



WRIGHT STATE
UNIVERSITY

2009 • RESEARCH AND SPONSORED PROGRAMS



C E N T E R S O F
E X C E L L E N C E



Greetings

This year’s annual report focuses on the establishment of Wright State’s seven new Centers of Excellence, which complement several existing centers that have already contributed greatly to the university’s research reputation. The new Centers of Excellence are the result of an initiative from the University System of Ohio and are designed to further distinguish research at Wright State from that at other state schools. This initiative coincides with what President Hopkins has proclaimed “Wright State’s Year of Innovation.”

So how can our new Centers of Excellence be innovative? Unlike traditional centers, Wright State’s Centers of Excellence will interact closely with each other to solve difficult research problems. In breaking down disciplinary boundaries, these centers can find novel solutions to their problems by using knowledge gained from other disciplines. Although multidisciplinary approaches foster innovative solutions, many schools have been unable to implement such approaches because of their traditional structure or culture. Wright State’s culture is one of collaboration and cooperation. By keeping our centers interconnected, we can generate novel solutions to very complex problems for a variety of stakeholders. Very often, interactions between researchers from different disciplines result in new and unexpected knowledge that lies at the nexus of disciplines.

Furthermore, our culture of collaboration also extends to researchers from business and government. We are reaching out to form partnerships with entities such as Wright-Patterson Air Force Base and many others to expand our capabilities. A significant amount of the infrastructure needed to achieve the necessary collaborations will be provided by the Wright State Research Institute, which was formed to provide nimbleness and outreach.

So, this year of innovation is one of planting the seeds of future success that will grow our university to new heights of research, development, and commercialization. These efforts will help make a positive economic difference to the region and to the state. As our efforts take root, we can expect Wright State to become a premier research university that provides an outstanding undergraduate experience and a great graduate education.

John A. Bantle

Jack Bantle
Vice President for Research and Graduate Studies
Wright State University

Wright State University’s Centers of Excellence

WRIGHT STATE UNIVERSITY’S researchers, scientists, engineers, and artists have joined their considerable forces to help businesses, organizations, government and military leaders, and regional developers to understand and meet the needs of their audiences and customers with creative efficiency.

The university’s new Centers of Excellence cut across traditional boundaries to solve problems and create innovative solutions where humans work and interact with technology, from information technology to flight, health care to process control. Business and engineering principles combine with those from the fine arts and social sciences in a market-driven approach to find answers to customer questions and needs.

The impact of Wright State University’s seven centers:

- **Human-Centered Innovation**
- **Knowledge-Enabled Computing (Kno.e.sis)**
- **Product Reliability and Optimization**
- **National Center for Medical Readiness**
- **Wright State University & Premier Health Partners Neuroscience Institute**
- **Collaborative Education, Leadership, and Innovation in the Arts**
- **Micro Air Vehicle Research**

reaches beyond formal parameters to address performance, modeling and simulations, testing and training, and decision making. The hallmark of Wright State’s center concept is the willingness and ability of its centers to work on common projects together to exploit the knowledge present in the intersections

of different disciplines. Their synergy serves the Dayton region and the state of Ohio by attracting national researchers, educators, artists, students, and investments while producing a talented workforce, human performance products and services, and a quality of life conducive to future growth.

These seven centers will complement existing Board of Trustee–approved centers at Wright State that have major external funding. Their combined impact in the Dayton region will be significant.

Wright State’s centers follow the legacy set by Ohio’s Third Frontier. The state’s commitment to technology-based economic development supports research and development, skilled people, financing, market pull, a supportive policy environment, and other elements. The Third Frontier project has created an effective system for innovation. Wright State’s centers will draw upon that foundation to guide Dayton in the 21st century.

Dayton’s reputation for innovation is built on the intersection of creativity with engineering. Dayton’s ability to compete in the future is dependent on multidisciplinary partnerships, emerging technology, strategic collaborations, and human-centered innovation. Wright State University’s seven Centers of Excellence will support and lead the region’s vision for tomorrow.

Emerging Center of Excellence in Supply Chain Management

IN ADDITION to the seven Centers of Excellence, Wright State is also developing an emerging Center of Excellence in Supply Chain Management. Supply chain management is critical to the operating effectiveness of any business and is an essential key in economic

efforts to attract new businesses and to retain current businesses.

Wright State’s emerging Center of Excellence in Supply Chain Management is already a proven leader in the region, providing supply chain programs and expertise for businesses, economic development officials, and students. The center fosters workforce development and job creation, creates research synergies with national/global industries, attracts businesses to the region to support their training, education, and research needs, promotes economic development for new businesses in the state of Ohio, reduces the carbon footprint for Ohio businesses, and promotes societal benefits.

Dayton’s ability to compete in the future is dependent on multidisciplinary partnerships, emerging technology, strategic collaborations, and human-centered innovation.

Human-Centered Innovation

Making systems and technologies that work for people

HOW WILL THE CARS OF THE FUTURE help you avoid a crash rather than just protect you when one occurs? How could airplanes fly without radar and air traffic controllers? What type of technology will help the elderly stay in their homes longer? Those are the types of questions Jennie Gallimore and other faculty will be answering in the new Ohio Center of Excellence in Human-Centered Innovation.

Focused on developing systems and technology for human use, the center’s research takes into consideration human needs, capabilities, and limitations. The result is the development of systems, technologies, processes, and organizational changes that enhance work, play, travel, education, and health.

“We have people who specialize in biomedical imaging and health care, creating technology for the disabled, and improving the structure of organizations. It’s such a broad range,” said Gallimore, a professor of biomedical, industrial, and human factors engineering, who will serve as the center’s director.

The Ohio Center of Excellence in Human-Centered Innovation includes 56 faculty from six colleges, providing unique synergistic opportunities for collaboration. Faculty in the center have an excellent record of external funding totaling more than \$33 million in the past five years from industry, state, and federal sources.

“Faculty members at Wright State have an established record of human-centered research and development through years of collaboration with industrial partners, federal agencies,

medical communities, and the Air Force Research Laboratory,” said David R. Hopkins, president of Wright State. “The challenges we face every day are multidisciplinary, therefore the solutions must be as well.”

With the historic activation of the 711th Human Performance Wing at Wright-Patterson Air Force Base (WPAFB) in 2008, following the Base Realignment and Closure process, Wright State can play a pivotal role in human-centered research and development for the Department of Defense (DoD).

In addition to collaborating with WPAFB and the DoD, Wright State’s center will also support the United States Air Transportation System, NextGen, a Congressional mandate that must be operational by 2025. “Instead of having air traffic controllers talk to you and tell you which way to go, the airplanes themselves can decide because they’ll have GPS and know where they are and be able to tell where other airplanes are. Everything will be done through data links rather than through radar and voice commands,” explained Gallimore.

Cyber security for NextGen is one project Gallimore is considering for the center. “If everything is data linked and it’s all computer run, there’s a possibility that somebody could take over the aircraft or take over the system. We’re trying to get involved in that, with Wright-Patterson Air Force Base as our partner, where we would provide the capability to do simulations and cyber security for NextGen here at Wright State.”



