection.

Social networks have been around forever and are formed well before we are even aware of them. Indeed, from the time we are born, networks spring up around us—based on the family we are born into, the places we frequent, the clubs we join, the schools we attend, the places we work, the neighborhoods we live in, and the people we come to know. What's different today, however, is that the recent revolution in communications technologies has changed how networks are formed and operate. Technology is facilitating new types of relationships, making social networks quite complex—increasing both their reach and depth. These social networks are important for all kinds of consumer decisions because they serve as filtering mechanisms that sort, analyze, and disseminate information. Consumer-oriented companies that learn how to tap into these expanding webs of “connected consumers” will do better in the next decade than those that ignore them.

TECHNOLOGY IS EXPANDING SOCIAL REACH

IFTF research on social networks has found that new consumer technologies are expanding the reach of social networks. By “reach” we mean the extent to which the relationships in a person’s network cross boundaries, specifically boundaries of geography, ethnicity, culture, age, values, interests, profession, organization, institution, and community.

In the past people could only manage a limited set of relationships defined by time and place—usually family and people in their immediate vicinity. Information technology breaks open these constraints by helping people build ties with others anywhere around the world who share their passions, lifestyles, or professional interests. A recent survey by the Pew Internet & American Life Project found that 84% of Internet users, or about 90 million Americans, have used the Internet to contact or get information from a particular group. Forty-nine percent of people in this category say the Internet has helped them connect with groups or people who share their interests, and a full 50% say that the Internet has helped them get to know people they otherwise would not have met.

In this way, technology is essentially an amplifier of the basic social activities that existed well before the Internet. Now it is easier and faster to communicate with people in a network, manage more relationships, activate relationships, maintain far-flung contacts, and so forth. As a result, social networks are no longer limited just to those relationships defined by strong social ties but now include many more layers.

Many of these new relationships are based on much weaker social ties—individ-

uals on the periphery of one’s network such as old college friends, friends from an online community, former work colleagues, friends from yoga class, and so on. All the information and knowledge contained in these networks of contacts, knowledge that otherwise may not be readily available (if at all), can be folded into an individual’s network with the click of a mouse. What’s more, each of these relationships can be important in a variety of ways for everyday life—finding a job, seeking advice, getting information, or, most important for our purposes, making purchasing decisions. For example, a “yoga friend” may be quite influential in health and other lifestyle purchases such as food or alternative medicine. In fact, consumers rely on people like the yoga friend to filter, process, and analyze product and service information before making purchasing decisions, especially those that are somewhat complex, such as health care, financial, or technology purchases.

SOCIAL REACH INFLUENCES THE PURCHASING CYCLE

It is more important than ever for businesses to be able to see consumers in the context of their social networks. Social networks shape the entire purchasing cycle by creating desire for new products and services, filtering product and service information, influencing the actual decision to purchase, and shaping the use of the product or service itself. What’s more, people whose networks cross many boundaries serve as key agents for diffusion, transmitting ideas, products, and practices from one group or network to another. Understanding networks is critical for understanding the diffusion of products and the spread of practices and ideas.

For the consumers, social networks help reduce the information work of purchasing decisions. IFTF's 2002 survey shows that 85% of Americans report searching multiple information channels before making major purchasing decisions. This amount of information requires consumers to exert great effort in finding, filtering, and evaluating information before making decisions.

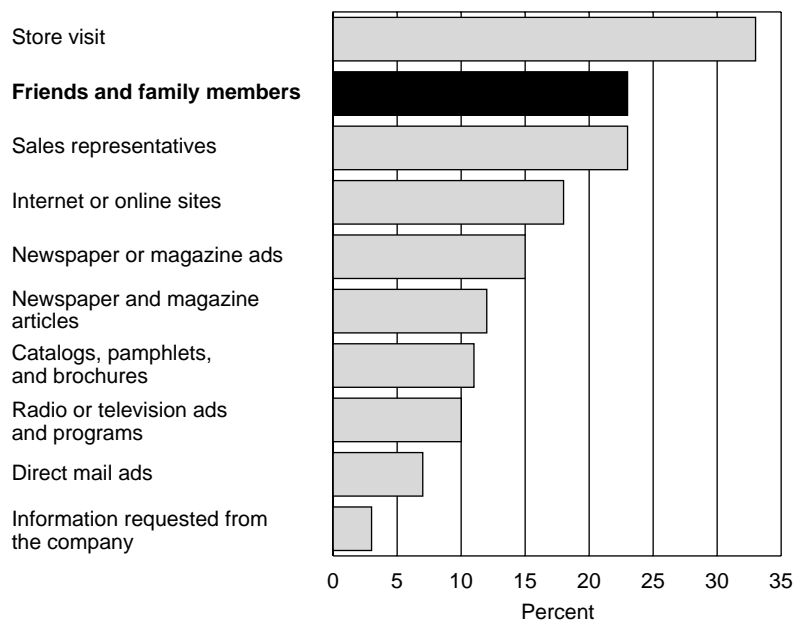
In response, consumers are becoming quite adept at leveraging social capital to help their decision making. Social capital is the amount of support consumers can call on from people in their social network. (For more on social capital see "Learning to Appreciate Social Capital.") Our research has found that consumers consistently rate "friends and family" as one of their most useful sources of information for making purchasing decisions (see Figure 47).

Given that consumers go to so many sources to make purchasing decisions, it would be helpful for businesses to know the extent of their networks. To track the social reach of consumers, IFTF has come up with just such an index. We describe it in the text box, "Finding Connected Consumers: The Social Reach Index," on page 128.

WHAT ARE CONNECTED CONSUMERS LIKE?

Although they represent less than 10% of the population, the unique characteristics of connected consumers are expressed to a lesser extent in people with moderate or high social reach as well. In other words, connected consumers are important leaders of consumer activities. For this reason, businesses ought to pay attention to the particular characteristics of connected consumers

Figure 47
Friends and Family Are a Preferred Source of Product Information
 (Percent of consumers who reported that ... was one of the two most useful sources of information in helping them make a major household purchase)



Source: Institute for the Future, Household Survey 2002.

■ Finding Connected Consumers: The Social Reach Index

To understand how new, broader social networks affect consumer behavior, we have quantitatively measured consumers' connectedness with what we call the "Social Reach Index." Social reach is a proxy for the social capital imbedded in social networks that can be accessed or activated for consumer decision making.

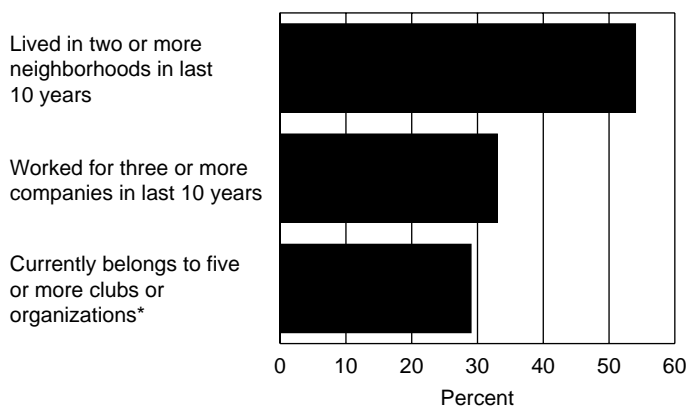
From our qualitative research, we found that networks are organized around eight key dimensions of life: family, values, interests, work, identity (ethnicity, culture, and so on) institutions and organizations, geography, and place. We chose three of the easiest to track as key topics for our index—work, neighborhoods, and clubs or organizations. The focus of the index was the reach or spread of the networks, which is best captured by changes and movement. When people move to a new neighborhood, start a job at a new company, or join a new club, they have greater opportunities to make connections with new people. These new connections represent important opportunities for the dissemination of new ideas and opinions. Therefore our index is organized around mobility and change as generators of increased social reach and social connectivity.

To create our index, we used data from IFTF's 2002 Household Survey of 1,500 Americans. In particular, we asked respondents to count the number of companies they had worked for and the number of neighborhoods in which they had lived in the last ten years, as well as the number of social clubs or organizations to which they currently belonged (see Figure 48).

To create the index, we assigned a point to the respondents for each behavior they expressed; the total number of points an individual accrues determines their rank on the index. For example, if a person had moved twice in the last ten years, but had not displayed any of the other behaviors listed in Figure 48, they would have one point on our index.

Using this index, we can see that some consumers have a very wide social network, while others have a much more narrow social reach (see Figure 49). We call consumers with very high social reach "connected consumers."

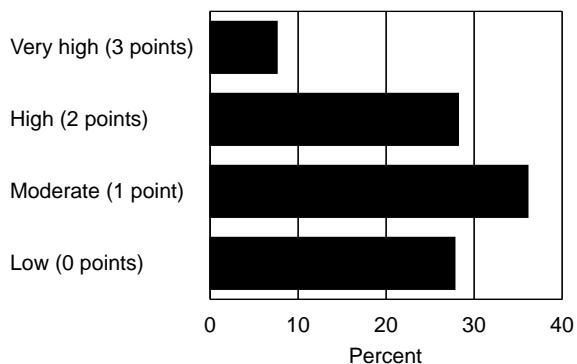
Figure 48
The Social Reach Index Components
 (Percent of U.S. population with ... characteristic)



* "Clubs or organizations" was defined as clubs, associations, online communities, organizations, or any informal group that meets regularly for physical exercise or sports, other hobbies, volunteering, self-improvement, parenting, professional groups, student or alumni organizations, and religious or political groups.

Source: Institute for the Future, Household Survey 2002.

Figure 49
Consumers Have a Range of Social Reach
 (Percent of the U.S. population with ... social reach)



Source: Institute for the Future, Household Survey 2002.

so they can identify how these consumers, and those who follow in their wake, are likely to use the reach of their social networks to get information about products and services and which factors influence their purchasing decisions.

Demographic Characteristics

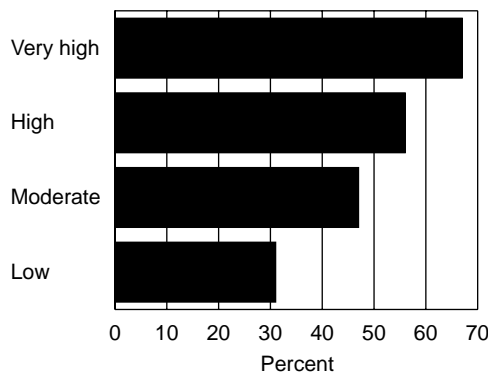
Connected consumers are especially likely to be young and highly educated (see Figures 50 and 51). Indeed, consumers with very high social reach are approximately six times more likely to be under 34 as those with low social reach. Although there is a strong age effect, social reach is not purely a youth phenomenon. Forty percent of those with very high social reach and 56% of those with high social reach (52% of those in these two groups together) are 35 or older. In the end, connected consumers are spread among all age groups.

Technology Usage Patterns

Connected consumers tend to be more technologically sophisticated than consumers with low social reach. Probably the most important evidence for this is their frequent use of the Internet (see Figure 52).

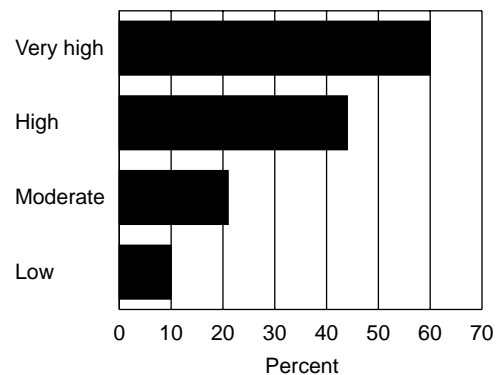
Connected consumers also tend to have sophisticated consumer electronics in their households. In our survey research, we asked consumers whether they had up to 19 different technologies in their household, including desktop or laptop computers, mobile phones, scanners and copiers, devices with high-speed Internet connections, DVD players, or digital cameras. When we added these tools up, we found that connected consumers have almost twice as many tools overall—eight on average—as the least connected consumers, who have about four.

Figure 50
Connected Consumers Are Well Educated ...
(Percent that has at least some college education, by social reach group)



Source: Institute for the Future, Household Survey 2002.

Figure 51
... And Connected Consumers Are Young
(Percent that is 34 years old or younger, by social reach group)



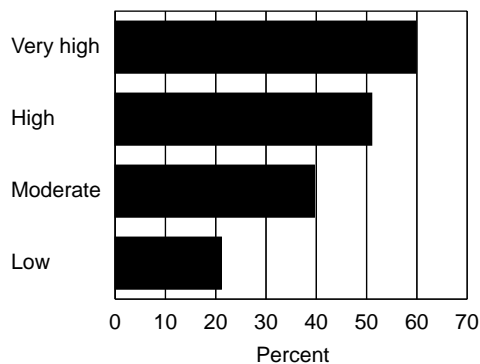
Source: Institute for the Future, Household Survey 2002.

What kinds of technologies do connected consumers turn to most often? They are particularly likely to own tools that enhance their mobility, such as mobile phones, laptop computers, and PDAs (see Figures 53 and 54). These tools, in particular mobile phones and PDAs, are important because their value lies in their social utility—connected consumers want tools that help them easily manage and tap into their social networks. Connected consumers not only have a broad social network, they have a broad technology infrastructure and the tools to manage it.

Information-Seeking Practices

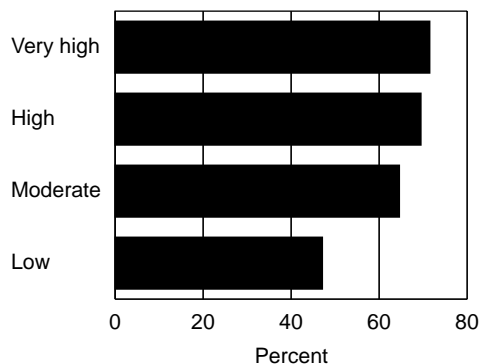
With greater social reach and access to technology, connected consumers have the means to empower themselves in their interactions with businesses. Indeed, their feelings of empowerment are reflected in the fact that connected consumers are comfortable sharing information with businesses.

