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Outside Help

FOCUS ON ENGINEERING MANAGEMENT

Companies are making connections to enrich—and accelerate—product development.

By John K. Borchardt

When it comes to covering territory, Procter & Gamble is an empire. It has more than 300 brands, most of them recognized worldwide, under which it sells products ranging from pet food and laundry detergent to prescription drugs and cosmetics.

Taken together, however, all those thousands of products represent perhaps 10 percent of the patents that the corporation holds. So P&G aggressively markets the remaining 90 percent of its intellectual property to other firms through a program it calls Connect + Develop. The program also invites prospective partners to come forward with suggestions for collaborative projects.

It is not surprising that the invitation is extended through a Web site, www.pgconnectdevelop.com. The idea of making business-to-business contact over the Internet is not unique to this Web site. It is instead part of an emerging trend in which the Internet is bringing organizations and individuals together for collaborative research and development of products in a process that has come to be known as open innovation.

It is another example of how the Internet has increased the speed and reach of idea exchange.

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connect + develop **P&G** P&G Global Operations

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Connect + Develop Examples

Clay® Derma-Pod
 The fastest-growing Clay sub-brand is the Derma-Pod, a small, one-use portion of Clay with a unique applicator. This deal focused on packaging and design, and was done with Cardinal Health.

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connect + develop™



External collaboration plays a key role in nearly 50 percent of P&G's products. We've collaborated with outside partners for generations but the importance of these alliances has never been greater.

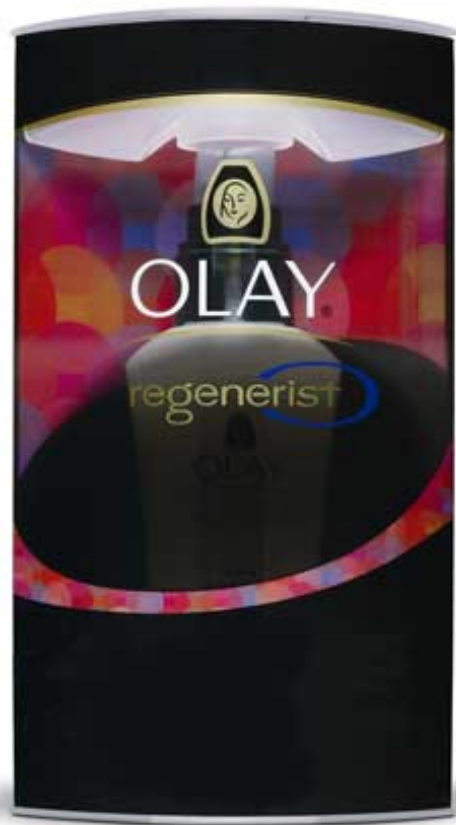
Our vision is simple. We want P&G to be known as the company that collaborates — inside and out — better than any other company in the world.

A.G. Lalley
 - A.G. Lalley
 Chairman of the Board and Chief Executive Officer

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Through the Connect + Develop Web site, Procter & Gamble invites individuals and organizations to contact the company about buying or selling technology. P&G products resulting from open innovation include Olay Regenerist anti-wrinkle skin cream and the Swiffer Duster.

Internet communications technology has made possible business models like MFG.com, which can take a request for bid and put it in front of potential suppliers all over the world, and Quickparts.com, which can receive a CAD file and return an instant bid on it.

It has also made possible the practice of open innovation, which attempts to let everyone share in the wealth of ideas that now can be communicated with an ease never possible before.

Bernard Munos is corporate strategy advisor to another major developer of intellectual property, Eli Lilly & Co. "Problems in one discipline have often already been solved in another," he said. "Cross-pollinating various styles of thought, problem-solving approaches, and training is a powerful driver of breakthrough innovation."

Open innovation is based on this premise, and on a second idea, summed up in a few words by Henry Chesbrough, director of the Center for Open Innovation at the University of California, Berkeley: "Not all smart people work for you." Chesbrough is the author of one of the defining texts of the practice, *Open Innovation: The New Imperative for Creating and Profiting from Technology*, published in 2005 by Harvard Business School Press.

According to Chesbrough, open innovation eliminates traditional boundaries among businesses, universities, government, independent inventors, and other sources of knowledge. Instead, ideas flow into and out of companies. By collaborating with other organizations, including customers, suppliers, university researchers, and even competitors, companies can import high-quality ideas at low cost, with less risk of having to work independently to reinvent technology that already exists.