Jennie Gallimore, professor of biomedical, industrial, and human factors engineering, and director of the Center of Excellence in Human-Centered Innovation

The center is also focused on the development of health care technology. Creating a simulation of a full-body virtual patient that will recognize the human voice and respond to questions is one example. “We’re trying to create these virtual patients so they’ll have personalities and emotions. One of the main things we’re concentrating on is communication,” said Gallimore. “If a patient has cancer, the doctor needs to communicate in a certain way and be empathetic. Signal processing of voice and pitch will help determine how you’re communicating with that patient.”

As Gallimore explains, the virtual patient has applications beyond health care. “If we can model people that seem very realistic, the government could use this to help people learn how to interact with people from different cultures. When someone from our Armed Forces goes to a foreign country, they could interact with these virtual people and learn about their customs and what would be considered rude or not rude.”

Receiving statewide recognition

The Ohio Center of Excellence in Human-Centered Innovation was the first Wright State center to be designated as a University System of Ohio Center of Excellence.

Eric Fingerhut, chancellor of the Ohio Board of Regents, praised the work in human-centered innovation being done by Wright State and cited its importance in bringing jobs to Ohio and making the state globally competitive.

“This recognition sends a clear message that the state is committed to supporting Wright State’s global leadership in this field,” said Fingerhut. “The selection and announcement of Ohio’s Centers of Excellence, in line with the University System of Ohio’s Strategic

Plan, are key to attracting the talent and entrepreneurship that will drive the state’s economic advancement.”

“To be distinguished as an Ohio Center of Excellence further

establishes the impact Wright State has on the economy of the state,” said Hopkins. “We are appreciative of the state’s continued support of our initiatives.”

The center aligns with, supports, and leverages three of four industry clusters for success as identified

by the Dayton Development Coalition. These include information technology/data management, health care and human sciences, and aerospace research and development. Economic impact will occur through the commercialization of new technology,

company formation, service and support, and health care cost reduction.

“As part of our commitment to this effort, we are working through the details that will allow us to target a significant set of the coalition’s entrepreneurial development resources on companies aligned with the Ohio Center of Excellence in Human-Centered Innovation to accelerate technology commercialization,” said Jim Leftwich, president and CEO of the Dayton Development Coalition.

Representatives from several Dayton area businesses and industries have committed more than \$1 million in cash and in-kind services over the next two years for research in human-centered innovation. They include the Dayton Development Coalition, Kettering Health Network, Advanced Technical Intelligence Center, Radiance Technologies, SelectTech Services Corporation, Beville Engineering, Inc., SAIC, daytaOhio, and Rhino Corp.

The new Ohio Center of Excellence for Human-Centered Innovation includes 56 faculty from six colleges, providing unique synergistic opportunities for collaboration.

CELIA

New center incorporates collaborative education, leadership, and innovation in the arts

WRIGHT STATE UNIVERSITY’S Departments of Art and Art History, Music, and Theatre, Dance, and Motion Pictures have developed CELIA—Collaborative Education, Leadership, and Innovation in the Arts—a Wright State University Center of Excellence.

“What make our center special are two key words in the title—collaborative and innovation,” said Hank Dahlman, professor of music and director of CELIA. “We’re looking for innovative projects and artistic products through collaboration both internally within the university and externally with partners in the Dayton area and, eventually, nationally and internationally.”

CELIA will enhance ongoing collaborations as well as nurture new partnerships. Projects accepted for the CELIA designation will demonstrate high-quality, innovative collaborations, and the ability to further strengthen the reputation of the arts at Wright State.

“A distinct feature of the plans of the founders of Wright State was to develop programs of the highest quality for educating artists. This goal has been realized in each of our three art departments,” said Charles Taylor, dean of the College of Liberal Arts. “Our Center of Excellence’s name—CELIA—emphasizes the unique collaborations through which these programs rise above others. The collaborative arts education, collaborative leadership in the arts, and the collaborative

innovation in the arts that have existed for a long time at Wright State University are unique to our university and distinguish us nationally and indeed internationally.”

Wright State has been doing collaborative work with Dayton arts organizations for years, including the Dayton Art Institute, Dayton Public Radio, Dayton Contemporary Dance Company, FilmDayton, and the Dayton Philharmonic Orchestra, among others. “The performing arts departments at Wright State are among the gems of Dayton’s arts community.

“Where we see this going is in assisting with the development of a truly diverse and creative class in the region and state.”

—HANK DAHLMAN,
professor of music and
director of CELIA

I never cease to be impressed with the quality of performances by Wright State students,” said Neal Gittleman, music director for the Dayton Philharmonic Orchestra.

Gittleman has worked with Wright State theatre and dance students on *West Side Story* and with singers from the music department’s Collegiate Chorale on many occasions with the Dayton Philharmonic. “Wright State performing arts students are well trained and perform as poised young professionals. They’re a great addition to Dayton’s lively arts scene,” he said.

One of the first projects completed under the CELIA umbrella was *The Last Truck: Closing of a GM Plant*, a documentary on the final days of General Motors Corporation’s last Dayton-area plant. *The Last Truck* was the creation of Julia Reichert, professor of theatre arts and motion pictures at Wright State, and WSU alumnus Steven Bogнар, ’86.

Like other Reichert/Bognar productions, the making of *The Last Truck* involved numerous students, alumni, and faculty from Wright State’s filmmaking community. “The support we received from the Wright State film department helped us hugely, on so many levels,” said Bogнар. “The demanding shoot called out to the Wright State film community for help,

and the students and alumni answered that call, braving day after day of freezing cold to shoot the film and bear witness to this major local event. It was an opportunity for the Wright State community to see firsthand the impact the economy has on the lives of real people.”

Another example of collaboration and innovation in the arts is STEAM3, a course for art, music, science, and mathematics education majors that incorporates the creative arts to teach science and math. The class combines the STEMM disciplines of science, technology, engineering, mathematics,

and medicine with art and music.

Teams of students teach science or math units at area schools using art or music as the methodology. Angela Nation, a fourth and fifth grade science and social studies teacher at Charity Adams Earley Academy for Girls, said the art and music activities helped her students make connections among the different disciplines. “They got a whole realm of different things they could talk about. It helped them understand that science is everywhere and can relate to anything,” said Nation.

Current and future CELIA projects will enrich the already-remarkable artistic climate in the Dayton region—an important tool for economic development. “Dayton has an outstanding arts community,” said Dahlman. “Where we see this going is in assisting with the development of a truly diverse and creative class in the region and state. We are in a position to leverage the artistic diversity and richness that we have in this region as we enter the next phase of development in the area.”

Hank Dahlman, professor of music and director of CELIA



CEPRO

Creating new technology to give Ohio companies a competitive edge

TO COMPETE IN A GLOBAL MARKET, Ohio must develop new technologies to continually spawn innovative products that require minimal cost to manufacture and sustain. Wright State’s new Center of Excellence in Product Reliability and Optimization (CEPRO) will perform cutting-edge interdisciplinary research in computational modeling, simulation, and the optimization of complex structures, advanced manufacturing processes, and high-tech products. It will deliver vital economic development technologies to industries that no longer possess the expertise for their own transformative research.

