



**South Carolina
Centers of Economic
Excellence
2003-2006**

**Report to the South Carolina
Budget & Control Board**

[CoEE program information for FY 2007 and FY 2008 is indicated in brackets.
The FY 2007 report will be issued at the beginning of the 2008 calendar year.]

[COVER PHOTOGRAPH: The state-of-the-art Hitachi equipment in Clemson University's top-rated Electron Microscopy facility is a key component of the Electron Imaging Center of Economic Excellence.]

Executive Summary

PROGRAM SUMMARY

In 2002, the South Carolina General Assembly enacted the South Carolina Research Centers of Economic Excellence Act (Act). The legislation designated \$200 million through 2010 from the South Carolina Education Lottery to establish Centers of Economic Excellence by creating unique endowed professorships at South Carolina's three senior research institutions: Clemson University, the University of South Carolina, and the Medical University of South Carolina. Each Center of Economic Excellence (CoEE) specializes in knowledge-economy research in fields such as engineering, nanotechnology, biomedicine, energy science, environmental science, and information and management science. The world-class scientists hired to become CoEE chairs will secure major private sector funding and federal grants for the state and over time will increase the state's knowledge base and stimulate the state's economy.

A nine-member Review Board appointed by the Governor, the President Pro Tempore of the Senate, and the Speaker of the House of Representatives approves new CoEEs and provides program oversight. The three research university presidents serve as *ex-officio*, non-voting members of the Review Board. Staff and operational support for the CoEE program are provided by the Commission on Higher Education.

Once a CoEE is approved by the Review Board, the fiscal lead institution, along with any collaborating institutions, has 18 months during which to solicit dollar-for-dollar, non-state pledges to match the state award total (between \$2 million and \$5 million). These non-state matching pledges must be realized within 78 months of the CoEE award date. State funds may only be drawn against in-hand (realized) non-state pledges.

By the end of fiscal year (FY) 2006, the CoEE Review Board had approved 29 research centers and 48 endowed chair positions, seven of which were appointed by the end of FY 2006. [An additional seven chairs have been appointed in FY 2007 and 2008.] As envisioned by the General Assembly, the program has turned into an economic boon for the state: of the \$118 million awarded by the Review Board, \$80 million in non-state

matches has been pledged, with more than \$48 million in pledges realized and \$41.6 million in state funds drawn down by the research institutions.¹

Over time, each institution has developed concentrated CoEE focus areas. Clemson University's core strengths are in automotive engineering (with four CoEE endowed chairs at the International Center for Automotive Research [CU-ICAR]), as well as in architectural science and materials development. From 2003 to 2006, the CoEE Review Board awarded \$38 million for the creation of 12 CoEE endowed professorships at Clemson:

- CU-ICAR, a worldwide automotive/motor sports research and development campus, has four CoEE endowed chairs in the fields of **Automotive Design and Development, Automotive Manufacturing, Automotive Systems Integration, and Electronic Systems Integration.**
- Research at the **Photonic Materials CoEE** concentrates on organic and inorganic materials for optical fiber and related photonic technologies.
- The **Electron Imaging CoEE** performs research in electron microscopy and provides companies competitive advantages in the field of advanced materials.
- The **Advanced Fiber-Based Materials CoEE** researches novel fiber materials, fabrics, and integrated components which possess unique functionality and performance over traditional textile materials.
- The **Supply Chain, Optimization & Logistics CoEE** focuses on supply chain modeling, material handling, logistics, planning systems, and distribution.
- The **Urban Ecology & Restoration CoEE** supports the growth of the state's environmental industry through the integration of basic ecological science with engineering and urban design.
- The goal of the **Molecular Nutrition CoEE** is to become the foremost center of scientific information on energy balance and the development and treatment of obesity.

¹ At close of FY 2007, these figures were \$144 million, \$89 million, \$62 million, and \$54 million, respectively.

MUSC's strengths lie in the areas of neuroscience, cancer research, vascular disease, and health care quality and finance. From 2003 to 2006, the CoEE program granted MUSC \$45.5 million to establish 10 CoEEs with 20 CoEE endowed chairs:

- The **Proteomics CoEE** pursues research in new and improved technologies for studying and gathering information encoded in the genomes of proteins.
- The **Marine Genomics CoEE**, a collaboration between MUSC and the College of Charleston, researches marine functional genomics and bioinformatics, including the analysis of physiological adjustments in animal and plant genetics that result from environmental changes.
- The **Regenerative Medicine CoEE**, a collaboration between all three research institutions (with MUSC as the lead institution), expands statewide expertise in developmental biology, adult stem cell technology, and tissue engineering.
- The **Neuroscience CoEE** researches age-related neurodegenerative problems including dementia, Alzheimer's disease, Parkinson's disease, and stroke.
- The **Translational Cancer Therapeutics CoEE**, a collaboration between MUSC and USC (with MUSC as the lead institution), expands opportunities for increased interdisciplinary research to enhance research in the biology common to cancer.
- The **Cancer Drug Discovery CoEE**, a collaboration between MUSC and USC (with MUSC as the lead institution), provides mechanisms for target identification and generation of lead compounds in the drug discovery process.
- The **Gastrointestinal Cancer Diagnostics CoEE** researches state-of-the-art translational medicine for gastrointestinal cancer patients, with the eventual goal of decreasing the overall impact of cancer mortality and morbidity.
- The **Vision Science CoEE**, a collaboration between MUSC and USC (with MUSC as the lead institution), focuses on the development of new therapies for macular degeneration, glaucoma, retinitis pigmentosa, and other eye diseases.
- The **Molecular Proteomics in Cardiovascular Disease and Prevention CoEE** works to translate advances in basic bench science into clinical bedside care in an effort to improve cardiovascular prevention and treatment.

- The **Clinical Effectiveness & Patient Safety CoEE**, a collaboration between all three research institutions (with MUSC as the lead institution), improves clinical education and patient safety through the use of simulation technology.

USC has developed three major CoEE clusters: future fuels (including hydrogen and solid oxide fuel cell research), biomedical science, and nanotechnology. In the first four years of the program, USC received \$35.5 million for 16 CoEE endowed chairs:

- The **Nanostructures CoEE** concentrates on research in experimental nanoscale physics and is positioning the state to compete in the global electronic technology market.
- The **Brain Imaging CoEE**, a collaboration between USC and MUSC (with USC as the lead institution), is a world-class brain imaging center which researches detection deception and minimally invasive brain stimulation technologies.
- The **Polymer Nanocomposites CoEE** conducts research on the development of new materials with improved properties for the polymers market.
- The **Travel and Tourism Technology CoEE**, a collaboration between USC and Coastal Carolina University, creates innovation in the tourism industry with new technological standards that will allow major tourism businesses to operate more efficiently.
- The Future Fuels Initiative, which is expanding USC's expertise in fuel cells and alternative energy, incorporates CoEE endowed chairs in **Hydrogen and Fuel Cell Economy, Renewable Fuel Cells, and Solid Oxide Fuel Cells**.
- The **Childhood Neurotherapeutics CoEE**, a collaboration between USC and MUSC (with USC as the lead institution), uses advances in metabolic disorders, pharmacogenetics, and neuroinflammatory diseases to study neurological disorders in children.

ECONOMIC IMPACT SUMMARY

After four years, the state's research institutions are fulfilling the Research Centers of Economic Excellence Act mandate to enhance the state's economy, recruit non-state dollars, and create jobs. Below follows a list of economic impact highlights that have resulted from the groundbreaking research being conducted by the Centers of Economic Excellence and the world-class scientists who lead them:

Technology Transfer:

- The **Regenerative Medicine CoEE** has filed for several patents in wound-healing technology.
- The **Proteomics CoEE** has filed for a patent in proteomics technology.
- The **Marine Genomics CoEE** has sold a diagnostic gene chip to the International Oyster Microarray Consortium on a cost-recovery basis.
- The **CoEE in Molecular Proteomics in Cardiovascular Disease Prevention and Treatment** is in business discussions for its biomarker testing system concept.

Industrial Consortiums:

- **CU-ICAR** is establishing the Clemson Vehicular Electronics Consortium to provide companies access to automotive research.
- The **Polymer Nanocomposites CoEE** is developing a pre-competitive research consortium to study the potential uses of nanomaterials to improve the performance of a variety of polyester polymers.
- The **Electron Imaging CoEE** chair-holder will supervise an industrial consortium formed by South Carolina firms concerned with the manufacture and use of advanced materials.
- The **Neurosciences CoEE** participates in the Georgia/South Carolina Neuroscience Consortium.

Increased Research Funding:

- The **Proteomics CoEE** is affiliated with the MUSC Proteomics Center, which recently received the largest competitive extramural research award ever awarded in the state (\$18.7 million).
- Dr. Kenneth Tew of the **Translational Cancer Therapeutics CoEE** has established a partnership with Novelos Pharmaceuticals, which has awarded a six-figure unrestricted research grant.
- The U.S. Air Force Research Laboratory has awarded the **Polymer Nanocomposites CoEE** a \$901,000 grant.
- Clemson University has secured funding for the **Supply Chain, Optimization & Logistics CoEE** from the National Science Foundation (NSF) for the creation of an Industry University Cooperative Research Center.
- The **Nanostructures CoEE** has received \$650,000 in research funding from a variety of sources, including the U.S. Department of Energy and the Army Research Office.

Corporate Relocation:

- The Timken Company, BMW, and Michelin have all located corporate teams and offices at the CU-ICAR campus. Timken's partnership at CU-ICAR is expected to generate at least 110 high-paying jobs in the Upstate region of South Carolina.
- Dr. Charles Smith of the **Cancer Drug Discovery CoEE** is relocating his company, Apogee Biotechnology, to Charleston. Apogee controls a portfolio of valuable pending patents for the study of a variety of diseases.

Spin-off Companies:

- The **Regenerative Medicine CoEE** has launched a spin-off company, FirstString, which markets wound repair technology.
- Cephos Corporation, a spin-off company of the **Brain Imaging CoEE**, uses brain imaging technology to detect deception.

- The **Neurosciences CoEE** has supported the creation of SemiAlloGen, Inc., a biotech company which develops therapeutics in the field of neurodegenerative disorders and cancer.
- The **Photonic Materials CoEE** has had an indirect impact on the launching of two companies: Advanced Photonic Crystals and Tetramer Technologies.

CONCLUSION

Since the beginning of the CoEE program, South Carolina's research institutions have realized the great potential of consortia research centers. Unprecedented scientific collaboration among Clemson, USC, and MUSC has become a hallmark of the Endowed Chairs Program. One-third of the CoEEs are scientific partnerships between and among South Carolina public institutions. Recruiting the world's finest researchers is no easy task, but by planning strategically for focused research clusters and committing to a unique spirit of institutional collaboration, the CoEE Program stakeholders have made South Carolina an attractive working environment in the new "flat world," where knowledge is the principal currency. In the coming years, South Carolina is set to become a major landmark on the knowledge economy map, attracting businesses and research entrepreneurs which will vitally enhance the state's economy and reposition the state for success in the new century.

I. Program Introduction and History

In 2002, the South Carolina General Assembly passed the South Carolina Research Centers of Economic Excellence Act (Act). The legislation designated \$200 million through 2010¹ from the South Carolina Education Lottery to establish unique Centers of Economic Excellence at South Carolina's three senior research institutions: Clemson University, the University of South Carolina, and the Medical University of South Carolina. Each Center of Economic Excellence (CoEE) specializes in knowledge-economy research in fields such as engineering, nanotechnology, biomedical science, and energy science which are designed to promote and enhance the state's economy and ultimately lead to higher per capita income through the creation of new, high-paying jobs.

The Act also created the CoEE Review Board, which provides program oversight. The Review Board is composed of nine members: three appointed by the Governor, three by the President Pro Tempore of the Senate, and three by the Speaker of the House of Representatives. Membership terms are three years, and individuals may serve three total terms. The three research university presidents serve as ex-officio, non-voting members of the Review Board. Staff and operational support for the Endowed Chairs Program are provided by the Commission on Higher Education (CHE). CHE approves the operational budget for the program.

The CoEE Review Board held its first meeting on October 17, 2002, at which time it approved formal bylaws (Appendix I). At the December 5, 2002, meeting, the Review Board approved Program *Guidelines* and *Request for Proposals 2002-2003*, which established a competitive, annual process whereby Centers of Economic Excellence and supporting endowed chairs are proposed by the research institutions and approved by the Review Board. The three-tier review process includes two rigorous scientific evaluations (a technical review and an onsite panel review), followed by the Review Board's analysis of the review findings and a formal vote on individual proposals.

¹ The General Assembly appropriated \$30 million per year in the state budget for fiscal years 2003 through 2006.

Once a research center is approved by the Review Board, an institution has 18 months in which to solicit dollar-for-dollar, non-state² pledges to match the state award total (between \$2 million and \$5 million). These non-state matching pledges must be realized within 78 months of the CoEE award date. State funds may only be drawn against in-hand (realized) non-state pledges. The majority of funds (all state funds, plus no less than \$2 million of the non-state match³) are placed into endowment. The endowment pays the salaries or salary supplements of the world-class scientists (endowed chairs) recruited to lead each CoEE and also provides funds for the purchase of specialized equipment, laboratory construction, other faculty, and research assistants.

Since the onset of the CoEE program, the CoEE Review Board has worked diligently to balance its oversight responsibilities with the mandate to enhance the state's knowledge economy. On August 30, 2004, the Review Board voted to limit the number of non-collaborative proposals to three per year, while continuing to allow an unlimited number of collaborative proposals. On June 29, 2005, the Review Board approved a marketing plan in order to disseminate program successes and enhance program visibility; one year later, on June 13, 2006, the Review Board secured the marketing services of the Clare Morris Agency. In addition, on June 13, 2006, the Review Board approved an RFP to audit the program for fiscal years 2003 to 2010.⁴

In the first four years of the program, the Review Board approved 29 CoEEs and 48 endowed chair positions.⁵ By the end of fiscal year (FY) 2006, seven endowed chairs had been appointed. As envisioned by the General Assembly, the program has turned into an economic boon for the state: Of the \$118 million⁶ awarded by the Review Board through FY 2006, \$80 million (67%) in non-state matches have been pledged, with more than \$48 million (40%) of these pledges realized and \$41.6 million in state funds drawn down by the research institutions.⁷

² Non-state matches may derive from private and federal sources.

³ At the October 20, 2006, CoEE Review Board meeting, the Review Board voted to change this minimum figure from \$2 million to 40% of the non-state match total.

⁴ On August 28, 2006, the Review Board contracted the services of Derrick, Stubbs and Stith, LLC, to conduct program audits. [The 2003-2006 program audit was formally approved on November 5, 2007, and has been submitted simultaneously to the South Carolina Budget & Control Board with this report. The program received an unqualified audit with no major material findings.]

⁵ Clemson University withdrew the Restoration CoEE in July 2007, which included two endowed chairs.

⁶ On October 30, 2006, the Review Board voted that three previous CoEE proposals approved for \$6 million (Regenerative Medicine, Clinical Effectiveness & Patient Safety, and Childhood Neurotherapeutics) be reduced to the statutory maximum of \$5 million.

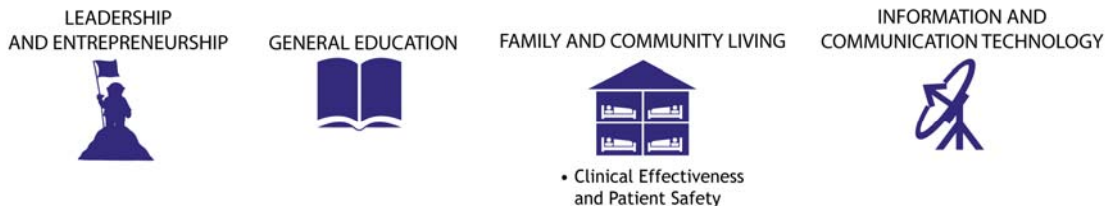
⁷ At close of FY 2007, these figures are \$144 million, \$89 million, \$62 million, and \$54 million, respectively.

