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CENTERS OF EXCELLENCE AT THE UNIVERSITY OF CINCINNATI

The Charge

Nominate Centers of Excellence that are nationally-ranked, graduate education/research-focused, USO-distinctive, and significant contributors to the economic advancement of the state.

Positioning UC

The University of Cincinnati is a comprehensive research university with a unique combination of 14 colleges that bring significant strengths to excellence in research and interdisciplinary collaborations.

Our Academic Health Center includes four professional colleges and occupies a prominent position in our community. Over 60% of our federal funding comes from the National Institutes of Health. Five hundred of UC’s faculty in the Department of Pediatrics see patients and perform research at Cincinnati Children’s Hospital, the third-ranked pediatric hospital in the nation.

The University also boasts highly distinctive academic strengths beyond the College of Medicine. For example, UC houses one of the world’s pre-eminent conservatories of music and performing arts (CCM) along with design and architecture programs (DAAP) that are internationally recognized for excellence.

As the home of co-operative education, UC provides what many would label the very best baccalaureate-based workforce development programs of any university in Ohio, particularly in technical fields.

The University is one of Ohio’s three comprehensive research intensive universities, those with the highest Carnegie research classification. The Cincinnati-Middletown metropolitan statistical area (MSA), which is home to UC, is the largest MSA in the state and is home to world class companies/divisions like Proctor & Gamble, GE Aviation, Kroger, Macy’s, Toyota and AK Steel.

UC is one of a cohort of the three universities (Case, Ohio State and UC) that account for nearly 80% of the Federal research dollars attracted to Ohio, and their combined economic impact is in the billions. In terms of Ohio’s state universities, UC ranks second only to Ohio State and generates twice as much Federal research funding as all of Ohio’s other state universities combined. In its latest report, the National Science Foundation ranks UC 18th for federal research expenditures and 23rd for total research expenditures among all public universities.
UC’s Center of Excellence Selections

UC is nominating eleven Centers of Excellence that will advance the state’s economic prosperity and quality of life, that differentiate UC within the University System of Ohio, and that complement rather than compete with other USO institutions. Seven of these we consider to be established, externally recognized and with the highest level of excellence; four are emerging. UC’s Centers of Excellence are nationally competitive and distinctive, reflecting signature academic strengths and UC’s responsiveness to the State’s economic priorities and societal needs.

In selecting the eleven Centers, UC focused on UC|21, the university’s strategic plan for “the new urban research university,” and the guidelines provided by the OBR. The eleven Centers are listed below.

Established
- Pediatrics
- Environmental Health
- Neurosciences
- Intelligent Air & Space Vehicle Energy Systems
- Sustaining the Urban Environment
- Music & Theatre Arts
- Urban Transformation & Justice

Emerging
- Diabetes & Obesity
- Nanoscale Sensors
- Design & Innovation
- Humanities: Classics, Creative Writing, Philosophy of Science

UC’s Strategic Planning

The eleven Centers reflect the evolution of UC over 190 years since its founding in 1819. The diversity of our nominated Centers is what one would expect from a comprehensive research university engaged in a comprehensive academic planning and prioritization process. Three years ago, under the aegis of our UC|21 Plan, a newly-created Strategic Planning Council was charged to “Develop a set of recommendations that will become a blueprint for the UC|21 Academic Plan, which drives resource allocation, the capital campaign, and infrastructure planning.”

What resulted were five major thematic areas from which emanate UC’s eleven centers. Begun in summer 2006, this work continues as our “blueprint” - driving budget reallocation and facilities planning as well as fund raising. These academic priorities, and the Centers of Excellence linked to them, are shown below:

- 21st Century Learning
- Health in the 21st Century: Pediatrics; Environmental Health; Diabetes/Obesity; Neurosciences
- Science & Technology in the 21st Century: Intelligent Air & Space Vehicle Energy Systems; Sustaining the Urban Environment; Nanoscale Sensors
• Arts, Design, and the Humanities in the 21st Century: Design & Innovation; Music & Theatre Arts; Humanities (Classics, Creative Writing, Philosophy of Science)
• Urban Solutions for the 21st Century: Urban Transformation & Justice

As our strategic plan defines “the new urban research university,” many of the Centers, not just those that have “urban” in the title, are engaged in activities aimed at enhancing or revitalizing the urban center in which the university is located, as well as urban areas across the state and the nation. This is also true of other UC centers and initiatives that, while excellent, do not fit the OBR’s emphasis on graduate education and research. For example, the HUD FY2010 budget specifically points to the University of Cincinnati and the University of Pennsylvania as institutions that have used their resources “to spark real sustainable revitalization in neighborhoods surrounding the university campus.”

The focus on UC’s Centers of Excellence extends to the university’s comprehensive campaign, Proudly Cincinnati. Each of our proposed centers has fund-raising targets in the campaign – from endowed chairs and professorships that will attract and retain excellent faculty, to facilities and equipment that will enable the work of the centers - with regional, national and international leadership as a goal.

Internal reallocation and fund raising based on our strategic plan are essential to the development plans for each center. And these are augmented to ensure sustained growth and development of our Centers of Excellence by:

• Expanded corporate relations anchored in our renowned co-op program
• Aggressive pursuit of federal funding based on the UC|21 Research Plan
• Leveraging of current endowments

The nominated Centers are also linked to key areas of recent State investments – particularly during this administration - investments for which we are immensely grateful. UC has been highly successful in various competitive programs including:

• COFSP - UC is #1 in the state for number of awards and total dollars
• ORSP - $27M
• Third Frontier awards
• Eminent Scholar awards
• Economic Growth Challenge awards

USO’s Criteria

The criteria listed in the USO’s guidelines include national and international recognition, distinctiveness within the University System of Ohio, a focus on research and graduate education, and demonstrated potential for economic advancement of the state.

In considering possible nominees for Centers of Excellence, the university consulted with its #1 nationally-ranked Economics Center for Education & Research, which has extensive experience in studies of economic impact and development, and its nationally-ranked Center for Entrepreneurship Education & Research to address the economic advancement criterion in the USO guidelines. This consultation led to consideration of the following in assessing the economic advancement impact of the Centers of Excellence we are nominating.

1 Further details can be found in an appendix to this submission.
Crucial factors in economic development have historically been viewed as innovation, investment, a quality workforce, and a supportive business environment. A preliminary report by the Brookings Institution, “Restoring Prosperity: The State Role in Revitalizing Ohio’s Core Communities,” characterizes universities as “anchor institutions” and “prosperity-driving assets” that are essential to economic growth. UC has positioned itself to be a crucial partner for regional industry clusters and our programs often form symbiotic relationships with the core businesses in these clusters. Our top-tier programs, from design to pediatrics to aerospace engineering, produce talented, highly-skilled workers needed in these clusters, and the local presence of our programs makes it easier for businesses to attract and retain their graduates and to gain direct access to the innovations and insights produced by our faculty’s research. Companies in these clusters are more able to capitalize on the diffusion of innovation and remain leaders in their industries as a result of having this immediate and priority access to UC’s R&D.

With increased regional and global competition to attract and retain businesses, the requirements for economic advancement have become more demanding and the focus of economic development practitioners has expanded. Innovative businesses and dynamic clusters are two components of economic vitality. The other two are creative people and attractive places. Instead of focusing only on recruiting or incubating new employers with the anticipation that employees will follow, we also seek to create a high quality environment that will attract creative, skilled workers with the anticipation that employers will follow the employees – “place-based” economic development.

More specifically, our urban research university and our Centers of Excellence are catalysts for the economic vitality of southwest Ohio and the state in the following ways:

- The University of Cincinnati has an economic impact as a business enterprise in its own right. Through our operation and capital investment, we create jobs, purchase goods and services, and bring “new money” into the economy, particularly research funding from federal and private sources. A study produced by our Economics Center for Education & Research shows that the economic impact associated with UC equals $1.6 billion for the metropolitan area. This economic activity generates almost 15,000 jobs. Affiliates of our Academic Health Center have an impact in the community of $1.7 billion including more than 16,000 jobs – this estimate is over and above the economic impact of the College of Medicine which equals $590 million.
- UC produces a highly educated and skilled workforce, intellectual capital essential for economic growth. This includes the preparation of a new generation of entrepreneurs who will create the new businesses of tomorrow. During the 2007-08 academic year, UC graduated 3620 students with baccalaureate degrees, 2035 with master’s degrees, 316 with Ph.D.s, and 373 students with professional degrees.
- Commercialization of UC’s research generates new products and technologies that seed business growth. Some of this is done through a wide range of formal structures, including centers for innovation, technology transfer, and business incubation; but faculty consultation with businesses is also essential to sustain them and help them implement transformative new technological applications. A good example is Siloam Biosciences, where UC research on “lab-on-chip” medical sensor platforms is now in the prototype state, venture capital has been secured, and commercialization should start in 2010. Our Health, Air and Space Vehicle Energy Systems, Nanoscale Sensors and Design and Innovation proposals will all generate new products and technologies that will improve the economic health of our region and the state. In 2008, 43 patent
applications were filed by UC faculty, 8 patents were issued, and technology transfer resulted in over $580,000 in revenue.

- UC offers services and resources that benefit communities and the economy. Urban university programs, like UC, are continually engaged in efforts focused on neighborhood revitalization. The dynamic intellectual and artistic environment that a university can provide for the broader community is an amenity attractive to many area employers and workers as well. Our Health, Music, Sustainability and Humanities proposals focus on this key aspect of economic growth and economic impact.
The University of Cincinnati’s Centers of Excellence: Established

PEDIATRICS

Center of Excellence Concept
UC’s relationship to Cincinnati Children’s Hospital Medical Center (CCHMC), one of the top children’s hospitals in the nation, helps drive excellence across all scientific and medical disciplines at the UC College of Medicine. The University of Cincinnati Department of Pediatrics consists entirely of staff members from CCHMC. The track record of superior funding from NIH and other sources is a demonstration that CCHMC is improving the competitiveness of research and treatment programs at UC. This has a tremendous impact on the regional and state economy by bringing dollars into the state, helping to grow a highly professional workforce in the region, and ensuring that quality health care is delivered to our children.

Scope of Activities
Arnold W.Strauss, M.D., chairs the Department of Pediatrics and directs the Cincinnati Children's Research Foundation. The Foundation, which is the umbrella organization under which the Department of Pediatrics operates, ranks second nationally among pediatric institutions in direct funding from the National Institutes of Health.

The Department of Pediatrics includes 510 full- and part-time UC faculty. Sponsored research expenditures now exceed $170 million, nearly doubling the amount of funding received just five years ago. The faculty currently conduct research in over 900,000 square feet of state-of-the-art laboratory and office space on a campus that is adjacent to and across the street from the University of Cincinnati medical campus.
U.S. News & World Report ranks the Department of Pediatrics at the University of Cincinnati the third best pediatric program at a medical school in the United States and, in June 2009, ranked all 10 pediatric subspecialties evaluated among the top 12 nationally, making CCHMC an Honor Roll pediatric hospital, the only such pediatric hospital in Ohio.

Prospects for Driving Economic Advancement
CCHMC has a distinguished history of driving economic advancement in the Cincinnati area. The total annual economic impact of CCHMC in FY07 was $2.72 billion, with a total impact on jobs of 24,381. CCHMC is expected to continue its influence on the economy and is conducting basic and translational research with UC in areas of great opportunity, such as diabetes, obesity, heart development, genetics, cancer and neurosciences.

Faculty Members Associated with the Center: 510
LEADERSHIP
Arnold W. Strauss, M.D.
Rachford Professor and Chair, Department of Pediatrics, University of Cincinnati College of Medicine
Physician-in-Chief and Medical Director, Cincinnati Children’s Hospital Medical Center
Director, Cincinnati Children’s Research Foundation

Graduate Programs Associated with the Center
Ph.D. in Developmental Biology, Immunobiology, Molecular Immunobiology
M.S. in Human Genetic Counseling
M.S. in Nursing

Professional Programs Associated with the Center
M.D. Degree
76 Residency and Fellowship Programs:
33 residency and fellowship programs sponsored by CCHMC are accredited by the Accreditation Council for Graduate Medical Education (ACGME)
35 fellowship programs for which there is no accreditation process through the ACGME
5 combined residency programs (i.e., Medicine/Pediatrics, Pediatrics/Neurology)
1 Pediatric Dentistry Residency
2 Psychology Programs (1 residency, 1 fellowship)

There are 177 residents in the Pediatrics and combined Pediatric residency programs, and 192 fellows and subspecialty residents, totaling 369 trainees in CCHMC graduate medical education programs for the 2008-2009 academic year.

Undergraduate Programs Associated with the Center
Arts & Sciences/Engineering, STEMM Disciplines

Outside Collaborating Entities
Administration on Developmental Disabilities
Agency for Healthcare Research and Quality
American Cancer Society
American Heart Association
Arthritis Foundation
Centers for Disease Control
Charlotte R. Schmidlap Fund
Children’s Tumor Foundation
Crohn’s & Colitis Foundation of America
Cystic Fibrosis Foundation
Department of Defense
Department of Education
Environmental Protection Agency ジュvenile Diabetes Research Foundation
First 5 LA Commission ルーキア & Lymphoma Society
Food and Drug Administration 国立健康科学研究所
Foundation LeDucq 国立科学基金
Harris Foundation/Coydog Foundation マーチ・オブ・ディーミズ
Health Resources and Services Administration 全米免疫不全ネットワーク

Supporting Scientific, Scholarly, and/or Creative Activities

U.S. News Rankings:
#3 pediatric program among colleges of medicine
#3 general pediatrics program among children’s hospitals
#1 digestive disorders program among children’s hospitals
#3 respiratory program among children’s hospitals
#5 cancer program among children’s hospitals
#4 endocrinology and diabetes program among children’s hospitals
#4 neonatology program among children’s hospitals
#5 urology program among children’s hospitals

Cincinnati Children’s is proud to have been granted Magnet status by the American Nurses Credentialing Center in February 2009. The Magnet Recognition Program® is the gold standard for acknowledging nursing excellence and collaboration among care providers. Organizations must demonstrate evidence of outstanding quality, innovation and outcomes in both documentation and a site visit. Out of over 5,700 hospitals in the United States, less than 6% have earned Magnet recognition.

Cincinnati Children's received the 2006 American Hospital Association-McKesson Quest for Quality Prize. This prestigious award is presented annually to an organization that demonstrates commitment to achieving the Institute of Medicine's six quality aims — safety, patient-centeredness, effectiveness, efficiency, timeliness and equity. The winner is chosen by a multidisciplinary committee of health care and patient safety experts. Cincinnati Children's is the first pediatric hospital to win the McKesson Quest for Quality Prize.

The Joint Commission, which accredits and certifies more than 15,000 health care organizations and programs in the United States, has named Cincinnati Children’s a 2008 recipient of the 12th annual Ernest Amory Codman Award. The award recognizes excellence in the use of outcomes measurement by health care organizations to achieve improvements in the quality and safety of health care.

Cincinnati Children’s is one of three recipients of the award in the hospital category and is being recognized for an initiative to eliminate preventable surgical site infections.

Selected Faculty Awards (2004 to 2009):
- Jeffery D. Molkentin, PhD, a scientist and professor at the University of Cincinnati (UC) College of Medicine and Cincinnati Children’s Hospital Medical Center has been named one of 56 new Howard Hughes Medical Institute (HHMI) Investigators.
- Alberto Peña, MD, director of the Colorectal Center for Children at Cincinnati Children's Hospital Medical Center, has received the 2008 William E. Ladd Medal from the American Academy of Pediatrics. The Ladd Medal represents the highest
honor that the AAP’s Section on Surgery bestows on a physician in recognition of outstanding contributions to the field of pediatric surgery.

- Arnold Strauss, MD, chair of pediatrics at the University of Cincinnati College of Medicine and director of the Cincinnati Children's Research Foundation, and Alan Jobe, MD, PhD, director of perinatal biology at Cincinnati Children's, were both elected to the Institute of Medicine (IOM) in 2008. Election to the IOM is one of the most prestigious honors in medicine. They join Thomas Boat, M.D. and Jeffrey Whitsett, M.D., who were elected previously.
- Marc E. Rothenberg, MD, PhD, received the E. Mead Johnson Award for Research in Pediatrics at the 2007 annual meeting of the Pediatric Academic Societies in Toronto. Established in 1939, the award is considered the most prestigious award in pediatric research.
- Thomas Boat, MD, is the 2006 recipient of the Ronald McDonald House Charities Award of Excellence. He was honored for his contributions to the care of children with cystic fibrosis and for his role as an advocate for better child health care through research and improvement of health care delivery systems.
- Jeffrey Robbins, PhD, is honored with the 2005 Research Achievement Award by the American Heart Association for his seminal achievements in cardiovascular research.
- Christof von Kalle, MD, and Christopher Baum, MD, received the Langen Science Award 2005 by the Paul-Ehrlich-Institute for achievements in the field of gene therapy.

**Management Plan**

Arnold W. Strauss, M.D., chairs the Department of Pediatrics at the UC College of Medicine and directs the Cincinnati Children's Research Foundation. The Foundation, which ranks second nationally among pediatric institutions in direct funding from the National Institutes of Health. The Cincinnati Children’s Research Foundation is an operating division of Cincinnati Children’s Hospital Medical Center (CCHMC).

CCHMC, founded in 1883, is a non-profit organization governed by a Chief Executive Officer and Board of Trustees. It is a full-service pediatric medical center with 511 registered inpatient beds and over 1,200 active medical staff.

CCHMC has been affiliated with the UC College of Medicine since 1926.

**Resource Management and Funding Plan**

The Pediatrics initiative is managed by CCHMC in collaboration with UC. Management and funding plans are driven through long-term strategy and joint initiatives are planned by a group of faculty from pediatric and adult specialty areas.

**Sponsored Program Activity Associated with the Center**

In FY08, CCHMC had total research expenditures of $296,213,517, of which $88,317,884 were from federal sources. They received 121 new awards in FY08.
### Suggested Metrics that Define Excellence for the Center

|--------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|------------------|------------------|
#### 1. World Class Academic Talent (Inputs)

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<td>Total Research Expenditures</td>
<td>$201,147,211</td>
<td>$228,742,404</td>
<td>$256,732,911</td>
<td>$273,287,364</td>
<td>$296,213,517</td>
<td>$320,418,032</td>
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<td>Federally Financed Research Expenditures</td>
<td>$74,253,115</td>
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<td>$95,134,898</td>
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<td>$108,942,131</td>
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<td>see note</td>
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<td>Institutional Investment into Physical Infrastructure</td>
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<td>pending</td>
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<td>Private Investment in Program</td>
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#### 2. Connection to the Industry’s Local Economy (Value Added)

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<td>Licenses and Options Executed (Number of Deals)</td>
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<td>Invention Disclosures</td>
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<td>55</td>
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<td>89</td>
<td>103</td>
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<tr>
<td>Consulting Agreements (with list of company names - note 3)</td>
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<td>pending</td>
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<tr>
<td>Number of Companies that have Relationships with COE</td>
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<tr>
<td>Jobs Created in the State or Region in Industries Related to the COE</td>
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<td>n/a</td>
<td>n/a</td>
<td>2172</td>
<td>2172</td>
<td>2172</td>
<td>2172</td>
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<tr>
<td>Average Salary of Jobs Created in the Region or State in Industries Related to the Center of Excellence (DOL)</td>
<td>$58,310</td>
<td>$55,170</td>
<td>$62,030</td>
<td>$64,960</td>
<td>$67,890</td>
<td>$69,248</td>
<td>$70,633</td>
<td>$77,984</td>
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#### 3. Economic Impact (Outputs)

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<td>Jobs in Region for the Cluster (Health Care/Biotech) (BioOhio)</td>
<td>n/a</td>
<td>n/a</td>
<td>36,700</td>
<td>37,434</td>
<td>38,183</td>
<td>38,948</td>
<td>39,725</td>
<td>43,859</td>
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<td>Graduates Placed in their Fields in the State</td>
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<td>pending</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
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<tr>
<td>Average Salary of Graduates</td>
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<td>pending</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
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<tr>
<td>Jobs Created and Retained by Spinoffs of the Centers of Excellence</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
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<tr>
<td>Average Salary of Jobs Created and Retained by Spinoffs of COE</td>
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<td>pending</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
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<tr>
<td>Economic Output of the Cluster in Region (BioOhio)</td>
<td>n/a</td>
<td>n/a</td>
<td>$8,300,000,000</td>
<td>$8,383,000,000</td>
<td>$8,468,830,000</td>
<td>$8,551,498,300</td>
<td>$8,637,013,283</td>
<td>$9,000,000,000</td>
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<tr>
<td>License Income</td>
<td>$2,731,000</td>
<td>$1,981,000</td>
<td>$3,015,000</td>
<td>$6,526,000</td>
<td>$17,400,000</td>
<td>pending</td>
<td>pending</td>
<td>pending</td>
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</table>

Note 1: Faculty Awards (see Item 9)
Note 2: External National and International Program Rankings (see Item 9)
Note 3: Consulting Agreements - Company Names (Pending)
Five to Ten Year Goals
CCHMC’s overall mission is to be the leader in improving child health world-wide through innovative laboratory, clinical, translational, outcomes, and quality improvement research; education of medical and graduate students, pediatric medical and surgical residents and fellows; and through innovative and unique clinical care. To fulfill this mission, over the next five years, we will:

1. Expand federally-funded research by 10% annually
2. Publish 900 or more scientific and medical manuscripts annually
3. Develop multidisciplinary clinical care services with national and international referral bases
4. Develop five integrated institutes:
   a. The Heart Institute
   b. The Perinatal Institute
   c. The Cancer and Blood Diseases Institute
   d. A Biodiagnostics Institute
   e. A Neurosciences Institute
5. Expand research and educational affiliations with leading pediatric institutions world-wide, including the five already established in China and The Hospital for Sick Children in London, in Israel, India, Brazil, Central America, and Africa
6. Develop state-of-the-art research and clinical care programs in genetics and genomics, bioinformatics, diabetes and obesity, and cancer in partnership with the UC COM.
ENVIRONMENTAL HEALTH

Center of Excellence Concept
The Center of Excellence in Environmental Health at the University of Cincinnati is a university-wide interdisciplinary initiative to increase understanding of how the environment impacts cancer risk and progression. Its principal mission is to reduce the overall health care costs, and economic and human life burdens associated with environmental pollution in the State and nation. The Center is structured to create the knowledge-base, next-generation technologies, and highly skilled workforce to facilitate and support the rapid establishment of a Green Collar Economy in Ohio and the region. The Center will be housed in the Department of Environmental Health (DEH) which has over 50 departmental faculty members and 350 research staff and students, who have exceptional expertise in identifying the environmental causes of cancer and other complex diseases, and in devising new detection methods, clinical devices, surveillance programs, and novel therapeutics to combat environmentally induced diseases such as cancer. This Center is enhanced through its relationship with the Cincinnati Cancer Consortium, the UC Drug Discovery Center, Cincinnati Children’s Hospital Research Foundation, the UC Center for Environmental Genetics, and University Hospital.

Scope of Activities
The DEH at UC is one of the nation’s oldest, most influential, and well funded environmental health research programs, with state-of-the-art capabilities in genome analysis, drug discovery, nanomedicine, exposure assessment, biomarker identification and computational medicine. Four major cancer research centers/programs are located here:

- Chemoprevention in Lung Cancer
- Familial Lung Cancer
- Breast Cancer and the Environment Research Center
- Breast Cancer Registry of Greater Cincinnati.

Large-scale population studies of Ohioans are on-going, with large scale sample collections and medical records going back as far as 17 and 29 years (Fernald Medical Monitoring Program and Cincinnati Lead Study), enabling UC to quickly analyze samples in response to
new research questions. Additional research thrusts are coming from the Center for Environmental Genetics which studies the relationship between gene-environment interaction and disease susceptibility of individuals and populations. The Center for Health Related Aerosol Studies and the Cincinnati Childhood Allergy and Air Pollution Study provide special expertise on the health impacts of air particle pollutants and indoor pathogens for both adults and children. The Children’s Hospital Environmental Health Center adds additional research capacities in improving health of Ohio’s citizens. The Marietta Community Actively Researching Exposure Study (CARES) focuses on environmentally related health outcomes in an underserved Appalachian community in Washington County, Ohio, the most polluted county in the United States.

