



UMass finds partners to join research

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How can a \$1 million endowment turn into a \$40 million research center that's expected to yield \$100 million in 10 years, creating new products and new jobs, and save lives?

It's not easy, but it's being done at the University of Massachusetts Amherst campus at the new Engineering Research Center for Collaborative Adaptive Sensing of the Atmosphere (CASA).

"If you want to make money, you have to invest money," John A. Armstrong said.

The retired IBM executive who lives in Amherst should know. He's the one who put up the \$1 million to create the Armstrong Professor of Engineering position at UMass that David J. McLaughlin was hired to fill. In turn, the associate professor of electrical and computer engineering helped bring the state, industry and other universities together to financially support the research center and prove to the National Science Foundation that investing money in the endeavor wasn't folly.

Following months of networking, phone calls and meetings, the state agreed to ante up \$5 million; Raytheon, IBM, M/A-Com, Vaisala, Vieux & Associates, Telephonics and The Weather Channel pitched in \$6 million in cash and in-kind donations; and UMass and its partners in the project, University of Oklahoma, Colorado State University and the University of Puerto Rico, Mayaguez, gave \$12 million, with UMass giving half. Seeing that support, the National Science Foundation kicked in \$17 million. The \$40 million in funding is over a five-year period.

"It's about partnerships today," UMass President Jack M. Wilson said from his office in Boston recently. "That's why CASA (Collaborative Adaptive Sensing of the Atmosphere) is such a wonderful example."

Since becoming the interim president in September and the permanent president in March, Wilson has cut a swath through the state with this message: The state's regional, economic and social development must go through UMass.

Research and development, with an emphasis on technology, will be the focus of that effort, he said. The players in such a scenario agree it will take the state and industry working together to win the precious federal grant money to make this happen.

"Everybody asks for partnerships. They want to know the state cares enough about this that it puts some of its resources on the table," Wilson said.

A 50-plus page report, overseen by Armstrong and released in February, titled, "Choosing to Lead: The Race for National R&D Leadership & New Economy Jobs," calls for partnerships, state support and more.

The report details the following worrisome facts. The state's share of all university research and

development activity throughout the country has fallen from 7.6 percent in 1985 to 6.9 percent in 2001. Federal research funding to Massachusetts has declined from about 7 percent in 1985 to 5.5 percent in 2001. All five UMass campuses, with Amherst as the flagship, would rank as the 42nd largest research university in the nation. To add to this, Massachusetts has had the highest percentage decrease in state higher-education spending of all 50 states.

The report, touted as the Massachusetts Technology Road map, was organized by Mass Insight Corp., a Boston-based public policy firm, and Battelle, an Ohio-based technology and economic development consulting firm.

The report calls for a 10-year plan that promotes new partnerships and aggressive financial commitment from the state, along with better use of UMass. New York, California, Pennsylvania and North Carolina are singled out as competitor states that exemplify what Massachusetts should be doing.

"This is absolutely a critical role, for all our universities to drive technology transfer," said Barbara B. Berke, director of the state Department of Business and Technology. "This is the backbone of the state's economy," she said.

Research leads to patents, which create intellectual property, which create licensing revenues for the institution, which create new business that produces new jobs, Berke said.

The \$100 million economic stimulus package passed by the Legislature in January is a start. The money is being used for several initiatives, including matching federal research grants and promoting regional technology development. Wilson wants to double the university's current \$300 million in annual research over the next five years.

"That \$100 million is all part of the big picture," said state Sen. Stanley C. Rosenberg, D-Amherst, a UMass graduate and chairman of the Senate's new Task Force on Higher Education.

Creating state, federal and private sector coalitions to advance new knowledge is the game now, Rosenberg said.

"We have to plant the seeds. If we don't have the seed money and the right attitude, no one is going to bring us into the game," he said. "CASA is a perfect example. We needed to put millions of dollars on the table so the federal government would put millions of dollars on the table."

CASA is by no means the only example of a successful partnership. Research at UMass Medical School in Worcester has stimulated a Biotech Research Park that has created jobs; a state investment in marine sciences allowed UMass Dartmouth researchers to help New Bedford scallopers increase their catch by \$50 million; and a collaboration between Springfield's Baystate Medical Center and UMass-Amherst has created research and development growth and jobs. The Boston and Lowell campuses are also contributing to successful collaborations.

"By having the collaboration between the university and industry, we can accelerate economic development, which will ultimately be jobs," said Keith M. Parent of Palmer, chief executive officer of Court Square Data Group of Springfield and a member of the UMass High Tech Executive Council. "I think economic development and growth in this state will come out of our university system. You're dealing with years of hierarchy in higher education. It's going to take some time."

Convincing Boston-based companies that Western Massachusetts is a viable and cheaper area for expansion is also key to economic growth west of Worcester, Parent said.

Raytheon Co. of Lexington, a major defense and aerospace systems supplier, doesn't have to be convinced that combining forces with outside-industry sources works. Since 1980, the company

and UMass Amherst have offered a graduate program in microwave engineering. The company has also partnered with school districts throughout the state to support science and math curriculums that promote careers in engineering.

Mark E. Russell, vice president of engineering at Raytheon, calls the company's relationship with the university a "technology pipeline."

"We hire from there. We send students to be educated," Russell said.

Russell and McLaughlin, now head of the CASA effort that's shared by the university's engineering and computer science departments, met in the 1980s when they were studying for degrees in electrical engineering at UMass Amherst. Years later, it is Raytheon's five donated radars that are the backbone of the CASA experiment.

"We're going to measure phenomenology in weather," Russell said. "That's never happened before."

Four of the five radars now sit dismantled inside the microwave sensing laboratory in Amherst. The other radar is in Puerto Rico. Radars are designed to stand alone, so they need to be modified to work together as a collaborating network.

For this project, UMass' expertise in computer networking and microwave sensing is being utilized, while Oklahoma concentrates on meteorological issues, Colorado on radar meteorology and Puerto Rico on antennas.

The idea is to arrange a dense network of radars at short range to forecast weather and help warn communities of weather emergencies. The series of radars will be able to detect weather, such as individual tornadoes, that often can't be detected by a lone radar. The first field test of the project will take place in September 2005 when four radars will go up in Oklahoma.

"It's as exciting as it sounds," McLaughlin said. "To be able to pinpoint a tornado and chase it down the street is something that motivates a lot of people."

All together, about 150 students, faculty and outside engineers are working on the project. After Oklahoma tornado activity is studied, urban flooding in Houston, Texas, and mountain flooding in Puerto Rico will be examined. Defense, transportation and homeland security are just a few other areas that could be affected by the new technology.

While Armstrong is quick to point out that the idea for an engineering research center had been in the works for years before he gave his \$1 million for the endowed engineering position, he does admit his donation helped make CASA a reality.

"It was leverage at a very important time," said Armstrong, a Harvard University graduate. "First of all, \$1 million, just by itself, won't turn into \$40 million just by itself. But, if you have people with the right ideas and they're given extra resources, then they can get it off. The message there is local people can help," he said.

The next big step for the state will be to put into action "Choosing to Lead," Armstrong said.

"One of the messages of "Choosing to Lead" is Massachusetts has been slow to realize the competition is much more proactive than we have been," Armstrong said. "The big trick is not to compare yourself to what you were doing 10 years ago. The trick is to compare yourself to what the competition is doing."