

Reaching Out

Industry sees prize challenges spurring innovation by attracting diverse ideas

Graham Warwick Washington

As budgets are cut and margins squeezed, and business becomes more competitive, industry is turning to challenges to seek diverse views on difficult problems. And the prize, for the companies, can be ideas, talent or visibility in key markets.

"Diversity of thought is key to innovation," says Ray Johnson, Lockheed Martin senior vice president and chief technology officer. "The more different views you get on a problem, the more you can facilitate a culture of innovation."

Increasingly, industry is using prize competitions to find ideas for innovations, and targets for investment. Lockheed ran an innovation challenge late last year, both globally and internally; Northrop Grumman stages a competition for students in the United Arab Emirates; Raytheon runs an annual internal competition, and Sikorsky has launched an online challenge to identify potential entrepreneurial partners.

"When Sikorsky Innovations was founded three years ago, we sought to reach outside the organization for partnerships, to other organizations investing in R&D and to young ventures doing cutting-edge work on a different growth curve," says Laurence Vigeant-Langlois, director of business development and business partnerships.

Sikorsky has made minority investments in several such entities. "But we wanted to go to an even earlier stage of development, to see if there was value in early identification and alignment with our needs," she says. The goal was to identify and invest in entrepreneurial ventures early, to tap into ideas, talent and markets.

Why a challenge? "There is a benefit, especially with entrepreneurs as they are deadline-driven," says Jonathan Hartman, advanced concepts engineer at Sikorsky Innovations. "An online challenge is a time-based way to reach out to them, and a unique opportunity to broadcast our needs to a wide audience." Accustomed to business-plan competitions, "entrepreneurs understand challenges as a route to funding," he says.

Targeted at entities with revenues less than \$5 million, the Entrepreneurial Challenge offers a year of incubation support, technical and business mentoring and an investment evaluation as the prize. The first round was launched in February 2012 with five questions seeking ideas in wireless sensing, signature control, software, energy storage and avionics cooling.

The first winner was Pankl Aerospace Innovations, a California-based company set up by Austrian automotive and aerospace manufacturer Pankl Racing Systems. Pankl's solution addressed the second challenge—adaptive signature control and active survivability—by proposing a set of technologies packaged into a concept rotorcraft called Hero. "It was the complementary transformational technologies, not the product, that drew us," Vigeant-Langlois says.

These include a lightweight, stretchable skin made of a fiber-reinforced, polyurethane-coated Lycra fabric, used by BMW in its Gina concept car. An alligator-inspired "wagging" tail allows faster turns, says Pankl Aerospace Systems CEO

Sonya Zierhut. The skin is covered with thin-film bendable displays for active camouflage and carbon-nanotube loudspeakers for active noise cancellation.

Sikorsky decided two other contestants also were worthy of incubation support: Ottawa-based Smart Rotor Systems, with a new pitch-link control technology; and inventor Drew Lambert, with a mobile network weather information concept.

"We are halfway through the incubation period with the winner and the others," says Vigeant-Langlois. At the end of the year-long prize period, the ventures will be assessed by Sikorsky to see if they are ready to move to the next level of investment. "We expect not all will lead to a formal relationship downstream," she says.

Sikorsky believes the venture has been valuable to both sides. "The winner has used the visibility to leverage interest with the investment community and others," says Hartman.

For the second round, Sikorsky adapted the challenge "not only to look upstream to the supply chain, but to include downstream companies that could be users of the products and services we offer," says Vigeant-Langlois. Questions focused on a different set of challenges: manned/unmanned vehicle operations, preserving damaged structures, lead-time reductions using 3-D manufacturing, reducing cost and time to develop new vehicles, and using vertical flight to open new markets.

"In the first round, we had a half-dozen fully qualified submissions. In the second, we had 16," says Vigeant-Langlois. "The number is not huge, but it's a balancing act between broadening the questions to reach a wide audience versus finding alignment with topics addressing aerospace and focused on rotorcraft."

The second-round winner is ExoLux Transportation, for a social-media platform offering connectivity in the urban VIP helicopter market. ExoLux coordinates a non-scheduled system of helicopter shuttles in south Florida. Rescale, a San Francisco-based company, gets a special mention for a cloud simulation platform that can accelerate design cycles.

