

Engineering and Technology Industry Council Campus Investment Proposal Biennium from July 1, 2011 to June 30, 2013

Campus: Eastern Oregon University

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Summary of Proposal:

Eastern Oregon University is submitting a proposal to support ETIC's strategy to establish Centers of Excellence in Oregon in the area of *Environmental Sensing and Systems*. This is an area where we can provide the most resources for our academic partners and regional industries in terms of research and potential funding. Eastern Oregon has abundant resources in wind, solar, water, and biomass and natural resources that need study and development. This proposal will outline two partnerships with the University of Oregon and Oregon State University that will further research capacities, help to leverage available federal and private funding for green initiatives in Oregon, and further the capacity of EOU to strengthen the recruitment and education of students in key areas of science and technology. Finally, it is our intention to weave advances in research and educational developments to strengthen regional economic development in the usage of advanced technologies.

Vision and Goals Statement

Eastern Oregon University has a specific mission to serve our region, which covers 46% of the state of Oregon. We seek to continue providing leadership in the delivery of state-of-the art technological education and development and maintenance of a STEM pipeline in Eastern Oregon. EOU gives students the opportunity to study pre-engineering and traditional computer science, including software development, network administration, scientific computing, biometrics, and robotics. The University has strong partnerships with regional community colleges and we will be aligning our projects wherever possible with the Science Center to be developed in Hermiston.

EOU proposes the following goals:

1. To build on existing strengths in facilities and capacities to work with academic and private partners, and to further strengthen our recruitment and graduation of computer science and pre-engineering students.
2. To collaborate with other OUS partners to build a capability in environmental sensing and systems research to strengthen Oregon's capacity to attract new funding for these research areas.
3. To further regional economic development, creating high tech industries in Eastern Oregon through the ETIC strategy of leveraging partnerships and areas of expertise, and by advancing our Industry Advisory Board as advocates in that mission. The charge of our IAB reads:

- a. The purpose of this Board is to serve the Department in an advisory capacity. The Board will advise Programs and Industry members to improve communications between educators, industry representatives, students and the community. The Board will advocate and promote sustainable growth and innovative change to develop EOU programs and foster regional technological industries and applications.
- b. The vision of the Board and Department is to develop sustainable and relevant educational opportunities to benefit students and industries in all of Eastern Oregon.

Investment Description

Our Investment Description includes three components:

1. Partnership with the University of Oregon Green Materials Center and PNNL for the development of a nanoscale sensor for bacterial detection.
2. Partnership with Oregon State University, College of Electrical Engineering to work on wi-fi sensors and environmental monitoring.
3. Development of a Scientific and Statistical Computing Facility (SSCF) to serve these research projects as well as regional high tech industries.

Collaboration with the University of Oregon and PNNL

Dr. Cavinato, an analytical chemist who conducts research in the area of sensor development and non destructive analysis, is currently working on a joint project with Andy Berglund at the University of Oregon and Richard Ozanich and Marvin Warner at Pacific Northwest National Laboratory for the development of a nanoscale sensor for bacterial detection. This novel sensor is based on aptamers (small sequences of DNA or RNA selected in vitro) linked to gold nanoparticles. The idea is to produce highly sensitive and specific colorimetric sensors tailored at detecting a biomarker unique to the bacterium of interest. While the first of these sensors will be aimed at detecting *Renibacterium salmoninarum* (Rs), the pathogen responsible for causing bacterial kidney disease (BKD) in salmonids, it will provide a model system that can be easily modified for detection of other pathogens. With current concerns in biodefense, water and food safety and security, and drug-resistant bacteria, the sensor addresses a need for rapid identification of infectious bacteria.

As EOU builds expertise in the area of environmental sensing and systems, it will be able to contribute to the growth of the UO Center for Green Materials and at the same time draw from the expertise in nanomaterials already in place at UO. The collaboration leverages existing strengths at both institutions bringing together Dr. Andy Berglund who has a well established SELEX lab for identification of appropriate aptamers and Dr. Anna Cavinato who has over twenty years experience in the field of noninvasive analysis using near infrared and FT-IR spectroscopy to detect bacteria in food and bacterial infections in salmonids. The additional collaboration with scientists at PNNL who have extensive experience in sensor design and the relevance of this project to biodefense, clinical diagnostics and environmental monitoring will further strengthen efforts to seek federal funding from agencies such as DoD, DHS, NIH, and EPA. They already have submitted a proposal to ONAMI to support this project. Potentially, the findings from this study could lead to the fabrication and commercialization of low cost biosensors that could be utilized in the field for rapid and accurate detection of pathogens without the need of skilled technicians or expensive equipment. Such a method could be eventually converted into dip stick format, making it simple and straight forward to use.