II. Strategic Planning and Collaboration

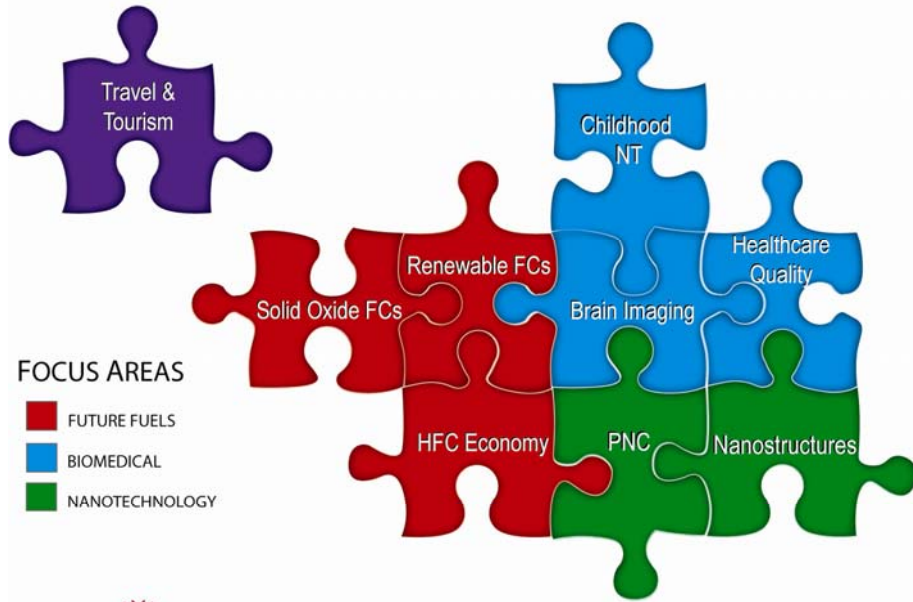
Over time, each research institution has developed concentrated CoEE focus areas.⁸ Clemson University's core strengths are in the area of automotive engineering (with four CoEE endowed chairs at the International Center for Automotive Research [ICAR]), as well as in the architectural sciences and materials development. USC has developed three major CoEE clusters: future fuels (including hydrogen and solid oxide fuel cell research), biomedical science, and nanotechnology. MUSC's strengths lie in the areas of neuroscience, cancer research, vascular disease, and health care quality & finance. The following graphic illustrations highlight the focus clusters at each of the three research institutions:



CoEE ENDOWED CHAIRS BY EMPHASIS AREAS, 2003-2006



⁸ From the 2005-2006 CoEE Onsite Review Panel Report: "In today's complex research environment, where scale is an increasingly important factor in achieving the critical mass of talent, facilities, and equipment, focus of this kind is essential for all but a handful of the largest and most comprehensive institutions. A key point about the universities' decisions on where to focus is that strengthening the economic development of South Carolina (while also improving the quality of life for its citizens) has been the driving criterion."



 UNIVERSITY OF SOUTH CAROLINA
CENTERS OF ECONOMIC EXCELLENCE 2003-2006

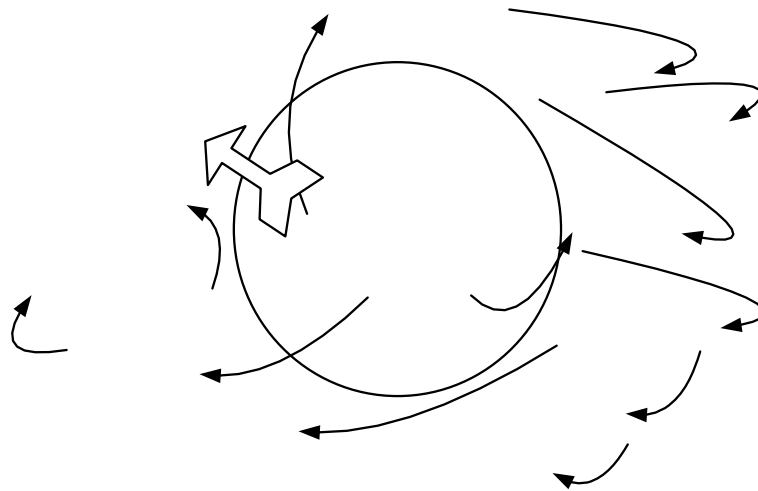
Abbreviations: NT = Neurotherapeutics; FC = Fuel Cells;
HFC = Hydrogen Fuel Cell; PNC = Polymer Nanocomposites.



MEDICAL UNIVERSITY OF SOUTH CAROLINA
CENTERS OF ECONOMIC EXCELLENCE 2003-2006

Abbreviations: NT = Neurotherapeutics; GI = Gastrointestinal.

The scientific discoveries and breakthroughs made by each CoEE will serve as a nucleus for industry and further research within the state, leading to a better and stronger knowledge base and economy. A prime example of the symbiotic strength of the CoEE Program is Clemson ICAR, which potentially can support USC as a test facility for alternative fuel sources. USC's research in fuels can then be reinvested at ICAR, where researchers are designing cars and trucks to best utilize future fuels. Thus, research at Clemson and USC is likely to lead to economic development as automotive and energy companies are attracted to locate in South Carolina or to invest in research being conducted in the state. This groundswell cycle of economic development is shown in the following illustration:



Since the beginning of the CoEE program, the research institutions have realized the great potential of collaboration and have pursued the creation of consortia research centers. Unprecedented scientific collaboration among Clemson, USC, and MUSC has become a hallmark of the Endowed Chairs Program. One-third of the CoEEs are scientific partnerships between and among South Carolina public institutions, including two four-year comprehensive teaching universities.⁹ Dr. John Schaefer, endowed chair-holder at MUSC's CoEE in Clinical Effectiveness and Patient Safety, has noted that such academic collaboration rarely exists anywhere in the nation—not even at Harvard or Yale. The appeal of bonded research partnerships serves as an enticing recruiting tool to the renowned momentum required to lead each

**Self-sustaining
momentum**

"BUZZ"

Spin-offs

⁹ College of Charleston (CoEE in Marine Genomics) and Coastal Carolina University (CoEE in Travel & Tourism).

**Attract
outstanding
students/**

**Investment
Centers
Excellent
Endowed**

Center. The 2005-2006 CoEE Onsite Review Panel Report also cited the uniqueness of collaboration at the state's research institutions:

The Review Panel was very impressed with the level of collaboration among South Carolina's three research universities. As with institutional strategic planning, there is a high level of substantive activity that transcends the rhetoric typically encountered in most parts of the country....Particularly praiseworthy are the decisions to create a joint school of pharmacy between USC and MUSC and the creation of the Health Sciences South Carolina....Major initiatives of this kind, taken together with the array of activities in other areas of life sciences, travel/tourism, and more, suggests that the initials 'SC' could stand for 'Spirit of Collaboration' as well as South Carolina.

Recruiting the world's finest researchers is no easy task, but by strategically planning focused research clusters and committing to a unique spirit of institutional collaboration, the CoEE program stakeholders have made South Carolina a very attractive working environment in the new "flat world," where knowledge is the principal currency. In the coming years, South Carolina is likely to become a major mark on the knowledge economy map, attracting major businesses and research entrepreneurs which will vitally enhance the state's economy.

III. Approved Centers of Economic Excellence: 2003-2006

2002-03			
Institution	Funding Year	Proposal Title	Proposal Amount
Clemson	2002-03	Automotive Design & Development	\$5 million
Clemson	2002-03	Automotive Manufacturing	\$5 million
Clemson	2003-04	Automotive Systems Integration	\$5 million
MUSC	2002-03	Proteomics	\$4 million
MUSC	2002-03	Neuroscience	\$3 million
MUSC/College of Charleston	2002-03	Marine Genomics	\$4 million
MUSC/Clemson/USC	2003-04	Regenerative Medicine	\$5 million ¹⁰
USC	2002-03	Nanostructures	\$4 million
USC/MUSC	2002-03	Brain Imaging	\$5 million
Total in 2002-03			\$30 million
Total 2003-04 Funding approved in 2002-03			\$10 million
2003-04			
Institution	Funding Year	Proposal Title	Proposal Amount
Clemson	2003-04	Optical Materials	\$5 million
Clemson	2003-04	Vehicle Electronic Systems Int.	\$3 million
Clemson	2004-05	Restoration [WITHDRAWN 7-07]	\$3 million
MUSC/USC	2003-04	Translational Cancer Therapeutics	\$5 million
MUSC/USC	2004-05	Cancer Drug Discovery	\$5 million
USC	2003-04	Polymer Nanocomposites	\$3.5 million
USC	2003-04 2004-05	Hydrogen & Fuel Cell Economy	<u>\$2.5 million</u> \$2.5 million
USC/Coastal Carolina	2004-05	Travel & Tourism Technology	\$2 million
Total in 2003-04			\$19 million
Total 2004-05 Funding approved in 2003-04			\$12.5 million
2004-05			
Institution	Funding Year	Proposal Title	Proposal Amount
Clemson	2004-05	Electron Imaging	\$5 million
Clemson	2005-06	Supply Chain, Optimiz. & Logistics	\$2 million
Clemson	2005-06	Urban Ecology and Restoration	\$2 million
MUSC	2004-05	Gastrointestinal Cancer Diagnostics	\$5 million
MUSC/USC	2004-05	Vision Science	\$4.5 million
MUSC/USC/Clemson	2005-06	Clinical Effect. & Patient Safety	\$5 million ¹¹
USC	2004-05	Renewable Fuel Cells	\$3 million
Total in 2004-05			\$17.5 million
Total 2005-06 Funding approved in 2004-05			\$9 million

¹⁰ Reduced from \$6 million to \$5 million on October 30, 2006. [See footnote 6, page 9.]

¹¹ Ibid.

2005-06			
Institution	Funding Year	Proposal Title	Proposal Amount
Clemson	2005-06	Advanced Fiber-Based Materials	\$4 million
Clemson	2005-06	Molecular Nutrition and Nutrigenomics	\$2 million
MUSC	2005-06	Molecular Proteomics in CV Disease & Prevention	\$5 million
USC	2005-06	Solid Oxide Fuel Cells	\$3 million
USC/MUSC	2005-06	Childhood Neurotherapeutics	\$5 million ¹²
Total in 2005-06			\$19 million
Total Since Program Inception			\$118 million

APPROVED CoEEs AND ENDOWED CHAIR POSITIONS		
Institution	Number of Approved Programs	Number of Chairs Approved
Clemson University	11	12
University of South Carolina	8	16
Medical University of South Carolina	10	20
TOTALS	29	48

For detailed information regarding funding totals for the Centers of Economic Excellence Program, see Appendix IV.

¹² Ibid.

IV. Summary Descriptions of the Centers of Economic Excellence

2002-2003 Centers of Economic Excellence

CoEE Endowed Chair Name: **Automotive Design & Development**

Fiscal Institution: **Clemson University**

Award Date: 8/25/03

Award Amount: \$5 million

The CoEE endowed chair in Automotive Design & Development is part of the Clemson University International Center for Automotive Research (CU-ICAR), a worldwide automotive/motor sports research and development campus with more than \$225 million in public and private investment to date. This CoEE endowed chair researches and advances the fields of vehicular design and development, methodologies, and design tools. Non-state funding for this CoEE has been secured with the Timken Company (Fortune 500), which is well-known for providing automotive industry products and solutions based on friction management and power transmission. Timken's research and development facilities will be housed on the CU-ICAR campus; also, the company plans to relocate a portion of its automotive powertrain engineering resources to the CU-ICAR campus. Timken's collaboration with CU-ICAR is expected to generate at least 100 jobs in the Upstate.

[Clemson hired Dr. John Ziegert as the TIMKEN COEE ENDOWED CHAIR IN AUTOMOTIVE DESIGN AND DEVELOPMENT on August 15, 2006.]



The Carroll A. Campbell Jr. Graduate Engineering Center at CU-ICAR

CoEE Endowed Chair Name: **Automotive Manufacturing**

Fiscal Institution: **Clemson University**

Award Date: 6/24/03

Award Amount: \$5 million

The CoEE endowed chair in Automotive Manufacturing leads CU-ICAR's efforts to develop novel micro-electromechanical systems technologies for manufacturing, as well as to improve the efficiency of manufacturing large, complex objects. This CoEE, along with the CoEE endowed chair in Automotive Systems Integration, has contacted and/or is in discussion to develop private sector partnerships with such major companies as General Motors, IBM, Toyota, Honda, Daimler-Chrysler, Hewlett-Packard, Nissan, and the Robert Bosch Corporation. Faculty-conducted workshops have been held with BMW, Michelin, Timken, and Siemens since 2004 to promote industry involvement in CU-ICAR's research initiatives. Two junior faculty members with expertise in production systems, control, and quality assurance have been hired to support this chair's research.

Dr. Thomas Kurfess, BMW COEE ENDOWED CHAIR IN AUTOMOTIVE MANUFACTURING [appointed 8-15-05]. Kurfess' research focuses on precision systems, controls, automation, and robotics. The results of his work are being used in a variety of manufacturing environments, helping U.S. companies to compete in the global market. In addition to automotive research, he is preparing the next generation of engineers to work in the complex global automotive industry. He is also director of the Carroll A. Campbell Jr. Graduate Engineering Center at CU-ICAR. Kurfess served as a special United Nations consultant to the government of Malaysia in the areas of applied mechatronics and manufacturing. He has received numerous honors and awards, including the National Science Foundation Young Investigator Award and a National Science Foundation Presidential Faculty Fellowship Award.



CU-ICAR campus

CoEE Endowed Name: **Automotive Systems Integration**

Fiscal Institution: **Clemson University**

Award Date: 6/24/03

Award Amount: \$5 million

The CoEE endowed chair in Automotive Systems Integration is considered the linchpin of the CU-ICAR faculty positions—a person who will advance the field of integrated platform design, development, and manufacturing. Leaders at BMW and other major automotive companies have noted a lack of cultivation and education of systems integration engineers. (Systems integration is the testing of vehicle systems and their components to ensure efficient and safe operation.) This endowed chair-holder will have a proven track record of research in integrated platform design and manufacturing and a clear vision of the importance of this approach to future product design, development, and manufacturing. This chair will likely become a global leader, both as a researcher and instructor, in a field that is crucial to the global automotive market. Michelin has committed itself as the major non-state partner of this endowed chair.

Clemson University is actively recruiting the COEE CHAIR IN MECHANICAL ENGINEERING AND AUTOMOTIVE SYSTEMS INTEGRATION.

CoEE Name: **Proteomics**

Fiscal Institution: **Medical University of South Carolina**

Award Date: 6/24/03

Award Amount: \$4 million

The Proteomics CoEE pursues research in new and improved technologies for studying and gathering information encoded in the genomes of proteins. Because of technology limitations, only limited protein information can currently be accessed and analyzed. However, the field of proteomics research is expected to lead to an understanding of cellular function at the molecular level, particularly how cellular functions go awry in disease. Thus, this CoEE is designed to yield patentable new technology and will provide visibility in the field of bioengineering which will attract industry. Currently the MUSC Proteomics Center has filed a patent in proteomics technology. The center is also the recipient of the largest competitive extramural research award ever received in the state (\$18.7 million). In addition, a \$500,000 NIH Shared Instrumentation Grant was recently secured for the purchase of a mass spectrometer for tissue imaging research.

MUSC is actively recruiting the COEE CHAIR IN PROTEOMICS.

CoEE Name: **Neuroscience**
Fiscal Institution: **Medical University of South Carolina**
Award Date: 6/24/03
Award Amount: \$3 million

The Neuroscience CoEE researches age-related neurodegenerative problems including dementia, Alzheimer's disease, Parkinson's disease, and stroke. This area of research has a major impact on South Carolina, where more than half of the population is over the age of 56. This CoEE is a strong component of MUSC's established Neuroscience Institute and also works in collaboration with the MUSC Center on Aging; specifically, the endowed chair-holders for this CoEE will work to assist in the establishment of biotechnology companies in South Carolina. The CoEE has partnered with Cure Parkinson's Project, a non-profit corporation devoted to curing Parkinson's disease. This CoEE will continue MUSC's affiliations with companies including AstraZeneca, Pfizer, Janssen Pharmaceuticals, and Merck. The CoEE has also supported the creation of SemiAlloGen, Inc., a biotechnology company which develops therapeutics in the field of neurodegenerative disorders and cancer. Recently this CoEE obtained an NIH Shared Instrumentation Grant for \$500,000.

Dr. Miguel Pappolla, JOSEPHINE TUCKER MORSE COEE ENDOWED CHAIR IN NEUROSCIENCE [appointed 1-3-06]. Pappolla's research focus is on neuron-protective compounds used to fight the effects of aging and disease and to protect humans against the damaging effects of aging and diseases such as cancer, Alzheimer's disease, and cardiovascular disease. These compounds will likely have commercial applications in medical treatments and nutritional supplements, as well as in cosmetic creams and anti-aging makeup. Pappolla's research has generated two patents, with two patents pending. He has earned multiple grants from NIH, the U.S. Department of Veterans Affairs, and other foundations and corporations. He is also professor of neurology in the MUSC Department of Neurosciences.

