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SPECIAL
REPORT ON
INNOVATION

Need new ideas to **energize** your enterprise? Find new ways to help your people **collaborate**. **P&G** and **MasterCard** did. You can too.

BY CHRISTOPHER KOCH

IT Builds a Better



As companies seek more and better ideas,
CIOs have an opportunity to reinvent the
innovation process and, by enabling
people to collaborate, make IT an engine
for growth

BY CHRISTOPHER KOCH



Innovation in big companies has always been treated like gold—hidden deep inside secret vaultlike labs and protected from everyone except the researchers in lab coats. When products or services emerge from the labs after years of development—and just one in a hundred does—they fail most of the time.

Faced with this lack of productivity, along with increased competition and shrinking product lifecycles, CEOs are no longer willing to rely exclusively on their internal labs. Asked in a recent IBM survey to rank their most important sources of innovation, CEOs placed internal R&D labs eighth out of nine, far behind the general employee population, business partners and customers. But only half felt that their organizations were collaborating beyond a moderate level. Worse, in another survey by The Boston Consulting Group, nearly

half of executives said they are dissatisfied with their companies' investments in innovation.

Out of all this dissatisfaction emerges a tremendous opportunity for CIOs: to use IT as the glue for a new, more distributed innovation process. The CEO wants to invite customers, suppliers, independent innovation mercenaries, even competitors into the innovation process. But if these groups can't effectively communicate, collaborate and share informa-

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- ⌘ How to use IT to accelerate R&D
- ⌘ Ways to facilitate and increase data sharing

tion, this new process will be less productive than the old one. Integration—of data, of people, of internal and external organizations—is critical, according to nearly 80 percent of the CEOs surveyed by IBM. Yet fewer than half say their organizations have adequate technology integration to support innovation.

There's a job here for the CIO beyond providing the glue gun of integration support. With a process that is becoming IT-intensive, why shouldn't IT design and own the process itself? So far, however, there is little evidence that CIOs are driving the innovation train. "CIOs are the caboose," says Jeff

Abrahamson, process standardization and integration will test CIOs' ability to lead process change in an area of R&D where they have had little, if any, involvement: the "R" part of early idea exploration and more free-form experimentation. First, they need to figure out how IT can enable many groups to communicate and collaborate without creating a management nightmare. In doing this, CIOs need to create and support standard processes for innovation so that this newly expanded and connected network doesn't crush productivity. In a recent survey by research company Aberdeen Group, more than 80 percent of

product in a lab, reverse engineer it and have a competing product on the shelves in six to nine months," says Dan Staresinic, global marketing director for consumer products with software vendor UGS and a former product supply manager at Procter & Gamble (read how Procter & Gamble revamped its innovation process on the following pages). Opening up the innovation process to outside collaborators hedges the risk of shorter product lifecycles by putting more ideas for products into the pipeline. "You want to lower your competitive exposure by having many little investments rather than a few big ones," says DeGraff. "By doing that,

Incremental efficiencies aren't enough in the age of outsourcing and offshoring. CIOs need to shift their emphasis to breakthrough innovation in processes that increase revenue.

DeGraff, associate professor of management education at the University of Michigan's Ross School of Business. "The COO and chief R&D officer have a vision, they appeal to the CEO and they all craft the innovation strategy in an offsite. Then they appeal to the CIO and say, 'How do we support this?'"

Yet with their reliance on IT to enable a broader, more global innovation process, companies may not be able to develop and maintain a long-term competitive advantage in innovation unless the CIO plays a bigger part in developing the strategy as well as executing it. "Innovation more often expresses itself on the revenue side of the income statement, and CIOs have a historical bias toward the cost side," says Robert Austin, associate professor of business administration at Harvard Business School. "That has to change."

The increased emphasis on collabora-

tion, process standardization and integration will test CIOs' ability to lead process change in an area of R&D where they have had little, if any, involvement: the "R" part of early idea exploration and more free-form experimentation. First, they need to figure out how IT can enable many groups to communicate and collaborate without creating a management nightmare. In doing this, CIOs need to create and support standard processes for innovation so that this newly expanded and connected network doesn't crush productivity. In a recent survey by research company Aberdeen Group, more than 80 percent of

business executives identified process definition and standardization as an important strategy for improving their product development performance. In companies where innovation is a critical part of success, the need for greater IT involvement will give the CIO more knowledge of the innovation process than any other C-level executive. Whether that translates into a strategic voice in the market direction of the company will depend on CIOs' leadership skills, their personal relationships with their CEOs and these CEOs' own views of the strategic value of technology.