Ramana Grandhi, distinguished professor of mechanical and materials engineering, is CEPRO’s director. Working with industries for more than 20 years to improve design processes, Grandhi has a client list that ranges from General Electric to Ford Motor Company.

Using computer-based research to model physics, Grandhi and his team of researchers are able to simulate a product before it’s actually made, saving companies millions of dollars. “They don’t have to do expensive testing first by making a prototype to see where it breaks to determine the life of it,” said Grandhi.

Grandhi has worked with the Air Force for 25 years in air vehicles, propulsion, and materials, helping them develop new methodologies,

techniques, and designs for creating aircraft components such as wings, fuselages, and tails. For the Air Force’s F-22 Raptor, Grandhi and his team have been looking at how laser peening could prevent the fighter’s wing lug from failing. Connecting the wings to the fuselage, the lugs on the F-22 have been developing fatigue and deteriorating faster than expected. Rather than redesigning something that’s already part of the plane, Grandhi is working with LSP Technologies, Inc., a Columbus, Ohio-based company, to see how they can make the lugs last longer.

LSP Technologies’ LaserPeen® process uses a high-intensity laser to create laser shots in the lugs, thereby removing the tension. “This is very expensive technology, but if we can prove that it will work, it could save millions of dollars. Everything could be done on the computer—how many shots to give, how much duration, what is the laser intensity,” Grandhi explained.

“Working with Dr. Grandhi, his staff, and students has been a great experience and a win-win for all of us,” said David Lahrman, director of business development for LSP Technologies, Inc. “We have supported his graduate students by educating them about our LaserPeen® process and providing information to support their graduate work on modeling the laser shock process. This program is important because it will provide



analytical methods to understand the implications of a surface enhancement process on a component and what type of process to apply. The models Dr. Grandhi is developing will, at some point, assist us with more efficiently applying our process to our customer’s components.”

Success with military applications could then be applied to the commercial sector. “We develop the technology and then translate it to industry,” said Grandhi. For example, if laser peening proves to be effective with the lugs in the F-22’s, it could be used to make prosthetic implants last longer, eliminating the need for additional surgeries.

Wind energy is another project for CEPRO where maintenance of the wind turbine blades is an issue. Grandhi is working with Minster Machine Company in Minster, Ohio, on how laser peening could prevent cracks in the blades.

CEPRO will incorporate Wright State faculty from across three colleges, including the College of Engineering and Computer Science, the Raj Soin College of Business, and the College of Science and Mathematics. “Most of the engineering problems are needing multiple disciplines, including several different types of engineering, business, computer science, and physics,”

explained Grandhi. “Our research all along has been interdisciplinary.”

CEPRO is in a unique position in that Wright State is located right next door to Wright-Patterson Air Force Base. While the base is CEPRO’s biggest customer, the desire to work with Ohio industries is also at the forefront. “We make sure all of the technology has commercial potential,” said Grandhi. “We want to make sure it gets into the broader industry.”

By helping companies that could not otherwise afford this foundational research and by getting new technological advances out to Ohio manufacturers as quickly as possible,

Ramana Grandhi, distinguished professor of mechanical and materials engineering, is CEPRO’s director.

CEPRO is giving Ohio industry a competitive edge and ultimately benefitting the state’s economy.

“The Center of Excellence in Product Reliability and Optimization helps Ohio companies in a variety of ways. CEPRO’s focus is on applications with strong product and commercialization potential for Ohio in advanced materials, aerospace, energy, and medical applications,” said David Swenson, vice president of business initiatives for the Edison Materials Technology Center (EMTEC). EMTEC’s primary role is to reduce new technology risk and costs to Ohio’s small- and medium-sized companies, which are the engines for Ohio’s economic growth.

“CEPRO can provide a flow of new technology that is usable by both existing and emerging markets—those that are high growth and critical to Ohio’s economy,” said Swenson. “By making CEPRO resources available, this initiative provides opportunities for new job creation and job retention in Ohio. Additionally, it can serve as a resource to attract new companies to Ohio by providing a unique academic/commercial partnership to generate products that are sustainable in today’s global business environment.”

For David Lahrman and LSP Technologies, “the models developed in CEPRO will serve more than just our company. The center Dr. Grandhi has created will serve several Ohio-based companies, because the research he is conducting reaches far beyond just our industry. The future of technology advances and applications will be understood and evaluated by modeling them before they are placed into a product. This will save cost and time with a higher degree of confidence. For Ohio companies, the center will provide the difference they need to succeed in their industry and, as a result, will mean more business.”

National Center for Medical Readiness at Calamityville

New training facility will prepare health care providers for disasters

THE PARKING GARAGE of a high-rise building collapses. Thousands of gallons of water flood local streets. Miners become trapped in underground tunnels.

Such real-life disaster scenarios will be an everyday occurrence when the National Center for Medical Readiness (NCMR) at Calamityville offers its first training courses in 2010. The NCMR will transform nearly 60 acres of land in

Fairborn, Ohio—on the site of the former CEMEX concrete plant—into a one-of-a-kind training facility for medical, public health, public safety, and civilian and military disaster-response decision makers from around the world.

“There are about a half-dozen other disaster-training sites in the United States, but none of them have medicine as their central core component,” explained NCMR Director Mark Gebhart,

who is also an associate professor of emergency medicine at Wright State’s Boonshoft School of Medicine. “This will be unique—the first of its kind.”

For Glenn Hamilton, professor of emergency medicine at the Boonshoft School of Medicine, the tragedies of September 11 and Hurricane Katrina raised the question of how the nation’s health care system could become better prepared for terrorist attacks or



natural disasters. “Homeland security doesn’t fully exist without security in the health care system,” said Hamilton. “Physicians and nurses are not really prepared in disaster readiness.”

Hamilton will serve as director of the NCMR Tactical Laboratory. The training provided in the Tactical Laboratory will feature realistic mockups of disaster situations, including confined spaces, submersion, elevated platforms, wilderness, rubble piles, transportation mishaps, and a field simulation hospital. The site’s existing facilities, with silos and thousands of feet of underground tunnels, offer a real-world training and research environment.

The tactical laboratory can also serve as a test bed for new products or research. For example, a micro air vehicle could be tested in the tunnels to see how it would work in urban spaces or confined areas to locate survivors.

The NCMR will also offer a Modular Emergency Medical System (MEMS). A collaboration with the Ohio Department of Health, the MEMS program will develop and maintain a statewide network of mobile Acute Care Centers (ACC) and Neighborhood Emergency Help Centers (NEHC). The ACCs and NEHCs can provide support to hospitals, primary care offices, and other health care systems during large-scale emergencies, such as a natural disaster or terrorist attack.

Each NEHC can provide triage services and basic medical treatment for up to 1,000 patients per day, freeing hospitals to focus on more serious conditions rather than case management or non-critical care.

The National Center for Medical Readiness will be a one-of-a-kind training facility for medical, public health, public safety, and civilian and military disaster-response decision makers from around the world.