[MUSC hired Dr. Gary Aston-Jones as the WILLIAM H. MURRAY COEE ENDOWED CHAIR IN NEUROPATHOLOGY on July 1, 2006.]

MUSC is actively recruiting the COEE CHAIR IN MOVEMENT DISORDERS.

CoEE Name: **Marine Genomics**
Fiscal Institution: **Medical University of South Carolina**
Collaborative Institution: **College of Charleston**
Award Date: 6/24/03
Award Amount: \$4 million

The Applied Marine Genomics CoEE researches marine functional genomics and bioinformatics, which includes analyzing physiological adjustments in animal and plant genetics that result from environmental changes. This CoEE also uses genomics tools to render aquatic species with increased resistance to disease and infection, as well as develops technology to enable rapid detection of pathogens. Genomics technology is an important tool for the South Carolina oyster and shrimp business. The CoEE's investors and collaborators include Hollings Marine Laboratory, the National Oceanic and Atmospheric Administration's National Ocean Service, and the S.C. Department of Natural Resources. This CoEE has sold a diagnostic gene chip to the International Oyster Microarray Consortium on a cost-recovery basis. Other contract partners include the University of Delaware and the National Institute of Standards and Technology.

MUSC is actively recruiting the COEE CHAIR IN MARINE BIOINFORMATICS and the COEE CHAIR IN MARINE GENOMICS.

CoEE Name: **Regenerative Medicine**
Fiscal Institution: **Medical University of South Carolina**
Collaborative Institutions: **Clemson University and University of South Carolina**
Award Date: 8/25/03
Award Amount: \$5 million

The Regenerative Medicine CoEE combines statewide expertise in developmental biology, adult stem cell technology, and tissue engineering. Regenerative medicine is defined as the regeneration of tissue and organs for the purpose of repairing, replacing, and maintaining organ function. The goals of this collaborative CoEE between all three research universities include: (a) fostering basic research in genetics, proteogenomics, developmental biology, cell biology, and physiology of stem cells; (b) translating basic research into novel therapies for genetic and degenerative disorders; (c) collaborating with the private sector to develop business innovation research grants that can lead to partnerships with the business community and the federal government; and (d) establishing pre-doctoral and postdoctoral training programs in stem cell technology, developmental biology, biomaterials, and tissue engineering. MUSC faculty have successfully renewed a \$10.8 million NIH Center of Biomedical Research Excellence Award for regenerative medicine research and received an Introductory Molecular Biology Research Experience NIH grant. This CoEE has filed for several patents for wound-healing technology. A spin-off company, FirstString, has been created featuring new wound repair technology; it has garnered investments of more than \$600,000. FirstString is presently working on a wound-repair gel which potentially may bring tens of millions of dollars of revenue to MUSC.

USC is actively recruiting the COEE CHAIR IN DEVELOPMENTAL BIOLOGY.

Clemson University is actively recruiting the COEE CHAIR IN BIOMATERIALS.

[MUSC hired Dr. Richard Swaja as the COEE CHAIR IN REGENERATIVE MEDICINE on October 1, 2006.]

CoEE Name: **Brain Imaging**

Fiscal Institution: **University of South Carolina**

Collaborative Institution: **Medical University of South Carolina**

Award Date: 6/24/03

Award Amount: \$5 million

The Brain Imaging CoEE combines expertise at USC and MUSC to create a world-class brain imaging center. This collaborative CoEE anticipates receiving federal grants and contracts and is likely to spawn startup companies in the areas of deception detection and minimally invasive brain stimulation technologies. The CoEE launched a spin-off company, Cephos Corporation, which uses brain imaging technology to detect deception. The CoEE is in discussion with Philips Research Scientists, which has decided to launch a research initiative in brain imaging and stimulation. Two recently acquired MRI systems, a Siemens Trio MRI system and a Bunker 7-Tesla, are attracting important companies such as Glaxo-Smith Kline, Jazz Pharmaceuticals and BioValve, which use the systems to speed drug discovery and development in mood stabilizers, anticonvulsants, and cognitive enhancers. This CoEE also launched the McCausland Imaging Center.

USC is actively recruiting the COEE CHAIR IN COGNITIVE NEUROIMAGING and the COEE CHAIR IN IMAGING BIOPHYSICS.

MUSC is actively recruiting the COEE CHAIR IN BRAIN IMAGING and the COEE CHAIR IN IMAGING SCIENCE.

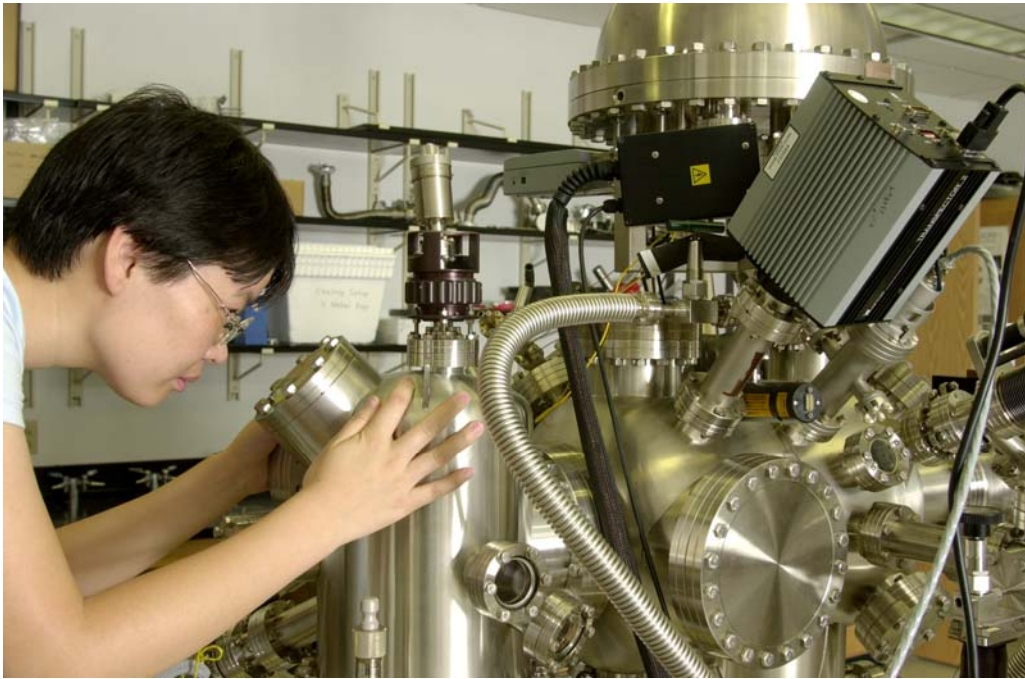


Dr. Gordon Baylis studies techniques for individualized diagnosis and treatment of brain degeneration in the Brain Imaging CoEE.

CoEE Name: **Nanostructures**
Fiscal Institution: **University of South Carolina**
Award Date: 6/24/03
Award Amount: \$4 million

The Nanostructures CoEE is a component of the USC Nanocenter. This CoEE concentrates on research in experimental nanoscale physics and is positioning the state to compete in the global future electronics market. The program has five major focus areas: (a) synthesis/characterization of nanowires in metals and semiconductors for novel magnetism in electronic circuits; (b) development of high power LEDs, transistors, and optoelectric properties of materials; (c) development of nanomagnetism, high frequency switching, and spintronics; (d) development of novel superconducting states/materials; and (e) discovery of novel concepts for nanoscale sensors for magnetic and structural properties. The CoEE has received \$650,000 in combined funding from NSF, the U.S. Department of Energy, the Defense Advanced Research Projects Agency, the Army Research Office, and Seagate Corporation. Two professors with expertise in condensed matter physics and theoretical physics have been hired to assist CoEE chair-holder Dr. Richard Webb.

Dr. Richard Webb, COEE CHAIR IN NANOELECTRONICS [appointed 8-16-04]. Webb is researching quantum devices for use in computer electronics and information technology. His scientific accomplishments include fabricating some of the world's smallest electronic circuits, which could pioneer the development of smaller, higher-performing electronic devices. Current products based on Webb's discoveries include sensors which diagnose heart problems and monitor internal faults in metal structures. Previously, Webb managed the quantum electronics program at IBM's T.J. Watson Laboratory. He is a member of the National Academy of Sciences (one of two USC researchers to hold that distinction) and is a fellow of the American Academy of Arts and Sciences.



A graduate student uses the Scanning Tunneling Microscope (STM) to study nanostructures in the surface chemistry laboratory.

2003-2004 Centers of Economic Excellence

CoEE Endowed Chair Name: **Optical Materials**

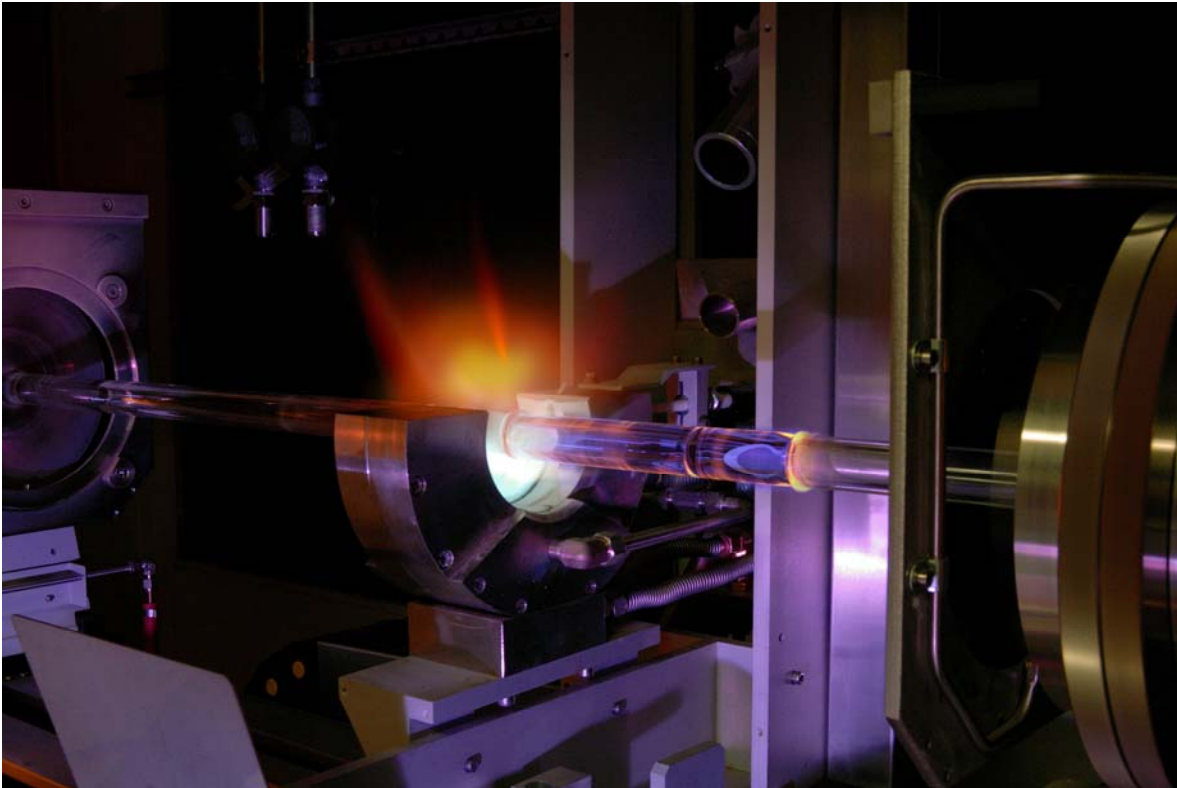
Fiscal Institution: **Clemson University**

Award Date: 4/27/04

Award Amount: \$5 million

The Photonic Materials CoEE is affiliated with Clemson's Center for Optical Materials Science and Engineering Technologies (COMSET). (Since 2000, COMSET's sponsored research has exceeded \$38 million.) The endowed chair will lead COMSET's research activities in organic and inorganic materials for optical fiber and related photonic technologies. 3M Corporation recently donated a modified chemical deposition vapor system to this CoEE, making Clemson one of only three universities in the world with industry-level optical fiber production capability. This CoEE focuses on the design, fabrication, and testing of optical fibers for use in (a) directed energy systems critical to federal defense efforts; (b) communication systems for automobiles and information technologies; and (c) light-based biomedical therapies. In 2005, the High Energy Laser Joint Technology Office awarded Clemson a \$2.7 million research grant. Clemson has also received major funding from the J.E. Sirrine Textile Foundation. This CoEE has impacted the launching of two companies: Advanced Photonic Crystals and Tetramer Technologies.

Clemson is actively recruiting the COEE CHAIR IN OPTICAL MATERIALS.



The modified chemical vapor deposition lathe donated by the 3M Corporation to the Photonic Materials CoEE.

CoEE Endowed Chair Name: **Vehicle Electronic Systems Integration**

Fiscal Institution: **Clemson University**

Award Date: 4/27/04

Award Amount: \$3 million

The CoEE endowed chair in Vehicle Electronic Systems Integration at CU-ICAR researches vehicle electronics, a complex field where components such as software, telematics, information and communication systems, electronics, mechatronics, and sensors must be integrated in a well-balanced way to create attractive, stable, and economic products. In automotive technology, the area with the greatest promise for growth is electronics, and South Carolina has the potential to become the Silicon Valley in vehicular electronics through the research conducted by this chairholder. The Clemson Vehicular Electronics Consortium has been created, which provides companies with a quick and convenient way to get involved in automotive research at CU-ICAR. Already, several companies have expressed interest in joining the consortium. Funding is being pursued for an anechoic chamber and facilities to accommodate this system. This facility will provide the only full-vehicle EMC test capability in the Southeast, which will save automotive companies time and resources and attract new industry into the state.

[Clemson hired Dr. Todd H. Hubing as the MICHELIN COEE CHAIR IN VEHICLE ELECTRONIC SYSTEMS INTEGRATION on July 1, 2006.]

CoEE Name: **Travel and Tourism Technology**

Fiscal Institution: **University of South Carolina**

Collaborative Institution: **Coastal Carolina University**

Award Date: 8/30/04

Award Amount: \$2 million

The purpose of the Travel and Tourism Technology CoEE is to provide innovation to the tourism industry through the creation of new technological standards that will allow hotels, airlines, rental car companies, restaurants and destination marketers to operate more efficiently. At present, technological applications such as software providers and web-based electronic commerce in the travel and tourism industry are severely outdated. As this CoEE makes new travel and tourism technology discoveries, it hopes to secure contracts with major corporations and tourism ministries as well as impact the South Carolina tourism industry (\$14.5 billion in economic activity in 2002). The CoEE's three primary goals include: (a) assisting technology developers and travel and tourism businesses to establish and adopt technological standards in hardware, software and web-based applications; (b) discovering and testing new technological applications based on new industry standards; and (c) evaluating the effects of new technology on organizational structures with the goal of increasing the efficiency of corporate management. This CoEE currently is developing international collaborations with universities and Ministers of Tourism in several countries, including China, Uruguay, Guatemala and Brazil.

USC is actively recruiting the COEE CHAIR IN TRAVEL AND TOURISM.

CoEE Name: **Translational Cancer Therapeutics**
Fiscal Institution: **Medical University of South Carolina**
Collaborative Institution: **University of South Carolina**
Award Date: 4/27/04
Award Amount: \$5 million

The collaborative Translational Cancer Therapeutics CoEE builds on existing strengths in pharmacology at USC and MUSC and expands opportunities for increased interdisciplinary research to enhance scientific research in the biology common to cancer. As research builds in the discovery and development of cancer drugs, the state economy will be strengthened by biotechnology companies with pharmaceutical interests. Already the creation of this CoEE has led to the hiring of prominent scientists from the University of Virginia, NIH, Harvard University, and the Fox Chase Cancer Center. Novelos Pharmaceuticals has awarded this CoEE an unrestricted grant to study lung and ovarian cancer. [In March 2007, this CoEE co-hosted the Hollings Cancer Center Spring Symposium in Cancer Drug Discovery and Development, which was attended by a host of international pharmaceutical and medical experts and representatives. In 2007, this CoEE also supported the recruitment of three new assistant professors and an associate professor to MUSC. These four individuals from Harvard University, the Fox Chase Cancer Center, the University of Virginia, and the National Institutes of Health have formed a drug discovery team under the direction of Dr. Tew.]

