

ETIC Success Story
College of Engineering
Oregon State University

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The Oregon legislature's investment of ETIC funding in the College of Engineering at OSU has expanded Oregon's engineering workforce while creating opportunities for young Oregonians. This critical investment has impacted the state's economy in the form of new ventures that create jobs in Oregon. The ETIC funding has also bolstered an already powerful public-private partnership and enabled the College of Engineering to leverage the state's investment by more than 10 to 1.

OSU Engineering has done more than simply increase its output of engineering graduates. It has also improved a pipeline from kindergarten to PhD that ensures the world's best engineering talent is available locally.

- Recruitment and retention of top Oregon talent is essential to the College of Engineering's ongoing success. Thanks to ETIC support of Don Heer and others, a program of hands-on, experiential learning was developed that engages students from day one through graduation. The TekBots program is so powerful that other engineering schools in the U.S. and abroad are adopting this learning system as a means of increasing retention. The concept has been extended through "TekPets" to middle schools as an engaging way of recruiting younger students to engineering and computer science fields. The TekPets project was introduced to 100 students in a Salem middle school and is being led by Ellen Porter a computer science sophomore from Gilchrist, Oregon. The experiential learning concept is being extended to other areas in the College of Engineering. Recent ETIC hire, Dr. Carlos Jensen who joined OSU from Georgia Tech, is creating a platform for learning for future computer scientists through the use of a handheld device and a community of code concept.
- Developing graduates who are prepared to contribute from their first day on the job is dependent on more than just classroom theory. ETIC-supported faculty at OSU mentor student teams in national and international design competitions, where OSU teams have been very successful: 40 wins or top-3 placements in the past three years. These events further develop the innovation skills needed by Oregon industry. For example Jaynie Schonbrod of Bay City, Oregon, led the 2006 SAE Mini Baja team to an international win and later landed an inkjet R&D position at HP in Corvallis. More recently, ETIC hire, professor Christine Kelley, mentored a group of chemical, biological, and environmental engineering students to win the national competition with their novel method of detecting *E. coli* in spinach.
- OSU's partnership with more than 100 companies under the Multiple Engineering Coop and Civil Engineering Coop internship programs serves as both a recruiting tool and as a means to develop work-ready engineering talent. Approximately 400 students are placed annually in six-month internships where they learn "real-world" engineering while helping to solve industry's problems. A preselect program guarantees high school freshmen internships in their final school year, helping to attract the best students to OSU. This program, together with more than \$6M in privately funded scholarships (leveraged by ETIC funding) awarded to engineering students, enables OSU to recruit top high school students from Oregon and elsewhere. The number of top students has more than doubled since the inception of ETIC.

- OSU's 50% growth in PhD enrollment has been achieved through leading collaborative research clusters staffed with faculty supported by ETIC. Weng-Keen Wong joined OSU's Intelligent Information Systems Research Cluster from Carnegie Mellon University. He has already recruited three new PhD students to join him in research on the early detection of disease outbreaks, an important security and health issue.
- Nearly 1,200 engineering and computer science graduates can be directly linked to ETIC funding since 1999. More than half reported being employed in Oregon immediately after graduation. These graduates have high wage jobs, earning more than \$100M in annual salaries since 1999.

Results from research conducted by OSU faculty supported by ETIC has had a direct benefit in creating new jobs for Oregonians. Since 2004, 11 new companies have been formed from the results of research conducted by College of Engineering researchers, and those companies have attracted more than \$85 million in private investment, originating mostly from outside of Oregon. The following are examples of how ETIC investment in new faculty has enabled this impact.

- Professor Martin Erwig joined OSU from the University of Hagen and immediately engaged in research related to end user software along with OSU professor Margaret Burnett. The results of their teamwork have been incorporated into the spreadsheet error checking software being developed by the new Oregon company RedRover Software.
- Brian Woods joined OSU after working for Dominion Energy's Innsbrook Technical Center outside of Richmond, Virginia. At OSU, he became part of the team developing the concept of a small scale nuclear power plant and is co-inventor of the technology. The idea developed by the OSU team is now being commercialized by the new Oregon company NuScale Power. NuScale is further leveraging this impact by working with local Oregon companies on the fabrication of components for the power plant.
- Alex Chang joined OSU from the University of Florida and began collaborating with ONAMI researchers at OSU. He is part of the team that created a new microreactor technology for nano particle production for drug delivery. The new Oregon company NanoBits is in the early stage of operations.
- Ted Brekken recently joined the wave energy group from the University of Wisconsin where he was leading their research efforts in wind and water power. Brekken is working with the OSU team to further develop the buoy power generator being commercialized by Columbia Power Technologies, with R&D sites in Oregon and Virginia.

OSU's broad impact on Oregon includes meeting the needs for sustainable transportation systems and preparing for coastal hazards imposed by the impending Cascadia Subduction Zone earthquake, which could generate a tsunami.

- ETIC hire Dan Cox came from Texas A&M University to Direct OSU's wave research laboratory, home of the NSF National Tsunami Lab. Among the projects conducted at the lab is the Seaside, Oregon tsunami evacuation study. Cox and his colleagues are helping the community of Seaside,

and other Oregon towns, understand how vertical shelters will save thousands of lives during a tsunami.

- Dr. Chris Higgins who joined OSU from Lehigh University has become an internationally recognized expert on bridge structures. He is leading research on bridge structural integrity and has already saved Oregon \$500 million by helping ODOT manage bridge replacement and repair. ETIC investment is helping Chris's current work on new bridge repair technologies that will save more money as Oregon continues the repair/replacement process.

OSU has clearly demonstrated that an investment in ETIC is an investment in Oregon's future prosperity: it builds the engineering workforce needed by Oregon's industry while creating a culture of innovation that spawns new businesses and creates new jobs for Oregonians.