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Wal-Mart's and Microsoft's dominance in modern business has been attributed to any number of factors, ranging from the vision and drive of their founders to the companies' aggressive competitive practices. But the performance of these two very different firms derives from something that is much larger than the companies themselves: the success of their respective business ecosystems. These loose networks—of suppliers, distributors, outsourcing firms, makers of related products or services, technology providers, and a host of other organizations—affect, and are affected by, the creation and delivery of a company's own offerings.

Like an individual species in a biological ecosystem, each member of a business ecosystem ultimately shares the fate of the network as a whole, regardless of that member's apparent strength. From their earliest days, Wal-Mart and Microsoft—unlike companies that focus primarily on their internal capabilities—have realized this and pursued strategies that not only aggressively further their own interests

but also promote their ecosystems' overall health.

They have done this by creating “platforms”—services, tools, or technologies—that other members of the ecosystem can use to enhance their own performance. Wal-Mart's procurement system offers its suppliers invaluable real-time information on customer demand and preferences, while providing the retailer with a significant cost advantage over its competitors. (For a breakdown of how Wal-Mart's network strategy contributes to this advantage, see the exhibit “The Ecosystem Edge.”) Microsoft's tools and technologies allow software companies to easily create programs for the widespread Windows operating system—programs that, in turn, provide Microsoft with a steady stream of new Windows applications. In both cases, these symbiotic relationships ultimately have benefited consumers—Wal-Mart's got quality goods at lower prices, and Microsoft's got a wide array of new computing features—and gave the firms' ecosystems a collective advantage over competing networks.

Over time, the companies in the ecosystems made investments to leverage their relationships and began to depend on Wal-Mart and Microsoft for their own success. For example, Procter & Gamble integrated its ERP system with Wal-Mart's, and AutoCad integrated Microsoft's programming components into its applications. Although Wal-Mart and Microsoft have been criticized for being tough on their business partners, the complex interdependencies among companies that these industry giants encouraged have made their business networks unusually productive and innovative—and allowed the two companies to enjoy sustained superior performance. Each of these ecosystems today numbers thousands of firms and millions of people, giving them a scale many orders of magnitude larger than the companies themselves and an advantage over smaller, competing ecosystems.

Although Wal-Mart and Microsoft have been astonishingly successful in organizing and orchestrating their vast business networks, their two ecosystems aren't anomalies. Most companies today inhabit ecosystems that extend beyond the boundaries of their own industries. The moves that a company makes will, to varying degrees, affect its business network's health, which in turn will ultimately affect the company's performance—for ill as well as for good. But despite being increasingly central to modern business, ecosystems are still poorly understood and even more poorly managed. We offer a framework here for assessing the health of your company's ecosystem, determining your place in it, and developing a strategy to match your role.

ancing, firms that provide the technology needed to carry on your business, and makers of complementary products that are used in conjunction with your own. It even includes competitors and customers, when their actions and feedback affect the development of your own products or processes. The ecosystem also comprises entities like regulatory agencies and media outlets that can have a less immediate, but just as powerful, effect on your business.

Drawing the precise boundaries of an ecosystem is an impossible and, in any case, academic exercise. Rather, you should try to systematically identify the organizations with which your future is most closely intertwined and determine the dependencies that are most critical to your business. If you look carefully, you will most likely find that you depend on hundreds, if not thousands, of other businesses. It is helpful to subdivide a complex ecosystem into a number of related groups of organizations, or business domains. These may in some cases represent something as well defined as a conventional industry segment. Each ecosystem typically encompasses several domains, which it may share with other ecosystems.

For an ecosystem to function effectively, each domain in it that is critical to the delivery of a product or service should be healthy; weakness in any domain can undermine the performance of the whole. In the case of Microsoft, the company's performance depends on the health of independent software vendors and systems integrators, among many others. (For a depiction of some of the crucial domains in Microsoft's software ecosystem, see the exhibit "Microsoft and Its Ecosystem.")

In the boom years of the Internet, there was an almost universal euphoria about the potential of business networks. Vast, connected communities of companies would enjoy unheard of efficiencies in operations and innovation. New technologies would disrupt traditional companies and create unprecedented opportunities for innovation, as well as for the growth of new companies. Network effects—the increasing value of a product or service as the number of people using it grows—would create enormous value and remove barriers to entry in businesses as different as B2B exchanges and grocery delivery. But things were not so simple, as the disastrous failures of companies like PetroCosm and Webvan made

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What Is a Business Ecosystem?