USC is actively recruiting a second COEE CHAIR IN TRANSLATIONAL CANCER THERAPEUTICS.

Dr. Kenneth Tew, JOHN C. WEST CHAIR IN CANCER RESEARCH [appointed 1-1-04]. Tew has an international reputation as a cancer drug discovery researcher and developer. His early research was pivotal in the design of treatment for hormone refractory prostate cancer. Tew's research has also proved instrumental in the late-stage clinical testing of two promising drugs, one for treating ovarian and lung cancer, and another that serves as a modifier of bone marrow-mediated immune function. Tew is presently conducting research on how cancer cells develop resistance to different drugs. Discoveries from this work have suggested links between cancer and Alzheimer's disease. Tew sits on scientific advisory boards of a number of pharmaceutical companies. He has been awarded a National Cancer Institute Outstanding Investigator Grant and an American Cancer

Research Society (ACS) Scientific Excellence Award. He is also chair of MUSC's Department of Cell and Molecular Pharmacology and Experimental Therapeutics.



Dr. Kenneth Tew

CoEE Name: Cancer Drug Discovery
Fiscal Institution: Medical University of South Carolina
Collaborative Institution: University of South Carolina
Award Date: 8/30/04
Award Amount: \$5 million

The Cancer Drug Discovery CoEE provides mechanisms for target identification and generation of lead compounds in the drug discovery process, thus creating a productive interface (currently lacking in the field) between academics and the biotechnology/pharmaceutical industries. This CoEE also develops research in structural biology for target analysis, chemical biology for designing drug candidates, and advanced biomedical screening technologies. The CoEE's success is built upon the expertise and resources of its four endowed chairs, two of which were appointed in 2006. One of these, Dr. Charles Smith, has formed a high throughput drug screening core that contains chemical libraries with 25,000 compounds. He is also relocating his company, Apogee Biotechnology, to Charleston. Founded in 2001, Apogee is funded by eight Small Business Innovation Research grants totaling \$2.7 million from NIH. The company controls a portfolio of pending patents that describe several classes of novel compounds and their uses for the treatment of a variety of diseases. Another chair-holder, Dr. John Lemasters is an expert in the advanced cellular technology of multiphoton confocal microscopy. His current projects center on the role of mitochondria in cell injury and death in cancer, heart and liver cells.

Dr. Charles Smith, CHARLES AND CAROL COOPER COEE ENDOWED CHAIR IN PHARMACY [appointed 2-1-06]. Smith's research mission is to design new drugs that fight cancer by unlocking molecular mechanisms important for tumor growth. This work could enable the development of new drugs to fight a variety of inflammatory diseases, including arthritis, Crohn's Disease, and diabetic retinopathy. From research largely funded by the NIH, Smith holds nine patents in his field. He has held faculty positions at Duke University, Penn State University, and the Fox Chase Cancer Center.

Dr. John Lemasters, COEE ENDOWED CHAIR IN ADVANCED TECHNOLOGIES [appointed 2-1-06]. Lemasters is a pioneer of techniques that allow scientists to see inside individual cells during reoxygenation (the restoration of oxygen to an organ following oxygen deprivation), which occurs following a heart attack or stroke. Lemasters specializes in a kind of microscopy that allows doctors to view slices of a single cell. His work is likely to help researchers understand the mechanisms by which the liver is injured through chronic alcohol use and how donated organs are damaged while being held for transplant surgery. Previously, Lemasters served as director of the University of North Carolina Cell and Molecular Imaging Facility and the Confocal Imaging Facility. He holds five patents in confocal microscopy.

USC is actively recruiting the COEE CHAIR IN MEDICINAL CHEMISTRY.

MUSC is actively recruiting the COEE CHAIR IN STRUCTURAL BIOLOGY.

CoEE Name: **Polymer Nanocomposites**
Fiscal Institution: **University of South Carolina**
Award Date: 4/27/04
Award Amount: \$3.5 million

Research at the Polymer Nanocomposites CoEE focuses on the development of new materials with improved properties for the polymers market. The plastics industry in South Carolina currently accounts for approximately 5% of the Gross State Product (GSP) of goods and services. Currently the plastics industry is experiencing commoditization of its basic materials (the plastic polymers themselves). This CoEE is hoping to transform the plastics industry and thus have a major impact on the state's manufacturing economy. This CoEE also is developing a pre-competitive research consortium to study the potential uses of nanomaterials to improve the performance of a variety of polyester polymers. Already this CoEE has received a grant of \$901,000 from the U.S. Air Force Research Laboratory to construct and evaluate polymer nanocomposite structures for application in high energy storage devices. Relationships have been formed with more than 20 manufacturers, plastic processors, and end-use fabricators. This CoEE is also currently receiving funding from two companies and is in negotiation for funding from two more companies.

USC is actively recruiting the COEE CHAIR IN MATERIALS SCIENCE AND ENGINEERING.



Dr. Hanno Zur Loye (left) leads USC research on polymer nanocomposites.

CoEE Name: **Hydrogen and Fuel Cell Economy**

Fiscal Institution: **University of South Carolina**

Award Date: 8/30/04

Award Amount: \$5 million

The CoEE in Hydrogen and Fuel Cell Economy is part of the larger Future Fuels™ Initiative, which is expanding USC's expertise in fuel cells and alternative energy. This CoEE will conduct research to develop hydrogen storage materials and sensors for fuel cells. Fuel cells produce electricity from hydrogen and hydrogen-rich carbon fuels without thermal combustion and are more efficient for power generation than existing coal and natural gas technology. Along with other components of the Future Fuels™ Initiative, this CoEE will be housed in the Horizon Center, a \$55 million public and private facility at USC Innovista. The two endowed chair-holders will work with public and private sector alliances such as the South Carolina Hydrogen and Fuel Cell Alliance and the Greater Columbia Fuel Cell Collaborative. USC presently has the nation's only NSF Industry/University Cooperative Research Center for Fuel Cells. The research of this CoEE will increase the number of dues-paying Fuel Cell Center members from companies all over the world. This CoEE has international collaborations with the Korea Institute of Energy Research and the Fraunhofer Institute for Solar Energy in Germany.

USC is actively recruiting the COEE CHAIR IN SENSORS and the COEE CHAIR IN HYDROGEN STORAGE MATERIALS.



The primary focus of the Horizon Center will be research and development in the areas of energy, engineering, and chemistry, including “next energy” fuel technology.

The Horizon Center is projected to be completed in Spring 2008.

2004-2005 Centers of Economic Excellence

CoEE Endowed Chair Name: **Electron Imaging**

Fiscal Institution: **Clemson University**

Award Date: 6/29/05

Award Amount: \$5 million

The Electron Imaging CoEE expands Clemson's use of its outstanding electron imaging laboratory, which has five electron microscopes and a modern focused ion beam instrument. The chair-holder will be an international authority in electron microscopy or related imaging technology and will supervise an industrial consortium formed by South Carolina firms concerned with the manufacture and use of advanced materials. Research in this CoEE will focus on design and performance experiments, and this Center will offer data analysis and consultation to consortium members. This CoEE will provide an enormous competitive advantage to industrial consortium members and help in the recruiting of high tech industries and startups to South Carolina as well as collaborate with ongoing research programs in the state in fields such as nanotechnology, photonic materials, and biomaterials. This CoEE also intends to expand Clemson's existing laboratory facilities by acquiring new microscopes such as a high resolution TEM, an EELS detector, and a large chamber variable pressure SEM. This CoEE is currently in major negotiations to secure the full non-state match.

Clemson is actively recruiting the COEE CHAIR IN ELECTRON IMAGING.

CoEE Endowed Chair Name: **Supply Chain, Optimization, and Logistics**

Fiscal Institution: **Clemson University**

Award Date: 9/16/05

Award Amount: \$2 million

The Supply Chain, Optimization and Logistics CoEE is a component of a larger initiative, the Clemson Institute for Supply Chain Optimization and Logistics (CISCOL). Research at this COEE centers on supply chain modeling, material handling, logistics, planning systems, and distribution. The primary goals include: (a) conducting interdisciplinary research of multifaceted problems associated with supply chain; (b) assisting in economic development by providing industries with access to Clemson's resources and expertise in supply chain activities; (c) delivering tangible products and services in the area of supply chain optimization and logistics through theoretical and applied research; and (d) conducting educational activities supporting technology transfer. This CoEE has received sponsored research funding from Southern Company, Michelin, and Lockheed Martin totaling \$180,000. Discussions for research funding are underway with Aerospace Engineering, IntelliTrans Solution, Alabama Power and Electric, and AGS Resources.

Clemson is actively recruiting the COEE CHAIR IN SUPPLY CHAIN, OPTIMIZATION AND LOGISTICS.

CoEE Endowed Chair Name: **Urban Ecology and Restoration**

Fiscal Institution: **Clemson University**

Award Date: 9/16/05

Award Amount: \$2 million

Through research, the Urban Ecology and Restoration CoEE supports the growth of the state's environmental industry. Presently land development-related infrastructure restoration accounts for an estimated one trillion dollars worldwide each year. This CoEE, along with the Clemson Restoration Institute, will attract world-renowned faculty of restoration development who will create a knowledge-based industry cluster. This CoEE is unique for its interdisciplinary, integrative approach to the restoration of historic, ecological, and urban infrastructure resources through the integration of basic ecological science, engineering, and urban design and planning. This CoEE is likely to fuel the creation and production of high-wage, knowledge-based professional opportunities that will bring evidence-based research and viable, applied, sustainable solutions to the restoration industry. Research outcomes at this CoEE will include the creation of new engineering systems for integrated wastewater management and treatment; bio-filters and bio-remediation materials and techniques for toxic soils; materials and installation techniques for re-vegetated aquatic buffer and filtration zones; erosion and sedimentation control techniques and materials; recycled and advanced building materials; pervious pavement systems for roads and parking lots; and materials and techniques for propagation, installation, and maintenance of native plant species in urban settings. Collaborations are planned with faculty at the College of Charleston and the American College of the Building Arts (Charleston).

Clemson is actively recruiting the COEE CHAIR IN URBAN ECOLOGY AND RESTORATION.

CoEE Name: **Gastrointestinal Cancer Diagnostics**

Fiscal Institution: **Medical University of South Carolina**

Award Date: 6/29/05

Award Amount: \$5 million

The Gastrointestinal Cancer Diagnostics CoEE researches state-of-the-art translational medicine for gastrointestinal cancer patients, with hopes of decreasing the overall impact of cancer mortality and morbidity and closing disparity gaps throughout the state. Areas of research include molecular profiling, therapeutic targets, screening technologies, therapy, environmental interactions and population studies, with particular emphasis on esophageal cancer, which is highly prevalent in South Carolina. This CoEE anticipates receiving major research grants and the creation of spin-off companies as the result of its research. Funding has been received for the establishment of a non-CoEE chair who will conduct research with the CoEE chair-holder. Major non-state partners include the Spartanburg Regional Healthcare System, Roche Carolina, and Bank of America.

MUSC is actively recruiting the COEE CHAIR IN GASTROINTESTINAL MALIGNANCIES.

CoEE Name: Vision Science
Fiscal Institution: Medical University of South Carolina
Collaborative Institution: University of South Carolina
Award Date: 6/29/05
Award Amount: \$4.5 million

The Vision Science CoEE focuses on the generation of new gene and pharmaceutical bases for the treatment of macular degeneration, glaucoma, retinitis pigmentosa, and other eye diseases. The three endowed chairs at this COEE will have expertise in the areas of gene-and pharmaceutical-based treatments for retinal degenerative diseases as well as bioengineering and material science techniques to develop novel products for improving surgical outcomes and drug delivery. This CoEE, along with the Vision Research Center, will serve as a platform for new product and business development and will create new jobs through the formation of start-up companies and the licensing of South Carolina intellectual property. The state economy will also be enhanced through the creation of new business opportunities for vendors and service-related businesses within the State. The initial five-year economic impact of this CoEE is projected to be between \$47 million and \$51 million.

MUSC is actively recruiting a COEE CHAIR IN GENE AND PHARMACEUTICAL TREATMENT OF RETINAL DEGENERATIVE DISEASE and a CoEE Chair in BIOENGINEERING AND MATERIAL SCIENCE TECHNIQUES.

USC is actively recruiting a COEE CHAIR IN GENE AND PHARMACEUTICAL TREATMENT OF RETINAL DEGENERATIVE DISEASE

CoEE Name: Renewable Fuel Cells for the Fuel Cell Economy
Fiscal Institution: University of South Carolina
Award Date: 6/29/05
Award Amount: \$3 million

The Renewable Fuel Cells for the Fuel Cell Economy CoEE is a part of the larger Future Fuels™ Initiative which is expanding USC's expertise in fuel cells and alternative energy. Along with other components of the Future Fuels™ Initiative, this CoEE will be housed in the Horizon Center, a \$55 million public and private facility at USC Innovista. This endowed chair-holder will work with the NSF I/UCRC for Fuel Cell and new and existing industries pursuing fuel cell opportunities as well as the Savannah River National Laboratory. The mission for this CoEE is to coordinate state and local research projects to attract additional capital investment in South Carolina for the fuel cell economy. The CoEE is developing new catalysts that allow alternative fuels to be produced from renewable sources. These new catalysts are the "next wellhead" as the transportation sector moves to less dependence on imported oil and on fuel which recycles carbon. This CoEE endowed chair-holder will provide expertise on developing new catalysts.

USC is actively recruiting the COEE CHAIR IN RENEWABLE FUEL CELLS.

CoEE Name: **Clinical Effectiveness
and Patient Safety**

Fiscal Institution: **Medical University
of South Carolina**

Collaborative
Institutions: **Univ. of South Carolina
Clemson University**

Award Date: 9/16/05
Award Amount: \$5 million

The Clinical Effectiveness and Patient Safety CoEE improves clinical education and patient safety through the use of simulation technology. Its goals include improving the quality of delivered care, advancing the practice and training of the medical workforce from student nurses to practicing physicians, and becoming an international focal point for health sciences education and innovative research in education and safety. Multiple simulation sites are being developed throughout the state, including ones associated with MUSC, Palmetto Health System, USC, Greenville Hospital System and Greenville Technical College. Once this unique, statewide medical simulation delivery model has been implemented, it will serve as a valuable learning system which can be licensed to other states and international regions. This CoEE is developing course curriculum with MUSC and USC and is training anesthesiology residents in difficult airway management. This CoEE is a major recipient of funding from the \$21 million Duke Endowment grant.

Clemson is actively recruiting a COEE CHAIR IN CLINICAL EFFECTIVENESS & PATIENT SAFETY.

USC is actively recruiting a COEE CHAIR IN CLINICAL EFFECTIVENESS & PATIENT SAFETY.



Dr. John Schaefer

Dr. John Schaefer, LEWIS BLACKMAN COEE ENDOWED CHAIR FOR PATIENT SIMULATION AND RESEARCH FOR HEALTH SCIENCES SOUTH CAROLINA [appointed 2-1-06]. Schaefer is working to reduce patient injury during airway management procedures using mannequin-based simulators. These procedures ensure that a person can breathe while receiving treatments such as anesthesia, CPR, or emergency medical attention. Airway management during such procedures is a common source of unintended patient injury. Schaefer founded the Peter M. Winter Institute of Simulation, Education, and Research at the University of Pittsburgh Medical Center, one of the world's leading patient simulation facilities.

2005-2006 Centers of Economic Excellence

CoEE Endowed Chair Name: **Advanced Fiber-Based Materials**

Fiscal Institution: **Clemson University**

Award Date: 6/13/06

Award Amount: \$4 million

The 2002 Palmetto Institute Report identified advanced materials as a seed cluster industry in the state, and the Advanced Fiber-Based Materials CoEE intends to be a catalyst in repositioning existing manufacturing resources to support new industry opportunities in this field. Research at this CoEE concentrates on the composition of novel fiber materials, fabrics, and integrated components which possess unique functionality and value-added performance over traditional textile materials. This CoEE is developing a niche industry in high-tech fibers and materials including fiber-reinforced composite materials based on metals, ceramics and polymers. A multimillion-dollar non-state match was donated by the J.E. Serrine Textile Foundation, and this CoEE is in continued conversation with Dow Chemical and DuPont to receive research support.

