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Carnegie Mellon is a global research university of more than 11,000 students, 84,000 alumni and 4,000 faculty and staff. Recognized for its world-class arts and technology programs, collaboration across disciplines and innovative leadership in education, Carnegie Mellon is consistently a top-ranked university. At Carnegie Mellon, our core values of innovation, creativity, problem-solving and collaborative teamwork provide the foundation for everything we do. Guided by these values, Carnegie Mellon students experience a distinctive education that gives them tools to pioneer solutions through an approach that values both teamwork and leadership. The effect is both far-reaching and close to home. Its real-world impact is visible within our local communities, across the country and around the world.

Over 11,000 undergraduate and graduate students at Carnegie Mellon receive an education characterized by its focus on creating and implementing solutions to solve real problems, interdisciplinary collaboration and innovation. A small student-to-faculty ratio provides an opportunity for close interaction between students and professors.

The university is committed to broadening and enhancing undergraduate education, allowing students to explore various disciplines while maintaining a core focus in their primary area of study. Realizing that today’s graduates must understand international issues, Carnegie Mellon is committed to providing a global education for its students and continues to expand its international presence and programs.

Carnegie Mellon’s unique mix of strengths in technology, business, public policy and the arts is distinctive among national research universities. Its schools and specialty programs are consistently ranked among the best in the country by *U.S. News & World Report*, *Business Week* and *The Wall Street Journal*.

Carnegie Mellon is one of the most technologically sophisticated campuses in the world. When it introduced its “Andrew” computing network in the mid-1980s, it pioneered educational applications of technology. In 2000, Carnegie Mellon continued its technical tradition with a campus-wide wireless network. Today, Carnegie Mellon consistently ranks as one of the “most wired” campuses in America.
Jared Cohon has been president of Carnegie Mellon University since 1997. He came to Carnegie Mellon from Yale, where he was dean of the School of Forestry and Environmental Studies from 1992 to 1997. He started his teaching and research career in 1973 at Johns Hopkins, where he was a faculty member in the Department of Geography and Environmental Engineering for 19 years. He also served as Assistant and Associate Dean of Engineering and Vice Provost for Research at Johns Hopkins. Dr. Cohon earned a B.S. degree in civil engineering from the University of Pennsylvania in 1969 and a Ph.D. in civil engineering from the Massachusetts Institute of Technology in 1973.

An author, coauthor, or editor of one book and more than 80 professional publications, Dr. Cohon is an authority on environmental and water resource systems analysis, an interdisciplinary field that combines engineering, economics and applied mathematics. He has worked on water resource problems in the United States, South America and Asia and on energy facility siting, including nuclear waste shipping and storage. In addition to his academic experience, he served in 1977 and 1978 as legislative assistant for energy and the environment to the late Honorable Daniel Patrick Moynihan, United States Senator from New York. President Bill Clinton appointed Dr. Cohon to the Nuclear Waste Technical Review Board in 1995 and appointed him as chairman in 1997. His term on the Board ended in 2002. President George W. Bush appointed Dr. Cohon in 2002 to the Homeland Security Advisory Council and President Barack Obama appointed him in 2009.

During his presidency, Carnegie Mellon has continued along its trajectory of innovation and growth. Priorities have included: undergraduate education; new interdisciplinary initiatives in information technology, biotechnology, energy and environment, and the fine arts and humanities; diversity; international initiatives; and the economic development of southwest Pennsylvania.

SEVEN DIVERSIFIED SCHOOLS
Carnegie Mellon’s seven schools boast diverse focuses, but share a common mission: innovation.

The H. John Heinz III College offers courses in arts, public policy, health care and educational technology management designed to develop the cultural, government and civic leaders of tomorrow. The Tepper School of Business, one of the top business schools in the world, was the first in the country to offer classes in e-commerce and entrepreneurship. And the College of Engineering (Carnegie Institute of Technology) is one of the foremost engineering schools in the United States. Its partnerships with industry and its inter-disciplinary research initiatives produce graduates who know how to transfer their fundamental knowledge to industrial practice.

The College of Fine Arts, home to the oldest school of drama in the nation, claims an outstanding roster of artists, producers, actors and designers among its graduates. The College of Humanities and Social Sciences explores the human experience through programs as diverse as cognitive neuroscience and creative writing. The Mellon College of Science is home to researchers who are leading inventive programs and research centers dealing with computational biology, molecular biosensors and imaging, nuclear magnetic resonance, polymer chemistry, green chemistry, computational finance and astrophysics.

The School of Computer Science leads the world in computing, artificial intelligence, human-computer interaction, machine translation and robotics. Its Robotics Institute, founded in 1979, was the first in the world to offer a doctoral degree in robotics.

Each of these schools is a leader in its field. And the points where they intersect are the places that engage Carnegie Mellon’s unique culture: creative minds collaborating to solve the most important problems facing the nation and world.
Carnegie Mellon has been a multifaceted institution throughout its existence. The original Carnegie Technical Schools, founded in 1900, comprised four colleges spanning the arts, sciences and vocations. As it later evolved into the Carnegie Institute of Technology, it became a national leader in fields as disparate as engineering and drama. In 1967, it merged with the Mellon Institute for Industrial Research, resulting in the modern Carnegie Mellon University. Today, the school has branch campuses in California and the Middle East and degree programs in six countries across the world.

Carnegie Mellon’s main campus comprises 103 acres in Pittsburgh’s vibrant Oakland neighborhood, where many of the city’s major cultural and scientific institutions are located. Close to 11,000 students and 1,200 full-time faculty conduct their studies here, and Pittsburgh’s long history as an American hub of industrial engineering, finance and arts-oriented philanthropy provides an appropriate backdrop for the university’s current innovative pursuits. The campus contains more than 50 academic, research and administrative buildings and three libraries. Resource sharing between Carnegie Mellon and other local universities provides students with almost unlimited information resources. What’s more, the campus is committed to environmental practices, building new LEED-certified dorms and buying electricity from a regional wind farm.

Carnegie Mellon West graduated its first class in August 2003, with 17 students receiving master’s degrees in information technology with specializations in software engineering, e-business technology and the learning sciences. The campus is located at NASA Ames Research Park in Silicon Valley, California; established in September 2001, it is designed to provide an educational experience that closely simulates the real-world work environment for which students are preparing. Students enrolled in master’s of science programs at Carnegie Mellon West have worked as interns and collaborative partners with major West Coast technology-research entities such as the SAP Corporate Research Center in Palo Alto and the NASA-sponsored High-Dependability Computing Project.

In 2003, Carnegie Mellon entered into an agreement with the Qatar Foundation to offer its highly ranked undergraduate programs in computer science and business at a campus in Qatar’s Education City. “This is an extraordinary opportunity to make contributions to the region and to the world,” said University President Jared L. Cohon. With this agreement, Carnegie Mellon joins other institutions such as Cornell University, Georgetown, Texas A&M, Northwestern, and Virginia Commonwealth University on the 2,400-acre, multi-institutional Education City in Doha, Qatar’s capital - the largest, comprehensive world-class campus in the Middle East. All development costs are being borne by the Qatar Foundation. Chuck Thorpe, one of the world’s leading robotics researchers, is the Doha campus’ first dean.
ADELAIDE, AUSTRALIA
www.heinz.cmu.edu.au

Carnegie Mellon became Australia’s first international university when the Heinz School and the Entertainment Technology Center (ETC) began operations in Adelaide in 2006. The Entertainment Technology Center at Carnegie Mellon offers an interdisciplinary master’s degree program with the College of Fine Arts (CFA) and School of Computer Science (SCS). The program focuses on honing students’ existing skills and teaching them to work effectively with other professional groups. Carnegie Mellon is the only university to offer the MET degree. Carnegie Mellon’s Heinz School Australia will offer the Master of Science in Information Technology and Master of Science in Public Policy and Management degrees.

KOBE, JAPAN
http://www.ini.cmu.edu/degrees/kobe_msit-is/index.html

In the fall semester of 2005, in collaboration with Hyogo Institute of Information Education Foundation, the Information Networking Institute began offering the Master of Science in Information Technology - Information Security program (Kobe MSIT-IS) at Carnegie Mellon CyLab Japan in Kobe. The degree is a joint initiative between the College of Engineering’s Information Networking Institute (INI) and the H. John Heinz III School of Public Policy and Management. The MSIT-IS degree prepares students to become leaders in information security by blending education in information security technology, business management and policy.

LISBON, PORTUGAL
www.ini.cmu.edu/programs/lisbon_msit-is/index.aspx

The Information Networking Institute offers the Master of Science in Information Technology - Information Security (MSIT-IS) program in Lisbon, Portugal, in partnership with Faculdade de Ciências, Universidade de Lisboa. The Lisbon MSIT-IS degree gives students advanced knowledge in security and dependability to prepare them to be leaders in industry and government. Coursework takes place at the University of Lisbon and uses a hybrid distributed education format that combines locally taught courses with courses taught from Carnegie Mellon via video conferencing technologies. The program confers degrees from both universities upon successful completion.

SOFTWARE ENGINEERING INSTITUTE
www.sei.cmu.edu

The Software Engineering Institute (SEI) is a federally-funded research and development center that helps others improve their software engineering capabilities. To fulfill this mission, SEI works with the research community to help create and identify new and improved practices, works with leading-edge software developers and acquirers to apply and validate new and improved practices and works through the global community of software engineers to amplify the impact of new and improved practices by encouraging and supporting their widespread adoption.

PITTSBURGH SUPERCOMPUTING CENTER
www.psc.edu

The Pittsburgh Supercomputing Center houses the most powerful computing system in the world dedicated to non-classified research. Funded by the National Science Foundation and available to scientists and engineers nationwide, its research capabilities bear on a wide range of important problems such as earthquake modeling, storm-scale weather forecasting, global climate change and protein genomics. A joint effort of Carnegie Mellon and the University of Pittsburgh together with Westinghouse Electric Company, the PSC is a leading partner in TeraGrid, the NSF’s cyberinfrastructure program.

