



- *The second generation of the commercial Internet is about much more than social networking for teenagers—and it represents both a threat and an opportunity for incumbents*
- *Web 2.0 principles enable innovative and cost-effective new ways to manage both operations and customer relationships*
- *Web 2.0 thinking can empower disruptive business models with the potential to redefine the strategic landscape of entire industries*
- *The advantage rests with incumbents, so long as they swiftly take advantage of the opportunities Web 2.0 presents*

The Python in the Garden

This article is the second of two Perspectives on the implications of Web 2.0. The first, “The Kindness of Strangers,” was published in October 2006.

To the mainstream businessperson of 1997, Web 1.0 was a curiosity. Cute and conceptual, it presented no serious threat to industrial-strength, COBOL-speaking “adult technology.” But after a ten-year progression through curiosity, denial, euphoria, and betrayal, the business community has embraced the Web as a platform for marketing, supply chain management, and internal coordination. Directly or indirectly, Internet Protocol (IP) connectivity has become the principal force-multiplier for organization redesign, process optimization, customer relationship management, and global outsourcing—essentially the managerial agenda of the past decade. And it has contributed to an astonishing 1 percent acceleration in the long-run productivity growth of the U.S. economy.

Now, a decade later, *Web 2.0* is all the rage. Its most ballyhooed exemplars are again cute and conceptual: T-shirt purveyors and teen communities. Will the cycle repeat? Is this the thin end of another large wedge? Or is Web 2.0 merely *flake.com* in a colorful new box?

There is hype, of course: *HAMSTERster.com* (social networking for your furry friends) may enjoy a life span no longer than that of its protagonists. But Web 2.0 embodies a set of core principles that extend beyond cute start-ups—and indeed beyond the Web itself. By enabling new methods of production, consumption, collaboration, and experimentation, they could shift sources of local and global competitive advantage.

The Core Principles

As argued in the first article in this series, two principles define Web 2.0. First, *loose modularity*, which describes an architecture of small tasks “loosely joined”—for example, the “mash-up” in which one Web site relies on data (typically supplied free of charge by others) to create rich hybrid offerings at minimal cost. And second, *the empowerment of the periphery*

through a *trusting community* that shares some intellectual property and within which reputation serves as a motivator and basis of trust.

These two principles can operate separately or—more powerfully—together. In particular, they make possible the distributed production of “information goods” through the cheap recombination of prior contributions. Users can become producers and are often motivated to give back to the community from which they draw. Economic and noneconomic motivations are intermingled. Collaboration happens with little formal coordination. Initiative originates at the edge of the network. Markets and nonmarket communities substitute for traditional, hierarchical organizations.

These principles are not new: they were envisioned by the creators of the Web, and many spectacular applications (such as eBay or Linux) antedate the term *Web 2.0* by some years. What is so recent is their manifest *scalability*, made possible by technology. As bandwidth, memory, and processing power become cheaper and more ubiquitous, the growth of symmetrical, peer-to-peer infrastructure enables symmetrical, peer-to-peer collaboration. Worldwide.

More than 220 million members of eBay trading in excess of \$50 billion per year—a higher gross merchandise volume than that of Lowe’s. One thousand people writing the 30 million lines of Linux code, competing with Microsoft’s \$10 billion investment in Windows Vista. Seventy-five million teens creating and consuming MySpace, which now commands more of their collective attention than television. Nearly 5 million “avatars”—alter egos created by members to represent themselves—building the metaverse of Second Life, a virtual world whose commercial construction would cost more than Hollywood’s most ambitious movie. One hundred thousand writing the 5 million pages of Wikipedia, which rivals *Encyclopædia Britannica* in a blind test of quality. The point is not that Lowe’s or Microsoft or *Britannica* is thereby rendered obsolete, or that the phenomenon is universal, but rather that there is something new and very vigorous in the gene pool.

Supply Chain 2.0

This gene isn’t only for the pining and pubescent. Consider Toyota. Toyota and its many suppliers manage their collaborative relationship on the basis of long-

term, open-ended, and largely implicit contracts. Learning about process improvement is treated as common “intellectual capital,” to be shared among peers across the supply chain. Reputation in the eyes of the entire supply chain underlies the social capital not just of companies but of individual engineers and teams. In other words, *trusting community*. And work is broken into small, tight, and very precise cycles of hypothesize-test-measure, conducted in parallel by independent teams; results are posted in a terse, standardized format and broadcast to all so that others can build on them. *Loose modularity*.

This is Web 2.0 in every regard except that the Web has nothing to do with it. The Toyota supply chain relies on technology for one thing only: cheap, universal peer-to-peer connectivity. Until very recently that meant distributing paper reports and using paggers.

Of course, there is a lot more to Toyota’s production culture than its formal similarities to Web 2.0. The cross-corporate norms, discipline, and shared tacit knowledge took decades to build, limiting both its scalability and its replicability by others. But Toyota stands as proof that with a minimum of cheap, pervasive connectivity, Web 2.0 practices can be applied, even without fancy technology.¹ Add technology, and an entirely new vista opens up in which organizations interact through a combination of Web 2.0 principles (mash-ups and community), Toyota-like work norms, open-ended alliances, and cross-enterprise collaboration technologies such as Web services and .NET. *Supply Chain 2.0*.