Clemson is actively recruiting the COEE CHAIR IN ADVANCED FIBER-BASED MATERIALS.

CoEE Endowed Chair Name: **Molecular Nutrition and Nutrigenomics**

Fiscal Institution: **Clemson University**

Award Date: 6/13/06

Award Amount: \$2 million

The Molecular Nutrition CoEE seeks to become the foremost center of scientific information on energy balance and obesity treatment. This CoEE researches the fundamental mechanisms by which macronutrients and micronutrients interact with the human genome to promote wellness and prevent disease. Goals for the CoEE include: (a) fostering basic research in food plant nutrigenomics, molecular nutrition, and molecular epidemiology; (b) enhancing existing molecular nutrition related graduate and postdoctoral training programs; (c) translating basic research into services such as obesity prevention and fitness promotion, treatment of weight disorders, and public health recommendations; and (d) collaborating with the private sector to develop small business grants that lead to long-term partnerships. South Carolina's \$1 billion food industry advantageously positions the Molecular Nutrition CoEE for partnerships and support from the SCRA Innovation Centers and SC Bio. This CoEE will also partner with nutraceutical and/or life science industries as well as life science-based companies that develop gene-based diagnostics/services and nutrition-based companies that manufacture designer foods and health supplements.

Clemson is actively recruiting the COEE CHAIR IN MOLECULAR NUTRITION AND NUTRIGENOMICS.

CoEE Name: Molecular Proteomics in Cardiovascular Disease and Prevention

Fiscal Institution: Medical University of South Carolina

Award Date: 6/13/06

Award Amount: \$5 million

The Molecular Proteomics in Cardiovascular Disease and Prevention CoEE works to translate advances in cardiovascular prevention and treatment “bench” science into clinical “bedside” care. This CoEE has five initial goals: (a) developing measurement systems to detect early indicators of heart failure; (b) relating diagnostic protein signatures to clinical outcomes; (c) developing therapeutic management strategies; (d) creating a statewide network to develop, test, and improve clinical care of heart failure; and (e) transferring technology into new South Carolina industries. The CoEE is in discussions with a company to develop a biomarker testing system, a device envisioned as a desktop, office instrumentation which will inexpensively measure protein markers to create individualized risk profiles for development of chronic heart failure. A spin-off company is also anticipated for the development of plasma protein detection methods using customized beads which have fluorescent antibodies attached to them. This CoEE has potential to yield major economic impact in the short-term.

MUSC is actively recruiting the COEE CHAIR IN NUTRIGENOMICS and the COEE CHAIR IN ENGINEERING.

CoEE Name: Solid Oxide Fuel Cells

Fiscal Institution: University of South Carolina

Award Date: 6/13/06

Award Amount: \$3 million

The Solid Oxide Fuel Cells CoEE is a part of the larger USC Future Fuels™ Initiative. Solid oxide fuel cells are one of the two leading types of fuel cells available for commercialization and are expected to find application in large, high-power systems such as full-scale industrial and large-scale electricity-generating stations. The proposed CoEE will expand the collaboration USC has for fuel cell development at the NSF I/UCRC, which currently has fourteen dues-paying members jointly working on generic aspects of fuel cell systems in a shared pre-competitive manner. This CoEE’s work is to remove barriers for the use of solid oxide fuel cells in society by: (a) designing components to accommodate variations in temperature and transport associated with practical uses; (b) understanding long-term behavior and durability of solid oxide fuel cell systems; (c) developing testing protocols that simulate solid oxide fuel cells behavior over their lifetime; and (d) developing systems for stationary power generation. USC has successfully created three startup companies in the field of energy and fuel cells, based upon the research emanating from USC faculty and students.

USC is actively recruiting the COEE CHAIR IN SOLID OXIDE FUEL CELL RESEARCH.

CoEE Name: Childhood Neurotherapeutics
Fiscal Institution: University of South Carolina
Collaborative Institution: Medical University of South Carolina
Award Date: 6/13/06
Award Amount: \$5 million

The Childhood Neurotherapeutics CoEE utilizes recent advances in pharmacogenetics, metabolic disorders, and neuroinflammatory diseases to study neurological disorders in children. Research at this CoEE will be particularly focused on the prevention of brain damage in premature infants (neuroprotection) and the curing of infant brain diseases through cellular engineering. In collaboration with the Greenville Hospital System, this CoEE operates a statewide team that is developing neural stem cell therapeutic approaches to neurological disorders in children. Neural stem cells have recently been identified as having high repair capacity, particularly during development. This important scientific discovery will allow the CoEE to impact the treatment of these disorders and to transfer research knowledge directly to patient application.

USC is actively recruiting the COEE CHAIR IN CHILD AND ADOLESCENT NEUROCHEMISTRY and the COEE CHAIR IN TRANSLATIONAL THERAPEUTICS.

MUSC is actively recruiting the COEE CHAIR IN NEURODEVELOPMENTAL DYSFUNCTION.

V. Economic Impact Achievements

Following the award of a Center of Economic Excellence, each research institution has 78 months in which to draw down the sum total of the state award (between \$2 million to \$5 million). Approximately the same amount of time can be required to recruit a world expert in the rarefied research field of an individual CoEE. Yet only four years into the program, a number of CoEEs have already made a major impact on the state's economy. Listed below are some major program economic development highlights through the end of FY 2006:

The **CoEE endowed chair in Automotive Design and Development**, part of the CU-ICAR initiative, has partnered with Timken Company (Fortune 500), a well-known provider of automotive industry products and solutions based on friction management and power transmission. Timken has established research and development facilities on the CU-ICAR campus in Greenville and has relocated its automotive powertrain engineering resources to a new worldwide powertrain engineering center at CU-ICAR. This partnership has already generated more than 150 high-paying jobs in the Upstate.

The **CoEE endowed chairs in Automotive Manufacturing and Automotive Systems Integration** (CU-ICAR) are in major discussions to establish private sector partnerships with companies such as General Motors, IBM, Toyota, Honda, Daimler-Chrysler, Hewlett-Packard, Nissan, and the Robert Bosch Corporation. These chairs have conducted workshops for several years with BMW, Michelin, Timken, and Siemens to promote industry involvement in CU-ICAR's research initiatives. BMW has located its Information Technology Research Center on the CU-ICAR campus. More than 200 engineers and technicians are currently housed in this facility.

The **CoEE in Proteomics** has filed a patent in proteomics technology. The MUSC Proteomics Center is also the recipient of the largest competitive extramural research award ever received in the state (\$18.7 million).

The **CoEE in Neuroscience** has partnered with Cure Parkinson's Project, a non-profit corporation which engages in faculty recruitment and provides infrastructure and equipment to help cure Parkinson's Disease. As a component of the Neuroscience Institute, this CoEE will continue MUSC's affiliations with companies like AstraZeneca, Pfizer, Merck, and Janssen Pharmaceuticals. The Center has also supported the creation of SemiAlloGen, Inc., a biotech company which develops therapeutics in the field of neurodegenerative disorders and cancer. It is also anticipated that endowed chair Dr. Miguel Pappolla's research in compounds that limit the extent of Alzheimer's Disease will be translated into a startup company or existing company.

The **CoEE in Marine Genomics** has begun to market its intellectual property as well as tangible products to the business and scientific community. The genomics group has sold a diagnostic gene chip to the International Oyster Microarray Consortium on a cost-recovery basis. Other contract partners include University of Delaware and the National Institute of Standards and Technology.

The **CoEE in Regenerative Medicine** has filed for several patents regarding wound-healing technology. A spin-off company, FirstString, has been created which markets new wound repair technology. In its start-up phase, FirstString has garnered over \$600,000 worth of investment and was chosen for support by the SC Launch Program.

The **CoEE in Brain Imaging** launched a spin-off company, Cephos Corporation, which uses brain imaging technology to detect deception. The CoEE is in continuing discussion with Philips Research Scientists, which has decided to launch a research initiative in brain imaging and stimulation. Companies including Glaxo-Smith Kline, Jazz Pharmaceuticals, and BioValve are using the CoEE's imaging facilities and personnel to speed drug discovery and development in anticonvulsants, mood stabilizers, and cognitive enhancers. The Center was also successful in launching the McCausland Imaging Center in Columbia.

Because of its affiliation with Clemson's Center for Optical Materials Science and Engineering Technologies (COMSET), the **CoEE in Optical Materials** has had an indirect impact on the launching of two companies: Advanced Photonic Crystals, which expects to have products on the market in 2008, and Tetramer Technologies, which earned more than \$1 million in revenues in 2006. Due to the fiber fabrication infrastructure and expert research activity, COMSET receives constant visits from private sector representatives. With this Endowed Chair, the CoEE is expected to continue and increase to economic impact.

The **CoEE endowed chair in Vehicle Electronic Systems Integration** (CU-ICAR) is establishing the Clemson Vehicular Electronics Consortium which will provide companies with access to automotive research at Clemson. Plans to pursue funding for an anechoic chamber and facilities are underway; this facility will provide an EMC test capability, which will save automotive companies' time and resources and attract new industry into the state.

Endowed chair-holder Dr. Kenneth Tew has established a mutual program between the **CoEE in Translational Cancer Therapeutics** and Novelos Pharmaceuticals. This partnership has produced a translational research effort in the arenas of lung and ovarian cancer. The company has awarded MUSC a six-figure unrestricted grant for continued research. This CoEE also recently co-hosted the Hollings Cancer Center Spring Symposium in Cancer Drug Discovery and Development, which was attended by a tableau of international pharmaceutical and medical experts and representatives.

Dr. Charles Smith, endowed chair-holder at the **CoEE in Cancer Drug Discovery**, is relocating his company, Apogee Biotechnology, to Charleston. Founded in 2001, Apogee is funded by eight Small Business Innovation Research grants totaling \$2.7 million from the National Institutes of Health. The company controls a portfolio of pending patents that describe several classes of novel compounds and their uses for the treatment of a variety of diseases. Drs. Smith and Lemasters were instrumental in obtaining an NIH grant for this CoEE to support the purchase of a \$230,000 shared novel biosensor instrument called a "Seahorse." The Medical University Hospital Authority has pledged \$3.8 million in support of this CoEE.

The **CoEE in Polymer Nanocomposites** has received a \$901,000 grant from the U.S. Air Force Research Laboratory to construct and evaluate polymer nanocomposite structures for application as high energy storage devices. Relationships have been formed with more than 20 manufacturers, plastic processors, and end-use fabricators; the CoEE is currently receiving funding from two companies and is in negotiation to receive funding from two more companies.

The **CoEE in Hydrogen and Fuel Cell Economy** works with public and private sector alliances such as the South Carolina Hydrogen and Fuel Cell Alliance and the Greater Columbia Fuel Cell Collaborative. This Center helps to increase dues-paying members for the Fuel Cell Center, the only NSF-funded Industry/University Cooperative Research Center for Fuels (I/UCRC). The Center has ongoing collaborations with the Korea Institute of Energy Research and the Fraunhofer Institute for Solar Energy in Germany.

The **CoEE in Travel and Tourism Technology** hopes to collaborate with major corporations to secure tourism contracts around the world. This Center is building international collaborations, including Ministers of Tourism in countries such as China, Uruguay, Guatemala, and Brazil. [In November 2006, faculty traveled to Uruguay to meet with the Minister of Tourism and individuals from Uruguay's leading university to develop ongoing collaborations with faculty at this university.]

The **CoEE in Supply Chain Optimization and Logistics** has received sponsored research funding from Southern Company, Michelin, and Lockheed Martin. Clemson has also secured Center funding from the National Science Foundation (NSF) for the creation of an Industry University Cooperative Research Center. Additional discussions regarding research funding are in process with Aerospace Engineering, IntelliTrans Solution, Alabama Power and Electric, and AGS Resources.

The **CoEE in Advanced Fiber-Based Materials** is pursuing leads with Dow Chemical and DuPont for potential support of the Center's research and endowed chair.

The **CoEE in Molecular Proteomics in Cardiovascular Disease Prevention and Treatment** is in early discussions with a company to fund its concept for a biomarker testing system. This device is envisioned as a desktop, office instrumentation which will simply and inexpensively measure protein markers to create individualized risk profiles for development of chronic heart failure. This Center has potential to yield high economic impact in the short-term.

VI. Program Academic Achievements

Improving the state's knowledge base and economy is not the only byproduct of CoEE research. Major indirect contributions of the CoEE Program include the education, training, and scholarly output of students, especially graduate students, and other faculty members or research partners working in conjunction with the endowed chair-holders. By mandate of the Review Board, each CoEE must be supported by affiliated graduate programs. As the research conducted at each CoEE gradually builds the reputation of each affiliate graduate program, it becomes easier to recruit, nationally and internationally, the very best students and postdoctoral researchers in each field. As industry builds around each CoEE and CoEE cluster, students and faculty members are likely to remain in state and continue building the state's knowledge economy. Listed below are some academic achievements which have resulted from the CoEE Program:

The **CoEE endowed chairs in Automotive Manufacturing and Automotive Design and Development** have developed and refined the M.S. and Ph.D. graduate program in Automotive Engineering. The **CoEE endowed chair in Vehicle Electronic Systems Integration** is in the process of proposing two courses for the new automotive engineering curriculum: Introduction to Automotive Electronic Systems and Automotive Electronics Design. The program changes have been approved by CHE and the Southern Association of Colleges and Schools (SACS). The first doctoral students under the refined programs have been admitted. In October 2004, faculty involved with CU-ICAR presented research results at the S.C. Endowed Matches for Business Excellence Recruitment Conference in order to promote research collaboration among other state institutions.

The **CoEE in Neuroscience** helps MUSC to strengthen its partnerships with Clemson and USC in the areas of bioengineering, stem cell research, and drug discovery. In collaboration with the Neuroscience Institute, this CoEE provides the following education opportunities: Brain Awareness Week (for elementary and middle school students), Frontier in Neuroscience (an opportunity for students, post-docs, and faculty to interact with internationally-renown neuroscientists), the Georgia/South Carolina Neuroscience Consortium, Grand Rounds (seminar programs which highlight translational research), and the Summer Undergraduate Research Program.

The **CoEE in Marine Genomics** has created a new Marine Genomics track in the program leading to the M.S. degree in Marine Biology at the College of Charleston. This track complements a highly innovative undergraduate degree program in Discovery Informatics at the College of Charleston. In May 2005, MUSC and NSF held an international workshop in Charleston on marine genomics which resulted in several scientific collaborations. In June 2005, NSF sponsored a genomics workshop on the organism *Fundulus* at the Hollings Lab in Charleston.

The **CoEE in Nanostructures** supports a research group that includes four post-docs, two graduate students, and two undergraduate students. The program has developed academic collaborations with scientists at Seagate Technology, UNC-Charlotte, Boston University, Louisiana State University, Florida Institute of Technology, and the University of Texas.

The **CoEE in Brain Imaging** has been successful in recruiting junior faculty for the program, both at USC and MUSC. A Brain Imaging course is currently offered at USC for undergraduate and graduate students. Two students with academic focus in neuroimaging techniques have received Ph.D.s in Communication Sciences, and another is currently a doctoral candidate in Psychology. The CoEE has sponsored three international symposiums featuring scientists from Johns Hopkins University, Duke University, UCLA, and the University of Arizona.

The **CoEE in Optical Materials** is a component of the larger initiative COMSET (see above), which received Commission of Higher Education approval in 2004 as the only optics research center in the state.

The **CoEE in Translational Cancer Therapeutics** has successfully recruited four accomplished faculty members from the Fox Chase Cancer Center, NIH, Harvard University, and the University of Virginia.

The **CoEE in Hydrogen and Fuel Cell Economy** has developed graduate-level courses in Electrochemistry, Mathematical Modeling, Fuel Cell Engineering, and Interfacial Engineering.

The **CoEE in Travel and Tourism Technology** is developing a Baccalaureate Degree in Tourism Management and a Masters Degree in Hospitality Technology Management.

The **CoEE in Polymer Nanocomposites** currently is supporting three graduate students and one postdoctoral fellow in Chemistry.

The **CoEE in Gastrointestinal Cancer Diagnostics** is in discussion with researchers at Johns Hopkins University and Duke University regarding a possible research collaboration in esophageal malignancy.

Endowed chair-holder Dr. John Schaefer of the **CoEE in Clinical Effectiveness and Patient Safety** has provided consultation for USC Upstate and Greenville Technical College. He is developing course curriculum with MUSC and USC and is currently training anesthesiology residents in difficult airway management. Nursing course development discussions have begun with Greenville Hospital System, Greenville Technical College, and Clemson.

