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On the Edge

Think the Internet has nothing new to offer? Think again.

By Kishore S. Swaminathan

The Duke of Wellington is renowned not only for defeating Napoleon at Waterloo. The Iron Duke also observed famously, if shortsightedly, that railroads would "only encourage common people to move about needlessly."

What Wellington did not realize was that the railroads would play a critical role in the industrial age by creating a transportation network that allowed goods to be produced in one place and used in another, often a great distance away. What we would today call the disaggregation of supply and demand led to the standardization of parts and tools, which, in turn, led to economies of scale for suppliers and sourcing flexibility for buyers. Many an erstwhile commoner did indeed move about, but purposefully, to build warehouses and factories, negotiate deals, develop new settlements and build a new economy.

Just as the railroads had a transformational impact on manufacturing, the Internet is poised to have a transformational impact on information technology. And just as the Duke of Wellington missed the point of railroads, much of the IT community, including many CIOs, may be missing the larger point of the Internet.

Virtual hardware

You say you've heard it all before? It's certainly true that songs of praise for the Internet are tired tunes to the ears of most technologists and business executives.

And there is no shortage of pundits who have declared that the latest web phenomena—blogs and wikis—are democratizing social expression at a scale hitherto unseen. Indeed, the explosion of YouTube and MySpace is nothing short of astonishing.

So what's left? A great deal, actually, that CIOs and their C-suite colleagues should care about.

IT hardware, for example, is becoming increasingly virtualized, making it possible to buy infrastructure capabilities—computing cycles, overlay networks and backup storage—from any number of vendors to create a completely virtual, on-demand infrastructure.

As this trend matures, it will make less and less sense for corporations not to take advantage of commodity services from third-party vendors that can, through economies of scale, provide those services more cheaply and reliably than the companies' own IT shops. In fact, Google is betting on this trend and building a highly scalable grid computing infrastructure that promises unprecedented performance, reliability and price.

Meanwhile, the enterprise software packages that are the lifeblood of many corporations' IT systems are evolving toward the same end. These products are now delivered electronically to the machines that use them rather than by truck to the mailroom, where they have to be unpacked, installed, configured and maintained.

Hosted software, also known as Software as a Service, or SaaS, is already a reality for small and medium-size corporations, as evidenced by the astronomical growth of businesses like Salesforce.com, Employease and NetSuite. And big players like SAP are close behind with their own hosted applications and services. A natural outgrowth of this trend would be for SaaS vendors, in turn, to augment their software services with human-supported processes and vice versa, blurring the line between the SaaS and business process outsourcing markets.

Framework for integration

As the choice for infrastructure and software providers multiplies, the question of integration becomes crucial: Can companies integrate and interoperate existing applications with hosted applications from multiple vendors?

Fortunately, this question is being answered today through a number of related technical advances. The overall framework for integration is provided by service-oriented architecture, an IT design technique based on web services, which is an industrywide standard for software interoperability.

By separating business processes from software components (*services*), SOA hopes to achieve both *business agility*—the ability to make business process changes quickly without the need to rebuild software systems—and *sourcing flexibility*—the ability to execute business processes from standardized services that may be sourced from multiple providers. Companies such as Workday (started by the original founder of PeopleSoft) are indicative of this IT trend: SOA-based, hosted, enterprise-class software with interoperability at its core. (For a related article, see "SOA: Tailwind for IT investments," *Outlook*, May 2007.)

From Moore's Law to Metcalfe's Law

Moore's Law—the prophetic prediction by Intel's Gordon Moore that computer chips would double in power every 18 months—has long served the IT community as the symbolic proxy for advances in IT.* But the Internet argues for a different mechanism for assessing the power of IT—by focusing on the power of the network rather than the power of the processor.

The fundamental insight behind the power of networks—first formulated by Robert Metcalfe circa 1980 and now known as Metcalfe's Law—is that when an interacting network of capabilities is sufficiently large, their combinatorial power will grow faster than the power of the individual components. Although the early railroads needed the steam engine to power them, the connectivity of the railroad network, rather than the speed of the steam engine, became the defining characteristic of the industrial age. In the future, Metcalfe's Law, rather than Moore's Law, may be a better harbinger of IT advances to come.

* Moore originally predicted that integrated circuit manufacturers would be able to double the performance of computers every 12 months. He later revised the time frame to 24 months to account for the increasing complexity of chips, although the popular expression of Moore's Law is currently 18 months.

A parallel set of advances, grouped under the Web 2.0 moniker, is leading to standardization and large-scale adoption of interoperable software components at a much more granular level. For example, Keyhole Markup Language, iCalendar and Shareable Content Object Reference Model are emerging as standards for describing and accessing geo-spatial, calendaring and e-learning components, respectively. In combination with two other Web 2.0 technologies—mashups and rich Internet applications—it's now possible to create sophisticated applications from standard third-party components. (For a related article, see "Rich Internet applications: Enabling the next-generation web," *Outlook*, September 2006.)

For example, using these technologies, a home-appliance retailer can easily build a self-help website that shows its customers how to fix a malfunctioning appliance (or, failing that, it can direct them to the nearest repair facility, help them schedule an appointment online and provide driving directions and traffic information). This all can be built today using third-party components at a fraction of the cost of doing it the traditional way: custom development.

Much as railroads led to the standardization of parts and tools and, thus, the flexible assembly of a wide range of products, the Internet is now leading to the flexible assembly of a wide range of business capabilities from standardized software components.

This means that CIOs must craft an IT strategy that seamlessly combines a range of proprietary and outsourced capabilities: custom applications for unique and highly differentiated business capabilities; customized off-the-shelf applications for not-so-unique capabilities; and completely outsourced applications for commodity capabilities.

By doing so, they can focus their attention and resources on what's unique and differentiating for their companies, foster innovation and aim for high performance.

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