BRILLIANCE BEGINS
with an idea
A NEW EDUCATION FOR a new world

The University of Wisconsin-Milwaukee is moving forward brilliant ideas. Our faculty and staff – often working alongside partners who are in search of solutions to current and future challenges – are creating a learning and research environment for our students that produces the possibility for astounding outcomes. Their work is making a difference for business, industry and nonprofits while also giving students unique learning opportunities, and providing faculty and staff with the expertise to strengthen their future work. All of them are filling the talent and ideas pipelines for economic development now and tomorrow.

We’re seeing our physics professors and researchers joining with colleagues from across the country to be part of a new Science and Technology Center funded by the National Science Foundation. It could transform the way diseases are studied and treatments are discovered. Students of architecture are making a difference alongside a nonprofit seeking to revive foreclosed homes. The Student Startup Challenge is a campus initiative in which educators and student entrepreneurs are elevating innovation to levels well beyond our initial ideas.

Working together, UWM faculty, staff and students, and their partners, are helping a new kind of education to evolve. It’s focused on academic needs, research horizons, business requirements and nonprofit goals. It’s really a new world. Brilliance begins with an idea, and ideas drive the economy and change lives.

Get behind the scenes at researchreport.uwm.edu.
Developing a drone is a multidimensional task that includes aerodynamics, control, electronics and software. Before they could stock it with sensing equipment, GPS and a radio receiver, Rockey had to customize a very large remote-control model airplane to carry the gear. “There is a relatively heavy payload,” he says. “The average weight it can handle is around two pounds. But the radio we’re using adds five pounds and is about the size of a car battery.

We are using an industry-standard fish telemetry radio because we want to be able to compare our work to something people can already do with this equipment,” adds Rockey, who is working on his second UWM bachelor’s degree to pursue his interest in robotics.

Using a basic remote, the pair sets up the controls to respond to certain plane functions, including programming flight patterns into the GPS. “Often, it’s a ‘lawn mower survey’ – a simple back and forth over a specific area,” says Rockey.

Moe is in charge of the computer programming necessary to autopilot the plane – and he also had to learn to fly it, which was a lot more difficult than he expected.

Programming the autopilot had to be worked out through trial and error. To measure signal strength over a large area, he used pre-existing software and modified it to follow and scan for radio signals.

He then had to create a topographical map by plotting the signals using a course consisting of five randomly placed points. When he steered the plane successfully over each point, the radio picked up the signal and coordinated it with the autopilot.

It’s a complex system with many parts and very little time to respond when something goes wrong. But, Moe says, the sense of accomplishment is great.

“I like writing code and then watching it do that specific work in the physical world,” he says.

With drones, we can fly more often than people going out in a real plane to accomplish the task. And we can get the kinds of information that are currently not available, like the average velocity of certain kinds of fish.

Tom Consi, assistant professor, freshwater sciences and engineering

FLYING HIGH WITH robotics research

The best way to track radio-tagged sturgeon as the fish travel up and down the Wolf River is from above.

The closer the tracking equipment can come, the stronger the radio signal will be. But flying near the surface of the water can be dangerous in a human-piloted airplane. It sounds like a job for a robot or, in this case, an aerial drone.

“With drones, we can fly more often than people going out in a real plane to accomplish the task,” says Tom Consi, assistant professor of freshwater sciences and engineering. “And we can get the kinds of information that are currently not available, like the average velocity of certain kinds of fish.”

Consi calls fish-tracking a "niche" application for the robot, but notes that there are broader uses. One is multispectral imaging, a method of remotely monitoring harmful algae blooms, like red tide, to determine how fast – and where – they spread.

But it was the sturgeon-tracking, a project of another scientist at UWM’s School of Freshwater Sciences, that provided the impetus for two engineering undergrads, Brady Moe and Kris Rockey, to build a drone.

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Before industrial pollution nearly wiped out the aquatic mayfly in the 1950s, Green Bay was, as Jerry Kaster calls it, a bustling “walleye factory.”

But no mayflies means no walleye. That’s why, in researching how to rebuild the food chain, Kaster and graduate student Christopher Groff are focused not on the fish that inhabit the water column, but on the insects living in the relatively overlooked benthic, or lake bottom, ecosystem.

Pollution has stripped many invertebrates from the sediment and, as a result, the consistency of the lake bottom has become soupy. In a healthy ecosystem, mayflies spend all but about two days of their lives burrowing in the bottom mud. In those 48 hours as adults they congregate over the water, forming a swarm so large and thick that Doppler weather radars in the vicinity can mistake the hatch for a thunderstorm.

The mayflies, also known as Hexagenia, conclude their terrestrial existence by mating over the water, dropping fertilized eggs in the process. Kaster, an associate professor in UWM’s School of Freshwater Sciences, says a large mayfly hatch can release around 350,000 tons of protein into the food chain.

“Limnoforming” is the word he coined to describe the process he is using to recondition the mud at the bottom of Green Bay, returning it to a thickness that can physically support the burrows of mayfly nymphs.

“Invertebrate ecology is a largely underrepresented part of the ecosystem, and it’s extremely important to the healthy functioning of the rest of the system,” says Groff, who grew up in Fond du Lac and earned his undergraduate degree in biological sciences from UWM.

Testing his theory involves not only the still-absent population of mayflies, but also another creature that should be inhabiting the bottom of the bay in greater numbers — tiny threadlike worms (aquatic cousins of earthworms) whose life cycles help thicken the mud.

In their research, funded by the National Oceanic and Atmospheric Administration, Kaster and Groff are using thousands of Tubificidae worms harvested from the Kinnickinnic River in Milwaukee. The researchers deploy custom-made “worm condos” — enclosed microcosms containing the thin Green Bay mud infused with worms — to test whether the mud can be rehabilitated.

“We’re also hoping the worms increase the available oxygen content in the sediment, especially given the hypoxia [low oxygen] in Green Bay,” says Groff.
“Cell membrane proteins control the flow of information and material into and out of cells,” says Abbas Ourmazd, Distinguished Professor of Physics and Electrical Engineering, who leads the UWM team. “But they are notoriously difficult to crystallize — if it can be done at all, it takes a very long time.”

Fewer than 20 percent of proteins currently form the kind of crystals necessary for this imaging.

The grant, awarded by the National Science Foundation, establishes a Science and Technology Center (STC) that will explore the use of powerful X-ray lasers to reveal the structure of proteins and viruses, and the ways they change as they affect the body’s functions. This work has the potential to spur much-needed innovation in the pharmaceutical field.

The new approach uses millions of X-ray “snapshots” from a wide range of random orientations, says Senior Scientist Peter Schwander, a member of the UWM team that also includes Distinguished Professor of Physics Dilano Saldin, Associate Professor Marius Schmidt and Senior Scientist Russell Fung.