ROBOTICS INSTITUTE
www.ri.cmu.edu

Carnegie Mellon’s Robotics Institute is a world leader in basic, fundamental and applied research in robotics technologies relevant to industrial and social tasks. Established in 1979 to combine practical and theoretical work in the field, it now hosts nearly 200 researchers working on some 150 projects ranging from applied manufacturing to medical robotics. Total sponsored project expenditures for FY04 were $40 million, with funding provided by the Department of Defense, NASA, the NSF and other federal and industry sponsors.
Carnegie Mellon has approximately 1,200 full-time and 170 part-time teaching and research faculty members with a student-faculty ratio of 10:1. Approximately 96 percent of faculty members have a Ph.D. or equivalent degree in their field. These professors, instructors and lecturers are in the classroom, lab, studio or work-place creating new knowledge on a daily basis with their students. Ninety-nine percent of all undergraduate classes are taught by faculty; more often than not, they teach both undergraduate and graduate courses. Undergrads have the opportunity to work on ground-breaking research projects with these award-winning faculty members, who frequently include Nobel Laureates as well as top U.S. government advisors.

The faculty at Carnegie Mellon includes some of the nation’s most accomplished scientists, scholars and artists. Here are just a few of the world-changing pioneers who work and teach on campus:

**Illah Nourbakhsh** and **Randy Sargent**, in collaboration with scientists at NASA’s Ames Research Center, have built a low-cost robotic device that enables any digital camera to produce breathtaking gigapixel panoramas, called GigaPans. **Sheldon Cohen** is one of the world’s most cited authors in the areas of psychology/psychiatry and social sciences. His work focuses on the roles of stress and social support systems in health and well-being.

**Kiron Skinner** holds a number of key positions in Washington, D.C. She was a member of former Defense Secretary Donald Rumsfeld’s Defense Policy Board and was its representative on Sec. Rumsfeld’s Defense Practice Implementation Board. **George Loewenstein** is among the founding fathers of decision science, a field that was pioneered at Carnegie Mellon by the late Herbert A. Simon. Loewenstein’s ground-breaking research examines the influence that emotions and other psychological factors have on economic decision-making.

**Barbara MacKenzie-Wood** traveled to South Africa for three weeks to create and lead one of the first theater programs for World Camps, an international organization that assists African children affected by AIDS.

**Tiziana Di Matteo’s** research interests focus on studying black holes. Her research encompasses a wide range of topics, including theoretical studies of the interplay between black hole growth and galaxy formation. **David Yaron** developed the Chemistry Collective, a project in the NSF’s National Science Digital Library and the Pittsburgh Science of Learning Center, that supports a community of innovative instructors interested in improving chemistry education through interactive and engaging online activities.

**Bahar Biller** focuses on the development of new simulation methodology of global supply chains, operational risk modeling and queuing theory. **Linda Babcock** provides expertise in negotiation and conflict resolution to numerous public sector, not-for-profit organizations and private sector organizations. Her work on women and negotiations, studying the workplace intersections of economics and psychology, has been discussed in hundreds of newspapers, magazines and television shows in the United States and abroad.
JENDAYI FRAZER RECEIVES LIBERIAN HUMANITARIAN AWARD

Carnegie Mellon University Distinguished Service Professor Jendayi Frazer, a leading architect of U.S.-Africa policy over the last decade, has been awarded the Distinction of Dame Grand Commander in the Humane Order of African Redemption by Liberia’s President, Ellen Johnson Sirleaf. The award, given for exemplary humanitarian work, was presented to Frazer for her work in the U.S. government to end Liberia’s civil war and restore peace and democracy to the country. She received the award, one of the most prestigious honors that the president can bestow, as part of Liberia’s 163rd Independence Day celebration on July 21.

PROFESSOR C. FRED HIGGS III AWARDED NEWKIRK AWARD

Carnegie Mellon University’s C. Fred Higgs III has won the prestigious 2010 Newkirk Award from the American Society of Mechanical Engineers (ASME) for his cutting-edge research in particle flow related tribology. Tribology, the study of interacting, moving surfaces, is an important field to a variety of industries, including the semiconductor and energy sectors and the biomedical arena. The award, which consists of a $1,000 honorarium and a certificate, was presented during the October 2010 International Joint Tribology Conference, in San Francisco.

PROFESSOR ROBERT SIEGLER AWARDED A $10 MILLION GRANT FROM THE DEPARTMENT OF EDUCATION

The Institute of Education Sciences, a research branch of the U.S. Department of Education, has awarded a $10 million grant to Carnegie Mellon University Professor Robert Siegler. The grant will fund a five-year research and development center aimed at understanding the difficulties students have in math. Siegler, along with two other colleagues, will run the Center on Improving Mathematics Instruction for Students with Mathematics Difficulties, which will be administered at the University of Delaware.

PROFESSOR RALPH HOLLIS NAMED A RECIPIENT OF 2010 R&D 100 AWARD

A magnetic levitation haptic interface invented by Carnegie Mellon’s Ralph Hollis, a professor in the Robotics Institute, is the recipient of a 2010 R&D 100 Award, presented by R&D Magazine to recognize the 100 most technologically significant products of the past year. The maglev haptic interface, which has been under development in Hollis’ lab since 1997, enables computer users to manipulate or interact with virtual or remote environments using their sense of touch. It provides highly realistic feedback so users can perceive textures, feel hard contacts and notice even slight changes in position. Users are working on applications for controlling remote robots and as a simulation technology for dental training and biopsy needle insertion.

DAVID DZOMBAK TO CHAIR NEW NATIONAL RESEARCH COMMITTEE

Carnegie Mellon University’s David A. Dzombak has been named chair of a new National Research Council (NRC) Committee, which will provide advice to the U.S. Army Corps of Engineers on scientific, engineering and water resource issues. Dzombak said the committee will develop a series of reports to help the Army Corps of Engineers anticipate and prepare for emerging water resource challenges. In addition to working with the Corps, the committee will work with experts and representatives from other federal agencies, including U.S. congressional staffers, state governments and the private sector.
Carnegie Mellon encourages students to think outside the bubble of academia. Our students come from all 50 states and 90 countries, and thanks to our Undergraduate Research Initiative, they’ve helped design robots for NASA, invented information-access tools for people with disabilities and analyzed the pollution on the surfaces of skyscrapers. This hands-on approach serves students well. Upon graduation, they already know how to make waves in the world. In recent years, alumni have conducted symphonies, written the new language of the Internet, served as national news correspondents and won the Nobel Prize in Physics. And with over 84,000 Carnegie Mellon grads spread throughout the world, alumni are able to provide mutual support, guidance and friendship no matter where they are.

### Degree students
- Undergraduate: 5,951
- Master: 3,670
- Doctoral: 1,750

### Gender
- Male: 7,308
- Female: 4,135

### Continent of origin
- Africa: 41
- Asia: 2,595
- Australia/Oceania: 54
- Europe: 276
- South/Central America: 84
- North America: 7,251

### Freshman admissions
- Applied: 14,153
- Admitted: 5,132
- Enrolled: 1,423

### Freshman SAT scores (average range)
- Math: 610-800
- Verbal: 600-780
- Writing: 610-760
- Total: 1820-2340

### Total degrees granted
- Bachelors: 1,349
- Masters: 1,761
- Doctorates: 245
- Total: 3,355

Source: Carnegie Mellon/Factbook
AKINSANMI RECEIVES SCHLUMBERGER FOUNDATION FELLOWSHIP GRANT

Carnegie Mellon University’s Eyiwunmi Akinsanmi has received a prestigious fellowship award from the Schlumberger Foundation. Akinsanmi, 25, who is studying for a Ph.D. in the Department of Engineering and Public Policy (EPP), has become a fellow of the Faculty for the Future and was awarded a grant of up to $50,000 for the next three years for developing tools to solve the energy and development needs of Sub-Saharan Africa. Akinsanmi said her research project ultimately will take her back to Nigeria where she wants to help solve the lighting problems currently suffered by millions of people with intermittent access to the electric grid.

FULBRIGHT SCHOLARS

Alumni Nathan Hall of Pittsburgh, James Harrell of Freedom, Pa., and Megan Larcom of Middletown, R.I., will each travel to Iceland, Hungary and Egypt, respectively, during the 2010-2011 academic year as part of the Fulbright Scholarship’s U.S. Student Program.

ROBB SERVES AS JUDICIAL INTERN FOR SUPREME COURT

Andrew Robb, a senior majoring in ethics, history and public policy at Carnegie Mellon University, served as a judicial intern at the Office of the Counselor to the Chief Justice of the Supreme Court of the United States. The Office of the Counselor assists Chief Justice John G. Roberts Jr. in his overall management of the Supreme Court. The counselor serves as a liaison for the chief justice, not only within the federal judiciary, but also with the executive and legislative branches. Robb was one of two judicial interns this summer that worked under the direction of the Supreme Court fellow.

NATIONAL FINALIST IN US GREEN BUILDING COUNCIL’S DESIGN COMPETITION

Wui-Joon Ha, a fifth-year architecture student at Carnegie Mellon University, has been selected as both the local student winner and a national finalist for the U.S. Green Building Council’s (USGBC) 2010 Natural Talent Design Competition. Ha designed an affordable Leadership in Energy and Environmental Design (LEED) Platinum house that will be one of four homes built in New Orleans’ Broadmoor neighborhood this fall.
Carnegie Mellon University School of Design and UPMC Saint Margaret Family Health Centers. Funded by The Heinz Endowments, the team has started to understand and define a method that has effectively integrated schools, doctors’ offices, and family centered community activities, providing them with affordable, easy to use health communications and services. Much of their time has been spent actively coordinating efforts in schools, doctor’s offices and family centered activities in the community to turn healthy lifestyle knowledge into action.
http://fitwits.org

Fitwits Program creates resources for healthy living at the intersection of families, schools, and community health services.