How the Innovation Process Is Changing

It's clear why companies are opening up their innovation processes to just about everyone: financial risk. "Today, it's not uncommon for a competitor to put your

you also maximize your opportunities for new breakthroughs because you're speculating in many different areas."

But by expanding the pipeline, companies expose themselves to a different kind of risk: management complexity. For example, inviting customers into the product innovation process means a potential avalanche of data that needs proper distribution and analysis. According to research company Forrester, 95 percent of grocery shoppers said they'd be willing to test new products and provide feedback to consumer packaged goods companies. When hundreds of millions of consumers push the "contact us" button on your website, you need mechanisms for sifting through the data and routing it to people who can interpret it and respond. And response time is critical: Almost all respondents said they would be more likely to buy from companies that reply to their queries quickly.

The stakes are even higher for IT when you invite contractors into the process. They don't just need to connect and pass data, they need to collaborate with internal employees and each other to avoid duplicating work and to contribute to projects that they are jointly assigned to. "The level of complexity is increasing immensely because you now have to vet all these different ideas and share information with people around the world," says Robert Cooper, professor of marketing at the DeGroote School of Business at McMaster University.

If not managed well, all these ideas can bog down the R&D process. DeGraff observes that companies can easily become paralyzed by all this creativity and remain mired in early-stage experimentation that leads nowhere.

Addressing this issue requires CIOs to take enterprise integration to a new level. In a study of 1,000 companies, the consultancy Booz Allen Hamilton found that only 94 were consistently more profitable than their competitors while spending less on R&D as a percentage of sales than the industry average. Those 94 have one thing in common, according to Kevin Dehoff, a vice president at the consultancy: high levels of cross-functional integration and collaboration—especially among groups that deal with customers such as sales, marketing and customer service. "R&D could come up with the greatest mousetrap, but if they don't understand customer requirements then the best mousetrap won't translate into better business performance," says Dehoff.

A hint of the advantage for highly integrated companies is evident in the returns from standardizing and auto-

matizing the "D" part of R&D—product development—on which vendors and CIOs have been working for years. Aberdeen has found that automating product development reduced product costs by 17.5 percent, cut design cycle time by 25 percent to 30 percent and reduced product defects 12-fold.

Of course, product development is focused on speeding a known quantity—a product design—to market. Experimentation is harder to standardize and automate. And IT tools that support research are less well-developed, observes Mike Burkett, a vice president at AMR Research. Yet with better records of past experiments, researchers can avoid dead ends that have already been explored, as well as find information they can leverage and reuse. IT can also reduce experimentation costs by replacing tests such as chemical explosions or car crashes with virtual versions. "IT can drive down the cost of trying things, which speeds up the process and lets you iterate more than before," says Harvard Business School's Austin.

A New Role for CIOs

A bigger issue for CIOs than the deployment of technology that supports innovation is the role they will play in improving and managing the innovation process. Innovation has been the province of R&D, with IT in "an optimization role," says DeGraff. "[CIOs] have been trained to eliminate waste, and that's become their natural focus."

But incremental efficiencies aren't enough in the age of outsourcing and offshoring. When CEOs can pack up a process and its IT and ship them to lower-cost destinations, they are less likely to view process improvement as a route to success. The gulf in thinking between CIOs and CEOs shows up in a recent survey by consultancy McKinsey, in which 43 percent of technology executives said that automating pro-

Elements of an IT-Enabled Innovation Process

The capabilities you need when ideas for new products come from outside the lab—and outside your company

Collaboration. Communication is critical among both internal employees and external contractors. Agree on a medium, whether it's e-mail, IM or fancy collaboration software, and get everyone using it.

Data access. Easy access to research information is the basis for doing collaborative innovation work with outsiders. Make project data available in a format that is standard, simple and easily viewable—think PDF and HTML.

Process standardization and automation. Standard templates and automated workflows that don't depend on specialized systems are important to getting multiple outside contributors involved in the process. Such tools also allow you to chunk up workflows so that one group can pick up where another left off. The caveat: Don't let standardization stomp on creativity—it's a delicate balance.

Cross-functional integration. Researchers and engineers don't own innovation anymore. Find ways to connect other functions to the innovation process—especially those that deal with customers, like sales, marketing and customer service—and give them a voice.

—C.K.

Be Visionary

Find additional information about **I.T.'S ROLE IN INNOVATION** online at www.cio.com/020107.

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cesses is the best route to improving operational efficiency, while the leading response among business executives was improving economies of scale.