Consider the world around us. Dozens of organizations collaborate across industries to bring electricity into our homes. Hundreds of organizations join forces to manufacture and distribute a single personal computer. Thousands of companies coordinate to provide the rich foundation of applications necessary to make a software operating system successful.

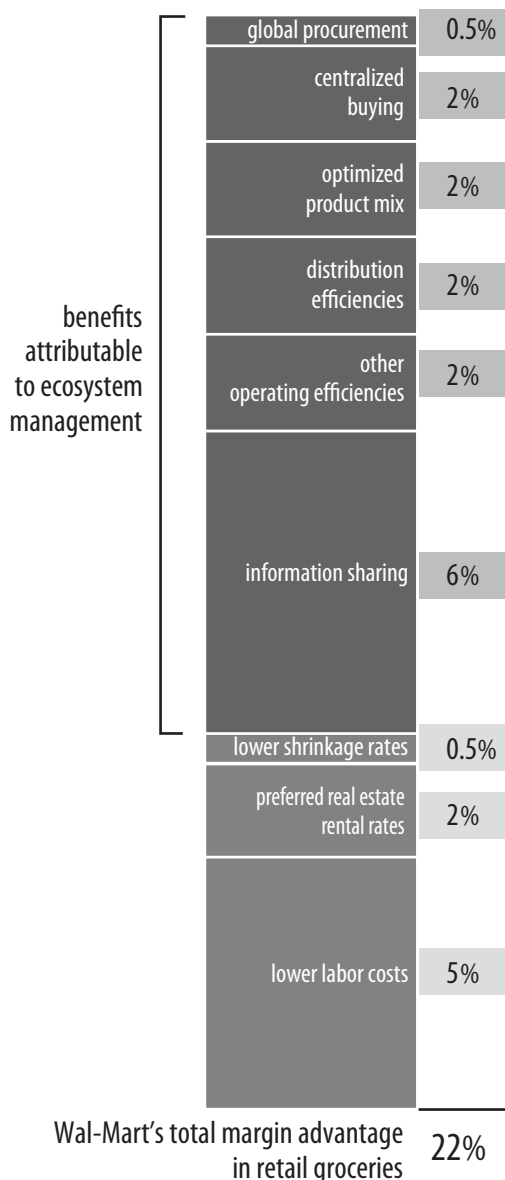
Many of these organizations fall outside the traditional value chain of suppliers and distributors that directly contribute to the creation and delivery of a product or service. Your own business ecosystem includes, for example, companies to which you outsource business functions, institutions that provide you with fi-

clear.

The implosion of the Internet bubble made it obvious that members of a network share a common fate, meaning that they could rise

and fall together. Many had predicted the bubble could not last, of course, but the sharpness, suddenness, and violence of the fall surprised most people. The stunning reversal of the virtuous cycle, which had seemed to automatically drive endless exponential growth, left many questioning their faith in the power of business networks. Instead of abandoning their faith, business leaders should work to understand the phenomenon more deeply. The analogy between business networks and biological ecosystems can aid this understanding by vividly highlighting certain pivotal concepts. (For a discussion of similarities and differences between the two types of ecosystems, see the sidebar “How Useful an Analogy?”)

The Ecosystem Edge



More than half of Wal-Mart's cost advantage in the retail grocery business results from how the company manages its ecosystem of business partners. For example, by sharing information, Wal-Mart is better able to match supply and demand across the entire ecosystem, increasing productivity and responsiveness for itself—and for its partners.

Source: authors' analysis of company data.

Assessing Your Ecosystem's Health

So what is a healthy business ecosystem? What are the indications that it will continue to create opportunities for each of its domains and for those who depend on it? There are three critical measures of health—for business as well as biological ecosystems.

Productivity. The most important measure of a biological ecosystem's health is its ability to effectively convert nonbiological inputs, such as sunlight and mineral nutrients, into living outputs—populations of organisms, or biomass. The business equivalent is a network's ability to consistently transform technology and other raw materials of innovation into lower costs and new products. There are a number of ways to measure this. A relatively simple one is return on invested capital.