“The challenge is to reconstruct a 3-D image from 2-D snapshots,” says Schwander.

In their quest to image single proteins and viruses, STC researchers will rely on two game-changing technologies — one of which was developed at UWM.

The first is an X-ray free electron laser (XFEL), which produces X-ray light more than a billion times brighter than that made by any other equipment. Of the three that exist, the closest is at the SLAC National Accelerator Laboratory in California.

The XFEL will allow imaging to be accomplished with protein crystals a thousand times smaller than before — even those at the nanoscale, which are much easier to form. The brightness of an XFEL flash may also allow scientists to “see” protein molecules in action for the first time.

To analyze the millions of “snapshots” taken at one sitting, the team’s second game-changer is a computer program that uses algorithms to piece together a 3-D image of the molecule. The program was created by Ourmazd, Saldin, Schwander and Fung, with Roshan D’Souza, associate professor of mechanical engineering, and engineering graduate student Ali Dastshi.

“Imaging with this new kind of X-ray scattering can speed the process of determining protein structures from years to only days,” says Ourmazd. “Part of the reason can be attributed to the mathematical procedure we have developed.”

For UWM students, the STC affords a unique opportunity to work across disciplines on groundbreaking research that will require expertise in computer science, biology, physics, mathematics and chemistry.

“The Science and Technology Center is a wonderful opportunity to further enhance excellence in interdisciplinary research on campus and in the region,” says Ourmazd.

Though still a way off, the XFEL technique offers tantalizing possibilities, such as perfecting techniques to make molecular “movies,” or imaging proteins without crystals.

The center also will emphasize applications of its research through its industrial partners in the Industrial Macromolecular Crystallography Association, composed of major pharmaceutical companies including Bristol-Myers Squibb, Pfizer, Abbott, Merck and Novartis.

SUNY Buffalo leads the grant. In addition to UWM, partners include Arizona State University; Cornell University; Rice University; Stanford University; the University of California, Davis; and the University of California, San Francisco.
Can air-polluting carbon dioxide (CO₂) emissions be collected and recycled back into fuel? UWM’s Ying Li believes they can, which would make it possible to use fossil fuels with little increase in greenhouse gases.

Conversion of the gas won’t be easy, but Li, an assistant professor of mechanical engineering, has hit on a process that will work — if he can perfect a nanomaterial with exactly the right properties.

Armed with a CAREER grant from the National Science Foundation, Li is improving the efficiency of a nanomaterial he engineered that could make CO₂ recycling scalable.

“You cannot eliminate carbon dioxide unless you convert it into something else,” says Li. His process uses sunlight to power a complex catalytic reaction involving CO₂, water and his hybrid nanomaterial. He calls it “artificial photosynthesis” because it converts CO₂, water and sunlight into hydrocarbons in a way similar to that of plants.

The result is a sustainable source for hydrocarbon fuels such as methane and methanol — carbon-neutral alternatives to fossil fuels like oil and natural gas.

To study with Li. Like engineers in U.S. manufacturing plants, Zhao would like to find a way to decrease the amount of CO₂ released into the atmosphere without compromising production.

“I am excited that we are working on the research that could change our world,” he says, “and also to see that our experiment results are promising and our ideas are becoming practical.”

The process begins when nanoparticles of the titanium dioxide catalyst that Li has developed absorb sunlight. The high-energy wavelengths of the ultraviolet spectrum excite electrons in the nanoparticles. CO₂ reacts with the electrons, and its carbon and oxygen atoms, together with hydrogen atoms in the water, are coaxed to the catalyst’s surface, where they can be extracted as hydrocarbons.

Li and his lab members are modifying the nanomaterial so that it will enhance the CO₂ conversion efficiency and lengthen the lifetime of the catalyst. Their fine-tuning has already improved the stability of the reaction, says Zhao.

The researchers are also performing the reaction at a higher temperature — above the boiling point of water — rather than at room temperature, in a quest to increase the yield of products resulting from the reaction. The increased temperature can be generated sustainably through industrial “waste” heat or the infrared portion of sunlight.

Ultimately, Li hopes to devise a technology that applies his “artificial photosynthesis” to a stationary emission source, like the smokestack of a coal-burning power plant.
Only a small number of human lungs available for transplant are accepted by surgeons.

“Thousands of patients die waiting for a suitable organ that can support life, and we have limited means to assess whether a [donor] organ is irreversibly damaged,” says Robert Love, M.D., a professor of surgery at the Medical College of Wisconsin (MCW).

The assessment process relies heavily on how the organs look externally.

Mahsa Ranji, a UWM assistant professor of electrical engineering, has developed a method that could dramatically increase the number of organs deemed usable for transplants. Called “optical biopsy,” it gives doctors a noninvasive tool that gauges the metabolic health of tissue. “Before now, the only way to see whether tissue is injured is through surgical biopsy,” says Ranji. “The main idea behind optical biopsy is to follow the metabolic state of the tissue through a catheter over time.”

The change in the tissue’s metabolism is the key to assessing the extent of injury, she adds, and that’s exactly what her technology delivers. “It is important because the gold standard now is a snapshot at the end point of an event,” she says. “You don’t have the story of what happened to the tissue at the beginning or in the middle.”

Ranji’s patented technology works by exciting certain proteins in living tissue that glow when they absorb blue and ultraviolet (UV) light. Since a catheter remains in contact with the tissue, drugs can also be administered while monitoring the efficacy of any treatments.

“We are interested in providing a deeper look at the mitochondria, the energy centers of the cells,” she says. “The intensity of the glow corresponds to the health of the tissue.”

Doctoral student Zahra Ghanian has been working on a related diagnostic tool created in Ranji’s lab – one that can extract markers of tissue damage on a cellular level. Ghanian gathers visual biomarkers of the level of oxidative changes in cells – clues that the tissue is injured. Then she writes a computer program that takes all the markers into account in determining the extent of damage.

In a process called segmentation, Ghanian can comb through images of retina cells, for example, to create the required data to use as diagnostic markers of diabetic retinopathy. “This gives you a picture of cells in the retina, indicating the number, kind and how they are distributed,” says Ghanian. “When the ratio of one kind of cell to another kind rises, it means the disease is progressing. This is one of the earliest signs of diabetic retinopathy that we can quantify.”

The work of Ghanian and Ranji exemplifies the advantage of locating UWM researchers at Innovation Campus in Wauwatosa: It brings biomedical research much closer to the regional medical complex where partnerships like those with Ranji’s lab can help accelerate discovery and support students.