CIOs need to shift their emphasis toward breakthrough innovation, especially in processes that increase revenue, like those directly linked to customers. "If you can improve the customer experience, that's good," says Austin. "If you can contribute to that improvement in ways that customers are willing to pay for, then that gets you and the company farther."

The advantage CIOs have of being able to see across all the major processes of the business should enable them to become innovation leaders—if they can learn to think big. "CIOs have to come to the boardroom with a sense of destiny and sell their knowledge and their vision," says DeGraff. He recalls a recent strategy meeting with a client, during which the CIO demonstrated an expert knowledge of the business and had unique insights on the direction of the company. The problem, says DeGraff, was his focus on making operational improvements and cutting costs instead of how IT could be used to capture these growth opportunities for the business. "The data to identify new markets existed and the CIO was fluent in it. He just had never seen his job as helping people [interpret] trends about where the markets were going to be. He didn't have a story with a sense of destiny and a point of view about those new markets."

It's time for CIOs to get a sense of destiny. **CIO**

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Capturing the Elements of Innovation

To increase global collaboration, Procter & Gamble tries a measure of IT in its R&D formula

BY CHRISTOPHER KOCH

Procter & Gamble is famous for being innovative, but the hard truth is that it had better be. The company spends 3.4 percent of its revenue on R&D, nearly twice the average of 1.6 percent in the consumer packaged goods industry. But big spending on R&D does not guarantee success: A study by consultancy Booz Allen Hamilton found no correlation between dollars spent on R&D and profitability. What matters is the productivity of that spend—the "hit rate" of ideas that lead to products.

The company behind Swiffer and Crest toothpaste assesses its hit rate at about 80 percent—pretty good, considering that the overall industry success rate is just 30 percent, according to ACNielsen. But in consumer products, the real blockbusters—products that aren't merely new variations or tweaks of existing products—are few. According to research company ProductScan, of 10,649 new product introductions across the industry in 2005, just 484 were truly innovative—meaning they added significant new benefits in areas such as formulation or technology. And the creativity of the big consumer goods players is waning: A study by McKinsey found the top seven companies, including P&G and competitor Unilever (whose products include Surf detergent), accounted for just 5 percent of all the patents filed for laundry and home-care products between 2000 and 2005.

No wonder then, that the 170-year-old manufacturer has been driving hard to improve its R&D productivity since CEO A.G. Lafley took the reins in 2000. Lafley's proclamation at the time, that by the end of the decade P&G would get at least half its new product ideas from external sources, was hailed as visionary. But really it was a response to the reality that the days of "not invented here" are over. Today,

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- ⚡ Why P&G wants to improve research productivity
- ⚡ Tools for promoting cross-functional integration
- ⚡ How to automate the experimentation process

A portrait of Keith Caserta, a middle-aged man with a mustache, wearing a light blue sweater over a striped collared shirt. He is smiling slightly and looking towards the camera. The background is a blurred office setting with windows.

IT can improve the success rate of R&D by integrating data used by researchers, patent lawyers and product developers, says **Keith Caserta**, P&G associate director and head of health care R&D information and decision solutions.

Lafley claims that outsiders are involved in developing 35 percent of new products, and P&G's spending on internal R&D has decreased 30 percent in seven years.

But P&G needed to do more than bring more cooks into the kitchen. It needed to change a perfectionist mentality in its research culture. "The front-end ideation process took time," says Steve David, who retired from a 34-year career at P&G in 2005, the last five years of which he spent as CIO. The company began rewarding researchers for speeding up experiments. "The goal was to encourage people to fail early and often and if the idea isn't working, either kill it or move it into another organization and let them work on it," recalls David, who is now a senior adviser to The Boston Consulting Group.

However, increasing the size and speed of the idea pipeline increased the complexity of managing the R&D process. Besides its own R&D organization of 8,000 scientists spread across 28 sites globally, P&G has outsourced portions of its R&D processes, such as routine chemical lab experiments, to lower-cost countries. The company has also begun collaborating more with outside technology companies, who pump new product ideas into P&G, collaborate with P&G scientists or simply develop products themselves with P&G's guidance and investment. In addition, the company uses its internal network and the Internet to connect with loose networks of research scientists who help solve vexing problems that are getting in the way of new products—a chemical formulation, for example. Coor-

dinating work and screening new ideas are critical to keeping the pipeline moving. "We need to run our global R&D organization as though we're in a single building," says Keith Caserta, associate director and head of health care R&D information and decision solutions with P&G.