When we analyzed companies' aggregate return on invested capital in three broadly defined industries—software, biotechnology, and Internet services—over the past decade, we discovered striking productivity differences among these three ecosystems. Software firms averaged better than a 10% return on invested capital, while biotechnology businesses had a negative return of roughly 5%, and, predictably, Internet companies had a negative return of nearly 40%.

Most interesting was the change in productivity over time. (See the exhibit “The Relative Health of Three Business Ecosystems.”) While the return on invested capital in the software and biotechnology ecosystems didn't vary much from year to year, it plummeted between 1996 and 1997 in the Internet services ecosystem, as companies like Yahoo and AOL

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began charging exorbitant fees to companies seeking traffic from their portals. The plunging figures precede by more than three years the actual collapse of the Internet sector in 2002. Clearly, an assessment of this ecosystem's

health before the collapse might have helped companies—Cisco, for example, which supplied Internet services companies with essential technology—reduce their dependence on a precarious network in which they had such big stakes.

Microsoft and Its Ecosystem

Microsoft's success depends on the health of the numerous domains—some of which comprise thousands of organizations—that make up its software ecosystem.

Domain	Number of Firms
Systems integrators	7,752
Development services companies	5,747
Campus resellers	4,743
Independent software vendors	3,817
Trainers	2,717
Breadth value-added resellers	2,580
Small specialty firms	2,252
Top value-added resellers	2,156
Hosting service providers	1,379
Internet service providers	1,253
Business consultants	938
Software support companies	675
Outbound hardware firms	653
Consumer electronics companies	467
Unsegmented resellers	290
Media stores	238
Mass merchants	220
Outbound software firms	160
Computer superstores	51
Application service provider aggregators	50
E-tailers	46
Office superstores	13
General aggregators	7
Warehouse club stores	7
Niche specialty stores	6
Subdistributors	6
Applications integrators	5
Microsoft Direct resellers	2
Microsoft Direct outlets	1
Network equipment providers	1
Network service providers	1

Source: company data.

Robustness. To provide durable benefits to the species that depend on it, a biological ecosystem must persist in the face of environmental changes. Similarly, a business ecosystem should be capable of surviving disruptions such as unforeseen technological change. The benefits are obvious: A company that is part of a robust ecosystem enjoys relative predictability, and the relationships among members of the ecosystem are buffered against external shocks. Think, for example, of the relationship between Microsoft and its community of independent software vendors, which collectively survived the adoption of the World Wide Web.

Perhaps the simplest, if crude, measure of robustness is the survival rates of ecosystem members, either over time or relative to comparable ecosystems. Again, it is instructive to apply this measure to the software, biotechnology, and Internet services communities. In software, we see strong growth over the decade, with some contraction around the technology recession of 2001, as the exhibit shows. The biotech community's population line is relatively flat, which masks a lot of industry churn—new start-ups replacing companies that went out of business. The Internet ecosystem's dramatic collapse in 2002 needs no elaboration, though, as we have noted, it seems to have been foreshadowed by the fall of one measure of ecosystem productivity, return on investment.

Niche Creation. Robustness and productivity do not completely capture the character of a healthy biological ecosystem. The ecological literature indicates that it is also important these systems exhibit variety, the ability to support a diversity of species. There is something about the idea of diversity, in business as well as in biology, that suggests an ability to absorb external shocks and the potential for productive innovation.

The best measure of this in a business context is the ecosystem's capacity to increase *meaningful* diversity through the creation of valuable new functions, or niches. One way to assess niche creation is to look at the extent to which emerging technologies are actually

being applied in the form of a variety of new businesses and products. The computing and automobile industries exhibit very different profiles in this vein. While the computing industry's enthusiastic embrace of innovative technologies has led to the sustained creation of opportunities for entirely new classes of companies, the automobile industry has historically sought to prevent additional niches from emerging.

It is critically important to appreciate that although healthy ecosystems should create new niches, it does not follow that old niches must persist. In fact, decreased diversity in some areas of an ecosystem enable the creation of niches in others. The collapse of main-frame-related business niches gave rise to a plethora of new domains related to personal computing and client-server networks. In biological evolution, reduced diversity at one

level can lead to the creation of a stable foundation that enables greater and more meaningful diversity at other, sometimes higher, levels. For example, the standardization of a simple DNA alphabet, as well as a few basic mechanisms of metabolism and several basic models for organisms, serves as the building blocks for the enormous variety of life on earth.