Fitwits is a collaborative research project designed by Carnegie Mellon University School of Design and UPMC Saint Margaret Family Health Centers. Funded by The Heinz Endowments, the team has started to understand and define a method that has effectively integrated schools, doctors’ offices, and family centered community activities, providing them with affordable, easy to use health communications and services. Much of their time has been spent actively coordinating efforts in schools, doctor’s offices and family centered activities in the community to turn healthy lifestyle knowledge into action.
http://fitwits.org
### Championing Service Learning and Educational Outreach

Carnegie Mellon’s Leonard Gelfand Center for Service Learning and Outreach cooperates with the university’s academic departments to provide more than 75 unique educational opportunities a year for local teachers and students. Although the university does not have a school or department of education, Carnegie Mellon has unique resources, perspectives and expertise to help our society revitalize education by providing experiences that lead to enhanced in-depth content knowledge for teachers and students. In addition, the Gelfand Center, directed by Assistant Vice Provost for Educational Outreach Judith Hallinen, allows Carnegie Mellon students to work with non-profit, civic and other agencies in the community through courses and projects that integrate academic content and community service to meet the needs of the organization while providing a context-based educational experience.

Here, individuals and groups with innovative ideas and strong commitment have sparked an intellectual revolution among thousands of children - from pre-school students through high school seniors. Carnegie Mellon students tutor primary, middle and secondary school students in academic subjects and the fine arts, and mentor young children seeking a successful future through education. Teachers work alongside campus researchers who are solving modern-day problems such as how to create new tissue to repair a damaged organ, or how to safely intervene when biological hazards threaten to harm thousands. Elementary, middle and high school students are made aware of cutting-edge technology in the fields of chemistry, computer science, robotics, engineering and mathematics. Individuals complete requirements for Pennsylvania certification in Music Education, Educational Leadership, and Educational Technology Management.

The dedication of human and technological resources to create and disseminate knowledge through research, artistic expression, teaching and learning, and to transfer this new knowledge to society is the mission of our institution. [http://gelfand.web.cmu.edu](http://gelfand.web.cmu.edu)

### Carnegie Mellon Launches $7 Million Initiative Using Robots To Boost Science, Technology Majors

A new four-year, $7 million educational initiative by Carnegie Mellon University will leverage students’ innate interest in robots and other forms of “hard fun” to increase U.S. enrollments in computer science and steer more young people into scientific and technological careers. The initiative, called Fostering Innovation through Robotics Exploration (FIRE), is sponsored by the Defense Advanced Research Projects Agency (DARPA) and designed to reverse a significant national decline in the number of college students majoring in computer science, science, technology, engineering and mathematics (CS-STEM). FIRE will develop new tools that enable middle and high school students to expand upon their interest in robots, leading them from one CS-STEM activity to the next.

### Carnegie Mellon’s Steinbrenner Institute Helps Heritage Community Initiatives Grow Green Collar Jobs

Carnegie Mellon University’s Steinbrenner Institute for Environmental Education and Research is helping Heritage Community Initiatives in Braddock, Pa., to retrain local workers to create a pool of green collar employees and boost both local economic growth and energy efficiency. The MOVE-IT Job Training Program is designed to provide skills to workers in order to help them obtain green jobs among industries looking to reduce energy consumption and environmental damage through more efficient use of the planet’s natural resources. The program has spawned a wonderful collaborative effort that will send these workers into a variety of industry sectors spanning green construction, deconstruction, demolition, recycling and home energy retrofits.

### Conflict Kitchen Launches New Cuisine, Highlights Different Country

Conflict Kitchen is a take-out restaurant run by School of Art faculty and students that only serves cuisine from countries that the United States is in conflict with. The food is served out of a storefront in the neighborhood of East Liberty, which rotates identities every four months to highlight another country. Each Conflict Kitchen iteration is augmented by events, performances and discussion about the culture, politics and issues at stake with each country focused on. They are currently presenting the second iteration of Conflict Kitchen via Bolani Pazi, an Afghan restaurant that serves a savory homemade Afghan turnover filled with pumpkin, spinach, lentils or potatoes and leeks. Developed in collaboration with members of the Afghan community, the bolani comes packaged in a custom-designed wrapper that includes interviews with Afghans both in Afghanistan and the United States on subjects ranging from Afghan food and culture to the current geopolitical turmoil. [www.conflictkitchen.org](http://www.conflictkitchen.org)
More than 50 years ago, it was Carnegie Mellon that showed the world another way – a more strategic way – to succeed in business. Bringing together the university’s leadership strengths in business management, computer modeling, organizational behavior and economic theory, the faculty team envisioned a business model built on a more sophisticated, scientific approach. A new academic principle was born, and nobody could have predicted the sweeping, worldwide influence that management science would create as a revolutionary model. Today’s business school standard combines both the case study and management science approaches as a basis for cutting-edge curriculum. Tepper School graduates know how to leverage management science to make better, smarter, innovative decisions.

**Center for Business, Technology and the Environment:** This center highlights the relevance of historical studies to understanding present-day concerns and formulates sound policies related to business, technology and the environment. Examples of such work include demonstrating how the development of transportation infrastructure influences regional economic growth; examining the relative successes and failures of past public and private policy initiatives in areas like economic development and land use planning; exploring the history of particular sites to appraise them for environmental risks (such as soil and subsoil contamination); assessing the impacts of new technology on business, society and the environment; and developing long-term trends in various environmental quality measures to provide benchmarks for current environmental policy.

www.history.cmu.edu/research/Btectr.html

**Center for Economic Development:**
The Carnegie Mellon Center for Economic Development (CED) provides the research and policy intelligence to foster an innovative region. Its research focuses on four key areas: technology, entrepreneurship, talent and the role of universities in innovation. Services include technical assistance in policy and strategy to guide economic analysis and modeling, mapping, benchmarking and timely analysis of key issues. www.cmu.edu/ced/index.html

**The Donald H. Jones Center for Entrepreneurship:** Recognized as one of the top entrepreneurship centers in the country, the center has been offering exceptional graduate, undergraduate and continuing education programs since its inception in 1990 (though entrepreneurship has been taught at the university since 1972). The Jones Center’s programs teach budding entrepreneurs how to construct successful business strategies into business plans, build effective management teams, attract the required investment capital, market their products or services and manage a rapidly growing business.

**Institute for Complex Engineered Systems**
Institute for Complex Engineered Systems (ICES) acts as an agent within Carnegie Mellon University to stimulate growth and new directions in multidisciplinary research. In this capacity, ICES is an engine for economic development and a critically important asset to southwestern Pennsylvania. The research areas not only respond to the changing needs of society, but also focus on new and ground-breaking initiatives, such as the Center for Sensed Critical Infrastructures (CenSCIR) and the Center for Nano-enabled Device and Energy Technologies (CNXT). Since its emergence from EDRC (Engineering Design Research Center) in 1997, ICES has capitalized on a solid foundation of multidisciplinary, engineering design research. New technologies fostered within ICES include advanced infrastructure monitoring, computational fluid dynamic modeling of arteries, enterprise wide optimization, integrated microsystems, software reliability, thermal management, and wearable computers. The establishment of new research centers and research thrusts remain an essential function as we expand our commitment to multidisciplinary research, systems thinking and industry collaboration within the College of Engineering and across all colleges at Carnegie Mellon. http://www.ices.cmu.edu
Pennsylvania Infrastructure Technology Alliance (PITA)
PITA is a Pennsylvania Department of Community and Economic Development (DCED) program designed to provide economic benefit to Pennsylvania through knowledge transfer, the discovery of new technologies, and the retention of highly educated students. It is a collaboration between the Commonwealth of Pennsylvania, the Center for Advanced Technology for Large Structural Systems (ATLSS) at Lehigh University, and the Institute for Complex Engineered Systems (ICES) at Carnegie Mellon University. PITA’s research and education projects involve Pennsylvania companies, faculty, and students. Its programs have lead to the creation and implementation of numerous cutting-edge technologies in Pennsylvania companies and have also enabled several start-up companies to form within the Commonwealth. www.pitapa.org

Center for Interactive Simulations: It is here that the Management Game was pioneered, an exercise that matches groups of students with an outside board of directors to solve a real problem faced by the company. Each team acts as senior management of a simulated manufacturing company for three years. Teams compete against each other as they add value to their companies. http://managementgame.tepper.cmu.edu/

Carnegie Bosch Institute for Applied Studies in International Management: The information revolution has made managing business on an international scale increasingly complex. A unique alliance between Carnegie Mellon’s business school and the Robert Bosch Group, one of Germany’s leading multinational, industrial companies, this center supports research and education in international management to educate and develop globally-minded managers and to foster international cooperation. The Institute funds a series of research projects and conferences focused on improving the management of international corporations. In addition, the Institute has established innovative executive education programs specifically targeted to meet the needs of global companies. http://cbi.gsia.cmu.edu

Green Design Institute: A major interdisciplinary effort, the GDI encourages safe economic growth by developing pollution-preventing green design tools for industry, government and the public. Research programs aim to reduce environmental damage by lowering environmental discharges, minimizing the use of non-renewable resources and reducing the use of renewable resources to sustainable levels. The GDI partners with industrial corporations, foundations and government agencies to develop joint research and education programs which improve environmental quality while encouraging sustainable economic development. www.ce.cmu.edu/GreenDesign

Institute for Software Research International: ISRI creates innovative solutions to the problems of practical, large-scale high-quality software-intensive systems for the new millennium. The primary focus is on systems that exploit the growing infrastructure for high performance, nearly ubiquitous in computing and communication, especially systems that the public depends on for services provided through the electronic marketplace. www.isri.cs.cmu.edu

Information Networking Institute: The first educational and research institute in the nation to be concerned with the movement of information over private and public networks, the INI enables end users to conduct business and communicate interactively in multiple media, voice, data, text, image and video. The Institute examines policy and technical and economic issues of all means of information sharing. This institute is a multi-disciplinary approach to the problems and opportunities presented by computer communications and networking. www.ini.cmu.edu

Center for International Corporate Responsibility: Recognizing the important role of business ethics in the global economy, this center aims to raise awareness and increase understanding of the global consequences of corporate decisions. Building on Carnegie Mellon’s legacy as a leader in business ethics research and education, the center organizes conferences on corporate responsibility with participants from around the world, publishes scholarly books and articles on international business ethics and incorporates ethics courses and training into Tepper’s curriculum. http://ba.gsia.cmu.edu/cicr

Allan Meltzer’s “History of the Federal Reserve, Volume Two” Offers Thoughtful Look Back and Vision for the Future

Monetary policy has done what it can to help the recovery ... [It] was easy to get into a pattern of activity where we think that, by just easing money or increasing expenditures or raising a deficit, we can achieve certain things.” So said Federal Reserve Chairman William McChesney Martin Jr. in 1962, advocating for tighter economic policy in the wake of recession. This seemingly familiar passage—one of thousands cited in “A History of the Federal Reserve, Volume 2” (University of Chicago Press, 2010) by world-renowned economist Allan H. Meltzer—serves as a reminder of how in-depth knowledge about the past can help inform key decisions affecting the future. Meltzer serves as The Allan H. Meltzer University Professor of Political Economy at the Tepper School of Business at Carnegie Mellon University. He is widely considered the preeminent expert on the Federal Reserve System, and his first volume of this history, published in 2003, has been lauded as the landmark work on the U.S. central banking system.