Enterprise 2.0

Or consider the domain of internal corporate organization. How many tasks can be rethought as the sum of small, loosely joined contributions? How much effort can be motivated and shaped by the collective approbation of a corporate community, even risking some dilution of accountability? How far can reputation be substituted for reciprocity as the primary basis of trust? Where can a community of individuals pooling problems and solutions outperform a handful of executives controlling priorities and resources?

Not everywhere, obviously: hierarchy has its purposes. But quite extensively, especially when organizations are

1. For more on Toyota’s approach, see Philip Evans and Bob Wolf, “Collaboration Rules,” *Harvard Business Review*, July-August 2005.

globally scattered, yet the need for coordination is great. New technologies exploit flexible social tagging, rather than restrictive centrally managed topic hierarchies, to organize knowledge management systems. Companies such as Dresdner Kleinwort are finding that best practices are better formalized in a continuously evolving wiki than in a corporate manual and that blogs beat memos as soapboxes for airing policy choices. Blogs for debating *ends*, wikis for fine-tuning *means*. IBM now has more than 4,000 global executives and engineers collaborating as avatars on private virtual islands within Second Life; virtual presence is hardly a substitute for face-to-face, but studies by psychologists at Stanford show that in immersive virtual environments, people exchange many of the subtle physical cues that distinguish the real world from phone conversations and videoconferences. And the technology is in its infancy. Its applications are still largely experimental, but Harvard's Andrew McAfee has coined the inevitable phrase *Enterprise 2.0*.

Mobile 2.0

Or consider the structure of an entire industry. It is widely recognized that the handset is becoming the most personal and pervasive platform for computing, communication, and entertainment. But unlike the computer industry's open and largely interoperable architecture of hardware, software, and services, cellular telephony is highly integrated: handsets are often sold by carriers locked to work on a single network; software applications are device specific; functionality, bookmarks, and content services are largely preset. By keeping their customers within what is often called a "walled garden," carriers, particularly in the United States, hope to protect their revenue streams. The relatively slow pace of industry innovation is a direct consequence.

Attackers are applying Web 2.0 principles. Skype is a simple peer-to-peer protocol: small pieces of code, loosely joined. Its 300 million users can make free global phone calls over the Internet. Skype and other IP voice applications are natural platforms for preexisting online communities such as eBay (which acquired Skype). In one hop, Skype jumps the garden wall.

Then there is Fon, a peer-to-peer global Wi-Fi network of 120,000 personal wireless access points. Fon is both a community (in which people share) and a market (in which people buy and sell access). More significantly,

Google, EarthLink, and many municipalities worldwide are investing in free community Wi-Fi networks; and iPass and Boingo are creating global, paying Wi-Fi networks. Combining Skype with Wi-Fi (and a Bluetooth earpiece), consumers can bypass the cell carrier entirely and get mobile voice from a laptop.

This cries out, of course, for a Skype- and Wi-Fi-enabled mobile handset. Most carriers refuse to sell or support such a device. (A British carrier by the name of 3 is an exception.) Nokia makes a Wi-Fi-enabled series (S60), some models of which use a version of the Python open programming language. This language makes the handset easily scriptable by the user or by third parties sharing (or selling) solutions. It enables a global community of user-developers to build on an open, scriptable platform—the antithesis of the walled-garden approach. Even more radically, First International Computer (FIC) in Taiwan started shipping the Neo1973—an entirely open-source Linux-based handset that is hackable right down to the physical layer—in the first quarter of 2007.

Caller communities, Wi-Fi communities, and hacker communities interoperating by means of an architecture of modular layers, loosely joined. Reducing a trillion-dollar industry to—well—just another IP application. *Mobile 2.0*.

Will some combination of these 2.0 technologies work? Not in my backyard. But in Asia, 80 percent of the handsets *today* are unlocked and sold independently of a carrier. India is already a larger cell-phone market than the United States, and growing by 6 million devices a month. Some of the world's best programmers are there, together with hundreds of millions of price-sensitive customers. In China, dozens of entrepreneurial hardware companies are trying to break out of private-label assembly. The Japanese are fabled early adopters.

Thus Mobile 2.0, if and when it happens, will surely happen in Asia. The cellular Silicon Valleys will not be in California, Massachusetts, or New Jersey but in Bangalore and Guangzhou. By the time the world realizes what has happened, the Bangalores and Guangzhous will be exporting their polished technologies back to the so-called advanced markets. When innovation is banished to warmer climes, it tends eventually to return—tanned, rested, and ready.

These are but sketches illustrating how the principles of Web 2.0 are broader than the specific dot-coms

that bear the label. Web 2.0 can redefine a supply chain, an enterprise, or even a whole industry. The story of Mobile 2.0 could be the story of television, of advertising, or of health care information: a really good case can be made for each. And if not now, wait five years, when the technology will be ten times faster, cheaper, and more ubiquitous.

Loose modularity is a conscious, strategic choice, very different from the tightly nested hierarchy of tasks and roles that defines conventional business; *trusting community* is also a strategic choice, very different from the power relations that define traditional organizations, supply chains, and marketing relationships.

After a decade of corporate rationalization and cost cutting, these principles offer a path—at last—to the organic growth and innovation that have eluded most incumbents. Like the fruit of the tree of knowledge in another, more poetic, walled garden, it is there for the

taking. If incumbents fail to pluck it, newer and nimbler players will. The ecology that is more innovative will become the ecology that is more competitive, and Web 2.0 will move from opportunity to threat. Technologies that today look cute, tomorrow will prove lethal. There is a python in the garden.

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