The third round will be launched at the Heli-Expo show this week, in Las Vegas, as Sikorsky continues to run spring and fall challenges. "We will keep the questions evolving. No set of five will be the same, so we can hit new markets," says Hartman. The company is also looking at using the challenge mechanism internally, to draw ideas from its employees.

Raytheon has been running an internal challenge for several years, asking employees to propose "disruptive" ideas that

PANKL AEROSPACE

can be inserted into its technology roadmaps. "The Raytheon Innovation Challenge is not limited in scope," says Mark Russell, vice president for engineering, technology and mission assurance. "Each year we pose 5-6 challenges. We say here's a problem 10 years down the road, we're not looking for tomorrow's answer, but something innovative."

While technologists can follow a career-long path to become one of Raytheon's 150 principal engineering fellows, the challenge deliberately casts a wider net and draws around 200 proposals each year. "More than two-thirds of responses are from people who have been with Raytheon for less than 10 years," he says.

One goal is to motivate engineers "to step out of their day job and tackle a problem they are not assigned to at the moment," Russell says. Lockheed's internal challenge was structured similarly, to encourage employees "out of thinking about day-to-day problems," says Johnson, adding "Apart from the financial reward, people want to get noticed."

"If we get a good solution, we fund it for a while, then eventually get customer contract R&D to follow," says Russell. The winner keeps ownership of the idea. "We do not hand it over to another group. That's the worst thing we can do. It would stifle their passion." Winning ideas have included using biometrics to monitor attention span at workstations to sense when operators are getting overloaded. "They are all based around our missions, such as analyzing data from UAVs," he says.

To celebrate its 100th anniversary in 2012, Lockheed Martin set no small goals for its Innovate the Future challenge. "We looked for ideas critical to the world community; global issues such as health care, clean water, renewable energy and cybersecurity," says Johnson. The challenge "was the first of its kind on a global scale for the aerospace industry," he believes.

"We posed one question: how do we enable a more secure future?" says Johnson. "Our focus is global security, but health care, water, and energy all affect security, directly or indirectly." The response "proved this type of challenge is very powerful."

The external competition was designed to help Lockheed

Technologies such as new fuselage materials, packaged in the Hero concept pictured, drew Sikorsky's attention to Pankl.

engage with a new generation of innovators. "Sometimes it is hard for the aerospace and defense industry to connect to a diverse community," says Johnson. "We are encouraged by the response—nearly 500 ideas, covering a wide range, from more than 130 countries."

Three third prizes of \$5,000 each went to ideas for early cancer detection, autonomic malware detection and avatar-assisted therapy. A second prize of \$10,000 went to an idea to enhance solar cell efficiency using photonic design. And the grand prize of \$25,000 went to Moble Benedict of the University of Maryland for a vertical-axis micro wind turbine with dynamic blade pitching for use in urban environments.

The internal competition challenged Lockheed employees to take creativity and apply it to affordability, and generated 670 ideas, says Johnson. A goal was to encourage "horizontal integration" by sharing ideas across the company "in a way that they do not do in their natural environment."

Five winners shared \$50,000 in prizes, the grand prize going to an idea from Lockheed's Aeronautics business for a way of capturing energy from wind at very low speed in urban and cluttered areas. "Our wind-energy business area is talking to the winner about taking the idea forward," he says.

All the winners also are receiving incubation support. "We learned from our innovation competition in India that when great concepts come in from very smart people, they may not have the business backing or experience to take the idea from creation to application, so we work with them to give them professional advice." Sikorsky provides incubation support in Stamford, Conn., but recognizes this is "geographically constraining" and other options may be offered at a later time.

How challenges are judged is important. For Raytheon, submissions are evaluated by a broad-based group of technical directors from across its businesses. "Selection is not run by one person at corporate. It is more of a peer review by a group of technologists," says Russell. For Lockheed, the impact of an idea and its creativity were major judging criteria.

Sikorsky uses two "fundamental, technology-agnostic criteria" to evaluate responses: how is the technology or business concept different, how will it create an improvement over the state of the art; and does the proposal provide a viable concept for the market? "We look at how their experience and skills align with what they are proposing," says Vigeant-Langlois. "We try very hard to be perceived as fair. We want them to consider coming back if they are not successful the first time."

From Lockheed's perspective, the response to its global innovation challenge "shows there is an interested group that wants to participate," Johnson says. "Even internally, ideas do not come forward easily. Here we had untapped ideas bought about because of diversity." ☛