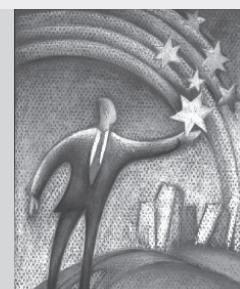




S.C. Research Universities Top \$500M in Federal Research Grants
EDUCATION



BMW, Michelin, Timken & Others Fund CoEE
BUSINESS



Major Statewide Collaboration in Health Sciences Spawned by CoEE
HEALTHCARE

THE MAIN STREET JOURNAL.

SPRING 2007

Brought to you by the S.C. CoEE Review Board.

25,000 New Jobs Projected by 2010

The state's Centers of Economic Excellence (also known as Endowed Chairs) program is designed to expand South Carolina's research base in high-growth, knowledge-based industry sectors. Ten of the twelve researchers already attracted to the state are working in two thriving industries that rely heavily on advanced technology—healthcare/life sciences and automotive sectors.

The new jobs the program will help create are also high-paying: The average salary of the 25,191 jobs predicted to be created in South Carolina by 2010—within healthcare/life sciences and automotive sectors alone—tops \$50,000.

New jobs, capital investment by sector

Healthcare/Life Sciences	Automotive
■ 4,708 new jobs paying average annual salary of \$50,128	■ 20,483 new jobs paying average annual salary of \$50,492
■ Approximately \$500 million in new investment	■ Approximately \$1.2 billion in new investment

Sources: Bureau of Labor Statistics, Census of Manufacturers, South Carolina Manufacturing Extension Partnership

World-Class Professors Bring Talent, Potential to SC

Some of the nation's top researchers have been recruited to South Carolina because of the Centers of Economic Excellence program. They're working toward discoveries that will save lives, improve products, and increase safety and convenience for everyone. The ultimate commercialization of their work could bring countless benefits—including new jobs, diverse opportunities, and a higher standard of living—to the citizens of the Palmetto State.

Dr. Gary Aston-Jones, Neurosciences

Dr. Aston-Jones' research focuses on the influence of motivation on cognitive processes. His research helped lead to a new drug treatment for ADD, and his work also has applications for better determining the specific processes involved in learning and dementia. Aston-Jones has received continuous funding from the National Institutes of Health for his work since 1983.

Dr. Tom Kurfess, Automotive Manufacturing

Dr. Kurfess' automotive-related research focuses on precision systems, controls, automation, and robotics. He leads the automotive engineering program that's the academic focus of Clemson-ICAR. Kurfess holds four degrees, including one in electrical engineering and computer science from the Massachusetts Institute of Technology. He has held faculty positions at Carnegie Mellon University and the Georgia Institute of Technology.

Dr. Todd Hubing, Vehicle Electronics Systems

Dr. Hubing's research focuses on the compatibility of the various electronic systems in automobiles with an eye toward making vehicles safer and better-performing. His research also has applications for the development of a more practical electric-powered car.

Dr. John J. Lemasters, Cancer Drug Discovery

Dr. Lemasters specializes in a kind of microscopy that allows users to view slices of a single cell. Applications for his work include preventing cell death after oxygen deprivation and understanding the mechanisms through which donated organs are damaged while being held for transplant surgery. He has an undergraduate degree from Yale as well as an M.D. and Ph.D. from Johns Hopkins University. He holds five patents.

Dr. John J. Schaefer, Clinical Effectiveness

Dr. Schaefer's work involves the use of mannequin-based simulators that let health care providers practice airway management skills. He plans to develop a training and evaluation model that will be used nationally. Schaefer co-holds patents for the most successful mannequin-based human simulators on the market and was involved in developing the recently released, next-generation infant simulators. The training center he helped establish at the University of Pittsburgh is now the largest and most active of its kind in the world.

Dr. Charles D. Smith, Cancer Drug Discovery

Dr. Smith is working to design new drugs to fight cancer by unlocking molecular mechanisms important for tumor growth. This work could also lead to new drugs to fight inflammatory diseases such as arthritis, Crohn's Disease, and diabetic retinopathy. From research largely funded by the National Institutes of Health, Smith holds nine patents. He is the founder of Apogee Biotechnology Corporation.

