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# Research & Strategic Partnerships: Quarterly Review, Volume 3, Issue 1

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## Unlocking Life's Code

An exhibition at OMSI introduces the public to the marvels of the genome and genetic research happening here in Portland.

### Reexamining the Data in Concussion Research

Could data mining reveal new insights into treatments for concussions? Systems Science Professor Martin Zwick thinks it's possible.

### PSU Researchers Discover Possible Cure for Malaria

Chemistry Professor Kevin Reynolds and co-investigators have discovered a possible cure for malaria that could be administered orally in a single pill.

### Access to Primary Care Doctors Lacking for Some Oregonians

In a longitudinal study, PSU researchers say despite the Affordable Care Act, some Oregonians still lack access to primary care doctors.



Research & Strategic Partnerships  
*Quarterly Review, Volume III, Issue 1, 2016*

## BUILDING BRIDGES

Over its 50-year history, the research portfolio of Portland State University has leveraged strong partnerships throughout our Metropolitan region. Ties with local social service organizations, county and city departments, and state programs gave rise to the Regional Research Institute in our School of Social Work. Public policy and urban planning collaborations contributed to the emergence of our College of Urban and Public Affairs. As the state's largest producer of teachers, our Graduate School of Education became adept in educational policy research. Portland's technology industries helped spur research in the Maseeh College of Engineering and Computer Science.

While these connections all continue to thrive, they are now being joined by an exciting new set of research programs derived from partnerships centered on Portland's South Waterfront area. The Collaborative Life Science Building, the Portland State Business Accelerator (PSBA), and the Tilikum Crossing Bridge are offering greatly expanded opportunities for PSU faculty and students to participate in joint discovery with colleagues in the Oregon Health and Science University (OHSU), Oregon Museum of Science and Industry (OMSI), and startup companies affiliated with the PSBA.

This concentration of scientific and educational capability, which also includes Portland Community College's CLIMB Center adjacent to OMSI, has recently been branded as the Innovation Quadrant. While Metro Portland has long had an abundance of creative pockets of innovation, there has not been a recognized geographic hub comparable to those established in the downtowns of Cleveland, Brooklyn, Cambridge, and San Francisco.

The Innovation Quadrant offers the first chance to layer our region's distinct talent, culture, design, transit, and real estate in a single synergistic district with the potential to become the center of higher education, public outreach, entrepreneurship, and cutting-edge science and technology.

To commemorate the opening of Tilikum Crossing and the launch of this dynamic new district, this issue of the *RSP Quarterly Review* focuses on PSU collaborations with OHSU, OMSI, and the City of Portland.

We start by describing how OMSI, PSU, and OHSU collaborated to bring an exhibit about the human genome from the Smithsonian Institution to Portland. We then present a series of stories about projects building on the complementary health and life science talents of PSU and OHSU researchers. These include a study of ethnic

inequities in health care access, a new malaria therapy, tools to improve MRI measurements, and a new way to assess the efficacy of alternative treatments for concussions.

We also include an article about one of PSU's best-kept secrets—a high-tech metallurgy lab located in OMSI whose partners include many of the country's largest metal manufacturers, including Boeing, Blount International, Precision Castparts, and the US Navy.

No collection of stories about PSU's partnerships would be complete without reference to the close ties between the City of Portland and PSU's Institute for Sustainable Solutions. Here we report on the selection of Robert Liberty as the Institute's new Director. We also describe a faculty member's analysis of the complex relationships between urban gardens and gentrification, in Portland and Vancouver BC. A sustainability link with OHSU is recounted in a story about the "Oregon's Healthiest State" summit.

One sobering fact about the new Tilikum Crossing Bridge is that by some accounts, it is Portland's only Willamette River crossing likely to survive a catastrophic Cascadia earthquake. One of our final articles describes how a new PSU mathematics professor is producing sophisticated models for how earthquake faults work, which may eventually help us better plan ways to reduce the seismic risk hanging over all of us who work and live in the Innovation Quadrant.

As the Innovation Quadrant continues to be built out, *RSP Quarterly Review* will continue to report on how PSU is benefiting and contributing as only a bridging, urban-serving university can do.



Jonathan Fink,  
Vice President  
Research & Strategic Partnerships

## Table of Contents

### Unlocking Life's Code

**1** With *Unlocking Life's Code* on exhibit at OMSI, Portlanders visiting the museum learned about the genome and life science research at PSU and OHSU.

### Re-examining the Data from Concussion Research

**5** Could datamining reveal new insights into treatments for concussions? Systems Science Professor Martin Zwick thinks it's possible.

### Developing Next Generation MRI Contrast Agents

**9** Dr. Mark Woods' research takes him back and forth between PSU and OHSU as he develops new and more effective MRI contrast agents.

### Research Shows Access to Primary Care Lacking

**11** In a longitudinal study, PSU researchers say despite the Affordable Care Act, some Oregonians still lack access to primary care doctors.

### Researchers Discover Possible One-Pill Cure for Malaria

**12** Chemistry Professor Kevin Reynolds and co-investigators have discovered a possible cure for malaria that could be administered in a single pill.

### Collaborative Plans to get Oregonians Healthier

**13** At the Oregon Healthiest State Summit, a diverse set of organizations unveiled a plan for getting more Oregonians outside on their journey to better health.

### Researchers to Study Urban Gardens and Gentrification

**14** A PSU-led research team will examine the relationship between urban agriculture and gentrification in Portland and Vancouver, BC.

### ISS names Robert Liberty as New Director

**15** PSU's Institute for Sustainable Solutions (ISS) named environmental lawyer and policy expert Robert Liberty as its new director.

### PSU Selected for Entrepreneurial Education Program

**16** PSU selected to participate in a program designed to help institutions integrate innovation and entrepreneurship into undergraduate engineering education.

### