If You Have a Problem, Ask Everyone

By CORNELIA DEAN
Published: July 22, 2008

John Davis, a chemist in Bloomington, Ill., knows about concrete. For example, he knows that if you keep concrete vibrating it won't set up before you can use it. It will still pour like a liquid.

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CASTING A WIDE NET Dwayne Spradlin, president of InnoCentive.

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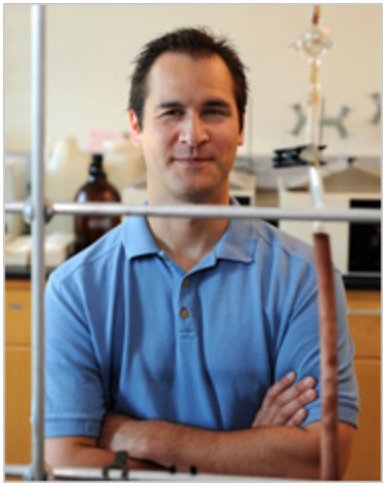

Steve Kagan for The New York Times

OIL John Davis had an idea for how to keep it unfrozen in storage tanks.


Hiroko Masuike for The New York Times

PARTNERS Maria Blair, an executive with the Rockefeller Foundation.


Erik Jacobs for The New York Times

REVIEWED Karim Lakhani has studied InnoCentive and its methods.

Now he has applied that knowledge to a seemingly unrelated problem thousands of miles away. He figured out that devices that keep concrete vibrating can be adapted to keep oil in Alaskan storage tanks from freezing. The Oil Spill Recovery Institute of Cordova, Alaska, paid him $20,000 for his idea.

The chemist and the institute came together through InnoCentive, a company that links organizations (seekers) with problems (challenges) to people all over the world (solvers) who win cash prizes for resolving them. The company gets a posting fee and, if the problem is solved, a “finders fee” equal to about 40 percent of the prize.

The process, according to John Seely Brown, a theorist of information technology and former director of the Xerox Palo Alto Research Center, reflects “a huge shift in popular culture, from

consuming to participating" enabled by the interactivity so characteristic of the Internet. It is sometimes called open-source science, taking the name from open-source software in which the source code, or original programming, is made public to encourage others to work on improving it.

The approach is catching on. Today, would-be innovators can sign up online to compete for prizes for feats as diverse as landing on the Moon (space.xprize.org/lunar-lander-challenge) and inventing artificial meat (www.peta.org/feat_in_vitro_contest.asp).

This year, researchers at the Howard Hughes Medical Institute and the University of Washington began recruiting computer gamers to an online competition, named Foldit, aimed at unraveling one of the knottiest problems of biology — how proteins fold (http://fold.it).

And in a report last year, a panel appointed by the National Research Council recommended that the National Science Foundation, the major government financing agency for physical science research, offer prizes of $200,000 to $2 million "in diverse areas" as a first step in a major program "to encourage more complex innovations" addressing economic, social and other challenges. (The report is available at http://www.nap.edu/catalog.php?record_id=11816).

Senator John McCain of Arizona, the presumptive Republican nominee for president, has proposed that the government offer $300 million to whoever invents a battery compact enough, powerful enough and cheap enough to replace fossil fuels.

Offering prizes for scientific achievements is hardly new. "It has been around for centuries," said Karim R. Lakhani, a professor at Harvard Business School who has studied InnoCentive. One early example was the work of John Harrison, the 18th-century clockmaker who, in response to a prize offered by the British Parliament, solved the problem of determining longitude at sea by inventing a clock that would keep good time even in heavy weather.

But, Dr. Lakhani said, "most laboratories, most R & D endeavors still work on the premise 'we can accumulate and make sense of all the knowledge that is relevant.' The open-source models and a model like InnoCentive show that other approaches can help."

Dwayne Spradlin, president and chief executive of InnoCentive, said in an interview that the company had solved 250 challenges, for prizes typically in the $10,000 to $25,000 range. According to the Web site (www.innocentive.com), the achievements include a compound for skin tanning, a method of preventing snack chip breakage and a mini-extruder in brick-making.

"Odds are one or more products in your home has been innovated in our network," Mr. Spradlin said. "Procter & Gamble has products that were innovated on the InnoCentive network."