Allan H. Meltzer
A HISTORY OF THE
Federal Reserve

Allan H. Meltzer
A HISTORY OF THE
Federal Reserve
VOLUME 2.  BOOK 2.  1982-1996

Allan H. Meltzer
A HISTORY OF THE
Federal Reserve
As the first university to officially form a Computer Science department, Carnegie Mellon helped define and continually redefines the field. Here, it has always been more than software and code. It’s robots exploring planetary terrain. It’s enabling people speaking six different languages to communicate easily with each other by speaking into translating computers. It’s elementary school students getting help in algebra from computer tutors.

Home to the largest terascale computer in the world dedicated to non-classified research and the world’s premier computer incident response team, Carnegie Mellon and its School of Computer Science are sure to lead the world in computer science innovation for years to come. Detailed here are a number of the university’s largest and most recent research initiatives.

**Fruit Fly Nervous System Provides New Solution To Fundamental Computer Network Problem**

The fruit fly has evolved a method for arranging the tiny, hair-like structures it uses to feel and hear the world that’s so efficient a team of scientists in Israel and at Carnegie Mellon University says it could be used to more effectively deploy wireless sensor networks and other distributed computing applications. Having devised an algorithm based on the fly’s nervous system, the researchers have concluded that it provides a fast solution to the MIS problem. Additionally, because the biological approach doesn’t require so many assumptions the solution is applicable to many more applications.

**Center for Automated Learning and Discovery:** CALD’s mission is to pursue basic science in automated learning methods, including data mining, statistical methodology and knowledge discovery driven by applications to problems of societal importance. New algorithms and theories developed here are being applied to areas like industrial process control, DNA sequencing, environmental assessments, information filtering and government statistical surveys. [www.cald.cs.cmu.edu](http://www.cald.cs.cmu.edu)

**Robotics Institute:** Even when robotics technologies were relatively primitive, their potential role in boosting the productivity and competitiveness of the United States was foreseen in the evolving global marketplace. The Robotics Institute at Carnegie Mellon University was established in 1979 to conduct basic and applied research in robotics technologies relevant to industrial and societal tasks and is recognized worldwide as one of the premier organizations of its kind. [www.ri.cmu.edu](http://www.ri.cmu.edu)

**Entertainment Technology Center:** A joint computer science and fine arts research endeavor, this center strives to provide a new model for interactive multimedia entertainment by incorporating technologies like artificial intelligence, speech recognition, and advanced learning technologies with the fine arts. [www.etc.cmu.edu](http://www.etc.cmu.edu)

**Human Computer Interaction Institute:** The largest and most diverse group of HCII researchers anywhere in the world, research at the Institute is devoted to the design, implementation and evaluation of interactive computer-based technology. HCII researchers have developed more than 20 generations of wearable computers, systems that combine wireless with handheld technologies. [www.hcii.cmu.edu](http://www.hcii.cmu.edu)
Organ Network Uses Carnegie Mellon Algorithm To Match Live Kidney Donors With Recipients

A computer algorithm developed at Carnegie Mellon University matched living kidney donors with medically compatible transplant candidates at the October 2010 national Organ Procurement and Transplantation Network (OPTN). The initial run of the computer matching process included just 43 kidney transplant candidates and 45 potential living donors, but a national kidney paired-donation (KPD) pool eventually could include as many as 10,000 donor-recipient pairs. “A unified nationwide exchange can yield significantly better solutions than multiple separate exchanges, and it is extremely rewarding that after we have worked on this for six years, the nationwide program is now live,” said Tuomas Sandholm, a Carnegie Mellon professor of computer science who has led the development of computer algorithms for optimizing match runs.

Pittsburgh Supercomputing Center: The PSC houses the most powerful computing system in the world dedicated to non-classified research. Funded by the National Science Foundation and available to scientists and engineers nationwide, its research capabilities bear on a wide range of important problems such as earthquake modeling, storm-scale weather forecasting, global climate change and protein genomics. www.psc.edu

Language Technologies Institute: This center draws on Carnegie Mellon’s long-standing accomplishments in the natural language processing of written and spoken language and information management to make language barriers a thing of the past. Speech translation systems developed here have made it possible for multilingual communication over the Internet and have aided the military’s need to translate foreign languages while in the field. www.lti.cs.cmu.edu

Laboratory for International Data Privacy: By partnering with institutions, agencies and corporations facing real-world privacy concerns, the “Data Privacy Lab” is dedicated to creating technologies and related policies with provable guarantees of privacy protection while allowing society to collect and share private (or sensitive) information. Work involves developing ways to learn sensitive information from disparate and seemingly innocent information and constructing solutions; the Data Privacy Lab seeks balanced, integrated solutions that weave technology and policy together. http://privacy.cs.cmu.edu

Creative Technology Nights for Girls: A free weekly program focused on exposing middle and high school girls to creative technologies, Creative Technology Nights uses computer animation, Web design, programming, robotics and interactive media, taught by graduate students from the School of Computer Science, to engage a future generation of women in technology. In addition, students are encouraged to socialize through a variety of social events such as movie nights, open houses and Bring-Your-Mother-to-Work-Night to create an alternative social space for female students pursuing technology. http://createtechnights.com

Carnegie Mellon Researchers Break Speed Barrier in Solving Linear Systems

Computer scientists at Carnegie Mellon have devised an innovative and elegantly concise algorithm that can efficiently solve systems of linear equations that are critical to such important computer applications as image processing, logistics and scheduling problems, and recommendation systems. Solving these linear systems can be time consuming on even the fastest computers. The new algorithm employs powerful new tools from graph theory, randomized algorithms and linear algebra that make stunning increases in speed possible. The algorithm, which applies to an important class of problems known as symmetric diagonally dominant (SDD) systems, is so efficient that it may soon be possible for a desktop workstation to solve systems with a billion variables in just a few seconds.
When it comes to issues of the environment and sustainability, Carnegie Mellon practices what it preaches. By helping to create a market for wind power, building energy efficient dorms and labs and applying its expertise to overcoming regional environmental challenges, the university imparts environmental awareness to not only its students, but the greater community. In energy, for example, microturbines designed at Carnegie Mellon can run on everything from palm oil to manure gas. Researchers are finding economic value in wind power and waste reduction, old industrial sites are being rebuilt into upscale neighborhoods with Carnegie Mellon’s assistance and green design is making the 21st-century workplace both safer and more effective.

Electricity Industry Center: Supported by a grant from the Sloan Foundation and the Electricity Research Power Institute, the goal of this center is to foster change in the electricity industry, its regulation and the way that industry stakeholders think about opening new businesses and bringing new insights to public policy. Here, researchers work with companies, labor, regulators, the financial community, consumers and technologists to make the electricity industry more competitive and its systems more reliable and secure, to create wealth and to serve the public interest better by enhancing human resources, speeding organizational learning and improving its regulatory environment. www.cmu.edu/ceic

Census Data Research Center: The CDRC provides researchers with access to detailed and confidential economic and demographic data collected by the Bureau of Census. The center’s mission is to turn the power of this research on immediate issues of public interest, such as the relationship between environmental regulation, economic activity and levels of pollution; causes and effects of regional economic growth; and the relationship between economic growth and crime.

Center for Business, Technology and the Environment: This center highlights the relevance of historical studies to understanding present-day concerns and formulating sound policies related to business, technology and the environment. Examples of such work include demonstrating how the development of transportation infrastructure influenced regional economic growth, exploring the history of particular sites to appraise them for environmental risks (such as soil and subsoil contamination) and developing long-term trends in various environmental quality measures to provide benchmarks for current environmental policy. www.history.cmu.edu/research/btectr.html

Masters Degree Program in Energy, Science, Technology and Policy
Carnegie Mellon University’s College of Engineering, has launched an innovative new graduate program to produce tomorrow’s energy leaders. The ESTP program covers a wide range of issues, including national and global socioeconomic issues that govern energy policy and legislation, the fundamental scientific principles governing and limiting energy conversion and transport, and the technical and regulatory barriers that exist today for developing future power systems. Graduates from the program will be provided with the skills to engineer new energy technologies that will improve efficiency, reduce environmental harm, increase sustainable power sources and build new infrastructure for distribution.

http://neon.materials.cmu.edu/energy

Carnegie Mellon University is part of a team that will receive up to $122 million over the next five years from the Department of Energy (DOE) to establish an Energy Innovation Hub focused on developing technologies to make buildings more energy efficient. The Energy Innovation Hub will be located at the Philadelphia Navy Yard Clean Energy campus, and will bring together leading researchers from academia, two U.S. National Laboratories and the private sector in an ambitious effort to develop energy efficient building designs that will save energy, cut pollution and position the United States as a leader in this industry. The grant will support six Carnegie Mellon Ph.D. candidates per year who will work with faculty from the School of Architecture’s Center for Building Performance and Diagnostics and the departments of Civil and Environmental Engineering, and Electrical and Computer Engineering.

