A woman with a white face and brown hair, wearing a blue and white checkered blazer over a blue top and a purple skirt with white polka dots, is shown from the waist up. She is holding a large bunch of glowing yellow lightbulbs in her right hand, and her left hand is raised towards two more glowing lightbulbs that are floating away from her. The background is a dark, textured surface.

A combination of high tech, soft touch, and loose coupling will enhance both productivity and business innovation

EXECUTIVE SUMMARY

The next productivity improvements will require a different kind of IT platform, one that integrates more flexible computing power with software tools to help people connect and innovate. Business processes will be organized loosely across process networks rather than tightly coupled within enterprise boundaries.



The

Innovation /

Productivity

Quotient

By John Hagel III and John Seely Brown

By now it's commonplace to observe that information technology alone can't generate productivity benefits. Countless research projects have documented that IT investment must be combined with business innovation to yield significant productivity improvement. That's fine as far as it goes. But these analyses aren't particularly helpful in telling us what is required to drive business innovation and specifically how IT investment can spur this innovation.

It's time to shift the debate and analysis. Instead of asking how IT improves productivity, we should ask how IT can enhance business innovation. That's the missing step to achieving higher levels of productivity. Without it, we're limited to applying IT to achieve narrow cost-reduction or automation goals—efforts that, by their very nature, have diminishing returns.

The real winners in terms of IT investment to generate major productivity advances have been highly innovative at two levels: They redesigned key business processes to exploit IT capabilities, and they focused on implementing continuing innovations in these business processes (see Executive Report, p. 73).

In fact, the kind of business innovation that has driven productivity until now is quite different from the innovation that will shape the next wave of improvement. In the past decade, businesses sought productivity through large investments in IT designed to deliver significant, one-time operating sav-

KATHERINE STREETER

ings. They typically did this by implementing ERP and CRM applications that imposed tightly coupled business processes within the enterprise. These initiatives were sometimes effective in delivering one-time efficiency gains, but they did so largely by forcing companies to implement standardized databases and processes, and, wherever possible, removing people from the processes by automating information flows. Given the state of the technology then, this approach was understandable, but limited.

That's all beginning to change, thanks to technology developments that will lead to continuing waves of innovation. To create more value and sustain current productivity gains, businesses need to identify new ways to coordinate activities across process networks spanning a large number of enterprises. Nike, for example, has harnessed a global network of hundreds of suppliers to support a product line that incorporates increasingly high-tech materials.

Loosening up

These requirements will drive a transition to a very different IT platform—one that will integrate more flexible configurations of computing power with software tools designed to help people connect and innovate. The combination of high tech and soft touch will set the stage for a very different way to organize business processes—we call it loosely coupled business processes—that will amplify the potential for business innovation and productivity enhancement.

One of the most sophisticated companies in orchestrating loosely coupled business processes is Li & Fung, a major player in the apparel industry that has a global process network encompassing more than 7,000 business partners. In another example, open-innovation technologies used by two rival groups—the Human Genome Project and

Celera—were instrumental in creating a diverse group of independent research partners to decode the human genome. And, in another case, third-party logistics companies such as APL Logistics, Menlo Worldwide Logistics, and Ryder are mastering the fine art of coordinating hundreds of independent logistics service providers across many different transportation modes to ensure rapid and reliable product delivery.

IT components, such as processors, storage devices, and optical networks, continue to deliver much more power at lower costs. These improvements are already creating new architectural options with huge potential for business innovation. Key among these models are grid computing in the hardware arena and service-oriented architectures on the software side.

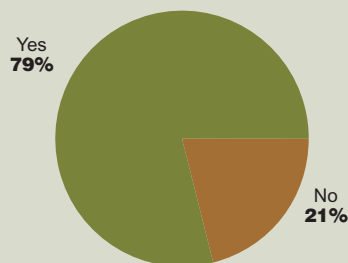
- **Grid computing.** A set of architectural standards emerging under the rubric of grid computing will go a long way toward making computing resources highly adaptable and, in some cases, available on demand. Grid computing takes unique advantage of computers and storage systems, providing an unprecedented amount of computing power at commodity prices, often at great savings. An entire spectrum of grid options is emerging, including clusters with thousands of commodity computers within a single “box” or spread out across an enterprise or multiple enterprises.

These options are beginning to share a common element: a virtualization layer or an overlay network in software designed to coordinate and manage vast pools of hardware resources. Large collections of small computers aren't new. What's new are the relatively low cost of buying such collections and the innovative approaches to managing them. Without the latter, the total cost of ownership often outpaces the savings. With these emerging overlay networks, companies can start to manage vast pools of resources as a single system, enhancing productivity by enabling much higher use of IT resources and more flexible deployment of these resources to support business innovations.

- **Service-oriented architectures.** When we began writing about the potential for loosely coupled business processes two years ago, technology solutions were lagging. Now, companies are beginning to migrate to SOAs that can make software resources more flexibly available. Expensive, hard-wired connections across software and data make it very difficult to modify business practices and policies. SOAs seek to break down these walls by adopting a more modular approach. They use widely accepted Web-services technology standards to create loosely cou-

Team Effort

Does your company promote the use of collaborative tools to improve worker productivity?



