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Eight **business technology trends** to watch

Eight emerging trends are transforming many markets and businesses.
Executives should learn to shape the outcome rather than just react to it.

James M. Manyika, Roger P. Roberts, and Kara L. Sprague

Article at a glance

A number of new and emerging technologies, many aimed at enhancing the way the Internet is used, promise to change how companies innovate, managers make decisions, and businesses lower costs, tap talent, or realize new business opportunities.

Although technology always promises benefits, actually gaining them requires a good understanding of its real business implications and of the concomitant managerial changes.

Over the next decade, eight technology-enabled business trends will really matter. Smart managers should start doing their homework now.

Technology alone is rarely the key to unlocking economic value: companies create real wealth when they combine technology with new ways of doing business. Through our work and research, we have identified eight technology-enabled trends that will help shape businesses and the economy in coming years. These trends fall within three broad areas of business activity: managing relationships, managing capital and assets, and leveraging information in new ways.

Managing relationships

1. Distributing cocreation

The Internet and related technologies give companies radical new ways to harvest the talents of innovators working outside corporate boundaries. Today, in the high-technology, consumer product, and automotive sectors, among others, companies routinely involve customers, suppliers, small specialist businesses, and independent contractors in the creation of new products. Outsiders offer insights that help shape product development, but companies typically control the innovation process. Technology now allows companies to delegate substantial control to outsiders—cocreation—in essence by outsourcing innovation to business partners that work together in networks. By distributing innovation through the value chain, companies may reduce their costs and usher new products to market faster by eliminating the bottlenecks that come with total control.

Information goods such as software and editorial content are ripe for this kind of decentralized innovation; the Linux operating system, for example, was developed over the Internet by a network of specialists. But companies can also create physical goods in this way. Loncin, a leading Chinese motorcycle manufacturer, sets broad specifications for products and then lets its suppliers work with one another to design the components, make sure everything fits together, and reduce costs. In the past, Loncin didn't make extensive use of information technology to manage the supplier community—an approach reflecting business realities in China and in this specific industrial market. But recent advances in open-standards-based computing (for example, computer-aided-design programs that work well with other kinds of software) are making it easier to cocreate physical goods for more complex value chains in competitive markets.

If this approach to innovation becomes broadly accepted, the impact on companies and industries could be substantial. We estimate, for instance, that in the US economy alone roughly 12 percent of all labor activity could be transformed by more distributed and networked forms of innovation—from reducing the amount of legal and administrative activity that intellectual property involves to restructuring or eliminating some traditional R&D work.

Companies pursuing this trend will have less control over innovation and the

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intellectual property that goes with it, however. They will also have to compete for the attention and time of the best and most capable contributors.

Further reading:
Yochai Benkler, *The Wealth of Networks: How Social Production Transforms Markets and Freedom*, New Haven, CT: Yale University Press, 2006.
Henry Chesbrough, *Open Innovation: The New Imperative for Creating and Profiting from Technology*, Boston: Harvard Business School Press, 2003.
James Surowiecki, *The Wisdom of Crowds: Why the Many Are Smarter than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations*, New York: Doubleday, 2004.
Eric von Hippel, *Democratizing Innovation*, Cambridge, MA: MIT Press, 2005.

2. Using consumers as innovators

Consumers also cocreate with companies; the online encyclopedia Wikipedia, for instance, could be viewed as a service or product created by its distributed customers. But the differences between the way companies cocreate with partners, on the one hand, and with customers, on the other, are so marked that the consumer side is really a separate trend. These differences include the nature and range of the interactions, the economics of making them work, and the management challenges associated with them.

As the Internet has evolved—an evolution prompted in part by new Web 2.0 technologies—it has become a more widespread platform for interaction, communication, and activism. Consumers increasingly want to engage online with one another and with organizations of all kinds. Companies can tap this new mood of customer engagement for their economic benefit.

OhmyNews, for instance, is a popular South Korean online newspaper written by upwards of 60,000 contributing "citizen reporters." It has quickly become one of South Korea's most influential media outlets, with around 700,000 site visits a day. Another company that goes out of its way to engage customers, the online clothing store Threadless, asks people to submit new designs for T-shirts. Each week, hundreds of participants propose ideas and the community at large votes for its favorites. The top four to six designs are printed on shirts and sold in the store; the winners receive a combination of cash prizes and store credit. In September 2007 Threadless opened its first physical retail operation, in Chicago.

Companies that involve customers in design, testing, marketing (such as viral marketing), and the after-sales process get better insights into customer needs and behavior and may be able to cut the cost of acquiring customers, engender greater loyalty, and speed up development cycles. But a company open to allowing customers to help it innovate must ensure that it isn't unduly influenced by

information gleaned from a vocal minority. It must also be wary of focusing on the immediate rather than longer-range needs of customers and be careful to avoid raising and then failing to meet their expectations.