Cancer is the second leading cause of death in the State of Ohio, and Ohio cancer death rates are higher than the average US rate for every one of the ten most common cancers. Due to our heavy manufacturing base, a large agricultural economy, and geographical location on the nation’s main north-south transportation route, Ohio residents are exposed to environmental contaminants at a higher rate than the national average. Four of the 26 US cities with the highest air particle pollution—the type that has the greatest impact on health—are in Ohio. Washington County, Ohio, was rated as the most polluted county in the United States, and some of our industrialized counties have cancer rates 50% higher than expected.

The economic costs of health care related to pollutant-linked disease are high. The central location of Ohio, a favorable labor cost structure, and a recently passed body of new legislation designed to attract new industries and business, including green economy jobs, should be ushering in a new era of economic growth. To ensure that our reputation as a “polluted” state does not negate new initiatives for economic revitalization, we need to:

- Understand how pollution leads to disease such as cancer, and provide solutions to alleviate this burden on health care and economic growth
- Advance revolutionary medical devices, surveillance programs and treatment regimens tailored to individuals based on their genetic composition and unique exposure pattern, the top agenda of the National Institutes of Health to shift our nation’s health care investment from curative to personalized, preventive care
- Identify biomarkers of exposure to reduce exposure to at-risk-populations and reduce health disparities among disadvantaged communities and generate leading edge preclinical and population-based studies to improve clinical management for all patients—both those at risk and those who have developed disease—across the entire state
- Conduct novel drug discovery studies of relevancy to cancer associated with environmental pollutants in order to create new pharmaceuticals that will add to Ohio’s new economy
- Build a skilled workforce of environmental health professionals to support new and unmet demands of a green economy. Through the offering of environmental and occupational health and medicine degrees and post-baccalaureate professional training, investments are made in building the human capital needed for this new economic model in our State,
- Generate the knowledge-base and intellectual property required for supporting a new generation of start-up companies and emerging economies in health care, consultation, and manufacturing connected to environmentally based diseases, including cancer.
Prospects for Driving Economic Advancement

The Center has been a trailblazer in the development of occupational health and medicine, industrial hygiene, toxicology, carcinogenesis, and gene-environment interactions. It has leaped into the 21st century as a leader in epigenetics, nanomedicine, personalized medicine and computational/functional genomics. The impacts of the research and educational activities have local, national, and global impact, across a wide range of environmentally-related diseases and cancers.

This Center conducts team science in theoretical, preclinical, population-based, and clinical research on prevention and cures for cancers and related diseases, and solutions to reduce exposure to toxicants at work, at home and during leisure activities. Our unparalleled working relationships with the Environmental Protection Agency, the National Institute of Occupational Safety and Health regional headquarters, Wright-Patterson Air Force Research Laboratory, as well as the leading recipient of National Institute for Environmental Health Sciences research funds in the nation’s public schools, make UC the leader in environmental health research in the state.

The Center is focusing increasingly on protection of intellectual property and technology transfer activities. With 13 disclosures in the past three years (FY06 to FY09), we anticipate significant growth in licensing revenue and future potential spin off opportunities. Cincinnati is well-positioned to move technology rapidly into commercialization through UC’s relationships with CincyTech USA, the Cincinnati Chamber of Commerce’s technology enterprise that provides expertise and funding to entrepreneurs, and BIOSTART, a state-funded biotech incubator located on UC’s campus. As an example, the following intellectual property is close to formation of start-up companies:

- Development of new diagnostics for breast and prostate cancer and new anti-cancer therapeutics (Shuk-mei Ho)
- New device for the detection and surveillance of osteoporosis and hip fracture (Amit Bhattacharya)
- Personal inhalation device for detecting exposure to chemicals in toxic fumes (James Lockey)

The Center is already a magnet for top students and faculty from around the world. Sustaining and growing this excellence is a priority for the University of Cincinnati. As the Center continues to strengthen collaborative efforts with its various partners including the Cincinnati Cancer Consortium, it is anticipated that there will be tremendous growth in the Center requiring recruitment of additional faculty and staff.

Faculty Members Associated with the Center: 52
Shuk-Mei Ho, Ph.D., Chair, Department of Environmental Health, College of Medicine

Epidemiology & Biostatistics
Bornschein, Robert, Professor (Emeritus)
Brown, Kathryn, Research Assistant Professor (research track)
Buncher, C. Ralph, Professor (tenured)
Chakraborty, Ranajit, Professor and Kehoe Chair (tenured)
Deka, Ranjan, Professor (tenured)
Dietrich, Kim, Professor* (tenured)
Haynes, Erin, Assistant Professor (tenure track)
Lemasters, Grace, Professor (tenured)
Levin, Linda, Research Assistant Professor (research track)
Medvedovic, Mario, Assistant Professor (tenure track)
Meller, Jarek, Associate Professor (tenured)
Pinney, Susan, Associate Professor (tenure track)
Porollo, Alexey, Research Assistant Professor (research track)
Rao, MB, Professor (tenured)
Ryan, Patrick, Research Assistant Professor (research track)
Shukla, Rakesh, Professor (tenured)
Succop, Paul, Research Professor (research track)
Wu, Tianying, Assistant Professor (tenure track)

Environmental & Industrial Hygiene
Adhikari, Atin, Assistant Professor (tenure track)
Bhattacharya, Amit, Professor (tenured)
Clark, Scott, Professor (tenured)
Davis, Kermit, Assistant Professor (tenured)
Grinshpun, Sergey, Professor (tenured)
Reponen, Tiina, Professor (tenured)
Rice, Carol, Professor *(tenured)
Tabor, Wilson, Professor (Emeritus)
Talaska, Glenn, Professor (tenured)

Occupational & Environmental Medicine
Donovan, James, Assistant Professor (clinical track)
Freeman, Andrew, Assistant Professor** (clinical track)
Jarrell, Judy, Field Service Professor (field service)
Lockey, James, Professor (tenured)
McKay, Roy, Assistant Professor (research track)
Rohs, Amy, Assistant Professor (clinical track)
Ross, Sue, Adjunct Assistant Professor (adjunct)

Environmental Genetics & Molecular Toxicology
Baxter, Stuart, Assoc. Professor (tenured)
Bingham, Eula, Professor, (Emeritus)
Borchers, Michael, Res. Assistant Professor (research track)
Choubey, Divaker, Associate Professor (tenured)
Foulkes, Ernest, Professor (Emeritus)
Genter, Mary Beth, Associate Professor (tenured)
Ho, Shuk-mei, Jacob G. Schmidlapp Professor & Chair (tenured)
Kasper, Susan, Associate Professor (tenured)
Lam, Ying-Wai, Research Assistant Professor (research track)
Leung, Yuet-Kin (Ricky), Research Assistant Professor (research track)
Miller, Marian, Research Associate Professor (Emeritus)
Nebert, Dan, Professor (tenured)
Puga, Alvaro, Professor (tenured)
Shertzner, Howard, Professor* (tenured)
Tam, Neville, Research Assistant Professor (research track)
Warshawsky, David, Professor (Emeritus)
Xia, Ying, Assistant Professor (tenured)
Yadav, Jagjit, Assistant Professor (tenured)
* denotes Division Director  
** Interim Division Director

**Graduate Programs Associated with the Center**

College of Medicine, Masters and Ph.D. in Environmental Health  
- Environmental Genetics and Molecular Toxicology, MS, PhD  
- Epidemiology and Biostatistics, MS, PhD  
- Environmental & Occupational Hygiene, MS, PhD

There are also four externally supported training programs in the department to produce graduate and post-doctoral fellows, and one training program devoted to training non-collegiate workers:  
- NIEHS T32 Gene-Environment Interactions Training Program  
- NIEHS T32 Molecular Epidemiology in Children’s Environmental Health  
- NIOSH T42 Education Research Center  
- NIH U54 (K30) Clinical and Translational Research  
- NIEHS U45 Worker Health and Safety Training Cooperative Agreement

College of Engineering  
- Biomedical Engineering  
  a. Tissue Engineering  
  b. Biomechanics  
  c. Bioinformatics  
  d. Nanobiotechnology  
- Civil and Environmental Engineering  
- Computer Science  
- Mechanical Engineering

*Graduate students from across the UC campus and CCHMC attend classes in Environmental Health due to the relevance of the environment to disease, engineering, design, behavior, and physiology. Environmental Health faculty hold secondary or joint appointments in several departments.

**Professional Programs Associated with the Center**

College of Medicine, MD Degree, Occupational Medicine Residency Program

Environmental Health is home to Continuing Medical Education (Dr. Judy L. Jarrell, Director). Clinicians and nurses are required to attend yearly training as part of the healthcare workforce development.

The expansion of human capital requires outreach to citizens outside the scope of traditional MS, MD, and PhD programs. The Department of Environmental Health meets the educational needs of workers through the Midwest Consortium for Hazardous Waste Worker Training Program. Since 1987, the Consortium has served the regional training needs of workers in traditionally blue-collar fields. Originally established to develop worker protection regulations for handling hazardous waste and help employers comply with 29 CFR 1910.120, the Consortium is developing new tools for developing Ohio’s workforce, with the goal of shifting blue-collar jobs to a green-collar workforce. It is estimated that 4,919
programs will be offered to 94,933 trainees for a total of 673,472 direct contact hours of training over the five years of the current program.

**Undergraduate Programs Associated with the Center**
The interdisciplinary nature of environmental health attracts high level undergraduate students to coursework in biostatistics, epidemiology, and toxicology. Students come from the College of Arts & Sciences, Engineering, and Nursing. STEMM disciplines including biological sciences, chemistry, engineering, mathematics, and design are represented. Undergraduate students are employed in research laboratories and business offices, complementing coursework with real-world experience that provides financial reward.

**Outside Collaborating Entities**
- American Heart Association
- American Lung Association
- Ausio Pharmaceuticals
- Cardinal Health
- Cairo University
- Cincinnati Children’s Hospital Medical Center
- Columbia University
- ConAgra Foods
- Dartmouth College
- Department of Housing and Urban Development
- Environmental Protection Agency
- Hill-Rom Incorporated
- Int’l Agency for Research on Cancer
- Int’l Chemical Workers Union Council
- LaRosa’s, Inc.
- Miami University of Ohio
- Michigan State University
- National Cancer Institute
- National Center for Research Resources
- National Eye Institute
- Nat’l Alliance Research Schizophrenia & Depression
- Nat’l Human Genome Research Institute
- Nat’l Institute Occupational Safety and Health
- Nat’l Institute Agricultural Science and Technology
- Nat’l Institutes Environmental Health Science
- Office Ergonomics Research Committee
- Ohio Bureau of Workers Compensation
- Ohio Cancer Research Associates
- Oregon Health Sciences University
- Pegasus Technical Services
- Robert Wood Johnson Foundation
- Safe Life Corporation
- South Dakota State University
- Steelcase, Inc.
- Thermo Fisher Scientific Inc.
- Underwriters Laboratories Inc.
- United Auto Works-Delphi
- University of Alabama at Birmingham
- University of Illinois at Chicago
- University of Michigan
- University of Pittsburgh
- University of Texas Medical Branch

**Supporting Scientific, Scholarly, and/or Creative Activities**
- NIH Ranking:
  - 1st in the nation for funding from the National Institute of Environmental Health Sciences
  - 4th (of 56) among departments of Environmental Health at public universities for NIH funding (from all Institutes)
- *U.S. News* Ranking:
  - UC College of Medicine: 40th in Research, 3rd for Pediatrics, 62nd in Primary Care
  - Cincinnati Children’s: 3rd for General Pediatrics, 4th for Cancer, 3rd for Respiratory
• Shuk-mei Ho, PhD, professor and chair of the environmental health department, is a past recipient of the Women in Urology Award for Excellence in Urologic Research. The award is presented jointly by the Society of Women in Urology and the Society of Basic Urologic Research. She was recognized by the Senate of 127th General Assembly of the State of Ohio and received the Ohio Senate honor for Outstanding Achievement in 2007.

• Ranajit Chakraborty, PhD, professor and director of UC’s Center for Genome Information, was selected for honorary fellowship in the Indian Academy of Sciences. The organization—which plans scientific meetings and publishes 11 scientific journals—grants honorary fellowship to no more than three distinguished scientists annually.

• James Lockey, MD, professor of occupational, environmental and pulmonary medicine, was appointed to serve on the Centers for Disease Control and Prevention’s radiation and worker health advisory board through August 2009.

• Grace LeMasters, PhD, was awarded the Secretary of Defense Outstanding Public Service Medal for selfless contributions to the improvement of defense operations and processes. The Outstanding Public Service Medal is the second highest award given by the Secretary to private citizens for superior accomplishments and contributions that merit special recognition. She also received the 2008 Research Award from the Lymphoma Foundation of America for outstanding work in cancer epidemiology.

• Elwood V. Jensen, PhD, was elected to the National Academy of Sciences in 1974. Of his 27 scientific prizes, the most recent is the prestigious 2004 Albert Lasker Award for Basic Medical Research. He is probably the most decorated cancer researcher in the State of Ohio.

• Kim Dietrich, PhD, was recognized by the General Assembly of the State of Ohio and received an Ohio Senate honor for Outstanding Achievement in 2008.

• Dan Nebert, MD, was the 2005 Winner of the Society of Toxicology’s Distinguished Lifetime Toxicology Scholar Award, and one of the most cited physician scientists in the field of toxicology.

• Ranajit Chakrabort, PhD, received “Over-Achiever” Recognition at the 56th Annual Meeting of the American Society of Human Genetics and was selected as the S.S. Sarkar Memorial Lecturer of 2007 by the Indian Anthropological Society.

• Michael Borchers, PhD, Outstanding New Environmental Scientist Award (NIEHS) 2006-2011.

• Marepalli Rao, PhD, was elected as a Fellow of the International Statistical Institute.

• Ranajit Chakraborty, PhD and Marepalli Rao, PhD, were inducted as Editorial Board Members of the International Journal Sankhya-B, published by the Indian Statistical Institute, which is one of the top ten prestigious journals of statistics in the world.

• Jack Meller, PhD, received the 2007 Advanced Technology Summit award sponsored by the Ohio Supercomputer Center.

• Carol Rice, PhD, received the Alice Hamilton Award, given by the American Industrial Hygiene Association to an outstanding woman who has made a definitive, lasting achievement in occupational and environmental hygiene.

• Roy McKay, PhD, received the Swift Memorial award for an outstanding publication in the field of aerosol science and technology (co-author), American Industrial Hygiene Association (2009).

• Tiina Reponen, PhD, received the John M. White Award for research in respiratory protection (co-author), American Industrial Hygiene Association (2009).
Management Plan
The Center is managed by a leadership team spearheaded by Dr. Shuk-mei Ho, Director and Chair of the Department of Environmental Health. An internationally recognized expert in carcinogenesis, Dr. Ho is also known for her team-building abilities. For example, she re-established the NIEHS Core Center for Environmental Genetics, a $1.55 million/year center dedicated to increasing the quality and quantity of environmental health sciences research through improving access to cutting-edge technologies, research team building, career development activities, and integrative access to biological specimens and data. Faculty from departments within the College of Medicine, University Hospital, and Cincinnati Children’s Hospital Medical Center participate on an Internal Advisory Board to give direction and perspective to initiatives.

Resource Management and Funding Plan
The Center’s resources are managed at the department and investigator level with joint decision making driven by the leadership team. Additional institutional investment in the Center’s programs is dictated by the UC Academic Priorities Planning Process, the UC College of Medicine strategic plan, departmental planning and strategic relationships with Cincinnati Children’s Hospital Medical Center, University Hospital and other clinical affiliates.

Sponsored Program Activity Associated with the Center
The Department of Environmental Health was awarded over $20 million in FY08 from federal, private, and industry sources.
Suggested Metrics that Define Excellence for the Center (see attached)

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<tbody>
<tr>
<td>1. World Class Academic Talent (Inputs)</td>
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<tr>
<td>Total Research Expenditures</td>
<td>$8,449,849</td>
<td>$8,129,408</td>
<td>$16,213,310</td>
<td>$17,497,619</td>
<td>$16,942,973</td>
<td>$16,637,270</td>
<td>$20,500,997</td>
<td>$25,000,000</td>
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<tr>
<td>Federally Financed Research Expenditures</td>
<td>$7,470,315</td>
<td>$7,369,787</td>
<td>$14,909,087</td>
<td>$16,506,289</td>
<td>$16,025,059</td>
<td>$17,627,565</td>
<td>$19,390,321</td>
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<td>National Academy Members</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Faculty Awards (note 1)</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
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<tr>
<td>Institutional Investment into Physical Infrastructure</td>
<td>maintenance</td>
<td>maintenance</td>
<td>$500,000</td>
<td>maintenance</td>
<td>maintenance</td>
<td>maintenance</td>
<td>$2,000,000</td>
<td>$1,800,000</td>
<td>$4,900,000</td>
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<td>Private Investment in Program (both Capital, Research, and any other Private Group)</td>
<td>$57,972</td>
<td>$45,053</td>
<td>$92,988</td>
<td>$32,544</td>
<td>$231,884</td>
<td>$250,000</td>
<td>$275,000</td>
<td>$2,500,000</td>
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<td>Referenced Publications per Faculty Member</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>3.7</td>
<td>3.5</td>
<td>3.8</td>
<td>4.0</td>
<td>4.2</td>
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<td>External National and International Program Rankings (note 2)</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
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<td>see note</td>
<td>see note</td>
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<tr>
<td>Number of Doctorates Awarded per Year</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>17</td>
<td>9</td>
<td>12</td>
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<td>Number of Post Docs Currently Employed</td>
<td>30</td>
<td>26</td>
<td>54</td>
<td>46</td>
<td>54</td>
<td>60</td>
<td>60</td>
<td>70</td>
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<td>2. Connection to the Industry's Local Economy (Value Added)</td>
<td></td>
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<td>Licenses and Options Executed (Number of Deals)</td>
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<td>0</td>
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<td>3</td>
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<td>Industrially Financed Research Expenditures</td>
<td>$631,861</td>
<td>$395,956</td>
<td>$767,368</td>
<td>$712,641</td>
<td>$609,632</td>
<td>$670,595</td>
<td>$737,655</td>
<td>$1,032,717</td>
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<td>Invention Disclosures</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>2</td>
<td>10</td>
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<tr>
<td>Consulting Agreements (with list of company names) (note 3)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Number of Companies that have Relationships with the Center of Excellence</td>
<td>3</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>15</td>
<td>17</td>
<td>20</td>
<td>30</td>
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<tr>
<td>Jobs Created in the State or Region in Industries Related to the Center of Excellence</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>235</td>
<td>235</td>
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<tr>
<td>Average Salary of Jobs Created in the Region or State in Industries Related to the Center of Excellence</td>
<td>$58,310</td>
<td>$59,170</td>
<td>$62,030</td>
<td>$64,960</td>
<td>$67,890</td>
<td>$69,248</td>
<td>$70,633</td>
<td>$77,984</td>
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<tr>
<td>Startup Companies Resulting from Center of Excellence</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td></td>
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<tr>
<td>3. Economic Impact (Outputs)</td>
<td></td>
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<tr>
<td>Jobs in Region for the Cluster (Health Care/Biotech)</td>
<td>n/a</td>
<td>n/a</td>
<td>36,700</td>
<td>37,434</td>
<td>38,183</td>
<td>38,946</td>
<td>39,725</td>
<td>43,859</td>
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<tr>
<td>Average Salary for Jobs in this Cluster</td>
<td>$58,310</td>
<td>$59,170</td>
<td>$62,030</td>
<td>$64,960</td>
<td>$67,890</td>
<td>$69,248</td>
<td>$70,633</td>
<td>$77,984</td>
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<td>Graduates Placed in their Fields in the State</td>
<td>4</td>
<td>11</td>
<td>6</td>
<td>7</td>
<td>12</td>
<td>9</td>
<td>12</td>
<td>20</td>
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<tr>
<td>Average Salary of Graduates</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>$75,000</td>
<td>$80,000</td>
<td>$90,000</td>
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<td>Jobs Created and Retained by Spinoffs of the Centers of Excellence</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Average Salary of Jobs Created and Retained by Spinoffs of the Centers of Excellence</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Economic Output of the Cluster in Region</td>
<td>n/a</td>
<td>n/a</td>
<td>$8,300,000,000</td>
<td>$8,383,000,000</td>
<td>$8,466,830,000</td>
<td>$8,551,498,300</td>
<td>$8,637,013,283</td>
<td>$9,000,000,000</td>
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<td>License Income</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>$10,000</td>
<td>$100,000</td>
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<td>4. Health Care Specific Measures</td>
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<tr>
<td>Active Clinical Trials Protocols</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>42</td>
<td>45</td>
<td>50</td>
<td>65</td>
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</table>

Note 1: Faculty Awards (see attached overview, Item 9)
Note 2: External National and International Program Rankings
Environmental Health is No. 1 in National Institutes of Environmental Health funding
Environmental Health is No. 4 among departments of Environmental Health at public medical schools for NIH funding

Note 3: Consulting Agreements (List of Companies)
Cardinal Health, Wein Products, Technova, Koken, ConAgra Foods, Schulman Associates

Note 4: Special Grants that advance status and mission (FY2009), Total Award
P30 – Center Grant – NIEHS – Environmental Genetics, $7,700,000
T32 – Training Grant – NIEHS – Gene Environment Interaction Training Program, $1,800,000
T42 – Education Grant – NIOSH – Education Research Center, $6,200,000
T32 – Training Grant – NIEHS – Molecular Epidemiology of Children’s Environmental Health Program, $2,800,000
U45 – NIEHS – Worker Health and Safety Training, $8,200,000
U01 – Puberty and Cancer Initiation: Environment, Diet and Obesity, $7,800,000

Five to Ten Year Goals
• Expand the Center’s impact in the areas of education, research, clinical care and contribute to the State’s economic growth
  o Work with collaborators to reduce health care costs from cancer and other environmental diseases by 15%
  o Focus on the emerging green economy and providing a skilled workforce to meet regional demand
  o Elevate the Center’s regional and national stature to become a magnet for biotechnology companies, consulting firms and pharmaceutical companies to establish new operations in Ohio and the region
  o Establish a new center to study the health effects of nanomaterials and its relationship to cancer and other complex diseases
  o Expand and strengthen the existing center for children’s environmental health by uniting well-designed population studies with technology-driven experimental research
• Hire 15 faculty members in the areas of cancer genetics, epigenetics, computational modeling, and clinical effectiveness research. Prominent academicians in biostatistics and research design will be recruited to fill teaching slots and support research.
• Continue to build bridges between Environmental Health, Engineering, and DAAP. Benchmarks of success include obtaining joint grants/contracts from federal and non-federal sources, building start-up companies via effective use of technology transfer and venture capitals, co-mentoring students, organizing regional and national meetings, establishing joint departmental functions open to faculty from different colleges, publications across departments, transdisciplinary pilot project grants, transdisciplinary external grants and U01 or P50 grants across campus.
• Emphasize technology transfer and licensing opportunities to generate additional revenue for the Center and Ohio’s economy.
• Attract venture capitalists to invest in Center- and University-initiated projects.
• Attain regional and national recognition as the source for dissemination of accurate information to the general public, health care providers, and policymakers.
• Become the national resource for advice on environmentally related issues in public health and economics.
**Center of Excellence Concept**
A long-time leader in the field of stroke research and a pioneer in clinical treatment for stroke, UC has made neuroscience research and the provision of neurological clinical care a key focus. UC’s program is unique in that specialists in multiple academic departments have come together to form the UC Neuroscience Institute. The institute is dedicated to providing state of the art patient care, research, education and the development of new treatments for stroke, brain and spinal tumors, epilepsy, traumatic brain and spinal injury, multiple sclerosis, Alzheimer’s disease, Parkinson’s disease, disorders of the senses (swallowing, voice, hearing, pain, taste and smell) and psychiatric conditions including bipolar disorder, schizophrenia, depression, adult and child attention deficit hyperactivity disorder and anxiety disorders.

**Scope of Activities**
The Institute includes seven centers that focus its education, research and clinical activities: the Brain Tumor Center, the Cerebrovascular Disease and Stroke Center, the Epilepsy Center, the Functional Neuroscience Center, the James J. and Joan A. Gardner Center for Parkinson’s Disease and Movement Disorders, the Neurotrauma Center and the Waddell Center for Multiple Sclerosis. Additionally, the Division of Bipolar Disorders Research and the Center for Imaging Research further expand the capabilities of the Institute. UC is also a node in the National Network of Depression Centers.