In fact, part of Ranji’s lab will be among five research labs that occupy the new Innovation Accelerator at Innovation Campus when it is completed this spring. See a description of the others on the next page.

Ranji has partnered on the lung transplant project with Elizabeth Jacobs, M.D., MCW associate dean of research and associate chief of staff for research at the Zablocki VA Medical Center. Testing of the optical biopsy system has already begun with human organs in experiments with Jacobs and Love. “If we need to do an experiment at MCW that needs animal models, we are right there. These experiments are expensive, time-consuming and involve a lot of people,” Ranji says. “So the proximity will help.”

She believes it will lead to more opportunities to work with medical professionals, allowing graduate students to see firsthand how the instrumentation they build is used on the patient-care side.
UWM, PARTNERS SHARE
a new home for innovation

When the Innovation Accelerator at UWM’s Innovation Campus opens in the spring, its occupants will include both academic researchers and corporate partners. In addition to a cohort of graduate students from Mahsa Ranj’s lab (see previous page), the Accelerator will house labs of four additional UWM engineering faculty members. See the range of work in the following descriptions.

UWM researchers:

Junhong Chen uses nanotechnology to create ultra-sensitive, low-cost sensors with medical, water and gas applications. He has founded NanoAffix Sciences LLC to commercialize his work. The company has received two Small Business Innovative Research grants.

Naira Campbell-Kyureghyan applies her expertise in biomechanics of the spine and hand to developing ergonomic tools that can reduce job-related injuries. Snap-on Incorporated recently licensed a wrench designed by her lab members and plans to bring it to market. She also created the Consortium for Advanced Research in Gas Industries (CARGI) to improve safety in the gas industry through ergonomics.

Na Jin Seo is working to improve rehabilitation of stroke victims, including helping them regain motor function in their hands using techniques that include video gaming. She and her students created the Thera-Bracelet, which uses vibration technology to help restore hand movement, and have recently launched a start-up company to bring this technology to market.

Ramin Pashaie brings expertise in optics and photonics, which he applies to neuroscience. He has created devices that can be used to optically stimulate nerves in the brain, which may someday lead to improved treatments for Parkinson’s disease.

Corporate and academic partners:

Concordia University Wisconsin will locate drug-discovery facilities, including a GMP (good manufacturing practice) pilot plant and a laboratory for analytical, formulation and process chemists. These facilities will be used by start-up companies and support new educational programs.

Serial entrepreneur Frank Langley is bringing Pel-Freez Biologicals to Milwaukee. The company produces blood and tissue products for diagnostic, pharmaceutical, biotechnology and medical-device companies, and research institutions.

Brooks Stevens, a full-service product development company, will re-establish a Milwaukee presence with a satellite office.

Mobile App Development Lab offers UWM students real-world experience in applying mobile technologies to health care.

ENGAGING THE 21ST CENTURY AUDIENCE

Extraordinary research opportunities and outstanding internship options drew Leigh Wilcox to UWM for her master’s degree in art history.

After earning an undergraduate degree in art, she interned at the Milwaukee Art Museum, working with the curatorial staff and observing other museum departments.

The experience confirmed her passion for curatorial work and guided her next step – entering the master’s degree program at UWM in fall 2012. “At UWM, master’s degree candidates in art history have the option of creating an exhibition for their capstone project – a rare opportunity.”

A graduate colloquium visit by Martha Wilson, a pioneering video, photo and performance artist, inspired a research project for Wilcox. Wilson’s work was to be the topic of a summer 2013 exhibition at UWM’s Institute of Visual Arts (INOVA), Peck School of the Arts.

Presenting Wilson’s work was a challenge. Wilson’s career extends back to the 1970s, and much of the material to be displayed at INOVA was in the form of early video, photographs of performances, and documentary items like magazines and exhibit programs.

Archival materials like this can feel “dead” to 21st-century audiences accustomed to lively, interactive engagement. INOVA Director Sara Krajewski asked the class to think about ways an exhibition could bring these documents to life.

The final Facebook post reflects Wilcox’s discovery that “the archive is not dead, just dormant – and we can reactivate it with the proper techniques.”
Knowing that Professor Roger O. Smith was working on a similar but more technology-based project at the R2D2 Center at UWM, she contemplated doctoral studies in Milwaukee. But first, she decided to gain some real-world experience. Working with doctors and patients at a large metropolitan hospital, Schwartz produced discharge plans for those with a broad range of injury and illness. “My goal for patients was the best quality of life possible after their hospital stay.”

Coming to the R2D2 Center and working on the Access Ratings for Buildings (AR-B) Project brought together her experiences at WU and at Barnes-Jewish Hospital in St. Louis.

The R2D2 Center, with partners at Marquette University and the UWM Mobile Innovation Lab (see page 26), is developing two different apps that will provide up-to-date accessibility information about public buildings for those with disabilities, their families and friends, and building owners.

“In spite of the Americans with Disabilities Act of 1990, people with disabilities continue to be challenged in the community by buildings with accessibility barriers,” says Smith. “Consequently, people with disabilities may not have information about barriers until they encounter them.”

The AR-B Project will help people answer questions such as, “Can we get Grandma’s wheelchair through the doors at the restaurant?” before going out to eat.

“It’s a matter of people being able to fully participate in life and do the things they need – and want – to do, despite a loss of function or disability,” says Schwartz. “We know that people are resilient, smart and capable. Our strategy is to give them the information they need so that they can plan better.”

The Consumer App is a tool for consumers to retrieve accessibility data. Since what is accessible to someone who is blind may not be accessible to someone in a wheelchair, people fill out an online profile – similar to other social media sites. “Users tell us as much as they want about their functional limitations, including temporary or permanent disability. Then, they can search for a location, look at other reviews and see what will work for them and what won’t.”

With the Trained Rater App, a trained evaluator goes to a building and does a comprehensive building assessment, collecting specific measurements.

“Our goal is to use social media to develop a large base of people who will go out and evaluate a building,” says Schwartz. To help with the training, students from the UWM Film Department are working on a video tutorial to teach people about conducting accessibility evaluations.

To date, the R2D2 Center has received $600,000 in funding from the National Institute on Disability and Rehabilitation Research for the AR-B Project. The center, located in the College of Health Sciences, performs interdisciplinary applied research and development related to technology and disability. The center affiliates with several colleges, schools and service programs across UWM.

Accessibility apps
ENABLE THOSE WITH SPECIAL NEEDS

As research assistant Jaclyn Schwartz describes her work with the Rehabilitation Research Design & Disability (R2D2) Center, it’s clear that she never loses sight of the people who benefit from her research efforts.