*Figure 52
Connected Consumers Go Online Frequently
(Percent who report accessing the Internet at least once a day, by social reach group)*



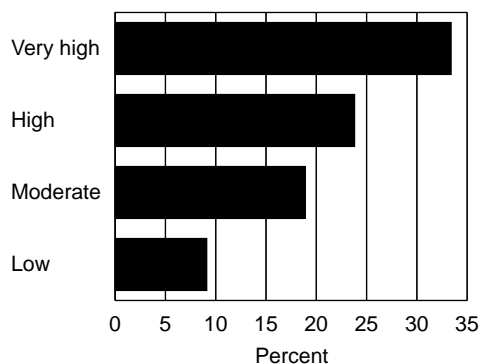
Source: Institute for the Future, Household Survey 2002.

*Figure 53
Connected Consumers Are More Likely to Have a Mobile Phone ...
(Percent that own a mobile telephone, by social reach group)*



Source: Institute for the Future, Household Survey 2002.

*Figure 54
... And Are Much More Likely to Own a PDA
(Percent that own a PDA, by social reach group)*



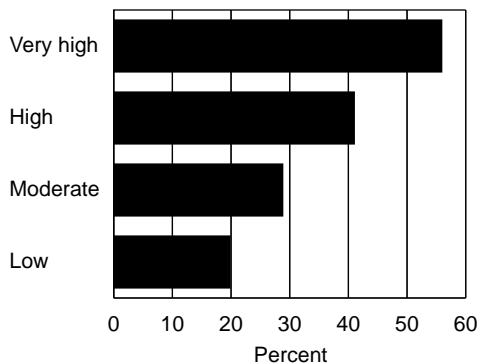
Source: Institute for the Future, Household Survey 2002.

Consumers with high social reach are more likely to let businesses contact them regularly with updated information about products and services (see Figure 55). These consumers may be good targets for permission-based marketing campaigns.

Connected consumers are also more likely to use a wider range of communications channels to get information before purchasing products. They use on average more than four sources, while those with low levels of social reach use fewer than three (see Figure 56). Connected consumers feel empowered to independently gather information across a range of channels in order to make better purchasing decisions.

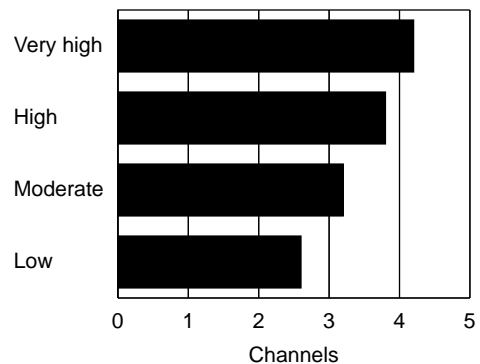
Connected consumers are particularly likely to pull information from their social networks. In our surveys, we found that connected consumers consistently reported asking their friends and family for information before making a range of purchases (see Table 14). This finding shows one of the most important attributes of wide social reach. Many people—even those with low social reach—use their friends and families as a source of information. However, those with very high reach are up to two times more likely to use their social networks for this purpose. In this way, we can think of connected consumers not just as people who know a lot of other people, but as people

Figure 55
Connected Consumers Want Regular Updates from Businesses
 (Percent of consumers who reported giving businesses permission over the past 12 months to send regular updates on products and services, by social reach group)



Source: Institute for the Future, Household Survey 2002.

Figure 56
Connected Consumers Use More Channels when Making Major Purchases
 (Average number of channels used to get information before making a major household purchase, by social reach group*)



* Channels include television and radio advertisements, company Web sites, sales representatives, mailed advertisements, catalogs, and so on. Major household purchases include major appliances, computers and other electronic equipment, and furniture.

Source: Institute for the Future, Household Survey 2002.

who are likely to interact with those other people about products and services.

Connected consumers are not only likely to get information from their social networks, they are also more likely to become important sources of information for others.

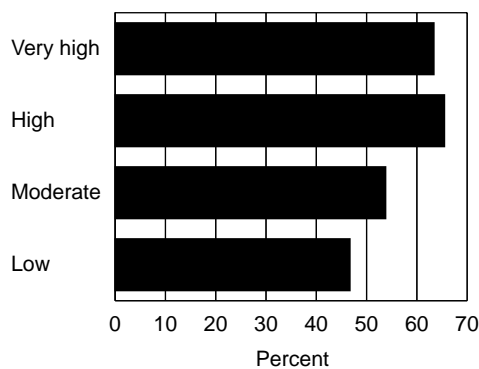
Our survey found that connected consumers are more likely to characterize themselves as someone who finds out about new products first and tells everyone else about them (see Figure 57).

Table 14
Connected Consumers Consult with Friends and Family More Often
 (Percent that reported asking friends and family for information ..., by social reach group)

| | <i>Before making a major household purchase</i> | <i>Before making a financial services purchase</i> | <i>About nutrition</i> |
|-----------|---|--|------------------------|
| Very high | 63 | 70 | 68 |
| High | 59 | 57 | 56 |
| Moderate | 51 | 50 | 47 |
| Low | 38 | 37 | 39 |

Source: Institute for the Future, Household Survey 2002.

Figure 57
Connected Consumers Are Sources of Information for Others
 (Percent who “strongly agreed” or “somewhat agreed” that they were likely to find out new things first and tell others about it, by social reach group)



Source: Institute for the Future, Household Survey 2002.

BUSINESS STRATEGIES FOR THE FUTURE

Connected consumers will redefine consumer interactions with businesses. Social networks will become an important lens through which to understand consumers and their behavior, particularly as technology continues to facilitate greater social connectivity among consumers themselves. Businesses that want to leverage this new social connectivity should consider the following strategies.

Leverage Social Reach

Companies should explore how their communication strategies can use consumer-to-consumer (C2C) channels in combination with other communication channels. For example, companies should look for ways to leverage the synergy between mass communication channels and interpersonal communications. Mass communications, such as TV and radio, are essential for building product awareness, but it is through interpersonal communication channels that consumers exert influence on one another. In their role as communication channels, networks hold tremendous power to get the attention of consumers. After all, recommendations from a trusted friend or acquaintance are the best way to convince potential customers to make a purchase.

We see the beginnings of these strategies in social network marketing, that is communication strategies that leverage C2C channels to generate word-of-mouth or product referrals. For example, a company that wants to develop a communication strategy for a new hair product for teenage girls today could build awareness in the marketplace through television advertisements, and reinforce it with a social network marketing cam-

paign involving samples of the product that girls can send to their friends. In the future, companies should begin to look for ways to leverage C2C channels within retail environments. Consumers today identify the retail environment as the most useful information channel for purchasing decisions; friends and family are the second most useful. A communication strategy that could combine these sources would be powerful indeed.

Social Networks as a Unit of Design

Social networks thrive on connectivity, the opportunity for spontaneous interaction, and the ability to self-organize around activities and interests. As a result, some companies are designing products, services, and experiences with these characteristics in mind.

In fact, social utility is quickly becoming an important differentiator of products and services. It already defines the value for many mobile tools like mobile phones, PDAs, and messaging systems like e-mail, short message services (SMS), and instant messaging. Companies such as Hasbro with its POX game, AOL and with its launch of AIM (an instant messaging service), and Classmates.com with its service that reconnects people to their schoolmates from elementary school through college are examples of companies and products where social networks are at the heart of their design.

Capture and Analyze Social Network Data

New technologies will enable companies to capture data on peer-to-peer interactions in a variety of contexts including the Internet, retail environments, and interpersonal communications systems like e-mail or instant messaging. An interesting example is MIT

Media Lab's Driftcatcher, an agent that classifies e-mail in social terms and characterizes the various relationships in a user's personal communication network by performing social network analysis on e-mail data.

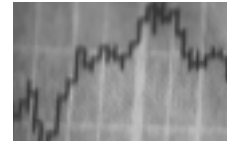
With Driftcatcher, e-mail users will be in a position to organize and visualize e-mail as social information. This means people will be able to see the natural hubs (people with an unusually high number of social links) in their networks and clusters of relationships that otherwise would not be visible. Although this is a personal application, the idea behind Driftcatcher is fundamentally important. Imagine a company being able to see their business-to-business and business-to-consumer communications as social information. Although there may be privacy issues to contend with, such information could be used to target highly connected consumers inside a companies' customer base.

Build Trust on the Network Level

We already see that connected consumers are comfortable sharing information with businesses, and may be good targets for permission-based marketing campaigns. In fact, the most trusted businesses could become part of a connected consumer's decision-making network. One approach is to build community around a brand, especially those that have a social component to them such as cars, clothes, or mobile phones. In fact, some companies have products in which communities have spontaneously evolved around them. Other companies are unaware of the opportunities they are sitting on to build community around their products and their consumers.

DaimlerChrysler is a good example of a company that recognized this opportunity. Its Jeep Jamborees—brand festivals where Jeep owners gather for food, drink, and off-road excursions—help build community around the brand. These events provide a rich social context that facilitates the creation of social ties inside a consumer market and a sense of shared meaning. In fact, several types of relationships are facilitated: relationships between the customer and the brand, between the customer and the firm, between the customer and product in use, and among fellow customers themselves. The payoffs are consumer trust, brand loyalty, referrals, and repeat business.

—Rod Falcon and Leah Spalding



China and India: New Sources of Global Innovation

The economies of China and India have grown significantly in the past decade, and have gone a long way in contributing to the growth of the global economy. But so far, the strength of these economies has rested on their abilities as imitators rather than innovators, as Joseph Schumpeter, an economist and social theorist on the dynamics of entrepreneurship and innovation, would say. In other words, they have excelled at the production of low-margin export products such as toys, clothing, and electronic goods that have passed into the realm of commodities, while the high-margin gains for the design and innovation of these products have gone to others. If the economies of China and India are to continue their growth and become even bigger players on the world stage, they must step up to become innovators rather than imitators.

The good news is that emerging market conditions in both China and India are ripe for such a step. The unique combination of large and expanding youth markets and high-tech know-how in both countries will generate significant innovation in the next decade and beyond. What's more, these innovations will carry the unique stamp of the cultures of both countries, thereby infusing the global economy with the flavors of these large nations.

KEY DRIVERS OF CHANGE

China and India are both undergoing market reform, are experiencing dramatic economic growth, and are home to large numbers of young, well-educated people. They are the world's two most populous nations, and their emigrants have helped build technology companies and infrastructure around the globe. The sizes of their populations provide enormous indigenous market opportunities. The combination of booming economies, new technologies, and large populations of young people will result in distinct and creative outputs from the people and industries of these two nations.

Market Reforms Spark Rapid Economic Growth

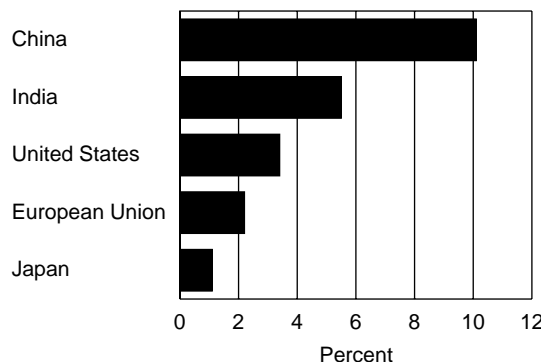
Both China and India are in the midst of major economic reforms that have fueled strong growth. These reforms have significant implications for the kind of business and innovation these economies will give rise to in the next decade.

India has long been considered a market with significant economic potential, and China has generated the highest sustained growth rate in the world in the last 20 years, since it began to liberalize its internal markets. In the last decade, India's real GDP grew 5.5% per year, China's 10% (see Figure 58).

China's Economy in Transition

China has been dismantling its socialist economy since 1978, and its leaders have committed themselves to creating a competitive market at home, by instituting both market pricing and labor mobility. Early reform was easy: the best way to achieve double-digit growth rates was for the gov-

Figure 58
China and India Are Experiencing Rapid Economic Growth
(Average annual percent change in real GDP, 1991-2001)



Source: International Monetary Fund, *World Economic Outlook*, April 2002.

ernment to keep out of the way, and allow resources to shift from the low-productivity rural sector to the expanding urban economy where manufacturing and services were growing. As a result, China's per capita GDP is growing, and its economy industrializing. Indeed, the transition of China's economy away from agriculture and toward services and industrialization has been rapid since the 1980s (see Figure 59).

Foreign direct investment (FDI) has been consistently high in China. Foreign-owned enterprises and joint ventures have helped to develop China's export industries, especially as FDI has shifted from infrastructure and energy toward technology-intensive sectors. Foreign investment has also improved industry technology, know-how, and workers' skills by exposing Chinese workers to global business practices and competition.

China's recent entry into the World Trade Organization (WTO) is considered by many to be a vote of confidence in China's economy. Continued FDI and planned changes to remove obstacles to business sector restruc-

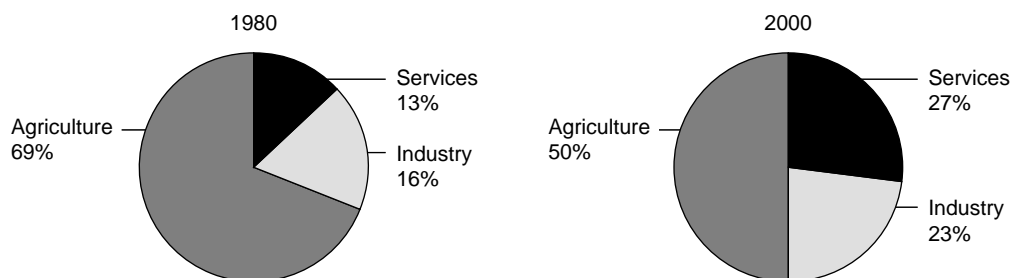
turing and increasing competition will keep this transition in full swing through 2010.