The Center’s research expenditures exceed $27 million per year and are growing. There are a number of large grants that distinguish the program as having achieved national excellence:

- The Point-of-Care Center for Emerging Neuro Technologies (POC-CENT) is funded by a $9 million, five-year grant, from the NIH to develop technologies geared toward early detection of neurologic emergencies. The POC-CENT serves as a resource hub for researchers at UC and across the country in need of help with any stage of technology development.
• The Center for Acute Stroke is supported by a $8.7 million Specialized Center grant from NIH. UC was the first to receive this award and there are now eight such centers in the nation.
• UC has also been awarded a $10 million NIMH grant to use neuroimaging to personalize treatment in bipolar patients.
• There is also a Udall Center for Parkinson’s Disease Research application pending. Receipt of this award is imminent and would make UC home to one of only 14 such centers in the nation.

Prospects for Driving Economic Advancement

Neurological, behavioral and psychiatric diseases and disorders are a major cause of death and disability throughout the United States and the world. Stroke alone is the third-leading cause of death in the nation, and it is estimated that direct and indirect costs of this disease near $63 billion annually. An estimated 1.5 million head injuries occur in the U.S. each year. Depression, bipolar disorder, attention deficit disorder and schizophrenia are among the 10 most disabling conditions in developed countries worldwide. Schizophrenia alone affects 1 percent of the US population, has an estimated economic burden of $32.5 billion and has an immense loss of productivity.

Given the health care costs alone, UC can make a tremendous impact on improving treatments for these diseases that drive down the cost of health care in our state, reduce the burden of uncompensated care, and the burden of costly employee benefit plans on our employers.

Further, investment in neurosciences research via the federal government and industry is on the rise. In examining the market, the Neurotechnology Industry Report for 2007 indicates that:

• 2006 venture capital investment in neurotechnology rose 7.5% to $1.666 billion
• Neurotech industry revenues rose 10% in 2006 to $120.5 billion; this includes neuropharmaceutical revenues of $101 billion, neurodevice revenues of $4.5 billion, neurodiagnostic revenues of $15 billion
• The Neurotech Index of publicly-traded neurotechnology companies was up 53% from its December 31, 2003 conception to March 31, 2006, outpacing the NASDAQ Biotech Index which gained 7% during the same period

UC is well-positioned to capture a fair share of this revenue to support Ohio’s biotech research and development enterprise.

The Institute is increasing its focus on technology transfer activities. With 26 disclosures in the past three years, we anticipate significant growth in licensing revenue and future potential spin-off opportunities. Cincinnati is well-positioned to move technology rapidly into commercialization through UC’s relationships with CincyTech USA, the Cincinnati Chamber of Commerce’s technology enterprise that provides expertise and funding to entrepreneurs, and BIOSTART, a state-funded biotech incubator located on UC’s campus.

Faculty Members Associated with the Center: 100
LEADERSHIP:

- Joseph Broderick, MD, Chairman, Department of Neurology; Director, Greater Cincinnati/Northern Kentucky Stroke Team; Research Director, the UC Neuroscience Institute
- Stephen Strakowski, MD; Chairman, Department of Psychiatry; Director, Center for Imaging Research
- John Tew, MD, Clinical Director, the UC Neuroscience Institute; Professor, UC Department of Neurosurgery

Graduate Programs Associated with the Center
College of Medicine, PhD program in Neuroscience (Primary educational program)
College of Medicine/Engineering, Biomedical Engineering degree program
McMicken College of Arts & Sciences, Psychology, Biological Sciences and Neuroscience degree programs
College of Allied Health Sciences, Communication Sciences and Disorders
College of Nursing, Psychiatric Nursing program
Winkle College of Pharmacy, Pharmacology program

Professional Programs Associated with the Center
College of Medicine, MD program
College of Medicine, Residency and Fellowship programs
College of Law, Glenn M. Weaver Institute of Law and Psychiatry

Undergraduate Programs Associated with the Center
McMicken College of Arts & Sciences, Psychology, Biology and Neuroscience degree programs

Outside Collaborating Entities
Abbott
Allergan, Inc.
Alternatives Research and Development Foundation
Ambrx
American Heart Association
Amylin
Association of American Medical Colleges/Centers for Disease Control
AstraZeneca
Boehringer Ingelheim
Boston Scientific Corporation
Bristol Meyers Squibb
Cincinnati Children’s Hospital Medical Center
CKIV Alignment, LLC
Cleveland Medical Devices
Columbia University
Concentric Inc.
Cornell University
Cypress Biosciences
Department of the Army

Department of Veterans Affairs
EKOS Corp.
Eli Lilly
Ethicon Endo-Surgery
Forest Laboratories
Genentech
Integra Foundation
Janssen Pharmaceutical Research Foundation
John E. Fogarty International Center
Johns Hopkins University
Johnson & Johnson
Marvin Lewis Community Fund
Medical University of South Carolina
Merck
Marcadia Biotech
Mayo Clinic
Massachusetts General Hospital
Michael J. Fox Foundation for Parkinson’s Research
National Center for Complementary and Alternative Medicine
The institute has several key accomplishments that cement its place as a leading academically-based program that will continue to drive our competitiveness. The institute is home to the Greater Cincinnati/Northern Kentucky Stroke Team, which serves as a community resource for the rapid diagnosis and treatment of stroke patients. This approach was pioneered in Cincinnati. Neurologists at the UC Neuroscience Institute have developed advanced treatments in stroke and have authored numerous works on this topic.

The Drake Center, a specialized medical and rehabilitative care hospital and one of UC’s clinical partners, has just launched a Stroke Recovery Center that combines the best in rehabilitative medicine expertise and equipment with the unique resources available through the Stroke Team and neuroscientists at UC.

In 2005, the Cerebrovascular Disease and Stroke Center became the first center in Cincinnati to be certified as a national Primary Stroke Center by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). The certification verifies that the center follows nationally recognized best practices for the treatment of stroke patients. The center was re-certified in 2007.

In 2005, the Epilepsy Center earned a Level 4 rating—the highest rating for epilepsy care—from the National Association of Epilepsy Centers. The center treats hundreds of patients annually and has the second-highest volume of epilepsy patients in Ohio.

In 2008, the United Council for Neurological Subspecialties accredited the institute’s neurocritical care fellowship program. The accreditation, achieved by only 12 institutions nationally, heightened the stature of UC’s program, which provides advanced training in the focused, specialized care of patients who have sustained a severe neurological injury. The only other program in Ohio is at the Cleveland Clinic.
In 2008, the Institute joined a national network to promote improved treatment, research and education in mood disorders (depression and bipolar disorder). Joining the University of Michigan, Stanford University, Harvard University, Johns Hopkins University and several others, UC is a founding member of the National Network of Depression Centers, representing Ohio in this important effort.

Matthew Flaherty, MD, assistant professor of neurology at the University of Cincinnati, is being awarded the 2009 Michael S. Pessin Stroke Leadership Prize for his research in stroke treatment.

Joseph Broderick, MD, chair of the Department of Neurology, received the 2003 William M. Feinberg Award for Excellence in Clinical Stroke from the Stroke Council of the American Stroke Association, a division of the American Heart Association. Dr. Broderick is an internationally recognized expert on the epidemiology of stroke.

Susan McElroy, MD, and Paul Keck, MD, attracted among the highest total citations to their papers in indexed journals of psychiatry and psychology over the past 10 years and are among the top 10 authors cited in the field.

Management Plan
The Institute is managed by a leadership team from the College of Medicine departments of neurology, neurosurgery and psychiatry, with appropriate involvement of partners from other Colleges and clinical affiliates.

Resource Management and Funding Plan
The Institute’s resources are decentralized and managed at the department and investigator level with joint decision making driven by the leadership team. Institutional investment in the Institute’s programs is dictated by the UC Academic Priorities Planning Process, the College of Medicine strategic plan, and strategic relationships with Cincinnati Children’s Hospital Medical Center, University Hospital and other clinical affiliates.

Sponsored Program Activity Associated with the Center
In 2008, UC was ranked ninth nationally (out of 79) and third (out of 48) among public universities for National Institutes of Health funding for departments of neurology with $12.2 million. With $16.9 million in NIH funding, the Department of Psychiatry was ranked 16th nationally (out of 91) and sixth (out of 53) among public universities.

Total sponsored research for the departments of Psychiatry, Neurology and Neurosurgery exceeds $32 million (in FY08).
Suggested Metrics that Define Excellence for the Center

**CENTERS OF EXCELLENCE METRICS**
**NEUROSCIENCES**

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### 1. World Class Academic Talent (Inputs)

- **Total Research Expenditures**
  - FY2004: $25,288,831
  - FY2005: $27,308,225
  - FY2006: $30,138,999
  - FY2007: $31,395,847
  - FY2008: $32,772,734
  - FY2009: $36,050,007
  - FY2010: $39,655,008
  - Goal: $51,551,111

- **Federally Financed Research Expenditures**
  - FY2004: $20,338,432
  - FY2005: $21,946,889
  - FY2006: $25,649,696
  - FY2007: $27,049,723
  - FY2008: $28,064,192
  - FY2009: $30,870,611
  - FY2010: $33,957,672
  - Goal: $44,144,974

- **National Academy Members**
  - FY2004: 0
  - FY2005: 0
  - FY2006: 0
  - FY2007: 0
  - FY2008: 0
  - FY2009: 0
  - FY2010: 0
  - Goal: 0

- **Faculty Awards (note 1)**
  - FY2004: see note
  - FY2005: see note
  - FY2006: see note
  - FY2007: see note
  - FY2008: see note
  - FY2009: see note
  - FY2010: see note

- **Institutional Investment into Physical Infrastructure**
  - FY2004: $1,625,000
  - FY2005: $1,625,000
  - FY2006: $1,625,000
  - FY2007: $1,625,000
  - FY2008: $200,000
  - FY2009: $500,000
  - FY2010: $200,000
  - Goal: $200,000

- **Private Investment in Program (both Capital, Research, and any other Private Group)**
  - FY2004: $425,594
  - FY2005: $501,067
  - FY2006: $841,456
  - FY2007: $822,138
  - FY2008: $1,005,112
  - FY2009: $2,000,000
  - FY2010: $5,000,000
  - Goal: $5,000,000

- **Refereed Publications per Faculty Member**
  - FY2004: 1.9
  - FY2005: 1.5
  - FY2006: 2.2
  - FY2007: 2.0
  - FY2008: 2.5
  - FY2009: 2.7
  - FY2010: 3.0
  - Goal: 3.5

- **External National and International Program Rankings (note 2)**
  - FY2004: see note
  - FY2005: see note
  - FY2006: see note
  - FY2007: see note
  - FY2008: see note
  - FY2009: see note
  - FY2010: see note

- **Number of Doctorates Awarded per Year**
  - FY2004: 35
  - FY2005: 5
  - FY2006: 5
  - FY2007: 3
  - FY2008: 6
  - FY2009: 5
  - FY2010: 6
  - Goal: 6

- **Number of Post Doctoral Positions**
  - FY2004: n/a
  - FY2005: n/a
  - FY2006: n/a
  - FY2007: n/a
  - FY2008: 1
  - FY2009: 92
  - FY2010: 0
  - Goal: 25

### 2. Connection to the Industry’s Local Economy (Value Added)

- **Invention Disclosures**
  - FY2004: 4
  - FY2005: 2
  - FY2006: 9
  - FY2007: 11
  - FY2008: 5
  - FY2009: 7
  - FY2010: 0
  - Goal: 12

- **Consulting Agreements (with list of company names) (note 3)**
  - FY2004: n/a
  - FY2005: n/a
  - FY2006: n/a
  - FY2007: n/a
  - FY2008: 50
  - FY2009: 55
  - FY2010: 60
  - Goal: 60

- **Number of Companies that have Relationships with the Center of Excellence**
  - FY2004: n/a
  - FY2005: n/a
  - FY2006: n/a
  - FY2007: 75
  - FY2008: 80
  - FY2009: 90
  - FY2010: 90
  - Goal: 90

- **Average Salary of Jobs Created in the Region or State in Industries Related to the Center of Excellence**
  - FY2004: $58,310
  - FY2005: $59,170
  - FY2006: $62,030
  - FY2007: $64,960
  - FY2008: $67,890
  - FY2009: $69,248
  - FY2010: $70,633
  - Goal: $77,984

### 3. Economic Impact (Outputs)

- **Jobs in Region for the Cluster (Health Care/Biotech)**
  - FY2004: n/a
  - FY2005: 36,700
  - FY2006: $8,300,000
  - FY2007: $8,383,000
  - FY2008: $8,466,830
  - FY2009: $8,551,498
  - FY2010: $8,637,013
  - Goal: $9,000,000

- **Average Salary for Jobs in this Cluster**
  - FY2004: $58,310
  - FY2005: $59,170
  - FY2006: $62,030
  - FY2007: $64,960
  - FY2008: $67,890
  - FY2009: $69,248
  - FY2010: $70,633
  - Goal: $77,984

### 4. Health Care Specific Measures

- **Active Clinical Trial Protocols**
  - FY2004: n/a
  - FY2005: 0
  - FY2006: pending
  - FY2007: pending
  - FY2008: pending
  - FY2009: pending
  - FY2010: pending
  - Goal: pending

- **Special Grants that Advance Status and Mission (note 4)**
  - FY2004: see note
  - FY2005: see note
  - FY2006: see note
  - FY2007: see note
  - FY2008: see note
  - FY2009: see note
  - FY2010: see note
  - Goal: see note

- **Special Accreditations (note 5)**
  - FY2004: see note
  - FY2005: see note
  - FY2006: see note
  - FY2007: see note
  - FY2008: see note
  - FY2009: see note
  - FY2010: see note
  - Goal: see note

- **Members of Institute of Medicine**
  - FY2004: 0
  - FY2005: 0
  - FY2006: 0
  - FY2007: 0
  - FY2008: 0
  - FY2009: 0
  - FY2010: 0
  - Goal: pending

- **Number of doctors included in “Best Doctors” (note 6)**
  - FY2004: n/a
  - FY2005: n/a
  - FY2006: n/a
  - FY2007: pending
  - FY2008: pending
  - FY2009: pending
  - FY2010: pending
  - Goal: pending

**Note 1:** Faculty Awards (see attached overview, Item 9)

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n/a = not available (data not previously tracked in a manner that is retrievable by Center)

pending = data requested but not received prior to publication deadline
Note 2: External National and International Program Rankings
No. 3 among departments of Neurology at public medical schools for NIH funding
No. 6 among departments of Psychiatry at public medical schools for NIH funding
Susan McElroy, MD, and Paul Keck, MD, are among the top 10 most cited authors in the field of psychiatry (http://sciencewatch.com/dr/sci/08/may18-08_4/)
Seeking ranking for Neurology and Neurosurgery, and Psychiatry in U.S. News & World Report Hospital rankings

Note 3: Consulting Agreements (list of companies)
Xanthostat, Amylin (2), Ethicon Endo-Surgery (2), UCB Pharma (4), Allergan, Theravance, Abbott, Shire Pharma (2), Genentech, Boehringer Ingelheim, Pfizer (7), Johnson & Johnson (3), Marcadia Biotech, Ambrx, Novo Nordisk, The Stroke Group. CKIV Alignment, LLC, Synthes Spine Company, LP, AstraZeneca (2), Briston Meyers Squibb, Sanofi Aventis, Eli Lilly (3), Cypress Biosciences, Wyeth, Boehringer Ingelheim (2), Forest Laboratories (2), P2D (2), Zafgen, Merck (2)

Note 4: Special Grants that advance status and mission Total Award
P50 - Specialized Center - NINDS - Center for Acute Stroke, $8,710,000
R01 - Research Program - NINDS - Genetic/Environmental Risk Factors for Stroke, $6,231,000
U54 - Cooperative Specialized Research Center - NINB - POC-CENT, $9,000,000
P50 - Specialized Center - NIMH - UC Bipolar Disorder Imaging and Treatment Research Center, $9,000,000
T32 - Training Grant - NINDS - Cerebrovascular Fellowship Training Program, $178,308
NIH - Familial Intracranial Aneurysm II, $6,499,000
NINDS - Hemorrhagic & Ischemic Stroke Among Blacks and Whites, $5,683,000
P50 - Specialized Center - NINDS - Udall Center for Parkinson's Disease Research, app pending (only 14 in the nation)

Note 5: Accreditations Recognizing Excellence (Current)
JCAHO Primary Stroke Center (current and recent in 2009)
National Epilepsy Center
JCAHO Certification Lindner Center of HOPE

Future Accreditations
Comprehensive Stroke Center (2010 or 2011)
ODMH Certification
Comprehensive Depression Center

Note 6: Best Doctors 2007
Five to Ten Year Goals

- Ensure sustainability of existing programs
- Retain faculty who are key to stability and expansion of programs
- Increase depth of all research and clinical programs
- Fuel growth in targeted areas:
  - Brain Tumor Center
  - Recovery After Stroke Program
  - Traumatic Brain Injury Program
  - Center for Imaging Research (add VHF magnet, HFI animal system, NMR, 11T MRI)
  - Alzheimer’s Program
  - PTSD Center (with VA)
  - Addiction Center
  - Comprehensive Mood Disorders Program
- Focus on improvement of clinical infrastructure
- Identify and leverage opportunities related to Psychiatric Emergency Services
- Maintain or obtain key rankings:
  - Current NIH funding: No. 3 among departments of Neurology (public medical schools); No. 6 among departments of Psychiatry (public medical schools)
  - Susan McElroy, MD, and Paul Keck, MD, are among top 10 most cited authors in field of psychiatry
  - Achieve U.S. News & World Report ranking in Neurology and Neurosurgery, as well as Psychiatry at University Hospital
  - 14 physicians listed on “Best Doctors”
- Maintain or obtain key accreditations:
  - JCAHO Primary Stroke Center (current and recertification in 2009)
  - National Epilepsy Center (current)
  - JCAHO Certification for Lindner Center of HOPE (current)
  - Comprehensive Stroke Center (future)
  - ODMH Certification (future)
  - Comprehensive Depression Center (future)
- Maintain or obtain grant funding via P01, P30, or P50 mechanisms to support stated goals.
INTELLIGENT AIR & SPACE VEHICLE ENERGY SYSTEMS

Center of Excellence Concept
The development of the next generation air and space vehicles is principally limited by needed advances in energy, power, and thermal management. By taking an integrated systems approach to thermal management, through energy efficiency by dynamic systems management, it is possible to achieve a quantum improvement in vehicle performance and cost efficiency. This effort is truly multidisciplinary, involving the development of not only new materials and energy transduction systems, but also the creation of dynamic time based models of vehicle components that are integrated together with advanced sensing, computing, and algorithms to facilitate global system optimization and control.

The people who support these specialties within the college are a constellation of over fifty foundational academic and research individuals, each a national leader in his or her own regard, focused in the areas of systems, materials, computing and simulation, instrumentation and sensing, structures, mechanics and dynamics, thermodynamics, and aerospace disciplines. A complete listing is given at the end of this document. This proposal highlights the way in which these areas have been brought together to focus on research in intelligent air and space vehicle energy systems.

With the establishment of one of the nation’s earliest programs in aerospace engineering in 1929, the UC College of Engineering celebrates an 80-year history as a leader in the development of new technologies to support the aerospace industry. Through its cutting-edge research, UC has, to a great measure, helped define the challenges and solutions for producing the next generation of air and space vehicles. We are widely recognized as a world leader in education and research in the areas of propulsion systems design, advanced composite materials and coating development, and intelligent systems engineering. This technical acumen is evidenced by $87.4 million in annual external funding, and externally validated by the benchmarking of several of our programs by international leaders during our recent ORSP competition in the areas of: aeroacoustics, erosion and multi-phase flow in turbomachinery, non-destructive evaluation (NDE) for prognosis and life management of propulsion systems, combustion research and turbomachinery aerodynamics and heat transfer.

Scope of Activities
UC has contributed to the Ohio’s industrial and economic priorities through highly skilled work force development and state-of-the-art research. Our ability to form strong partnerships with the high concentration of leading industrial companies and federal laboratories in Ohio helps to support and guide both research and educational efforts dealing with future promising technology developments, and on moving promising nascent
technologies into commercialization. The proposed center builds on and complements successful collaboration efforts already established at UC, drawing on the technical areas outlined above, and including the following centers and strategic alliances:

- Center for Intelligent Propulsion and Advanced Life Management Systems (CIPALMS): A Third Frontier 2008 funded center involving four industrial partners (GE Aerospace, Goodrich, Parker Hannifin, Timken) two federal labs (NASA GRC, AFRL at WPAFB) and two not-for-profit organizations (OAI, AVETEC).
- Collaborative agreement between NASA Glen Research Center & UC, executed 2007.
- University Strategic Alliance (USA) of General Electric Aviation: An international group of seven universities with strong gas turbine research activities executed 2000.
- Propulsion 21: A NASA strategic alliance of five Ohio universities, two government labs, and seven industrial partners.
- Center for Intelligent Maintenance Systems (IMS): A partnership of three universities with 50 industrial members including a number in aero-propulsion.
- Institute for Development Commercialization of Advanced Sensor Technology (IDCAST): An innovative consortium of academia, AFRL, and industry, led by the University of Dayton with UC and Wright State as partners, to develop the next generation of sensing technologies.

Prospects for Driving Economic Advancement
The success of the proposed program is reflected in the ability to not only conduct world-class research, but to also facilitate the transfer of this knowledge through both industry partnerships and the education of a highly skilled and creative work force.

Ohio ranks 7th and 8th, respectively, among the 50 states based on the dollar value of aerospace products produced and industry employment.

Nearly half of the $35B annual revenues generated by the United States aircraft engine industry are attributed to Ohio-based companies, with more than 200,000 aero-propulsion jobs within the state.

With GE Aviation, Wright-Patterson AFB, and the myriad of associated high-tech industries in our backyard, the Cincinnati-Dayton corridor has led the world in advances in aviation for the nearly 100 years and has bragging rights as one of the nation’s greatest concentrations of aerospace-related engineering expertise. Our goal is to continue to play a key role in the ensuring continued global competitiveness of the US in this industry through the development of advanced power
and propulsion energy research and technology as well as education of a highly skilled workforce. The targeted education supports an integrated approach to the development of future adaptive power and propulsion systems that meet the new challenges of alternate energy and thermal management and the increasingly stringent demands for reducing fuel burn, environmental impact, and life cycle cost.

This program also has an integrated commitment not just to knowledge creation but also to knowledge transfer. The educational component of this endeavor is supported at the undergraduate level with a mandatory co-op program and further buttressed with heavy participation in the Choose Ohio First Scholarship Program. This program incorporates literally hundreds of companies to partner in the education of students by providing a structured experiential learning environment while at the same time these partner companies are able to satisfy their needs for a talented workforce. Over the period 2004-2008, 6,299 co-op placements of 2,460 engineering students were made in Ohio Energy and Aerospace industries. These graduates obtain high tech jobs with starting salaries averaging $65K per year. In addition to producing manpower to drive the state’s economic engine, in the last 5 years, UC’s research efforts in these areas has produced more then 200 invention disclosures resulting in 25 license agreements, more than $9M in industrial funding, and nearly $0.5M in royalty/patent income to the university. Further, these same space-age technologies, originally developed to solve aerospace problems, are routinely spun off in applications in Ohio’s other major industrial sectors such as automotive and biomedical.

At the graduate level, besides providing the traditional MS/PhD graduate degrees, UC offers the only Professional Masters Degree in engineering in the State of Ohio. Further, since the signing of the Advanced Aerodynamic Engineering agreement with General Electric in 1966, the UC College of Engineering has provided graduate training and degrees to nearly a thousand working GE engineers. In addition to the numerous one-on-one industry research and support relationships, the UC College of Engineering in partnership with the National Science Foundation supports an Industry/University Cooperative Research Center for Intelligent Maintenance Systems with over 40 industrial partners who offer both technical and financial assistance.

**Faculty Members Associated with the Center**

The center’s Principle Investigators are Awatef Hamed, Department of Aerospace Engineering, Arthur Helmicki, Electrical and Computer Engineering, Jay Lee, Department of Mechanical Engineering, Vesselin Shanov, Chemical and Materials Engineering. In addition, the center involves the active participation of more than 30 faculty from these departments including faculty of extraordinary quality: 4 AIAA Fellows (Profs. Tabakoff, Hamed, Ghia, Gutmark), 4 ASME Fellows (Profs. Tabakoff, Hamed, Ghia, Lee), 1 AAS Fellow (Prof. Nagy), 3 Ohio Eminent Scholars (Profs. Gutmark, Lee, Steckl), 1 SME Fellow (Prof. Lee), 1 ISEAM Fellow (Prof. Lee), 1 IEEE Fellow (Prof. Steckl), 1 API Fellow (Prof. Ahn), 1 Adhesion Society Fellow (Prof. Boerio), and 1 combined AFOSR Young Investigator/NSF Career Awardee (Prof. Heikenfeld).