So how can you promote the health and stability of your own ecosystem, thereby helping to ensure your company's well-being? It depends on your role—current and potential—within the network. Are you one of the niche players that make up the bulk of most ecosystems? If you occupy one of the few hubs or nodes characteristic of networks, are you using that position to act as an indispensable keystone? Do you dominate your ecosystem? If not, do you harbor ambitions to dominate it—

How Useful an Analogy?

Haven't there been enough biological analogies in business literature? It's a fair question, but we feel strongly that the analogy between evolved biological systems and networks of business entities is too often misunderstood. A sophisticated examination of this analogy is essential to improving our understanding about how such networks operate.

There are certainly strong parallels between business networks and biological ecosystems. Both are characterized by a large number of loosely interconnected participants that depend on one another for their effectiveness and survival. If the ecosystem is healthy, individual participants will thrive; if the ecosystem is unhealthy, individual participants will suffer. In business, that's because the companies, products, and technologies of a business network are, like the species in a biological ecosystem, increasingly intertwined in mutually dependent relationships outside of which they have little meaning. Moreover, the consequences of these relationships often are beyond the control of any of the network participants. Rather, they result from the overall state of the system, which is subject to continuous change, including constant upheavals in membership.

Modern business networks and biological ecosystems also are characterized by the presence of crucial hubs that assume the keystone function of regulating ecosystem health. An example of a biological keystone is the sea otter, which helps regulate the coastal ecosystem of the Pacific Northwest by consuming large numbers of sea urchins. Left unchecked, sea urchins overgraze a variety of invertebrates and plants, including kelp, which in turn support a food web that is the engine of near-shore productivity. The decline of the sea otter population in the nineteenth and twentieth centuries, when they were trapped for their fur, had a profoundly negative impact on a wide variety of coastal fish and other organisms.

Like keystones in business networks, sea otters represent only a small part of the biomass of their community but exert tremendous influence. Note, too, that, as in business ecosystems, some individual members of the community—the sea urchins that get eaten by the otters—suffer as a result of the keystone's behavior, but the community as a whole benefits.

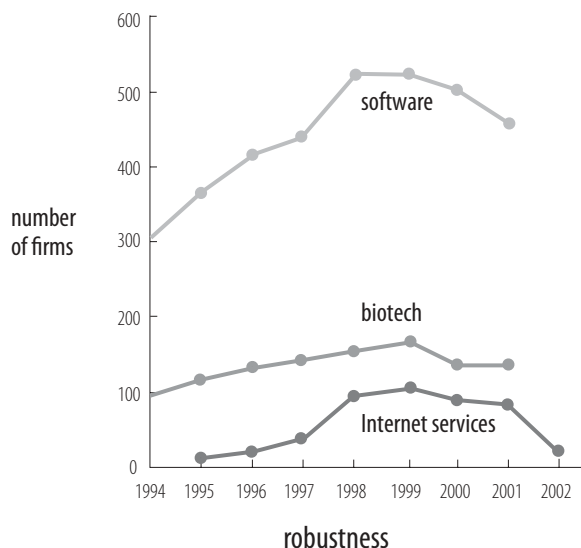
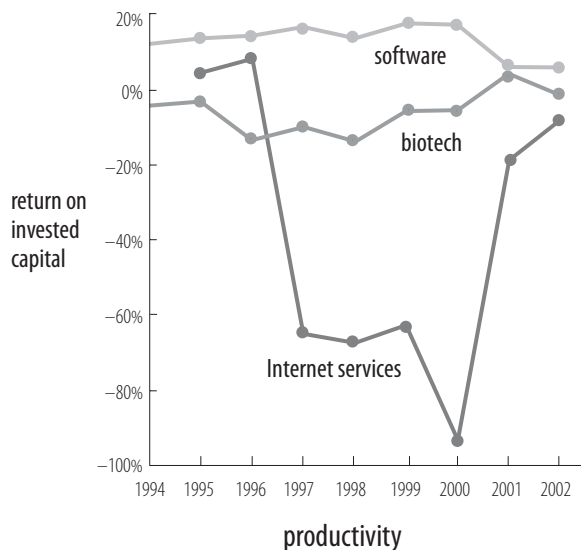
The biological counterparts of the two other primary roles we have identified in business ecosystems—the dominator and the niche player—are more obvious. Many

weeds, which supplant other species in their ecosystems, are classic dominators. And most species in nature, like most companies in the business world, are niche players, with a specialized function that contributes to the functioning of their ecosystems.