Her interest in the health sciences was sparked as a teenager when she drove her brother, who had childhood hearing loss, to his sessions with a speech-language pathologist. Later, when her undergraduate studies in speech-language pathology included observation of other health science professions, she was impressed by an occupational therapist who worked with children with autism.

After graduating from the University of Texas at Austin, she was accepted into the master’s degree program in occupational therapy at Washington University in St. Louis. “The WU program is particularly research intensive. My master’s thesis project was a checklist for people with low vision to help them know what buildings would be accessible to them.”

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New optical fibers
SPEED UP THE INTERNET

Before the next generation of high-speed communication and biomedical imaging can be realized, researchers must first find ways to make the Internet faster.

Arash Mafi, an associate professor of electrical engineering, wondered if one solution might be a curious phenomenon that had been observed in 1958, but has never been put to practical use: Anderson localization.

The phenomenon is named for physicist Philip W. Anderson, who first theorized the “trapping” of electrons in a highly disordered medium, work that earned a Nobel Prize in 1977.

Mafi and graduate student Salman Karbasi decided to apply the phenomenon in the work they were doing to improve the performance of optical fibers. The research has tremendous potential: Data transmission through conventional optical fibers is the backbone of the Internet.

“In a commonly used single-core fiber, only one spatial channel of light traverses through. That limits the information-carrying capacity,” says Mafi, who worked as a scientist at Corning Incorporated, the world’s largest manufacturer of optical fibers.

Mafi and Karbasi have found that Anderson localization is one way of propagating multiple beams in a single strand of optical fiber.

Karbasi’s fiber architecture brought the idea to life. The design consists of two randomly distributed materials that increase the scattering of photons within the fiber. Karbasi’s calculations indicated Anderson localization would occur within this disordered interior, causing a beam of light traveling through it to freeze laterally. His design worked, and also allowed multiple frozen beams to pass through a single fiber.

“We designed our fiber so that it provides more physical places where the light can propagate,” says Karbasi of the project, which also includes Karl Koch, a scientist with Corning.

The opportunity to work alongside Mafi, winner of a CAREER grant from the National Science Foundation, is the reason Karbasi chose to study at UWM.

“Cary Ross began his UWM studies knowing that he wanted to make a difference. After graduating in 2012 with a B.S. degree in health care administration, he’s doing just that as an associate consultant in the Asset Management Professional Services department at GE Healthcare.

Ross works with small and large health care systems to help make their organizations more efficient. In a time of soaring health care costs, the importance of process improvement is clear.

“By going into an organization and, for example, improving equipment utilization, we can save health care dollars that are currently being wasted,” he says. “We show them how they can run their organization more economically on the amount of equipment they have – or even less – by outlining a process that will work for that specific facility.”

He also looks into infection control standards in regard to patient safety and works with hospitals to decrease hospital-acquired infection rates. “Often, this can be improved simply by having people communicate with each other better and accept accountability.”

Ross emphasizes the importance of including employees in the process, from hands-on staff to chief executives. “We want the staff to feel that this is their project and be proud of the changes they will help make.”

Although Ross has seen his skills improve dramatically in his first year of employment at GE, he traces his on-the-job performance back to the faculty and coursework at UWM. “Health care administration provided me with the foundation that I needed for both the rigorous interview process and the demands of this position at GE.”

His degree from the College of Health Sciences combines a minor in business administration from the Lubar School of Business, a course of study that gave Ross the knowledge and skill sets needed to succeed in a very complex industry.

Ross also credits an internship at Froedtert Hospital’s pharmacy with helping to prepare him for his current role. “That experience gave me the confidence to tackle the interview for the position at GE,” he says.

Making an impact by improving health care
Although CDS clients consist mainly of local organizations that don’t have the resources to hire architectural services, the owner of the New Berlin property just happened to be one of the most well-known businesspeople in the city. “I saw our student, Ryan, presenting to Shel Lubar and he had Lubar enthralled,” says Greenstreet. “This is a man whose calendar is not so easy to get on.”

CDS has worked with more than 120 clients since its launch and continues to make its mark on Milwaukee and around the state—with about 10 student workers each semester.

“CDS cannot compete with firms for work. But we can work on projects and contribute suggestions that firms could later implement,” says CDS director Carolyn Esswein. “For student-designers, that offers the chance to push the envelope for clients.

“If students propose a big, moving idea that generates excitement, then the clients may do some private fundraising to keep the concept.”

A small percentage of the work gets built exactly as planned, says Shortridge, but CDS’s influence is apparent on many of the projects they take on.

One partner likely to incorporate student designs in its construction is Layton Boulevard West Neighbors, a South Side nonprofit that buys foreclosures in the Layton neighborhood and renovates them for resale in its Turnkey Renovation Program.

Undergraduate Aaron Loomans stayed in Milwaukee last summer to work on a Turnkey project, helping to transform a turn-of-the-century duplex into an energy-efficient, five-bedroom single-family home.

He worked one on one with a volunteer architect from Eppstein Uhen on one of the foreclosed houses, produced renderings used in Turnkey marketing, met with contractors, developed basic construction documents and even went door to door explaining the project to the neighbors.

“You won’t get that kind of variety at a traditional firm internship, which tends to be heavy on computer-aided design work that supports bigger projects,” says Loomans, a senior from Appleton, Wis.

Most CDS projects are fast paced, beginning and ending in one semester. But the effects are profound. When Wausau city officials wanted to develop 16 acres along the Wisconsin River, CDS work was used to secure three grants from the Environmental Protection Agency to remediate two brownfields and make the design a reality.

And when Milwaukee’s Sixteenth Street Community Health Centers proposed adding a bike trail along the Kinnickinnic River as a way of promoting neighborhood health, CDS students hosted a community-wide charrette—a competition with public input—to generate potential designs. The event helped attract Wisconsin Coastal Management Program funding for the trail, which opened last year.

“Without the buy-in from so many groups, it would have been easier for the city to throw in the towel when problems arose,” says Ben Gramling, the centers’ director of environmental health.

DESIGNING STUDENTS PUT POLISH ON real-world projects

the owner of a swampy tract of land in a New Berlin, Wis., industrial park didn’t know what to do with the property. The only undeveloped site in the park, the owner’s first inclination was to simply fill it in with dirt.

Ryan Shortridge came up with an alternative: Embrace the wetlands and rebrand the area as a “conservation” industrial park.

“We told them that the tract was an amenity. Instead of more manicured landscaping, we proposed keeping it a little more rustic and including things like habitat restoration and walking paths,” says Shortridge, a UWM graduate student in architecture.

Shortridge is used to being handed a challenge. He helps lead a student design-support group called Community Design Solutions (CDS), which was created a dozen years ago by Robert Greenstreet, dean of the School of Architecture & Urban Planning.