The hiring of talented faculty to fill four endowed chairs, three through the Ohio Research Scholar award and one through the Ohio Eminent Scholar award offers a unique opportunity to expand and enrich the quality of UC programs, and to further enhance our ability to attract highly qualified students into the college, grow external research funding and increase the number of trained graduate students and post docs.
Graduate Programs Associated with the Center
Graduate degrees at the MS and PhD levels in the Departments of Aerospace, Chemical and Materials, Mechanical, and Electrical and Computer Engineering.

Professional Programs Associated with the Center
Professional degrees at the MEng level in the Departments of Aerospace and Engineering Mechanics, Chemical and Materials, Mechanical, and Electrical and Computer Engineering.

Undergraduate Programs Associated with the Center
Undergraduate degrees at the BS level in the Departments of Aerospace and Engineering Mechanics, Chemical and Materials, Mechanical, and Electrical and Computer Engineering.

Outside Collaborating Entities
A wide assortment of industrial and government organizations in Ohio including: ODOD, AFRL, WPAFB, GE Aviation, IDCAST, Goodrich, Parker Hannifin, Timken, NASA Glenn Research Center, OAI, the Wright Brothers Institute, and AVETEC. In addition, partnerships are in place with federal level organizations such as NSF, AFOSR, and NASA.

Supporting Scientific, Scholarly, and/or Creative Activities
The center affiliated faculty direct the research efforts of more than 20 laboratories and facilities within the College of Engineering including: The Center for Materials Characterization, the Gas Dynamics and Propulsion Lab, the Propulsion Systems and Aeroacoustics Simulation Lab, the Gas Turbine Simulation Lab, the Complex Adaptive Systems Laboratory, the Systems Modeling & Information Technology Laboratory, the Experimental Computing Laboratory, the Structural Dynamics Research Laboratory and the Intelligent Maintenance Systems Center. On average, they produce more than 20 refereed publications per faculty per year along with numerous other conference publications and presentations. They sit on numerous journals editorial and conference/workshop organizational boards and are members of several professional societies. Cumulatively, they trained more than 60 PhD graduates in the 2004-2008 period, they currently employ about a dozen post doctoral fellows in their laboratories, and they have been responsible for creating 5 startup companies in Ohio.

One example of the kind of creative and innovative ideas coming out of the proposed center is the development the UC Advanced Aviation, Energy, and Materials Research Institute, a partnership being developed between UC and GE Aviation which incorporates world-class component and assembled systems testing facilities together with administrative and educational facilities all housed at one site near GE, managed by UC and available to be utilized by industry, government, and academic entities to form a one-of-a-kind, state-of-the-art combined experimental and educational resource. The goals include finding outside users, developing other markets (energy, materials, advanced manufacturing, etc.) to ensure financial viability and cross fertilization of aerospace technologies with other Ohio and national industries, in addition to creating new spinoff ventures and synergy between the efforts of Center faculty and local government and industry.

Management Plan
Consists of an internal Executive Committee with input from an External Oversight Committee. The Executive Committee includes the PIs, College Dean, and University VP for
Research. Its function is to define strategies for Research and Educational developments, decide major policy issues, oversee the Center’s finances and administration, and conduct annual reviews of accomplishments. The Oversight Committee includes industry and Federal lab representatives, GE, Goodrich, Parker, AFRL, NASA GRC etc., to ensure continued relevance to end users and to the state and regional economy, enhance research commercialization potential, and partner in continued education and training of a highly trained work force.

Resource Management and Funding Plan
The University of Cincinnati, College of Engineering, State of Ohio, numerous federal agencies, industrial partners, and private donors have collectively invested major resources into the proposed center including facilities valued at $43M. Recently acquired resources and future funds from focused campaigns will further enhance center activities in areas including recruitment of new faculty, infrastructure, scholarships, etc. Recent examples include:

- **OBR** $685,494 Eminent Scholar award for Endowed Chair in “Power and Propulsion Systems” July 2007, the fifth College of Engineering Eminent Scholar award.
- **Third Frontier ODOD** $4,300,000 of $10,800,000 award “Ohio Center for Advanced Propulsion and Power” Dec 2003.
- **Space Institute Gift** of $20,000,000 from a private donor, the largest bequest in UC’s history by an individual, established the Thomas Jefferson Endowed Chair in Space Exploration and the Alan B. Shepard Endowed Chair in Space Exploration, and the Space Exploration Research Fund.
- **PACE, Partners for the Advancement of Collaborative Engineering Education** $420,687,132 from, a consortium of international companies, in-kind contribution of high-end design and engineering computer tools (both hardware and software) for both classroom and research labs.
- The future **UC Advanced Aviation, Energy & Materials Research Institute** is being developed as a partnership between UC and GE Aviation to provide world-class aerospace testing facilities.

Moving forward, the Proudly Cincinnati Campaign (2005-2013) has exceeded by 25% the College of Engineering combined FY06, 07 and 08 goal of $10.04M. Its overall $58M goal is to provide:

- Foundation and infrastructure for Learning, Design Innovation, and Interdisciplinary systems
- National leadership in select areas of collaborative advanced technology
- Faculty, Scholarship and Student Support for recruiting excellence
- Excellence fund for deep engagement with business, professional and civic communities

Sponsored Program Activity Associated with the Center
Drawing on the established research programs involved in the center’s research objectives, the proposed center ties into externally funded research totaling $87.4M in expenditures from 2004 to 2008, including such efforts as:

- **Air Force Office of Scientific Research (AFOSR)** $25,000 award for workshop on “Prognosis of Aircraft & Space Devices, Components & Systems” to identify
scientifically sound directions & achievable specific targets for the BAA to be issued by AFOSR, Feb. 2008.

- **ASEE & AIAA & Rockwell International** J. Leland Atwood $3,000 Aerospace Educator Award to Prof. Hamed to recognize outstanding educational achievement and innovative improvements in aerospace education, Jan 2009.
- **NSF-Industry/University Cooperative Research Center** on Intelligent Maintenance Systems,” NSF (EEC-0117518), $400,000, 8/1/01-7/31/06.
- **NSF Industry/University Cooperative Research Center** on Intelligent Maintenance Systems,” NSF (EEC-0117518), $200,000 10/1/06-9/30/09.
- **UC Nanoworld laboratories**: a partner of the US Air Force and of WPAFB through a spin off company General Nano LLC and funded SBIR I and SBIR II projects.

**Suggested Metrics that Define Excellence for the Center**
The attached table provides a compilation of benchmark statistics based on those used by such agencies as the National Science Foundation (NSF), the *U.S. News and World Report*, and recently utilized in the report “Engineering Ohio’s Future,” presented by the Ohio Engineering Dean’s Council to the Ohio Board of Regents Chancellor, May 2009.
Intelligent Air & Space Vehicle Systems Benchmark Metrics

Supporting PhD Programs 7
Supporting Master's Programs 7
Supporting Baccalaureate Programs 6
Faculty 33

1. World Class Academic Talent (Inputs)
   Total Research Expenditures FY 2004-2008 $87.6M
   Federally Financed Research Expenditures FY 2004-2008 $36.3M
   National Academy Members 0
   Faculty Awards FY 2004-2008 17
   Institutional Investment into Physical Infrastructure FY 2004-2008 $43M
   Private Investment in Program (Capital, Research, & any other Private Group) FY 2004-2008 $20M
   Refereed Publications per Faculty Member FY 2004-2008 20
   Number of Doctorates Awarded per Year FY 2004-2008 60
   Number of Post Docs Currently Employed 13

2. Connection to the Industry's Local Economy (Value Added)
   Licenses and Options Executed (Number of Deals) FY 2004-2008 25
   Industrially Financed Research Expenditures FY 2004-2008 $9.4M
   Invention Disclosures FY 2004-2008 202
   Number of Companies that have Relationships with the Centers of Excellence 75+
   Jobs Created in the State/Region in Industries Related to the Centers of Excellence FY 2004-2008 3,800
   Average Salary Jobs Created in the Region/ State in Industries Related to the Centers of Excellence $82K
   Startup Companies Resulting from Centers of Excellence FY 2004-2008 5

3. Economic Impact (Outputs)
   Jobs in Region for the Cluster 200,000
   Average Salary for Jobs in this Cluster $82K
   Graduates Placed in their Fields in the State FY 2004-2008 260
   Average Starting Salary of Graduates $65K
   Economic Output of the Cluster in Region FY 2004-2008 $14B
   License Income FY 2004-2008 $481K

Sources: UC Sponsored Research Services, UC Office of Intellectual Property, UC Office of Career Placement, Cincinnati USA Partnership for Economic Development, Ohio Department of Development, Salary.com

Five to Ten Year Goals

- Expand R&D efforts in power and propulsion vehicle integration to make Ohio the international leader
- Support and strengthen Ohio aerospace industry and provide the needed highly skilled workforce
- Encourage technology transfer and the establishment of small business development emanating from our R&D efforts
- Strengthen cross-disciplinary research cluster for cooperative air and space transportation systems
- Make UC the destination for engineering education in advanced energy optimization and development
- Meet future challenges of increasing environmental constraints and decreasing carbon prints
SUSTAINING THE URBAN ENVIRONMENT

Center of Excellence Concept
While more than eighty percent of the population of the United States lives in urban environments and megacities around the globe devouring natural and energy resources at unprecedented scales, there is little emphasis on how such growth can be sustained. Critical transportation, water, and energy infrastructure networks are crumbling as are the aging infrastructures of industries that fuel Ohio’s economy, yet there is little political will to fund their renewal (i.e., I-35 bridge in Minnesota). The spread of infectious diseases, nanopollutants, and adverse environmental health impacts is increasing, yet the relationships to urban development are largely unknown (i.e., endocrine disruptors in drinking water). Homeland security concerns are described for various threats against urban regions, yet we are largely unprepared to detect attacks and respond to avoid a crippling and sustained loss of core city functions (i.e., Hurricane Katrina).

In all of these regional urban problems, a lack of coordinated spatial and temporal information about systemic change hampers efforts to identify the extent of the problem, and to discover possible remedies. There is a need for new multi-disciplinary approaches to seamlessly link diverse urban-scale research, education, and translational activities. As the preeminent urban research university in the State of Ohio, the University of Cincinnati enjoys an international reputation in the physical and environmental aspects of the built environment.

The proposed University System of Ohio Center of Excellence in Sustaining the Urban Environment brings together under a single thrust ten exceptional discipline-specific degree programs with a robust history of collaboration. The overall objective of the Center is to improve the health and wealth of urban dwellers by developing and disseminating engineering and scientific metrics, policies and technologies that promote the evolution of economically and environmentally sustainable urban regions. The Center will serve as a job-creation engine for economic development through specialized opportunities in technology,
design, manufacturing, construction, workforce development and advanced research related
to urban infrastructure.

Scope of Activities
Activity in Sustainable Urban Environments (SUE) was established in 2006 with financial
support from the Dean of the Graduate School and the Office of the Provost in response to a
successful external review of the graduate program in Environmental Engineering and
Science. Additional funding was provided by the office of the Dean of the College of
Engineering. Together, nearly one million dollars of new funds have been committed to
establish research, education, and translational activities. A natural outcome of our initial
activity was the development of three focal areas for activity in this area. These are:

Sustainable Water Infrastructure Technologies: Water treatment and distribution, wastewater
collection and treatment, storm water collection, minimization of combined sewer overflow
and mitigation of flooding, and industrial wastewater treatment and reuse represent major
challenges to sustaining urban environments. The National Academy of Engineering
considers implementation of modern drinking water and wastewater treatment systems to be
among the top five engineering achievements of the 20th century (NAE, 2008). In the United
States, efforts to supply drinking water and dispose of wastewater have produced an
infrastructure unrivaled in the history of civilization. Without question, the public health
benefits provided by the national water infrastructure have been enormous. The legacy is
clear, but what does the 21st century hold? Investment in maintenance and repair of the
public water infrastructure has been woefully inadequate over the past 50 years. Grades for
the condition and capacity of the nation’s drinking water and wastewater infrastructure
dropped from “D” in 2001 to “D-” in 2005 according to the American Society of Civil
Engineers’ latest report card on America’s infrastructure. The U.S. Environmental Protection
Agency (EPA) estimates that nearly $670 billion is required to meet the capital needs alone
of the national wastewater and drinking water industries through the year 2019.

The Environmental Engineering and Science (EE&S) Program at the University of Cincinnati
and several faculty members in Chemical Engineering (ChE) have a very strong tradition in
water infrastructure research. The College of Engineering and the National Risk
Management Research Laboratory (NRMRL) of the U.S. EPA, which is adjacent to the
University, are coordinating efforts to establish Cincinnati as the “Water Infrastructure
Center” of the U.S. by attracting major equipment manufacturers to the area. This is a natural
outgrowth of the fact that the Environmental Program is one of the highest-funded programs
in the country while most EPA research on infrastructure development is carried out at
NRMRL.

The Environmental Program boasts world-renowned researchers in water infrastructure
technologies with annual research expenditure exceeding $5 M. Research in advanced water
treatment is carried out by Dr. Dionysios Dionysiou (EE&S), Dr. Peter Smirniotis (ChE), Dr.
George Sorial (EE&S), and Dr. Makram Suidan (EE&S). Dr. Dominic Boccelli (EE&S), Dr.
Steven Buchberger (EE&S), Dr. Margaret Kupferle (EE&S) Dr. Daniel Oerther (EE&S) and
Dr. James Uber (EE&S) are experts in mitigating water quality deterioration in distribution
systems and protection of source and product water. Dr. Paul L. Bishop (EE&S) and Dr.
Makram T. Suidan (EE&S) are world-renown in wastewater treatment technology
development with Dr. Suidan holding three patents on such processes. Dr. Steven G.
Buchberger (EE&S) and Dr. Makram T. Suidan (EE&S) are working with the Metropolitan
Sewer District of Greater Cincinnati to develop innovative technologies for control of storm
water flow and groundwater recharge. The Environmental Program faculty has varying
degrees of involvement with large industrial entities and equipment manufacturers including
Proctor and Gamble, BASF, DOW Chemicals, Siemens, Suez and a large number of
engineering consulting firms. The faculty performs research and development activities with
these companies and provides expert assistance.

**Sustainable Industrial Development:** Future industrial sustainability and development will
depend, in large measure, on our ability to manufacture products with minimal impact on the
environment. Issues such as carbon footprints, co-generation, gasification, biofuels
development, emissions of air pollutants such as volatile organic compounds (VOCs), NOx,
SOx, submicron particulates, and hazardous air pollutants will all represent major challenges
to sustaining urban environments. There are currently major efforts underway at both the
federal, state and local level to create awareness about how our actions impact the
environment, especially in such ways as climate change and the necessity of decreasing our
emissions of carbon dioxide and other global warming gases. In addition, the underlying
science and subsequent development of technologies for more advanced air pollution control
methods will be essential if industries are to compete in the global marketplace. All of the
aforementioned issues impact industry and will have a major bearing for industrial
development for Ohio’s future.

Faculty from the EE&S Program as well as from Chemical Engineering (ChE) in the College
of Engineering, and from the Environmental Health Department (EH) of the College of
Medicine have a long tradition and international reputation in the air quality, air pollution
control, energy production, and energy management areas. The prodigious output of these
class is well documented and is reflected in the high number of them listed as fellows in
associations, and serving on national review panels and as editors and associate editors of
major environmental journals. Annual research expenditures in these areas exceed $1M and
are from such funding areas as the National Science Foundation, the U.S. Environmental
Protection Agency, the National Institute of Health, the U.S. Department of Energy, as well
as private corporations, and state and local agencies. These researchers include Dr. Dion
Dionysiou (EE&S); Dr. Tim C. Keener (EE&S); Dr. Mingming Lu (EE&S); Dr. George
Sorial (EE&S); Dr. Heng Wei (EE&S); Dr. Vadim Guliants (ChE); Dr. Soon-Jai Khang
(ChE); Dr. Joo-Youp Lee (ChE); Dr. Peter Smirniotis (ChE); Dr. Sergey Grinshpun (EH);
and, Dr. Tina Reponen (EH).

**Sustainable Urban Infrastructure Sensing, Redevelopment and Management:** It is rightly
said that if you can't measure it, you can't improve it. In the future new organizations and
industries will use sensing and information technologies to promote intelligent infrastructure
renewal and economic development. Already these industries are forming in certain sectors,
such as the promotion by Google and others of “SmartGrid” technologies that will allow
individual consumers to understand and manage how they are using electricity at an
unprecedented level of detail. Indeed the entire electric power generation industry is
undergoing a revolution based on the availability of smart metering and smart appliances at
the household level. With an already strong base in sensor and information technologies, and
infrastructure management, the SUE Center of Excellence will be pursuing similar
technological and economic developments in other public sectors such as water and
transportation infrastructure, and land use planning. The aggregated results of these sensing
technologies will be made public through geographic information networks that help
individual consumers understand their complex reliance on urban infrastructure and
consequent impact on the metropolitan and global environments. The customers for these
new industries will be public and private utilities, city governments, and individual consumers who are naturally curious about their relationship to their environment.

As one particular example of the potential of this new industry, consider the seemingly cut-and-dried nature of surface water pollution by overflows of raw sewage during rainfall events (the Cincinnati area alone contributes 6 billion gallons of raw sewage to the Ohio River annually). The standard approach to solving such problems, estimated to cost in the hundreds of billions of dollars over the next 20 years ($3 billion in Cincinnati alone), is large scale infrastructure capacity expansion. On the other hand are more efficient approaches that focus on adoption, implementation, and maintenance of green infrastructure options that capture and use rainwater at the individual parcel level, before it enters the public sewer infrastructure (these options include green roofs, rain barrels, rain gardens, and porous pavements). The key to the successful implementation of these approaches is the blend of engineering and technical knowledge with an understanding of how to model and influence behavioral choices over a metropolitan region; indeed, the adoption and maintenance of these options are fundamentally an individual level decision resting with property owners. New industries will emerge that combine the ability to automatically measure and convey the impact of individual based decisions (such as the use of rain barrels to capture storm water) on an aggregate environmental metric (such as the volume of sewer overflows), as well as to compare individual decisions with regional expectations. A smart rain barrel that measures storm water harvested, and conveys that automatically to a personalized web site along with results aggregated for the community, is no longer just a rain barrel, but becomes also a force for local infrastructure development. Similarly, cheap sensors integrated with privately owned vehicles that measure road quality and convey that information automatically to a central geographic information network will make that car, and that individual, an element of an urban infrastructure assessment program. This marshalling of sensing and information technologies to effectively manage our infrastructure and our environmental impacts represents a new industrial opportunity.

UC strengths supporting this area include the premier program in Environmental Engineering, as well as partners in Electrical Engineering, DAAP, College of Arts and Sciences, and the College of Business. OBR Distinguished Professor Dharma Agrawal has been instrumental in establishing strong collaborations throughout the University, within the State of Ohio, and around the world as a leader in wireless networking solutions with an emphasis on environmental monitoring and sensing of the built environment. The expertise in IT is complemented by an exceptionally strong multidisciplinary program in environmental and biomedical sensors. UC Distinguished Research Professor Bill Heineman and collaborators have lead nationally-recognized efforts to create and integrate new sensor technologies. In 2007, this work was recognized by the establishment of an Ohio Eminent Scholar position in the area of NanoBioDevices that will span the Department of Chemistry in the College of Arts and Sciences and the Department of Electrical Engineering in the College of Engineering. The Geography Department has recently embarked on a hire of a critical cluster of faculty in geographic information networks, one of a small number of thrust areas designated by that college. And David Curry, Professor of Marketing, has pioneered computational methodologies to model and predict individual level product choices, one important aspect of behavioral science that must be blended with sensing technology in order to predict metropolitan scale impacts.

Progress to date: Since 2007, SUE has utilized internal block funding to fund competitive grants in multidisciplinary areas to foster the collaboration needed to initiate this difficult...
area of multi disciplinary applied research and industrial development. Titles of representative research projects that have been supported include:

- Agent-based Modeling Linking Spatial Data with Transportation, Sprawl, Crime, and Health
- Exposure of School Children to Traffic-associated Particulate Matter in an Urban Area with Intense Highway Traffic
- Fabrication Strategies to Improve the Sustainability of Healthcare Projects
- Biomass Utilization for Urban/Suburban Sustainability
- Sustainable Environmental Nanotechnologies: Fundamentals, Applications, and Implications
- Pilot Study for the Creation of an Over-The-Rhine Housing Monitoring Informational System
- Microfluidic Model of Pollutant Diffusion in Brownfield Soil

Findings from these research projects have been disseminated to the public through three conferences hosted by the SUE: one in 2007, two in 2008, and a fourth conference planned for 2009.

With research underway and a minor established, the Center has initiated translational activities including economic development and providing expert input on regional initiatives. For example, the proposed Center Director, Dr. Daniel Oerther has served on a Steering Committee for the Green Cincinnati Plan developed by the Office of the Mayor of the City of Cincinnati as well as a member of AGENDA360 organized by the Greater Cincinnati Chamber of Commerce. Both of these initiatives are intended to improve the economic viability of the Greater Cincinnati Region through ‘greening’ of the community to attract young professionals as well as to provide economic opportunities through green collar jobs.

**Prospects for Driving Economic Advancement**

The concept for sustainable economic (and industrial) development is illustrated in the accompanying figure where knowledge creation combined with technology development, advanced manufacturing methods, and system component research and testing will lead to work force and technology development, which leads to industry and opportunity expansion. All of the key environmental components necessary for this expansion are incorporated in the concept of the Sustainable Urban Environments Center.

Ohio has been blessed with an abundance of fresh water and low-cost energy generation capabilities, which are some of the major reasons that some of the United States’ largest corporations have established important industrial manufacturing facilities within the state. However, many of these facilities operate with aging infrastructures that are in many cases inefficient to operate and represent both a cost-efficiency-of-manufacturing problem, as well as a problem for Ohio’s environment. Electricity demand will continue to increase
dramatically and the need for cleaner production of electricity with a concomitant decrease in both air pollutants and the carbon footprint will be a necessity in the future. Biofuels and alternative methods of producing power including solar, wind and more efficient use of existing resources will all be necessary. It is thus expected that multi-disciplinary research efforts will be required to develop, optimize and apply technologies to prepare the nation for formidable future challenges for energy production, utilization and management while minimizing environmental risks. Preparation of novel catalysts for more efficient utilization of raw materials for energy production, development of materials, technologies and processes for minimizing power plant emissions, and fabrication of innovative systems for effective utilization of alternative energy sources are among the critical challenges facing Ohio as we seek a sustainable economic future. All of these will require an orchestrated collaboration of people from various disciplines, which is what the Sustaining the Urban Environment Center seeks to accomplish. The ability to utilize existing industrial space in order to implement technological upgrades in order to ultimately reduce the cost of production will be one of the major economic drivers for the next 25 years.

Faculty Members Associated with the Center (by department)


CME: S. Clarson, V. Guliants, S. Khang, V. Kuppa, J. Lee, R. Singh, P. Smirniotis,

DAAP: M. Zaretsky, C. Chifos, D. Edelman, J. Looye

Environmental Health: S. Ho, S. Grinshpun, T. Reponen, J. Yadav

A&S: L. Liu, E. Maurer

Graduate Programs Associated with the Center

Environmental Engineering and Science Program, ENGINEERING
Department of Environmental Health, MEDICINE
School of Architecture and Interior Design, DAAP
Civil Engineering Program, ENGINEERING
School of Planning, DAAP
Department of Geography, ARTS AND SCIENCE
Department of Chemical and Materials Engineering, ENGINEERING
Department of Marketing, BUSINESS

Professional Programs Associated with the Center

University of Cincinnati Environmental Training Institute
College of Engineering Masters of Engineering Degree Program

Undergraduate Programs Associated with the Center

Minor in Sustainability, CAMPUS-WIDE
School of Architecture and Interior Design, DAAP
Civil Engineering Program, ENGINEERING
School of Planning, DAAP
Construction Science Program, APPLIED SCIENCE
Architectural Engineering Technology Program, APPLIED SCIENCE
Department of Geography, ARTS AND SCIENCE
Outside Collaborating Entities
U.S. Environmental Protection Agency
National Institutes of Occupational Health and Safety
U.S. Food and Drug Administration

Supporting Scientific, Scholarly, and/or Creative Activities
The following two figures illustrate the University of Cincinnati’s expertise in the areas of environmental engineering and energy as compared to other state-wide colleges of engineering. These figures were completed in response to a recent request from the Ohio Engineering Dean’s Council.