The analogy isn't perfect, of course. For example, inputs like sunlight and nutrients in biological systems can be fairly constant or at least follow predictable cycles. Inputs like technology in business ecosystems are constantly changing. But to be perfect, an analogy would have to be so simplistic that it would offer little real insight.

Note, too, that our use of the term "ecosystem" is probably closer to the biological term "community." We follow others in choosing ecosystem, rather than the generic-sounding community, because it clearly signals that we are discussing a complex system and that we are working with a biological analogy. Indeed, the familiar concept and vivid terminology of the biological ecosystem can help focus managerial attention on features of modern business networks that are often ignored by conventional theories about markets and industry structure but that underlie many drivers of business success and failure.

The Relative Health of Three Business Ecosystems



Two measures of an ecosystem's health over time are its productivity and its robustness. The chart on the top shows differences in productivity—measured according to the average return on invested capital—among the software, biotechnology, and Internet services ecosystems. The chart on the bottom shows the robustness—measured according to the number of firms—in the same three ecosystems.

Source: authors' analysis of data from publicly traded companies identified by SIC code (software and biotechnology) or by initial public offering records (Internet services).

and are you aware of the risks that come with that role? The answers to these questions may be different for different parts of your business. They may also change as your ecosystem changes. (See the sidebar "Match Your Strategy to Your Environment.")

The Keystone Advantage

Keystone organizations play a crucial role in business ecosystems. Fundamentally, they aim to improve the overall health of their ecosystems by providing a stable and predictable set of common assets—think of Wal-Mart's procurement system and Microsoft's Windows operating system and tools—that other organizations use to build their own offerings.

Keystones can increase ecosystem productivity by simplifying the complex task of connecting network participants to one another or by making the creation of new products by third parties more efficient. They can enhance ecosystem robustness by consistently incorporating technological innovations and by providing a reliable point of reference that helps participants respond to new and uncertain conditions. And they can encourage ecosystem niche creation by offering innovative technologies to a variety of third-party organizations. The keystone's importance to ecosystem health is such that, in many cases, its removal will lead to the catastrophic collapse of the entire system. For example, WorldCom's failure had negative repercussions for the entire ecosystem of suppliers of telecommunications equipment.

By continually trying to improve the ecosystem as a whole, keystones ensure their own survival and prosperity. They don't promote the health of others for altruistic reasons; they do it because it's a great strategy.

Keystones, in many ways, are in an advantageous position. As in biological ecosystems, keystones exercise a systemwide role despite being only a small part of their ecosystems' mass. Despite Microsoft's pervasive impact, for example, it remains only a small part of the computing ecosystem. Both its revenue and number of employees represent about 0.05% of the total figures for the ecosystem. Its market capitalization represents a larger portion of the ecosystem—typical for a keystone because of its powerful position—but it has never been higher than 0.4%. Even in the much smaller software ecosystem, in which

the company plays an even more crucial role, Microsoft's market cap has typically ranged between 20% and 40% of the combined market cap of software providers. This is a fraction of the more than 80% of total market capitalization of the much larger ecosystem of computer software, components, systems, and services that IBM held during the 1960s.

Broadly speaking, an effective keystone strategy has two parts. The first is to *create value* within the ecosystem. Unless a keystone finds a way of doing this efficiently, it will fail to attract or retain members. The second part, as we have noted, is to *share the value* with other participants in the ecosystem. The keystone that fails to do this will find itself perhaps temporarily enriched but ultimately abandoned.

Keystones can create value for their ecosystems in numerous ways, but the first requirement usually involves the creation of a platform, an asset in the form of services, tools, or technologies that offers solutions to others in the ecosystem. The platform can be a physical asset, like the efficient manufacturing

capabilities that Taiwan Semiconductor Manufacturing offers to those computer-chip design companies that don't have their own silicon-wafer foundries, or an intellectual asset, like the Windows software platform. Keystones leave the vast majority of value creation to others in the ecosystem, but what they do create is crucial to the community's survival.