India's Growing Economy

India is also undergoing significant market reform, which has been one of the key forces behind its current economic growth. Since the shift from socialism in 1991, India's GDP has experienced strong growth rates of 5.5% per year and is forecasted to grow by at least that much annually through 2010.

India will continue to struggle with corruption, population growth, reforms and regional disputes such as the tension with Pakistan about Kashmir; however, the country is still well positioned to continue its economic expansion. Some of the key factors in its favor include a well-educated workforce, a western-style business and government structure and education system, an English-based business environment, a democratic government, and a large consumer base—all of which will help the Indian economy integrate into and contribute to the global market.

Figure 59
The Transformation of China's Economy
(Percent share of employment, by sector)



Sources: World Bank, *World Development Indicators*, 2000; *China Statistical Yearbook*, 2000; International Monetary Fund, *International Financial Statistics*.

**Technology Is Transforming
China and India**

Technology is the second major driver transforming China and India into sources of innovation in the global market. Indeed, scientists and engineers from China and India have already contributed well beyond their numbers to the information technology revolution of the late 20th century. Now many of these scientists and engineers are turning their attention homeward, both as locations for their businesses and as vast untapped consumer markets.

***New Users Will Innovate
with Technology***

Both countries' populations are rapidly adopting new technologies (see Table 15). (See "A Force to Be Reckoned With: The Chinese Middle Class Consumer" to learn more about the growing consumer market for information technologies in China.) After Japan and the United States, for example, China is the third-largest market for computers. In India, demand for telecom

equipment is expected to increase dramatically due to government plans to triple the phone density by 2005.

As consumers integrate technology into their daily lives, they will become natural innovators—finding new uses for the technology and adapting the technologies to fit distinct and emerging needs. For example, the large unemployed populations living in the rural industrial regions of China might devise new group learning or job-search tools based on new communication technologies.

***Indigenous Technology Industries
Will Innovate***

Both China and India are in strong positions to grow their indigenous technology industries, assuming they are able to implement more stringent intellectual property protection. India, in particular, has been shifting toward playing a global role in developing technologies, rather than just servicing them by means of such things as international call centers. China—already a powerful IT man-

*Table 15
Technology Takes Off in China and India*

| | 1997 | 2000 |
|--|------|------|
| China | | |
| Personal computers per 1,000 | 6 | 16 |
| Internet users in millions | 0.4 | 22.5 |
| Fixed lines and mobile telephones per 1,000 people | 69 | 178 |
| India | | |
| Personal computers per 1,000 | 2 | 5 |
| Internet users in millions | 0.7 | 5 |
| Fixed lines and mobile telephones per 1,000 people | 19.5 | 36 |

Source: World Bank, *World Development Indicators*, April 2002.

ufacturing force—will be shifting its emphasis toward new product development and is continuing to invest in its biotechnology infrastructure. As a result, production by China's electronics and IT sectors was expected to hit \$199 billion in 2002, up from \$157 billion in 2001. Sales of software in Chinese markets are expected to be \$30 billion by 2005, of which 60% will be software and related services produced in China.

Young People Will Demand Innovation

Demography, said August Comte, a 19th century philosopher, is destiny. Well, maybe not entirely. But the composition of a population certainly does shape economic, social, and political realities, and demographics is the third major driver of the emergence of China and India as innovators in the world economy. While much of the developed world is devising policy for managing the aging of their populations, China and India have the opportunity to leverage their large young populations, which tend to be more innovative and experimental than their older counterparts.

Indeed, most of the developed world, Europe in particular, will be shouldering a significant challenge to maintain economic growth and innovation as population profiles shift toward the elderly. In Germany, the world's third largest economy, for example, 25% of the population will be over 65 and 50% will be of working age in 2025.

By contrast, India and China have much younger populations. Whereas 18% of the industrialized world's population is below the age of 15, 36% and 24% are under 15 in India and China, respectively. Though many of these young people live in poverty by global standards, there are some surprises.

For example, the single child rule in China has created a generation of "little emperors" who are indulged by their parents. Ninety-five percent of boys and girls in China attend secondary school, and China is the third largest market for computers, largely because parents are eager to provide their children with every opportunity for advantage.

As its population flattens, then shrinks, Western Europe's economic presence will inevitably decrease as well, a phenomenon that will create opportunities for economies of emerging countries, such as China and India, to play a greater role in defining products and services in the global economy. Indeed, large generations of young people often bring great change—in the United States, the baby boomers changed the university system, dress and cultural codes, and the electoral system during the tumultuous 1960s. They changed family life in the 1970s and the workplace in the 1980s. The next generation of youth changed notions of entrepreneurship in the 1990s, brought mobility into lifestyles, and fueled the dot-com boom. As Pearl S. Buck said half a century ago, "Young people don't know enough to be prudent, and therefore they attempt the impossible—and achieve it, generation after generation."

These young people on their own won't prepare the nations for innovation. But the combination of political and social reform, technological advances, economic growth, and the sheer size of these young populations will create an environment rich with creative potential. These young people will be living in a time of economic prosperity and tremendous social and political change, and will be able to access new experiences through communications and information technologies. They will create a new culture and identity for themselves, and as part of

this they will be defining new products, services, and experiences that reflect their values and lifestyles.

Companies providing these new products and services will emerge in response. With the growth of their younger population, the growing consumer demand in these countries will have a greater influence on world markets as national and multinational companies scramble to meet their particular cultural needs.

FORECAST: CHINA AND INDIA WILL TAKE THE NEXT STEP

Schumpeter's economic perspective on the relationship between innovation (which typically generates high profit margins) and imitation (which drives down high profit margins) can shed some light on the changes the Chinese and Indian markets must undergo to take the next step into the global markets.

Innovation can be defined in many ways, but in business it is generally defined as developing and introducing a new product, technology, or process to the market. Most innovations are not scientific breakthroughs but are deeply rooted in existing ideas—they are market breakthroughs. Imitation, on the other hand, means commoditization—doing what has already been done in the most cost-effective manner. Imitation generally falls to the economies with the lowest labor costs.

Both China and India have generally been considered manufacturers and imitators, rather than innovators. But industries based on imitation alone will not make a country highly industrialized. Innovation is what separates the developing from the developed economies. Moving from imitation to innovation will be important for the continuing growth of China's economy in particular, but applies to India as well.

In most of the developed world, innovation means technology. But it can also mean new philosophies, processes, and business models. All of these will apply to China and India.

Specifically, China will build and refine technology innovations appropriate to its blossoming and diverse domestic market, then it will aim for the broader world market. India will contribute in the same way, but will also use its burgeoning market in popular culture to expand abroad by exporting things like fashion, entertainment, and other lifestyle activities. And both countries innovations will be home to “bottoms up” innovation, meaning many new ideas will arise from everyday users and small-scale companies as well as established institutions.

China's Search for Innovation: Consumer Markets at Home

China's path to innovation will be more similar to the growth of the United States and France than to the Asian Tigers of Singapore, Korea, Hong Kong, and Taiwan. Whereas the Asian Tigers achieved their economic growth by aiming their products at the rapidly expanding world markets, the United States and France grew by attending to their domestic consumer markets. Similarly, China will build its economy on the 200 million-person strong middle class demanding technology-based consumer products.

Places like Shanghai—with rich cultural history and international presence—will be pivotal centers for reestablishing the language and culture of innovation in post-Cultural Revolution China and will provide fodder for creativity. The demand for more up-scale goods such as family- or community-oriented communication and coordination

tools will force the market to respond with higher quality, a greater number of choices, and leading-edge products. Hong Kong will continue to be an essential port for China—not only for the import and export of physical products, but also for the exchange of western-style business knowledge, practices, and ideas.

India: Exporting Cultural Innovations

Culture is a design input. It affects the way people think about, create, and use products and services. There are a variety of ways Indian culture will shape the innovation process in the future. It will manifest in cultural activities as well as in the ways new technologies are developed and integrated into daily life.

In the 1960s, the focus of Indian cultural export was spiritualism. Yoga is one example of an activity rooted in Indian culture that has transforming daily life in much of the developed world. Introduced into the United States in the 1860s, yoga is now a fairly common household activity as well as a capitalistic endeavor. For example, Wal-Mart carries yoga “starter kits.” And the faddish Bikram College of India has gone from being taught to a handful of students in the 1970s to patenting the script accompanying the series of poses so that only Bikram-certified instructors can teach Bikram-style yoga. As the role of religion has shifted, cultural aspects like yoga have touched on some people’s aspirations and desires for spirituality and body-mind connectedness.

What’s next? Movies, fashion, and more. Many of today’s Indian exports are arriving in the form of film, fashion, home décor, and foods. The Indian film industry, for example,

already produces 800 films a year, compared with 600 in Hollywood and 100 in the United Kingdom. What will be different in the next decade or so will be the reach of these films in the global market. The successes of Indian films at high-exposure festivals and the subsequent release of some of these in the United States and United Kingdom signals a greater openness to one Indian style of film characterized by emotion, intelligence, and a real-life rawness. *Monsoon Wedding* is a perfect example of an evocative film, rich with layers of emotion that did very well in the United States in 2002, ranking in the top 20 box office sales in May and leading the limited-release film industry just after its release. Andersen’s forecast for the Indian film industry estimates that export earnings will increase to \$1.12 billion in 2006 from \$617 million in 2001.

Aspects of Indian culture are influencing the fashion industry as well. Last summer London’s upscale department store, Selfridges, did a promotion of Indian designers to accompany the success of Andrew Lloyd Webber’s musical *Bombay Dreams*. Bollywood-inspired items included a silver maharajah-style bed, Indian couture, and T-shirts irreverently splashed with Hindu deities. M.A.C., the cosmetics maker, introduced Aura nail polish and Smolder eye kohl, and one Manhattan salon is offering mehndi, or henna body painting. Given that the fashion and entertainment industry must completely replace their product lines from season to season, expect to see more Indian items and elements feed the developed world’s hunger for innovation in fashion and entertainment.

Contributions to Technology and Talent

India and China have provided significant sources of talent and innovation in the global technology infrastructure, much of it through significant expatriate communities. AnnaLee Saxenian, a researcher at the University of California, Berkeley, who has been studying the global impact of technology workers in Silicon Valley, goes as far as arguing that the Valley's economy was built by "IC"—not information and communications, but Indians and Chinese.

But these technology workers don't just leave their countries behind once and for all. In a series of surveys, Saxenian found that these foreign-born professionals often had strong links to their native countries. Indeed, over half the respondents who were running start-up companies in the Valley also had set up subsidiaries, joint ventures, subcontracting, or other business operations at home. Her research found that three-quarters of Silicon Valley's Indian and Chinese immigrant professionals said that they would consider starting businesses in their native countries in the future. The biggest problems mentioned were immature market conditions in China and unreliable infrastructure in India.

Both nations will have to work hard to woo and leverage this pool of western-trained scientists, engineers, and entrepreneurs. They can begin by attracting and retaining their talented technologists, an effort that is already underway. Technologists are already among the highest paid workers in India, for example, and officials expect the total number of local software developers in India to grow to 1.3 million in four years from 400,000 in 2002. This would make India home to more software programmers than any other coun-

try. Exports of software and services in 2000-2001 were \$8.3 billion up from \$5.7 billion the previous year. For its part, China recently announced a recruitment drive to draw hundreds Chinese-born scientists from abroad by promising western-style salaries.

The combination of the dot-com boom and bust in the Western economies and rapid economic growth and change in China and India will result in a significant return of talent to China and India. Returnees acculturated in an environment of entrepreneurship and capitalism will apply their skills and experiences in their home countries. With the opening of the economies in these two countries, the returnees will be poised to make China and India a greater part of the global economy in the 21st century.

WHY SHOULD BUSINESS CARE?

One major implication of China's and India's increasing importance as sources of innovation in the global economy is the real opportunities for companies to harness this innovation to invigorate their own creative processes for developing new products, services, and experiences for every market around the world.

Leveraging Brain Circulation

Participating in the global talent networks created by the kind of brain circulation Saxenian describes in her research will be one basic way for companies to leverage China and India's innovative potential. Some ways for global companies to tap into this resource include funding satellite projects in India and China or mixing cultures and experience within global teams. Striking a balance between honoring partner values and needs and core organizational values will be critical. Networks will play a partic-

ularly important role in establishing presence and legitimacy in both China and India.

From Imitation to Innovation

The sheer intensity of change forecasted for the regions of China and India suggest that even as they remain principally imitators, they will turn the corner toward innovation. As the young populations become more exposed to economic opportunity, the desire to partake in the success of the West by generating profit and owning the consumer goods of the West will initiate innovation. The sheer convergence of tremendous demographic, cultural, and economic forces—large, young, increasingly urban populations, economic growth, and technology—will create a kind of “dynamic disequilibrium” where market forces lead to an organic evolutionary process of industrial mutation, out of which creativity, and new ideas and approaches will emerge.