The figures illustrate the prominence that the University of Cincinnati in these two important areas.

Management Plan
Consists of an internal Executive Committee with input from an External Oversight Committee. The Executive Committee includes the PIs, College Dean, and University VP for Research. Its function is to define strategies for Research & Educational developments, decide major policy issues, oversee the Center’s finances & administration, and conduct annual reviews of accomplishments. The Oversight Committee includes industry and Federal lab representatives, U.S. EPA, NIOSH, FDA etc., to ensure continued relevance to end users and to the state and regional economy, enhance research commercialization potential, and partner in continued education and training of a highly trained work force.

2 Engineering Ohio’s Future, report To the Ohio Board Of Regents, Ohio Engineering Dean’s Council, June 18, 2009
Resource Management and Funding Plan
SUE was established in 2006 with financial support from the Dean of the Graduate School and the Office of the Provost in response to a successful external review of the graduate program in Environmental Engineering and Science. Additional funds were provided by the Dean of the College of Engineering. Together, nearly one million dollars of new funds have been committed to establish research, education, and translational activities. These funds are administered by the Environmental Engineering and Science Program.

Sponsored Program Activity Associated with the Center
Research expenditures associated with the following programs, departments, or centers:
Environmental Engineering and Science Program, ENGINEERING
Department of Environmental Health, MEDICINE
School of Architecture and Interior Design, DAAP
Civil Engineering Program, ENGINEERING
School of Planning, DAAP
Construction Science Program, APPLIED SCIENCE
Architectural Engineering Technology Program, APPLIED SCIENCE
Department of Geography, ARTS AND SCIENCE
Center for Environmental Studies, ARTS AND SCIENCE
Department of Chemical and Materials Engineering, ENGINEERING
Suggested Metrics that Define Excellence for the Center

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<tr>
<th><strong>Sustainable Urban Environments</strong></th>
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<td><strong>Supporting PhD Programs</strong></td>
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<td><strong>Faculty</strong></td>
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</tbody>
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1. **World Class Academic Talent (Inputs)**
   - Total Research Expenditures FY 2004-2008 $45.34M
   - Federally Financed Research Expenditures FY 2004-2008 $39.35M
   - National Academy Members 0
   - Faculty Awards FY 2004-2008 28
   - Institutional Investment into Physical Infrastructure FY 2004-2008 $2.7M
   - Private Investment in Program (both Capital, Research, and any other Private Group) FY 2004-2008 $6M
   - Refereed Publications per Faculty Member FY 2004-2008 42
   - Number of Doctorates Awarded per Year FY 2004-2008 25
   - Number of Post Docs Currently Employed 7

2. **Connection to the Industry's Local Economy (Value Added)**
   - Licenses and Options Executed (Number of Deals) FY 2004-2008 14
   - Industrailly Financed Research Expenditures FY 2004-2008 $2.19M
   - Invention Disclosures FY 2004-2008 202
   - Number of Companies that have Relationships with the Centers of Excellence 28
   - Jobs Created in the State or Region in Industries Related to the Centers of Excellence FY 2004-2008 1,700
   - Average Salary of Jobs Created in the Region or State in Industries Related to the Centers of Excellence $82K
   - Startup Companies Resulting from Centers of Excellence FY 2004-2008 3

3. **Economic Impact (Outputs)**
   - Jobs in Region for the Cluster 150,000
   - Average Salary for Jobs in this Cluster $80K
   - Graduates Placed in their Fields in the State FY 2004-2008 219
   - Average Starting Salary of Graduates $67K
   - Economic Output of the Cluster in Region FY 2004-2008 $6.4B
   - License Income FY 2004-2008 $94K

**Sources:** UC Sponsored Research Services, UC Office of Intellectual Property, UC Office of Career Placement, Cincinnati USA Partnership for Economic Development, Cincinnati Chamber of commerce, Ohio Department of Development, Salary.com

Participating Faculty: Bishop, Boccelli, Buchberger, Dionysiou, Ioannides, Keener, Kupferle, Lu, Miller, Oerther, Rassati, Salem, Shahrooz, Sorial, Suidan, Swanson, Uber, Wei, Heng, Clarson, Guliants, Khang, Lee, Singh, Smirniotis, Zaretsky, Chifos, Edelman, Ho, Grinshpun, Reponen, Yadav
Five to Ten Year Goals

- Win a NSF ERC/STC center in Sustainability to concentrate on sustaining aging manufacturing centers
- Leverage campus-wide minor in Sustainability to create cross-unit MS and Doctoral programs concentrating on sensors development, systems and energy engineering, engineering management, planning and the health of environments
- Stimulate green entrepreneurship by forming 5 successful startup companies, with first three in building and advanced energy systems; sustainable manufacturing; and urban water management
The College-Conservatory of Music (CCM) has provided excellence in training musicians and performing artists for over 130 years. In recent decades, the school has earned an international reputation as one of the world’s leading conservatories of performing and media arts. CCM’s vibrant programs, renowned faculty and state-of-the-art facilities attract students from every corner of the United States and forty countries to develop their talents as artists in their chosen fields.

CCM alumni have positioned themselves at the very top of their fields across all of the performing and media arts and have earned the highest awards their fields have to offer: Academy Awards, Emmy awards, Tony awards, Grammy awards and a Pulitzer Prize, as well as Fred Astaire dance awards, Naumburg awards, Julius Herford prizes, and many more.

CCM trains for creative industries and such industries have recognized the excellence of this training with the list of honors that continue to be awarded to its talented graduates. Apart from leading the industry as performers and practitioners, CCM alumni are active in every first ranked symphony orchestra, opera company, university, production house, media company and other key creative industries that study at CCM supports.

CCM is renowned for the breadth and depth of its achievement in training performing and media artists to be active at the very top of their professions. This is the central culture of CCM – excellence and expression underpinning high-level achievement.

CCM will define and enshrine this excellence through the establishment of a UC Center of Excellence in Music & Theatre Arts.

**Concept & Scope**

It is the goal of the UC Center of Excellence in Music & Theatre Arts (UC COEMTA) to bring together multifarious and discrete art forms into new synthetic relationships and with
one another. Such a relationship will be expressed through pedagogy, research, contributions to the profession and most importantly **artistic product and outcomes**, mostly in the form of performances, **that enhance the region culturally, economically and educationally**.

Further, the UC COEMTA, maintains deep and strategic connections with the performing arts industry in Cincinnati and other major centers in the country such as New York City, Chicago, and Los Angeles. It additionally serves as a national and international focus for performing arts related conferences and seminars that bring both national attention but more importantly strong economic development and stimulus to Cincinnati and the State of Ohio.

The outputs of the multi-art synthesis that is the focus of the **center have strong relevance and industry partnerships with a number of local performing arts companies** such as Playhouse in the Park; the Ensemble Theatre Company; Cincinnati Opera; Cincinnati Ballet; Cincinnati Chamber Orchestra; Chamber Music Cincinnati; the Cincinnati Symphony Orchestra and May Festival.

The UC COEMTA is supported by an Ohio Eminent Scholar in Chamber Music; several endowed named professorships; industry partnerships beyond Cincinnati; a range of international programs and an established endowment of over $72 Million. Added to this is a strong $96 million infrastructure that supports research and innovation in art forms from wig making, make-up, set and costume design to set building and costume construction. The facility is home to numerous dance studios, instructional and research spaces, performance halls and theaters.

The ultimate goal of the UC COEMTA is to establish a deeper local and statewide recognition and impact with even deeper ties to industry and the community while deepening the economic impact it provides to the region. Beyond this, it is an ambition of the center to establish a bolder and more impactful international presence that will allow for and encourage fullest investment in the center, the city, the state and region, while also deepening the teaching and research mission and scope of the center.

The UC COEMTA has an established reputation of bringing significant conferences in music, theatre arts and pedagogy to Cincinnati. In 2008-9 the Center hosted the National Collegiate Choral Organization conference, the USITT conference and the World Association for Symphonic Bands and Ensembles. In 2010, it will host the International Viola Congress; a Joint meeting of the Society for American Music and the International Society for the Study of Popular Music in 2011 and in 2012 will have a significant role in the World Choir Games and the International Choir Competition, which **will bring over 50,000 visitors to Cincinnati**.

The scope, intention and impact of UC COEMTA are of truly international and professional quality. With innovation and pioneering synthesis at the core of the center’s activities it continues to attract international renown for its work in research, education, collaboration and its impressive range of **nearly 1000 public events annually, making it the largest single source of performing arts in Ohio**.

**Prospects for Driving Economic Advancement**
State-of-the-art place-based economic development points to quality of life as a crucial factor in attracting and retaining the labor force needed to draw new businesses and retain/grow
existing businesses in a region. The arts, particularly the performing arts, are an essential component of that quality of life. This is discussed elsewhere in UC’s submission.

The arts also have economic impact of their own. The Cincinnati area has a well-regarded arts community, which produces a total annual economic impact of over $200 million on the greater Cincinnati economy, including the generation of $72 million in household income and employment of 3,292 full and part-time workers in fiscal 2005.\textsuperscript{3} Arts organizations also produced an average economic impact of more than $40 million annually from their capital expenditures over the four 2001-2005 period.

When compared to other “recreational” enterprises, the total economic impact of the arts trails only that of Kings Island and the Cincinnati Reds. The impact of “The Arts” is greater than that of other popular attractions such as the Cincinnati Bengals.

The College & Conservatory of Music at UC is the foundation for the performing arts in greater Cincinnati and beyond. CCM graduates and faculty are a part of every performing arts organization in the area and they help attract events with significant economic impact to Southwestern Ohio as well. As an example, the seventh World Choir games scheduled for 2012 would not be coming to Cincinnati were it not for CCM and UC, according to the Artistic Director of the World Choir Games, Christian Ljunggren. This event alone is expected to have an economic impact of $14 Million for the city of Cincinnati and state of Ohio.

**Faculty Members Associated with the Center**
The Center of Excellence in Music & Theater Arts includes over 100 faculty in seven divisions of the College and Conservatory of Music. Among the faculty are Robin Guarino, J. Ralph Corbett Distinguished Chair in Opera; Nicholas Muni, Distinguished Artist in Residence; Aubrey Berg, Patricia A. Corbett Distinguished Chair of Musical Theater, Richard Hess, Dolly, Ralph and Julia Cohen Chair in Drama; Awadagin Pratt, 1992 Winner of the Naumburg International Piano Competition; and James Tocco, Ohio Eminent Scholar in Chamber Music. Nine faculty members are also in the Cincinnati Symphony Orchestra.

**Graduate Programs Associated with the Center**
- Master of Music (MM) in 29 fields
- Master of Fine Arts (MFA) in Theatre Design and Production
- Doctor of Musical Arts (DMA) in 25 fields
- Doctor of Philosophy (PhD) in Music

**Professional Programs Associated with the Center**
- Performers Certificate in 4 fields
- Artist Diploma (AD) in 18 fields

**Undergraduate Programs Associated with the Center**
- Bachelor of Arts (BA) with Music emphasis
- Bachelor of Music (BM) in 25 fields
- Bachelor of Fine Arts (BFA) in 4 fields

\textsuperscript{3} Economics Center for Education and Research, University of Cincinnati August 2006
Outside Collaborating Entities

- In Cincinnati: the Cincinnati Symphony Orchestra, the Cincinnati Chamber Orchestra, Chamber Music Cincinnati, the Cincinnati Ballet, the Cincinnati Opera, the Cincinnati Playhouse in the Park, the Ensemble Theatre of Cincinnati, the Vocal Arts Ensemble of Cincinnati, the School of Creative and Performing Arts, the Cincinnati Fringe Festival, Cincinnati Public Schools, The Blue Wisp Jazz Club, WCET, WGUC/WVXU and the Cincinnati Chamber of Commerce
- Throughout the country: Steinway & Sons, New York; Irving Klein String Competition, San Francisco; Music Theory Midwest; South Central Society of Music Theory; June in Buffalo Festival; The Producing Office, New York; Headlands Center for the Arts, California; Juilliard; Harvard
- Around the world: Shanghai Theater Academy; Central Conservatory of Music, Beijing; Hochschule für Musik und Theater, Munich; UPBEAT International Summer Music School, Croatia; Aleksander Tansman International Composition Competition, Poland; The Hindemith Foundation, Switzerland; 4th Jacheon International Music and Film Festival, Seoul, and the International Computer Music Association and the International Musicological Society

Supporting Scholarly and/or Creative Activities

Scholarly and creative output: In just the last five years, faculty have produced 100 music compositions, 50 recordings, 95 books and articles, over 300 original works, and nearly 2000 performances.

In the same time frame, faculty have served as master teachers over 450 times in a wide variety of professional programs and organizations:
- In Ohio: Oberlin College, Cincinnati Opera, Dayton Opera, Cincinnati Symphony Orchestra, Cincinnati Chamber Orchestra, Vocal Arts Ensemble of Cincinnati, Dayton Philharmonic.
- Throughout America: Aspen Music Festival; Tanglewood Music Festival; Music Academy of the West; Glimmerglass Opera; Joffrey Ballet School, Chicago; Dance China NY, New York; Ballet New England; Central Kentucky Youth Symphony; University of Arkansas; Boston Conservatory; Carnegie-Mellon University; Duquesne University; Western Illinois University; Florida International University.
- Around the world: Sichuan Conservatory, Chengdu, China; Hochschule der Kunst, Berlin, Germany; Freie Universität, Berlin, Germany; Taipei International Choral Festival, Taipei, Taiwan; Korean Choral Association, Seoul, South Korea; A Mozarteum, Salzburg, Austria; China Conservatory, Beijing, China; Central Conservatory of Music, Beijing, China; Shanghai Theatre Academy (Dance College), Shanghai, China; Opera Theatre and Music Festival of Lucca, Italy; Hong Kong Academy of Performing Arts, Hong Kong, China; Krakow Academy of Music, Krakow, Poland; Yong Siew Toh Conservatory, National University of Singapore, Singapore; Hochschule für Musik und Theater, München, Germany; Hansei University, Seoul, South Korea; Shanghai Conservatory of Music, Shanghai, China.

Management Plan

The Center of Excellence in Music & Theatre Arts represents much of the College & Conservatory of Music. Thus, the management and the management plan for the center are essentially the same as for CCM.
The management team for the Center includes Dr. Douglas Knehans, Dean of CCM and Head of Center; R. Terrell Finney, Head, Opera, Musical Theatre, Drama, Theater Design and Production; Shellie Cash, Head, Dance; David Adams, Head, Performance; Dr. Roberta Gary, Head, Keyboard; Dr. Joel Hoffman, Head, Composition, Musicology and Theory; Dr. Earl Rivers, Head, Ensembles and Conducting; and Dr. Liz Wing, Head, Music Education.

Members of this team coordinate cross-disciplinary activity as well as conduct individual research. They are responsible for the budget management, personnel management and project management within their respective areas. The Head of the Center coordinates the overall budget and personnel management of the center. The center includes more than a hundred faculty, supported by a staff of more than fifty and state-of-the-art facilities.

**Resource Management and Funding Plan**

The Center receives an annual operating budget of around $10 Million from the University of Cincinnati. Additionally, the center holds endowment investments of around $72 Million. The development team has a goal of raising an additional $26 Million by 2012, bring the endowment investment of the center to $98 Million.

The CCM Village is equipped with state-of-the-art classroom, studio and performance facilities, which are housed in four buildings: Dieterle Vocal Arts Center, Memorial Hall, Corbett Center for the Performing Arts and Mary Emery Hall.

This complex stresses the synergy between the performing arts and electronic media and effectively accommodates CCM’s vast performance calendar. With the help of design architect Henry N. Cobb, founding partner of Pei Cobb Freed & Partners, the college has produced a physical environment that truly reflects and advances its reputation as one of the world’s finest and most comprehensive training centers for music and theatre arts.

**Sponsored Program Activity Associated with the Center**

A sponsored program has a different meaning in the arts than in the STEMM disciplines, so comparisons between the fields are not meaningful. In FY2007, CCM had $99,960 in sponsored programs through a variety of relationships with companies like Macy’s and Duke Energy, performing arts organizations, and foundations.

**Metrics**

The programs offered at CCM are routinely listed among the best of the best nationally and internationally. While arts programs are not “ranked” routinely as are programs in other disciplines, a *US News and World Report* survey found the CCM Opera department to the 6th highest listed program in the US. The program in conducting was ranked 5th, the Voice program 3rd and the composition program 9th in the United States.

The Department of Musical Theatre is the oldest degree-granting program of its kind in the U.S., and will mark its 40th birthday next year. With over 700 applicants annually, it is obviously a program in exceptionally high demand.

The Theatre Design and Production Department’s graduate degrees have gained membership to the University/Resident Theatre Association, a highly selective group of theatre training programs that represent the highest professional standards of instruction.
In addition to metrics provided below, the impact of the Center of Excellence in Music and the Theatre Arts is evidenced by where its graduates are employed and the recognition they have achieved.

**Employment of Graduates**

- Graduates of the Ensembles & Conducting Division direct choirs and choruses from the MUSE Cincinnati Women’s Choir to the Hong Kong Children’s Choir. And graduates of the Music Education Division teach music and direct choruses at schools across the state.
- Opera Department graduates have performed on the stages of the world’s greatest opera companies including ~25 with the Metropolitan Opera (New York), ten with the Lyric Opera of Chicago, fifteen with the San Francisco Opera, four with the Royal Opera (London), and seven with La Scala (Italy). More than thirty other opera companies have engaged Opera Department graduates, including both the Cincinnati Opera and the Dayton Opera.
- Musical Theater alumni appear in almost every major production on Broadway, as well as national tours companies, Las Vegas shows, and musical productions in cities throughout Ohio and around the country.
- Drama Department alumni write and compose and act for film, television, and theatre productions, in Cincinnati, in Hollywood, in New York and around the country.
- Dance Department alumni appear with the Cincinnati Ballet Company, the Martha Graham Dance Company, and dance companies across America.
- Conducting and performance alumni work with symphony orchestras from Cincinnati to Toledo, from Sioux City to Singapore, and the Air Force and Army Bands.
- Alumni across CCM fill over 85 faculty positions in institutions across the United States and internationally, including ~20 in the Cincinnati area or in other parts of Ohio.

**Achievements**

- Examples of awards: Suzanne Farrell (Kennedy Center honoree, National Medal of arts recipient, five honorary doctorates), Kathleen Battle (5 Grammies, an Emmy, the NAACP Image award, the Lawrence Olivier Award, six honorary doctorates), Kevin McCollum (6 Tony awards), David Daniels (*Musical America* Vocalist of the Year, Richard Tucker Award)
- Examples of leadership achievements: Founder/Director, Suzanne Farrell Ballet, New York; Founder/Director, Girl Talk Theatre, Boston; Founders, The Satori Group, Seattle; Founding Artistic Director, J City Theatre, Jersey City; Che’ Rae Adams, Producing Artistic Director, Los Angeles Writer’s Center; Founder, CircEsteem, Chicago; Founder, Ensemble Theatre of Cincinnati; Music Director Designate, Orchestra di Milano; Associate Conductor, New York Philharmonic; Music Director, Opera Theatre and Music Festival of Lucca (Italy); Founder, Phoenix Ensemble
1. World Class Academic Talent (Inputs)

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<th>Faculty Awards FY 2004-2008</th>
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<td>$4,056,000</td>
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<th>Private Investment in Program (both Capital, Research, and any other Private Group) FY 2004-2008</th>
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<td>National Rankings (U.S. News and World Report)</td>
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<td>3rd in Vocal training;</td>
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<td>5th in Conducting;</td>
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<td>6th in Opera;</td>
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<td>9th in Music Composition</td>
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<th>Number of Doctorates Awarded per Year FY 2004-2008</th>
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2. Connection to the Industry’s Local Economy (Value Added)

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<td>$465,000</td>
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<th>Number of Companies that have Relationships with the Centers of Excellence FY 2004-2008</th>
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<th>Jobs Created in the State or Region in Industries Related to the Centers of Excellence FY 2004-2008</th>
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<th>Average Salary of Jobs Created in the Region or State in Industries Related to the Centers of Excellence FY 2004-2008</th>
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<td>$51,560</td>
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3. Economic Impact (Outputs)

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<th>Jobs in Region for the Cluster FY 2004-2008</th>
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<td>$79,473</td>
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Five to Ten Year Goals

- Create deeper ties to industry and community, and increase economic impact
- Establish bolder and more impactful international presence that will encourage investment in southwest Ohio
- Enhance teaching and research mission of CCM
- Build scholarship endowment to $50M
- Build college endowment to $100M
Concept
The Center brings together scholars and students who take a multi-disciplinary approach to major issues of justice affecting urban communities – among them, safety and crime, race, gender, class, criminal justice and the equitable treatment of persons who come in contact with the criminal justice system; human rights, and poverty. Hallmarks of the Center are interdisciplinary research and expertise in social challenges with respect to equity, fairness, justice, and equality – challenges that are magnified in metropolitan environments that hinder community stability, growth and economic development. The Center for Urban Transformation & Justice provides metropolitan communities with access to experts with experience evaluating, developing and implementing a range of evidence-based programs to increase safety, reduce violence, and redirect offenders to productive lives and employment. The Center’s goal is to transfer the technology of “what works” to community decision makers and to assist them in implementing and evaluating programs that prior research has indicated are more likely to be successful. UC is exceptionally positioned to positively impact issues of urban transformation and safety in Ohio cities and regions. Faculty experts provide evidence-based solutions and research partnership that serve Ohio with best practices and effective outcomes. The Center’s portfolio of projects demonstrates that it has a regional, national and international profile as shown by its funded projects, faculty publications and presentations, consultations, and the leadership of programs. The Center and its partners leverage the University’s premier programs in criminal justice and law with exceptional engagement in the city, and the region. The Center’s goals are closely aligned with economic and workforce development and safety programs such as Cincinnati’s Strive program, Agenda 360 (Southeast Ohio’s Regional Action Plan), and the Cincinnati Initiative to Reduce Violence (CIRV).

Scope of Activities
The Center for Urban Transformation & Justice brings together the resources of the faculty and students and the University to work with city, state and local entities to bring problem solving and evidence-based applications to crime in urban and metropolitan areas, increase community safety and ensure justice. The Center draws upon the success and experience of the Center for Criminal Justice Research (CCJR) at the University of Cincinnati, which was founded in 1996 to serve the needs of criminal justice agencies locally, statewide, and throughout the nation, and to facilitate research in the administration of justice and the nature of criminal behavior. Also housed within CCJR are the Corrections Institute and the Policing Institute. Since formation, the CCJR has received 445 grants and contracts that total over $41 million dollars. Of these, 385 have been focused on corrections and 60 on policing and crime prevention. All projects administered by CCJR are fully funded by federal, state, local and private agencies. The types of agencies and clients served by CCJR include police, courts, and corrections at the local, county, state and federal levels. CCJR also collaborates with
private service providers, Ohio Office of Criminal Justice Services, National Institute of Justice, National Institute of Corrections, Office of Community Oriented Policing Services, Ohio Department of Rehabilitation and Correction, Ohio Department of Youth Services, Ohio Attorney General's Office, as well as many other distinguished government offices.

Two on-going projects highlight the research center’s contribution to the needs of the state and local communities throughout Ohio. First, the Cincinnati Initiative to Reduce Violence (CIRV) is a multi-agency collaborative approach that focuses on reducing homicides and other forms of violence while providing support services to facilitate the transition of likely offenders to a nonviolent lifestyle. CIRV is now serving as a model through a partnership with the state for six additional Ohio cities. The University of Cincinnati Policing Institute and the Cincinnati Police Department were awarded the prestigious 2008 International Association Chiefs of Police /Motorola Award for Excellence in Law Enforcement and the 2008 National Criminal Justice Association’s Outstanding Criminal Justice Program Award for their initial work on CIRV.