The Western Pennsylvania Brownfields Center: This multi-disciplinary center seeks to create new vitality and economic growth within urban areas by reusing former industrial sites that have been abandoned over time. Urban renewal, neighborhood planning and environmental mitigation and repair are all important components of the Brownfields Center’s research and the future of the urban areas it studies. www.cm.edu/steinbrenner/brownfields

Center for Integrated Study of Human Dimensions of Global Change: A coordinated research program between 22 institutes that seek to understand how human activity changes the preexisting environment, its research measures global temperature, atmosphere and land use to draw conclusions and better inform the public debate about future economic and social developments. www.hdgc.epp.cmu.edu

Green Design Institute: A major interdisciplinary effort, the Green Design Institute encourages safe economic growth by developing pollution-preventing green design tools for industry, government and the public. Research programs aim to reduce environmental damage by lowering environmental discharges, minimizing the use of non-renewable resources and reducing the use of renewable resources to sustainable levels. Partnerships with industrial corporations, foundations and government agencies develop joint research and education programs, which improve environmental quality while encouraging sustainable economic development, are a key component of this initiative. www.hdg.e.p.p.cmu.edu/GreenDesign

Institute for the Green Oxidation of Chemistry: This research, education and development center is studying ways to use “green chemistry” to deal with three major problem areas: renewable energy technologies, especially solar technologies; reducing reliance and dependence on fossilized carbon; and protecting the atmosphere by obtaining chemical feedstock from renewable resources and the replacement of polluting technologies with benign alternatives. www.chem.cmu.edu/groups/collins

Pittsburgh Supercomputing Center: The PSC houses the most powerful computing system in the world dedicated to nonclassified research. Funded by a $45 million National Science Foundation grant, the terascale system can process six trillion calculations per second. Available to scientists and engineers nationwide, its research capabilities bear on a wide range of important scientific problems such as earthquake modeling, storm-scale weather forecasting, global climate change and protein genomics. www.psc.edu

Intelligent Workplace: This “office of the future” is a living laboratory of the advanced workplace that serves as a test bed for innovations in building enclosure, design, HVAC and telecommunications systems. Located on top of one of the oldest buildings on campus, it was created to help researchers test and develop technologies to improve the office environment for the U.S. work force. As a “lived-in” office, the Intelligent Workplace provides a flexible environment to assess the performance of new products in an integrated, occupied setting. www.cmu.edu/architecture

Center for Building Performance and Diagnostics: The first center in the nation to focus on the building industry, the CBPD is engaged in ground-breaking work that investigates the impact of advanced technology on the physical, environmental, and social settings in office buildings. The CBPD receives support from the National Science Foundation, and is a NSF Industry/University Cooperative Research Center. www.arc.cmu.edu/cbpd

Advanced Building Systems Integration Consortium: Established in 1988, ABSIC is a university-industry-government partnership to pursue research, demonstration and development toward improving the quality and performance of commercial buildings and building systems. Consortium research topics range from increasing the satisfaction, health, well-being and productivity of a building’s occupants to improving the technological adaptability and energy efficiency of the building. www.cmu.edu/architecture

WaterQUEST Center: Newly established in 2005, the WaterQUEST Center is dedicated to the study of urban water quality. Co-directors Jeanne VanBriesen and David Dzombak point to current research that shows the health and quality of life of Americans in urban watersheds are at risk from antiquated water systems that are in need of upgrading and repair. WaterQUEST explores ways to keep our drinking water safe from sewage infiltration, pollution and leakage. www.ce.cmu.edu/~wquest

Center for the Environmental Implications of Nanotechnology (CEINT) CEINT is an interdisciplinary center within the Institute for Complex Engineered Systems (ICES). Funded by the National Science Foundation (NSF), the vision of this center is to elucidate the relationship between the vast array of nanomaterials and properties to their environmental and human health risks. Graduate students and faculty from seven departments within the Carnegie Institute of Technology and the Mellon College of Science study the occurrences, transport, transformations, fate, and toxicity of engineered nanomaterials in the environment, aiming to understand the potential environmental exposure, biological effects, and ecological consequences. www.ices.cmu.edu/ceint/index.html
Long before it was famous for robots and economics, Carnegie Mellon was already producing some of the world's best artists, designers, performers and architects. Now we’re combining our strengths in the arts, technology and the humanities to train a new kind of arts professional: one who is as tech-savvy and socially aware as creative. Our information technology program teaches the arts leaders of the future the skills to effectively manage a nonprofit organization. The Entertainment Technology Center, a joint endeavor between the schools of Fine Arts and Computer Science, is meshing the power of computers and the resonance of art to engage students in new ways of learning. Whether addressing the challenges of huge urban revitalization or of small arts management, Carnegie Mellon is at the focus of the marriage of arts and technology.

**Studio for Creative Inquiry:** Drawing on Carnegie Mellon’s unique strengths in the arts and technology, the Studio is recognized as a national model for an artist community within a research environment. Here, resident fellows, Carnegie Mellon students, faculty and others partner with community groups to produce innovative work, with the locus of activity based in three areas: biology (the relationship of biological and cognitive science with the human being), ecology (the connection of humanity within the larger environment) and robotics (the relationship of intelligent machine with the human being). Community partnerships represent a diverse mix of focuses from the Pittsburgh Children’s Museum to the National Black Programming Consortium to the City of Pittsburgh. [http://studioforcreativeinquiry.org](http://studioforcreativeinquiry.org)

**The Entertainment Technology Center:** A computer science and fine arts research center, the ETC strives to provide a new model for interactive entertainment by incorporating technologies like artificial intelligence, speech recognition and advanced learning technologies with the fine arts. [www.etc.cmu.edu](http://www.etc.cmu.edu)

**Center for Arts Management and Technology:** CMAT is a resource, training and service organization charged with investigating emerging technology and subsequent application to the field of arts management. Part of the H. John Heinz III College, CMAT success stories include the Arts and Culture Observatory, a database available to arts leaders, philanthropies, government agencies, scholars and others with objective, independently collected data based on the internal and external conditions of creative non-profit enterprises in the Pittsburgh region. [www.artsnet.org](http://www.artsnet.org)

**Urban Lab:** Here, the challenge of urban revitalization is met head on by students from Carnegie Mellon’s world-class public
Remaking Cities Institute and Entertainment Technology Center Unveil Technology and Research for an Oakland Way-finding Initiative

The Remaking Cities Institute (RCI) in the School of Architecture at Carnegie Mellon University developed several urban design and technical alternatives for way-finding systems, including analog and digital signage, interactive kiosks with touch screens, wireless data delivery to smart phones and laptop computers and real time transit and parking information. The Entertainment Technology Center (ETC) at Carnegie Mellon designed and fabricated a prototype kiosk installation. This research and technology is part of a way-finding initiative called Innovation Oakland lead by the Oakland Task Force in partnership with the Oakland Business Improvement District (OBID), Carnegie Mellon, Carlow University, UPMC and the University of Pittsburgh. “Innovation Oakland will provide direction and information for visitors and regular users, and will also demonstrate the integration of technology, design and public art,” said Donald Carter, director of the RCI. “A primary goal of the study is to put Oakland on the map internationally as the leading example of cutting-edge research and best practices for way-finding design and digital applications.” www.onlyinoakland.org/innovationoakland

Center for the Arts in Society: Arts and its relationship to the changing political and technological landscapes is explored at this center through projects seeking new perspectives from outside sources and by collaborating with local arts institutions and communities. Students and scholars explore pressing issues such as cultural production and social responsibility, as well as developing new disciplinary approaches — visual anthropology, public arts policy and statistical graphics — through coursework and research projects that take them out of the classroom and into the city. www.hss.cmu.edu/cas

Center for Building Performance and Diagnostics: The mission of the CBPD is to fundamentally improve the quality of the built environment. The first center in the nation to focus on the building industry, the CBPD is engaged in ground-breaking work that investigates the impact of advanced technology on the physical, environmental and social settings in office buildings. The CBPD receives support from the National Science Foundation and is a NSF Industry/University Cooperative Research Center. www.cmu.edu/architecture

Advanced Building Systems Integration Consortium: Established in 1988, the ABSIC is a university-industry-government partnership to pursue research, demonstration and development toward improving the quality and performance of commercial buildings and building systems. ABSIC conducts research, development and demonstrations for the purposes of increasing the satisfaction, health, well-being and productivity of occupants; enabling organizational change; and technological adaptability while improving cost, energy and environmental effectiveness. ABSIC has been created for the advancement of the North American building industry in pursuing the technologies and the settings needed for high-performance work environments. www.cmu.edu/architecture

Intelligent Workplace: This “office of the future” is a living laboratory of the advanced workplace that serves as a test bed for innovations in building enclosure, interior, HVAC and telecommunications systems. Located on top of one of the oldest buildings on campus, it was created to help researchers test and develop technologies to improve the office environment for the U.S. work force. Issues of health, individual comfort, organizational flexibility, motivation, productivity and efficiency are studied there. As a “lived-in” office, the Intelligent Workplace provides a flexible environment to assess the performance of new products in an integrated, occupied setting. www.arc.cmu.edu/cbpdd

Regina Gouger Miller Gallery: This gallery, on the campus of Carnegie Mellon University, has sought to support the creation, growth and understanding of contemporary art through exhibitions, projects, events and publications. The 9,000 square foot space functions less as a showroom for art, than one for experimentation, examination, discovery and discussion. The gallery aspires to engage diverse audiences, to create and strengthen communities through art, and to stimulate, provoke and encourage contemplation of the visual arts of our times. The Miller Gallery is a non-collecting facility located in the Purnell Center for the Arts on the main campus of Carnegie Mellon. It is named for Regina Gouger Miller, alumna of the School of Art, avid art collector and generous principal donor. http://millergallery.cfa.cmu.edu

The Computational Design Lab: Since the late 1960s, Carnegie Mellon’s School of Architecture has been a leading research center in computer-aided design. In the 1970s, researchers worked on models of design cognition, design automation and design databases. This agenda bore fruit in the CAD software that has revolutionized design practice. In the 1980s and 1990s, Carnegie Mellon was known for work in geometry, generative systems and collaborative design. Today the Computational Design Laboratory continues in this tradition of building experimental systems to explore ideas at the intersection of computation and design. http://code.arc.cmu.edu
Advances in computer and communications technologies have formed the basis for global economic growth and an increase in our standard of living for more than two decades. We rely on information technology in all aspects of our daily life, and with this reliance comes the need to make information systems more secure, trustworthy, sustainable, and available in the face of both intentional attacks and accidental faults. That’s why Carnegie Mellon launched CyLab, a broad new IT security initiative that builds on the university’s decades of leadership in the field, leadership cultivated at the institutes detailed on this page, from the Software Engineering Institute’s world-renowned CERT/CC computer emergency response team to the Laboratory for Data Privacy’s work to keep personal information safe and secure.

CyLab: Carnegie Mellon CyLab is a bold and visionary effort aimed at creating a public-private partnership to develop new technologies for measurable, available, secure, trustworthy and sustainable computing and communications systems and to educate individuals at all levels. CyLab is a university-wide, multi-disciplinary initiative involving more than 200 faculty, students and staff, and builds on more than two decades of Carnegie Mellon’s leadership in Information Technology. Through its close connection to the CERT/CC, CyLab also works closely with US-CERT, a partnership between the Department of Homeland Security’s National Cyber Security Division (NCSD) and the private sector, to protect our national information infrastructure. CyLab is an active participant in the Pittsburgh Regional Cyber Team, in which foundations, universities, businesses, and economic development organizations have conducted a path breaking analysis of the growth and development of the cybersecurity industry in the US.

www.cylab.cmu.edu

CERT Coordination Center: Established in 1988 as the first computer security incident response team, the CERT/CC is internationally recognized as a trusted reporting center for cyber security incidents and technology vul-

Carnegie Mellon Researchers Awarded NSF Grant to Develop Secure Internet Architecture

Researchers at Carnegie Mellon University will lead a three-year, $7.1 million effort sponsored by the National Science Foundation (NSF) to develop a next-generation network architecture that fixes security and reliability deficiencies now threatening the viability of the Internet. “Obviously, a lot of wisdom is embedded in the current Internet and we’ll retain that. But parts of it are clearly broken and can’t be fixed with incremental steps,” Peter Steenkiste, professor of computer science and electrical and computer engineering. The eXpressive Internet Architecture (XIA) Project, one of four new projects funded through the Future Internet Architecture Program of the NSF’s Computer and Information Science and Engineering (CISE) Directorate, will include features that will help users find the content they seek wherever it is most accessible, speeding information retrieval while easing network traffic.
Carnegie Mellon, FBI Announce Competition Promoting Internet Safety Awareness

Carnegie Mellon University and the Federal Bureau of Investigation today announced a national competition, in which students will share their knowledge about how to avoid dangers associated with Internet use by creating computer animations that promote safety concepts. The animation competition is the latest component of the FBI’s ongoing Safe Online Surfing (SOS) Program developed by the FBI’s Cyber Division and Nova Southeastern University. The SOS Program delivers critical Internet safety information to third- through eighth-grade students. More than 70,000 children in 41 states have completed the program, which fosters fun competition between local schools.

Center for Broadband and Wireless Networking: Founded in 2001, this interdisciplinary center is focused on research and education in advanced networking concepts and systems with an emphasis on industrial relevance. The center’s work melds many of Carnegie Mellon’s existing strengths including: interdisciplinary research, wired networks, wireless networks, and optical devices and signal processing. www.ece.cmu.edu/research/areas.html

Center for the Computational Analysis of Social and Organizational Systems: Using a mix of social and computer sciences, researchers at CASOS are attempting to understand and model the way groups are structured, communicate and interact. Through modeling of two distinct groups: the human group institution or society and the multi-agent artificial computational system, new insights into the fundamental principles of organizing, coordinating and managing multiple information processing agents are gained. The center currently has five research thrusts: organizational design; adaptation and evolution; social and organizational networks; e-commerce and validation and analysis. www.casos.cs.cmu.edu

Data Storage Systems Center: Founded in 1990, this NSF Engineering Research Center is considered to be the preeminent university-based research and education program in magnetic and magneto-optic recording technology in the United States. The main research thrusts are storage and computer systems integration, magnetic recording technology, magneto-optic recording technology and the electronic subsystems used in the above technologies. www.dssc.ece.cmu.edu

CMU Usable Privacy & Security Laboratory: CUPS was established in 2004 to bring together Carnegie Mellon researchers working on a diverse set of projects related to improving the usability of privacy and security software and systems. The privacy and security research community has become increasingly aware that usability problems severely impact the effectiveness of mechanisms designed to provide security and privacy in software systems. Indeed, one of the four grand research challenges in information security and assurance identified by the Computing Research Association is: “Give end-users security controls they can understand and privacy they can control for the dynamic, pervasive computing environments of the future.” This is the challenge that CUPS strives to address. CUPS is affiliated with Carnegie Mellon CyLab. http://cups.cs.cmu.edu

Entertainment Technology Center: The concept behind the ETC is to have technologists and fine artists work together to produce artifacts that are intended to entertain, inform, inspire or otherwise affect an audience/guest/player/participant. Despite the center’s name, a number of its projects have strong connections to national security issues, such as the fire fighting training simulation Hazmat: Hotzone; PeaceMaker, a video game simulation of the Israeli-Palestinian conflict that can be used as a tool to promote peaceful resolutions among Israelis, Palestinians, and young adults worldwide; and MySecureCyberspace for Kids, a collaboration with CyLab that aims to educate children about cyber security and instill in them good cyber citizen habits, so that being safe and secure online becomes as second nature as brushing their teeth or looking both ways before crossing the street. www.etc.cmu.edu

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Entertainment Technology Center: The concept behind the ETC is to have technologists and fine artists work together to produce artifacts that are intended to entertain, inform, inspire or otherwise affect an audience/guest/player/participant. Despite the center’s name, a number of its projects have strong connections to national security issues, such as the fire fighting training simulation Hazmat: Hotzone; PeaceMaker, a video game simulation of the Israeli-Palestinian conflict that can be used as a tool to promote peaceful resolutions among Israelis, Palestinians, and young adults worldwide; and MySecureCyberspace for Kids, a collaboration with CyLab that aims to educate children about cyber security and instill in them good cyber citizen habits, so that being safe and secure online becomes as second nature as brushing their teeth or looking both ways before crossing the street. www.etc.cmu.edu
Pittsburgh’s steel mills may have burned out long ago, but Carnegie Mellon’s technology is contributing to the city’s new status as a hotbed for biotechnology research and innovation. The university doesn’t have a medical school in the traditional sense, but its highly specialized biotechnology and cognitive studies programs are having an impact everywhere, from the operating table to the way we rehabilitate stroke victims.

Collaborations between Carnegie Mellon and other institutions have already resulted in better dyes and modeling for studying cells, a revolutionary approach to hip replacement surgery and a new understanding of how infants think. And, its educational programs are training the researchers that will lead the growth of these sectors into the future.

**Molecular Biosensor and Imaging Center:**
The MBIC’s approach to biosensor research promises to yield sophisticated molecular sensors that could be used to detect real-time behavior of the building blocks of life, including a subject’s RNA, DNA, protein, peptides, lipids and hormones. Biologist Alan Waggoner leads a team working on fluorescent probes, which use dyes to signal changes in target molecules. These sensors will provide a very powerful tool for detecting a wide range of important biological processes involved in health and disease. Likely applications for the technology are as varied as hospital bed monitoring devices, handheld biohazard scanners for field use and food freshness detectors.

**Center for Cognitive Brain Imaging:**
The CCBI investigates high-level cognition — language comprehension, problem-solving, visual thinking and executive processes — through the use of function magnetic resonance imaging (fMRI) and related approaches. Its research goal is to develop a unified theory that explains how thought emerges from brain function. The center uses state-of-the-art scanners at the new Brain Imaging Research Center, as well as behavioral studies, eye fixation studies and therapy studies of people with brain damage. The main applications are to the understanding and treatment of brain damage and to the enhancement of human performance in high-technology environments.

**Center for Automated Learning and Discovery:**
CALD applies machine-learning methods in order to classify the cognitive state of a human subject based on fMRI observations. That is, the project has successfully “trained” artificial-intelligence systems to determine from
brain images whether a subject is looking at a picture or a sentence, reading a noun or a verb, etc. Eventually, these systems will lead to "virtual sensors" that can detect hidden cognitive states of a subject, providing a key tool for diagnosis of mental processes in patients with brain injuries. www.cald.cs.cmu.edu

Center for the Neural Basis of Cognition: A joint endeavor of Carnegie Mellon and the University of Pittsburgh Medical Center (UPMC), the CNBC is dedicated to the investigation of the neural mechanisms that give rise to human cognitive abilities. UPMC serves a large population of patients with functional and/or neurological disorders, including epilepsy, stroke, Parkinson's disease, schizophrenia, affective illness and Alzheimer's disease, and employs state-of-the-art functional imaging techniques for identifying sites of neurological damage. Carnegie Mellon's expertise in cognitive psychology imparts another layer of scientific analysis of the psychological disturbances these patients experience. Using experimental computational models, our researchers can study the neural pathways of normal brains and uncover the effects of structural damage on brain function and human performance. www.cnbc.cmu.edu

Bone Tissue Engineering Center: The BTEC is a collaboration between Carnegie Mellon, the University of Pittsburgh Medical Center, Children's Hospital and Duquesne University. Its mission is to develop bone and cartilage therapies to treat developmental deformities, ablative injuries, degenerative changes, tendon/ligament healing, hypoplastic fat and vascular insufficiencies. The center also encourages the transfer of developed technologies and treatments to enable new biotech ventures. www.btec.cmu.edu

Laboratory for International Privacy: Carnegie Mellon's “Data Privacy Lab” is dedicated to creating technologies and related policies with provable guarantees of privacy protection while allowing society to collect and share private or sensitive information for many worthy purposes, such as biomedical research. The Lab partners with institutions, agencies and corporations to develop answers to questions such as: What are good and bad privacy practices for sharing DNA sequences? http://privacy.cs.cmu.edu