This is where IT comes in. It takes an army to manage all these constituencies, making coordination and collaboration critical. "Opening up the idea process introduces more fragmentation and friction," says Navi Radjou, a vice president for research company Forrester. If IT is going to reduce the complexity of managing innovation in a company as widely distributed and diverse as P&G, it has to meet some difficult requirements.

First is flexibility. "We need IT that is

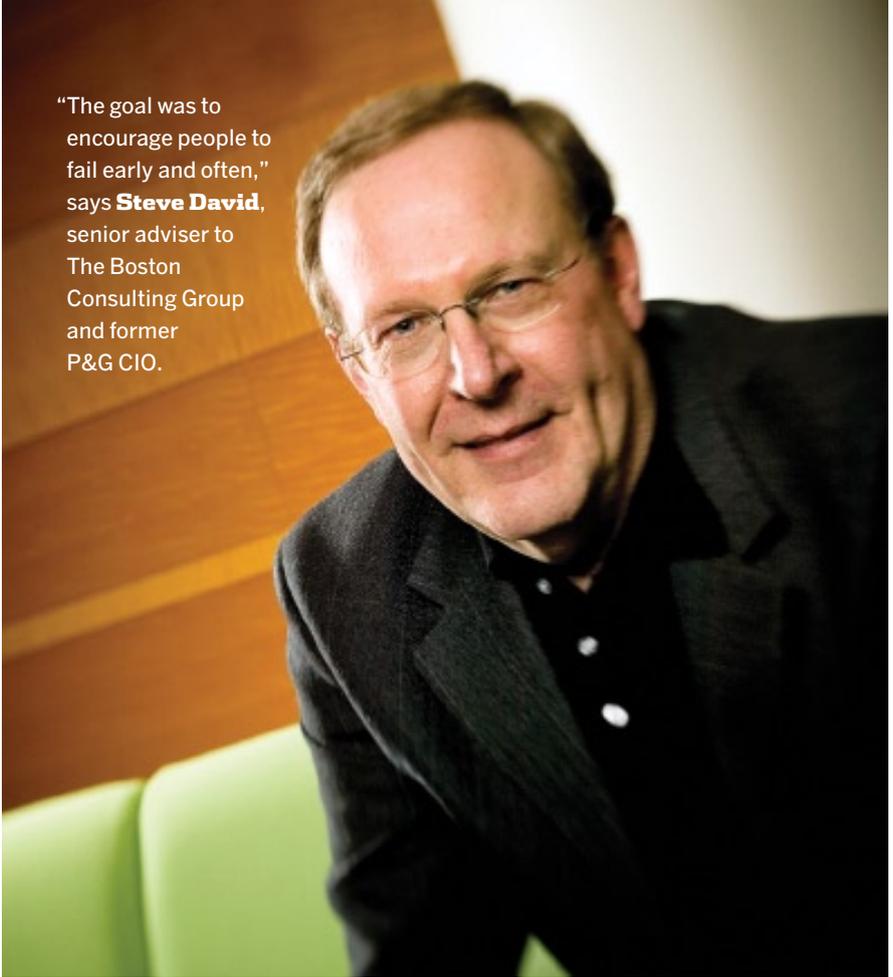
flexible enough to meet a broad range of business needs, because we do chemically based products, biologically based products and assembled products," says Caserta. Next is scalability. "Technology has to stand up to thousands of users in a global installation, and that's been challenging in some cases," he says. Finally, the solution should promote cross-functional integration and collaboration.

In an attempt to address all of these requirements, P&G is experimenting with product lifecycle management (PLM) software (which is traditionally applied to the product development phase of R&D for assembled products like diapers and razors) in the experimental research portion of all R&D processes, assembled products, and chemical, biological and mixture-based products. PLM is like ERP for the product development process: a big, feature-rich software platform that companies typically try to standardize across the entire enterprise. P&G has a pilot with vendor UGS using PLM as a backbone for storing and sharing its researchers' "lab notebooks"—the records of their experiments that are almost always created on paper. If the system becomes a reality, the lab notebook will become an electronic talisman that links internal P&G researchers across P&G's many global labs, as well as those of its contractors. The project is a reflection of the larger push within P&G to create a more connected, global innovation process.

Converting those notebooks to electronic form is no small matter for most researchers, who see any attempts to standardize or automate the research process as a threat to their creativity—even though they understand the benefits of sharing. "They are resistant to change of any type, and anything that they think affects their freedom they will fight," jokes Charlie Cruze, systems manager for P&G Pharmaceuticals and a former researcher.