Further reading:
C. K. Prahalad and Venkat Ramaswamy, *The Future of Competition: Co-Creating Unique Value with Customers*, Boston: Harvard Business School Press, 2004.
Don Tapscott and Anthony D. Williams, *Wikinomics: How Mass Collaboration Changes Everything*, New York: Portfolio Hardcover, 2006.

3. Tapping into a world of talent

As more and more sophisticated work takes place interactively online and new collaboration and communications tools emerge, companies can outsource increasingly specialized aspects of their work and still maintain organizational coherence. Much as technology permits them to decentralize innovation through networks or customers, it also allows them to parcel out more work to specialists, free agents, and talent networks.

Top talent for a range of activities—from finance to marketing and IT to operations—can be found anywhere. The best person for a task may be a free agent in India or an employee of a small company in Italy rather than someone who works for a global business services provider. Software and Internet technologies are making it easier and less costly for companies to integrate and manage the work of an expanding number of outsiders, and this development opens up many contracting options for managers of corporate functions.

The implications of shifting more work to freelancers are interesting. For one thing, new talent-deployment models could emerge. TopCoder, a company that has created a network of software developers, may represent one such model. TopCoder gives organizations that want to have software developed for them access to its talent pool. Customers explain the kind of software they want and offer prizes to the developers who do the best job creating it—an approach that costs less than employing experienced engineers. Furthermore, changes in the nature of labor relationships could lead to new pricing models that would shift payment schemes from time and materials to compensation for results.

This trend should gather steam in sectors such as software, health care delivery, professional services, and real estate, where companies can easily segment work into discrete tasks for independent contractors and then reaggregate it. As companies move in this direction, they will need to understand the value of their human capital more fully and manage different classes of contributors accordingly. They will also have to build capabilities to engage talent globally or contract with talent

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aggregators that specialize in providing such services. Competitive advantage will shift to companies that can master the art of breaking down and recomposing tasks.

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Richard Florida, *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community, and Everyday Life*, New York: Basic Books, 2004. Daniel H. Pink, *Free Agent Nation: How America's New Independent Workers Are Transforming the Way We Live*, New York: Warner Books, 2001.

4. Extracting more value from interactions

Companies have been automating or offshoring an increasing proportion of their production and manufacturing (transformational) activities and their clerical or simple rule-based (transactional) activities. As a result, a growing proportion of the labor force in developed economies engages primarily in work that involves negotiations and conversations, knowledge, judgment, and ad hoc collaboration—tacit interactions, as we call them. By 2015 we expect employment in jobs primarily involving such interactions to account for about 44 percent of total US employment, up from 40 percent today. Europe and Japan will experience similar changes in the composition of their workforces.

The application of technology has reduced differences among the productivity of transformational and transactional employees, but huge inconsistencies persist in the productivity of high-value tacit ones. Improving it is more about increasing their effectiveness—for instance, by focusing them on interactions that create value and ensuring that they have the right information and context—than about efficiency. Technology tools that promote tacit interactions, such as wikis, virtual team environments, and videoconferencing, may become no less ubiquitous than computers are now. As companies learn to use these tools, they will develop managerial innovations—smarter and faster ways for individuals and teams to create value through interactions—that will be difficult for their rivals to replicate. Companies in sectors such as health care and banking are already moving down this road.

As companies improve the productivity of these workers, it will be necessary to couple investments in technologies with the right combination of incentives and organizational values to drive their adoption and use by employees. There is still substantial room for automating transactional activities, and the payoff can typically be realized much more quickly and measured much more clearly than the payoff from investments to make tacit work more effective. Creating the business case for investing in interactions will be challenging—but critical—for managers.

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Bradford C. Johnson, James M. Manyika, and Lareina A. Yee, "The next

revolution in interactions," mckinseyquarterly.com, November 2005.
Scott C. Beardsley, Bradford C. Johnson, and James M. Manyika, "Competitive advantage from better interactions," mckinseyquarterly.com, May 2006.
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Managing capital and assets

5. Expanding the frontiers of automation

Companies, governments, and other organizations have put in place systems to automate tasks and processes: forecasting and supply chain technologies; systems for enterprise resource planning, customer relationship management, and HR; product and customer databases; and Web sites. Now these systems are becoming interconnected through common standards for exchanging data and representing business processes in bits and bytes. What's more, this information can be combined in new ways to automate an increasing array of broader activities, from inventory management to customer service.

