Providing leadership to Indiana and the region

One of the strategic goals of the University of Southern Indiana is to use University expertise and other resources to provide leadership to Indiana and the region. While USI has a long history of outreach and engagement, the opportunities to collaborate and provide applied research on issues impacting the region have never been greater. The stories that follow about the partnership with the Naval Surface Warfare Center–Crane Division, the new USI-Glenwood Community Health Center, the Mid-America Institute on Aging, and the annual business ideation contest are but a few of the many ways the University joins with community partners to make a difference in the state and in Southwest Indiana.

Ryan Richardson of SAIC, a Crane contractor, served as head referee for the inaugural First Lego League tournament held at USI. The event was a regional qualifier for the state competition.

USI and NSWC–Crane Division

Working together to build a tech-savvy workforce and generate economic development

The partnership between the University of Southern Indiana and the U.S. Navy's engineering and technical support center in nearby Crane, Indiana, is deep and broad.

From a fourth-grader building a robot to the company executive looking for a solution to a technology problem, the relationship between the University and the Naval Surface Warfare Center–Crane Division, the third largest naval installation in the world, comes to bear. "We don't have this kind of relationship with any other university," said John Dement, technology transfer manager for Crane. "Usually, when a lab like Crane deals with a university, we're doing research and development with them. It's fairly narrow and project-based. There's a contract.

"But, with USI, it's not about money. It's about a long-term commitment to change a region. USI is leveraging Crane's authority to provide technical assistance to make a difference."

USI and Crane officials signed agreements to enhance USI faculty research and student-learning opportunities. One agreement also provides for collaboration to identify information or technology developed at Crane for military uses that could be commercialized or further developed for other uses, spurring economic development.

STEM activities

Both Crane and the University are making an impact by promoting STEM (science, technology, engineering, and mathematics) activities and careers. The goal is to build a workforce in Southwest Indiana that will support a technology-based economy and continued economic development.

The Southwest Indiana STEM (SwISTEM) Resource Center, hosted by USI's Pott College of Science, Engineering, and Education, has partnered with Crane, as well as its industrial contractors, on a number of activities—including SeaPerch, a national robotics program funded by the U.S. Office of Naval Research. The first SeaPerch competition for Southwest Indiana was held at USI in 2011, attracting 21 teams of middle and high school students from

12 schools. Participants built their own remotely operated underwater robots for the competition. At press time, the University was planning to accommodate up to 80 teams for the 2012 contest. The event encourages learning basic engineering and science concepts with a marine engineering theme.

In the fall, USI introduced another robotics contest, the regional First Lego League (FLL) competition. It attracted 13 teams of children ages 9 to 14. Allison Grabert, interim director of the SwISTEM Resource Center, said the opportunity to network with professionals from Crane and its industrial contractors infuses events such as these with a real-world connection.

Ryan Richardson of SAIC, a Crane contractor, served as head referee for the FLL tournament. "Every student I spoke with had a different reason for participating, but one theme continued to rise to the top and that was the students' desire to succeed, learn, and have fun with one another," he said.

Opportunities such as SeaPerch and FLL give children visibility into the high-tech world of engineering and technology.

Crane also has hosted summer faculty development workshops for middle school and high school teachers sponsored by the SwISTEM Resource Center and provided judges and awards for the annual Tri-State Science and Engineering Fair hosted by USI. In 2011, Crane recruited high school sophomores from Rickover Naval Academy to attend the Pott College's GO (Girls Only) STEM! Camp and assisted them with transportation costs.

Developing curriculum

USI faculty member Dr. Jeff Thomas has developed curricular materials that relate to the work at Crane. An associate professor of education, Thomas worked with the USI Office of Distance Education, the U.S. Navy Crane STEM coordinator, and six scientists at Crane to complete the project.

The videos feature scientists from three Crane divisions (Elastomers, Prototypes, and Solar Power) discussing and demonstrating how science is involved in their work and how it relates to elementary students. Shooting took place in a tower, in a machine-filled laboratory, and in a field at the expansive Crane site. The project was coordinated through USI's Center for Applied Research. Crane will host the videos on its web site.