The resistance to IT-based processes has persisted to the point of silliness. Some researchers at P&G are known to write up

"The goal was to encourage people to fail early and often," says **Steve David**, senior adviser to The Boston Consulting Group and former P&G CIO.



their experiments using Microsoft Office applications and then glue printouts of their work, page by page, into the notebooks, making them look like witches' wrinkly cookbooks. Less humorous is the way the notebooks stay hidden on researchers' shelves while their colleagues in other P&G labs unknowingly duplicate their work, or how the notebooks can be spirited away for months or even years by lawyers who need them as evidence for patent cases.

To accommodate researchers' discomfort with automation during the PLM pilot, Caserta and his team have been careful not to disrupt how researchers get their data into the system. The researchers can enter the information any way they want, whether in Microsoft Word or through legacy systems that are integrated with the electronic laboratory notebook (ELN) system. The plan is to allow researchers to throw in all sorts of documents—what technologists call unstructured data. They can then apply descriptive tags to the files. The system then converts the files to PDF format, allowing them to be searched and shared by anyone with access to the ELN system. The PLM software is already installed as the global standard for a number of areas in product development

across all of P&G. By hooking into this existing system, the lab notebooks become visible to functions farther downstream from the researchers, such as engineers in product development, while functions with tangential involvement in the process, such as the patent lawyers, can access the data without removing it from the system. As a result, P&G increases cross-process integration, what Caserta calls "the horizontal view," of the innovation process within the company.

No less important are the subtle attempts to automate the research process itself. Templates that automatically display the researcher's name and the project don't assault researchers' delicate sense of independence but do demonstrate a direct benefit by sparing them from rote duties. That paves the way for acceptance of more standardization and automation of the process down the road. "We can template the stan-

Ideas for Collaboration

Futurists Don Tapscott and Anthony D. Williams write about how P&G harvests ideas from outsiders in **WIKINOMICS: HOW MASS COLLABORATION CHANGES EVERYTHING**. Read an excerpt online at www.cio.com/020107.

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ard, repetitive experiments so all they do is fill in the numbers,” says Cruze. However, he adds, automation doesn’t merely save individual researchers’ time. It opens up projects to collaboration with researchers in other labs, who can see where one team left off and continue the work.

The pilot is small—only 75 scientists spread among a limited number of U.S. and international locations—and things change dramatically when you attempt to roll out complex enterprise software to

thousands (5,500 is the target globally). Meanwhile, trying to create a platform that can meet the needs of biotech researchers as well as engineers designing diapers may be a stretch. “To go from product idea all the way through to [product retirement] is a long time frame and maybe asking too much,” says Robert Cooper, professor of marketing at the DeGroote School of Business at McMaster University. “I’m skeptical that they can hook it all together. It starts to become a 1,000-pound marshmallow.”

The stakes are big. Improvements in speed and productivity in the early idea phase of R&D can have an impact all the way down the line. Concludes Caserta: “If you can improve your productivity in the idea phase, it gives you the opportunity to have a higher success rate at every stage after that.” **CIO**

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Technologies for Innovation

Multiple constituencies, from customers to top executives, have a role in the innovation process. There are technologies to help each group contribute more productively.

Idea Constituency	How IT Can Help	Vendors
Customers	<ul style="list-style-type: none"> • Surveys • Online validation of prototypes • Mining of customer complaints and suggestions 	Active Decisions, Affinova, Agile, E.piphany, IBM, Intelliseek, Questa, SAS, Spotfire
General employees	<ul style="list-style-type: none"> • Identifying internal subject-matter experts • Collecting and analyzing ideas 	Akiva, BrainBank, IBM, Imaginatik, Knowledge Systems, Microsoft, Mindjet, OAS, Tacit
Academics and freelance inventors	<ul style="list-style-type: none"> • Screening independent inventors • Listing technologies • Matching buyers and sellers 	Arizona Technology, Enterprises, InnoCentives, IP2IPO, NineSigma, UVentures, yet2.com
Project managers	<ul style="list-style-type: none"> • Reprioritizing innovation projects • Reallocating innovation resources dynamically • Fixing scientific bottlenecks • Collecting and sharing experiences from past projects • Supporting design-for-manufacturability and design-for-serviceability 	AspenTech, Formation Systems, Gensym, IBM, IDe, Invention Machine, Microsoft, NinaTek, SAP, Sopheon, Spotfire, UGS PLM
Top executives	<ul style="list-style-type: none"> • Analyzing patents • Predicting technology lifecycles and financial impact of market disruptions • Identifying risky projects 	Capgemini, Evalueserve, Icosystem, Invention Machine, NuTech Solutions, SAP

SOURCE: Forrester Research and CIO reporting



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process of innovation*

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