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Undergraduate researchers
BRIDGE THE DISCIPLINARY DIVIDE

Michael Erspamer didn’t envision himself working in a health sciences lab when he decided on his metalsmithing major.

The Peck School of the Arts senior was conducting research in digital fabrication with associate professor Frankie Flood when Jay Kapellusch found him. An assistant professor of occupational science and technology, Kapellusch recruited several undergraduates from Flood’s Digital Craft Research Lab to work on a joint project with his students at the Occupational Therapy Research and Development Lab.

The charge: Redesign the garden-variety wheelchair to ease the transfer of patients out of it. Kapellusch was looking for collaborators who could approach a project in assistive technology from a different perspective.

“Students in art and design, in particular, are great observers of society and often recognize problems that are easily overlooked,” he says. “Having a diversity of skill sets fosters creativity and typically leads to true innovation and more robust solutions.”

Increasingly, undergraduates majoring in one discipline are able to apply their skills by participating in the research lab of a faculty member in a completely different field.

For Erspamer, the experience was transformative.

Fabrication of materials like metals and plastics is a staple of the Digital Craft Research Lab. “We are used to working with these materials every day,” Erspamer says. “Although we wanted to achieve functionality, our biggest motive was to do it at a lower cost.”

Students can become involved in research at UWM as early as the summer before their freshman year, and there are plenty of cross-disciplinary opportunities, says Kyla Esguerra, associate director of the Office of Undergraduate Research.

The interdisciplinary aspect of undergraduate research is also a goal of the National Science Foundation (NSF). Because new discoveries in biology demand more quantitative analyses, NSF funds initiatives across the U.S., including one at UWM, that give undergraduates exposure to both math and biology.

Mathematics major Kimberly Siegler and Tyler Raphael, a double major in biochemistry and biological sciences, were among this year’s cohort in UWM’s Undergraduate Biomath Initiative. The program brings together students from each discipline to explore freshwater research questions.

“This sounded like what I wanted to do with my career,” says Siegler, when she learned about the program. “It’s the age of data. We have more information than we know what to do with.”

Siegler worked on building a mathematical model to simulate harmful algal blooms in Lake Winnebago that involved associations among various environmental conditions.

Raphael participated in a different modeling project, one that tracked quantitative data on lake conditions to find clues to a biological mystery: the phenomenon of cell death in phytoplankton.

“Phytoplankton are single-celled organisms;” he says, “so we don’t understand why cell death happens in this creature.”

The program has yielded a year of “firsts” for Raphael.

“I had never been on a boat on Lake Michigan before and didn’t know how to take water samples;” he says. “I learned a little about differential equations. And I went to my first research conference where I could share research with other students.”

Alexa Jones was looking for a research experience that would be relevant to her interests. The double major in anthropology and Spanish found it by teaming up with Raoul Deal, a senior lecturer in art and design.

Jones helped to stage Deal’s bilingual art exhibit of woodcut prints inspired by stories of recent Latino immigrants in Milwaukee. Called “Ni de aquí, Ni de allá / From Neither Here, Nor There,” the exhibit relates tales of border-crossing, family transitions and discrimination.

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Jones’ role was to translate the text so that it appeared in the exhibit in English and Spanish.

Along with translation, she is building new skills in coordinating a large public event. “It’s interesting to see how you can use all the pieces in just one project,” she says. “It gives you experience in organizing research.”
What began as an extension of a Product Realization course open to engineering, arts and architecture students now invites participation from students in a growing number of fields through new “experiential courses” in different schools and colleges.

The SSC was founded by the College of Engineering & Applied Science, Peck School of the Arts and the UWM Research Foundation, and submissions the first year were limited to traditional “hardware” products. The competition’s scope quickly expanded, with associate professor Kim Beckmann and lecturer Amy Decker of the Peck School’s Design & Visual Communication Program involving their course.

Open to art and information studies students, the course extends the reach of the SSC by engaging student consultants from a variety of disciplines, like those in the UWM Mobile Innovation Lab (also called the “App Brewery”; see page 26).

This year, the School of Information Studies formally joined the SSC partnership, adding coursework in mobile app development – along with support for a new category in the competition.

In the Lubar School of Business, Entrepreneur-in-Residence Jim Hunter is teaming up with SSC winners this year to help them develop business plans, just as he has done for students in Lubar’s New Ventures Business Plan Competition.

Beckmann, whose course has inspired student-made products ranging from computer games to services like home delivery of locally grown food, says the main focus is on problem-solving in a commercialized context.

“Educating students on the application of these skills should, ultimately, create a new generation of design innovators and business partners,” she says.

Nathaniel Stern, associate professor of art and design who co-founded the SSC with Avdeev, agrees. “It’s not just about starting up, but starting out,” he says.

Meanwhile, the competition has become a long-term fixture on campus. It has attracted two new funding sources, the UW System’s Growth Agenda for Wisconsin and the National Collegiate Inventors and Innovators Alliance.

But most of all, they came to start their own businesses.

They came from a wide range of fields, from physical therapy to information studies. They came with ideas for products, like a mobile app for managing coupons and a quick, affordable method of detecting bacteria in water.

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When Ogechi Chidebell arrived in Milwaukee in 2011, she relied heavily on her smartphone to get to know the city.

“Even though I didn’t know my way around, I could walk downtown and wouldn’t feel lost,” says Chidebell, a Lubar School of Business Executive MBA student from Nigeria. “I didn’t have to feel like an outsider in Wisconsin.”

She navigated with Google maps and chose restaurants, coffee shops and other small businesses based on online review sites like Yelp.

“I realized that this information is something that Nigerians don’t have.” In fact, Chidebell says, many small businesses in Nigeria never appear in Google searches.

That realization inspired her winning entry in UWM’s Student Startup Challenge (SSC), an app called Agogo Network. Named for a gong-like instrument used in ancient Nigeria to announce important events, Chidebell’s Agogo platform would provide listings and reviews for restaurants, tailors, beauty salons and entertainment venues.

“It’s creating a ‘Yelp’ for Nigeria,” Chidebell says.

While taking a UWM course called IT Infrastructure, she learned that Google search results are based on backlinks to existing web pages. Few Nigerian small-business owners can afford websites, Chidebell says. Yet what Nigeria does have is one of the highest numbers of mobile phones in use in the world.

Chidebell knew that a mobile app would be where she would find opportunity.

“One thing the Student Startup Challenge did was open my eyes that I really could do something that would change the lives of people,” she says.
Brewing new apps
to help nonprofits

Milwaukee convention-goers will soon be able to get immediate information on daily sessions, speakers, schedule changes and more — just by consulting their smartphones.