In addition, ETIC investment in this project will help establish for the first time at Eastern Oregon University, and ultimately in the eastern side of the state, expertise in nanotechnology. EOU plays a pivotal role in the education and economic development of eastern Oregon and it is paramount that

students pursuing STEM degrees be involved in state-of-the-art research projects that will make them competitive in the work place or for admission to graduate and professional schools.

Collaboration with Oregon State University

Our physics and engineering faculty, Dr. Tom Herrmann and Dr. Anthony Tovar will be involved in the interfacing of sensors to data collection hardware. They have experience and expertise in circuit design and the use of several microcontrollers, including the one used in OSU's robotics curriculum (the Atmel AVR). We propose to collaborate with Oregon State University Professor and Head of the School of Electrical Engineering and Computer Science, Dr. Terri Fiez. Dr. Fiez's research interests include the development of ultra-low-power wireless sensor networks. Our faculty have experience with the use of wireless hardware and software in robots, and will contribute to the testing and development of useful sensor networks. Our goal is the development of low-cost sensor networks for use in silvicultural/agricultural settings.

The faculties in biology, chemistry and computer science will be working with the physics and engineering faculty to implement the testing of this project, in collaboration with the OSU team. We have ongoing research at the Rebarrow Forest and the McKenzie Farm, and regional sites that need environmental monitoring, such as the Ashgrove Cement factory in Baker County. We also can work with our partners in the Hermiston/Pendleton area and in other regions as well.

Development of a Scientific and Statistical Computing Facility (SSCF)

As part of our commitment to the Centers for Excellence, we propose to construct a new facility for scientific computing. Currently, the CS Program at EOU offers a concentration in scientific and statistical computing, to prepare students for careers developing software applications in the sciences. Current lab facilities and infrastructure are insufficient for the anticipated needs of the program in the 2011-2013 biennium. There are two issues that need to be addressed. First, there is no dedicated computer lab on campus that can seat more than 24 students. We propose to double this capacity to 48 workstations in order to support the growth of the program. Second, the existing Linux parallel processing cluster is now five years old and beginning to suffer hardware failures. Part of the problem is that there are very few places on the EOU campus that have the necessary HVAC capability for an installation of this size. The estimated cooling needs of the cluster are approximately 14,000 BTU/hr, and the hardware failures we are experiencing are in part due to the inability to provide sufficient cooling. A new cluster, using up-to-date components, would use less power and thus be easier to maintain as well as less expensive to run. The existing cluster is used primarily by the CS program for teaching parallel processing concepts and by the chemistry department for molecular modeling; we anticipate that an updated system would be critical for our continuing scientific work.

Private Support

EOU is developing collaborative relationships with a number of area partners. Through our Industry Advisory Board, we are actively supported by IRZ, Cayuse Technologies (who are supported by Accenture), Grande Ronde Hospital and Zephyr Technologies. We anticipate that these collaborations will develop into a fruitful source of research and program support over the next five to ten years.

Results and Benefits

The development of these technologies will carry enormous potential for collaborative grants, possible patents, and definite savings for regional agriculture and natural resource industries. Eastern Oregon

regions are eligible for Rural Energy for America Program (REAP) and Rural Broadband grants. For example, there are regional consortia for rural broadband that have actively submitted proposals in this area and recently the La Grande school district received several hundred thousand dollars to upgrade broadband. In addition, the EOU Industry Advisory Board has just recruited Rick George, the Director of Natural Resources for the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and we have plans to work with Stuart Harris of the CTUIR in sensor field studies in the summer of 2010. EOU faculties in all three Colleges have been exploring collaborations with county and regional partners as well.

The short-term benefits that will flow from the goals outlined above are:

- Increased support for research at EOU and in Eastern Oregon. Two full-time staff positions are proposed for support of research in remote sensing and nanotechnology. We anticipate that this will result in a quantitative increase in external funding.
- Enhanced collaboration with UO and OSU in research supporting the Centers of Excellence. This should provide increased opportunities for undergraduate research as well as an increase in publications and in patents received.
- An updated infrastructure at EOU to support its educational and scientific mission, resulting in increased enrollment in CS and pre-engineering.

Note that we can only estimate the magnitude of these increases. However, these metrics provide easily quantifiable indicators of the success of ETIC's investment. We will report on these measures at the end of the biennium.

In the medium term, we would expect the following additional benefits:

- A significant increase in research opportunities in Eastern Oregon.
- An increase in the technically trained workforce in the region.
- More opportunities for EOU graduates to pursue advanced degrees at our partner institutions.
- Enhanced external funding for science and technology in Oregon.
- More private-sector investment in Eastern Oregon.

Future Plans & Resources

By 2013, we will know if the strategies enunciated in this proposal are successful in growing the program, course enrollments, and capacity for regional economic development. For the past two years, Eastern Oregon University has grown in enrollments and student credit hours, as well as academic and community partnerships. Our new President has a well defined objective to increase enrollment by one-fifth in the next several years. In addition, as mentioned throughout the proposal, we also intend on working on gaining private investments with our Industry Advisory Board. There is a real opportunity to partner with the city of La Grande in the creation of the Scientific and Statistical Computing Facility that will help us leverage resources as well.