Each ACC can provide inpatient care for up to 250 people simultaneously, including hydration, bronchial therapy, and antibiotics. Both types of centers are designed for rapid deployment and self-sufficiency, enabling them to reach emergency sites quickly and provide vital care during the critical first 72 hours following an incident.

A community partnership that will transform the region

THE NCMR is the result of a community partnership with the City of Fairborn, government officials, and area business and military leaders. CEMEX donated its facility and the surrounding 54-acre property, and the Ohio Department of Development has granted \$2.8 million to clean up the brownfield site. Wright State University will provide \$900,000 in matching funds. To date, more than \$13 million in state and federal support has been received for the project.

“The Fairborn community values and is proud to support Wright State University and the National Center for Medical Readiness Tactical Laboratory at Calamityville,” said Gary Woodward, former mayor of Fairborn. “Our community will gain substantial benefits now and in the future through this effort, including cleanup and revitalization of an abandoned brownfield site in the city, the addition of future new jobs for the area, the beginning of a new leading-edge homeland security training facility in our

region, and the multiplier effect of the need for more goods and services to support this major effort in Fairborn.”

Wright State anticipates the initial site cleanup will be completed in early 2010, after which it can begin focusing on renovating and building the first phase of the tactical laboratory. The first courses should be offered at the new site in 2010. Phase II will include additional props and a water feature, and Phase III will add a state-of-the-art hospital/student center. Phases II and III will begin once funding is in place.

Once it is fully functioning, the NCMR is expected to generate a direct and indirect economic impact of \$374 million to the Dayton region over a five-year period. Training courses alone are estimated to bring in

more than \$4.3 million annually. As a test-bed for commercial product research and development, the laboratory could produce additional revenues of more than \$2 million annually.

Approximately 35 new jobs will be created, with construction resulting in another 344 jobs. In addition, the tactical laboratory will increase tourism and overnight stays in the region, increase sales and income tax revenues, and provide opportunities for the establishment and expansion of local business ventures.

But one of the greatest benefits of the National Center for Medical Readiness at Calamityville cannot be measured in dollars and cents. “As a physician, you want to be able to do good for people,” said Gebhart. “With a project like this, you can touch so many lives.”

“There are about a half-dozen other disaster-training sites in the United States, but none of them have medicine as their central core component.”

—NCMR Director Mark Gebhart



Mark Gebhart surveys the former CEMEX concrete plant, a 54-acre property that will be transformed into the National Center for Medical Readiness (NCMR). Gebhart serves as NCMR’s director.

Knowledge-Enabled Computing (Kno.e.sis)

Forging a path to meaningful data in today's knowledge economy

HOW CAN COMPUTING better serve human needs? How can massive amounts of multimedia information be more useful for people? Those are the types of issues the Ohio Center of Excellence in Knowledge-Enabled Computing (Kno.e.sis) will be tackling.

Amit Sheth, professor of computer science and engineering and LexisNexis Ohio Eminent Scholar, will serve as the center's director. "Most of the new products and services are centered around the creation and use of new knowledge," said Sheth. "In a very broad sense, economies have moved from agricultural to industrial to service to a knowledge economy. The largest growth in all areas, including manufacturing and services, is in the knowledge service component of those."

With all of the data resulting from searches, the problem is no longer locating data but making sense out of the data through meaningful processing that leads to insights. The center's semantic computing vision is to move from computing focused on data or information processing to productive thinking and decision making. It will transform the measures of success from storage capacity and processing

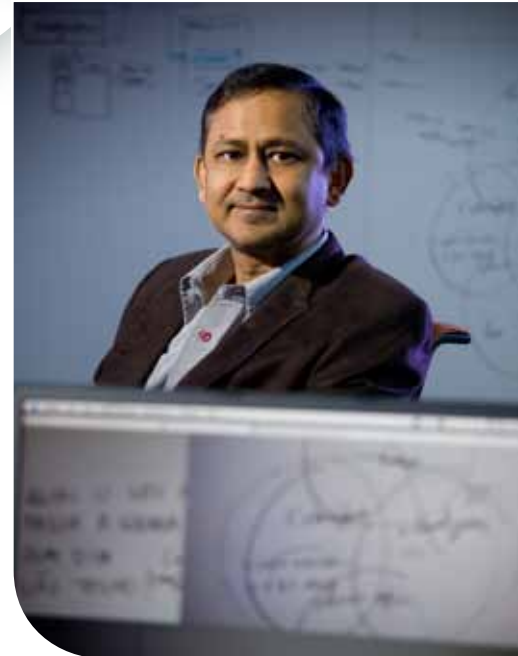
speed to indices that reflect the quality of human experience and effectiveness, such as creativity and innovation.

"Through the use of knowledge, we are able to create tremendous value," said Sheth. "How do you make data meaningful? How do you go away from just number crunching to creating much higher, value-added services and products through the use of knowledge?"

Sheth sees an excellent fit with the military's increasing emphasis on projecting soft power, and the Air Force's increasing emphasis on cyberspace, which requires intelligent use of information and social computing. "When we fight a war, it's also about understanding the culture and how people react," he said. "Making

Web 2.0 technology more meaningful—which is what we call Web 3.0 technology—is very important in how we fight today's nontraditional war." Some of the center's work will focus on understanding social data and how culture affects thinking.

The center's vision is inherently multidisciplinary, requiring synergy between advanced computing (including Internet and Web), knowledge processing, visualization, and cognitive