During the late 1990s FedEx and UPS linked data flowing through their internal tracking systems to the Internet—no trivial task at the time—to let customers track packages from their Web sites, with no human intervention required on the part of either company. By leveraging and linking systems to automate processes for answering inquiries from customers, both dramatically reduced the cost of serving them while increasing their satisfaction and loyalty. More recently, Carrefour, Metro, Wal-Mart Stores, and other large retailers have adopted (and asked suppliers to adopt) digital-tagging technologies, such as radio frequency identification (RFID), and integrated them with other supply chain systems in order to automate the supply chain and inventory management further. The rate of adoption to date disappoints the advocates of these technologies, but as the price of digital tags falls they could very well reduce the costs of managing distribution and increase revenues by helping companies to manage supply more effectively.

Companies still have substantial headroom to automate many repetitive tasks that aren't yet mediated by computers—particularly in sectors and regions where IT marches at a slower pace—and to interlink "islands of automation" and so give managers and customers the ability to do new things. Automation is a good investment if it not only lowers costs but also helps users to get what they want more quickly and easily, though it may not be a good idea if it gives them unpleasant experiences. The trick is to strike the right balance between raising margins and making customers happy.

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John Hagel III, *Out of the Box: Strategies for Achieving Profits Today and Growth Tomorrow through Web Services*, Boston: Harvard Business School Press, 2002.
Claus Heinrich, *RFID and Beyond: Growing Your Business with Real World Awareness*, Indianapolis, IN: Wiley Publishing, 2005.
Jeanne W. Ross, Peter Weill, and David C. Robertson, *Enterprise Architecture as Strategy: Creating a Foundation for Business Execution*, Boston: Harvard Business School Press, 2006.

6. Unbundling production from delivery

Technology helps companies to utilize fixed assets more efficiently by disaggregating monolithic systems into reusable components, measuring and metering the use of each, and billing for that use in ever-smaller increments cost effectively. Information and communications technologies handle the tracking and metering critical to the new models and make it possible to have effective allocation and capacity-planning systems.

Amazon.com, for example, has expanded its business model to let other retailers use its logistics and distribution services. It also gives independent software developers opportunities to buy processing power on its IT infrastructure so that they don't have to buy their own. Mobile virtual-network operators, another example of this trend, provide wireless services without investing in a network infrastructure. At the most basic level of unbundled production, 80 percent of all companies responding to a recent survey on Web trends say they are investing in Web services and related technologies. Although the applications vary, many are using these technologies to offer other companies—suppliers, customers, and other ecosystem participants—access to parts of their IT architectures through standard protocols.[1]

Unbundling works in the physical world too. Today you can buy fractional time on a jet, in a high-end sports car, or even for designer handbags. Unbundling is attractive from the supply side because it lets asset-intensive businesses—factories, warehouses, truck fleets, office buildings, data centers, networks, and so on—raise their utilization rates and therefore their returns on invested capital. On the demand side, unbundling offers access to resources and assets that might otherwise require a large fixed investment or significant scale to achieve competitive marginal costs. For companies and entrepreneurs seeking capacity (or variable additional capacity), unbundling makes it possible to gain access to assets quickly, to scale up businesses yet keep their balance sheets asset light, and to use attractive consumption and contracting models that are easier on their income statements.

Companies that make their assets available for internal and external use will need to manage conflicts if demand exceeds supply. A competitive advantage through scale

may be hard to maintain when many players, large and small, have equal access to resources at low marginal costs.

Further reading:
Robert D. Hof, "Jeff Bezos' risky bet ," *BusinessWeek*, November 13, 2006.

Leveraging information in new ways

7. Putting more science into management

Just as the Internet and productivity tools extend the reach of and provide leverage to desk-based workers, technology is helping managers exploit ever-greater amounts of data to make smarter decisions and develop the insights that create competitive advantages and new business models. From "ideagoras" (eBay-like marketplaces for ideas) to predictive markets to performance-management approaches, ubiquitous standards-based technologies promote aggregation, processing, and decision making based on the use of growing pools of rich data.

Leading players are exploiting this information explosion with a diverse set of management techniques. Google fosters innovation through an internal market: employees submit ideas, and other employees decide if an idea is worth pursuing or if they would be willing to work on it full-time. Intel integrates a "prediction market" with regular short-term forecasting processes to build more accurate and less volatile estimates of demand. The cement manufacturer Cemex optimizes loads and routes by combining complex analytics with a wireless tracking and communications network for its trucks.

The amount of information and a manager's ability to use it have increased explosively not only for internal processes but also for the engagement of customers. The more a company knows about them, the better able it is to create offerings they want, to target them with messages that get a response, and to extract the value that an offering gives them. The holy grail of deep customer insight—more granular segmentation, low-cost experimentation, and mass customization—becomes increasingly accessible through technological innovations in data collection and processing and in manufacturing.