As we gain in strength our next steps will be to create stronger partnerships in the academy and the community. Therefore, we hope that we will be able to add two to three faculty to our program in the coming five years. Obviously, this will depend on the same factors and their success mentioned above.

Proposed Investment and Private Support Forecast (\$M)

		2011-2013 Biennium
1	Sources of funds	
2	Base budget for ETIC-related programs -- all sources except ETIC allocation & private support	\$ 0.180
3	Proposed allocation from ETIC budget (\$M) (3)	\$ 0.917
4	Expected private support (\$M) (4)	\$ -
5	Total (\$M)	\$ 1.097
6	Personnel supported (FTE) (5)	
7	Existing faculty (1)	2.5
8	New faculty(2)	0.0
9	Existing staff (1)	0.0
10	New staff(2)	3.0
11	Total	5.5
12	New positions created (6)	
13	Faculty (2)	0.0
14	Staff (2)	3.0
15	Total	3.0
16	Uses of ETIC funds in line 3	
17	New facilities	\$ 0.315
18	Improvements to facilities (7)	\$ -
19	Laboratory equipment (7)	\$ -
20	Other equipment (7)	\$ -
21	Other one-time expenses	\$ -
22	Existing faculty salaries & benefits (1)	\$ 0.255
23	New faculty salaries & benefits (2)	\$ -
24	Existing staff salaries & benefits (1)	\$ -
25	New staff salaries & benefits (2)	\$ 0.322
26	Services & supplies	\$ 0.025
27	Other	\$ -
28	Total (8)	\$ 0.917
	Notes:	
	(1) Hired through June 2011 that will be supported by ETIC funds during 2011-13 biennium.	
	(2) To be hired with ETIC funds during 2011-2013 biennium.	
	(3) Include any Certificates of Participation to be issued during 2011-2013 biennium.	
	(4) Consistent with ETIC Private Support Policy dated 1-23-02.	
	(5) FTE expressed as percent of full time over 2 years of biennium. For instance, a new full-time faculty member hired on 7/1/12 would be counted as 0.5 because he/she joined half way through the biennium.	
	(6) FTE on an ongoing basis. For instance, if a new half-time position is created but not expected to be filled until the last month of the biennium, it would still be counted as 0.5.	
	(7) Include improvements and equipment to be purchased with ETIC funds and any Certificates of Participation to be issued during the biennium.	
	(8) Totals on line 3 and line 28 should match.	

Metrics Forecast (for programs/departments receiving ETIC funding):

	Actuals (1)		Projected (2)		
	AY 99	AY09	AY13	AY15	AY20
Undergraduate student credit hours	0	2666	3000	3250	3500
Graduate student credit hours					
Graduation rate, 6-year (3)					
Bachelor's degrees granted	0	10	15	20	25
Master's degrees granted					
PhD degrees granted					
Women graduating (4)		11%	15%	20%	25%
Minorities graduating (5)		33%	33%	33%	33%
Externally-funded research expenditures (6)			\$500,000	\$1,000,000	\$1,500,000
Invention disclosures (7)					
License/options (8)					
License income received (9)					
Spin-off Companies (10)					
National ranking of <program or department> (11)					
National ranking of <college>					
Notes:					
(1) Actuals for 12-month period ending in June of the year shown.					
(2) Forecast for the 12-month period ending in June of the year shown.					
(3) Percentage of undergraduate students who started ETIC-Supported program as freshmen six years earlier who have completed bachelor's degree in an ETIC-supported degree.					
(4) From engineering, computer science, and other programs directly benefiting from ETIC funding, stated as percent of all those graduating.					
(5) Racial and ethnic minorities who are US citizens or permanent residents, stated percent of US citizens or permanent residents graduating.					
(6) Total external dollars spent by ETIC-related departments towards research during academic year. Because of the sensor focus of this project, we do anticipate external funding with related departments that already receive external funding.					
(7) See Association of University Technology Managers (AUTM) survey definitions.					
(8) Number of license or option agreements executed during the year. See AUTM survey definitions.					
(9) License issue fees, payments under options, annual minimums, running royalties, termination payments, the amount of equity received when cashed in, and software end-user license fees equal to \$1000 or more, but not research funding, patent expense reimbursement, valuation of equity not cashed-in, or end-user license fees less than \$1000. See AUTM survey definitions.					
(10) New companies that are dependent on the licensing of your program's technology for their initiation. See AUTM survey definitions.					
(11) Forecasts for multiple programs and departments are encouraged. Each ranking should be footnoted with the ranking body or ranking methodology.					