UWM students in the university’s Mobile Innovation Lab have created a mobile app for Visit Milwaukee that also features popular tourist destinations, maps, local news and more.

The lab, also called the “App Brewery” because of its location in the Pabst Brewery complex, employs nearly 20 UWM students who apply skills learned in coursework to projects for area nonprofits.

Coursework is offered by the School of Information Studies (SOIS), but students staffing the lab come from diverse majors, including information studies, business, engineering, computer science and arts.

“The App Brewery experience combined with the school’s course array gives students a venue for applying their classroom learning,” says WooSeob Jeong, interim dean of the School of Information Studies. “It really showcases the best of SOIS and UWM, while providing an invaluable experience for our students to work within the community.”

Aaron Hartwig, a junior in engineering, is in his second year at the App Brewery.

“These are real-world projects for very real clients,” he says. “You don’t feel like you’re at a university when you’re in these client meetings. You feel like you’re working for some company.”

The use of mobile apps to navigate conventions is becoming the norm, says Brent Foerster, vice president of sales and marketing for Visit Milwaukee.

“We have limited budgets, and yet, we’re being evaluated on our ability to compete against other cities,” he says. “Without the collaborative approach to help us produce these tools that we need to stay competitive, I just don’t know how we would do it.”

Student workers are also working on apps for the Sojourner Family Peace Center. Also, the Brewery held a summer camp this year for high school students who worked on an app for the Urban Ecology Center.

Students want to use the device that we all have in our back pockets as a way of making a difference, says Michael Hostad, director of web and mobile strategy at UWM. But they also want to learn a skill with earning potential, he says.

“The moment you walk onto the campus, there is already this opportunity to help make sure that when you graduate, you’ll be able to start a career right away,” says Anthony Jesmok, a junior in SOIS.

The App Brewery is another place where UWM students can be exposed to skills that will allow them to operate their own businesses.

“All the students who are in the Brewery right now could spin off their own companies,” says lead app developer Quinn Madson. “That is what’s really going to have a lasting impact from this program.”

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Quinn Madson, UWM Mobile Innovation Lab

The App Brewery is growing with the addition of five more student app developers, including Katherine Becker (from left), Jon Major Condon, Jai Moua, Michael Naunheim and Kayleigh Rappaport

Jake Widmer (from left), Aaron Hartwig, Anthony Jesmok and Jessica Gilmore are student app developers in UWM’s Mobile Innovation Lab.
When Milwaukee Mayor Tom Barrett needed a translator to make a meeting with a Basque business delegation go smoothly, Susan Schweigert was there to help.

Schweigert, who earned her degree from UWM’s growing online graduate program in translation and interpreting two years ago, now runs her own business, Schweigert Language Services. She offers translation of written documents from Spanish, Portuguese and French to English and is certified as a Spanish interpreter in the Wisconsin courts.

Schweigert credits her coursework in her Master of Arts in Language, Literature and Translation (MALLT) program with giving her the business and legal skills she needed to launch her career.

“I liked the idea of the flexibility and variety of having my own business. I’m immensely grateful for what I learned in those courses and in the program,” says Schweigert.

UWM’s online program, one of the few in the country, is meeting an increasing demand for interpreters (spoken language) and translators (written), says Lorena Terando, coordinator of the program.

“Even the United Nations is having trouble finding translation experts,” she says.

The increasing globalization of business is a key factor, adding to the demand for programs like UWM’s. MALLT has grown from 30 students to more than 50 in a few short years.

“Japanese companies are expanding their manufacturing operations in Kentucky and Tennessee, and German and Spanish companies are doing a great deal of work in green energy,” says Kate Scholz, MALLT assistant coordinator.

With the addition in 2014 of a Russian-to-English track, UWM now offers seven options: Spanish, Japanese, Arabic, French and German to English, and English to Spanish. UWM’s program, one of the few in the U.S. granting a master’s degree in translation, is approved by the American Translators Association. Because it is totally online, it attracts students from around the U.S. and as far away as Jordan.

It’s a simple fact of business: If you can’t sell a product for more than it costs to manufacture, you won’t make a profit. But when a product needs to be remanufactured, the equation becomes much more complicated.

“When a product fails, it impacts every aspect of the supply chain,” says Anthony Ross, Rockwell Automation Endowed Chair in Supply Chain Management in the Lubar School of Business.

Rockwell Automation approached a group of UWM researchers with specific questions about design, quality and reliability expectations of remanufactured products. Faculty members from the Lubar School and the College of Engineering & Applied Science (CEAS) responded to these concerns with a study funded by the UWM Research Growth Initiative. Ross and Wilkistar Otieno, assistant professor of industrial and manufacturing engineering, are co-principal investigators.

Ph.D. students Osman Aydas from the Lubar School and Thomas Omwando from CEAS are part of the research team. “Our students are engaged in studying and proposing solutions for real-world problems in a way that is academically rigorous and timely for business,” says Ross.

The researchers were asked to answer two questions. The first was how to decide, when a failed machine is returned, whether it is worth the cost and labor to repair it. Otieno is directing that phase by creating a remanufacturability index applicable to a variety of product families.

“We will be able to determine whether a product is worthy of remanufacture, the proportion of components that should be replaced with new components and, most important, the number of useful lives (cycles of remanufacture) a product has before it is retired,” Otieno says.

The second phase, led by Ross, uses quantitative models to examine work-process and labor-assignment improvements when manufacturing and remanufacturing happen alongside each other. These decisions have environmental and economic implications for supporting customers.

“Remanufacture and repair may cost less and preserve customer satisfaction when compared to providing a new item,” says Ross. Remanufacturing also consumes significantly less energy, labor and natural resources, as well as drastically reducing the amount of material put into the waste stream over the life cycle of a product.

Anthony Ross (left) and Osman Aydas

NEW OPPORTUNITIES
found in translation

Anthony Ross (left) and Leah Leone, who leads the Spanish language track in UWM’s program.
The photo was baffling: tiny hammocks suspended from the roof of an open pavilion. Senior history major Danielle Eyre put long hours into researching what role those “baby hammocks” played in Milwaukee’s history.

As she traced the story behind the photo, Eyre developed research and writing skills she says will serve her well in graduate school and the job market.

That photo—which Eyre eventually determined was of an early 1900s fresh air “spa” for babies near the lake—is just one small piece of the Encyclopedia of Milwaukee, an ambitious 10-year effort begun in 2008 to compile a carefully authenticated, comprehensive resource with information on everything Milwaukee.

Lead editors for the project are Associate Professor of History Amanda Seligman and Margo Anderson, Distinguished Professor of History, both also members of the Urban Studies faculty. Working in collaboration with senior editors Thomas Jablonsky and James Marten from Marquette University, IT professionals and a team of students, they’re creating printed and online versions of the encyclopedia.