The Intellectual Property Issue Must Be Resolved

One of the major struggles for businesses and policymakers in both nations will be to build the regulatory infrastructure to support the growing industries, especially those that are meant to be global. Trade, intellectual property rights, and immigration policies all assume more of an open two-way exchange of information, technology, and ideas, usually through formal flows within a corporation, than the companies of both countries are accustomed to. In particular, the reputations of both countries for less than exemplary adherence to accepted notions of intellectual property rights poses a barrier to attracting the investment of global interests. Without protection for new ideas, the companies’ incentives to invest in the develop-

ment, production, and marketing of a range of new products will be dramatically lower. Thus, India and China’s acceptance of the general rules of intellectual property protection under the WTO will have a big impact on the flow of investments, the facilitation of trade through global companies, and the competitive position of their own products.

CONCLUSION: NOT JUST LIKE THE WEST

For decades, most global markets have been defined by North American and European styles and values, for example, “newness,” youth, individuality, and reliability. Japan, Korea, and the Asian Tigers were able to compete in the global market by understanding the Western rules and beating the West at its own game. Though the Western perspective will remain strong as people emulate a “developed world” lifestyle due to the forces already in motion, the sheer volume of users and producers in China and India will slowly but surely establish a new set of values. New measures of value will include things like community and togetherness, creative expression, accessibility, and flexibility.

To figure out how to play by the rules of indigenous markets, companies must look closely at what people in those markets are doing with products and services. Spontaneous adaptation will provide a source of inspiration and understanding for the core values, aspirations, and unmet needs of the domestic consumers of countries like China and India. Companies ought to pay special attention to the successes that feel most “foreign” to them. These cultural breakthroughs will point to new opportunities and new markets.

—Susannah Kirsch



New Twists in the S-Curve

New technology-enhanced products and the forms of communication they enable will change the way businesses think about diffusion. Companies have long used the traditional S-curve as a framework for anticipating the pace of adoption of new products or services. But the digital revolution has changed communication patterns, and our notion of how new ideas and products diffuse is changing as well. This new approach is likely to have significant impacts on how companies design products and services and work to spread them in the marketplace.

THE CLASSIC S-CURVE TRANSFORMED

The S-curve is a way of describing the expected course of an innovation. What emerged originally as a tool for examining the diffusion of hybrid corn in farming communities has become a predictive tool for forecasting the market growth of all kinds of consumer products and technology innovations around the world (see Figure 60).

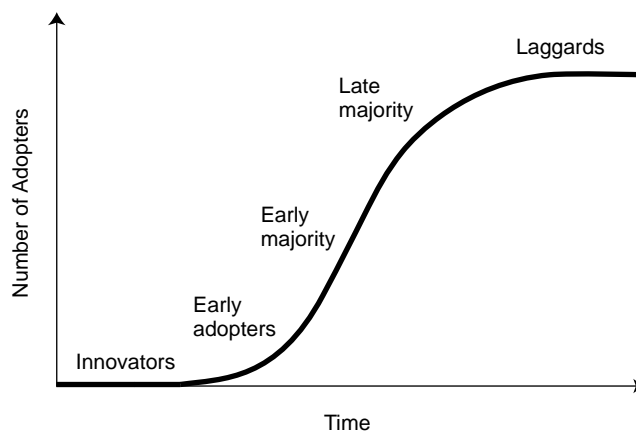
Traditional S-curves show the accumulated number of adopters of an innovation over time. The premise is that adoption is slow at the beginning, with innovators as the first adopters. After this long tail of early experimentation (and sometimes modification) early adopters learn of the innovation and adopt it into their daily practice. During this time, an inflection point is reached, where the number of adopters begins to grow dramatically. Typically this is when the mass market (or early and late majorities) is convinced of the innovation's benefits through commercial and personal information channels. The number of adopters reaches a

plateau when only more skeptical laggards slowly adopt the innovation.

As Everett Rogers argues in his classic text, *The Diffusion of Innovation*, communication processes among the different groups of adopters are a key driver that shapes the S-curve. He defines the diffusion of innovation as “the process by which an innovation is communicated through certain channels over time among members of a social system.”

As methods of communication change, then, it stands to reason that the diffusion curve will change as well. Indeed, this is what's happening today. The classic S-curve was developed for an older economy, and just as other classic economic ideas—about resource scarcity, intellectual property, and the like—have been upended in the digital age, so too will the model of product diffusion change. Fundamental transformations in communication methods, enabled by new connective technologies, are transforming both the way businesses communicate their innovations and the way they diffuse their

Figure 60
The Traditional S-Curve



Source: Rogers, Everett, *The Diffusion of Innovation*, 1962.

products in the marketplace. (For more on these technologies, see “Connectivity: Ten Technologies to Watch.”)

Enhanced communications will speed up the flow of information, opinion, and insight that consumers are exposed to during their interactions with new products and businesses. Flows will be larger and broader and cross more social boundaries. Information will have the trust of respected sources in social networks. These factors will contribute to faster adoption or rejection decisions by consumers and will thus make product diffusion curves steeper (see Figure 61). New diffusion curves in 2012 won't really retain the S-shape, but will look more like steep peaks or plateaus as consumers adopt rapidly and possibly reject rapidly.

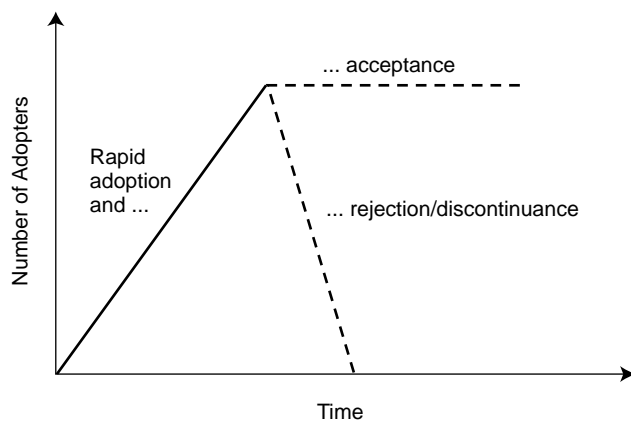
To be successful in the 21st century, businesses will have to understand the dynamics of the new diffusion curves. The new curves will be driven by four factors: the customization of products, the new forms of interpersonal communications, the

way new social networks operate, and the growing importance of machine-to-machine communication.

Customizable Products Create New Innovators

When products can be customized, the process of choosing that product and what it is used for changes. Traditional diffusion theory assumes that companies make a standardized good, which is then sold and consumed as is. In high-tech fields, this model has already grown outmoded. Customizability is now a defining feature of almost any product endowed with embedded intelligence, communications ability, or expandability. No two personal computers have exactly the same software and content, for example. Every PC user is a systems-builder, installing software, connecting printers, scanners, MP3 players, gamepads and joysticks, buying access to Internet services or AOL.

Figure 61
Two Curves in the Future



Source: Institute for the Future

Customization in high-tech products is an active process, that is becoming more popular and accessible. In recent years, customizability has spread to cellphones, PDAs, software, and services. Much of the appeal of Palm PDA has come from the tens of thousands of software applications that user-developers have written for it. Mobile phones offer even greater customizability, thanks to the wide variety of ringtones, faceplates, antennas, and services users can choose. Juha Christensen, Microsoft's corporate vice president of mobility, predicts that "three years from now you will not find two mobile devices on the planet that are configured the same way. ... [E]very device on the planet is going to be differentiated."

Another form of customization occurs online, with software agents and Internet services. Software agents build a model of users' interests and tastes based on their browsing or buying habits, and recommend additional products that may interest them. Amazon.com, Netflix (the DVD rental service), and the television recording system TiVo all use recommendation systems to keep customers engaged.

Customization changes the innovation curve by undermining the traditional distinction between producers and consumers. Early hypertext theorists posited that the bounds between readers and writers would be deconstructed by hypertext; sites like Slashdot, which offers an online commons for community members to talk about new technologies, and web logging (blogging) sites, which provide online tools to create and maintain archived logs of personal opinion, have brought that vision to pass. What's more, peer-to-peer file sharing networks like Napster and Gnutella turn music fans into

distributors as well as consumers, connected by a gift economy that cuts out record labels and retailers.

As customizable products that rely as much on user input as the original product design for their final configuration spread throughout the marketplace, it will be harder to discern a pattern of diffusion.

Interpersonal Communications Create a Vibrant C2C Space

The diffusion of ideas about new products and services can be much quicker because of new connective technologies that bring consumers together in new ways. This consumer-to-consumer (C2C) flow of information has the potential to be a powerful influence on the purchase and adoption of products in the way it facilitates discussions and the exchange of advice, recommendations, and expertise about products and services.

The two primary channels of communications assumed by the classic S-curve—mass media and interpersonal channels—are undergoing profound change. In the next decade, connective technologies will spawn new genres of personal media and new forms of interpersonal communications that will challenge mass media and commercially generated sources of information as a significant influencer of adoption of new products and services. (For more on the effects of social networks on consumer purchasing patterns, see "Who Is the Connected Consumer?")

Consumers already rely on each other as important sources of information for making purchase decisions. A recent IFTF consumer survey reports that friends and family members were either the first or second most important source of information out of ten choices for purchases in two major cate-

gories: major household purchases and financial services (see Figure 62).

Interpersonal channels of communications enabled by e-mail, mobile communications, and new forms of Web media, such as Web logs (blogs), will provide more diverse ways for consumers to reference each other in an information-rich world. Consumers will be able to expand their reach to members outside their own networks of friends and family and tap into external networks previously inaccessible. By creating these links to new and diverse groups, chances of being exposed to new ideas increase. The result is a more active and dynamic connection of contacts around products and services, communications that will change the innovation curve by intro-

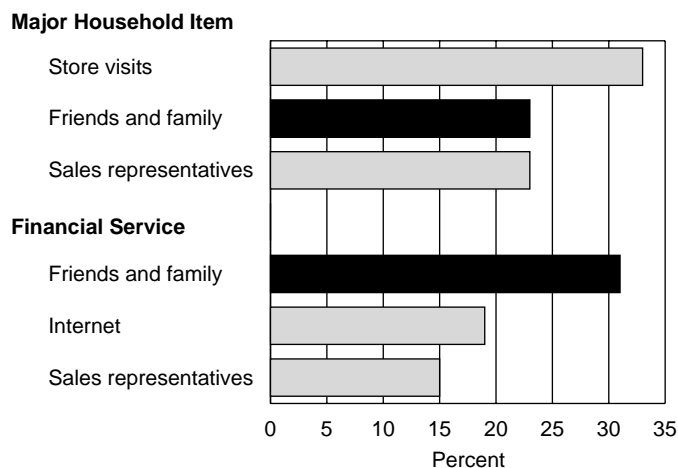
ducing new products faster and speeding up the adoption–rejection process.

Several developments will drive the ability of consumers to engage in these broader, innovative interpersonal networks—web logs, mobile media, and third-party opinion services.

Blogs Facilitate Consumer-Casts

A blog (short for “web log”) is a new form of personal expression that combines short entries organized chronologically on a Web site. Entries can include text, images, and most importantly, links to other Web sites and resources, and commentary on material published elsewhere. Many blogs are personal labors of love, but public figures or writers (like Andrew Sullivan, Dan Gillmor, and Joshua Micah Marshall) use blogs to

Figure 62
 Friends and Family Are Key Information Sources
 (Percent of consumers who reported that ... was one of the two most useful sources of information in helping them make a ... purchase)



Source: Institute for the Future, Household Survey 2002.

comment on recent events and publicize their work (see Figure 63). While blogs bear some resemblance to diaries, blogging itself is an intensely public and social phenomenon. Many bloggers have permanent links to other blogs, or conduct long-running dis-

putes with adversaries: the result is a larger ecology of blogs, ideas, and commentary.

Blogs can provide an easy meeting ground for consumers to share opinion and insight about new products, services, and company performance. Because they func-

Figure 63
Blogs Provide a New Meeting Ground for Consumers



Source: <http://weblog.siliconvalley.com/column/dangillmor/>;
<http://www.talkingpointsmemo.com>.

tion as social networks, blogs take advantage of the power of weak links to bridge otherwise dispersed social groups. Imagine the travel expert in your network of family and friends blogging about good hotels and restaurants or the best way to get foreign currency. Not only is this info easily available to family and friends, but a simple URL can make it available to all the networks of each family member and friend.

Blogging and other forms of social interaction that emerge from the Web will create a new kind of informal consumer-to-consumer communication that will shape purchasing patterns and the nature of interactions with business. These types of communications integrate the trust of friends and family with the expertise of broad social networks.

Mobile Media Brings Messaging into Context

Combine blogging with mobile communications (PDAs, cellphones, palm tops, and others), and consumers can be instantly in touch with relevant information when and where it matters most. Text messaging in real time enables consumers to react to a new product or service in the moment and send that insight to a blog or ask others for advice. Consumers can warn members of their network not to bother trying a new retail store, for example, or not to buy the new wine rack at Store X. Mobile media offers an opportunity for consumers to access the resources of their social networks, friends, and family throughout the purchasing cycle.

Third-Party Services Host Opinion Exchanges

Several service providers are establishing places on the Web for sharing insights and opinions about products, services, and com-

panies. Epinions (www.epinions.com) and Planetfeedback (www.planetfeedback.com), for example, are two organizations that take the pulse of brands, products, or companies by acting as an impartial host to consumer communications. Such exchanges will be important third-party sources of information that will shape the innovation–decision process from initial awareness to adoption or rejection. As such, they are important listening posts for companies trying to learn what consumers think about them.

Social Networks Become Sources of Action

The new interpersonal communications enables consumers to create and participate in more diverse social networks. These networks create pathways for information exchange that help consumers learn about innovations and decide whether to adopt or reject them. In the next decade, new connective technologies will enable social networks to form ad hoc groups—also called “swarms” or “smart mobs”—even more rapidly, making them even more active and influential.

Howard Rheingold writes about smart mobs at length in his book, *Smart Mobs: The Next Social Revolution*. He describes these groups as “people who are able to act in concert even if they don’t know each other ... They carry devices that possess both communication and computing capabilities. Their mobile devices connect them with other information devices in the environment as well as with other people’s telephones.”