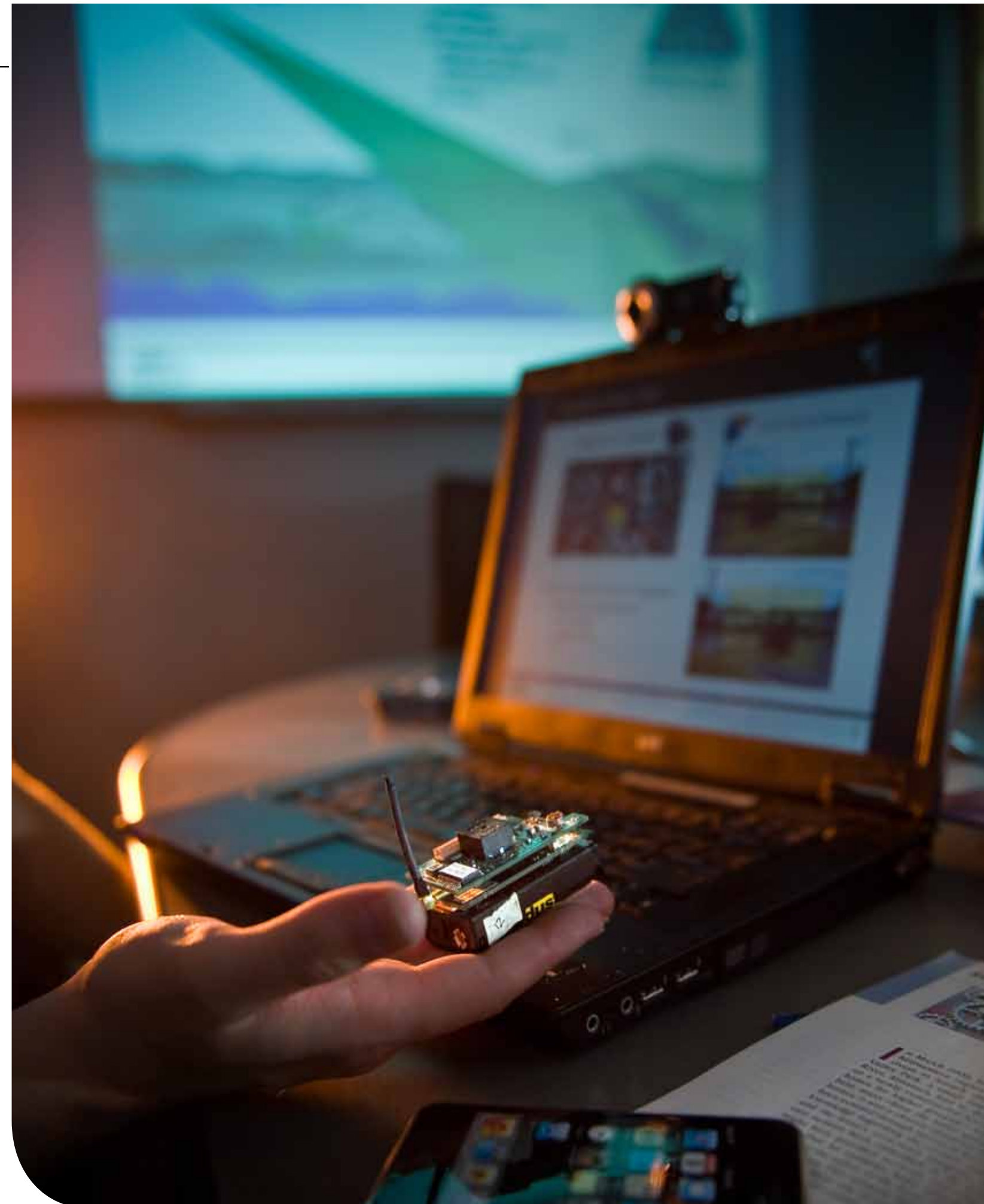


Amit Sheth, professor of computer science and engineering and LexisNexis Ohio Eminent Scholar, is director of the Center of Excellence in Knowledge-Enabled Computing (Kno.e.sis).

systems. The Ohio Center of Excellence in Knowledge-Enabled Computing brings together the processes of three existing Wright State centers: daytaOhio, the Kno.e.sis Center, and the Center for Healthy Communities. In the rapidly emerging area of Semantic Web/ Web 3.0, Kno.e.sis has the largest group of researchers in the United States.

Sheth is listed among the top 30 most-cited computer scientists in the world, and the center's 15 faculty members from four colleges have more than 34,000 citations. "Dr. Sheth's work is recognized both nationally and internationally," said Jim Leftwich, president of the Dayton Development Coalition. "The Ohio Center of Excellence in Knowledge-Enabled Computing is world class in Web 3.0, and its relevance to knowledge services can give this region a competitive advantage and generate an unbelievable number of jobs."

The center's semantic computing vision is to move from computing focused on data or information processing to productive thinking and decision making.



**Wright State University
& Premier Health Partners**

Neuroscience Institute

New research center could give hope to people with neurological disorders

SURVIVORS OF STROKES and people living with Parkinson's disease, ALS, and other disorders of the nervous system may one day find help in Dayton, Ohio. The Wright State University & Premier Health Partners Neuroscience Institute will speed the transfer of research discoveries from the laboratory to the bedside, improving the diagnosis and treatment of neurological disorders. This major public-private initiative partners the Dayton region's strongest biomedical research institution with the clinical resources of the region's leading hospital system.

"Nerve regeneration is not synonymous with recovery," explained Timothy Cope, chair of the Department of Neuroscience, Cell Biology, and Physiology, and director of the Wright State University & Premier Health Partners Neuroscience Institute. "Unlike the central nervous system—where the spinal cord is injured and the nerves do not regenerate—if you damage a peripheral nerve, it regenerates but when it reconnects you don't regain normal function."

The gap between nerve regeneration and the restoration of normal function is one of the key components of research for Cope and his team of neuroscientists. They have already

begun to identify where the problems are at the cellular level. "We have publications, ongoing studies, and data collection that are providing really interesting insights into where the problems are," said Cope. "Regeneration restores a lot and that's great news, but it's incomplete. Properties of nerve cells and the special structures they use to communicate get jumbled in ways that limit recovery."

For example, if a chef in a restaurant cuts a nerve in his hand with a carving knife, he may not be able to move his hand anymore. If the nerve grows back, he will be able to move his hand again, but the movement will not be normal. The chef may be able to pick up a skillet or a cookbook, but he might not be able to tie his apron or cut vegetables.

Premier Health Partners has made a major investment of \$4.35 million over five years to create a new Department of Neurology within Wright State University's Boonshoft School of Medicine.

Everyday tasks involving dexterity are not the same. Premier Health Partners has made a major investment of \$4.35 million over five years to create a new Department of Neurology within Wright State University's Boonshoft School of Medicine.