DATA: Optimize 2004 productivity study of 300 business-technology executives

pled connections that can be quickly and cost-effectively developed across data and applications.

Unlike previous generations of component-based software, such as Corba, SOAs typically correspond much more closely to business activities, such as issuing a purchase order or obtaining a risk assessment on a loan application. As SOAs spread, they'll first leverage and then transform monolithic applications and current approaches to enterprise-application integration. In the process, they'll make it easier to switch from one source of modular software functionality to another. Like hardware, software will begin to look more like a commodity.

There's a catch, though. Loosely coupled connections don't cost a lot to develop, but they can consume a large amount of computing and network resources. For this reason, grid computing is closely linked to the emergence of SOAs. If large amounts of inexpensive compute power can't be made flexibly available, broad-based SOAs won't be economically viable. On the other hand, the emergence of grid computing could significantly accelerate SOA deployment.

The alignment of grid with SOAs will be especially powerful because the implementation doesn't require replacing the entire installed base of IT platforms. That's attractive

to business executives in no mood to finance major replacement of IT investments. It also means that the productivity gains will materialize more quickly, since we don't need to wait out lengthy replacement cycles to see the effects. These grids are likely to emerge first at the edge of the enterprise, leveraging legacy systems, but in time, they'll require replacement of at least some of those systems to deliver total-cost-of-ownership benefits. The combination of grid and SOAs will shorten lead times between business innovation and its deployment, delivering productivity improvements much more rapidly.

More flexible IT architectures will encourage waves of more modest business innovations—creative new combinations of resources in some areas and novel approaches to work in others—that in aggregate will transform the way we organize and work. For example, financial-services companies such as Schwab can use these new IT architectures

to roll out and then refine innovative ways to package financial and information services from a variety of vendors to deliver more tailored value to customers. Retailers could use similar architectures to compress replenishment cycles by drawing in a broader range of logistics providers or apparel suppliers on an as-needed basis.

Of course, IT architectures alone can't accomplish this; they merely create the potential for increased innovation. To realize this potential, we must help people connect with one another more easily to discuss business opportunities and challenges, and give them tools to generate innovative business solutions.

We've seen the business-innovation pendulum swing heavily toward process design and support over the past couple of decades. But that hasn't helped access the underlying knowledge that's the real engine of business innovation. By standardizing and automating processes—and eliminating routine jobs to show quick productivity gains—IT has minimized the role of

Flexible IT architectures will transform the way we organize and work

people. It's time to bring them back into the equation.

Three categories of technology are converging to make it easier to leverage human resources: social software, E-learning tools, and new access devices. In fact, without focusing on enhancing the ability to "collaborate on demand," much of the hype about business on demand will remain meaningless.

- **Social software.** More robust capabilities are being developed to help connect the right people at relevant times, provide them with collaboration tools, and create records of interactions that can generate insight into innovation opportunities. Social software includes such traditional tools as E-mail—especially when enhanced by group lists—and bulletin boards, as well as more recent innovations such as instant messaging for business; Weblogs, in their collaborative applications; wikis, or collaborative workspaces; and social-network analysis tools.

Companies, especially in information-intensive

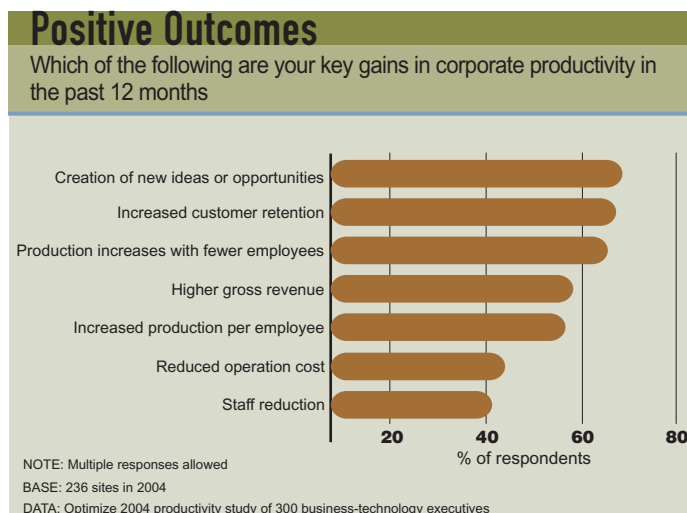
See "Eureka! Xerox Software Gets Social" at www.optimizemag.com/issue/028/innovation_olside.htm.

businesses such as financial services and logistics, are beginning to deploy social software to support exception handling in their business processes. Exceptions are the big, secret underbelly of the massive enterprise applications implemented over the past couple of decades. In the quest for standardization, these applications generate large numbers of exceptions that must be handled manually. In fact, exception handling

ingly embedded in E-learning platforms. Innovations in these technologies are leading to a fundamental rethinking of learning in business environments.