The second requirement for keystones' success is that they share throughout the ecosystem much of the value they have created, balancing their generosity with the need to keep some of that value for themselves. Achieving this balance may not be as easy as it seems. Keystone organizations must make sure that the value of their platforms, divided by the cost of creating, maintaining, and sharing them, increases rapidly with the number of ecosystem members that use them. This allows keystone players to share the surplus with their communities. During the Internet boom, many businesses failed because, although the theoretical value of a keystone platform was increasing with the number of customers, the operating cost was rising, as well. Many B2B

Match Your Strategy to Your Environment

A company's choice of ecosystem strategy—keystone, physical dominator, or niche—is governed primarily by the kind of company it is or aims to be. But the choice also can be affected by the business context in which it operates: the general level of turbulence and the complexity of its relationships with others in the ecosystem.

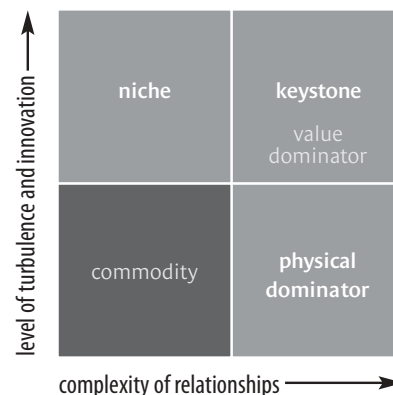
If your business faces rapid and constant change and, by leveraging the assets of other firms, can focus on a narrowly and clearly defined business segment, a niche strategy may be most appropriate. You can develop your own specialized expertise, which will differentiate you from competitors and, because of its simple focus, foster the unique capabilities and expertise you need to weather the turbulence of your environment.

If your business is at the center of a complex network of asset-sharing relationships and operates in a turbulent environment, a keystone strategy may be the most effective. By carefully managing the widely distributed assets your company relies on—in part

by sharing with your business partners the wealth generated by those assets—you can capitalize on the entire ecosystem's ability to generate, because of its diversity, innovative responses to disruptions in the environment.

If your business relies on a complex network of external assets but operates in a mature industry, you may choose a physical dominator strategy. Because the environment is relatively stable and the innovation that comes with diversity isn't a high priority, you can move to directly control the assets your company needs, by acquiring your partners or otherwise taking over their functions. A physical dominator ultimately becomes its own ecosystem, absorbing the complex network of interdependencies that existed between distinct organizations, and is able to extract maximum short-term value from the assets it controls. When it reaches this end point, an ecosystem strategy is no longer relevant.

If, however, your business chooses to extract maximum value from a network of as-



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sets that you don't control—the value dominator strategy—you may end up starving and ultimately destroying the ecosystem of which you are a part. This makes the approach a fundamentally flawed strategy.

If you have a commodity business in a mature and stable environment and operate relatively independently of other organizations, an ecosystem strategy is irrelevant—although that may change sooner than you think.

A firm that takes an action without understanding the impact on the ecosystem as a whole is ignoring the reality of the networked environment in which it operates.

marketplaces, for example, continued to increase revenue despite decreasing and ultimately disappearing margins, which led to the collapse of their business models.

A good example of a keystone company that effectively creates and shares value with its ecosystem is eBay. It creates value in a number of ways. It has developed state-of-the-art tools that increase the productivity of network members and encourage potential members to join the ecosystem. These tools include eBay's Seller's Assistant, which helps new sellers prepare professional-looking online listings, and its Turbo Lister service, which tracks and manages thousands of bulk listings on home computers. The company has also established and maintained performance standards that enhance the stability of the system. Buyers and sellers rate one another, providing rankings that bolster users' confidence in the system. Sellers with consistently good evaluations attain PowerSeller status; those with bad evaluations are excluded from future transactions.

Additionally, eBay shares the value that it creates with members of its ecosystem. It charges users only a moderate fee to coordinate their trading activities. Incentives such as the PowerSeller label reinforce standards for sellers that benefit the entire ecosystem. These performance standards also delegate much of the control of the network to users, diminishing the need for eBay to maintain expensive centralized monitoring and feedback systems. The company can charge commissions that are no higher than 7% of a given transaction—well below the typical 30% to 70% margins most retailers would charge. It is important to stress that eBay does this because it is good business. By sharing the value, it continues to expand its own healthy ecosystem—buyers and sellers now total more than 70 million—and thrive in a sustainable way.

The Dangers of Domination

Keystones exercise the power of their position within an ecosystem in a somewhat indirect manner. But ecosystem dominators wield their clout in a more traditional way, exploiting a critical position to either take over the network or, more insidiously, drain value from it.