VII. CoEE Review Board: 2003-2006

2002-2003

NAME	POSITION	APPOINTMENT
Margaret Addison	Member	Governor I
Harry Lightsey, Jr.*	Member	Governor II
Samuel J. Tenenbaum	Vice Chair	Governor III
Anthony O'Neill	Member	President Pro Tempore I
William Amick	Member	President Pro Tempore II
James Bailey	Member	President Pro Tempore III
Edward T. McMullen, Jr.	Chair	Speaker of the House I
Benjamin T. Rook	Secretary	Speaker of the House II
Rita Allison**	Member	Speaker of the House III
James F. Barker	Ex-Officio	
Raymond S. Greenberg	Ex-Officio	
Andrew A. Sorensen	Ex-Officio	

* Robert W. Pearce, Jr. replaced Harry Lightsey, Jr. as a Governor appointee during FY 2002-03.

** Paula Harper Bethea replaced Rita Allison as a Speaker of the House appointee during FY 2002-03.

2003-2004

NAME	POSITION	APPOINTMENT
Margaret Addison	Member	Governor I
Robert W. Pearce, Jr.	Member	Governor II
Samuel J. Tenenbaum	Vice Chair	Governor III
Anthony O'Neill	Member	President Pro Tempore I
William Amick	Member	President Pro Tempore II
James Bailey	Member	President Pro Tempore III
Edward T. McMullen, Jr.	Chair	Speaker of the House I
Benjamin T. Rook	Secretary	Speaker of the House II
Paula Harper-Bethea	Member	Speaker of the House III
James F. Barker	Ex-Officio	
Raymond S. Greenberg	Ex-Officio	
Andrew A. Sorensen	Ex-Officio	

2004-2005

NAME	POSITION	APPOINTMENT
John Molnar*	Member	Governor I
Robert W. Pearce, Jr.	Member	Governor II
Samuel J. Tenenbaum	Vice Chair	Governor III
Anthony O'Neill	Member	President Pro Tempore I
William Amick**	Member	President Pro Tempore II
James Bailey	Member	President Pro Tempore III
Edward T. McMullen, Jr.	Member	Speaker of the House I
Benjamin T. Rook	Chair	Speaker of the House II
Paula Harper-Bethea	Secretary	Speaker of the House III
James F. Barker	Ex-Officio	
Raymond S. Greenberg	Ex-Officio	
Andrew A. Sorensen	Ex-Officio	

* John M. Rivers replaced John Molnar as a Governor appointee during FY 2004-05.

** Harry M. Lightsey, III replaced William Amick as a President Pro Tempore appointee during FY 2004-05.

2005-2006

NAME	POSITION	APPOINTMENT
John M. Rivers	Member	Governor I
Robert W. Pearce, Jr.	Member	Governor II
Samuel J. Tenenbaum	Vice Chair	Governor III
Anthony O'Neill	Member	President Pro Tempore I
Harry M. Lightsey, III	Member	President Pro Tempore II
Donald Babb	Member	President Pro Tempore III
Edward T. McMullen, Jr.	Member	Speaker of the House I
Benjamin T. Rook	Chair	Speaker of the House II
Paula Harper-Bethea	Secretary	Speaker of the House III
James F. Barker	Ex-Officio	
Raymond S. Greenberg	Ex-Officio	
Andrew A. Sorensen	Ex-Officio	

VII. Program Contact Information

For additional information on the CoEE Program, contact Commission on Higher Education staff:

Dr. Gail Morrison
CHE Deputy Director
Division Director
Academic Affairs & Licensing
803.737.0056
gmorrison@che.sc.gov

Dr. Argentini Anderson
Program Manager
Academic Affairs and Licensing
803.737.2276
aanderson@che.sc.gov

Mr. Arik Bjorn
Information Specialist/Archivist
Academic Affairs and Licensing
803.737.2293
abjorn@che.sc.gov

Ms. Laura Belcher
Program Coordinator
Academic Affairs and Licensing
803.737.4854
lbelcher@che.sc.gov

South Carolina Centers of Economic Excellence
c/o S.C. Commission on Higher Education
1333 Main St. Suite 200
Columbia, SC 29201

Fax: 803.737.2297

Official CoEE Program Website: www.sccoee.org

Program & Review Board Meeting Materials available at: www.endowedchairs.org

APPENDIX I

SOUTH CAROLINA CENTERS OF ECONOMIC EXCELLENCE

BY-LAWS OF THE REVIEW BOARD

Article I

Objectives and Purposes

The Research Centers of Excellence Review Board was created by Chapter 75 “South Carolina Research Centers of Economic Excellence” of Act No. A356 of 2002. The purpose of the Board is to provide for oversight and operation of the “Centers for Excellence Matching Endowment” and to determine whether or not to award matching funds and in what amount for Endowed Research Chairs to the three senior public research universities of the State of South Carolina.

Article II

Membership

The Research Centers of Excellence Review Board consists of nine appointed members: three appointed by the Governor, three by the President Pro Tempore of the State Senate, and three by the Speaker of the South Carolina House of Representatives. Members are appointed to serve three-year terms, except that the initial appointments are staggered from one to three years. In addition to the voting members, the presidents of the senior research universities serve as ex officio non-voting members of the Board.

Article III

Meetings and Attendance

Section 1: Meetings

The Board shall meet at least once each quarter of its fiscal year. The fiscal year of the Board shall be the same as that of the State of South Carolina. A majority of the voting members of the Board shall constitute a quorum for conducting the business of the Board. The Chairperson of the Board may call a special meeting at his or her discretion and must call a special meeting if requested in writing to do so by at least three voting members of the Board. At least five days’ notice including a list of the subjects to be considered shall be given to all members of the Board prior to any meeting. Any Board member may participate in any meeting, either regular or special, by telephone or other appropriate conference communication. No Board member may vote by proxy without the prior approval of all of the remaining members of the Board in attendance at any meeting. Meetings shall be conducted according to the governing procedures found in the most revised edition of *Robert’s Rules of Order*. Certain procedures in *Robert’s Rules of Order* concerning executive sessions or closed meetings are superseded by Section 70 of the South Carolina Freedom of Information Act.

Section 2: Attendance

The attendance requirements for Review Board members are outlined in the South Carolina Code of Laws, Title I, Chapter 3, Article 5, Section 1-3-245, which states that:

(A) A member of a state board, council, commission, or committee who has three consecutive unexcused absences from regularly scheduled meetings held by the particular board, council, commission, or committee is considered removed from the board, council, commission, or committee and a vacancy is created. The chairman of the board, council, commission, or committee immediately shall notify the Governor or appropriate appointing authority of the member's three consecutive unexcused absences and of the resulting vacancy. An unexcused absence must be defined by each respective board, council, commission, or committee in rules governing its operation.

(B) This section does not apply to an ex officio member of a state board, council, commission, or committee or to a designee of an ex officio member.

An unexcused absence shall be defined as one in which the Board member fails to contact the chairman of the Review Board or the Review Board senior staff at the Commission on Higher Education in advance of the absence, and provide either via e-mail or in writing, notification of the pending absence accompanied by a satisfactory and legitimate reason for the absence.

Article IV

Officers and Their Duties

Section 1: Officers

The Officers of the Board shall consist of a Chairperson, a Vice-Chairperson, and a Secretary, to be elected annually at the first meeting of the Board in each fiscal year. The term of the Officers shall be for one year and a majority of all votes cast shall be necessary to elect an officer of the Board. Other officers may serve unlimited successive terms if re-elected by the Board.

Section 2: Duties of the Officers

The Chairperson shall preside at all meetings of the Board, shall appoint the members of all committees established by the Board and shall generally perform the responsibilities that pertain to the Office of Chairperson. He or she shall be responsible for ensuring that the agenda for each meeting is mailed to all members of the Board in a timely fashion and that all documents or other materials to be presented to the Board are available in adequate copies for each meeting. He or she shall also assure that all required reports of the Board are completed and filed in a timely manner.

The Vice-Chairperson shall preside at all meetings when the Chairperson is absent or when requested to do so by the Chairperson. He or she shall perform all other duties requested by the Chairperson.

The Secretary shall keep the minutes of the meetings of the Board and shall have the custody of all records of the Board. The Secretary may delegate the responsibilities under his or her supervision to the Staff of the Commission on Higher Education.

Other Administrative Officers may be selected by the Board to carry out such duties as shall be assigned to them by the Board.

Section 3: Committees

The Board may create committees to study specific matters and report thereon to the Board. The Chairperson shall appoint the members of each such Committee. The Board may alter the purposes of any Committee or disband it at any time.

EXECUTIVE COMMITTEE

There shall be an Executive Committee consisting of the Review Board Chair, Vice Chair, Secretary, and the Chair of the Audit Committee. The immediate past-Chair shall serve as an ex-officio, non-voting member of the Executive Committee.

Meetings of the Executive Committee shall be held at the call of the Chair at such place and time as the Executive Committee from time to time by resolution shall decide, subject to the same provisions as to notice as are provided with respect to meetings of the Board.

Three members of the Executive Committee, present in person, shall constitute a quorum. A simple majority vote of those present and voting will be required for the passage of any act of the Executive Committee while in session.

The Executive Committee shall have such powers and duties as may be delegated to it by the Board. The Board may delegate to the Executive Committee any of its duties except those required by law to be performed by the Board.

The Executive Committee is charged with assisting the Review Board Chair in carrying out the mission and function of the Review Board, and serving in a planning capacity for all activities and responsibilities legislatively assigned to the Board.

AUDIT COMMITTEE

There shall be an Audit Committee consisting of a Chair (to be appointed by the Review Board Chair), and two additional members of the Review Board.

The Audit Committee assists the Board in the effective discharge of its responsibilities by furnishing them with analysis, appraisals, recommendations and comments concerning the

activities reviewed. The Audit Committee provides reviews to assure that the Board's plans are carried out, policies and procedures are observed, assets are accounted for, and records and reports are reliable.

The Audit Committee has access to all Board activities and records related to the subject under review. As such, the responsibility to execute specific actions remains with the Board. The Audit Committee reports to the Board.

The Audit Committee may be concerned with any area of Board activity and is responsible for the following activities:

- Provide accountability of compliance to the full Board in the form of a report.
- Inform and advise management personnel by providing them with objective analyses, appraisals, recommendations, and pertinent comments concerning the operations for which they are responsible.
- Review the reliability and integrity of financial information and the means used to identify, measure, classify, and report such information.
- Review and test compliance with statutory, regulatory, and internal policy requirements.
- Determine the extent to which resources are used efficiently and effectively.
- Evaluate the timeliness, reliability, and usefulness of institutional records and reports.
- Serve as coordinator of external audits by issuing a Request for Proposals soliciting an external, independent agency to audit Endowed Chair funds.

Article V

Responsibilities of the Board

Under the appropriate statutes or by necessary implication therefrom, the "Research Centers of Excellence Review Board" is charged with the following responsibilities:

1. Prepare an annual report to the South Carolina Commission on Higher Education including a schedule for receiving grant proposals and awarding grants (Sec. 2-75-10).
2. Oversight and operation of the Centers of Excellence Matching Endowment (Sec. 2-75-10 and Sec. 2-75-30). The Fund is to be managed by the State Treasurer and any interest thereon becomes a part of the Fund (Sec. 2-75-30).
3. Provide a privately audited Annual Report to the South Carolina Budget and Control Board (Sec. 2-75-10).

4. Determine that all application requirements for funds have been met and adopt any additional application forms or requirements that are necessary to fulfill the purposes of the Act (Sec. 2-75-60 and Sec. 2-75-50).
5. Appoint panels of experts to review applications for funds and receive within ninety (90) days thereafter the report of such panels (Sec. 2-75-60).
6. Determine whether or not to award matching funds and the amount of each such grant (Sec. 2-75-60).
7. Prepare an annual budget for the operations of the Board and submit all appropriate forms pursuant thereto to the South Carolina Commission on Higher Education for its approval (Sec. 2-75-70).

Article VI

Amendment of By-Laws

These By-Laws may be changed, amended, or repealed by an absolute majority vote of all of the member of the Board, except that no such change shall be made unless a copy thereof has been mailed to all members of the Board at least five days prior to the meeting at which such is to be acted upon.

Article VII

Adoption

These By-Laws and their revisions approved by the Review Board at its August 30, 2004, Quarterly meeting. Additional revisions include: Addition of Past-Chair to Executive Committee made by the Board on January 6, 2005; addition of Adoption of Formal Procedural Rules made by the Board on August 20, 2007.

APPENDIX II

SOUTH CAROLINA CENTERS OF ECONOMIC EXCELLENCE ENDOWED PROFESSORSHIP PROGRAM

PROGRAM GUIDELINES

Effective Date:
August 20, 2007

I. Introduction and Purpose

During the 2002 legislative session, the S.C. General Assembly passed the South Carolina Research Centers of Economic Excellence Act. With an allocation of \$30 million in lottery funds, to be matched on a dollar-for-dollar basis with non-state funds, the General Assembly established a program to award to the State's three research universities, through a competitive application process, funds to endow professorships and facilitate establishment of research centers in research areas that will eventually lead to enhanced economic opportunities for the State's citizens. The General Assembly viewed this program as an incentive program to be used to raise capital from the private sector to support, in particular, the recruitment and maintenance of leading scientists and engineers whose work will ultimately promote the growth and expansion of knowledge-based industries and the creation of more and better paying employment opportunities for the people of South Carolina.

The Act creates a Centers of Economic Excellence Matching Endowment, which is to be funded annually by appropriations from the South Carolina Education Lottery Account in an aggregate amount not to exceed \$200,000,000 by 2010. This endowment fund is to be managed by the State Treasurer with interest earnings of the endowment remaining in the fund. The Act also establishes a Centers of Economic Excellence Review Board (Review Board), consisting of twelve members. Three members each are appointed by the Governor, by the President Pro Tempore of the Senate, and by the Speaker of the House of Representatives respectively. The presidents of the three research universities are ex-officio nonvoting members of the Review Board. The Commission on Higher Education provides staff assistance to the Review Board. The Review Board is responsible for awarding matching funds, for oversight and operation of the fund, and for various accountability requirements established in statute for the program.

In February 2007, the Review Board formally changed the program name to South Carolina Centers of Economic Excellence [abbreviated CoEE].

II. Eligible Institutions

Senior research institutions eligible to submit proposals for funds under this program include Clemson University, the Medical University of South Carolina, and the University of South Carolina-Columbia. The senior research institutions may submit individual proposals, or collaborative proposals with each other, and/or in conjunction with other South Carolina higher education institutions. Specific partnering activities with other research universities and higher education institutions, with businesses, or with the community are strongly encouraged. Cooperative proposals are strongly encouraged. However, for each proposal, one of the three senior research universities must serve as the singular fiscal agent for the proposal and award.

III. Eligible Professors

A. National Search

The Act stipulates that the endowed professorships should be used “to recruit and maintain leading scientists and engineers at the senior research universities of South Carolina.” It is the Review Board’s expectation that the successful application will be constructed around an individual who is acknowledged as a scholar of distinction by national and/or international measures. It is also the Review Board’s expectation that the professor’s most substantial contributions to the field in question lie ahead in his/her future scholarly work. The professor must have a track record for and the capacity to create new knowledge at the cutting edge of his or her discipline. The Review Board also recognizes that in addition to direct contributions carried out through the professional efforts of the endowed professorship recipient, other indirect contributions are expected to be accomplished through the education, training, and scholarly output of students, especially graduate students, and other faculty members or partners working in conjunction with the endowed professorship recipient.

The professor must in most cases be a new hire to the institution and emerge as a candidate through a national search. Except under very unusual circumstances, which must be documented to the Review Board’s satisfaction, the endowed professorships will be awarded to full-time faculty at the respective institutions.

B. Standards of Appointment

Institutions must ensure that appointments to endowed professorships enacted under the program described herein must meet the standards listed below of national or international eminence. An individual’s national/international reputation as an eminent scholar within their field must be evidenced by criteria such as:

- An outstanding record of research substantiated by publications, licenses, and/or patents;
- A record of prominent leadership roles on such entities as editorial boards, advisory boards, and professional associations;
- A record of successful grants and awards and/or the potential to provide sustainable funding for the research program; and
- A record of external research that has the potential to make substantive contributions to the State’s economic development, provide solutions for community, health, business, or education problems, and lead to the creation of well-paying jobs and enhanced economic opportunities for the people of South Carolina.