Real-time Outbreak and Disease Surveillance: RODS is a computer-based surveillance, analysis and communication system that monitors public-health data and looks for patterns that suggest an abnormal or hostile occurrence. In this way, it provides early warning of naturally occurring disease outbreaks as well as terrorist attacks employing biological pathogens. The Biomedical Security Institute that runs RODS is a collaboration between Carnegie Mellon, the University of Pittsburgh and the Allegheny County Health Department. www.rods.pitt.edu

Quality of Life Technologies Engineering Research Center: June 2006, will see the creation of Carnegie Mellon’s newest life-sciences hub: the Quality of Life Technologies Engineering Research Center (QoLT ERC). A joint venture with the University of Pittsburgh, the QoLT ERC will be dedicated to improving and sustaining the quality of life for a large and growing segment of our population: people with reduced functional capabilities due to aging or disability. As families, communities and individuals, we face new challenges to attain, prolong and preserve quality of life. Future QoLT systems will not just be gadgets for convenience, they will be intelligent assistants that fundamentally enhance the lives of both the infirm and their caregivers. Projects include nurse robots, fall-prevention technologies, robotic walkers and remote people-monitoring. www.qolt.org

Pittsburgh Mind-Body Center: Increasingly, medical science recognizes the importance of understanding the common pathways—psychological, behavioral, and psychobiological—that connect environmental factors with the onset of and recovery from diverse physical illnesses. That's why Carnegie Mellon and the University of Pittsburgh, supported by the NIH, founded the Pittsburgh Mind-Body Center. Each of the center’s four major research initiatives is working toward a better understanding of how the mind influences a person’s physical experience with a particular disease. Two of the studies, on osteoarthritis and breast cancer, are designed to serve as interventions, while the other two, on infectious flu and cardiovascular disease, are oriented toward examining risks for disease. www.wpic.pitt.edu/pmbc

Carnegie Mellon Engineering Professor Develops new Biomaterials to Improve Drug Delivery

Carnegie Mellon University’s Christopher Bettinger is developing new biomaterials for use in a wide range of biomedical applications, including regenerative medicine, neural interfaces and drug delivery. To help make these biomedical devices more efficient, Bettinger’s research team is investigating materials and fabrication strategy for the use of organic thin film transistors, which involve the use of organic semiconducting compounds, to assist in biomedical applications. “We found that by combining small-molecular semiconductors and biodegradable polymers it allows for potential electronic functionality in biodegradable medical implants that has previously been unattainable,” Bettinger said.
Driving the 21st century is rapid technological advances, which has led to cloning, eroding jurisdictions, biometrics and e-commerce. While urban crime rates have declined, cyber crime and terrorism are emerging threats. Traditional pollution concerns have been augmented by global concerns, such as ozone depletion. Economic inequality is measured not just in earning but in the digital divide and access to health care. Anchored by the H. John Heinz III School of Public Policy and Management and the Department of Engineering and Public Policy, Carnegie Mellon offers programs that address our changing environment and train leaders adept at solving the complex, real-world problems that face our society.
ing present-day concerns and formulating sound policies related to business, technology, and the environment. Examples of such work include demonstrating how the development of transportation infrastructure influenced regional economic growth; examining the relative successes and failures of past public and private policy initiatives in such areas as economic development and land use planning; exploring the history of particular sites to appraise them for environmental risks (such as soil and subsoil contamination); assessing the impacts of new technology on business, society, and the environment; and developing long-term trends in various environmental quality measures to provide benchmarks for current environmental policy.

**National Consortium on Violence Research:** The largest single social science project ever funded by the National Science Foundation, this interdisciplinary consortium brings together researchers from the United States, Canada and Europe to study the dynamics that surround violence in urban areas and to develop policy initiatives aimed at reducing such violence. The Consortium is comprised of 66 active members who are eminent scholars in the field of violence research, and who are affiliated with 40 institutions, across 23 states and in 4 countries. NCOVR's research participants are linked through a Data Center sharing common resources, a telecommunications network, a newsletter and periodic workshops and conferences.

**Center for Economic Development:** The CED provides the research and policy intelligence to foster an innovative region. Its research focuses on four key areas: technology, entrepreneurship, talent and the role of universities in innovation. Services include technical assistance in policy and strategy to guide action, economic analysis and modeling, mapping, benchmarking and timely analysis of key issues. www.cmu.edu/ced

**Center for History and Policy:** In the 14 years since its inception, research at this center has resulted in over two dozen student research opportunities on topics like policies concerning the evolution of youth gangs in American cities between the 1920s and the present; the historical controversies surrounding the participation of blacks, women and gays in the military; the formulation and implementation of environmental regulations during World War II; changes in rates of infant mortality in 20th century Pittsburgh; and cocaine use. Several have resulted in, or are in the process of leading to, journal articles and book-length publications.

**Pittsburgh Center for Social History:** Active working groups addressing topics like the State and Society, Working Class History and the History of Mentalities are the heart of this Carnegie Mellon and University of Pittsburgh joint effort. Launched in 1986, the center groups over 100 social historians in the Pittsburgh region to promote research in this growing field.

**Paving the Way for Food Stamps at Farmer’s Markets**
As a result of welfare reform in the early 2000s, food stamp benefits moved from paper-based coupons to electronic benefits transfer (EBT) cards. While this change was mostly positive, it also severed food stamp users from many local farmers’ markets. Working with project sponsor Just Harvest, an innovative local advocate for economic justice, nine Heinz College students investigated the alternatives for bringing food stamps back to the seven farmers’ markets managed by the City of Pittsburgh. The project team examined the various business processes already used by farmer’s markets in other cities across the country for accepting EBT and found that the most appropriate option for CitiPark’s markets would be to use a token-based scrip system managed by a central cashier. In interviews, local farmers and other market vendors overwhelmingly approved of such an approach, as it would not interfere with hand-to-hand transactions, yet enable them to take advantage of EBT and debit and credit card sales. Using a geographic information system, or GIS, students also assessed food stamp user access to the CitiPark’s system via walking distance, current transit routes and vehicle ownership. The students compared card processing vendor options, proposed marketing and evaluation strategies and identified funding options for the project. The work culminated with the development of a grant proposal for Just Harvest which lays out a low cost path for implementing a token-based scrip system at city markets.
Carnegie Mellon’s Robotics Institute has been a world leader in basic and applied research in the field of robotics since 1979. The institute takes a broad view of robotics: it builds robots for planetary exploration, robots that crawl through pipes and over rough terrain robot arms, minifactories, grippers, sensors and controllers. But it also works on speech understanding, process scheduling, data mining, traffic safety and many more things that don’t exactly look like robots. At the institute’s National Robotics Engineering Center, scientists are building robot forklifts, ship-cleaning robots and other devices for prompt commercial application. Other work is more conceptual, and may take longer to find practical use, but will undoubtedly have major impact on life in the future.

Field Robotics Center: The area of field robotics involves mobile robots operating in natural terrain. These robots must learn about their surroundings and safeguard themselves while performing tasks and objective sensing as well as self-navigation in random or dynamic environments. Projects at the Field Robotics Center include robots that can map mines and explore harsh planetary environs. www.frc.ri.cmu.edu

MERITS of Pittsburgh: This center performs basic and applied research in computer-assisted surgery, smart medical and diagnostic tools, 2D and 3D medical image analysis and informatics, rehabilitative and prosthetic devices, assisted living and preventive health care equipment and continuous health care process improvement. Much of its research involves partnerships with a variety of regional medical centers and biotechnology corporations. www.ri.cmu.edu/centers/mrcas

Center for Integrated Manufacturing and Decision Systems: CIMDS is an eclectic collection of people, projects and labs involved in research in the fields of manufacturing; visualization and interfaces; intelligent coordination and logistics; intelligent sensors, measurement, and control; and artificial intelligence. www.ri.cmu.edu/centers/cimds

National Robotics Engineering Consortium: Founded in 1994, with a $2.5 million grant from NASA, NREC’s mission is to commercialize the mobile robotics technologies that NASA has developed by working with Carnegie Robotics LLC

Carnegie Mellon University has launched a new firm, Carnegie Robotics LLC, which will develop, manufacture and service robotic components and systems in partnership with the university’s highly successful National Robotics Engineering Center (NREC). Carnegie Robotics will create products based upon technology licensed from the NREC, an arm of Carnegie Mellon’s Robotics Institute that performs applied research and prototype development for industrial and government organizations. John Bares (right), director of the NREC since 1997, has taken a leave of absence from the university to lead the startup company.
American industry. Currently, NREC has nearly 20 projects ranging from autonomous farming equipment to robots that inspect and repair gas lines without disturbing gas flow.  
www.rec.ri.cmu.edu

Vision and Autonomous Center: Computer vision, autonomous navigation, virtual reality and space robotics are the areas explored by the 100 faculty, staff and students here. A vision-guided autonomous helicopter that can help law enforcement officials in mapping, surveillance and search-and-rescue operations is one of the premier projects developed at this center.  
http://vasc.ri.cmu.edu

Space Robotics Initiative: The SRI is developing robots and their support technologies (communication, manipulators and multiple robot coordination) for interplanetary exploration, space solar power station construction and MRO and solar-powered space flight. Some projects include Autonomous Rover Technologies; pursuing insights in fundamental aspects of robot perception; navigation; position estimation; integrated exploratory science from a robot; and the “Icebreaker” Lunar Ice Discovery Initiative, a proposed mission to explore the south pole of the Moon.  
http://www.ri.cmu.edu/centers/sri

Advanced Mechatronic Laboratory: Research within the AML focuses on the idea of Rapidly Deployable Intelligent Systems. The main threads of this research are composition, collaboration, task management and adaptation; current research focus includes adaptable software, distributed information systems, distributed robotics systems, intelligent instruments and interactive robot programming.  
www.cs.cmu.edu/~aml