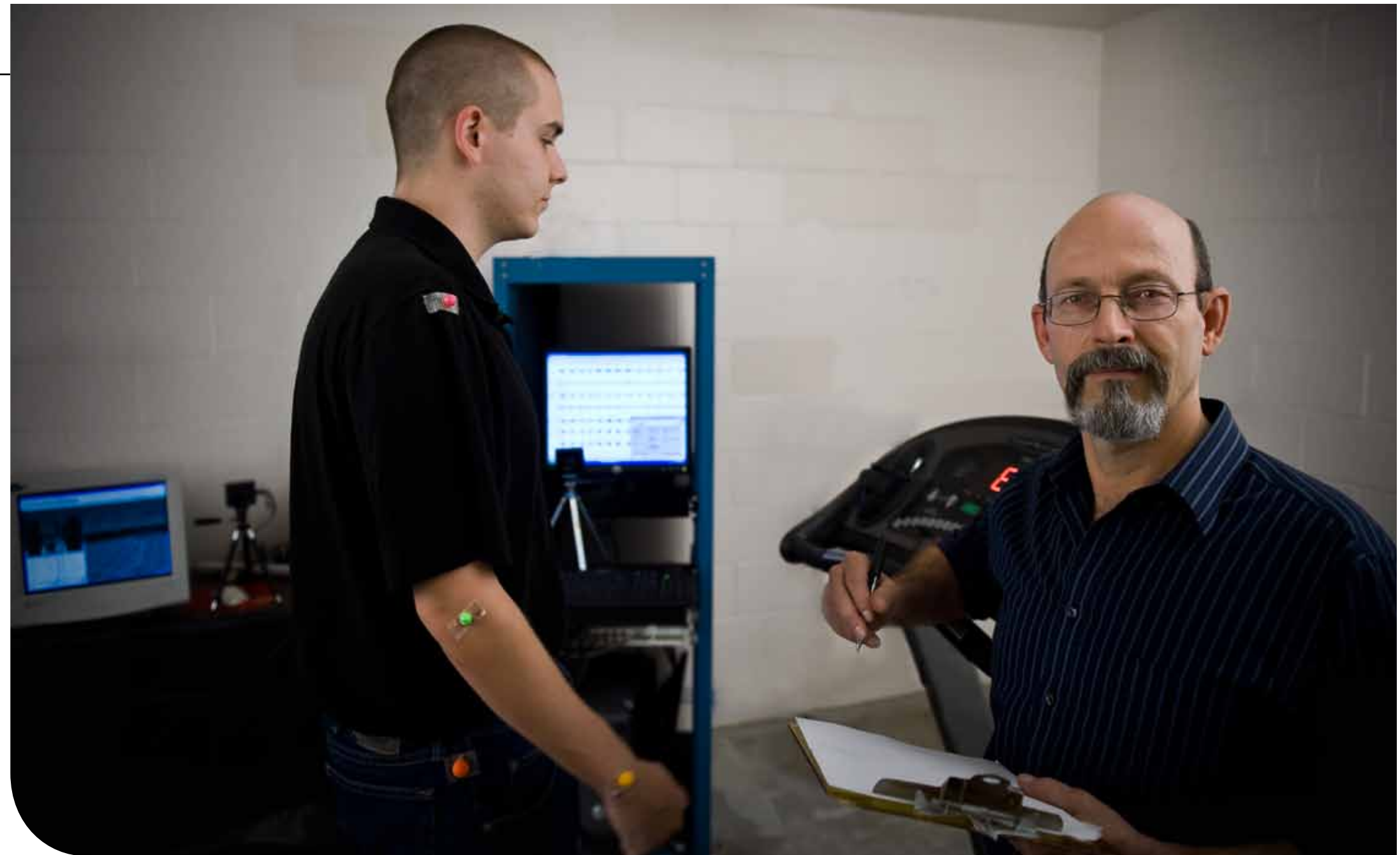
"Attracting sufficient numbers of clinical neurologists to serve our community has been an ongoing challenge," said Molly Hall, M.D., chief academic officer and vice president of academic affairs for Premier Health

Partners. "This new partnership will help attract additional neurology specialists, provide improved access to neurological care in the area, and enhance the ability of Wright State's researchers to attract federal grants and major clinical trials to this region." "These advances are critically needed for the treatment of movement disorders arising from common conditions such as strokes, Parkinson's disease, multiple sclerosis, ALS, neuromuscular disorders, and various neuropathies that arise from complications of diabetes,

chemotherapy, or nerve injury," said Robert Fyffe, associate dean for research affairs in the Boonshoft School of Medicine and professor of neuroscience, cell biology, and physiology. "These disorders currently affect millions of patients at incalculable cost to families, society, and the economy. The Neuroscience Institute will promote research from the molecular to the behavioral level to gain new insights into these disorders, and it will also be the training ground for medical and graduate students, who will be the physicians and scientists of the future."

"One of the major research strengths in the Boonshoft School of Medicine is the field of neuroscience, where groups of NIH-funded researchers have already made an impact in areas such as spinal cord and brainstem control of movement and breathing," said Fyffe. A primary focus of their research is nervous system disorders that affect movement. The Premier Health Partners system has a large and diverse patient base that provides excellent opportunity for high-quality research and clinical trials.

With neuroscientists and neurologists at the forefront of research and treatment, the Wright State University & Premier Health Partners Neuroscience Institute could one day provide the best possible care for neurological disorders. As Cope explained, "The Neuroscience Institute will give our region a visibility where people will say 'I'm going to go to Dayton where they've got some clinical trials and they've got some basic scientists who are focused on solutions that are relevant to the problems I have.'"



Timothy Cope, chair of the Department of Neuroscience, Cell Biology, and Physiology, is director of the Wright State University & Premier Health Partners Neuroscience Institute.



Micro Air Vehicle Research

Soaring to new heights

“THIS WAS MY PASSION. Having a small-size airplane that looks like a fly is a dream,” explained George Huang, chair of Wright State’s Department of Mechanical and Materials Engineering and director of the new Center of Excellence in Micro Air Vehicle Research.

Using nature for inspiration, Huang and his team of researchers have created a micro air vehicle (MAV) modeled after the dragonfly. The MAV has a seven-and-a-half-inch wingspan and weighs 10 grams—the weight of two nickels.

According to Huang, there are many military and non-military advantages of having a plane this size, including rescue missions and spying on enemies in urban areas.

“Terrorists are in buildings, not open fields. You need to go in and see what the enemies are doing, find out where radioactive materials are located. That can only be done with a smaller object that can maneuver like a fly, not an airplane,” Huang explained.

To develop the MAV, Huang and his team studied the dragonfly and how it can sense the flow direction, going up or gliding down as needed to conserve energy. While the MAV is currently radio controlled, Huang hopes to develop

sensors for the body of the MAV so it can determine flow direction and react accordingly.

“There are different types of engineering working together to get to that stage,” said Huang. “It’s an interdisciplinary approach covering a broad range of knowledge from electrical engineering to computer science to human factors.”

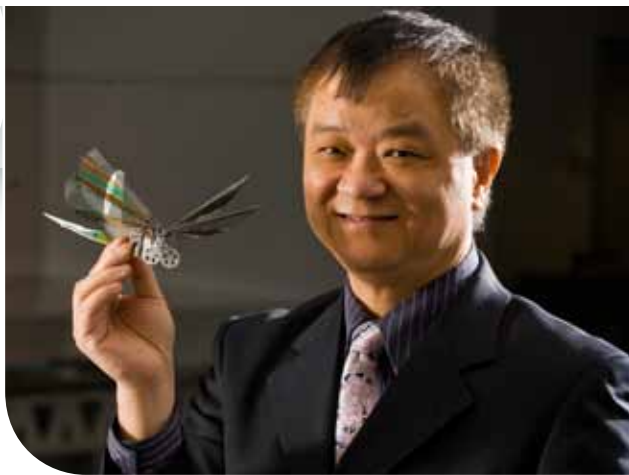
Huang and his students also tapped into the expertise of local companies, including Mound Laser & Photonics Center, Inc., in Miamisburg. According to president and CEO Larry Dosser, his team used laser micromachining to create parts for the MAV and laser welded them together. “MAV work

is ideal for us. We took a wing from a fly, scanned it, and converted it for the lasers to replicate,” Dosser explained.

“The MAV is a classic example of how we can apply our technology to develop something that the Air Force and Department of Defense can use. A lot of this technology has defense or sensing applications, but there are also very similar applications in the medical device fields.”

As the design of the MAV continues to evolve, Huang is looking for other partners and funding to support the project. “We see the opportunities

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to work with the Air Force and local companies to develop a micro air vehicle,” said Huang, who cites the Air Force’s goals of releasing a palm-sized MAV by 2015 and an insect-sized MAV by 2030.