The *physical dominator* aims to integrate vertically or horizontally to own and manage a large proportion of a network directly. Once

the dominator becomes solely responsible for most of the value creation and capture, there is little opportunity for a meaningful ecosystem to emerge. Physical dominators, the ultimate aggressors, eventually control much of an ecosystem. But at least they are responsible for creating the value that they capture. During the heyday of mainframes, IBM dominated the computing ecosystem, providing most of the products and services its customers needed. The strategy was effective, allowing IBM to create and extract enormous value for long periods of time. But it failed when IBM encountered the PC ecosystem, which was much more open and distributed, supported by effective keystone strategies put forth by the likes of Microsoft and Apple (and, yes, even IBM itself), and which reached much higher levels of innovation and flexibility.

By contrast, a *value dominator* has little direct control over its ecosystem, occupying in some cases just a single hub. It creates little, if any, value for the ecosystem; a value dominator extracts as much as it can. By sucking from the network most of the value created by other members, it leaves too little to sustain the ecosystem, which ultimately collapses and brings the value dominator down with it.

One need only look to Enron for a sobering example. It is useful to contrast Enron's approach to its ecosystem with eBay's. The two companies faced similarly daunting challenges in the late 1990s: how to use the Internet to form numerous individual markets, in the process generating massive business networks of trading partners of which they would be the hub. Enron started by leveraging its established and unique position in the energy sector, and its aggressive, blue-chip managerial talent, to improve the efficiency of high-value but traditionally fragmented markets. eBay's beginnings were much more humble. It had few assets and focused initially on the narrow collectors' market.

In the years that followed, Enron and eBay moved to create and nourish hundreds of new markets. And this is where their paths drastically diverged. eBay took the keystone route, sharing the wealth it generated and, along the way, creating an enormous and healthy ecosystem of trading partners. Enron became a value dominator, extracting as much value as it could from the new markets it entered by using its strategic position to exploit asymme-

tries in information across the market. The aggressive behavior of Enron's traders impeded the type of trust that eBay was building in its communities.

The results are starkly instructive. The implosion of Enron's ecosystem ultimately led it to conceal in illegal partnerships its resulting market losses. Meanwhile, eBay boasted positive cash flow from the start and ended up generating huge profits. The company that shared the wealth ended up making the money.

Leveraging a Niche

In business ecosystems, most firms follow niche strategies. A niche player aims to develop specialized capabilities that differentiate it from other companies in the network. By leveraging complementary resources from other niche players or from an ecosystem keystone, the niche player can focus all its energies on enhancing its narrow domain of expertise.

When they are allowed to thrive, niche players represent the bulk of the ecosystem and are responsible for most of the value creation and innovation. They typically operate in the shadow of a keystone, which offers its resources to niche players, or a dominator, which works to exploit or displace them.

Because a niche player is naturally dependent on other businesses, it needs to analyze its ecosystem and identify the characteristics of its keystones and dominators, current or potential. Do strong keystones exist? Are there multiple keystones competing to play the same role? How far removed are the dominators?

An example of a niche player is Nvidia, a designer of integrated circuits known as graphics accelerators, which are the foundation for video games and a host of other multimedia applications. Because it has no plants of its own, Nvidia leverages the manufacturing platforms of two keystone companies, Taiwan Semiconductor Manufacturing and IBM. It also leverages their intellectual assets (their component libraries and design tools), not to mention the assets of several other firms, including assembly and testing companies. This complex web of relationships enables Nvidia to avoid the significant costs and risks associated with owning and operating manufacturing, assembly, and test operations. The company can focus its resources on product design, quality assurance, marketing, and customer support. At the same time, its interdependencies mean the company must share the fate of the other participants in the ecosystem. Thus, Nvidia's performance is tied not only to that of Taiwan Semiconductor Manufacturing and IBM but also to that of library providers like Artisan Components and design tool providers like Synopsis.