In this way, the innovation–decision process can be brought to action very quickly. Consumers will be able to form emergent groups in cyberspace—the swarms or smart

mobs—based on a particular interest, question, or concern, and take action in the physical world. In 2012, smart mobs won't stop with getting information about products and adopting them, but will engage a community to act in response to products or businesses.

For example, groups of consumers will be able to form emergent buying clubs to take advantage of special volume discounts. They will also be able to approach a company with specific product requests and prices or approach a retailer en masse with a request to carry a particular product or

brand. Imagine consumers being able to instantaneously activate the collective power of a group to negotiate better prices for products or to contribute input on feature designs or service packages.

With familiar and trusted experts as close as one message away, consumers will be able to manipulate webs of opinion, references, and insight, and shape their activities and those of others. Indeed, the practice of joining ad hoc groups for such purposes will become a distinguishing characteristic of the savvy consumer of 2012. Anyone with

■ Consumer Network Roles Expand Influence

Malcolm Gladwell, author of *The Tipping Point*, identifies three key players in an expanded social network that are essential for the spread of innovations: mavens, connectors, and salesmen. These roles will expand their sphere of influence in a world of enhanced connectivity.

Mavens are information hounds. They research and gather detailed information about their passions, and they love to share it with others. Connectors, on the other hand, are not knowledgeable about things but about people. Connectors know who knows what, and they thrive on hooking up people who might need each other. Salesmen, as the name suggests, have the power of persuasion. They hold the trust of others and delight in being able to direct people to one choice or another.

It is important to remember that, in social networks, these roles are played by everyday consumers, not professionals. The mother-in-law who saves travel brochures becomes the family expert on travel; the neighborhood techie knows all the salesmen at consumer electronics stores and can point you to the right one for your needs; the retired professor at the coffee shop who convinces you to take your wife to a particular restaurant for your anniversary.

The local expertise of individuals such as these can now be leveraged across a broader social network by means of communications technologies. When these individuals share their information electronically in e-mail, list serves, or online discussions, and are pointed to electronically in blogs or Web sites, the value of their expertise grows exponentially.

access to the Internet or any number of communicating devices (cellphone, pagers, text messaging devices, PDAs) will likely take part.

Machine-to-Machine Communications in the Social Network

A final shift in the nature of communications that will shape the new diffusion process is the expansion of machine-to-machine communication. Places, objects, rooms, and clothing will be tagged with sensors that are aware of their surroundings and can communicate with other objects and communications devices. These objects will become new actors in the social web of communications that shape the adoption of innovations.

This new layer of messaging and transactions is already happening. Various reports state that data traffic on telecommunications networks has already surpassed voice traffic. Web services, which allow Web sites to automatically find and publish information from other pages, are spreading rapidly among both organizations (like e-commerce sites) and individuals (like, bloggers). New technologies will further increase machine-to-machine communication. Radio frequency identification (RFID) chips, carry information that can then be communicated to other machines. These chips are expected to grow rapidly in the next decade, as they find applications in logistics and supply-chain management, then health. Finally, the markets for image sensors and biochemical sensors are projected to increase by 290% and 150%, respectively, by 2006.

Consumers will be able to tap into this communications layer to inform their own decisions. Alternatively, they will be able to

offload some of the consumer innovation–decision process to “aware” machines they have personalized to their needs, such as software bots and smart appliances, that will make decisions and act for them. This raises the issue about who (or what) will be actually managing consumer communications in the future. As consumers offload some of their work to smart machines, companies may have to think about directing communications to these machine partners rather than the consumers themselves.

FORECAST: THE NEW S-CURVES

The changes in the way consumers communicate with each other and businesses and new kinds of highly customizable high-tech products will change the shape of the diffusion curve. There are four ways the S-curve will change its form and function over the next ten years that are relevant for product strategists.

Curves Will Be Steeper and Shorter

As consumers learn more, and learn it faster, the adoption curve will grow steeper. A steeper adoption curve means that businesses should carefully monitor and track social network communication, product and brand reputation, and other indicators of product or brand acceptance. The “good news” and “bad news” about products will travel very quickly.

Companies Will Have to Act Faster

Faster diffusion of products implies that social protocols will not have as much time to develop. If your product is one that requires a steep learning curve (especially concerning interacting with other people) be prepared to support that learning directly. For example, social protocols for learning how to e-mail and use mobile phones took

several years to develop. Rapid diffusion without sufficient social protocols could lead to early rejection of certain products.

Curve Clusters Will Define Opportunities

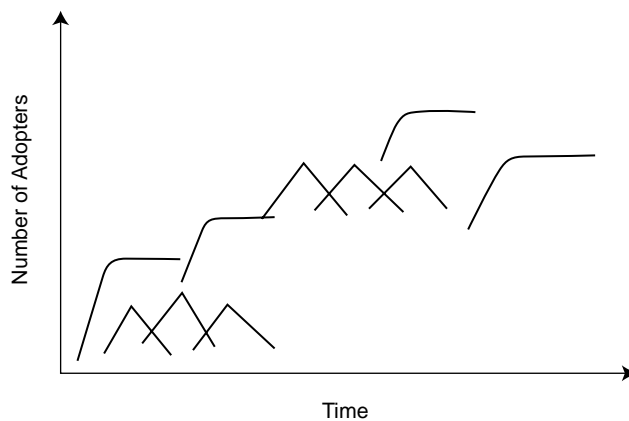
Products such as communications devices that are essentially designed to be reinvented by consumers will define a territory of innovation–adoption curves rather than a single curve. There will be multiple diffusion curves as products become highly customized and splinter off into their own categories (see Figure 64). Mapping the territory of curves, rather than the single curve, will illustrate the kinds of reinvention and diversification of the core product idea. This larger space will more accurately portray the range of market segments and product categories to which the product belongs. It is in this

broader territory of curve clusters that opportunities for new products or extensions will be found.

Adopter Categories Will Give Way to Communicator Categories

Characteristics based on communications and exposure to new ideas will replace the traditional adopter categories. Indicators such as number of network contacts, number of social networks, and social network reach, will be indicative of potential adoption behavior. The classic adopter categories focus on how early or late consumers adopt a new product. These categories tend to pigeon-hole consumers and do not reflect the variability and fluidity of how consumers are acting today with different products and information. For example, laggards who are slow to adopt advanced mobile phone

Figure 64
Clusters of Curves in the Future



Source: Institute for the Future

devices may not necessarily be laggards in other related consumer electronics categories. Diffusion no longer happens in a linear, step-by-step fashion, but all at once, as part of a huge web of communications. New tracking technologies that help to monitor social network communication will help to bring about a more systematic understanding of consumers and their connections to people and new ideas about products and services. Developing a way to think about consumers in terms of their social network communications, and how they act as conduits and translators of new ideas, will be more insightful to their roles in diffusing new products.

IMPLICATIONS FOR BUSINESS

Technology-enabled products and the new forms of communication they inspire will change the traditional S-curve describing the diffusion of product and service innovation. Understanding the new S-curves will help businesses plan better for future markets, products, and communications.

- *Use S-curves as diagnostic tools rather than measurement devices.* At best, S-curves are historical records of how new ideas and products are diffused. They are best used as diagnostic tools to understand the impacts of social network communication on the adoption of innovations rather than as forecasts of specific time-tables. Use S-curves to ask questions rather than predict adoption behavior.
- *Focus on social network dynamics rather than adopter groups.* Thinking in terms of frameworks that describe how social networks work is much more relevant for understanding diffusion processes than the traditional rigid classifications of adopters. These frameworks illustrate how connections are made and the consequences of these connections for passing along information and decision making, and are useful for understanding adoption in 2012 than adopter categories whose distinctions are based on outmoded characteristics.
- *Mapping clusters of curves.* Rather than focusing on one single diffusion curve, focus on innovation (or technology or product) clusters. Clusters point to creative breakthroughs and possible cultural change. They show what products or tools are adopted in concert and point to possible cultural values that underlie their relationship. New kinds of customizable products and enhanced communications networks will accelerate the clustering of innovations. In fact, there may no longer be dominant curves but lots of little ones. The trick is finding the pattern or theme that runs through a cluster to determine its meaning in the market. The focus should be on mapping the territory of the cluster of curves rather than mapping any single curve itself.
- *Look at the back of the curve.* Many users of the S-curve, particularly those in Silicon Valley, focus on the early part of the S-curve, the approach to the inflection, or take-off, point. Much happens after the slope increases, however. Post inflection point is a critical time for communicating about social protocols for using innovations and applying them in context, for example. Social protocols get created over time, and they drive or break adoption by the general public. Companies can be

more active in supporting the creation of social protocols rather than relying on them to develop spontaneously.

- *Look post-adoption.* Consumers get value from newly adopted innovations when they apply them to their daily lives. Often consumers re-invent, customize, or re-contextualize innovations. For example, answering machines were designed to take messages so that consumers wouldn't miss calls while they were away from their phones. A popular use of answering

machines, however, is to use them as a way to screen calls while at home. This re-invention created a market for new kinds of features. Such reinventions demonstrate just how consumers get value from innovations in unexpected ways. Such reinventions are also a rich source of communications among consumers that could provide useful insight for encouraging adoption and improving the products and services in question in addition to future products and services.

—*Andrea Saveri*
and *Alex Soojung-Kim Pang*



Professional Business Services: The Key to Innovation

We are well into an era in which knowledge—especially, technological knowledge—has become at least as important to business as raw materials, labor, and the process of manufacturing. As a result, ideas and innovations of all kinds are having greater impacts in the marketplace than ever before, the diffusion rates of innovations are accelerating, and competition in all areas of technology and other forms of knowledge application is increasing. Constant experimentation and tremendous flexibility is required for companies to respond to these changes.

The continuous restructuring of the advanced technology sector puts a premium on getting critical information flows through all kinds of firms, and especially those operating in global markets. It's very difficult for these firms to keep up with the whole range of changes that affect production, distribution, marketing, and operations on their own. To solve this problem, business services, also known as knowledge-intensive business services (KIBS), have come to play a major role in the innovation process. In fact, serious technology-based innovation depends on a healthy and growing KIBS sector.

The role of KIBS is not so much to carry technological innovations into the marketplace but to help clients apply and absorb technology effectively into their own processes. Above all, KIBS diffuse best practices both within and between industry clusters. As key players in the diffusion of innovation throughout the marketplace, KIBS will play an increasingly important role in the next ten years in the success of companies of all kinds in both the United States and high-tech-oriented European countries such as Finland.

KNOWLEDGE-INTENSIVE BUSINESS SERVICES

KIBS can be described in general terms as:

- Private companies or organizations that rely heavily on professional knowledge (that is, knowledge based on specialized postgraduate training in everything from science, to law and business) or expertise related to a specific disciplinary or functional domain such as accounting. Examples of such companies include

large consulting firms like PricewaterhouseCoopers, the service arm of IBM, and EDS.

- Companies that supply intermediary expertise to companies with high R&D requirements. Examples include SRI International, Xerox PARC, intellectual property law firms like Wilson Sonsini, and biotech firms like Genentech.
- Those companies that use their knowledge to produce services that are intermediate products to their clients' own knowledge-generating and information-processing activities. Examples include software firms like Oracle, Siebel, and PeopleSoft.

KIBS are a rapidly growing subsector of all services. Their recent growth reflects companies' increasing demands for specialized knowledge—KIBS play a prominent role in knowledge accumulation and transfer. Specialization and distributed knowledge production are also creating demand for integrative services, such as insurance brokers that assist customers in tailoring their insurance policies.

New-technology-based KIBS are of particular interest in the context of the innovation process, since they rely heavily on the professional knowledge of scientists, engineers, and other experts. These KIBS provide information and knowledge to their users, intermediate inputs like software and gene testing to their client's own knowledge generation, and specialized knowledge for other technical functions. In these ways, KIBS can influence innovations across industries.

INNOVATION AND ORGANIZATIONAL CHANGE

Discussions of innovation are often limited to technological innovation. However, the ability of an enterprise to produce technical innovations often depends on social or organizational innovations that in turn create sustainable competitive advantage in the marketplace. Differentiating social and technical innovation is becoming increasingly difficult, when, on the one hand, production becomes service-dominated and, on the other, services become more technical.

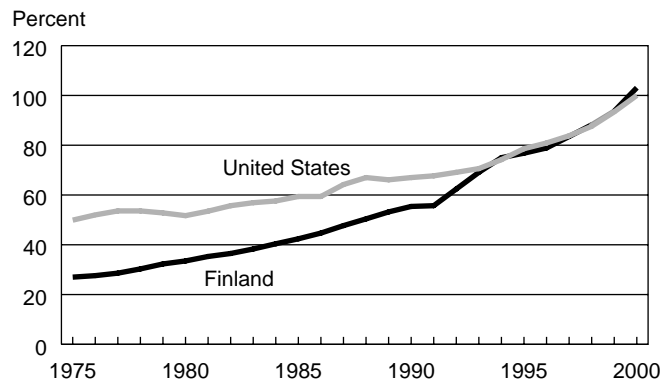
To improve and increase their innovation activity, enterprises must pay more attention to social innovations, which means increased utilization of KIBS, network structures, and the shrewd application of modern information and communication technologies. In one way, KIBS can be regarded as a production input in much the same way raw materials and labor are. In another way, KIBS' role is

much more complex in that the benefit KIBS bring to innovation activity is closely tied to the interaction between the service providers and the clients, and to the learning process that arises as a result of this interaction. In other words, in performing its role KIBS can fundamentally change the nature of the company itself.

With all the fast-paced innovations entering today's marketplace, understanding KIBS is critical to understanding the process of diffusing such innovations throughout the economy, especially in passing innovation among different industry clusters.