Second, the Ohio Department of Youth Services (Ohio DYS), with the assistance of the Division of Criminal Justice at the University of Cincinnati, is in the process of developing Community Based Treatment Centers (CBTCs). The impetus for developing these programs originates in the 2005 UC evaluation of Ohio RECLAIM funded programs. Findings indicated that moderate risk youth placed in Ohio DYS institutions recidivated at a substantially higher rate than similar youth placed in the community. Hence, this initiative is intended to create an alternative placement for moderate risk youth committed to Ohio DYS. The University of Cincinnati has been charged with developing the program model, training and coaching staff on the model, and developing a quality assurance protocol that ensures program fidelity.

These two projects are representative of policing, crime prevention and corrections projects that have been recently completed. For example, recent correctional studies have focused on assisting agencies to implement evidence-based practices in the areas of disproportionate minority confinement, cognitive based treatment programs to help agencies better serve the needs of youth and adult clients in an effort to reduce recidivism, and evaluate nationally to assess program integrity and effectiveness. Policing and crime prevention studies have addressed racial profiling, police use of less than lethal force, community education efforts to reduce crime and citizen involvement in crime prevention efforts.

**Prospects for Driving Economic Advancement**

Criminal behavior affects economic development and the quality of life and safety within communities. The Center assists jurisdictions and cities to reduce crime and improve the quality of life for community residents. Through the Center’s partnerships, there is an increase in the overall level of support and understanding of issues of justice and safety in local government. The provision of new knowledge and research-based approaches are linked to research practices that promote the monitoring of new best practices and the benchmarking of effective strategies that increase economic and business development, combat urban core deterioration, attract businesses to the areas, and improve community safety.

**Faculty Members Associated with the Center**

Dr. James Frank (Director, Center for Criminal Justice Research); Dr. Robin Engel (Director, University of Cincinnati Policing Institute); Dr. Paula Smith (Director, University of
Graduate Programs Associated with the Center
Doctoral and Master’s programs in Criminal Justice. Doctoral graduates have all secured prominent academic positions within the state and nationally. The Master’s program continues to prepare a new generation of police and correctional leaders using evidence-based approaches to solve urban challenges. 79 Criminal Justice PhD students, 34 Criminal Justice Master’s students, 601 Criminal Justice Distance Learning Master’s students (Autumn 2008). Juris Doctorate graduates of the College of Law participate in research and outreach centers and are employed in the city and the region. Enrollment in the Autumn 2008 included 362 School of Law students.

Professional Programs Associated with the Center
College of Law, Arts & Sciences Geography; College of Design, Architecture, Art, and Planning – Urban Planning; School of Education; School of Human Services. Multiple municipal and regional police academies (see Appendix).

Undergraduate Programs Associated with the Center
Criminal Justice and Paralegal Studies. Enrollment in the Autumn of 2008 included 550 undergraduate students, 75 paralegal studies students, 11 legal assisting technology students, and 8 certified legal assistant students.

Outside Collaborating Entities
See the Appendix for a listing of selected School of Criminal Justice Technical, Training, and Research Partners.

Supporting Scholarly Activities
The School of Criminal Justice: The School’s program and faculty are nationally and internationally recognized. The doctoral program was ranked 3rd by the U.S. News and World Report in their most recent 2009 ranking of criminal justice and criminology programs. Peer-reviewed studies of faculty scholarly productivity consistently recognize the faculty as one of the most productive in the discipline (ranked first or second in the United States). The publication rates of program doctoral graduates similarly are ranked as first or second highest nationally. Individual faculty members are also highly ranked in peer-reviewed publications. In 1998, Dr. Francis Cullen was ranked as the most cited scholar in the field of criminal justice and criminology. In a recent article, six Division faculty ranked in the top 150 (with Dr. Cullen listed as the second most productive, and Drs. Wright, Fisher, Engel, Wooldredge, and Latessa also included). The ability to secure external research funding on a consistent basis indicates that grantors have confidence in the ability of applicants to produce quality and timely research that will have significant policy implications. Dr. Edward Latessa was ranked in the top five “rainmakers” in three categories—state funds secured, number of state agencies involved, and number of local funding agencies. Dr. John Eck is internationally recognized for his work involving Routine Activities Theory and crime analysis. His co-authored (with Ronald Clarke) manual on crime analysis has been translated into 19 languages. He is credited with developing the SARA model for Problem-Oriented Policing and regularly consults with law enforcement agencies in England.
The College of Law: Ranked 52nd in the nation by U.S. News and World Report (and second in Ohio), the College features the Urban Morgan Institute for Human Rights – the first endowed institute in the field to be established at an American law school. The Institute publishes the *Human Rights Quarterly*, an internationally leading journal ranked among the top in its field in downloads. The College also features the Ohio Innocence Project. Supported primarily through an endowment from the Rosenthal Institute they are one of the leading innocence projects in the country with three focuses – litigation, law reform and public education. They have also been involved in training police officers and prosecutors on best practices and will host the first international conference on wrongful conviction in 2011. Criminal Justice and Law are discussing collaborations including grant proposals and joint research projects. Professor Godsey is a regular commentator on issues relating to criminal law in both the local and national press including National Public Radio. Recently Mark Godsey published on the Sixth Circuit’s Garner v. Mitchell, 2009 Emerging Issues 3527 (Apr. 16, 2009). He was quoted in Garner v. Mitchell, 557 F.3d 257 (2009).

Management Plan
The Center will operate under the School of Criminal Justice’s Center for Criminal Justice Research and will be managed by a Board composed of the Directors of the University of Cincinnati Policing Institute, University of Cincinnati Corrections Institute and the Rosenthal Institute for Justice/Ohio Innocence Project. We will continue to seek external funding from a variety of local, state and national sources. These grants will be managed by the Research Center and its Associate Director.

Five to Ten Year Goals

- Multi-disciplinary approach to major issues of justice affecting urban communities: safety, crime, race, gender, class poverty, and the equitable treatment of persons
- Partners with city, state, and local entities to increase community safety and ensure justice
- Interdisciplinary research and faculty expertise assists communities with evidence-based solutions
- Evidence-based applications and solutions drive change that is linked to increased economic and business development
- Work with local community agencies and governments to reduce crime and improve quality of life in Ohio communities
- Increase the overall understanding and implementation of evidence-based solutions for issues of justice and safety in partnership with community leadership
- Implementation of best practices leads to increases in economic and business development, combats urban core deterioration, and improves community safety

Suggested Metrics that Define Excellence for the Center
Center success will be based upon a variety of indicators including the amount of grant funds secured from external sources, number of grants managed, number of urban/metropolitan areas served, number of research and training partners and caseloads (successes), number of students participating in funded projects and outreach, and national academic program rankings and research publication metrics.

- Since 1996, Criminal Justice Research Institutes have received over 445 grants and $41M in contracts
• In 2009, $3,615,197 in Federal Research Awards; $4,842,761 in Total Research Awards
• Criminal Justice – ranked #3 by U.S. News and World Report in 2009
• College of Law – ranked #52 by U.S. News and World Report in 2009
Appendix

Center for Criminal Justice Research: http://www.uc.edu/ccjr/
University of Cincinnati Policing Institute: http://www.uc.edu/Policing/
University of Cincinnati Corrections Institute: http://www.uc.edu/corrections/
Ohio Innocence Project: http://www.law.uc.edu/institutes/rosenthal/

Center for Urban Transformation & Justice Leadership:

Edward J. Latessa; Professor and Director of School
Professor Latessa received his Ph.D. from the Ohio State University in 1979. He has published over 110 works in the area of criminal justice, corrections, and juvenile justice and is co-author of seven books including Corrections in the Community, and Corrections in America. Professor Latessa has directed over 100 funded research projects including studies of day reporting centers, juvenile justice programs, drug courts, intensive supervision programs, halfway houses, and drug programs. He and his staff have also assessed over 550 correctional programs throughout the United States, and he has provided assistance and workshops in over forty states. Dr. Latessa served as President of the Academy of Criminal Justice Sciences (1989-90). He has also received several awards including; The Mark Hatfield Award for Contributions in public policy research by The Hatfield School of Government at Portland State University, the Outstanding Achievement Award by the National Juvenile Justice Court Services Association (2007), the August Vollmer Award from the American Society of Criminology (2004), the Simon Dinitz Criminal Justice Research Award from the Ohio Department of Rehabilitation and Correction (2002), the Margaret Mead Award for dedicated service to the causes of social justice and humanitarian advancement by the International Community Corrections Association (2001), the Peter P. Lejins Award for Research from the American Correctional Association (1999); ACJS Fellow Award (1998); ACJS Founders Award (1992); and the Simon Dinitz award by the Ohio Community Corrections Organization.

James Frank; Professor and Director of the Center for Criminal Justice Research
Professor Frank is a 1993 Ph.D. from Michigan State University. He received his J.D. from Ohio Northern University in 1977. Professor Frank has been on the CJ faculty for 18 years. His primary research interests include understanding police behavior at the street-level, the formation of citizen attitudes toward the police, and the use of evolving technology by patrol officers. He has been involved in a number of externally funded research projects that primarily examine street-level police officer behavior. He has published policing articles in Justice Quarterly, Police Quarterly, Journal of Criminal Justice, the American Journal of Police, Crime and Delinquency and Policing: An International Journal of Police Strategy and Management.

Paula Smith; Assistant Professor and Director of the Corrections Institute
Paula Smith received her PhD in psychology from the University of New Brunswick. Dr. Smith has been involved in the development and delivery of treatment programs to federal parolees with the Corrections Service of Canada. Her research interests include meta-analysis, the assessment of offender treatment and deterrence programs, the development of actuarial assessments for clinicians and managers in prisons and community corrections, the effects of prison life, treatment responsivity, and the transfer of knowledge to practitioners and policy makers.
Robin Shepard Engel; *Associate Professor and Director of The Policing Institute*

Dr. Engel received her Ph.D. in criminal justice from the University at Albany. She taught at Pennsylvania State University prior to joining the UC Faculty in 2002. Dr. Engel’s research includes theoretical and empirical explorations of police supervision, patrol officers’ behavior, and police response toward problem citizens. Her empirical research analyzes the influence of extralegal factors (e.g., race, ethnicity, age, gender, mental status) on police behavior. Her recent scholarly work has appeared in *Criminology, Justice Quarterly, Crime and Delinquency,* and the *Journal of Criminal Justice.* Dr. Engel is currently directing Cincinnati’s Citizen Initiative to Reduce Violence project and is working with six other cities in Ohio on similar violence reduction strategies. She also serves as an expert witness in criminal and civil racial profiling cases.

Mark Godsey, *Professor of Law and Director, Lois and Richard Rosenthal Institute for Justice/Ohio Innocence Project*

Mark Godsey graduated from the Moritz College of Law at The Ohio State University, where he served as an articles editor of the Law Review and graduated Order of the Coif, summa cum laude and 2nd in his class, Professor Godsey clerked for Chief Judge Monroe G. McKay of the U.S. Court of Appeals for the Tenth Circuit in Salt Lake City, Utah. Professor Godsey then joined the faculty at the Salmon P. Chase College of Law at Northern Kentucky University, where he was a Faculty Supervisor to the Kentucky Innocence Project. In addition to his teaching and scholarly activities at UC Law, Professor Godsey is an active criminal litigator. He serves as the Faculty Director for the Lois and Richard Rosenthal Institute for Justice and Ohio Innocence Project, where he represents convicted Ohio inmates for whom new evidence, such as DNA evidence, proves their innocence. He represents indigent criminal defendants before the U.S. Court of Appeals for the Sixth Circuit as a member of the CJA panel. In 2004, he received a Superstar of Criminal Law Award by the Ohio Association of Criminal Defense Lawyers. Professor Godsey is a regular commentator on issues relating to criminal law in both the local and national press. He is frequently interviewed by local television news, and has appeared nationally on Larry King Live, Dateline NBC, CNN, Court TV, the Oxygen Network, NPR and A&E’s American Justice, among others. He has been quoted in papers and magazines across the country, including *The New York Times,* *Newsweek,* *People,* and the *Wall Street Journal.*

**Selected Criminal Justice Technical Assistance, Training and Research Partners:**

**Departments of Correction**
- Ohio Department of Rehabilitation and Corrections
- California Department of Corrections
- Maine Department of Corrections
- Oklahoma Department of Correction
- Pennsylvania Department of Corrections
- Vermont Department of Corrections
- Rhode Island Department of Corrections
- Eastern Ohio Corrections Center

**Counties**
- Franklin County, Ohio
- Grant County, Indiana
Allen County Ohio
Lucas County, Ohio
Potter County CSCD Amarillo Texas
Cuyahoga County Department of Justice Affairs Criminal Justice Services, Ohio
Fairfax County, Virginia Juvenile and Domestic Relations Court
Community Supervision and Corrections Department of Tarrant County Fort Worth, Texas
Los Angeles County, California
Lane County, Oregon
Hennepin County, Minnesota
Marion County, Indiana
Douglas County, Nebraska
Union County Probation, Pennsylvania
Summit County Court of Common Pleas, Summit County Ohio
Bartholomew Co Indiana

Cities/City Agencies
Cincinnati Police Department
Cleveland Police Department
Fairfield, OH Police Department
City of Seattle
Santa Clara Probation Department, California
Cleveland, Mansfield, Toledo, Youngstown, Dayton, and Canton Police Departments

Community Corrections
Indiana Department of Community Corrections
Indiana Association of Community Corrections Act Counties
Oregon Department of Corrections, Community Corrections Branch
Monday Community Correctional Facility, Ohio

Juvenile
Ohio Department of Youth Services
Virginia Department of Juvenile Justice
Idaho Department of Juvenile Corrections
Oklahoma Office of Juvenile Affairs
Alaska Division of Juvenile Justice, Department of Health and Human Services
Warren County Juvenile Court, Ohio
Oregon Youth Authority
Pine Hills Youth Correctional Facility, Miles City Montana
Nebraska Department of Health and Human Services Children & Family Services
Berkshire Farm Schools, New York
Family Services Inc., Lafayette Indiana

Private/Non Profit
Toledo Volunteers of America
Volunteers of America, Ohio River Valley Cincinnati, Ohio
Volunteers of America Northern New England
Oriana House
Alvis House, Ohio
Independence House Fillmore, Denver Colorado
The Carey Group
MTC Corporate, Utah
Mark Morris Associates, Orinda California
ACLU Baltimore

**Other**
Administrative Office of Illinois Courts
Nebraska State Probation
Nebraska State Patrol
Council of State Governments, Texas
Arizona Department of Public Safety
Pennsylvania State Police
National Institute of Corrections
Center of Excellence Concept
The Center of Excellence in Diabetes & Obesity is the top program of its kind in the nation. It includes a multidisciplinary group of 86 world class scientists, physicians and educators who focus on research and treatment of obesity, diabetes and related illnesses. The work of this Center will result in discoveries that reduce illness and death in our state and nation that are due to obesity, diabetes and complications related to those diseases.

Obesity is a major contributor to heart disease (#1 cause of death in the U.S. and Ohio), cancer (#2), stroke (#3), and diabetes (#6). According to the Centers for Disease Control, Ohio has the 5th highest rate of diabetes in the nation and this problem is expected to escalate as the population ages and as the epidemic of obesity continues to strike younger adults, adolescents and children. It is imperative that steps be taken in the academic communities to generate knowledge through research that will lead to new strategies to prevent and reduce obesity throughout the population. Success in this endeavor is critical since the medical and financial burdens (estimated at $116 billion in 2007) related to obesity, and major co-morbidities like diabetes, hypertension and cardiovascular disease, are enormous. Arguably the metabolic and vascular consequences of obesity are the single biggest American public health challenge at present and require a substantial, concerted effort to control.

Scope of Activities
The basic scientific research program focuses on the regulation of body weight and the etiology and potential treatment of obesity. The Center is unique in its interaction with industry, particularly regarding its involvement with Ethicon Endo-Surgery. This creates a focus on bringing products to market that are responsive to community, patient and clinician needs, to work on behalf of patients suffering from these diseases, to deliver educational programs, promote research and quality clinical care.
With the involvement of Cincinnati Children’s Hospital Medical Center, the program has been elevated to a unique position in the state because it can address diseases across the lifecycle in an environment where the pediatric expertise is as impressive as the expertise available for adults.

**Prospects for Driving Economic Advancement**

The regional business community has adopted this Center as part of its Agenda 360 planning initiative to reshape the economy of the Cincinnati area. While health care is an important quality-of-life factor, this Center was specifically viewed as a growth area within the health care industry that would permit Cincinnati to differentiate itself nationwide. Industry reports indicate that the obesity and diabetes related area of biotech and drug development is one of the most promising segments over the next few years.

Recent successes of the Center include a $10,000,000 grant to UC from Ethicon EndoSurgery for work on obesity-related procedures; there is also an ongoing Program Project Grant from the National Institutes of Health (approximately $4,500,000) to UC for obesity research.

The total research funding in obesity and related illnesses should exceed $100 million in the next five years and it is anticipated that approximately 10 faculty will be recruited to expand the program. For each faculty member hired, UC needs 7 support personnel (scientists, technicians, nurses, staff). Additional jobs may be created through spin-offs as this area becomes a destination for companies commercializing new therapies. The total jobs created could exceed 180.

**Faculty Members Associated with the Center: 86**

There are 86 faculty members associated with the Center from the College of Medicine, College of Nursing, College of Allied Health Sciences, and Cincinnati Children’s Hospital Medical Center. The Center is led by a multidisciplinary team of physicians and scientists:

- Randy Seeley, Ph.D., Depart of Psychiatry, College of Medicine
- David D’Alessio, M.D., Depart of Internal Medicine, College of Medicine
- Tom Inge, M.D., Depart of Pediatrics, College of Medicine; Cincinnati Children’s Hospital Medical Center

**Graduate Programs Associated with the Center**

- College of Medicine, Ph.D. programs in Neuroscience
- College of Nursing degree programs
- College of Allied Health Sciences, degree programs in Food and Nutrition
- College of Education, degree programs in Health Education, Health Promotion

**Professional Programs Associated with the Center**

- College of Medicine, M.D.

**Undergraduate Programs Associated with the Center**

- Arts and Sciences, STEMM disciplines
Outside Collaborating Entities
Abbott Laboratories
Ajinomoto Co., Inc (Japan)
Ambrx Inc
American Heart Association
Amgen
Aventis
Cincinnati Children’s Hospital Medical Center
Department of the Air Force
Department of the Army
Department of Housing and Urban Development
Department of Veterans Affairs
Eli Lilly and Company
Ethicon Endo Surgery Incorporated
Juvenile Diabetes Research Foundation International
Medical College of Georgia
Merck
National Heart, Lung and Blood Institute
National Institute on Aging
National Institute of Child Health and Human Development
Nat’l Institute Diabetes/Digestive/Kidney Diseases
Nat’l Institute Environmental Health Sci
Nat’l Inst Neurological Disorders and Stroke
National Science Foundation
North Carolina Agricultural & Tech State University
Novartis
Omnicare
Oregon Osteoporosis Center
Phase 2 Discovery
Procter & Gamble
University of Kentucky
Cincinnati Veterans Affairs Medical Center
Zafgen, Inc.

Supporting Scientific, Scholarly, and/or Creative Activities

U.S. News & World Report Rankings:

UC College of Medicine: 40th in Research, 3rd for Pediatrics,
62nd in Primary Care
University Hospital: 31st for Endocrinology
Cincinnati Children’s: 3rd for General Pediatrics,
1st for Digestive Disorders
4th for Diabetes/Endocrine Disorders

As the top program in the nation, the Center has consistently grown its funding base and continues to attract world class talent to join its effort. Researchers and physicians from the Center are leaders in the field, as evidenced by extensive publication in peer-reviewed journals and work that is referenced in the popular media on a regular basis. Additionally, some of the key members of the Center have been recognized for their impressive work:

Randy Seeley, PhD, psychiatry, College of Medicine
2003 Lilly Scientific Achievement Award
2006 Nobel Symposium presenter
2008 Ernst Oppenheimer Award from the Endocrine Society
2009 Outstanding Scientific Achievement Award from the American Diabetes Association

Matthias Tschöp, MD, psychiatry, College of Medicine
2000 Lilly Research Laboratories President's Award for Excellence in Science
2000 Eli Lilly Endocrine Research Award for Science
2001 Schoeller-Junkmann Award of the German Endocrine Society
2002 Young Investigator Award, European Neuroendocrine Association (ENEA)
2009 Newly inducted member, American Society for Clinical Investigation (2009)
Sarah Couch, PhD, nutritional sciences, College of Allied Health Sciences
Ohio Dietetic Association's 2004 Research Dietitian Award

Management Plan
The Center is managed by a leadership team from the College of Medicine and Cincinnati Children’s Hospital Medical Center with appropriate involvement of partners from other Colleges and clinical affiliates.

Resource Management and Funding Plan
The Center’s resources are decentralized and managed at the department and investigator level with joint decision making driven by the leadership team. Additional institutional investment in the Institute’s programs is dictated by the UC Academic Priorities Planning Process, the College of Medicine strategic plan, and strategic relationships with Cincinnati Children’s Hospital Medical Center, University Hospital and other clinical affiliates.