Buying or licensing ideas frees companies to focus their internal R&D on areas where they have clear competitive advantages. The results include decreased R&D risks and more funds available for the most promising opportunities. This focus also enables organizations to identify innovations to sell or license to other firms that could put them to more profitable use. This can raise cash for additional R&D investments in the firm's core or growth business areas.

INTERNET INTERMEDIARIES

To accomplish these goals, many companies work with a variety of Internet-based firms that facilitate knowledge exchange. The purpose of these firms, which Chesbrough calls "innovation intermediaries," is to match one entity's technical needs with a source of technology solutions. Sometimes the solution can be a ready-to-go product.

Innovation in research and development is increasingly coming from smaller firms that are often difficult to identify. National Science Foundation data indicates that companies with fewer than 1,000 employees received 5 percent of new U.S. patents in 1972. By 2000, small companies were receiving 30 percent of the patents issued.

Internet-based firms such as yet2.com, NineSigma, and InnoCentive have developed technology to help potential partners, including quite small companies, find each other and form partnerships with organizations that can bring a novel idea to market. These innovation intermediaries offer a variety of services.

Yet2.com (<http://www.yet2.com>), founded in 1999 by a consortium of Procter & Gamble, DuPont, Bayer, Honeywell, Caterpillar, Siemens, and NTT Leason, offers services that bring buyers and sellers of technology together, enabling participants to maximize the financial return on their intellectual assets. The firm says its clients represent more than 40 percent of the world's R&D capacity.

According to Nancy Harris, manager of the corporate headquarters office, yet2.com makes its money by charging fees. The nature of the project determines who pays. For one project, it may be a seller seeking to identify potential buyers of a technology. In another, it may be a firm seeking to buy a technology and to identify technology providers.

Founded in 2000 by Mehran Mehregany, a professor at Case Western Reserve University in Cleveland, NineSigma (www.ninesigma.com) has similar objectives. According to Mehregany, who is Goodrich Professor of Engineering Innovation at Case Western Reserve, "NineSigma delivers connections to sources all over the world to meet its clients' technology needs." Projects include applied research, design and development, process improvements, finished products, and finding new applications and new markets for existing technologies. NineSigma matches technology seekers with unobvious innovations, using qualified program managers (some of whom are engineers), Web-based tools, and a global database of solution providers.

According to Paul Stiros, CEO of NineSigma, the organization's clients fall into two categories—technology buyers called innovation managers and technology suppliers called solution providers. Small businesses are often solution providers. Like yet2.com, the organization that pays for the project is the one that contacts NineSigma, either a technology buyer or a solution provider.

WORKING WITH INDEPENDENTS

InnoCentive was founded in 2001 by Eli Lilly's Ventures unit. Its objective is to connect companies to independent inventors. Through the InnoCentive Web site, www.InnoCentive.com, "seeker" companies can post their "R&D challenges" to "solvers"—more than 120,000 engineers and scientists in 150 countries worldwide.

Peter A. Lohse, InnoCentive's director of scientific operations, reported that more than half the solution submissions have come from outside North America. The solvers submit solutions to challenges and earn a financial reward of \$5,000 to \$1,000,000 if their solution is chosen.

Overall, the solution rate for problems posted on InnoCentive is about 40 percent. Problems for mechanical engineers include a tool to apply thick, viscous liquids, gels, or pastes smoothly on vertical surfaces (reward of \$20,000); a low-cost, high-speed manufacturing method to make a through-hole structure in polymer films (reward of \$8,000), and a boom system designed to collect spilled oil in the presence of sea ice (amount of award not specified).

The inventors may or may not be hired as consultants to work on reducing the idea to practice. Many of the mechanical engineering competitions are for basic designs, not working models. According to Peter Lohse of InnoCentive, the average time spent working on a winning idea submission is 74 hours.

Working with seekers and solvers is a three-stage process, Lohse said. First, InnoCentive's facilitators work with seekers to define the challenge. Then, they post the challenge on the InnoCentive Web site. They also e-mail individuals registered with InnoCentive who are likely to be effective solvers for a particular challenge. In addition, they can coach solvers in preparing their solution submissions. Finally, the facilitators review the solutions and forward selected solutions to seekers for review. If the seeker selects a submission as solving the challenge, InnoCentive will expedite the payment and intellectual property transfer from solver to seeker.

In addition to the contacts it makes through its own Web site, Procter & Gamble is a client of the Internet-based innovation intermediaries.

The company says it has achieved a goal of using outside contacts to obtain almost 50 percent of its new ideas, technologies, and products. The result has been an increased output of new products and improved manufacturing processes for both new and established products. You can see results of P&G's open innovation every time you shop at a grocery or drug store.