C. Letter of Appointment

At the time the appointment is made, the institution shall send a Letter of Appointment to the endowed professorship recipient that delineates the commitments and ongoing contributions to be expected. The Letter will stipulate the resources available as well as the degree of control over the same that the professor will have to accomplish the specified goals. The Letter will also inform the recipient of the high standards expected of the holder of the endowed professorship, and it will also denote how attainment of these goals is to be evaluated through periodic reviews.

A copy of the Letter of Appointment (in both paper and electronic formats), including signatures of the endowed professorship recipient and the chief executive officer of the higher education institution, must be forwarded to the chair of the Centers of Economic Excellence Review Board (c/o Commission on Higher Education, 1333 Main Street, Suite 200, Columbia, SC 29201) no later than ninety (90) days following the appointment of the recipient. The recipient's curriculum vitae must be submitted along with the Letter of Appointment.

D. Standards of Performance

The following standards of performance are illustrative of those expected of all recipients of endowed professorships established under this Act:

- Continuing record of scholarly and creative endeavors;
- Leadership in and across academic units and collaborations with scholars within as well as external to one's own university and with the private sector;
- Pursuit of activities that enhance the reputation of the university;
- Generation of additional private, governmental, foundation and other external grants and funds;
- Innovative leadership and mentoring of students and other faculty;
- Attraction of high quality students; and
- Evidence of the ability to promote and develop "enhanced economic opportunities in knowledge-based industries for all South Carolinians" and generate "well-paying jobs" through linkages to South Carolina industries and development of related licenses and patents.

E. Changing Disciplines or Recipients of Prior Chair Awards

An institution may petition the Review Board for permission to change the academic discipline(s) for a particular endowed professorship established under this program. The petition must document clearly the reasons for the requested change. The documentation must contain the written concurrence of the original donor of matching funds or their legal representative.

In the event that the recipient of an endowed professorship conferred under this program leaves the institution, or is unable to discharge his or her responsibilities, a replacement must be obtained in accord with the process outlined in III.A-D above.

F. Consolidation of Two or More Extant Chairs

An institution may petition the Review Board for permission to consolidate two or more extant endowed professorships established under this program. The petition must document clearly the reasons for the request and must include, at a minimum, the written concurrence of the original donor of matching funds or their legal representative. In no case may the consolidated endowment exceed the statutory limitation of \$5 million.

G. Other Terms of the Appointment

It is understood that the appointment is subject to the laws of the State of South Carolina and the policies and regulations of the home institution. In consortial or collaborative proposals with more than one endowed chair, each proposed chair must have a designated home institution, and a singular institution must be designated as the fiscal agent for the proposal and award.

Whenever acknowledgement of support is noted in publications or other venues, the SC Centers of Economic Excellence program must be acknowledged.

IV. Eligible Disciplines/Fields

In the South Carolina Research Centers of Economic Excellence Act, the South Carolina General Assembly found that “endowed professorships should be used to recruit and maintain leading scientists and engineers at the senior research universities of South Carolina for the purposes of developing and leveraging the research capabilities of the universities for the creation of well-paying jobs and enhanced economic opportunities in knowledge-based industries.” More specifically, Section 2-75-90 (B) of the Act states that matching funds “may be used only in the areas of Engineering, Nanotechnology, Biomedical Sciences, Energy Sciences, Environmental Sciences, Information and Management Sciences, and for other sciences and

research that create well-paying jobs and enhanced economic opportunities for the people of South Carolina and that are approved by the Centers of Economic Excellence Review Board.”¹

V. Centers of Economic Excellence Defined

A Center of Economic Excellence is defined to include at least one endowed professorship for a faculty member who is recruited for that purpose. Additional endowed professorships dedicated to the same specified knowledge-based industry or field of commerce, or to a closely related one, may be sought. Both state funds and non-state matching funds may be used to “maintain” an endowed professorship to include financial support for the professor’s salary, fringe benefits, and start-up/support package, and may also include support for other faculty, staff, and especially graduate students, as well as equipment, facilities, library, and other resources necessary to meet the performance standards described in III.D above. Thus, the creation of centers of economic excellence, while initially resting on the shoulders of one or more eminent scholars and researchers, will encompass and promote a critical mass of activity in the identified discipline/field that goes beyond any individual awarded an endowed professorship.

A Center of Economic Excellence must be supported by affiliated graduate programs. It may develop academic degree programs as part of the scope of its activities. These programs are required to seek approval at both institutional and Commission on Higher Education levels following customary procedures. However, should academic degree programs be developed, funding through the South Carolina Research Centers of Economic Excellence Act may only be used to support graduate programs and graduate students. Any new graduate degree programs or new research centers, bureaus, or institutes expected to be developed should typically be identified in the funding proposal.

In summary, the key elements of a Center of Economic Excellence are as follows:

- At least one world-class faculty member holding an endowed professorship, supported by a critical mass of additional senior faculty members;
- A research team consisting of junior faculty members, research faculty, and graduate students, especially doctoral students;

¹ Part 1B proviso in the Appropriations Act for FY06-07 clarified this section of the Act. Part 1B reads:

5A.18. (CHE: Research Universities Matching Resources) Notwithstanding the provisions of Sections 2-75-05(B)(4) and (6) and 2-75-50 of the 1976 Code, to meet the endowed professorships matching requirement of those provisions, a research university may use funds specifically provided for use in the areas of Engineering, Nanotechnology Biomedical Sciences, Energy Sciences, Environmental Sciences, Information and Management Sciences, and for other sciences and research that create well-paying jobs and enhanced economic opportunities for the people of South Carolina and that are approved by the Research Centers of Excellence Review Board that are derived from private or federal government sources, excluding state appropriations to the institution, tuition, or fees. The only federal dollars that may be used to meet the endowed professorships matching requirement are those federal dollars received after July 1, 2003.

- An appropriate research infrastructure, including space, equipment, and technical staff, and sustainable funding sources; and
- Strong ties to ongoing university research programs and objectives at the home institution or at other participating universities.

VI. Proposal Review and Awards Processes

The Review Board will award total funds at an equal amount to the appropriation by the General Assembly for the fiscal year plus any unencumbered funds that may be available (i.e., interest on lottery funds, projects not completed). Each year new proposals, as well as resubmitted proposals, will undergo the full review process.

The Review Board will oversee a three-stage review process for determining awards. First, the three research universities will work with the Review Board staff to nominate reviewers to conduct technical and scientific reviews of the proposals. The Review Board staff will select no fewer than five technical reviewers to review each proposal, and a minimum of three technical and scientific reviews must be received by the Review Board staff for each proposal. The Review Board staff will limit the number of university-nominated reviewers to two per proposal.

Second, the Review Board staff will contract with a minimum of five out-of-state expert reviewers—to include individuals with expertise in economic development as well as in appropriate scientific disciplines—who will serve on a site review team that will visit each of the research universities. The On-Site Review Team will interview relevant investigators and other university personnel regarding proposals and will have access to collected scientific and technical reviews as well as other materials germane to the proposed projects. The On-Site Review Team will evaluate the proposals using an approved set of metrics; each recommendation will include a detailed narrative, which will explain the On-Site Review Team's recommendations.

Third, the On-Site Review Team will present its findings to the Review Board, which will make final decisions on awards. The On-Site Review Team will recommend an appropriate level of funding to achieve successfully the stated goals of each project. The Review Board will consider these recommendations in determining award amounts for each project.

VII. Eligible Matching Funds

Institutions have the option of obtaining dollar-for-dollar cash matches or in-kind matches. An *in-kind match* refers to the value of non-cash contributions provided by a third party. These contributions may be in the form of real property, equipment, supplies and other expendable property, and the value of goods and services directly benefiting and specifically

identifiable to the project or program. If a good/service has been donated to an institution, the institution may claim the fair market value of the good/service as a ‘cash equivalent’ match. If a good/service has been sold/provided to the institution at a reduced rate, the institution may claim the reduced rate of the good/service as a ‘cash equivalent’ match. [See The Research University Infrastructure Act Cost Share Accounting Policy for specific guidelines on claiming in-kind matches.]

Only funds and in-kind contributions that have been committed to this program and derived from contributions or revenues from non-S.C. tax dollars committed and raised after January 1, 2002, may be used as matching funds. (The term “contributions” is defined to mean only such funds and in-kind contributions that are actually collected by a university’s Centers of Economic Excellence Fund [see Section VII below] and verified by the respective institution in such a manner as deemed satisfactory to the Centers of Economic Excellence Review Board.) Cash contributions, revenues, or other types of monetary funding used as matching funds may not be borrowed. Institutionally affiliated 501(c)(3) organizations and component units may contribute matching donations, provided such funds do not derive from state appropriations, tuition, institutional revenue or fees. Matching donations from such entities must be accompanied by a letter from the entity’s chief financial officer, as well as the chief financial officer of the research institution, verifying that the funds have not derived from these sources.

Federal funds may be used as matching funds² but must be investments in infrastructure in direct support of a particular Center of Economic Excellence (i.e., equipment grant, construction grant). Federal awards made for the purpose of conducting specific scientific investigations are not eligible. By statute (S.C. 2-75-90), only “federal dollars” received after July 1, 2003, may be used as matching funds. This date does not refer to the grant award date, but instead refers to the date federal funds are first available for use by the institution. The term “received” refers to grant award dates for all grants awarded after July 1, 2003. For grants awarded prior to July 1, 2003, the term “received” refers to the date of acquisition of an item for which a research institution becomes eligible to receive reimbursement via federal grant dollars.

At least \$4 million (\$2 million award matched by \$2 million) and possibly as much as \$10 million (up to \$5 million award matched by \$5 million) can be generated under this program. For an endowed professorship, all of the state match, plus no less than 40% of the raised, non-state matching funds, must go into an endowment. Until 40% of the non-state match total has been obtained in official pledges and/or cash contributions, no other State funds may be dispersed. In-kind matches may not account for more than 60% of the non-state match total.

² The ability to use federal funds for non-state matches was first allowed under Proviso 5A.27 in Part 1B of the FY04 Appropriations Act, which reads:

5A.27. (CHE: Research Universities Matching Resources) Notwithstanding the provisions of Sections 2-75-05(B)(4) and (6) and 2-75-50 of the 1976 Code, to meet the endowed professorships matching requirement of those provisions, a research university may use funds from any source except state appropriations to the institution derived from taxes or fees imposed or authorized to be imposed by the General Assembly, or any other state appropriations derived from taxes or fees imposed or authorized to be imposed by the General Assembly.

VIII. Establishment of Research Centers Fund

Each research university, as a condition of participation in this program, shall establish its own Centers of Economic Excellence Fund. Each institution's Centers of Economic Excellence Fund shall operate as a depository for private funds or non-state tax dollars and the state's matching contribution under this program. Each university, under the supervision and management of its governing board or its foundation, shall have the responsibility for the maintenance and investment of its own Centers of Economic Excellence Fund in a manner consistent with its duties as fiduciary for such funds. Each participating institution may, in order to facilitate the establishment of two or more endowed professorships under this program, cause the funds held in trust for any particular endowed professorship to be held in a separate and segregated account upon the establishment and operation of the endowed chairs. Thereafter, the institution's Centers of Economic Excellence Fund shall continue to operate as a depository for private contributions and State matching funds associated with subsequently proposed endowments under this program.

For consortial proposals, each institution must establish an institutional fund as described above. The institution designated as fiscal agent shall transfer appropriate funds to its consortial partners for deposit in their own institutional Center of Economic Excellence Fund.

The institutions shall be responsible for maintaining appropriate records and financial statements for presentation annually to an independent auditor. For consortial proposals, it is the responsibility of the institution serving as fiscal agent to compile, prepare, and submit the appropriate reporting and evaluation documents required under Section X below.

IX. Conditions for the Transfer Of State Matching Funds

Prior to the transfer of State matching funds from the SC Centers of Economic Excellence Matching Endowment Fund to the Institutional Centers of Economic Excellence Fund, the Review Board shall find that the following requirements have also been satisfied:

- i. The proposing institution has in-hand the required institutional match, as stipulated by written confirmation from the president along with a copy of the verifying instrument (e.g., bank statement, CD, etc.), and has assigned and/or deposited institutional matching funds (1:1 dollar match) in the institution's CoEE fund. Pledges of funds, cash gifts, in-kind contributions, and awards for appropriate grants must be in-hand within 18 months of the Centers of Economic Excellence award.³ Upon verification by the Review Board of official pledges and/or cash contributions of no less than 40% of the non-state match total that must go into the endowment, transfer of the State match to the University will be made in increments of not less than \$100,000 in exact amounts of the cash in-hand as certified by the institution. All awarded endowment funds must be drawn down within five years of the receipt by the Review Board of verification of the pledge. The Review Board has the authority to extend this period if justified extenuating circumstances prevent meeting the five-year requirement.

³ For extension of pledge verification deadlines, see Section XI below.

The following chart summarizes due dates for institutional obligations, and presents a timeline for a CoEE awarded by the Review Board on June 30, 2003:

Date of Endowed Chair Inception	Within 18 months of Award	Within 5 years of Each Verified Pledge	Within 5 years of Final Verified Pledge
Date of Review Board Approval and Award	Written verification of <u>pledges</u> equaling the total amount of the award must be submitted to Board	Written verification of <u>pledges received</u> , equaling the initial pledge amount, must be submitted to the Review Board	All state award funds must be drawn down, subject to verification of pledges received
Example:			
\$3 Million CoEE awarded June 30, 2003	Pledge of \$1 Million <u>verified</u> on October 1, 2003	Pledge dollars must be received by October 1, 2008	State funds of \$1 Million drawn by October 1, 2008
	Pledge of \$1.5 Million <u>verified</u> on January 15, 2004	Pledge dollars must be <u>received</u> by January 15, 2009	State funds of \$1.5 Million drawn by January 15, 2009
	Pledge of \$500,000 <u>verified</u> on April 30, 2004	Pledge dollars must be <u>received</u> by April 30, 2009	State funds of \$500,000 drawn by April 30, 2009

- ii. The funds received and deposited in the institution's Centers of Economic Excellence fund meet all eligibility requirements and the university provides a letter from the chief executive officer of the appropriate foundation that is managing the fund identifying the designated and restricted account for the center/professorship;
- iii. The presidents of all participating institutions have submitted a recommendation to the Review Board for the approval of the proposal and the proposal has been approved by the Review Board;
- iv. The president of the university has provided to the Review Board a copy of the endowed professor's letter of appointment (if one has been hired);
- v. The president of the university has provided the completed Account Set Up and Matching Funds Certification document.

X. Reporting and Evaluation Requirements

Quarterly Non-State Match Reports

On a quarterly basis, the lead fiscal institution of each proposal must submit to the Review Board a report detailing received non-state match pledges, which consists of legal or financial data, including but not limited to, a transmittal or award letter from the non-state match source; internal accounting documentation of the institutional fiscal agent; or an inventory list, appraisal or other such information that demonstrates the value of a given pledge, and confirms that the pledge is from a non-state source.

Annual Evaluation

On an annual basis, each institution receiving funds under this program shall furnish to the Review Board a progress report containing the following:

Financial Information: A notarized affidavit providing full disclosure of the financial activity of the institution's Centers of Economic Excellence fund shall be provided. Such financial disclosure shall include: (1) a certification that the principal of the endowment fund has remained intact, and (2) an account of all earnings and expenditures associated both with the endowment fund and with funding not placed in endowment but used in support of the Research Center of Economic Excellence. This financial report shall be signed by the president(s) of the university(ies) and the appropriate official of the financial institution(s) in which the endowment funds are deposited. Any additional information as may be required for the Review Board's annual report to the Budget and Control Board or for the audit performed by an independent auditor shall also be provided.

Programmatic Progress Report: A narrative not to exceed five pages in the first year and ten pages thereafter (12 pt., double-spaced) shall be provided which includes, in addition to whatever items are deemed appropriate by the reporting institution, the following:

- Documentation that the proposed objectives are being met along with a description of the continuous assessment processes used to verify stated outcomes;
- Documentation of development of ongoing private sector partnerships;
- Demonstration of the significant achievements of the endowed professorship/research center of excellence;
- Documentation of the education and training of graduate students;
- Presentation of a plan for fostering innovation and knowledge-transfer, with identifiable economic development outcomes within the existing or emerging research field or cluster;
- Documentation of how and the manner in which the expertise developed within the project's activities is being, or will be, shared with other

institutions in South Carolina through scholarly interactions, research collaborations, consortial agreements, etc.; and

- Other outcomes data that can be used to evaluate the effectiveness of the entire Research Centers for Economic Excellence program during the five-year review described in B below.