Sponsored Program Activity Associated with the Center
The Center had approximately $32 million in awards for FY08 and has several significant federal grants that bring new money into Ohio and local industry connections that advance the biotech/health care cluster in southwestern Ohio:

- High Fat Diet Induced Obesity, NIDDK Program Project Grant, $6,000,000
- Training Grants in Pediatric Gastroenterology and Nutrition, Research Training in Child Nutrition and Behavior, and Neuroendocrinology of Homeostasis, $3,000,000
- Cincinnati Mouse Metabolic Phenotyping Center, NHLBI Collaborative Grant, $6,000,000
- New Treatments for Obesity, Ethicon Endo-Surgery, $10,300,000
Suggested Metrics that Define Excellence for the Center

**CENTERS OF EXCELLENCE METRICS**

**Diabetes and Obesity**

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Total Research Expenditures (UC Only/CCHMC data pending)</td>
<td>$9,021,592</td>
<td>$9,953,769</td>
<td>$12,014,602</td>
<td>$11,819,802</td>
<td>$16,208,083</td>
<td>$17,828,891</td>
<td>$19,611,780</td>
<td>$29,417,671</td>
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<tr>
<td>Federally Financed Research Expenditures (UC Only/CCHMC data pending)</td>
<td>$6,073,497</td>
<td>$9,010,144</td>
<td>$7,977,887</td>
<td>$10,210,871</td>
<td>$12,952,906</td>
<td>$14,248,197</td>
<td>$15,673,016</td>
<td>$23,509,524</td>
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<tr>
<td>National Academy Members</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Faculty Awards (note 1)</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
<td>see note</td>
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<tr>
<td>Institutional Investment into Physical Infrastructure</td>
<td>$30,345,000</td>
<td>maint</td>
<td>maint</td>
<td>maint</td>
<td>maint</td>
<td>maint</td>
<td>$2,000,000</td>
<td>$3,000,000</td>
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<tr>
<td>Private Investment in Program (UC Only/CCHMC data pending)</td>
<td>$130,221</td>
<td>$272,108</td>
<td>$717,552</td>
<td>$76,693</td>
<td>$1,420,450</td>
<td>$1,562,495</td>
<td>$1,718,746</td>
<td>$2,578,117</td>
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<tr>
<td>Refereed Publications per Faculty Member</td>
<td>3.2</td>
<td>3.4</td>
<td>3.3</td>
<td>3.7</td>
<td>3.8</td>
<td>4.0</td>
<td>4.2</td>
<td>4.7</td>
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<tr>
<td>Number of Post Doctoral Associates</td>
<td>10</td>
<td>13</td>
<td>10</td>
<td>12</td>
<td>9</td>
<td>13</td>
<td>14</td>
<td>17</td>
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<tr>
<td>Number of Post Doctor Currently Employed</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>34</td>
<td>37</td>
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<tr>
<td>Number of National Academy Members</td>
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<td>n/a</td>
<td>n/a</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

| 2. Connection to the Industry's Local Economy (Value Added) | |
|----------------------------------------|---------------|---------------|---------------|---------------|---------------|-------------|-------------|------------------|
| Licenses and Options Executed (Number of Deals) | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 3 |
| Industrially Financed Research Expenditures (UC Only/CCHMC data pending) | $815,873 | $671,517 | $1,553,867 | $400,099 | $1,135,632 | $1,249,195 | $1,374,115 | $2,061,172 |
| Consulting Agreements (with list of company names - note 3) | n/a | n/a | n/a | n/a | n/a | 17 | 20 | 30 |
| Number of Companies with Relationships with COE | n/a | n/a | n/a | n/a | n/a | 37 | 40 | 50 |
| Jobs Created in the State or Region in Industries Related to the COE (DOL) | n/a | n/a | n/a | 2172 | 2172 | 2172 | 2172 | 2172 |
| Average Salary of Jobs Created in the Region or State in Industries Related to the Center of Excellence (DOL) | $58,310 | $59,170 | $62,030 | $64,960 | $67,890 | $69,248 | $70,633 | $77,984 |
| Startup Companies Resulting from Center of Excellence | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| 3. Economic Impact (Outputs) | |
|----------------------------------------|---------------|---------------|---------------|---------------|---------------|-------------|-------------|------------------|
| Jobs in Region for the Cluster (Health Care/Biotech) (BioOhio) | n/a | n/a | 36,700 | 37,434 | 36,163 | 38,946 | 39,725 | 43,859 |
| Average Salary for Jobs in this Cluster (DOL) | $58,310 | $59,170 | $62,030 | $64,960 | $67,890 | $69,248 | $70,633 | $77,984 |
| Graduates Placed in their Fields in the State | n/a | n/a | 7 | 1 | 7 | 3 | 4 | 5 |
| Average Salary of Graduates | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Jobs Created and Retained by Spinoffs of the Centers of Excellence | n/a | n/a | n/a | n/a | n/a | 34 | 37 | 34 |
| Average Salary of Jobs Created and Retained by Spinoffs of the Center of Excellence | n/a | n/a | n/a | n/a | n/a | 17 | 20 | 30 |
| Economic Output of the Cluster in Region (BioOhio) | n/a | n/a | $8,300,000,000 | $8,383,000,000 | $8,468,300,000 | $8,551,488,300 | $8,637,013,283 | $9,000,000,000 |
| Economic Output of the Cluster in Region (BioOhio) | $6,611 | $4,758 | $1,954 | $4,544 | $0 | $0 | $35,000 | $70,000 |

| 4. Health Care Specific Measures | |
|----------------------------------------|---------------|---------------|---------------|---------------|---------------|-------------|-------------|------------------|
| Active Clinical Trials Protocols (UC Only) | see note | see note | see note | see note | see note | see note | see note | see note |
| Special Grants that Advance Status and Mission (note 4) | see note | see note | see note | see note | see note | see note | see note | see note |
| Special Accreditations (note 5) | see note | see note | see note | see note | see note | see note | see note | see note |
| Members of Institute of Medicine | see note | see note | see note | see note | see note | see note | see note | see note |
| Number of Doctors included in "Best Doctors" (note 6) | see note | see note | see note | see note | see note | see note | see note | see note |

Note 1: Faculty Awards (see Item 9)
Note 2: External National and International Program Rankings
Ranked No. 31 by U.S. News and World Report for Endocrinology (University Hospital)
Ranked No. 3 by U.S. News and World Report for Digestive Diseases (Children's Hospital)

Note 3: Consulting Agreements - Company Names
J&J/Ethicon Endo Surgery (2), Amylin Pharmaceuticals, Eli Lilly (2), Zafgen, Merck,
Marcadia, Ambrex, Wyeth, MannKind, Amgen, Novartis (2), Procter & Gamble, Sanofi-Aventis, FAES Farma

Note 4: Special Grants that advance status and mission (FY2009)
P01 - Program Project Grant - NIDDK - High Fat Diet Induced Obesity, $6,000,000
T32 - Training Grant - NIH - Pediatric Gastroenterology and Nutrition, $1,700,000
T32 - Training Grant - NIH - Research Training in Child Nutrition and Behavior, $810,000
T32 - Training Grant - NIH - Neuroendocrinology of Homeostasis
Ethicon Endo-Surgery - New Treatments for Obesity, $10,300,000
U24 - Collaborative Grant - NHLBI - Cincinnati Mouse Metabolic Phenotyping Center,
$6,000,000 (One of seven in the nation, unique focus on immunological aspects of Type I diabetes, measurement of various glucose and lipid metabolism parameters relevant to Type II diabetes as well as diabetic complications such as heart disease and obesity.)

Note 5: Accreditations Recognizing Excellence (Current)
Will seek JCAHO accreditation in diabetes and in obesity/bariatric surgery

Note 6: Best Doctors 2007
David D'Alessio, Nelson Watts, Raouf Amin, Jorge Bezerra, Frank Biro, John Bucuvalas,
Mitchell Cohen, Lawrence Dolan, Edward Donovan, Gregory Grabowski, James Heubi,
Thomas Inge, Thomas Kimball
Five to Ten Year Goals

- Develop business plan to include service line data from UC/CCHMC/UH and downstream revenue opportunities
- Address start-up needs for education and research programs
- Engage Dean’s Office and department chairs around developing key recruitments:
  - Adult NAFLD clinician (Internal Medicine/GI)
  - Adult bariatric surgeon (Surgery)
  - Development of metabolic systems (TBD)
  - Cell biologist focused on adipose tissue (TBD)
  - Cardiology investigator with interests in metabolic disease (CCHMC)
- Identify complementary resources in CTSA, Public Health, and other areas
- Develop comprehensive community outreach and education program
  - Establish a Speaker’s Bureau for community events.
  - Develop materials for speaking to a broad range of audiences (from physicians to public).
  - Establish an internet presence for the center that includes a portion targeted at the community.
  - Establish a profitable CME franchise.
  - Develop a Certified Diabetes Educator program (possibly via distance learning).
- Continue development and expansion of clinical enterprise
  - Establish new clinic location, considering costs (lease vs. renovation) and options for GRI site.
  - Develop a database of patients for monitoring quality of care and support of clinical research.
  - Pursue key clinical recruitments (noted above).
  - Charge a committee to develop a Chronic Disease Management program across UC and CCHMC.
  - Pursue key clinical accreditations and rankings, (e.g. seek JCAHO certification in diabetes and in obesity/bariatric surgery)
- Continue development and expansion of research enterprise
  - Identify leadership for cohort study.
  - Set up metabolomics infrastructure (equipment and staffing).
  - Pursue key research recruitments (noted above)
  - Implement a pilot-project program.
  - Emphasize growth in clinical trials and industry relationships (e.g. Ethicon Endo-Surgery).
  - Maintain and pursue key research grants, such as a P30/Center grant or P50/Specialized Center Grant.
NANOSCALE SENSORS

Center of Excellence Concept
We propose to establish a multidisciplinary Center of Excellence in Nanoscale Sensor Technology for the development of innovative, breakthrough technology to provide the next generation of nano- and microscale sensors for chemical, biological, medical, and environmental applications. Nanosensors are poised to become ubiquitous in modern life, providing the foundation for rapid and sophisticated medical diagnostics, for monitoring the safety of our food chain, for keeping the quality of our water high, guiding environmental remediation, indeed, even monitoring the aging of our bridges and highways. Nanosensors provide unique data that drive decisions in increasingly sophisticated and timely ways.

This Center will bring together a talented interdisciplinary group of faculty to carry out a mission to imagine and develop sensors to meet the significant societal needs at the local, state, and national levels. Both societal and economic benefits will accrue to the University and to the State of Ohio from each of these levels. A recent OBR survey ranked the University of Cincinnati as prominent in nanoscience and having strength in sensors. No other Ohio university was ranked as having that intersection of prominence and strength in both nanoscience and sensors.

The Center will promote a cohesive, focused program devoted to specific applications of relevance to Ohio companies and to Ohio researchers seeking new avenues in which to compete in the global revolution in nanoscale sensor technology, for example nanobiotechnology. Center research will provide the basis for radically new technologies and patents which, in turn, will stimulate new Ohio-made high technology products through linkages to Ohio companies.

Scope of Activities
Imagining, developing, prototyping and commercializing nanoscale sensors requires a strong team of interdisciplinary researchers with expertise that spans the spectrum of the disciplines of electrical and chemical engineering, chemistry, physics, and biology. The University of Cincinnati already has that collaborative team in place, with talented researchers from Engineering, Physics, and Chemistry. This interdisciplinary team has the expertise to develop innovative sensor designs and fabrication technologies at the nanoscale. Collaborative ties have been made with the College of Medicine, government laboratories and Ohio industry to further broaden the expertise as needed for certain projects.
This Center of Excellence would propel activities from benchtop innovation to commercialization and real-world application of fully packaged and deployable systems. An outstanding example is Siloam Biosciences, where UC research led by Dr. Chong Ahn on "lab-on-chip" medical sensor platforms is now in the prototype stage; venture capital has been secured and commercialization should start in 2010. Researchers within the Center will generate innovative sensor concepts, including miniaturization to the micro and nano scales; innovative sensor arrays to provide redundancy for minimizing error due to sensor failure; and innovative microfluidic systems to pave the way for sophisticated sensor deployment in real environments, including sampling and calibration.

**Prospects for Driving Economic Advancement**
This Center will fill vital skill shortages in Ohio, by graduating highly qualified PhDs who will enter Ohio's workforce, but also by attracting workers and firms from outside Ohio. As a measure of the contribution to Ohio's economy, in the course of their careers the faculty associated with this proposed Center of Excellence have graduated PhDs who have taken jobs in the following Ohio companies and institutions:

**Companies**
Armco Steel; Chelsea Laboratory; Cincinnati Electronics; Cleveland Clinic; General Electric; Goodyear; Kodak; Lyondell; L-3 Communications; Proctor & Gamble; Ross Products; Siloam Biosciences; Taitech; Yellow Springs Instruments

**National Laboratories**
US Environmental Protection Agency (Cincinnati); US FDA Forensic Laboratory (Cincinnati); Wright Patterson AFB

**Universities**
Cleveland State University; Ohio University; University of Akron; University of Dayton; University of Toledo; University of Cincinnati

**Sponsored Program Activity Associated with the Center**
The 18 faculty in this Center have an established record of obtaining research grants from the National Science Foundation, the National Institutes of Health, Department of Energy, and other funding agencies. The benchmarks for this team of faculty are outstanding:

- Over $12,000,000 in currently active (2009) external grants and contracts.
- Over $11,000,000 in research expenditures for the period 2004-2008
- 15 United States Patents issued
- 35 U.S. Patents filed and pending
- Hundreds of students graduated with their Masters and PhD degrees, students who now serve in highly skilled and highly paid positions in Ohio's and the nation’s workforce.

In addition to its role in meeting Ohio's workforce needs, this Center will furnish vital enabling technology for other Centers of Excellence. The centers focused on medical research, The Center for Intelligent Air & Space Vehicle Energy Systems, and the Center for Sustaining Urban Environments will all benefit from the development and commercialization of new sensors, from implantable and wearable medical sensors for the monitoring and control of glucose and other serum levels, to robust in situ sensors for engine particulate control and monitoring, to environmental sensors to detect air and water pollution in homes and cities.
### Faculty Members Associated with the Center

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Current External Funding Agencies</th>
<th>Research Specialty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chong Ahn</td>
<td>Electrical/Comp. Eng.</td>
<td>NIH, NSF, CCHMC, Cleveland Clinic</td>
<td>Microfluidics and sensors for environ. and biomed. applications</td>
</tr>
<tr>
<td>Fred Beyette</td>
<td>Electrical/Comp. Eng.</td>
<td>NSF, NIH, Taitech Inc.</td>
<td>Sensor electronics</td>
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<tr>
<td>Marc Cahay</td>
<td>Electrical/Comp. Eng.</td>
<td>NSF, AFRL, Systran</td>
<td>Nanoscale device modeling, vacuum nanoelectronics, spintronics</td>
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<tr>
<td>Dion Dionysiou</td>
<td>Environmental Eng.</td>
<td>NSF, EPA, Dupont, P&amp;G, AFRL</td>
<td>Environmental nanotechnology</td>
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<tr>
<td>Peixuan Guo</td>
<td>Biomed. Engineering</td>
<td>NIH, Kylin Therapeutics</td>
<td>pRNA gene delivery</td>
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<tr>
<td>Jason Heikenfeld</td>
<td>Electrical/Comp. Eng.</td>
<td>NSF, Motorola, Sun Chemical, AFRL, General Dynamics, Polymer Vision Inc.</td>
<td>Electronic control of fluids for optical, electrical, and bio devices</td>
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<tr>
<td>William Heineman</td>
<td>Chemistry</td>
<td>NSF, DOE,</td>
<td>Chemical sensors and micro-fluidic systems for chemical analysis</td>
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<tr>
<td>Suri Iyer</td>
<td>Chemistry</td>
<td>NSF, NIH</td>
<td>Bio-recognition for sensing selectivity and specificity</td>
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<tr>
<td>Howard Jackson</td>
<td>Physics</td>
<td>NSF</td>
<td>Plasmon-enhanced biosensors and optical waveguide sensing arrays</td>
</tr>
<tr>
<td>Thomas Mantei</td>
<td>Electrical/Comp. Eng.</td>
<td>NSF, Boeing</td>
<td>Plasma treatment of materials</td>
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<tr>
<td>Carlo Montemagno</td>
<td>Biomed. Eng.</td>
<td>NSF</td>
<td>Nanomedicine</td>
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<tr>
<td>Ian Papautsky</td>
<td>Electrical/Comp. Eng.</td>
<td>NSF</td>
<td>Microfluidics and sensors for environ. and biomed. applications</td>
</tr>
<tr>
<td>Mark Schulz</td>
<td>Mechanical Eng.</td>
<td>NSF, ONRL</td>
<td>CNT synthesis, biosensors, and structural health monitoring</td>
</tr>
<tr>
<td>Carl Seliskar</td>
<td>Chemistry</td>
<td>DOE</td>
<td>Chemical sensors and micro-fluidic systems for chemical analysis</td>
</tr>
<tr>
<td>Vesselin Shanov</td>
<td>Chemical/Mater. Eng.</td>
<td>NSF, Parker Hannifin</td>
<td>Carbon nanotube synthesis and characterization, biosensors</td>
</tr>
<tr>
<td>Donglu Shi</td>
<td>Chemical/Mater. Eng.</td>
<td>DOE</td>
<td>Nanostructured materials and nanobiosensors</td>
</tr>
<tr>
<td>Leigh Smith</td>
<td>Physics</td>
<td>NSF</td>
<td>Plasmon-enhanced biosensors and optical waveguide sensing arrays</td>
</tr>
</tbody>
</table>

### Graduate and Undergraduate Programs Associated with the Center

- Biomedical Engineering (PhD, MS, BS)
- Chemistry (PhD, MS, BS)
- Electrical Engineering (PhD, MS, BS)
- Environmental Engineering (PhD, MS)
- Environmental Health (PhD, MS)
- Materials Engineering (PhD, MS)
- Mechanical Engineering (PhD, MS, BS)
- Physics (PhD, MS, BS)
Professional Programs Associated with the Center
The UC Institute for Nanoscale Science and Technology, which has successfully fostered nanotechnology innovation at UC since 2004, and the Center for Chemical Sensors and Biosensors, which was initiated in 2001, will provide the foundation for this Center. The Center will benefit greatly from the availability of the UC Engineering Research Center clean room nanofabrication facility, the ERC Advanced Materials Characterization Center, and the Sensors Instrumentation Center. Additionally, the faculty involved in this Center each have state-of-the-art laboratory facilities, including wet laboratory space, sensor packaging and characterization tools, injection molding and embossing machines, and advanced laser and optical characterization capabilities. Finally, the Environmental Protection Agency's National Risk Management Research Laboratory is situated contiguous with the University of Cincinnati, and has expressed its willingness to promote the use of its sophisticated analytical capabilities and research facilities.

Outside Collaborating Entities
Full participation in Ohio’s Institute for Development and Commercialization of Advanced Sensor Concepts (IDCAST), with nearly 50 Ohio companies, will foster industrial relationships and stimulate potential commercialization. Productive industrial affiliations already established include ongoing collaborations with established companies such as YSI Inc. located in Yellow Springs, Ohio, and Applied Science Inc. located in Cedarville, Ohio. One faculty participant in this effort, Professor Chong Ahn, leads a start-up company, Siloam Biosciences, in Cincinnati, Ohio, developing innovative "smart" polymer medical sensor diagnostic platforms. Additionally, the Environmental Protection Agency, located contiguous to the UC campus, is actively collaborating with UC on sensor development, especially with respect to environmental monitoring to maintain the quality of Ohio's water supply.

Supporting Scientific, Scholarly, and/or Creative Activities
The University of Cincinnati is featured in the Ohio Research Expertise Taskforce Database as prominent in nanoscience, one of only two Ohio Universities so listed, and as having strength in sensors. The University is internationally recognized for its strong interdisciplinary program in sensors research that spans departments in the College of Arts & Sciences and the College of Engineering. Included is the Center for Chemical Sensors and Biosensors that was initiated in 2001 by an Ohio Board of Regents Doctoral Investment Award for “Chemical Sensors at the Cutting Edge: A Vehicle for PhD Graduate Education.” The Instrumentation Facility for the Center is equipped with state-of-the-art instruments capable of sensor development, testing and characterization. Instrumentation valued at approximately $3 million was funded by grants from the Ohio Board of Regents Hayes Investment Fund and the Ohio Third Frontier Wright Center of Innovation, IDCAST. UC is a member institution of IDCAST, which is funded by the state of Ohio to promote commercialization of sensor technology in Ohio and thus serves as an existing conduit to Ohio companies for commercialization of sensors developed at UC.

Center Management
The activities of this Center of Excellence will be conducted under the auspices of two collaborative UC centers, the Institute for Nanoscale Science and Technology and the Center for Chemical Sensors and Biosensors.
Nanoscale Sensors Benchmark Metrics

Supporting PhD Programs

Supporting Master's Programs

Supporting Baccalaureate Programs

Faculty

1. World Class Academic Talent (Inputs)
Total Research Expenditures FY 2004-2008 $11M
Faculty Awards FY 2004-2008 17
Institutional Investment into Physical Infrastructure FY 2004-2008 $1M
Number of Doctorates Awarded per Year FY 2004-2008 20

2. Connection to the Industry's Local Economy (Value Added)
Invention Disclosures FY 2004-2008 73
Average PhD Salary Jobs Created Region/State Industries Related to the Centers of Excellence $80K
Startup Companies Resulting from Centers of Excellence FY 2004-2008 3

3. Economic Impact (Outputs)
Average PhD Salary for Jobs in this Cluster $80K
Average Salary of PhD Graduates $80K
License Income FY 2004-2008 $186K

Sources: UC Sponsored Reasearch Services, UC Office of Intellectual Property, UC Office of Career Placement

Participating Faculty: Ahn, Banerjee, Beyette, Cahay, Dionysiou, Guo, Heikenfeld, Heineman, Iyer, Jackson, Mantei, Montemagno, Papautsky, Schulz, Seliskar, Shanov, Shi, Smith

Five to Ten Year Goals

- Develop a robust and sustainable interdisciplinary collaboration model for engaging faculty across the disciplines within the Colleges of A&S, Medicine, and Engineering
  - Double external funding from NSF, NIH, EPA, and DOE
  - Train graduate students in a truly interdisciplinary way (example is NSF IGERT proposal under review)
- Increase interaction with industry and commitment to commercialization
  - Develop a model to increase industrial collaboration at earlier stages
  - Bring more ideas to the prototype stage
  - Increase invention disclosures and patent selected ones
  - Increase industrial collaborations for additional sources of funding
Center of Excellence Concept
The University of Cincinnati’s Center for Design & Innovation will be an “innovation design spine” that will redefine how universities and companies can work together on the challenges that Ohio faces in the first half of this century. Three major cities throughout the State of Ohio (Cincinnati, Cleveland, and Columbus) have colleges and universities with excellence in design, engineering, and business that contribute to and interact with local and regional economies. Linking these three centers would make Ohio one of the most innovative states in the country. A research and small manufacturing network, connected to consumer trends, would be a powerful contribution to a product and service development corridor, and a welcome addition to the Ohio economy.

Universities must develop new strategies and methods for companies to employ to remain competitive in response to the rebalancing of the world’s economy, the loss of manufacturing jobs in Ohio, and the emergence of the service economy.

The University of Cincinnati has been involved in a variety of new research and education initiatives that will serve as the foundation for a new comprehensive center of design research and innovation. Few universities can match the diverse excellence that UC can bring together in an interdisciplinary core that will leverage all aspects of the university including the Medical School. The importance of brand value, integrated manufacturing and user-centered design, and health and wellness are issues shared by the colleges of Design, Architecture, Art, and Planning (DAAP), Business, Engineering, and Medicine.

The “innovation design spine” concept will act as a transformative agent for growing the local economy and creating future leaders who will direct the positive change that will impact the emerging global economy. During the last 5 years, several colleges in the university have worked together to collaborate with companies to start a number of new initiatives and programs, providing a benchmark for the capability of the proposed UC Center for Design
and Innovation. The initiatives include the Live Well Collaborative (LWC), Partners for the Advancement of Collaborative Engineering Education (PACE), the College of Business’ planned Innovation MBA, and DAAP’s Center for Design Research and Innovation (CDRI). These are the interdisciplinary collaborations that serve as the foundation for the new center. In forming the center, UC intends to build on its demonstrated success in cooperative education, seeking to become the leader in creating a new level of trans-disciplinary research and education.

Through scholarship and partnership, UC is committed to enhancing local companies and the economy. The Colleges of Design, Architecture, Art, and Planning (DAAP), Business, and Engineering are focused on serving as valued partners to corporations by providing interdisciplinary support, training, and research in the areas of design and innovation.

The Center for Design & Innovation will serve as a catalyst and coordinator that will support the development of undergraduate and graduate programs and will attract and inspire future thought leaders. It will give students tools and methods that foster a new approach towards “design thinking.” The College of Business (COB) will be offering a Master’s of Innovation program that presents tremendous potential for programmatic growth and further corporate engagement. The College of Engineering’s (COE) faculty and student body will have significant impact on the leadership for the process and logistics that are critical to any successful product development endeavor. Engineering has formed a simulation center with Procter and Gamble that has the goal to become an interdisciplinary research center for COE, COB and DAAP. DAAP’s graduate programs in Architecture, Planning, and Design are creating the new design thought leaders that will influence the planning of communities, from building in the urban environment to the implementation of product and information systems.

Scope of Activities
UC has a comprehensive array of academic, artistic, and professional programs, including a globally renowned College of Design, Architecture, Art and Planning, complemented by an extensive cooperative education program. As companies continue to innovate and respond to emerging challenges, education must contribute to and learn from corporations involved in this period of rapidly evolving cultures and economies. Companies today must manage brand equity by carefully balancing the expectations of consumers, needs of investors, and the emerging new products and services of their competitors.

Innovation must occur at all levels and areas in companies. This includes in-depth consumer research, effective use of simulation technology, integrated manufacturing, packaging and distribution, point of purchase, connect and develop strategies, and life cycle analysis.

This capability must be effectively connected to emerging cultural issues influencing health and wellness across the life span. UC is capable of fielding a comprehensive team of faculty and students to address these issues simultaneously.

Prospects for Driving Economic Advancement
UC’s success in co-op, DAAP’s Center for Design Research and Innovation, and the Live Well Collaborative demonstrate the ability to develop industry research partnerships that advance knowledge in the profession, and attract further design research funding and business collaboration to translate and support results into new branded concepts and products. Graduates of the College of DAAP hold positions at all levels of corporate and consulting businesses in Cincinnati, Columbus and Cleveland. Procter and Gamble, Ethicon
and LPK are examples where design staff number in the hundreds, with more than 50% being UC graduates. Architectural and planning firms also employ DAAP graduates thus providing a significant contribution to those fields throughout Ohio.

New product development has been a focus of a cluster of researchers in the College of Business for the past 20 years. Research and educational programs focus on innovative, multi-stakeholder, and interdisciplinary research and curricular modalities intended to generate new understandings and build skill sets that promote sustainable new product/service development. The pivotal point for the Center is modeling best practice in user involvement in product or service development. Research programs, coursework development, and delivery reflect ongoing collaborations with colleagues in the Colleges of Business, Design, Architecture, Art, and Planning, Engineering, Medicine, Nursing, Pharmacy, and departments from within the McMicken College of Arts & Science.