Dr. Richard Swaja, Regenerative Medicine

Dr. Swaja's work is focused primarily on regenerative medicine—restoring the structure and function of damaged tissues and organs. Swaja is also working to increase technology transfer between research institutions and South Carolina companies. Swaja served as the senior advisor for biomedical engineering in the National Institutes of Health's Office of Extramural Research, and managed programs and conducted research at Oak Ridge National Laboratory.

Dr. Kenneth Tew, Translational Cancer Therapeutics

Dr. Tew's research has been pivotal in treatment and drug testing for several types of cancer. Tew is also working to better understand how cancer cells develop resistance to different drugs. Tew earned a Ph.D. and was awarded a doctor of science from the University of London. He is active on scientific advisory boards of a number of pharmaceutical companies and was awarded a National Cancer Institute Outstanding Investigator Grant.

Dr. Richard A. Webb, Nanostructures

Dr. Webb is researching new quantum devices for use in computer electronics and information technology. His work could lead to smaller, higher-performing electronics. Current products based on his discoveries include sensors to diagnose heart problems and monitor internal faults in metal structures. Webb is a member of the prestigious National Academy of Sciences, and he also managed the quantum electronics program at IBM Corporation's T.J. Watson Laboratory.

Dr. John Ziegert, Automotive Design & Development

Dr. Ziegert's research is focused on designing automotive instruments and machines for use in high-precision measurement and manufacturing. At Clemson-ICAR, Ziegert and his team are developing friction management and power transmission solutions that show promise for improving the manufacturing processes for a variety of industry sectors. Ziegert serves as president of Tetra Precision Inc., a Florida-based metrology company. He holds three patents; three more are pending.

Centers of Economic Excellence Program (CoEE) Advances South Carolina's Research and Economic Growth

Nearly five years after the South Carolina General Assembly passed the Research Centers of Economic Excellence Act, the state is beginning to see very positive early returns on its investment. Momentum continues to build as elements needed for longer-term benefits begin to take shape.

This visionary effort, more commonly known as the Endowed Chairs program, is investing state and private funds in university-based talent and technology to help nurture a vibrant, knowledge-based economy in South Carolina—one that will result in higher-paying jobs and a better quality of life for South Carolinians.

The CoEE program is already paying dividends for the state:

Improving South Carolina's standard of living by creating well-paying jobs

The program is funding research in specific sectors that show the greatest promise to create high-skill, high-paying jobs. Among these are advanced materials, health and life sciences, automotive engineering, logistics, fuel cells, and nanotechnology.

Enhancing quality of life through life-saving therapies and life-improving technologies

The program is funding research to identify next-generation cancer drugs, therapeutics for Alzheimer's disease, and alternative energy sources, to name just a few crucial areas in which South Carolina-based research could help solve some of the world's most difficult problems. The program allows these major research breakthroughs to move into the marketplace where they can save and improve lives in South Carolina and across the globe.

Acting as a catalyst to attract new federal and private funding for research in South Carolina

The program has been a magnet for outside investment that will help build South Carolina's economy. State money for the program, supported by S.C.

Education Lottery proceeds, must be matched dollar-for-dollar by an industry partner, foundation, or individual. The state's three research universities have also seen a dramatic increase in externally sponsored awards: Since the inception of the program, Clemson, MUSC, and USC have increased their externally sponsored research by an impressive \$141 million.

Recruiting renowned scientists and engineers from many parts of the world to lead high-impact, economy-building research programs

The CoEE program is attracting accomplished researchers to South Carolina from institutions such as the National Institutes of Health, Oak Ridge National Laboratory, and others. The research of these top-flight scientists means more patents, venture capital investment, and creation of startup companies in South Carolina.

Creating a talent pipeline for South Carolina

The presence of top researchers and facilities via the CoEE program helps South Carolina's research universities attract the best and brightest students, who will become the state's next generation of outstanding researchers. Among the new academic programs being created around the CoEE program are new graduate programs in automotive engineering, electrochemistry, fuel cell engineering, and mathematical modeling.

Providing research that will help South Carolina companies be more profitable, so that they can grow and create jobs

The program is increasing the level of research in the state and increasing the rate of technology transfer to the private sector to create commercially viable products and job growth. In fact, research funded by the program directly supports the strategic business goals of South Carolina companies. Researchers are already beginning to generate technology that South Carolina companies can commercialize to create new prod-

ucts, improve processes, increase sales, expand in South Carolina, and ultimately create jobs.

Fueling collaboration among academia, business, and government so that we can accomplish more with less

In the last five years, collaboration among South Carolina's research universities, government, business and industry is on the rise. This collaborative effort is on track to become among the nation's strongest.