A company in Japan, Unicharm, initially developed the product that became the Swiffer Duster. Accessing and using this outside technology substantially reduced P&G's product development time. The Swiffer Duster and its manufacturing process were developed in 18 months.

Other new products introduced by P&G based on ideas communicated through Connect + Develop include a new Bounce fabric softener formulation developed by an independent inventor, Regenerist anti-wrinkle skin cream, and new pump dispenser designs developed by a European packaging products company. In all cases, P&G's own personnel had to carry the basic idea forward to a commercial product.

The Connect + Develop strategy is focused in a group called External Business Development, headed by Jeff LeRoy. According to LeRoy, "External Business Development's mission is to negotiate deals and transactions with other companies or individual innovators dealing with either an inbound or an outbound exchange of intellectual property. Maybe it's something P&G has. Could be know-how, could be a technology. It could be just about anything we have that another company has an interest in through licensing. We also look to bring things in so that we don't have to invent them ourselves." He noted, "Rather than inventing stuff ourselves like we used to always do traditionally, we now want to look outside first."

To find technology it can use, P&G has developed a network of technology entrepreneurs, who literally search the world for new ideas. Some of them are engineers and scientists. They have to be able to identify technology that can be turned into non-obvious innovations. For example, the basic technology behind Regenerist skin cream was originally developed in Europe to promote faster wound healing.

Open innovation is becoming more widely practiced as companies realize that simply hiring more engineers and increasing research budgets may not accelerate innovation. Open innovation is a methodology that enables organizations to increase their technology imports and exports, and accelerate the pace of new product introduction while increasing profitability.

The practice of open innovation doesn't pose a threat to traditional engineering departments. Chesbrough himself wrote that companies practicing open innovation need to maintain adequate internal R&D activities to turn external ideas into profitable products and processes.

Open innovation also creates the opportunity for engineers to engage in a broader range of activities and assume new responsibilities, like those of P&G's technology entrepreneurs, for example.

After all, Charles Vest, president of the National Academy of Engineering, put it this way: "Companies obtain innovation wherever it is found: in other countries, other companies, and even from competitors." For open innovation to succeed, engineers need to overcome the "not invented here" mindset and both welcome and use ideas from outside their own organization.

John K. Borchardt, a freelance writer based in Houston, is a 22-year veteran of the oil and gas industry.

CONNECTING WITH EXPERIENCE

At least one Internet-based innovation intermediary specializes in connecting retired professionals, particularly engineers and scientists, to organizations seeking short-term help on technical projects.

The organization, *YourEncore* (www.yourencore.com), was founded in 2003, "when P&G and Eli Lilly recognized the need to utilize the expertise of their retirees," said Mike Burns, formerly Procter & Gamble Research Fellow and now chief technology officer of *YourEncore*. Fourteen other companies have joined *YourEncore* since then.



The 787 Dreamliner, shown here in full-scale airframe hydraulic stress testing, is the result of open innovation efforts by Boeing and other companies in the U.S., U.K., Japan, China, and elsewhere.

YourEncore has more than 4,000 engineers, scientists, and other technology-oriented retirees from 650 companies in the high-tech, consumer products, food products, chemical, and life sciences fields. More than two dozen Fortune 1000 companies use its services. YourEncore receives fees from client companies while retirees receive free



registration on the site and pay no fees.

An account executive consults with a client company to determine its technology needs and to identify experts in the YourEncore

database who meet those needs. When experts register with the program, they describe their experience and qualifications in a keyword-searchable database. Also, they check off categories of jobs called service offerings for which they are qualified and in which they would like to work.

Retired engineers often work as YourEncore employees for their former employers. However, they also apply their expertise to industries other than those in which they have spent their careers. Brad Lawson, president and CEO of YourEncore, said that retired Boeing engineers are in high demand at medical device firms. Systems engineers are in demand among life sciences and manufacturing operations.

Lynne Wenberg, senior research manager for strategic business development and analysis at Boeing, connects *YourEncore* with Boeing's personnel needs across the company. "They are brought back for short-term, very specific projects, often in advisory roles," she said. "Employment agreements are performance-based and completed when the project goals are reached."

Retired Boeing engineer Dick Covert said that he got a modest raise, on an hourly basis, compared to his preretirement salary. Another big attraction Covert noted was, "I can set my own hours as long as the work is done." While he could work additional hours, he prefers to limit himself to 20 hours a week to allow time for other activities.

Some *YourEncore* experts work from their homes, which may be located hundreds of miles from the organizations using their services. These experts usually work on short-term projects and often function as consultants.

—JOHN K. BORCHARDT

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