The PACE Center also conducts extensive applied and fundamental research in PLM based Product and Process Design and Optimization, which has been funded by various local industries such as Procter and Gamble, Siemens PLM Software, General Tool Company, Ford Motor Company, Alltech Biotechnology, MAC Tools, Lenscrafters and federal agencies such as the National Science Foundation. Currently, the Department of Mechanical Engineering is in the process of hiring an additional full time tenure track faculty member in the areas of sustainable design and manufacturing to further widen the research and teaching outreach of the Center. Since 2003, students who participated in projects supported by the PACE center have entered the work force in various local industries such as GE, Honda, FKI Logistex, etc. The results of the applied research projects have led to substantial increase in productivity for several small and large Ohio-based companies, making them more competitive in the global market. Graduating students from the program will create a pool of highly skilled employees who are well versed in global design and manufacturing methods and concepts. This will enable Ohio industries to increase their competitiveness in the global economy and enable the creation of more high-end design, engineering and manufacturing jobs. In addition, the results of the research will also be disseminated to local industry to increase their capabilities. Successful research initiatives that can be commercialized will be spun off into independent entities, resulting in increased opportunities for attracting venture capital support and creating new jobs.

There are several key companies that UC, DAAP, COE, and COB have relationships with at all levels in the state. They include P&G, Macy’s, Kroger, Consulting Firms (LPK, FRCH Brand Image, Landor), Architecture and Interior Design Firms, Ethicon Endo-surgery, Crown Equipment Corporation.

**Faculty Members Associated with the Center**

- College of Design, Architecture, Art, and Planning: Robert Probst, Dean and Professor of Design; Craig Vogel, Associate Dean and Professor of Design; Brigid O’Kane, Associate Professor of Industrial Design
- College of Engineering: Sam Anand, Professor of Mechanical Engineering; Marybeth Privitera, Assistant Professor of Engineering
- College of Business: Ann Welsh, Professor of Management; Karen Machleit, Marketing Department Head and Professor of Marketing
- Office of Research: Anne Chasser, Associate VP Intellectual Property
Graduate Programs Associated with the Center

- DAAP: MDesign; Master of Community Planning and PhD in Regional Development Planning; MSArchitecture
- Engineering: MS and PhD
- Business: MBA; MS, Marketing
- Nursing: MSN

Professional Programs Associated with the Center

- DAAP: BS in Industrial Design (Product and Transportation); Digital Design; Graphic Design; Interior Design; Fashion Design (Fashion, Product Development); Bachelor of Urban Planning; March
- Engineering: BS Mechanical Engineering; Electrical and Computing Engineering; Chemical and Materials Engineering; Civil and Environmental Engineering; Biomedical Engineering
- Business: BBA - Accounting; Finance-Real Estate; Information Systems; Management; Quantitative Analysis and Operations Management
- Nursing: BS Nursing

Outside Collaborating Entities

PACE:
- Corporate partners: GM, EDS, HP, Siemens, and Sun Micro Systems plus ten additional contributing corporate members
- 50 Institutions (26 international and 24 US)
- UC is the only institutional member in Ohio and one of the few members in the world that combine design and engineering

The Live Well Collaborative:
- Corporate partners: P&G, Hill Rom, General Mills, Citi Group, LG Industries
- Contributing members: LPK, Haney PRC, Moore and Associates

Co-op/Professional Practice Partners:
- DAAP, over 800 co-op placements in the Greater Cincinnati Region, with another 400 placements throughout Ohio; additional co-op placements for business and engineering majors
- Ongoing industry collaborations and sponsored studios including Apple, JC Penney, Macy’s, Urban Outfitters, Target, Ethicon, Respironics, Samsung, HP, LG, P&G, General Motors, Chrysler, Honda, Mitsubishi, etc.

Projects with Non-Profit Organizations and Municipalities:
- Center for Urban Design Niehoff Studio - Research on economic and environmental impact on Wilmington, Ohio

Supporting Scientific, Scholarly, and/or Creative Activities

The Industrial Design Program in DAAP is highly ranked nationally with the undergraduate and graduate programs ranked as #3 and #8 respectively. The programs in Architecture and Interior Design are both rated #2 and the Planning program is the only co-op program in the
US. The Department of Mechanical Engineering is also home to P&G’s UC Simulation Center, which is equipped with state-of-the-art simulation facilities.

Since 2003, the Colleges of Engineering and DAAP have launched collaborative initiatives in the areas of industrial design and mechanical engineering that led to the development of a center for collaborative activities across the university campus. These activities were recognized by Partners for Advancement of Collaborative Engineering Education (PACE), which is an industry consortium made up of General Motors, EDS, Hewlett-Packard, Sun Microsystems, Siemens, and other leading design and engineering software and hardware companies. The University of Cincinnati was officially recognized as a PACE Institution in October 18, 2007, with an in-kind gift of $420,687,130 in addition to other grants and gifts from industry leaders. Ongoing activities with this organization has given the University of Cincinnati a regional and global presence within a network of numerous additional associated industries as well as a vibrant coalition of 50 colleges and universities worldwide including MIT, Georgia Tech, Purdue, Virginia Tech, University of Michigan, the Art Center College of Design, and the College for Creative Studies, 24 of which are located in the United States. The University of Cincinnati is the only PACE Institution within the state of Ohio.

Since its inception, the DAAP’s Center for Design Research and Innovation has been involved in leading collaborative teaching and research in the areas of global product design and manufacturing, with over 50 undergraduate and 10 graduate students from Mechanical Engineering and Industrial Design participating. The graduate research conducted in the center has resulted in numerous journal and conference publications. Undergraduate students actively engage in collaborative interdisciplinary projects, which prepare graduates as catalysts for change within the industry as they embrace collaboration and a respect for diverse disciplines. The Center’s successes can be gauged from the following recent activities:

- First place winners in the PACE Console Competition for a Sport Utility Vehicle, December 2007
- 1st, 2nd, and 3rd place winners in the Sustainable Mobility Challenge Mid Term Review ‘08
- 1st and 3rd place winners in the Sustainable Mobility Challenge Final Review ’08.

Currently, students from the Center are participating in a Global Collaborative Project with 15 international universities to develop an Emerging Market Vehicle.

The Center was also involved in the recent successful award of the University of Cincinnati’s Choose Ohio First Scholarship Program (COFSP). The ‘Global Product Design and Manufacturing’ option is one of the STEM areas in which scholarships are being awarded to undergraduate and graduate students. One of the innovative aspects of this option is the development of a “Virtual Company” Curriculum model for team building. In this model, each course in the curriculum is modeled as rotational job training across different departments in a company.

Research centers within the College of Business create competitive advantage through alliances between business and academia. These centers provide expertise in competitive benchmarking, new product and service development and market assessment critical to workplace and economic development:
- Economics Center for Education & Research provides local businesses and communities with valuable, accurate and objective economic research that aids in policy and economic development decisions.
- Center for Entrepreneurship Education & Research removes barriers and creates gateways for all entrepreneurs (inside and outside existing firms).
- Center for Productivity Improvement (CPI) conducts focused research on the development of systems and technologies that improve the competitive position of sponsoring firms and organizations. CPI accomplishes this mission by assisting manufacturing, service, government, and not-for-profit organizations through projects designed to improve productivity and develop a competitive advantage. The Center provides a vehicle for firms to access the applied research expertise of CPI staff through the outsourcing of research and development projects and engaging in joint ventures.
- Goering Center for Family & Private Business offers its members and community partners outstanding programs focusing on the unique and critical issues facing family businesses of all sizes including: Succession Planning, Estate and Wealth Transfer Planning, Communications, Strategic, Management, Governance, Family Councils, Conflict Resolutions, Leadership Development, Business Valuation, Philanthropic Strategies, Financing and Ownership Strategies.

**Management Plan**

Building on the successes of the Live Well Collaborative and PACE a management team will be assembled consisting of faculty, administration and external advisors. The University of Cincinnati has already established an Innovation Council as the advisory group that will serve as a prototype of what the advisory committee would be. The center will be led by this strategic team of on and off campus innovators.

**Resource Management and Funding Plan**

In addition to college/departmental budgets associated with the Center, the Center generates revenues from industry partnerships and from donors. Examples of donations related to the Center include:

- $420 million in-kind PACE grant awarded to the University for combined proposal from DAAP and College of Engineering.
- $10 million Myron Ullman gift to support School of Design, College of DAAP.
- $4 million gift focused on Signage that resulted in two faculty chairs, one in the College of Business and one in the College of DAAP.
- $1 million in directed seed funding for key initiatives by outgoing President Nancy Zimpher, including the appointment of an innovation council.

**Sponsored Programs Activity Associated with the Center**

- Live Well Collaborative
- PACE
- Transportation
- Funded activities for many faculty and student design and engineering projects

**Suggested Metrics that Define Excellence for the Center**

- *Design Intelligence* rankings
  - Industrial Design - #3
  - Design Graduate Program - #8
o Architecture and Interior Design - #2
  • $1M UC-Procter and Gamble Live Well Collaborative – Third Frontier Award
  • $3M – TechSolve Inc. – Third Frontier Award

**Five to Ten Year Goals**

- Increase in number of companies seeking to work with UC through the new center
- New startup companies in manufacturing and service developed and supported by UC’s methods and programs
- Documentation of new jobs created
- IP developed by the center leading to the creation of new products and services
- Local, regional and national recognition for the methods and impact as a result of the new center
- Increase in applications to faculty positions for DAAP, Engineering and Business
- Increase in number and quality of national and international applicants to graduate and undergraduate programs in DAAP, Engineering and Business
HUMANITIES: CLASSICS; CREATIVE WRITING; PHILOSOPHY OF SCIENCE

Center of Excellence in Humanities Concept
This is an umbrella term to encompass UC’s internationally renowned programs in Classics, Creative Writing, and the Philosophy of Science. These programs have extremely productive and nationally recognized faculty members; highly selective graduate programs that attract acclaimed and well-published students who become leaders in the field; an excellent record of placement and long-term productivity for the PhD graduates; innovative undergraduate programs that attract UC’s top students; dedicated libraries in Creative Writing, with a world-class archive of recordings of the most notable writers over the past 50 years, and in Classics, with simply the best Classics collection in North American; and significant histories of excellence.

Scope of Activities
The Center of Excellence in Humanities will (a) continue to attract and train leading national talent; (b) continue to develop innovative pedagogy; (e) serve as a hub for literary, intellectual, and cultural activity in the state; (f) strengthen our alliances with local schools and cultural organizations to enhance literacy and quality of life for area citizens; (g) attract development money from corporate and individual investors who seek to contribute to city and state cultural excellence, cultural diversity, and advanced literacy; (h) continue to promote workshops, lectures, and visiting programs; and (i) produce internationally recognized scholarship.

Prospects for Driving Economic Advancement
Through the Taft, Semple, and other smaller endowment funds, we have over $130M in targeted scholarship, academic, and scholarly support. In addition, the caliber of our programs has a significant impact on the reputation of the state, both nationally and internationally. The work of our faculty, students, and alumni significantly enriches the lives of Ohioans, through direct means (e.g. our Outreach Program, our various lecture series and workshops) and indirect means (e.g. the ways in which our well-trained and thoughtful graduates influence the lives of those around them). Moreover, our strong PhD programs have long placed new PhDs as university professors in schools throughout the country, and have always, in particular, been successful in placing educators here in Ohio and the region (both university professors and high school teachers). In recent years, our graduate students have become faculty in local universities such as NKU, Mt Saint Joseph, Xavier, Miami, regional universities such as Akron, Earlham College, Berea College, Western Kentucky University, as well as national and international venues such as Notre Dame, Wisconsin, Arizona, Bowdoin, Franklin & Marshall, Bucknell, Trent, Clemson College, Central Michigan State University, Centre College, Georgia State University, University of Indiana-South Bend, Bethel College, Point Park University, Stockton College, and Utica College. All
of these placements, we believe, are part of the symbiotic chain that attracts top students and faculty to Cincinnati.

Please note that while direct economic advancement is only normally tangentially connected to the Humanities, it is also well known, but underappreciated, that for significant industry to remain in an area, it is imperative that the area foster a “creative class” (see, e.g., Richard Florida The Creative Class (2004), Who’s Your City (2008).

- Programs in advanced literacy, developed and produced by the creative writing program, will assist area elementary and high school students to develop advanced literacy.
- Summer programs for teachers have long been an essential part of the English department’s activities.
- Cincinnati has long been a hub of literary endeavor and publishing: the creative writing program helps this region to connect with and develop this important aspect of our regional character and rich resource.
- UC offers the only option in Ohio for students to study conceptual foundations of science, which is crucial given world-class centers in nearby Indiana and Pittsburgh. Keeping Ohio’s students in Ohio prevents "brain-drain" to other states, which is especially critical given the importance of science education on science policy and STEMM careers.
- We recruit students from worldwide because of reputation of the faculty and the programs.
- Many of our graduates (BA/MA/PhD) stay in Ohio.
- 21st century industry only locates where there is a strong creative class.

Faculty Members Associated with the Center

**Classics:** Getzel Cohen, Jack Davis, Steven Ellis Harold Gotoff, Kathryn Gurzwiller, Eleni Hatzaki, William Johnson, Kathleen Lynth, Holt Parker, Susan Prince, Michael Sage, Peter van Minnen, Gisela Walberg.  
**Creative Writing:** Don Bogen, Julia Carlson, Brock Clark, James Cummins, John Drury, Jennifer Glaser Michael Griffith, Joanie Mackowski, James Schiff, and Leah Stewart.  
**Philosophy of Science:** John Bickle, Valerie Hardcastle, Koffi Maglo, John McEvoy, Thomas Polger, Robert C. Richardson, Robert Skipper, as well as Arnold Miller (Geology), Kenneth Petren (Biology), Michal Polak (Biolo)gy, Michael Riley (Psychology), George Uetz (Biology), and Guy Van Orden (Psychology).

Graduate Programs Associated with the Center

MAs and PhDs in Classics, Philosophy with philosophy of science track, and English with creative writing emphasis.

Undergraduate Programs Associated with the Center

BAs in Classics, Classical Civilization, English-Creative Writing track, and Philosophy; minors in Classics, Classical Civilization, English, and Philosophy; and a Certificate in Creative Writing.

Outside Collaborating Entities

American School of Classical Studies in Athens, the American Research Institute in Turkey, the American Academy in Rome, American Philological Association (APA Monographs), American Society of Papyrologists, the Butrint Foundation in Albania, the Cognitive Science Institute in Budapest, Hebrew Union College (Jewish-Christian Studies), the National
Endowment for the Arts, the National Endowment for the Humanities, University of California-Los Angeles, the University of Osnabrück the University Research Council, and the Witter Bynner Foundation.

Supporting Scholarly & Creative Activities
Individual faculty and student research and creative activities (poems, articles, novels, books, conference presentations, and artistic productions); visiting scholars and lecturers; excavations in the Mediterranean, presently in Greece, Cyprus, Albania, and Italy; two dedicated and extensive library collections; editing several journals. As an example, a dedicated endowment allows us to sponsor a dozen or more visiting scholars each year from around the world to use the Burnam Classics Library. In the past two years alone, so-called Tytus fellows will have come here from Greece, France, Italy, Australia, Ireland, Russia, Turkey and England (including from Oxford) to make use of our extraordinary resources.

Management Plan
All affiliated units have a normal departmental structure in place. In general, there is a Department Head, Director of Graduate Studies, and Director of Undergraduate Studies. The Head is responsible for general management and strategic planning. The Directors report to the Head on curricular and student matters. The current plan places a priority on growing both the undergraduate and graduate programs.

Resource Management and Funding Plan
In addition to normal departmental funding, please see discussion above regarding endowments already in place.

Sponsored Program Activity Associated with the Center
E.g., a Packard Humanities Institute grant supports excavation work in Albania; National Geographic Society grant will (next year) support work in Italy (Pompeii). In the past, faculty have held grants from the NSF, NEH, NEA, American Council of Learned Societies, Center for Hellenic Studies, the Fulbright Association, the Institute of Advanced Study at the University of Durham, UK, the Kingsley Tufts Foundation, National Humanities Center, the McDonnell Foundation, the Poetry Society of America, the Rona Jaffe Foundation, and the Witter/Bynner Foundation.

Suggested Metrics that Define Excellence for the Center

Benchmarking
- Classics and classical languages received the No. 1 ranking in the country by Academic Analytics Faculty Scholarly Productivity Index for 2008, up from No. 3 in 2007 (overtaking Columbia and Brown). There is no Classics department in the USO that comes close to UC Classics in national and international recognition. UC Classics offers primarily the PhD degree for graduate studies. The Ohio State Classics Department remains, despite great infusion of state funds, primarily an MA program, and other Ohio schools offer only the BA or MA. UC is Ohio's only regular source of new PhDs in Classics.
- Academic Analytics ranked English (the home of the Center for Excellence in Creative Writing) in the top 20 percent nationally, ahead of English faculties at such universities as Michigan, Washington, Pittsburgh, Iowa, Ohio State, and all other Ohio institutions. (Only one other institution in the state, Ohio University, offers a doctoral program in English with Creative Writing emphasis, and our program is far more accomplished and selective than OU’s by any measure.)
• Academic Analytics ranked Philosophy in the 3rd decile, alongside University of Michigan and North Carolina, two of the best programs in the world according to the PGR, and well ahead of the other PhD-granting philosophy programs in Ohio.
• The Classics Department's doctoral program was cited for national distinction in the last review of the graduate program by the external reviewers, and the reviewers ranked the archaeology program above the benchmark programs, which included UC Berkeley, Brown, UCLA, and UNC Chapel Hill (all top programs).
• The highly influential "Philosophical Gourmet" ranks philosophy of biology in Top 20 (with Cambridge and Texas), Top 25 in cognitive science (with Columbia and Princeton), Top 25 in philosophy of mind (with Stanford and Yale). It is the only ranked program in Ohio in philosophy of biology, and on par with Ohio State in philosophy of cognitive science and philosophy of mind. The philosophy program at the University of Cincinnati is the only one in Ohio with a special track of study in philosophy of science, particularly philosophy of biology, neuroscience, cognitive science, and psychology.

Faculty Productivity
• Core faculty in Creative Writing (7) have published approximately 200 works in peer-reviewed journals 2004-2008; this number includes 6 books. faculty work is included in such definitive anthologies as The Norton Anthology of Poetry and The Oxford Anthology of Twentieth-Century American Poetry; in the past two out of three years, the work of core faculty has been included in the popular Best American Poetry anthology (Scribner’s) and is regularly reprinted as models in college textbooks.
• Classics faculty are remarkably successful at garnering individual grants through national competition from a variety of distinguished venues. In the last six years, these have included: American Council of Learned Societies (3 grants), National Endowment for the Humanities (4 grants), Harvard's Loeb Foundation (2 grants), Institute for Advanced Study, Center for Hellenic Studies, National Humanities Center, as well as honorific visiting appointments at L’École normale supérieure in Paris, All Souls College at Oxford, and the American School of Classical Studies in Athens. This is a very strong indicator of our excellence and high national and international profile.

Economic Impact
• New programs for area elementary & high school students to develop advanced literacy
• Summer programs for teachers
• Expanded hub for literary endeavor and publishing
• Preventing “brain-drain” in Ohio through innovative programming in the study of the conceptual foundations of science, science policy, and science education to keep Ohio’s students in Ohio
• Recruitment of students nationally and internationally
• Job placement in Ohio (BA/MA/PhD)

Five to Ten Year Goals
• Improve national rankings
• Increase collaborations with local schools and institutions
• Job placements in Ohio
• Continue to enhance our national and international reputations
• Increase external funding for faculty and graduate students
• Leverage national & regional reputations to create summer institutes for Ohio teachers & students
• Increase scholar-in-resident positions
Appendix

Overview of the role of university resources in economic development

Over the centuries, the most important requirements of economic development have changed. In the 1700s and 1800s it was land; during much of the 1900s it was capital; today skilled, educated human capital plays a dominant role. More than ever, universities, particularly urban research universities, provide essential ingredients to economic development. These are:

- Faculty knowledge and expertise,
- Research,
- Vehicles for fostering and disseminating innovation, and
- Large numbers of students.

The acquisition and application of knowledge are the key elements for economic prosperity. Regions such as Silicon Valley, Boston, Austin, and Research Triangle have used strategies that focus on creative talent, knowledge, and quality of life to achieve enviable economic growth.

In keeping with the importance of the knowledge worker, economic development practitioners are changing their approach. The shift has moved away from recruiting new employers with the anticipation that employees will follow. The new focus is on creating an environment that will attract creative, skilled workers with the anticipation that employers will follow the employees. Now, creating a quality environment for residents is a new economic development strategy.

This new model of economic development has social and cultural drivers. Urban research universities convene and create spaces for inquiry, risk-taking, cross-fertilization of ideas, and openness to change. These drivers contribute to an enhanced quality of life, or quality of place, that has been identified as increasingly important to economic growth. Particularly in regions that lack popular natural resources such as mountains and oceans, the cultural contributions of universities are difference-makers. Indeed, local programs such as the Cincinnati Conservatory of Music not only produce world-class graduates, but also enrich the community, both adults and youth, through programmatic offerings and individual tutorial relationships with faculty and students.

Of course, economic development takes more than just a pleasant place to live. It takes innovation, investment, a quality workforce, and a supportive business environment. A preliminary report by the Brookings Institution, “Restoring Prosperity: The State Role in Revitalizing Ohio’s Core Communities,” characterizes universities as “anchor institutions” and “prosperity-driving assets” that are essential to economic growth. The report states: “An economy based on knowledge bestows new importance on universities and medical research centers, many of which are located in the heart of central cities.”

Universities are crucial partners for regional industry clusters and particular programs often form symbiotic relationships with the core businesses in these clusters. Local examples of this range from the connection between Procter & Gamble and the University of Cincinnati’s design program, to the pipelines from the College of Engineering to GE Aviation and other advanced manufacturing firms. Top-tier university programs produce the talented and highly skilled workers needed in these clusters, and the local presence of those programs makes it easier for businesses to attract and retain their graduates and to gain direct access to the
innovations and insights produced by faculty research. Companies in these clusters are more able to capitalize on the diffusion of innovation and remain leaders in their industries as a result of having this immediate and priority access to university R&D.

More specifically, there are four ways in which urban research universities in general, and specifically Centers of Excellence, are catalysts for the economic vitality of the region and the state.

First, universities have an economic impact as business enterprises in their own right. Through their operation and capital investment, they create jobs, purchase goods and services, and bring “new money” into the economy, particularly research funding from federal and private sources.

Second, universities produce a highly educated and skilled workforce, intellectual capital that is essential for economic growth. This includes the preparation of a new generation of entrepreneurs who will create the new businesses of tomorrow. A university is uniquely poised to create high quality workers through the coexistence of many disciplines and colleges, the opportunities for students to participate in a wide range of activities, experiences, strengths, and perspectives. In this way, universities create, not just highly skilled workers, but high quality workers, individuals who are well rounded, with a broad base of proficiencies. The University of Cincinnati’s preeminent coop program leverages this benefit by providing meaningful work experiences, often in the state and in the region, that build their expertise and increase the likelihood they will stay in the region.

Third, the commercialization of university research generates new products and technologies that seed business growth. Much of this is done formally through a wide range of structures, including centers for innovation, technology transfer, and business incubation, but a more personal and informal collaboration and consultation with businesses is also essential. Common metrics include patents, licenses & associated revenues and start-ups, but other valuable results can be traced to university consulting which sustains businesses and help them implement transformative new technological applications.

Fourth, universities offer services and resources that benefit communities and the economy. Urban programs are continually engaged in efforts focused on neighborhood revitalization. Additionally, the presence of a major university connotes a particular environment that is often attractive to individuals because of the diverse, collegial, and vibrant environment. The dynamic intellectual and artistic environment that a university can provide for the broader community is an amenity attractive to many area employers and workers as well.

Randall Kempner concludes his 2003 paper, “People-based Economic Development Strategies,” with this summary of the importance of an approach that is highly dependent on the knowledge workers that universities produce.

As Stanford Economist Paul Romer has eloquently stated, the only form of capital with infinite potential returns is human capital. To realize those returns, regions must create an environment that nurtures the development of its citizens. This means providing education opportunities that help students build basic skills, use technology, and strengthen their capacity to innovate. It means creating a quality of life that encourages those students to stay in the region and attracts talented transplants. It means fostering a culture that rewards risk-taking, values meritocracy and tolerates a
wide diversity of ideas and lifestyles. It means focusing economic development efforts on helping regional firms to incorporate technology and strengthening networks that support clusters.

The requirements for economic development have become more demanding. Innovative businesses and dynamic clusters are two components of economic vitality. The other two include creative people and attractive places. It is no longer sufficient to focus on only one aspect of industry or the economy. We need a multi-faceted economic development strategy that creates and retains talented workers, thus attracting and nurturing the businesses that are needed for a vibrant regional economy.

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