"The collaborative approach was instrumental," Thomas said, "in creating a superb product that will help classroom teachers across the nation connect with students about the role of the U.S. Navy and the exciting work that scientists do."

Bryan Woosley, a transducer and elastomers scientist at NSWC - Crane, presents the Department of Navy - Senior Division Award to Brianne Neeley during the 2011 Tri-State Science and Engineering Fair. Neeley is from Castle High School in Newburgh, Indiana.

In an earlier partnership, Thomas developed lesson plans for regional fourth- and fifth-graders to complete during field trips to Crane. One set of plans focuses on harnessing power and includes experiences to help students understand the role of solar power in the lives of U.S. Navy personnel. The other set focuses on power and propulsion and includes experiences in building rockets.

Undergraduate research

USI students investigating the relationship between the mechanics of the butterfly hind wing and its false-head behavior in an undergraduate research project visited Crane facilities last summer. They planned to use Crane's microcomputer tomography (microCT) capability to collect information on the dimensions and microstructure of the butterfly hind wing for numerical modeling.

"Although we were not successful with the CT imaging, the Failure Analysis group at Crane was kind enough to offer another imaging technique (scanning electron microscopy) to help collect data," said Dr. Julian L. Davis, assistant professor of engineering. "I believe the students gained an appreciation for the

USI's Southwest Indiana STEM Resource Center hosts the SeaPerch robotics competition, generating interest and excitement in engineering and technology among middle school and high school students.

collaborative efforts—between individuals and institutions—that motivate many research projects. I also hope they gained an appreciation for the persistence necessary to succeed in research: it doesn't always work perfectly the first time around!"

Innovation Discovery

Crane and USI are collaborating on ways to commercialize Crane's military inventions and otherwise match Crane's experts, facilities, and additional resources with appropriate businesses, industries, and entrepreneurs. USI's Center for Applied Research (CAR), and the Growth Alliance for Greater Evansville (GAGE) are significant links in this endeavor. Transferring technology from military use to commercial applications can trigger economic growth and create jobs.

CAR has developed a mining process for intellectual property that is designed to discover and document commercially viable projects. Called Innovation Process Discovery (IPD), it has been identified as a best practice by the Navy Technology Transfer Program and is a prototype for federal research laboratories throughout the country.

"At NSWC–Crane, technical staff develop innovative solutions to enhance existing devices and develop future capabilities in the areas of electronic warfare/information operations, special missions, and strategic missions," said Dement of Crane.

With a technical staff of more than 2,000 persons working every day to develop solutions for military use, Crane offers fertile ground for spotting innovation with additional application.

Before the Innovation Discovery Process, there was no process in place to identify and capture the intellectual-property aspects of discoveries at Crane. And there was little awareness among the scientists, technological personnel, and engineers of the technology transfer and commercialization potential of the innovations developed and implemented within their military projects.

At IDP events, Crane inventors present their specific project to a panel of technology transfer experts, business and engineering faculty, serial entrepreneurs, and industry experts who then explore potential inventions and commercialization opportunities using a structured creative-thinking process led by USI.

Since 2008, 40 Crane employees have presented 23 projects to expert panels. The process has led to 21 formal disclosures of inventions and 18 patent applications. Many more potentially viable projects have been identified.

The process unlocks the potential for commercial opportunities and exposes NSWC Crane's inventors to external partners. Once patented, these inventions become licensable to businesses and entrepreneurs leading to new business start-ups.

Student entrepreneurs

Expert panels are not the only ones who delve into thinking about how Crane's patented concepts can be applied elsewhere. Students in USI's College of Business program on entrepreneurship recently developed ideas for three Crane innovations: an airborne cargo mounting system that eliminates the need for tie-down chains, a crane, and pallets; a mechanism that allows a pilot's goggles to tilt and lock into position; and a modular safe room designed to provide protection from ballistics. Students in a class on ideation and innovation were challenged to produce ideas that would employ the technology in the commercial market and an additional "weird and wow" idea that was a take-off on the patent idea.

"In essence, the students are another outlet that generates creative new ideas for Crane," said Bryan Bourdeau, instructor of business. "At the same time, students learn about ideation and critical thinking from engaging with

Students enrolled in the entrepreneurship program in the College of Business present ideas to a panel of experts.