InnoCentive began in 2000 as e.Lilly, an in-house innovation "incubator" at the pharmaceutical giant Eli Lilly, Mr. Spradlin said, with the company posting problems that its employees had been unable to solve. From the beginning the results were good, he said. "Most of our companies tell us they have a one-third or better solve rate on their problems and that is more cost-effective than anything they could have done internally."

The company says solvers come from 175 countries. More than a third have doctorates, Mr. Spradlin said, and while motivated by money, they also have a desire to solve "problems that matter."

The company, with offices in Waltham, Mass., has a staff of scientists who work with seekers and solvers, reviewing challenges to make sure they are clear and detailed, and guiding would-be solvers who may have a solution.

That specificity is crucial to InnoCentive's operation, people who have studied the company say. "If you say, 'find me a cure for cancer' it may not work," Dr. Lakhani said. But if problems can be "decomposed" into what he called modular questions, like "find me a biomarker for this condition, these questions may be more tractable."

The idea that solutions can come from anywhere, and from people with seemingly unrelated work, is another key. Dr. Lakhani said his study of InnoCentive found that "the further the problem was from the solver's expertise, the more likely they were to solve it," often by applying specialized knowledge or instruments developed for another purpose.

For example, he said, the brain might be thought of as a biological system, but "certain brain problems may not be solvable by taking a biological approach. You may want to cast it as an electrical engineering approach. An electrical engineer will come in and say, 'Oh, here's the answer for you.' They have not thought of themselves as being neuroscientists but now they can approach the problem from the point of view of electrical engineering."

The oil-flow problem was solved by an outsider, said Scott Pegau, its research program manager. If it could easily have been solved "by people within the industry, it would have been," he said. Instead, Mr. Davis approached it with knowledge he picked up at a friend's concrete business.

One critical element is encouraging organizations to take novel innovation approaches in the first place. That was the task that drew the Rockefeller Foundation to the company, said Maria Blair, an associate vice president there.

Ms. Blair said the foundation was nearing the end of an 18-month pilot program after which the success of the partnership would be assessed. Anecdotal evidence so far suggests the arrangement can be useful, she said, citing as an example a challenge to devise a reliable, durable solar-powered light source that could function as a flashlight and as general room illumination.

"The solver ended up being a scientist from New Zealand," she said, and his light is now being made in China.

"What we want to do," she added, "is connect the nonprofits to the platform, to InnoCentive."

The nonprofits get a break on InnoCentive fees, Mr. Spradlin said, and Ms. Blair said the foundation could subsidize access to innovation platforms. But she said many nonprofit organizations had difficulty dealing with intellectual property rights and related issues.

InnoCentive deals with these issues, in part, by requiring winning solvers to transfer intellectual property rights to the seekers, whose identities are secret, before they can claim an award.

Dr. Lakhani said some companies worried that by posting information about their problems they risk giving valuable information to competitors. Another fear, he said, is that a solver will devise a useful solution, but refuse to turn it over for the prize or even patent it to keep it out of the hands of the organization that originally sought it.

“We have not observed yet any of these kinds of games,” Dr. Lakhani said.

By contrast, the Foldit contest is a volunteer effort. It began as Rosetta@home, a project using down-time of computers throughout the world to do the laborious calculations needed to determine the shapes of proteins, strings of amino acid crucial to the cells of every living thing. The way these molecules work depends on how the strings fold, but calculating the folding is, as the Foldit researchers put it, “one of the pre-eminent challenges of biology.”

In Foldit, players will compete online to design proteins, and researchers will test designs to see if they are good candidates for use in drugs. The researchers who worked to design it say results will also be interesting because people’s intuition for protein folding does not seem necessarily to be tied to formal training or laboratory experience.

“Our ultimate goal is to have ordinary people play the game and eventually be candidates for winning the Nobel Prize,” said Zoran Popovic, a computer scientist and engineer at the University of Washington.

Mr. Spradlin’s goal for InnoCentive is at least as ambitious. By 2011, he hopes InnoCentive participants will have answered at least 10,000 challenges.

When companies and organizations have a problem, Mr. Spradlin said, “I want us to be the first place they go.”