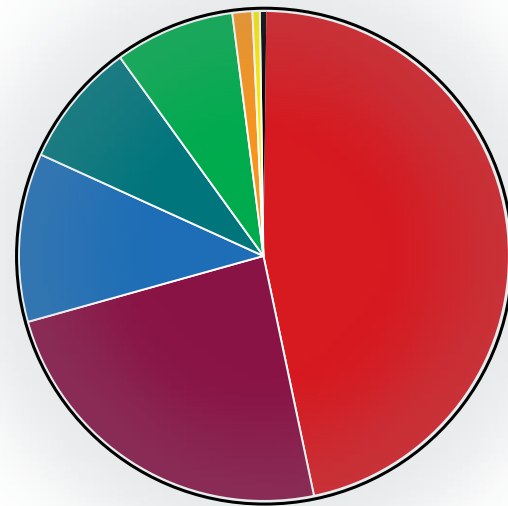
“Just as the Wright brothers created the first airplane and changed the world, Wright State can be a leader in this new type of aircraft—the micro air vehicle. This cutting-edge technology could change the future of both military and civilian operations, ranging from rescue missions to gathering information. By creating partnerships with Wright-Patterson Air Force Base and local aerospace companies, the Dayton region can once again lead the world in flight,” said Bor Jang, dean of Wright State’s College of Engineering and Computer Science.

“This is the new industry of the 21st century. The Dayton region can evolve from making cars to creating micro air vehicles that you can hold in your hand,” said Dosser. “The collaboration between Wright State and our company will help all of us stay on the leading edge of this technology.”

Huang hopes the Dayton region will become the Silicon Valley for micro air vehicles. “Companies will come here and this will become a center for micro air vehicle technology,” said Huang.

Awards

Awards by Major Funding Source FY09

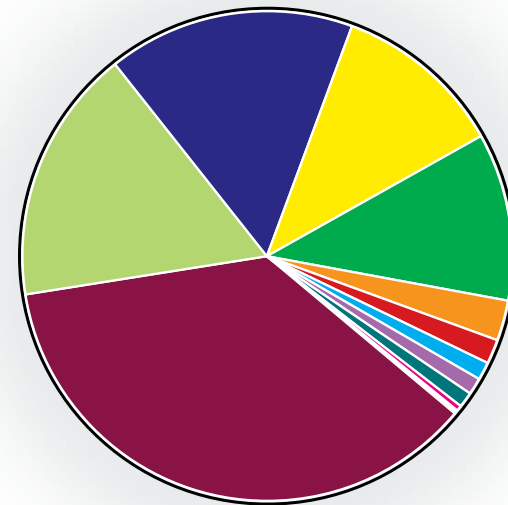


Major Funding Source	Number of Awards	Amount Awarded
Federal Agencies	128	\$34,769,357
State Agencies	84	\$17,827,888
Educational Institutions	87	\$8,263,932
Nonprofits	90	\$6,156,156
Industry/Business	146	\$5,816,866
Other Government Agencies	44	\$1,008,634
Foreign Sponsors	4	\$329,597
Miscellaneous	10	\$211,295
Total	593	\$74,383,725

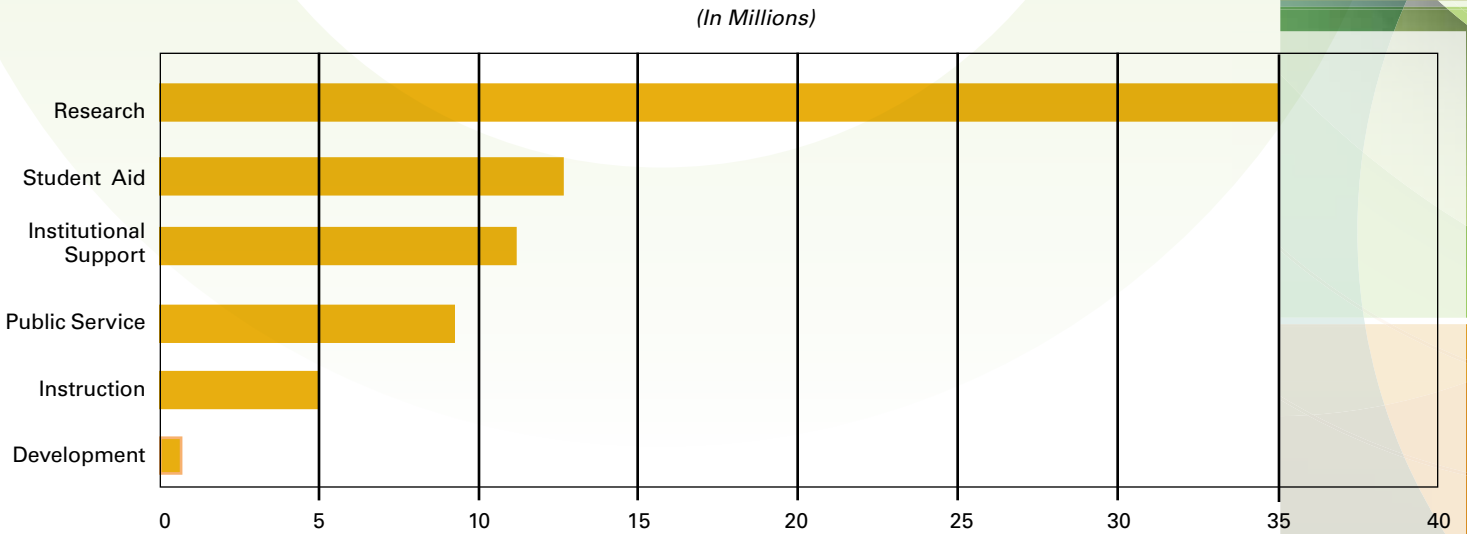
Awards by Type of Activity FY09

Type of Activity	Number of Awards	Amount Awarded
Research	306	\$35,424,646
Student Aid	39	\$13,149,790
Public Service	137	\$11,712,854
Institutional Support	32	\$8,700,869
Instruction	62	\$4,621,097
Development	17	\$774,469
Total	593	\$74,383,725

Awards by Campus Area FY09



Campus Area	Number of Awards	Amount Awarded
Boonshoft School of Medicine	174	\$27,082,345
Student Services/U-wide/Library	41	\$12,551,373
College of Science & Mathematics	100	\$12,108,095
College of Engineering & Computer Science	114	\$8,360,667
School of Graduate Studies	24	\$8,144,159
Curriculum & Instruction	12	\$2,001,050
College of Education & Human Services	11	\$1,169,190
School of Professional Psychology	28	\$881,080
College of Liberal Arts	54	\$861,883
College of Nursing & Health	9	\$855,740
Raj Soin College of Business	9	\$201,866
Lake Campus	17	\$166,277
Total	593	\$74,383,725