Facilitating technology transfer to create new spin-off companies from university research

If a research breakthrough occurs in South Carolina, then the resulting products are more likely to be made here—that means new jobs. As university research increases in South Carolina, we will begin to see more patent applications being filed and new high-growth companies being created.

Building South Carolina's competitive advantages to help us attract jobs and investment

In the new technology-driven economy, states that fail to focus on research and commercialization will continue to lose jobs. South Carolina has to refocus its economic strategies or risk decline. Through legislative action such as the creation of the CoEE program, we are increasing our ability to attract higher paying jobs on the merit of our state's innovative research and technology transfer. South Carolina has the distinction of being among a handful of states supporting research as a main component of economic development—giving the state's economy a competitive edge moving forward.

Advancing the state's effort to create a vibrant knowledge economy

The CoEE program is actively supporting job-creating research in high-growth, high-wage industries that have the power to transform the state's economy.

Centers Focus on Industries of Tomorrow

The following is a list of Centers of Economic Excellence programs that have been approved since the inception of the legislation:

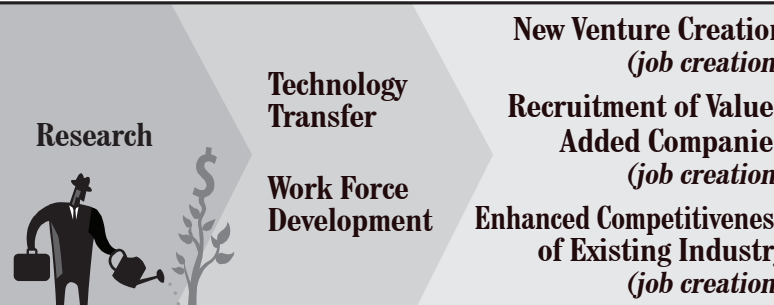
Automotive Design & Development, Clemson	Travel & Tourism Technology, USC/Coastal Carolina
Automotive Manufacturing, Clemson	Cancer Drug Discovery, MUSC/USC
Automotive Systems Integration, Clemson	Electron Imaging, Clemson
Nanostructures, USC	Supply Chain, Optimization & Logistics, Clemson
Marine Genomics, MUSC/College of Charleston	Urban Ecology and Restoration, Clemson
Proteomics, MUSC	Renewable Fuel Cells, USC
Neuroscience, MUSC	Gastrointestinal Cancer Diagnostics, MUSC
Brain Imaging, USC/MUSC	Vision Science, MUSC/USC
Regenerative Medicine, MUSC/Clemson/USC	Clinical Effectiveness & Patient Safety, MUSC/USC/Clemson
Optical Materials, Clemson	Advanced Fiber-Based Materials, Clemson
Restoration, Clemson	Molecular Nutrition, Clemson
Vehicle Electronic Systems, Clemson	Solid Oxide Fuel Cells, USC
Polymer Nanocomposites, USC	Childhood Neurotherapeutics, USC/MUSC
Hydrogen & Fuel Cell Economy, USC	Molecular Proteomics in CV Disease & Prevention, MUSC
Translational Cancer Therapeutics, MUSC/USC	Healthcare Quality, USC/MUSC/Clemson

Program Update

- 12 accomplished researchers have been recruited from across the nation to USC, MUSC, and Clemson as part of the CoEE program. (see article this page).
- 30 proposals have been approved since the inception of the program, which include a total of 52 CoEE Endowed Chairs.
- All state money being used for the program is funded by S.C. Education Lottery funds and is being matched dollar-for-dollar with non-state funds.

The Link Between Research & Job Creation

Research + Knowledge = Economic Impact



Endowed Chairs — a smart investment in future

By Jim Barker, Ray Greenbergand, Andrew Sorensen
Guest columnists

Imagine if the business world's "next big thing" — the next Microsoft or Genentech — were headquartered in South Carolina. Think of the high-paying jobs — in R&D, engineering and human resources — that such a company would create here, and the effect that inflow of payroll, capital investment and tax revenue would have on our economy.

How do we make this happen?

Five years ago, the General Assembly created a program designed to attract to South Carolina the world's most talented researchers — those who are, in fact, working to create the superstar technologies of tomorrow. This visionary initiative, the Centers of Economic Excellence Program (also known as Endowed Chairs) leverages state and private funds along with university-based research to drive economic growth.