Examples are emerging across a wide range of industries. Amazon.com stands at the forefront of advanced customer segmentation. Its recommendation engine correlates the purchase histories of each individual customer with those of others who made similar purchases to come up with suggestions for things that he or she might buy. Although the jury is still out on the true value of recommendation engines, the techniques seem to be paying off: CleverSet, a pure-play recommendation-engine provider, claims that the 75 online retailers using the engine are averaging a 22 percent increase in revenue per visitor.[2] Meanwhile, toll road operators are beginning to segment drivers and charge them differential prices based

on static conditions (such as time of day) and dynamic ones (traffic). Technology is also dramatically bringing down the costs of experimentation and giving creative leaders opportunities to think like scientists by constructing and analyzing alternatives. The financial-services concern Capital One conducts hundreds of experiments daily to determine the appropriate mix of products it should direct to specific customer profiles. Similarly, Harrah's casinos mine customer data to target promotions and drive exemplary customer service.

Given the vast resources going into storing and processing information today, it's hard to believe that we are only at an early stage in this trend. Yet we are. The quality and quantity of information available to any business will continue to grow explosively as the costs of monitoring and managing processes fall.

Leaders should get out ahead of this trend to ensure that information makes organizations more rather than less effective. Information is often power; broadening access and increasing transparency will inevitably influence organizational politics and power structures. Environments that celebrate making choices on a factual basis must beware of analysis paralysis.

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Thomas H. Davenport and Jeanne G. Harris, *Competing on Analytics: The New Science of Winning*, Boston: Harvard Business School Press, 2007.
John Riedl and Joseph Konstan with Eric Vrooman, *Word of Mouse: The Marketing Power of Collaborative Filtering*, New York: Warner Books, 2002.
Stefan H. Thomke, *Experimentation Matters: Unlocking the Potential of New Technologies for Innovation*, Boston: Harvard Business School Press, 2003.
David Weinberger, *Everything Is Miscellaneous: The Power of the New Digital Disorder*, New York: Times Books, 2007.

8. Making businesses from information
Accumulated pools of data captured in a number of systems within large organizations or pulled together from many points of origin on the Web are the raw material for new information-based business opportunities.

Frequent contributors to what economists call market imperfections include information asymmetries and the frequent inability of decision makers to get all the relevant data about new market opportunities, potential acquisitions, pricing differences among suppliers, and other business situations. These imperfections often allow middlemen and players with more and better information to extract higher rents by aggregating and creating businesses around it. The Internet has brought greater transparency to many markets, from airline tickets to stocks, but many other sectors need similar illumination. Real estate is one of them. In a sector where agencies have thrived by keeping buyers and sellers partly in the dark, new

sites have popped up to shine "a light up into the dark reaches of the supply curve," as Rich Barton, the founder of Zillow (a portal for real-estate information), puts it. Barton, the former leader of the e-travel site Expedia, has been down this road before.

Moreover, the aggregation of data through the digitization of processes and activities may create by-products, or "exhaust data," that companies can exploit for profit. A retailer with digital cameras to prevent shoplifting, for example, could also analyze the shopping patterns and traffic flows of customers through its stores and use these insights to improve its layout or the placement of promotional displays. It might also sell the data to its vendors so that they could use real observations of consumer behavior to reshape their merchandising approaches.

Another kind of information business plays a pure aggregation and visualization role, scouring the Web to assemble data on particular topics. Many business-to-consumer shopping sites and business-to-business product directories operate in this fashion. But that sword can cut both ways; today's aggregators, for instance, may themselves be aggregated tomorrow. Companies relying on information-based market imperfections need to assess the impact of the new transparency levels that are continually opening up in today's information economy.

Further reading:
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Carl Shapiro and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy*, Boston: Harvard Business School Press, 1999.

About the Authors
James Manyika is a director and **Kara Sprague** is a consultant in McKinsey's San Francisco office; **Roger Roberts** is a principal in the Silicon Valley office.

Conclusion

Creative leaders can use a broad spectrum of new, technology-enabled options to craft their strategies. These trends are best seen as emerging patterns that can be applied in a wide variety of businesses. Executives should reflect on which patterns may start to reshape their markets and industries next—and on whether they have opportunities to catalyze change and shape the outcome rather than merely react to it. Q

Notes

[1] "How businesses are using Web 2.0: A McKinsey Global Survey," mckinseyquarterly.com, March 2007.

[2] Erick Schonfeld, "Click here for the upsell," *Business 2.0*, July 11, 2007.

Related Articles on mckinseyquarterly.com

"How businesses are using Web 2.0: A McKinsey Global Survey"

"How companies are marketing online: A McKinsey Global Survey"

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