In our exploration of the future of KIBS, we track the role of KIBS in the United States and Finland. We choose Finland because it is a high-tech economy in Europe that has successfully nurtured many R&D-intensive firms. Indeed, total productivity of workers and capital in Finland reached the level of the United States in 2000 (see Figure 65).

Figure 65
Finland's Productivity Matches That of the United States
(Productivity as a percent of U.S. productivity, where U.S. productivity equals 100 in 2000)



Source: Statistics Finland

DRIVERS OF KIBS GROWTH

There are five key drivers of KIBS growth: rising levels of education; the emergence of a truly global economy; the growing role of services in the manufacturing industry; the value of networking for organizations; and new innovation and production models.

Educational Attainment Is Increasing

The increase in educational attainment in countries across the North Atlantic in the last 30 years has been the foundation of the knowledge-based economy in general and of KIBS growth in particular. In every country of North America and northern Europe the average level of educational attainment is rising rapidly. The share of today’s young people in the countries of the North Atlantic in their early 20s attending colleges and universities is twice the level of those in their 60s.

In the United States, for example, the population is more educated than ever. The younger generations continue to graduate from high school and college at consistently higher rates than their predecessors. In some European Union countries, such as Finland, the same is true (see Table 16).

In Finland the educational level of the labor force has, in fact, increased to a completely new level. The number of highly educated persons more than doubled, and the size of the labor force with less than an upper secondary education has been cut in half in the last 25 years. By the mid-1990s, the supply of persons with a postsecondary education exceeded that of persons with the equivalent of less than a high school education. Education levels are similar in many other European countries, such as in Scandinavia, the Netherlands, and the United Kingdom.

Table 16
Educational Attainment Levels Are High in the United States and Finland
(Percent that has attained at least an upper secondary education or at least a tertiary education, by age group and sex, 2001)

| | <i>Upper Secondary Education</i> <i>(High school + some college)</i> | | <i>Tertiary Education</i> <i>(College and postgraduate)</i> | |
|----------------------|---|--------------|--|--------------|
| | <i>25–34</i> | <i>35–44</i> | <i>25–34</i> | <i>35–44</i> |
| United States | | | | |
| Males | 87 | 88 | 36 | 37 |
| Females | 89 | 89 | 42 | 38 |
| Finland | | | | |
| Males | 84 | 81 | 30 | 32 |
| Females | 90 | 87 | 46 | 42 |

Source: Organisation for Economic Co-operation and Development, *Education at a Glance 2002*.

Higher education plays a key role in the knowledge infrastructure that enables businesses to make use of KIBS. This is important because of the added value the KIBS create jointly within the customer's business processes, typically in fairly complex direct interactions that wouldn't be possible without highly educated workers. Simply put, without higher education knowledge-driven businesses couldn't exist.

Rapid Expansion of the Global Economy

In the last decade, the global economy attained a very high rate of growth. The engines of that growth were the extraordinary surge in the absorption of foreign goods and inputs in the United States and Western Europe through the intermediation of large global companies. These companies could operate globally only with the building of a

very sophisticated infrastructure of new information and communications technologies across borders. In other words, the growth of the global economy was essentially knowledge driven. During the 1990s, the global economy experienced its highest decade-long rate of growth in some time (see Table 17).

The expansion of the global economy in general, especially in the last decade, was fostered in large part by international trade. In the last three decades, the volume of trade has consistently contributed to world growth, having increased about 33% faster than overall world GDP (see Figure 66).

International trade was driven to a large extent by the growth in knowledge-intensive products. These products, with higher levels of R&D per unit of sale, are the fastest growing sector of world trade. In the advanced high-tech countries, they make up about a

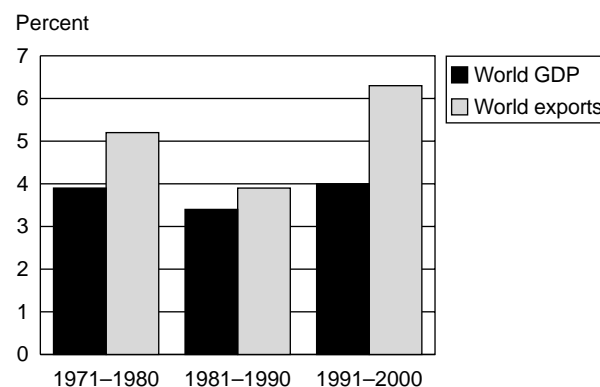
Table 17
GDP Growth Was Highest in the 1990s
(Average annual percent increase in real GDP)

| | 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 |
| World total | 3.9 | 3.4 | 4.0 |

*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 66
World Trade Is a Big Contributor to Growth
(Average annual percent increase in volume)



Source: International Monetary Fund; World Trade Organization.

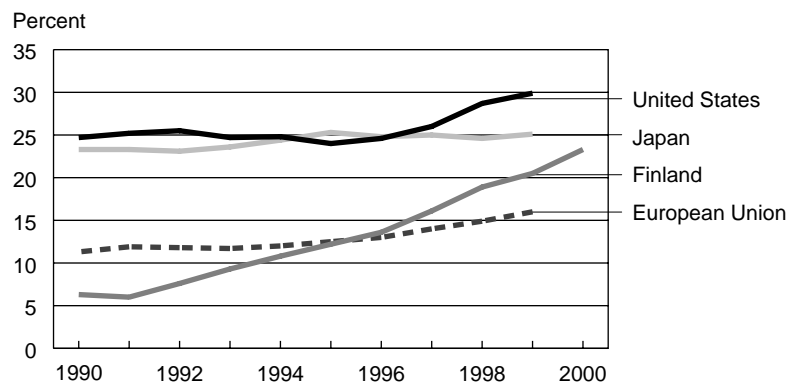
quarter of all exports. Finland joined that group in the late 1990s (see Figure 67).

Given the importance of research-intensive products to the growth of the global economy, the role of knowledge workers is becoming increasingly important as well. Their role is to help the companies that are the major conduits of high value-added products in understanding, interpreting, and sharing ideas and opportunities across borders, as described in the text box “No Longer Just Wood: The Finnish Forest Cluster Goes International.”

Increasing Role of Services in Manufacturing

By now it is widely accepted that services have an important role in almost every existing value chain. However, the role of services in manufacturing has evolved only gradually. Through the 1970s, services were generally seen as a secondary support for the marketing and distribution of manufactured products. But in the 1980s, services became a valuable means of competition, as markets became national and global in nature. During the 1990s, services provided support for R&D, protection of intellectual property, partnership and merger opportunities, marketing strategy, infrastructure development that allowed a

Figure 67
High-Tech Exports Are Increasingly Important
(High-tech products as a percentage share of all exports)



Source: Organisation for Economic Co-operation and Development; Statistics Finland.

broadening of communications and distribution strategies, and design and creative support. Services were often organized as a separate business alongside manufacturing. Today, however, services are increasingly an integral strategic input for manufacturers, who are increasingly adopting service-oriented strategies and business practices. (For an example of this trend, see the text box, “Metso Future Care: Service Business Driving Manufacturing,” on page 168.)

New technologies with extremely high knowledge requirements for effective use are increasingly appearing in the traditional manufacturing sectors and creating demand for new knowledge-intensive services.

Personal interaction remains important for the effective use of these technologies and electronic interface and service delivery channels cannot replace it. For other relationships, technology-based innovations are turning traditional professional services into commodity packages where these professional services are moving from a client-intensive mode to a combination of standardized modules. Such services include Web-based libraries of legal contracts, basic accounting tasks, and some medical diagnostic services. Here modularity and commodification have led to improved productivity, better quality, and lower prices. These can have significant wider impacts in the concerned industries.

■ **No Longer Just Wood:
The Finnish Forest Cluster Goes International**

Clusters are collections of industries that are related and support each other. The Forest Cluster in Finland includes the producers of forest products (paper, pulp, paperboard, and timber), forest industry chemicals, automation enterprises, packaging and printing, energy, and logistics. The Forest Cluster is one of the most important in Finland; its share of GDP is about 10%, share of industrial production 30%, and share of export income nearly 40%.

An increasing global supply of roundwood timber, the liberalization of trade, the slow development of wood processing technology, and an increase in the shared-knowledge base have gradually diminished the relative importance of the wood itself as the basis for innovation in the Forest Cluster. Instead, networking, training, the development of more effective processes, and the reorganization of the business, often facilitated by KIBS, are now fundamental to adding value in this sector, and are becoming the main contributors to international competitive advantage. In fact, today, interaction between the cluster’s various sectors and businesses, especially at the international level, is both a source of knowledge, skills, innovation, and development, and the key driver of growth.

■ Metso Future Care: Service Business Driving Manufacturing

Based in Finland, Metso Corporation is a global supplier of process industry machinery and systems, as well as know-how and after-market services. In 2001, net sales of the corporation were EUR 4.3 billion (\$4.3 billion). Its core businesses are fiber and paper technology, rock and mineral processing, and automation and control.

Implementing a Service-Driven Business Concept

Metso is expanding its business scope from being a traditional machine supplier to being a comprehensive service supplier. The focus is on improving the efficiency, quality, and competitiveness of customers' core processes by supplying value-added solutions and services based on Metso's R&D, engineering, and manufacturing skills. The cornerstones of Metso's strategy are:

- Development of value-enhancing solutions for its customers' core processes. Metso has set up expert service technology centers in China, the United States, and Finland. Metso is not just selling crushing, screening, and grinding mills but developing automation systems and helping with designs and processes at the plants using Metso equipment.
- Integration of control technology, process automation and the most advanced information technology solutions in Metso's products and services. System integration includes adding elements of remote control, distance diagnostics, materials technology, and improvements in the IT infrastructure.
- Development of know-how and after-market services for the large population of machinery, equipment, and processes delivered by Metso. Metso is building relationships with clients around the notion of sustained competitiveness, and it is building them over the life cycle of products. These include helping clients with installation, operation, maintenance, and disposal of equipment and making the value transparent at each stage. The total picture gives firms the ability to see Metso as providing competitiveness, not just machinery.

This new service-oriented way of thinking about its business has led to new ways of managing customer relationships and thinking about earnings. By benefiting the customer, the aim is to strengthen the partnership between the customer and Metso, and through the customer's success, to improve Metso's profitability. Metso's aim is to deliver product-service systems that can enhance the performance of customers' production process, shifting the focus toward problem solving and solution sales instead of the sale of machines alone.

Source: Metso Corporation

The Metso case highlights the increasing role of knowledge-intensive maintenance services in the manufacturing context. These services are likely to grow significantly. They represent an important addition to the traditional professional services that provide support for manufacturing technology evolution and innovation, services such as management, strategy, technology, and IT consulting as well as accounting and legal services. Hence, the rapid growth of KIBS is marked by its growing importance within the traditional manufacturing sector.

The key to future success is to develop services that can support productivity improvements over the entire life cycle of manufacturing products. Enabling technologies—like distant control and monitoring—are playing a key role in these kinds of continuing maintenance services.

Increasing Importance of Networks

For many industries and at a variety of scales, the networking system for 20th century corporations can be described as a tree—the CEO occupies the root and the bifurcating branches represent the increasingly specialized and non-overlapping tasks of lower-level managers and workers. In its clearly organized hierarchical structure, the tree model is especially well suited for mass production, which was the way of economic success until recently.

These days, however, there is huge value in ideas and information as opposed to the standardized use of materials, labor, and manufacturing processes. As companies face an information explosion and an unprecedented need for flexibility in a rapidly changing marketplace, the old corporate tree

is undergoing a complete makeover—from a tree structure to a web or a network organization. This image emphasizes the flatter organization that has lots of cross-links between its nodes, and can respond quickly and flexibly to new information.

Internal organizational changes in a firm are only one consequence of the shift to a network economy. Another, perhaps even more important change, is the realization that the network web extends beyond the firm. Effective firms never work alone but rather connect to a wide variety of other firms and services on the outside in an ever-expanding web of outsourcing and supply relationships. At both the macro- and micro-economic levels, the network economy is here to stay, as shown in the continuing increase in outsourcing. Despite some high profile losses and cancellations, such as some recent cases for EDS and Anderson, outsourcing will continue to be increasingly common. And as the services demanded of outsourcing partners become more complex and value added, KIBS will become a more essential part of any company's outsourcing strategy.

Many large manufacturing companies, for example, are outsourcing portions of their IT infrastructure needs to large consulting firms that allow them to focus on their core competencies. The outsourcing groups must be capable of handling complex infrastructure and service issues. A number of \$1 billion contracts have been signed by firms like Cap Gemini Ernst & Young, IBM, PricewaterhouseCoopers, and EDS to bring specialized service expertise to the heart of manufacturing firms.

Innovation and New Business Models

Innovation and new business models have already started to transform the kinds of KIBS companies need and will increase the demand for KIBS in the future.

On the innovation front, the adoption of new R&D activity models is increasing the need for the kinds of services that KIBS provide. Small entrepreneurial start-ups in areas like biotech and software form themselves around a patented idea. They use venture capital funds to develop the idea into an applied product. Then they sell that product to a large manufacturing enterprise like Novartis or IBM who has the resources to develop and distribute that idea worldwide. Often partnerships between the large multinational enterprise and the small R&D firm are formed at an early stage.

Other models will drive a need for more KIBS. The most common new production practice is “lean” or “agile” production, that is now widespread among high-tech manufacturing processes. This paradigm is characterized by efficient control of the supply chain by a brand firm, flexible configurations, and long-term relationships that maximize flexibility of production. Such systems already have many elements and practices that increase the need for networking and, in turn, the need for KIBS. Agile production is likely to spread in next 5 to 10 years into even more traditional industries such as forest products, white goods, apparel, and food products.