To date, the program has brought 12 world-class scientists or "endowed chairs" to our state's universities. It has also established 30 Research Centers of Economic Excellence in areas such as nanotechnology, health sciences, future fuels, energy alternatives, automotive engineering and advanced fibers. These centers house research in targeted industries with the greatest promise to create high-skill, high-paying jobs. State funds for the program come from S.C. lottery proceeds and must be matched dollar-for-dollar with non-state monies from corporations, foundations or private donors. This model has created a magnet for private-sector investment in South Carolina.

The state's three research universities, Clemson University, the University of South Carolina and the Medical University of South Carolina, are using the program to benefit our state. In addition to increased research collaboration among the three institutions, we are now able to get the attention of the world's best scientists and graduate students.

As an example, BMW, Michelin, Timken and other South Carolina companies recognize the value of the research now happening in the state. They've tapped into those capabilities and have stepped up to fund endowed chairs. World-class scientists recruited under the program are generating technology that these and other companies can commercialize to create new products, improve processes, increase sales and ultimately create jobs.

The Centers of Economic Excellence Program is helping us attract new companies to South Carolina — which could produce an immediate payoff for the state in jobs and investment — based on the value of research and innovation happening here. What's more, the program is also beginning to create spinoff companies from university research in high-growth, high-wage industries.

South Carolina's students also benefit from the program. Increasing the level of training we can provide lets us keep our best and brightest at home, helping to end our exporting of talent. In addition, the presence of top researchers via the endowed chairs program helps attract top-flight students from other states. Statistics show that many of these bright minds will remain in South Carolina following graduation. Together, these in-state and out-of-state students can become our next generation of innovators.

South Carolina's political leadership should be commended for creating and supporting the Centers of Economic Excellence Program during the past five years. Continuing to fully fund this effort must be a high priority. Changing course would be devastating, costing us precious momentum in our battle to gain ground toward greater success in the knowledge economy.

We encourage our state's leaders not to look at funding the endowed chairs program as an appropriation, but rather as an investment — a smart investment that will fuel innovation, enhance economic opportunity and lead to a stronger South Carolina.

Mr. Barker is president of Clemson University. Dr. Greenberg is president of the Medical University of South Carolina. Dr. Sorensen is president of USC.



Centers of Economic Excellence (CoEE) Program Produces Early Successes

While the CoEE program was designed to produce benefits over the long term in South Carolina, the program has already led to many tangible, positive outcomes for the state:

- At the Clemson University International Center for Automotive Research (CU-ICAR), four CoEE Endowed Chairs will form the academic core of the project. Since its groundbreaking, CU-ICAR has generated more than \$215 million in investments from a collaboration of state, university, and major industry resources. By summer 2007, the first phase of development at CU-ICAR will be complete, accounting for more than 500 new jobs.

- In the last five years, South Carolina's three research universities (Clemson University, the University of South Carolina, and the Medical University of South Carolina) have attracted more than \$500 million a year in federal research funding, in part because of the CoEE program.

- The program has attracted industry-match dollars from Bank of America, Roche Carolina, BMW, Michelin, Timken, Sun Microsystems, and a number of other companies, along with grants from major foundations such as the Duke Endowment.

- The program is driving economic diversification in South Carolina by building the state's competitive position in emerging high-growth industries. These sectors include automotive engineering, health sciences, life sciences, nanotechnology, advanced materials, supply chain optimization and logistics, fuel cells, and molecular nutrition.

- When the health sciences component of the CoEE program is fully funded and in place, as many as 40 world-class scientists, plus a cadre of researchers and technicians, will be working in South Carolina. The economic impact could range from hundreds of millions to billions of dollars in new products and jobs.

- The program has spawned a major statewide collaboration in health sciences. Two of South Carolina's largest hospital systems, Greenville Hospital System and Columbia-based Palmetto Health, along with two of the state's largest universities, MUSC and USC, are pooling resources to invest in health science research.

- Two researchers are currently being recruited for CoEE Endowed Chair positions at brain-imaging research centers in Charleston, Columbia, and Greenville. The USC alumnus who donated \$1.75 million to the South Carolina Brain Imaging Center of Excellence said that it is unlikely he would have made such a large gift if it were not for the CoEE program.