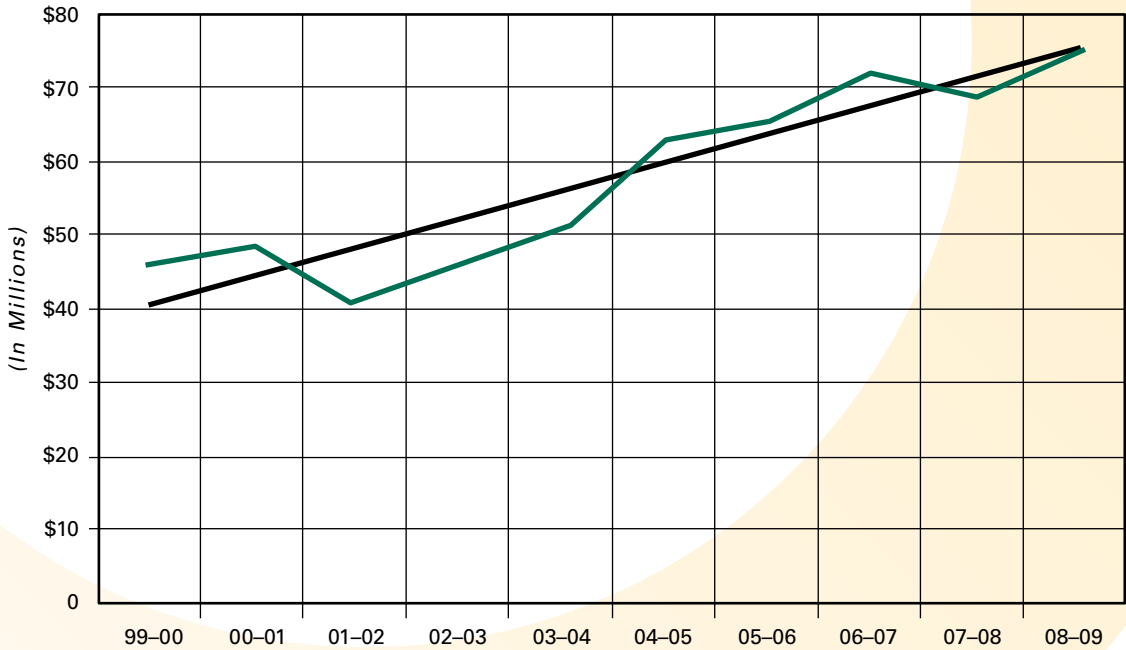


Note:
Institutional support = academic support plus employer assistance plus institutional support plus student services
Instruction = instruction plus non-credit instruction

Awards

Ten Years of Funding: Grant and Contract Awards FY00 to FY09

<i>Fiscal Year</i>	<i>Number of Awards</i>	<i>Amount Awarded</i>	<i>Increase/Decrease Vs. Prev. Yr.</i>
1999-00	475	\$45,339,049	31%
2000-01	481	\$48,510,950	7%
2001-02	537	\$41,362,186	-15%
2002-03	554	\$46,255,284	12%
2003-04	570	\$50,462,293	9%
2004-05	573	\$62,655,115	24%
2005-06	558	\$64,378,342	3%
2006-07	576	\$71,377,270	11%
2007-08	580	\$69,119,080	-3%
2008-09	593	\$74,383,725	8%



Awards by Federal Agency and Campus Area FY09

<i>College/School</i>	<i>EDUC</i>	<i>DHHS</i>	<i>NSF</i>	<i>VA</i>	<i>DoD</i>	<i>NASA</i>	<i>Other Fed</i>	<i>Federal Total</i>
Medicine	\$699,989	\$10,246,414	\$0	\$2,948,417	\$99,393	\$430,000	\$0	\$14,424,213
U-wide	\$12,178,450	\$0	\$0	\$24,093	\$0	\$0	\$0	\$12,202,543
Sci. & Math.	\$0	\$950,695	\$2,385,177	\$0	\$675,847	\$403,514	\$122,112	\$4,537,345
Engineering	\$0	\$373,464	\$1,211,520	\$77,147	\$1,173,797	\$41,000	\$42,000	\$2,918,928
Curr./Instr.	\$250,000	\$0	\$0	\$0	\$78,135	\$0	\$0	\$328,135
Education	\$100,000	\$0	\$0	\$0	\$0	\$0	\$0	\$100,000
Prof. Psych.	\$89,123	\$0	\$0	\$0	\$0	\$0	\$0	\$89,123
Nursing	\$0	\$85,740	\$0	\$0	\$0	\$0	\$0	\$85,740
Liberal Arts	\$83,331	\$0	\$0	\$0	\$0	\$0	\$0	\$83,331
Business	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Lake Campus	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Grad. Studies	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TOTAL	\$13,400,893	\$11,656,313	\$3,596,697	\$3,049,657	\$2,027,172	\$874,514	\$164,112	\$34,769,358

Awards by Type and Campus Area FY09

<i>College/School</i>	<i>Research</i>	<i>Instruction</i>	<i>Pub. Serv.</i>	<i>Other</i>	<i>Total</i>
Medicine	\$17,043,421	\$912,525	\$8,549,138	\$577,261	\$27,082,345
U-wide/Student Serv./Library	\$185,526	\$0	\$143,397	\$12,222,450	\$12,551,373
Science & Mathematics	\$9,601,149	\$1,769,056	\$660,559	\$77,331	\$12,108,095
Engineering & Computer Sci.	\$7,197,804	\$350,567	\$58,719	\$753,577	\$8,360,667
Graduate Studies	\$1,095,985	\$0	\$262,725	\$6,785,449	\$8,144,159
Curriculum/Instruction	\$250,000	\$346,015	\$5,000	\$1,400,035	\$2,001,050
Education & Human Services	\$2,523	\$654,686	\$341,981	\$170,000	\$1,169,190
Professional Psychology	\$10,000	\$334,867	\$261,564	\$274,649	\$881,080
Liberal Arts	\$0	\$248,381	\$584,937	\$28,565	\$861,883
Nursing & Health	\$0	\$5,000	\$500,000	\$350,740	\$855,740
Business	\$38,239	\$0	\$84,687	\$78,940	\$201,866
Lake Campus	\$0	\$0	\$0	\$166,277	\$166,277
TOTAL	\$35,424,647	\$4,621,097	\$11,452,707	\$22,885,274	\$74,383,725

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Wright State University and The Year of Innovation

WITH ONE FOOT IN THE PRESENT AND ONE FOOT IN THE FUTURE, Wright State University has created an environment where people can flourish, generate ideas, be authentic, and ask the questions that lead to innovation. By committing to be part of the solution, Wright State University meets the region's education, business, government, and community partners where they are and asks: "What are the problems you're facing today? What do you need? How can we help?" The result is social innovation, technological innovation, and policy innovation—innovation of the sort that John Kao, author of *Innovation Nation*, calls the creation of "something that is both new and valuable."

Wright State University President David R. Hopkins has declared the 2009–2010 academic year Wright State's "Year of Innovation." The university's culture of innovation has resulted in improved processes that are leading to new and exciting things for the region. A new way to teach mathematics...a dog park for service animals...new technology for search and rescue...a robot that helps to teach tomorrow's nurses...airplane cockpits redesigned. Wright State innovation is having an impact on campus, throughout the region, and across the state.

In this annual report, you can read about one of Wright State University's newest innovations—the creation of seven Centers of Excellence. These centers cut across traditional boundaries to solve problems and create innovative solutions where humans work and interact with technology—from information technology to flight, health care to process control. Business and engineering principles combine with those from the fine arts and social sciences in a market-driven approach to find answers to customer questions and needs.