Yet another business model is already important in the top high-tech industries—collaborative business. Whereas agile production can be characterized as having a value model focused on life cycle production and a network model focused on orchestration, collaborative production will call for

a different value model that facilitates joint planning and innovation across partners along the entire supply chain. This new model will ultimately create a new kind of KIBS—business hubs. These business hubs are likely to be created where formal partnerships evolve into looser partnerships, often orchestrated by a new form of KIBS called the intelligent agent, that can provide quick responses across a range of partners in real time and that can provide the flexibility needed for a range of business needs.

KIBS SECTOR IS GROWING IN HIGH-TECH ECONOMIES

Given these drivers, the rapid growth of KIBS is characteristic of high-tech economies. In Finland, for example, KIBS grew considerably during the 1990s; the number of personnel in KIBS firms was 71% higher in 2000 than in 1990, while employment in the rest of the economy actually fell (see Figure 68). During the same period in the United States, KIBS growth was strikingly high as well, although growth in the wider service sector, such as in retail and other consumer-oriented services, meant that total employment in the United States rose as well.

FORECAST

Knowledge-intensive services are becoming critical to, and even embedded in, manufacturing companies, especially those engaged in the global economy. They are becoming an increasingly important part of even traditional heavy manufacturing companies like Metso. As a key to adding value to a whole range of businesses, knowledge-intensive service activities (KISA) are sure to continue to grow in the advanced manufacturing centers of the world. The opposite side of the KIBS coin, knowledge-intensive service

activities are undertaken by firms when they mix and match expertise and assistance provided by external sources, private (KIBS) and public (the government and universities) and their in-house expert activities.

As a result, KIBS will show long-term growth despite the slowdown in KIBS growth with the dramatic fall in investment spending and R&D expenditures since 2000. In the United States, for example, business investment fell about 7% during this period. The cause of decline was the sharp contraction of the information and communications sector. An excess capacity in the telecommunications industry led to a cutback in investment in that sector that spread quickly to a whole range of suppliers. In the United States, KIBS employment fell at an annual rate of 0.7% between 2000 and 2002.

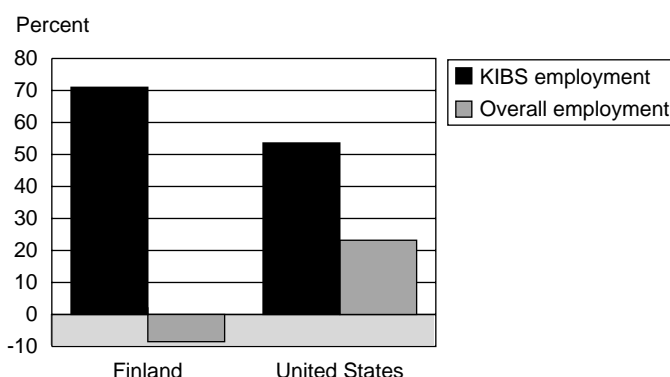
We expect business investment to slowly pick up in the next 18 months until it reaches its more normal growth rate of between 5% and 7% (in real expenditures). As investment picks up, expect to see a revival of KIBS growth as well. In the longer term, we

will see continued expansion in KIBS employment in both the United States and, even stronger, in Finland in the coming decade (see Figure 69 on page 172).

THE NEW ROLE OF KIBS IN INNOVATION SYSTEMS

As described earlier, KIBS can be perceived as typical intermediaries, such as law and accounting firms, or as more value-added translators that are deeply involved in various kinds of tangible and intangible knowledge flows that are so important in the knowledge-based economy. This second set of roles played by KIBS has much in common with the role of organizations in the public knowledge infrastructure such as research and technology organizations and institutions of higher education. These types of organizations also play a role in diffusing knowledge to various firms and organizations they work with through contract research, education at university and post-graduate levels, and training personnel for their client firms.

Figure 68
KIBS Growth Was Rapid in the 1990s
(Percent change in employment, 1990–2000)



Source: U.S. Bureau of Labor Statistics; Statistics Finland, *Statistics of Enterprises and Establishments*.

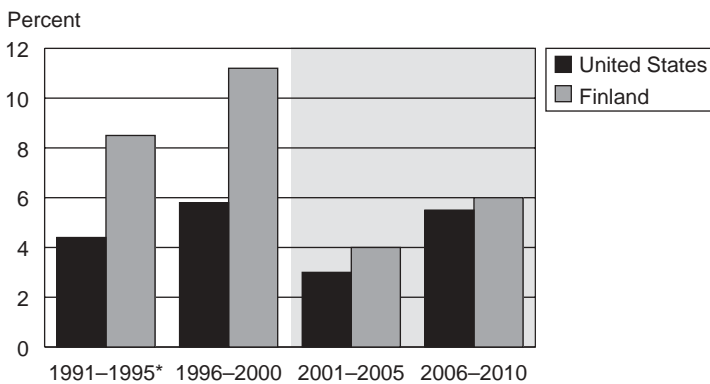
It has been argued that, given their role as co-producers of knowledge and innovation with client firms, KIBS are developing into an informal, private “second knowledge infrastructure” partially complementing and partially taking over the intermediary role traditionally played by the government and university institutions that compose the “first knowledge infrastructure.”

In the long run, the traditional distinction between private knowledge developed and retained inside a firm and private knowledge based on advisory services (like KIBS) will disappear or become altogether obsolete. In

this view, the blurring of boundaries would then eventually result in a more flexible capacity of external KIBS professionals cooperating with internal KIBS professionals in providing knowledge-intensive service activities. Ultimately, networked service professionals, not firms and institutes, would increasingly act as facilitators, carriers, and sources of knowledge flows.

—Tiina Tanninen-Ahonen
Senior Technology Advisor
Tekes, the Finnish Technology Agency

Figure 69
Employment in KIBS Will Grow in the Long Term
(Average annual percent growth in number of employees in KIBS companies)



* Data for Finland are for 1993-1995.

Source: Institute for the Future; Tekes; U.S. Bureau of Labor Statistics, *Employment and Earnings*; Statistics Finland.



Winning Strategies in a Weak Economy

Each year in the *Ten-Year Forecast* we highlight company strategies that might be used as models. This year we doubted we could find enough of them to write the article. It was a year in which share values of the major exchanges in the world lost anywhere from 15% to 30% of their value and companies that grew by acquisition—like AOL Time Warner and Vivendi—ran into trouble. Worse, it was a year in which too many companies and CEOs admitted to reporting unearned revenues, putting out misleading financial reports, or receiving compensation packages that had no connection to shareholder value.

Despite wave after wave of bad news, we still found several companies that stood above the storm and kept their eye on the longer term perspective—Wal-Mart, Amazon, Southwest Airlines, Wells Fargo, Pfizer, Vodafone, and Viacom. These seven companies did four things well.

- They used technology to master customer relationships.
- They kept a sharp eye out for consumer value and adapted their processes to provide that value.
- They continued to look for innovative opportunities in new areas.
- They worked hard to maintain close contact with consumers in a world of fragmented communications.

THE SEVEN FAR-SEEING, VALUE-ORIENTED COMPANIES

These seven companies were able to maintain a long-term perspective on their strategic decisions in 2002, while building value for themselves and their customers in the near term (see Table 18).

**Wal-Mart:
Supply Chain Clout**

Wal-Mart is the largest retailer in the world, with sales of around \$250 billion in 2002. It was also the leader in gaining in retail market share during the last two years when overall growth in retail sales was moderate at best.

In a time of economic concern and falling consumer confidence, consumers searching for value rushed to Wal-Mart and other dis-

Table 18
The Value-Oriented Companies

| Company | Industry | Key to Success |
|--------------------|-----------------------|---|
| Wal-Mart | Retail | Used technology and supply chain clout to provide value for consumers. |
| Amazon | E-retail | Kept focus on clear model, grew it step-by-step, and made sure cash flow increased. |
| Southwest Airlines | Airline | Concentrated on providing basic service at a value price. |
| Wells Fargo | Commercial banking | Focused on customer service at a time when consumers were the strongest driver of economic growth; used technology to provide the infrastructure for such personal service. |
| Pfizer | Pharmaceuticals | Focused on R&D, though its strength came from the size and extent of its market reach. |
| Vodafone | Mobile communications | Expanded by acquisition but stayed out of debt; saw that nurturing its current customers was the key to long-term success. |
| Viacom | Media | Built a very well-balanced media company that is poised to take advantage of a rebound in advertising spending. |

Source: Institute for the Future

counters that continued to provide them with high quality branded products at low prices. Indeed, retail sales data, led by market leader Wal-Mart, show that in 2002 discount stores grew 6% in same store sales, whereas apparel and department stores lost almost 1% and 2%, respectively. But this was no surprise. Even during the boom years of the 1990s, sophisticated consumers from the whole spectrum of income groups flocked to Wal-Mart and companies like Costco and Toys 'R' Us to shop for a selection of national brands at discount prices.

Wal-Mart built its business model on three principles:

- Making stores accessible to consumers by locating them near major highways for maximum draw and setting long hours to allow people to shop at convenient times.
- Using technology and flexible logistics to provide a strict control of inventory so that what people want most is always on the shelf.
- Exerting pressure down the supply chain through its growing share of the consumer market and its targeted use of store brands to ensure that customers get the best prices on every item in the store.

These strategies have allowed Wal-Mart to provide a simple, clear value proposition to its customers, in good times and bad. By the sheer size of its customer base in both general retail sales and groceries, Wal-Mart has the clout to set the baseline for the prices of national branded products. Because of its size and influence on the market, this should continue well into the future. In fact, some variation of the Wal-Mart value model has appeared in almost every other sector of retail activity as well—including home sup-

plies, toys, banking, air travel, brokerage sales, books, travel, and e-commerce.

Amazon: Sticking to the Business Model Step-by-Step

Amazon is the world's largest and most successful e-tailer, with some \$4 billion in sales in 2002. The company defined the success of dot-coms in the late 1990s by keeping its focus on its primary goal—providing value to the consumer by offering a wide range of commodity-like products such as books, music, and videos at relatively low prices through the Internet with home delivery. By gradually adding new products to its offerings, Amazon has kept the lead in e-commerce sales through the bust years of the early 2000s.

Amazon has done so by making its business model work—focus on online shopping, and offer a wide selection in a clearly defined product area. Although Amazon has started careful ventures into toys, apparel, electronics, and even used items, these expansions have not altered the company's focus from its core markets.

As a result, Amazon's sales have continued to grow at a healthy annual rate. The company has reinvested its money in its base systems of operation, as well as gradually increasing its R&D budget, which now runs at \$240 million a year, a ratio of sales well above most retailers. The key to Amazon's success has been avoiding the twin dangers of getting into debt while expanding its offerings and creating unwieldy organizational complexity. It has done so by focusing on the elements of the process it does best—offering convenient access, an easy, standard shopping procedure, secure transactions, and efficient delivery and return options. It has

also focused on the customer relationship side of the transaction and has left the selection of goods on offer in its newer areas to its affiliated stores like Circuit City, Target, Toys ‘R’ Us, Office Depot, Drugstore.com, Marshall Fields, and a range of apparel retailers. As e-commerce spending continues to grow faster than the overall economy, Amazon is well positioned to take advantage of that rapid growth.

Southwest Airlines: Basic Service, Value Price

The Wal-Mart discount model has been adopted in a number of different industries. Southwest Airlines is a great example of success in the airline business, posting about \$5.6 billion sales in 2002.

Southwest is a young airline that offers the same discount fares to every traveler. It does this by focusing on high volume point-to-point travel, without trying to offer complex hub services to a wide range of connecting points. It provides a clear value proposition—low fares, frequent service, and a friendly atmosphere. But in exchange, it limits the services provided—no meals, no reserved seating, no ticket sales through travel agents, and few transfers within a given hub. Indeed, the airline often uses secondary airports in big metro areas rather than the major ones. Yet Southwest has been a dramatically successful and profitable carrier even after the major falloff in airline business after September 11, 2001.

Southwest’s average capacity remained fairly high for the last two years at close to the peak levels of 2000 (between 67% and 70%, compared to the average of below 60% for most of the larger airlines). While profits have dropped during 2002 to about half of

what they were in previous years, Southwest remains one of the few airlines that has produced consistent profits in the last two years in an industry devastated by shifts in travel patterns and bankruptcies among some of the industry stalwarts. Other successful discount airlines following the same model include JetBlue, easyJet, WestJet, and Ryanair. With a younger fleet, a clear value proposition to its customers, and a growing attraction of business as well as leisure travelers, Southwest is poised for future success.

Wells Fargo: Technology-Driven Customer Service

Wells Fargo is the third largest commercial bank in the United States, operating on a national basis and heavily oriented toward consumer banking. Its total assets reached \$335 billion in 2002.

With its focus on consumer services, Wells Fargo has had double-digit income growth for the last six quarters. It has remained one of the most profitable banks in the United States with total revenue increasing dramatically during 2002 with especially high gains in all areas of its consumer banking business—home equity and home mortgages, consumer deposits, and Internet banking. The bank has a particular focus on maintaining and improving consumer services and is sorting through its customers to find those that might need additional value-added services.

To this end, Wells Fargo is constantly looking for incremental improvements in consumer services. It has opened up access points at a whole variety of locations and channels—traditional full-service branches, branches in grocery stores, ubiquitous ATM machines, automated telephone lines, opera-

tor-assisted calls, and Web banking. It invests heavily in time and money to provide an excellent technical infrastructure at the organization level—transactions support, online activity, customer record sharing across bank departments, and improved security features. Organizational efforts are made to share personal service ideas across the entire bank, but their implementation is left to regional managers. This allows the emergence of a high quality national infrastructure supporting individual banks with regional discretion at the customer service level.