Despite the best, highly specialized strategies, niche players usually find that they come into conflict with other niche players, keystones, and especially dominators. Innovation—at the core of their strategy of specialization and differentiation—is critical to their success in these battles. Niche players that do not or cannot actively advance and evolve their products toward the edges of the ecosystem may find that the frontier of a keystone's expanding platform will approach the niche they occupy—often forcing the niche player to let its product be incorporated into the platform. Indeed, a keystone's moves to improve an ecosystem's overall health sometimes come at the expense of a niche member, which gets swallowed up by the keystone. Still, differentiation provides a powerful defense, as Intuit has demonstrated by consistently protecting its position in fi-

More Than Strategy

The implications of operating in an interdependent business ecosystem are not felt only in the corner office and at corporate strategy-setting sessions. They ripple through an entire organization and have some of their most immediate and concrete impact at the level of individual products and their design. It is no longer possible to design, or even conceive of, a product in isolation. Products exist in the context of other products. Think of how music players and snowboarding jackets, GPS devices and calendars, cameras and computers have begun to merge functions.

This creates opportunities for innovation and product development. Because (at least in healthy product ecosystems) new products can leverage the capabilities provided by existing products, de-

signers can exploit these capabilities as raw materials for the creation of new functionality.

But the connections that enable such opportunities also pose difficult design challenges. First of all, innovators need to learn to leverage the broad range of external capabilities available in the ecosystem. Additionally, it becomes increasingly important for developers to think of a product not just in terms of something that someone will use but as a platform that other products and services might be able to exploit. Moreover, the designers of almost all products can no longer assume that users care much about the identity or features of their products, only about how they fit in with and enhance the systems of which they are a part.

nancial management software against competitive offerings by Microsoft.

In fact, niche players can sometimes wield surprising power in the face of keystones. For example, the computer industry has witnessed the emergence of loosely coupled technology interfaces through which different computer systems, components, or applications interact with one another without following strict design rules. A good example is extensible markup language (XML). Such interfaces have loosened the bonds that typically tied a niche player to its keystone's platform. This has made it easier for niche players to end a relationship with a keystone that is extracting too much value from a system or whose platform doesn't offer sufficient value. Niche players can use this kind of leverage to keep keystones honest and prevent them from becoming dominators. Intuit, while it continues to leverage Microsoft tools and programming components, has worked consistently to reduce the cost of switching to other platforms, thus obtaining greater control over its own future.

It is also important to remember that even though a niche player may have relatively little leverage in comparison to a keystone, there are typically hundreds if not thousands of niche players that will move away from a keystone if its behavior begins to stray into domination.

Roles in an ecosystem aren't static. A company may be a keystone in one domain and a dominator or a niche player in others. And niche players may eventually become the keystones for their own new ecosystems. For instance, Nvidia created a powerful graphics programming platform, which has spawned additional communities of graphics application developers.

Business Ecology


The ecosystem-based perspective we have described has a number of broad implications for managers. One is the central importance of interdependency in business: A company's performance is increasingly dependent on the firm influencing assets outside its direct control. This has wide-ranging implications for strategy, operations, and even policy and product design.

Related to this is the importance of integra-

tion. Because a company operating in today's networked setting can use resources that exist outside of its own organization, integration now represents a critical form of innovation. This fundamentally changes the capabilities needed and the structure of corporate functions in areas including business operations, R&D, strategy, and product architecture. (See the sidebar "More Than Strategy.")

The broad scattering of innovation across a healthy ecosystem and the diversity of organizations in it also change the nature of technological evolution. Rather than involving individual companies that are engaged in technology races, battles in the future will be waged between ecosystems or between ecosystem domains. Increasingly, the issue won't be simply "Microsoft versus IBM," but rather the overall health of the ecosystems that each fosters and depends on.

Finally, a firm that takes an action without understanding the impact on its many neighboring business domains, or on the ecosystem as a whole, is ignoring the reality of the networked environment in which it operates. Think again of the Internet boom. When AOL and Yahoo struck aggressive deals with their dot-com partners in those optimistic years, they financially weakened those companies. Their actions may have temporarily bolstered their individual performance and masked the inherent troubles of weaker Internet firms, but the collective effect on the system was destabilizing and ultimately catastrophic. Contrast this with Wal-Mart's partners, which, despite the retailer's tough demands, continue for the most part to thrive financially.

No one would argue that AOL or Yahoo was unaware of the fact that they were embedded in a network of interdependent firms. Both explicitly viewed themselves as hubs in these networks. But without a framework for assessing network health, they proceeded with strategies that optimized short-term financial gains while undermining critical domains in their ecosystems—strategies from which they still are struggling to recover. 

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