Seligman, who worked on a similar project in Chicago, calls the encyclopedia “our gift to the city.” The editors expect the print edition to be complete in 2017 and to include more than a million words, 740 entries and 1,000 pages.

Total cost is estimated at $2 million, of which $1.3 million has already been raised through contributions and grants from the National Endowment for the Humanities and the Greater Milwaukee Foundation.

A preliminary website is going online this spring and a comprehensive print bibliography is due out later in 2014. The project’s Facebook page already has more than 400 followers.

The encyclopedia differs from a conventional, linear history, says Seligman. With the encyclopedia, researchers, journalists, students and others will be able to dip into the content at any point to learn more about a particular topic—whether it’s labor relations, Gertie the Duck or Hank Aaron.

That’s how students in the Wisconsin Alliance for Minority Participation (WiscAMP) program learn, working with local companies and UWM researchers.

One of those students, Juan Orjuela, a UWM sophomore, has always wanted to be a veterinarian. His research work with Gerlinde Hoebel, assistant professor of biological sciences, has given him a head start on that professional goal. Orjuela studied the reactions of male and female frogs to certain calls and vibrations, and how these affect the way frogs mate.

WiscAMP helps prepare students for the STEM areas by involving them in undergraduate research and internships, locally and nationally. The WiscAMP program is part of a UW System initiative that also works in partnership with a number of private institutions.

The program is designed to encourage students from groups underrepresented in the STEM disciplines by offering opportunities that will help them continue in these fields, says program coordinator John L. Baker Jr. His office reaches out to recruit students through Facebook, Twitter and STEM-related listservs. The program has 64 students this year, a 52.4 percent increase over last year, according to Baker.

The undergraduate research part of the program—in which students are paired with both faculty/graduate student and peer mentors—is funded by the National Science Foundation. The mentors are trained by WiscAMP and UWM Student Success Center staff and meet regularly with the students.

The program also provides tutoring in conjunction with departmental and Panther Academic Support Services, if needed, and stipends for the summer so students don’t have to try to hold down a job while doing internships or research.

“The most interesting part of my research internship was when we would go out for our field days,” says Orjuela. “We drove to the UWM Field Station late in the night, put on our waders and headlamps, and penetrated the ponds in search of frog pairs to catch and later test in the lab.”
Raising children is tough enough, but especially challenging for young parents who may not have expected to add a baby to their lives.

The Young Parenthood Program, based in the Joseph J. Zilber School of Public Health, is focused on helping teens and young adults learn to work together to raise a child – even if they don’t choose to remain a couple.

“This is the type of community-based research that’s important we do as a school of public health. It’s a real partnership between the academic world and those of us working in the community,” says doctoral student Mary Mazul, a project leader for the program.

Mazul, who was recently named director of population health for Wheaton Franciscan Healthcare, and fellow project leader Jill Denson, bridge the gap between academics and community work. Denson is director of social work at Milwaukee Health Services Inc., a community-based clinic.

“They are not students working on this research project,” says Paul Florsheim, associate professor of public health, who leads the team. “They are my collaborators, because they both play important roles in the communities where we do our research. I think this speaks to the somewhat unusual nature of our students, some of whom are accomplished professionals.”

There really isn’t another program that works with young couples to help them with co-parenting.

Paul Florsheim, associate professor of public health
Autism in another language

INSPIRES ALUMNA

A n interest in teaching and a desire to help Milwaukee’s Spanish-speaking community started Celina Echeveste on her career path.

But it was a trip to her parents’ native Mexico that helped her discover a particular way she, as a future bilingual special education teacher, could make a difference.

The 2012 School of Education graduate, now a teacher at Forest Home School, saw how children with special needs were sometimes treated in Mexico.

“I saw parents who were ashamed of these children, and they weren’t getting the help they needed,” Echeveste says. That observation led her to research autism spectrum disorders (ASD) and non-English-speaking families for her master’s degree program – and to create a guidebook that would help them identify the disorders early on. “I did not want parents here to feel that way about their children just because they didn’t understand or know enough about autism.”

Says Maureen Keyes, associate professor of exceptional education and Echeveste’s graduate adviser: “I recall the first time that I met Celina. She heard that I had experience in the area of ASD and took the chance that we could work together. I was impressed with her tenacity, intelligence and commitment from that first meeting.”

The guidebook Echeveste created covers the characteristics and initial warning signs of ASD, and includes school and community resources as well as pamphlets printed in Spanish. Echeveste hopes to have the entire guidebook translated.

“Children in Spanish-speaking families and African American children tend to be diagnosed less often than others. Maybe they don’t have the resources, or they don’t understand what autism is. I have a lot of parents come in and say they wish they had the resources earlier.”

As a student researcher working in a Joseph J. Zilber School of Public Health lab, Chelsea Weirich has had the opportunity to help analyze water samples from around the world, gather samples from water near local beaches for the Milwaukee Health Department, and use the laboratory’s mass spectrometer to detect toxins in the water for later analysis.

“I’m particularly interested in the public health aspects of drinking water,” she says.

“The thrust of the lab’s work is looking at how toxic chemicals – either natural, like blue-green algal growth fed by phosphorus and other factors in the lakes, or man-made, like those created from personal care products – affect the quality of the water,” says Todd Miller, assistant professor of environmental and occupational health.

Modern drinking water treatment processes remove some of the toxins, but there is evidence that not all are removed, says Miller.

While much of Weirich’s research work has focused on harmful blue-green algae and their toxins, she has also helped gather lake water samples that include antimicrobial ingredients from personal care products. Because these products are flushed into rivers, lakes and streams, Miller and his research team are looking at possible public health concerns.

“These antimicrobials are very hard to detect in drinking water,” says Miller. “We want to see if there is any impact on people who ingest them, and find ways to prevent their occurrence in drinking water. Another worry is that these may end up in food, since sewage sludge can be made into fertilizer, and 64 percent of it is applied to agricultural land.”

Weirich is among a number of students in Miller’s Laboratory for Aquatic Environmental Microbiology and Chemistry. She hopes to eventually work for an agency such as the Centers for Disease Control and Prevention, the Department of Natural Resources or the Environmental Protection Agency. Or, she may become a researcher in academia.

Weirich says the learning she’s done in the lab will help her in any of those careers.

“I’m sure I’ll use these experiences in the future.”

WHAT’S IN YOUR water?

Chelsea Weirich (above) and Todd Miller (inset)

Celina Echeveste
Nicholas says he is pleased with the direction in which the program is heading and with the caliber of students it attracts. Their management success, he adds, is not the most important metric for him.