Tele-Supervised Autonomous Robotics: In January 2004, NASA established a long-term program to extend human presence across the solar system, a primary goal of which will be to establish a human presence on the moon no later than 2020, as a precursor to human exploration of Mars. A central concept of this vision is that future space exploration activities must rely on human and robotic capabilities combined in order to achieve a long-term, well-orchestrated campaign of space exploration. In order to meet these technological challenges, systems which support safe human supervision of fleets of task-oriented robots will be a necessity for future space exploration. T-SAR’s research focuses on providing end-to-end tools for human tele-supervision of autonomous robots in support of sustained, affordable and safe space exploration.  
www.ri.cmu.edu/labs/lab_72.html

Intelligent Software Agents Laboratory: The ISAL envisions a world in which autonomous, intelligent software programs, known as software agents, undertake many of the operations performed by human users of the World Wide Web, as well as a multitude of other tasks. The Software Agents Lab has developed the RETSINA multi-agent system infrastructure and has applied that infrastructure and its agents to many domains, including financial portfolio management; personalized Web information management; book-buying auctions; logistics planning in military operations; and wireless, mobile communications, to name a few.  
www.cs.cmu.edu/~softagents

Manipulation Laboratory: The goal of the Manipulation Lab is autonomous robotic manipulation in the presence of uncertainty, that is, the production of robots that can perform a variety of tasks in the physical world, ranging from industrial assembly to everyday chores. Examples include pre-positioning parts for camcorder assembly to sorting papers on a desktop. Practical issues addressed by the lab’s research include: What are the fundamental mechanics of manipulation? How can a robot construct a plan to achieve specified goals? How can minimal sensor information be used to achieve tasks?  
www.ri.cmu.edu/labs/lab_9.html

Microdynamic Systems Laboratory: The MSL is exploring the limits of robotics in terms of speed, precision, dexterity and miniaturization. This endeavor requires development of new sensing, actuation and control technologies for agile robotic systems that can be applied to a variety of real-world situations. Major themes of the work include moving toward robotics operating at or below the micrometer scale, simplifying robotic mechanisms while providing greater functionality through software and providing new ways for humans to interact with the world through robotics. Examples include sensor-mediated coarse-fine manipulation, miniature factories for precision assembly, magnetic levitation haptic interfaces that allow humans to interact with remote or simulated environments through the sense of touch, dynamically-stable mobile robots for human environments and high-speed walking machines.  
www.msl.ri.cmu.edu

Multi-Layered 3-D Imaging on Water Surfaces
Aqualux 3D, a new projection technology developed at Carnegie Mellon University’s Robotics Institute, can target light onto and between individual water droplets, enabling text, video and other moving or still images to be displayed on multiple layers of falling water. In contrast to existing technologies for projecting images onto water surfaces, Aqualux 3D makes it possible to create three-dimensional images in water by using multiple layers of precisely controlled water droplets. By combining the droplets with clouds of mist, it would be possible to create unique 3-D effects for theme parks, exhibitions and interactive games that don’t require special eyeglasses to view.

NASA Delivers $500,000 to Astrobotic Technology for Moon Mission
Carnegie Mellon University spin-out Astrobotic Technology has received the first $500,000 task order from the $10 million contract that NASA awarded the company in October. The order will help the company design, build and test the primary structure for its lunar lander. With the addition of engines, electronics and departure ramps, this lander will carry Astrobotic’s robotic rover to the Sea of Tranquility landing site of Apollo 11 in 2013.
Software design, development and integration are often plagued by schedule delays, cost increases, performance problems and defects. Data indicate that 60-80% of the cost of software development is in rework—that is, fixing defects that are found during testing. And, as our systems become more interconnected in networks, the stakes are rising. Defects in products that are linked to the Internet open vulnerabilities to cyber attack and exploitation. The Software Engineering Institute emphasizes the view that you should design quality into software, not test and patch it. Since 1984, SEI has been identifying, developing and advocating engineering and acquisition practices, tools and methods to improve all aspects of software. In the fall of 2007, the SEI published CMMI® for Acquisition (CMMI-ACQ), a new comprehensive best practices model within its CMMI Product Suite which provides guidance for initiating and managing the acquisition of products and services. CMMI has become the de facto standard in process improvement for small and large software development organizations worldwide.

Capability Maturity Model Integration
When organizations want to improve the way they do business, they often focus on securing the best people, methods and tools. Processes are the means for coordinating those resources. Improving an organization’s processes provides an effective way to lower costs, improve quality and deliver products and services predictably on budget and on time. Developed by a team with members from industry, government and the SEI, the Capability Maturity Model® Integration (CMMI®) approach comprises best practices that organizations can use to improve their processes. The newest addition to the CMMI Product Suite, CMMI for Acquisition (CMMI-ACQ), is for organizations that acquire products and services. CMMI-ACQ integrates acquisition best practices from government and industry acquisition standards and experience.

www.sei.cmu.edu/cmmi

CERT Coordination Center (CERT/CC)
The CERT/CC improves the national cyber response and readiness capability and builds international computer security information exchange and collaborative analysis capabilities. It develops and deploys tools to improve the effectiveness of response teams. As a result, the CERT/CC enhances the ability of organizations in government and industry to protect themselves from attack and limit the damage and scope of attacks. Its key efforts include improving national cyber response and readiness capability by discovering and resolving vulnerabilities in software products used in critical information infrastructures, and developing and deploying tools to improve the effectiveness of the response team and investigator communities, such as malicious code cataloging and analysis tools.

www.cert.org

The Software Architecture Technology Initiative develops methods and techniques to ensure that organizations’ business and mission goals are predictably achieved by using effective software architecture practices throughout the development life cycle. This work involves developing methods for evaluating system and system-of-systems architectures, developing assessment and improvement instruments for architecture competence and investigating technology for reconstructing architectures from source code and ensuring architectural conformance. The initiative also strives to help organizations specify, define, evaluate, document and evolve software architectures. Its approach centers on predicting the impact of software architecture decisions on product quality attributes such as performance, reliability, modifiability and usability.

www.sei.cmu.edu/architecture

Personal Software Process and Team Software Process
To foster the necessary skills, discipline and commitment required for successful software projects, organizations need powerful tools. The SEI Personal Software ProcessSM
Predictability by Construction: The Predictability by Construction lab develops repeatable techniques for predicting the runtime behavior of assemblies of software components. This work enables organizations to define and implement standards that, when followed, result in predictable runtime quality, use automation to enforce these standards and define objective and predictable quality standards and measures for software components developed internally or provided by third-party suppliers. The initiative targets organizations that develop and maintain software-intensive systems with critical runtime properties. It works to promote its techniques and theories through direct involvement in the software research and developer communities, publication and training.

www.sei.cmu.edu/predictability/index.cfm

Product Line Practice Initiative
The Product Line Practice Initiative creates, refines, codifies and transitions technical and management practices of demonstrated effectiveness for exploiting commonalities that exist across families of software-intensive systems in particular domains. Through its published guidance, methods, diagnostics, patterns and adoption support, the initiative enables organizations to use a product line approach to predictably achieve business and mission goals. A product line approach to software has been proven to dramatically reduce development systems, improve return on software investments, improve software system integration and give an organization more options in the future. The initiative directly engages the community. It provides focused assistance to customers to address key product line challenges. And it trains developers, acquirers and educators and licensees transition partners to accelerate widespread use.

www.sei.cmu.edu/productlines

SEI Partner Network
The SEI Partner Network is a group of organizations and individuals trained and authorized or certified by the SEI to deliver official SEI services worldwide. These services include courses, consulting methods and management processes that aid in the implementation of the SEI's software engineering technologies. Individuals who deliver SEI services on behalf of SEI Partners are trained and evaluated by the SEI to ensure that they have the necessary knowledge and skills to deliver SEI services successfully. Currently, SEI Partners provide training and services in software process improvement, software architecture, software measurement and analysis and network security and survivability.

www.sei.cmu.edu/partners

Integration of Software-Intensive Systems
The purpose of the Integration of Software-Intensive Systems (ISIS) Initiative is to identify, mature, and transition software engineering practices and technologies to accomplish sustainable integration and interoperability across systems of systems. Once interoperability is achieved, it must be sustained when upgrades are applied and capabilities enhanced. ISIS seeks to identify practices that assure sufficient sharing of information, make developers aware of how their systems interoperate with others and make requirements for interoperability clear and available. ISIS work is targeted to acquisition or procurement practices as well as to development.

www.sei.cmu.edu/isis

Software Engineering Measurement and Analysis (SEMA)
Measurement and analysis techniques help organizations identify problem areas, track their efforts to improve software processes, lower costs, reduce defects, maintain schedule and gather valuable return-on-investment information. From introducing basic measurement principles to helping high-maturity organizations master advanced analytical methods, SEMA provides the guidance necessary to improve efficiency, effectiveness and quality.

www.sei.cmu.edu/sema

Acquisition Support Program
Acquiring systems that deliver mission capabilities on their promised date is a national imperative. However, acquisition programs frequently have difficulty meeting aggressive cost, schedule and technical objectives. The SEI's Acquisition Support Program helps acquisition program managers face the challenges of risk management, use of commercial off-the-shelf (COTS) components, process use and application, program management, architecture, survivability, interoperability, source selection, and contract monitoring. Through the ASP, the SEI works directly with acquisition programs to help them achieve their objectives. Teams of SEI experts work in acquisition contexts in the Army, Navy and Air Force intelligence agencies as well as other DoD and civil agencies.

www.sei.cmu.edu/programs/acquisition-support

The CERT Resilience Management Model Book Published
The CERT® Program of Carnegie Mellon’s Software Engineering Institute announced that the CERT Resilience Management Model (CERT®-RMM) Version 1.1 has been published by Addison-Wesley Professional. CERT-RMM, a maturity model for operational resilience, is the foundation for a process improvement approach to security, business continuity, and aspects of IT operations management. It establishes an organization’s resilience management system: a collection of essential capabilities that the organization performs to ensure that its important assets stay productive in supporting business processes and services, even in the event of disruption. CERT-RMM provides a process structure into which an organization’s best practices can be inserted and managed. The organization can then measure the achievement of process goals to verify that implemented practices are providing the expected results. The model is currently being used by large manufacturing companies, federal civilian agencies, financial services firms, and other types of organizations.