During Years 1 to 3 of the Center, this progress report is expected to be developmental in nature. In Years 4 and 5, specific quantifiable achievements are expected to be documented.

The annual report shall be submitted to the Centers of Economic Excellence Review Board on October 31 of each year. The annual report shall reflect the financial and programmatic activity through June 30 of the prior fiscal year. Failure to submit the annual report by the October 31 deadline may, pending action by the Review Board, result in the Review Board's prohibition of the further withdrawal of Centers of Economic Excellence funds from the Review Board's endowment by the institution for all of its funded projects.

Five-year Summative Program Evaluation

Every five years, the Review Board shall conduct an evaluation of the entire South Carolina Centers of Economic Excellence program, using an external evaluation team to determine the effectiveness of the program in meeting its statutory goals and objectives.

While the specifics of the five-year review will be determined at a later date, likely outcomes data are listed below and should be collected by each Center from its inception:

- Number of graduate and undergraduate students involved in Center activities;
- Number of other faculty involved in Center activities;
- Number and kinds of collaborations resulting from activities with institutional as well as other partners;
- New knowledge/new technology generated as measured through refereed papers; conference papers, and technical reports;
- Technology transfer, as measured by numbers of new patents, licenses, copyrights, or businesses; and
- External funding generated, including private, foundation, government, and state dollars.

Additional outcomes data as appropriate to each proposal should be collected from the inception of each Center.

XI. 18-Month Pledge Verification Deadline Extensions

In the event that one or more institutions fail to meet the 18-month pledge verification deadline for a Center of Economic Excellence (Section IX above), the fiscal lead institution may request a six-month pledge verification deadline extension from the Review Board. The institution must submit a formal letter to the Review Board Chairman prior to the expiration of the 18-month pledge verification deadline. This letter must provide written justification that clearly documents the reason(s) for the requested extension and explains the efforts that were made to meet the original 18-month pledge verification deadline. If granted, the six-month

pledge verification extension will commence from the end date of the original 18-month pledge verification deadline.

A fiscal lead institution may apply for two six-month pledge deadline extensions for any one Center of Economic Excellence. Prior to the expiration of the first six-month extension, the institution must submit a letter to the Review Board Chairman for permission to extend the pledge verification deadline another six months. As with the first petition, the institution must clearly document the reason(s) for the second deadline extension.

Should an institution fail to meet the pledge verification deadline after two six-month extensions, the institution must resubmit the proposal to the Review Board. The resubmitted proposal must undergo the full review process.

XII. Usage of Funds for Programmatic Support Purposes

Pursuant to Section 2-75-70 of the South Carolina Research Centers of Economic Excellence Act, funds from the Centers of Economic Excellence Lottery Account may be used to pay for programmatic support expenses. The expanded fund—that is, that portion of the Lottery Account which may be defined as “accumulated interest”—may be used for programmatic support expenses, which include: staff support; operation of the Review Board and all Review Board committees; operational expenses of onsite review panels; marketing contracts; auditor contracts; conferences and professional development directly related to the program; honoraria for technical and onsite reviewers; and other prudent programmatic support expenses directly related to the operational success of the SC Centers of Economic Excellence program.

The Review Board may also permit Programmatic Support Proposals that make use of the expanded fund in order to directly assist the Research Centers in their mandate to enhance economic opportunities in knowledge-based industries; e.g., an information technology system or infrastructure project that collectively serves *all* of the research institutions and endowed chairs. Such Programmatic Support Proposals must conform to the Review and Awards Process, and all other proposal requirements, as stipulated in these *Guidelines*, including:

- Programmatic Support Proposals must be in an amount no less than \$2 million and no greater than \$5 million;
- Programmatic Support Proposals are subject to a three-stage review process (e-review, onsite panel, Review Board) as described above in Section VI, and elsewhere, if appropriate;
- Programmatic Support Proposals must comply with the non-state matching requirements and calendar deadlines as stated in Section VII above, and elsewhere.
- Programmatic Support Proposals are subject to all evaluation and report deadlines as stated in Section X above, and elsewhere.
- Programmatic Support Proposals are subject to all the terms and conditions for the transfer of state matching funds as stated in Section IX above, and elsewhere, with the following **exception**: State matching funds need not be placed in an endowment, but

instead may be placed in the Centers of Economic Excellence Fund of the lead fiscal institution for use as stipulated in the Programmatic Support Proposal. The lead fiscal institution shall be responsible for maintaining all appropriate records and financial statements for presentation annually to an independent auditor.

XIII. General Information for Proposals

a. Appointments to any endowed professorship funded under this program must be made consistent with the laws of the state of South Carolina and with the policies and regulations of the institution serving as fiscal agent.

b. In all venues in which support for a Research Center or the related endowed professorship established under this program is acknowledged, this program should be acknowledged by name.

c. State matching funds requested and awarded from the SC Centers of Economic Excellence Matching Endowment fund shall be used in support of direct costs, not indirect costs. It is understood that the institutional commitment will include indirect costs.

d. Consistent with SC ST SEC 2-75-50(b), individual proposals must be in an amount no less than \$2 million and no greater than \$5 million.

e. Individual proposals may be for (a) a single endowed professorship; (b) single or multiple professorships clustered in a new research center; or (c) single or multiple professorships clustered in an already existing research center.

f. After reporting a pledge or the acquisition of non-state state matching funds on a Matching Funds Certification form, drawdown-related form, annual report, or other program information form or financial report, an institution may find it necessary to exchange said pledge or realized non-state match:

1. The exchanging of any pledged non-state match must be reported via the resubmission of all forms/reports/programmatic materials/etc. on which the pledge previously appeared, accompanied by a letter of explanation from the president of the lead fiscal institution of the CoEE in question. CHE staff will then provide the Review Board with a quarterly report of all exchanged pledges.
2. The exchanging of any non-state match funds against which no state funds have been drawn must be reported via the resubmission of all forms/reports/programmatic materials/etc. on which the matched funds previously appeared, both as pledge and realized pledge, accompanied by a letter of explanation from the president of the lead fiscal institution of the CoEE in question. CHE staff will provide the Review Board with a quarterly report of all exchanged non-state funds against which no state funds have been drawn.
3. The exchanging of any non-state match funds against which state funds have been drawn must be proposed via letter to the Review Board from the president of the lead fiscal institution of the CoEE in question. This letter must contain a detailed explanation

of why the non-state funds require replacement and the means by which the institution intends to replace the matched funds. Resubmission of all forms/reports/programmatic materials/etc. on which the matched funds previously appeared, both as pledge and realized pledge, must accompany the letter. The Review Board will vote on the exchanging of these funds, and any further necessary actions, at the meeting following the submission of the president's letter.

g. Unless otherwise specified, revisions to these *Guidelines* will be implemented in a retroactive fashion, such that all Centers of Economic Excellence, and the Program generally, will benefit fully from all corrective amendments and new policies. Revisions to these *Guidelines* based upon new legislation or legislative amendments, however, will be implemented according to the application dates as prescribed in statute.

XIV. Program Contacts

For questions concerning the SC Centers of Economic Excellence Program, please contact one of the following:

Dr. Gail M. Morrison, Deputy Director and Director of Academic Affairs & Licensing, SC Commission on Higher Education, at gmorrison@che.sc.gov , or 803.737.2243

Dr. Argentini Anderson, Program Manager, SC Commission on Higher Education, at aanderson@che.sc.gov , or 803.737.2276

Mr. Arik Bjorn, Archivist / Information Specialist, SC Commission on Higher Education, at abjorn@che.sc.gov , or 803.737.2293

APPENDIX III

SOUTH CAROLINA CENTERS OF ECONOMIC EXCELLENCE ENDOWED PROFESSORSHIP PROGRAM

PROGRAM ACCOUNT REPORT



APPENDIX III
South Carolina Centers of Economic Excellence
Program Account Report
through 6/30/2006

	<u>FY 02 - 03</u>	<u>FY 03 - 04</u>	<u>FY 04 - 05</u>	<u>FY 05 - 06</u>	<u>Totals</u>
Beginning Balance at July 1st	-	29,982,497.62	53,367,045.03	70,189,110.00	
Appropriations	30,000,000.00	30,000,000.00	30,000,000.00	30,000,000.00	120,000,000.00
Operating Expenditures	(33,814.38)	(183,928.16)	(202,549.41)	(107,438.26)	(527,730.21)
Cash Retained for Operations	-	-	-	-	-
Disbursement to Recipients	-	(7,500,000.00)	(15,072,920.00)	(19,057,247.00)	(41,630,167.00)
Interest Revenue	16,312.00	1,068,475.57	2,097,534.38	3,134,968.78	6,317,290.73
End Balance at Revision Date	29,982,497.62	53,367,045.03	70,189,110.00	84,159,393.52	84,159,393.52

APPENDIX IV

SOUTH CAROLINA CENTERS OF ECONOMIC EXCELLENCE ENDOWED PROFESSORSHIP PROGRAM

SUMMARY OF FUNDED PROPOSALS

APPENDIX IV
South Carolina Centers of Economic Excellence
Summary of Funded Proposals

Institution(s)	Funding Year				Proposal	Proposal Amount	State Funds Drawn	Match Pledged*	Match Received*	Date of Inception	18 month pledge window	Pledge deadline met	60 month draw down window
2002-03													
Clemson	2002-03				Automotive Design & Development	\$5 Million		\$5,000,000	\$5,000,000	8/25/2003	2/25/2005	yes	2/25/2010
Clemson	2002-03				Automotive Manufacturing	\$5 Million	\$5,000,000	\$5,000,000	\$5,000,000	6/24/2003	12/24/2004	yes	12/24/2009
Clemson		2003-04			Automotive Systems Integration	\$5 Million	\$5,000,000	\$5,000,000	\$5,000,000	6/24/2003	12/24/2004	yes	12/24/2009
USC	2002-03				Nanostructures	\$4 Million	\$2,016,700	\$4,000,000	\$2,016,738	6/24/2003	12/24/2004	yes	12/24/2009
MUSC/Coll of Charles.	2002-03				Marine Genomics	\$4 Million	\$1,500,000	\$4,000,000	\$1,500,000	6/24/2003	12/24/2004	yes	12/24/2009
MUSC	2002-03				Proteomics	\$4 Million	\$1,762,385	\$4,000,000	\$500,000	6/24/2003	12/24/2004	yes	12/24/2009
MUSC	2002-03				Neuroscience	\$3 Million	\$2,400,000	\$3,000,000	\$2,400,861	6/24/2003	12/24/2004	yes	12/24/2009
USC/MUSC	2002-03				Brain Imaging	\$5 Million	\$2,970,800	\$5,000,000	\$2,970,896	6/24/2003	12/24/2004	yes	12/24/2009
MUSC/Clemson/USC		2003-04			Regenerative Medicine	\$5 Million*	\$2,000,000	\$5,000,000	\$3,427,173	8/25/2003	2/25/2005	yes	2/25/2010
Total 2002-03						\$30 Million	\$22,649,885	\$40,000,000	\$27,815,668				
Total 2003-04 Funding Allocated in 2002-03						\$10 Million							
<hr/>													
2003-04													
Clemson		2003-04			Photonic Materials	\$5 Million	\$3,791,265	\$5,000,000	\$3,791,265	4/27/2004	10/27/2005	yes	10/27/2010
Clemson		2003-04			Electronics Systems Integration	\$3 Million	\$2,500,000	\$3,000,000	\$2,500,000	4/27/2004	10/27/2005	yes	10/27/2010
Clemson			2004-05		Restoration [WITHDRAWN 7-07]	\$3 Million				8/30/2004	2/28/2006	N/A	2/28/2011
USC		2003-04			Polymer Nanocomposite	\$3.5 Million	\$1,866,620	\$3,500,000	\$1,866,900	4/27/2004	10/27/2005	yes	10/27/2010
USC		2003-04 (\$2.5 M)			Hydrogen & Fuel Cell Economy	\$5 Million	\$1,840,945	\$2,500,000	\$1,841,018	4/27/2004	10/27/2005	yes	10/27/2010
			2004-05 (\$2.5 M)		Hydrogen & Fuel Cell Economy			\$2,500,000		8/30/2004	2/28/2006	yes	2/28/2011
MUSC/USC		2003-04			Translational Cancer Therapeutics	\$5 Million	\$5,000,000	\$5,000,000	\$5,000,000	4/27/2004	10/27/2005	yes	10/27/2010
USC/Coastal Carolina			2004-05		Travel & Tourism	\$2 Million	\$925,000	\$2,000,000	\$925,000	8/30/2004	2/28/2006	yes	2/28/2011
MUSC/USC			2004-05		Cancer Drug Discovery	\$5 Million	\$4,500,000	\$5,000,000	\$5,000,000	8/30/2004	2/28/2006	yes	2/28/2011
Total 2003-04						\$19 Million	\$20,423,830	\$28,500,000	\$20,924,183				
Total 2004-05 Funding Allocated in 2003-04						\$12.5 Million							

All totals current through October 1, 2007

* See footnote 6, page 9.

APPENDIX IV
South Carolina Centers of Economic Excellence
Summary of Funded Proposals

Institution(s)	Proposal	Proposal Amount	State Funds Drawn	Match Pledged*	Match Received*	Date of Inception	18 month pledge window	Pledge deadline met	60 month draw down window
2004-05									
	Funding Year								
Clemson	2004-05	Electron Imaging	\$5 Million			6/29/2005	12/29/2006	Extension II	12/29/2011
Clemson	2005-06	Supply Chain, Optimization & Logistics	\$2 Million	\$2,000,000		9/16/2005	3/16/2007	yes	3/16/2012
Clemson	2005-06	Urban Ecology & Restoration	\$2 Million			9/16/2005	3/16/2007	Extension I	3/16/2012
USC	2004-05	Renewable Fuel Cells for Fuel Cell Economy	\$3 Million	\$1,160,900	\$3,000,000	6/29/2005	12/29/2006	yes	12/29/2011
MUSC	2004-05	Gastrointestinal Cancer Diagnostics	\$5 Million	\$2,363,303	\$5,000,000	6/29/2005	12/29/2006	yes	12/29/2011
MUSC/USC	2004-05	Vision Science	\$4.5 Million	\$3,029,799	\$4,500,000	6/29/2005	12/29/2006	yes	12/29/2011
MUSC/USC/Clemson	2005-06	Clinical Effectiveness & Patient Safety	\$5 Million*	\$2,502,432	\$5,000,000	9/16/2005	3/16/2007	yes	3/16/2012
		Total 2004-05	\$17.5 Million	\$9,056,434	\$19,500,000				
		Total 2005-06 Funding Allocated in 2004-05	\$9 Million						
2005-06									
Clemson	2005-06	Advanced Fiber-Based Materials	\$4 Million	\$2,897,165	\$2,897,165	6/13/2006	12/13/2007		12/13/2012
Clemson	2005-06	Molecular Nutrition	\$2 Million			6/13/2006	12/13/2007		12/13/2012
USC	2005-06	Solid Oxide Fuel Cells	\$3 Million			6/13/2006	12/13/2007		12/13/2012
USC/MUSC	2005-06	Childhood Neurotherapeutics	\$5 Million*			6/13/2006	12/13/2007		12/13/2012
MUSC	2005-06	Molecular Proteomics in CV Disease & Prevention	\$5 Million			6/13/2006	12/13/2007		12/13/2012
		Total 2005-06	\$19 Million	\$2,897,165	\$2,897,165				
Totals Since Program Inception			\$118 Million	\$55,027,314	\$90,897,165				\$63,497,393

All totals current through October 1, 2007

* See footnote 6, page 9.



The South Carolina Centers of Economic Excellence Report to the South Carolina Budget & Control Board Report is published annually by the South Carolina Centers of Economic Excellence Review Board and the South Carolina Commission on Higher Education in accordance with S.C. 2-75-10.

In accordance with S.C. 1-11-425, the following information is provided:

Number of Reports Printed	50
Cost Per Report	\$18.48
Total Printing Cost	\$924



The Horizon 1 Building, part of the University of South Carolina's Innovista research district. This facility is scheduled to open in 2008 and will house Centers of Economic Excellence in future fuels research.