“I wanted to continue my support by contributing to the amount the students had to manage. It was intended for the students to have a live learning experience, so the benefactors, myself included, knew what we were going into.”

Students will likely be dealing with greater pots of money soon after graduation, says Franke. His donation stemmed from his affection for his hometown and the UWM neighborhood where he grew up. “I hope that by supporting the program, the Lubar School not only can train students for investment careers, but also help support more employment in Milwaukee in the field.”

That is one of the goals of Spellman, who once was the director of research for a $50 billion pension fund. He sees himself as the bridge between academia and the professional world. A UW-Madison grad who helped direct that school’s Applied Security Analysis Program while he was earning his Ph.D., Spellman came to UWM for the chance to build a new program.

“I also view this as a great opportunity to help the business community in this area and beyond,” he says.

Franke, Nasgovitz and Nicholas are three of the program’s many supporters. Nine companies have donated professional-grade software. For example, every IMCP student has FactSet, an investment analysis tool that may cost $25,000 per user. “Students use the same resources as professionals managing billions of dollars,” says Spellman.

The program engenders loyalty because of the special treatment the students receive and the resources available to them, he says. In January 2013, the program was accepted into the CFA (Chartered Financial Analyst) Institute University Recognition Program.

Essma’s dedication paid off: He accepted a job offer ahead of his December graduation from Green Street Advisors, a provider of real estate investment research located in Southern California.
Communication skills and empathy are critical for any health care professional dealing with families facing medical crises.

Crystal-Rae Venes developed those skills as a nursing student, not just in health care settings but also through research at UWM.

Led by nursing professor Jane Leske, Venes assisted in a two-year study that showed that families of trauma patients – like those injured by firearms or in auto accidents – can benefit by being present during critical moments of care. Venes was one of the co-authors when the research was published, and her research experience helped inspire her to become a trauma care nurse.

She now works as a case manager for iCare (Independent Care Health Plan), helping patients with chronic health problems, but her research work at UWM still influences her approach to patient care.

“T use the knowledge I’ve gained every day, between working in the ICU and teaching patients in the community. Families dealing with someone with congestive heart failure or diabetes have to know how to best help them, just like those families who have loved ones in intensive care,” she says.

Leske says, “I think it’s important that students know research is not just about collecting and analyzing data.” By participating in the research study, her students “got to see a multidisciplinary approach to patient survival.”

Leske is an international expert on caring for families of patients in critical care situations. With a colleague, she wrote the Critical Care Family Needs Inventory, a survey tool that’s been translated into more than 20 languages to develop family-centered care guidelines in hospitals worldwide.

Drug treatment courts offer treatment to nonviolent offenders with drug problems in an effort to keep them out of prison, save the costs of incarceration and prevent future crimes.

Milwaukee County’s Drug Treatment Court is coordinated by Carol Carlson, a 2011 graduate of UWM’s Master of Science in Social Work program. Carlson’s interest in the court began during her studies at UWM, when a winter break internship in New Orleans connected her with graduates of the drug treatment court there.

Excited by the concept, she worked with the Helen Bader School of Social Welfare (HBSSW) to set up an internship with Milwaukee’s drug treatment court – with the goal of forming an alumni group and identifying prospective peer mentors. That experience helped her land her current position.

“As it happened, the Milwaukee County Drug Treatment Court coordinator retired as I was graduating,” says Carlson. “I applied for the position and started in January 2012.”

UWM has another major connection to the court. The two federal grants that launched the court in February 2009 require evaluations of the program. The Center for Applied Behavioral Health Research (CABHR), housed in HBSSW, provides this vital expertise. A third grant received at the end of 2012 extended the program for three more years.

Michael Fendrich, Wisconsin Distinguished Professor and professor of social work, and Thomas LeBel, CABHR scientist and associate professor of criminal justice, currently lead the evaluation, with the assistance of Gregory Powers, doctoral student in social work.

They are part of a team, headed by a judge, that includes prosecutors, public defenders, a Milwaukee Police Department law enforcement officer, program coordinator and treatment professionals from the Milwaukee County Behavioral Health Division. The court’s coordinator and case managers are provided through JusticePoint, a Milwaukee-based nonprofit organization.

Carlson oversees the program, “making sure that we adhere to evidence-based practices and the protocols.” Her monthly meetings with the UWM evaluators help determine where the program is doing well and where changes or improvements are needed.
THE ROADS TO innovation

New knowledge comes from various corners of the university – from our research labs, our students’ real-world learning experiences and our support of entrepreneurship.

Designed specifically to stimulate innovative thinking, these roads are creating a pipeline of talent that will fill the jobs of today and the near future, and overhaul our local and state economies in the process.

The UWM Research Foundation is a vital navigator of these avenues to innovation, making it easier for research scientists and students to accelerate the pace of innovation and bring the results to market through licensing agreements and new ventures.

With annual research spending of about $60 million, the university excels in a host of research areas, including water, energy, health care, advanced materials, nanotechnology and health care informatics.

Through its Catalyst Grant Program, the Research Foundation has awarded $3.4 million to talented faculty, funding that has produced $10 million in follow-on investments in UWM technologies. Fifteen license and option agreements have resulted from Catalyst projects.

The Research Foundation’s co-sponsorship of UWM’s Student Startup Challenge and its related coursework provides students with the same guidance in commercializing their ideas as it does for faculty.

Bringing ideas to the market is only one facet of the innovation process. Together with the UWM Research Foundation, the UWM Real Estate Foundation provides state-of-the-art facilities where researchers can meet, exchange ideas and collaborate.

The latest example is the Innovation Accelerator at UWM’s Innovation Campus, which will open this year. It will give UWM researchers 25,000 square feet of collaboration space near important regional partners. And an addition to the School of Freshwater Sciences, located near Milwaukee’s Global Water Center, will also be completed in 2014.

We don’t travel these pathways alone. A broad network of community partners helps drive the process at each step, providing important resources and market-driven needs, bringing ideas to market and providing jobs for innovators and entrepreneurs.

New internal approaches, however, can be far more potent with additional external partners. I invite you to join us on the multiple roads at UWM that feed our innovation age. To find out more, please contact us.

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President, UWM Real Estate Foundation
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As Wisconsin’s premier public urban institution, the University of Wisconsin-Milwaukee enjoys a growing national reputation for excellence in research, teaching and community engagement. On an operating budget of $700 million, it educates nearly 28,000 students and is an engine of innovation for Southeastern Wisconsin. The 104-acre main campus and satellites sites are located in the economic and cultural heart of the state. The university’s recent expansion includes new academic and research facilities, and the creation of the Joseph J. Zilber School of Public Health and the only School of Freshwater Sciences in the United States.

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