Wells Fargo has handled the move from state to regional to national operation very well. It has moved year-by-year to improve consumer applications, supported by a robust infrastructure. In this way, it is reaping the rewards from a consumer-driven economy, and will continue to do so as the consumer—in contrast to the sluggish expansion of business—remains a steady source of income from credit cards, loans, and investments.

**Pfizer:
Big R&D and Market Reach**

Pfizer is the largest pharmaceutical company in the world, with some \$32 billion in revenue. After its proposed merger with Pharmacia goes through, combined revenue will be more than \$46 billion and it will be very close to being the number one-ranked R&D company of any kind in the world, ahead of traditional leaders like General Motors, IBM, and Microsoft.

Pfizer has 8 of the 30 best-selling drugs on the market today, all of them earning over \$1 billion per year. They include leading products for cardiovascular disease (Lipitor and Norvasc), for nervous system disorders

(Zoloft and Neutrontin), and for male potency (Viagra). As a result, its revenues on pharmaceutical products grew by 17% in the last year. The company also produces a range of consumer health products sold over the counter, such as Benadryl, Desitin, Neosporin, and Roloids. It is in the process of selling off smaller, low-margin businesses in confectionary and gums, shaving products, and pet products.

Like other pharmaceutical companies, Pfizer has made a big effort to reach out directly to consumers through aggressive mass-market ad campaigns to raise the level of awareness of its products and what they can do. In the past, pharmaceutical companies have marketed their drugs primarily to doctors, since doctors were traditionally the ones making the prescribing decisions. But Pfizer led the way in marketing directly to the consumer by means of print ads and TV commercials leveraging the changing relationship between the more active and engaged consumer and their physicians.

Pfizer's nearly completed merger with Pharmacia is part of a strategy to combine a broad and diversified R&D effort with the worldwide marketing clout that can bring products to market quickly and effectively in a broad range of affluent markets. The merger adds Pharmacia's \$14 billion in revenue and \$2.3 billion in R&D to Pfizer's \$32 billion in revenue and \$4.8 billion in R&D. The goal of the merger with Pharmacia is to gain all the advantages of the globalizing market in an area where R&D is of critical importance. It brings a diversified R&D portfolio into control of a single player, countering recent industry trends for relying on outsourced R&D. Pfizer sees at least five major benefits from the merger.

- It gives Pfizer a stronger role in the disease categories it is already strong in.
- Increases the size of its R&D operation and spreads associated risks over a wider range of activities.
- Eases its access into global financial markets for the flexible funding that will give it a competitive advantage in a high-tech arena.
- Expands the marketing clout needed to reach global markets quickly once it has developed new products.
- Provides it with more buying power over its supply chain and more clout with its partners.

Pfizer is building a more varied in-house R&D portfolio that it can use to provide a wider range of products to its already strong global position and to enhance its role as a research and marketing leader in the rapidly evolving world of pharmaceuticals and health care. With health care spending up around the world, especially in the rich countries with aging populations, Pfizer is well positioned for the future.

**Vodafone:
Value-Added Services
Customer-by-Customer**

Vodafone is the largest mobile telecom company in the world with dominant positions in northern Europe, Italy, and Japan (with J-phone), and an important market share in the United States (with Airtouch). It has a solid cash position with total revenue of \$50 billion coming from 110 million customers. Vodafone has done well in the industry sector that has experienced the greatest fall in share value since 2000 by offering customers the

mobile services they want, such as reliability, data services, and maps and continuously adding enhanced applications. It has developed a mobile phone service model that works in an industry of tremendous overcapacity and over-promised technologies.

During the mobile boom, like many other players struggling to build market positions, Vodafone made huge acquisitions to buy into key markets. It spent as much as \$270 billion for acquisitions, including Mannesmann in Germany and Airtouch in the United States. But most of the acquisition costs were in shares, not cash. So Vodafone did not mortgage its future cash flow as it increased market share, as many others, including WorldCom and Deutsche Telekom, did.

Instead, Vodafone, invested a portion of its cash flow into generating incremental new applications for customers—providing subscribers with data services, Net access, games, maps, directions, and so on. The company sees clearly that in the longer run, profits will not come from continually expanding its customer base, but from raising new cash from its best customers. Its goal is to maximize value for—and thus revenues from—each subscriber.

Vodafone accepts the fact that mobile communications is a technology in flux, and that as each new generation of technology there is the possibility that customers will migrate to the next new system. It is banking on its ability to utilize its existing relationships with customers to continually offer them add-on services—this will provide not only attractions to keep existing consumers experimenting and happy but continue to provide the basic cash generation that is the key to a successful consumer-oriented company.

**Viacom:
Wide-Ranging Channels to Reach
the Consumer**

Viacom is one of the world's largest media companies with revenues of \$24 billion and revenue growth that parallels consumer spending in the United States. It has built a spectrum of communications channels that offer more focused entertainment and information for a wide range of consumers—a major U.S. TV network (CBS); successful international cable channels (MTV, TNN, Nickelodeon, BET); radio stations and outdoor advertising (Infinity); entertainment through its major producer of content for movies and television (Paramount) and a major publishing house (Simon & Schuster); and the largest video distribution chain (Blockbuster). The revenue streams are well balanced, with about 20% of its revenues coming from each of its five areas.

With advertising spending likely to pick up in 2003, Viacom, with its many channels, is well poised to take off. Viacom is also interested in pushing more activities into international markets. Its MTV network has been very adept at adapting its format to a variety of regional audiences, from England to Brazil and India. The lack of success of some of the big European media companies—Bertelsmann and Vivendi, for example—opens the way for American companies to use their financial clout and content depth to continue their expansion into growing markets abroad.

All in all, Viacom has a strong position in many key media markets; it has a solid dispersion of revenue and income across those channels; it has maintained a strong cash position through the downturn of the econo-

my; and it is poised to take advantage of the rebound in advertising in channels that can be targeted to key audiences.

**CONCLUSION:
WHEN CONSUMERS LEAD,
COMPANIES MUST FOLLOW**

As a group, these seven companies did well in a market led by consumers. They did so by building consumer contacts and relationships, by enhancing the services and value they provided, by using their cash carefully to build value, by using technology to support customer relationships, or by some combination of all of these. These companies were well prepared to work their way through the economic troubles and to use their cash positions, their technology portfolios, and their relationships with consumers to build value for themselves and their customers. They were all firms that built a strong position within their supply chain and used their strong market position to take a leading role in defining and controlling supply conditions. They are poised to multiply their success in the good times to come. Many other companies, in consumer markets and everywhere along the supply chain, would do well to follow their lead.

—Gregory Schmid

Appendix: List of Figures and Tables

FIGURES

| | | |
|-----------|--|----|
| Figure 1 | Hispanic Brands Are Increasingly Available in the United States | 4 |
| Figure 2 | The Expanding Hispanic Population | 5 |
| Figure 3 | Hispanic Purchasing Power on the Rise | 6 |
| Figure 4 | Spending Priorities of Hispanic Consumers | 7 |
| Figure 5 | After a Long Decline, Elderly Workforce Participation Rates Are Rising | 14 |
| Figure 6 | Pension Assets Are Much Higher | 15 |
| Figure 7 | Gap for Retiree Expenditures Much Smaller Than for Income | 16 |
| Figure 8 | Restricted Activity Days Are Down | 17 |
| Figure 9 | Chronic Conditions Are Down for Those Aged 45-64 | 18 |
| Figure 10 | More People Work in Knowledge-Based Activities | 18 |
| Figure 11 | Pensions Shift to Defined-Contribution Plans | 19 |
| Figure 12 | Most Plan to Work After Retirement | 20 |
| Figure 13 | It's the Educated That Work Longer | 21 |
| Figure 14 | More Older Workers in the Future | 21 |
| Figure 15 | Ten Connective Technologies | 24 |
| Figure 16 | Bandwidth Capacity to Take Off in 2005 | 26 |
| Figure 17 | Web Services Will Grow Rapidly | 27 |
| Figure 18 | RFID Tag Usage Will Reach the Trillion Mark by the End of the Decade | 28 |
| Figure 19 | Global Sales of Image Sensors Will More Than Double in Five Years | 29 |
| Figure 20 | Biosensors Will Tap a Strong Market for Medical Devices | 30 |
| Figure 21 | Worldwide Investment in Nanotechnology Rose Steeply in 2001 | 31 |
| Figure 22 | France Telecom's Optical Fiber Display Is a Fabric | 32 |
| Figure 23 | Almost All U.S. Households Will Use Voice-Activated Web Services by 2005 | 33 |
| Figure 24 | Biometrics Revenue Will Grow Rapidly Over Next Few Years | 34 |
| Figure 25 | As Power Premium Decreases, Energy Use Increases | 35 |
| Figure 26 | Dependence on Food and Fuel for Trade Has Decreased | 53 |
| Figure 27 | Foreign Direct Investment into China Increasing Dramatically | 65 |
| Figure 28 | China Has the Largest Market for Mobile Phones | 68 |
| Figure 29 | Online Population Is Increasing Rapidly in China | 69 |
| Figure 30 | E-Mail Is the Most Popular Online Activity in China | 70 |
| Figure 31 | The Emerging Health Economy | 75 |
| Figure 32 | U.S. Health Care Expenditures' Share of GDP to Reach 17% in a Decade | 78 |
| Figure 33 | Seniors Spend Three Times More on Health Care | 78 |

| | | |
|-----------|---|-----|
| Figure 34 | Nearly Half of Those with a Chronic Illness Are Engaged Health Consumers | 79 |
| Figure 35 | More Than 150 Million Americans Will Be Using CAM Products in a Decade | 79 |
| Figure 36 | NIH R&D Spending Tripled in a Decade | 80 |
| Figure 37 | Pharmaceutical Industry R&D Spending Increased Even Faster | 80 |
| Figure 38 | Biotech Investments Remain Strong | 81 |
| Figure 39 | Investments in Medical Devices Still High, Despite Recent Decline in Overall Investment | 81 |
| Figure 40 | Functional Foods Market Will Grow Rapidly | 82 |
| Figure 41 | Cosmeceuticals Market Growing Faster Than Overall Cosmetics Market | 82 |
| Figure 42 | Timex's Fitness Monitor Is Just One Kind of Wearable Medical Device | 83 |
| Figure 43 | Health-Friendly Building Materials Include Low-Volatility Paints | 83 |
| Figure 44 | Biosecurity Needs Will Drive Doubling of Air Filtration Market | 83 |
| Figure 45 | Number of Health Information Searches Has Soared | 83 |
| Figure 46 | Health Ecologies Include the Individual, Behaviors, and Resources | 85 |
| Figure 47 | Friends and Family Are a Preferred Source of Product Information | 127 |
| Figure 48 | The Social Reach Index Components | 129 |
| Figure 49 | Consumers Have a Range of Social Reach | 129 |
| Figure 50 | Connected Consumers Are Well Educated ... | 130 |
| Figure 51 | ... And Connected Consumers Are Young | 130 |
| Figure 52 | Connected Consumers Go Online Frequently | 131 |
| Figure 53 | Connected Consumers Are More Likely to Have a Mobile Phone ... | 131 |
| Figure 54 | ... And Are Much More Likely to Own a PDA | 131 |
| Figure 55 | Connected Consumers Want Regular Updates from Businesses | 132 |
| Figure 56 | Connected Consumers Use More Channels when Making Major Purchases | 132 |
| Figure 57 | Connected Consumers Are Sources of Information for Others | 133 |
| Figure 58 | China and India Are Experiencing Rapid Economic Growth | 138 |
| Figure 59 | The Transformation of China's Economy | 139 |
| Figure 60 | The Traditional S-Curve | 150 |
| Figure 61 | Two Curves in the Future | 151 |
| Figure 62 | Friends and Family Are Key Information Sources | 153 |
| Figure 63 | Blogs Provide a New Meeting Ground for Consumers | 154 |
| Figure 64 | Clusters of Curves in the Future | 158 |
| Figure 65 | Finland's Productivity Matches That of the United States | 163 |
| Figure 66 | World Trade Is a Big Contributor to Growth | 165 |
| Figure 67 | High-Tech Exports Are Increasingly Important | 166 |
| Figure 68 | KIBS Growth Was Rapid in the 1990s | 171 |
| Figure 69 | Employment in KIBS Will Grow in the Long Term | 172 |

TABLES

| | | |
|----------|---|-----|
| Table 1 | Regional Presence of Hispanic Population | 6 |
| Table 2 | The Hispanic Heartland—Five Metros Areas | 8 |
| Table 3 | New Latino Destinations | 8 |
| Table 4 | Spanish Dominates But Varies by Generation | 9 |
| Table 5 | Language Preferences Shift with Context and Media | 9 |
| Table 6 | Identity Is Contextual and Varies by Generation | 10 |
| Table 7 | Retirement Spending Shifts Prominent in Four Areas | 16 |
| Table 8 | Slight Upward Shift in Older Working Men | 20 |
| Table 9 | The Wealthiest Nations Are Most Dependent | 54 |
| Table 10 | The Middle East and Latin American Supply Food and Fuel | 55 |
| Table 11 | Supplier Status Doesn't Guarantee Prosperity, But It Doesn't Hurt | 55 |
| Table 12 | Food and Fuel Dependencies in 2010 | 60 |
| Table 13 | Americans Are Participating Less in Political and Community Activities | 120 |
| Table 14 | Connected Consumers Consult with Friends and Family More Often | 133 |
| Table 15 | Technology Takes Off in China and India | 140 |
| Table 16 | Educational Attainment Levels Are High in the United States and Finland | 164 |
| Table 17 | GDP Growth Was Highest in the 1990s | 165 |
| Table 18 | The Value-Oriented Companies | 174 |