- The program has helped USC significantly bolster its position as one of the nation's leading research institutions. The Carnegie Foundation, a leading education policy center, recently designated USC as an institution with "very high research activity." Only 62 public and 32 private research institutions in the U.S. share this ranking, which firmly establishes USC among the nation's top research universities.

- The Center for Clinical Effectiveness and Patient Safety, approved by the Research Centers of Economic Excellence Review Board in September 2005, will have operations in Charleston, Columbia, and Greenville. Each location could hire more than 100 people. Research conducted by the center will develop models of improved patient care and health professional education through the dissemination of information and the use of technology.

- South Carolina's Bioengineering Center has been reestablished through the CoEE program. This center will help make the state more attractive to biotech companies looking to expand or potential biotech startups.

- The USC Center for Hydrogen and Fuel Cell Technology (a Center of Economic Excellence) was chosen by the National Science Foundation to become the nation's first Industry/University Cooperative Research Center for Fuel Cells.

- One CoEE researcher, Dr. Charles Smith, is moving his biotechnology company to Charleston. Apogee Biotechnology Corporation will be working on next-generation drugs to treat cancer and other diseases in South Carolina.

- The Duke Endowment awarded a three-year, \$21 million grant to Health Sciences South Carolina, enabling it to fully develop and implement Research Centers of Economic Excellence Endowed Chairs and establish the Center of Healthcare Quality and Clinical Effectiveness. The grant is the largest ever made by the 82-year-old private foundation's healthcare division and will help propel South Carolina into the forefront of research on patient safety, clinical effectiveness, and quality of healthcare.

Lottery paying off for science in S.C.



Dr. Richard Swaja, the Endowed Chair in Regenerative Medicine at the Medical University of South Carolina, plans to learn how to make human cells reorganize themselves to create new organs.

With appointment at MUSC, program has funded the hiring of 11 academic stars.

By James T. Hammond
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The State newspaper, Columbia, S.C.

In creating the program, the General Assembly justified the spending on the grounds that future high-paying jobs will be built around scientific breakthroughs in fields such as health sciences, transportation and alternative fuels.

Swaja's appointment this year is under an endowed chair proposal approved in 2002-03. Swaja also will serve as director of the S.C. Bioengineering Alliance, a joint venture of MUSC, USC and Clemson.

Swaja is working to attract other top scientific talent to South Carolina. The group of scientists will work together to drive research discoveries that have strong commercial potential.

The four-year gap between approval of the endowed chair and the hiring of a researcher to fill it illustrates the state's long-term commitment to the highest-level research at the three campuses.

Harris Pastides, USC's vice president for research, said he expects that USC will announce additional appointments for its endowed chair proposals soon. He said the timeline for Swaja's appointment "demonstrates the added complexity in getting interuniversity centers rolling."

"While the long-term payoff of developing statewide (research centers) cannot be overestimated, it takes extra time, money and effort to demonstrate to the chair candidates that the collaboration is real and sustainable," Pastides said.

"I believe that South Carolina's climate is ripe for a statewide bioengineering program," Swaja said. "Fortunately, we are not starting at zero. We have good facilities and good people in place, and we have already seen substantial research advancements here."

The appointment of Dr. Richard Swaja to the Endowed Chair in Regenerative Medicine at the Medical University of South Carolina raises to 11 the number of scientists hired at the state's three research universities under a lottery-funded program to attract academic stars. Swaja's research goal is to learn how to make human cells reorganize themselves to create new organs. It is cutting-edge research that might take years to achieve success but holds the promise of both improving human life and creating a new source of jobs in the state. "The promise of Swaja's work extends far beyond South Carolina. It truly has international implications," MUSC president Ray Greenberg said.

So far, the S.C. Research Centers of Economic Excellence Review Board has approved 31 proposals of \$2 million to \$6 million apiece.

The board has approved projects totaling \$125 million from lottery funds. With the required match, that means \$250 million of new scientific research.

Since the program started, the General Assembly has earmarked \$30 million per year for the program. The funds are used to create endowments, the income from which will support the research activities.

So far, the research chairs are in these fields:

- MUSC — neuroscience, regenerative medicine, pharmacology, clinical effectiveness and microscopy
- USC — nanotechnology
- Clemson — automotive engineering, auto design and electronic systems integration

South Carolina Centers of Economic Excellence Review Board

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Raymond S. Greenberg	Charleston, SC	Ex-Officio Member
Andrew A. Sorensen	Columbia, SC	Ex-Officio Member