Crane. It's a real-world educational platform. I believe commercially viable ideas will come out of that class. It's only a matter of time."

A nine-person panel, including USI President Linda Bennett, recently judged the student presentations. As a judge for a similar event last year, Dement said USI students demonstrated some of the best presentation skills he has seen.

Technology transfer

To match Crane innovations with regional companies and entrepreneurs, the USI-Crane partnership also relies on GAGE, an economic development organization dedicated to enhancing the overall economic vitality of the region. USI is the education partner in GAGE.

"We are going out and working with regional companies that typically have a technology base," said Gene Recker, manager of education and entrepreneurial support for Innovation Pointe, a business incubator associated with GAGE. Dement and Recker, along with Debbie Dewey, president of GAGE, and the USI-Crane partnership manager, Dr. Andrew J. Moad, work as a team to stimulate technology transfer.

"We want to find out if companies have a product development challenge or issue that needs a technology-based solution," Recker said. "We ask them to describe the problem in concrete terms or what the solution would look like. Then we search through Crane or through the entire federal lab consortium to see if there's a technology out there that might be a potential solution.

"We have had success in doing that. In one case, a company needed a material with certain attributes. We found a similar material and were able to connect the person at the company with the scientist who invented it. They are now exploring how to move forward."

The technology transfer effort also can connect companies or individuals with experts at Crane for informational purposes.

"Crane has scientists who are leaders in their field," Recker said. "Sometimes a company wants to know where technology in that field is going. They want to know trends. Talking with experts in their field can be beneficial."

Crane test facilities offer another opportunity for collaboration. Companies often cannot afford state-of-the-art laboratories like those at Crane. Under certain circumstances, laboratory work may be done at Crane. Recker said this may require formal agreements and a fee, but is advantageous in some situations.

Dewey said the one-on-one "pull" approach working with companies was successful in a pilot program in 2011. This is a focused strategy different from the technology showcase that offers a more general look at available technology to a broad audience. Moving forward, the technology transfer team will expand the "pull" approach and add a "push" approach to identify technology or expertise in the region that might be useful to Crane.

Another boon to those interested in Crane technology is a business translation project completed by Jonathan Rietman as a student in USI's Master of Business Administration program. With the assistance of Dement, he and fellow student Nick John analyzed and translated complex patent information into non-scientific terms. The business translations helped inventors at NSWC Crane better understand the value of their patents for potential use in a commercial setting.

The translations were distributed to partnership intermediaries such as Tech Link and First Link and to a university network for use in helping transfer the technologies. These partners also provided assistance in identifying markets to explore for companies that could have interest in the patents.

Future collaboration

Senior leaders of both USI and Crane continue to brainstorm new ways to make a difference in Southwest Indiana. Also under consideration are studies of how innovation takes place and more collaboration in the area of education.

Dr. Mohammed Khayum, dean of the College of Business, and Dr. Kevin Celuch, professor of marketing, will lead a study to identify mechanisms in Crane's innovation process.

"Crane is a living laboratory to study innovation," Dement said. "USI brings the measures and metrics of innovation. If we can quantify and measure what we do, we can do it more effectively."

In the area of education, the partners are exploring the prospect of connecting doctorally prepared Crane scientists with USI as adjunct instructors. Instruction could take place at USI or at Crane facilities.

Moad named USI-Crane partnership manager


Moad

Dr. Andrew J. Moad has joined the University as USI-Crane partnership manager.

The manager serves as the liaison in growing the University's relationship with the Naval Surface Warfare Center - Crane Division in areas including applied research, technology transfer, innovation, and STEM (science, technology, engineering, and mathematics).

"I'm very excited that Andy Moad is joining USI," said Dr. Mark C. Bernhard, USI associate provost for Outreach and Engagement. "His work as an analytical chemist in both government and corporate sectors, combined with his entrepreneurial spirit, made him the candidate of choice."

Moad was most recently a new product development chemist at Red Spot Paint and Varnish in Evansville. He also has experience as a research chemist at the National Institute of Standards and Technology, an agency of the U.S. Department of Commerce. He earned a doctorate in analytical chemistry at Purdue University.