In the past, the formal training process focused on bringing people together in centralized facilities. Now, it's possible to deliver the training material and experience to distributed desktops.

This leads to a second significant shift in approach. Training used to be deployed with a push model—people assembled for training when they were scheduled to receive it, and the corporation determined the schedule. Increasingly, training can be delivered on a pull model, where modules are delivered on demand, not when the company has scheduled it. Finally, the training can become more personalized, allowing employees, within some limits, to modify the sequence or schedule the sessions according to their needs. E-learning can play a significant role in enhancing business innovation by allowing people from very different backgrounds to effectively collaborate, using common frameworks and vocabularies.



has become one of the largest sources of operating expense. It also represents a major source of inefficiency. Often, the right people to handle the exception can't be identified. When they're located, attempts to bring them together take up significant time.

Exceptions can be a rich seedbed for business innovation. They force employees to address unexpected challenges and opportunities, and push their practices into new directions. Ultimately, if specific exceptions recur frequently enough, they can lead to significant business-process refinements.

Social software can transform exception handling by reducing costs. It also can help create a repository documenting the exceptions, the people involved, and the resolutions. Appropriately implemented, SOAs can be a part of this process because they rely heavily on electronic documents for coordinating resources. The potential for supporting collaborate-on-demand techniques to spur productivity and innovation preceded the era of SOAs, but the social-software tools emerging today further increase the potential.

- **E-learning.** These platforms represent a second cluster of technologies helping to raise, rather than diminish, people's role. The technologies include digital video, high-bandwidth IP networks for video streaming, simulation tools, gaming technology, and search technology. Social software will also be increas-

Cisco Systems is a leader in exploring this potential of E-learning platforms. In fact, it's the only company we are aware of that has deployed E-learning platforms across a broad range of business partners to foster shared understanding. The company has developed diverse ways of reaching and supporting customers and channel partners, so it doesn't rely solely on its sales force or field system engineers.

Cisco deploys learning portals to serve the specific needs of its direct sales force, system engineers, and channel partners. Robust search technology using metadata tags helps portal users locate the learning modules most relevant to them. The search capability is complemented by tailored learning road maps designed for various users, helping to guide them to the appropriate learning modules.

Cisco is working on personalizing this E-learning capability even further by understanding each employee's specific work context and offering prescriptive recommendations for learning resources. These approaches have yielded significant cost savings. Cisco estimates that a video-based training session that used to cost \$200,000 to develop and deliver through centralized training facilities has had its costs cut by two orders of magnitude, to \$2,000, in the past five years. Other, harder-to-quantify benefits include the enhanced ability to present a common face to the customer across diverse distribution channels. By accelerating the learning and development of its

channel partners, Cisco also wins greater loyalty.

- **Access devices.** Rapid evolution of access-device technologies also helps to connect people and resources. Much has been said about smarter, more compact, and lower-cost handheld devices—telephones, PDAs, and their hybrids—supported by higher-bandwidth, lower-cost, and more ubiquitous wireless networks. They’re making employees accessible anytime and anywhere, and arming them with the tools to make them more productive. When combined with E-learning platforms and social software, more powerful access devices significantly enhance the potential for business innovation. A company can mobilize the right people more quickly to address issues in real time.

Many companies in industries such as logistics and high technology are attracted to the loosely coupled business-process approach because it promises greater flexibility. Far fewer companies recognize the potential to enhance business innovation. For loose coupling to generate flexibility and especially innovation, it must be firmly embedded in an evolving set of relationships designed to foster trust, shared meaning, aligned incentives, and conflict mediation.

The key point for CIOs is that these new business-process approaches are difficult to implement in the context of traditional IT platforms. The convergence of grid computing and SOAs will provide the flexible foundation required to support loosely coupled business processes. These will achieve their full innovation potential only if people are effectively connected and supported in their efforts. It’s the combination of all these elements that will unleash the next waves of business innovation and productivity improvement. ○

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THE 90-DAY PLAN



The move from tightly coupled business processes to looser structures and platforms will evolve over time. However, you can select one process at a time—such as exception handling—as your test bed for change. Here’s how to begin to change this one process.

ACTION ITEMS

COMPLETE

FIRST MONTH: Identify areas of opportunity

- Conduct a survey across your company to pinpoint the operational areas where substantial resources are consumed in handling exceptions.
- Quantify the resources consumed and the time lags created in core operating processes by current approaches. Where relevant, quantify the potential impact of inefficient exception handling on revenue generation.
- Select two or three categories of exception handling with the greatest impact on business economics.

SECOND MONTH: Design and deploy tools

- Observe the selected areas of exception handling to determine which people are involved and how they approach exception-handling issues.
- Identify two or three senior experts in each area. Work with these people to determine what IT tools would be most useful in helping them connect with others who need to be involved in the exception-handling process. Design and source the appropriate suite of tools.

THIRD MONTH: Develop migration paths for platforms

- Identify the broader IT platforms required to support these exception-handling process areas. Develop a migration plan to more loosely coupled IT platforms designed to provide more flexibility for business innovation.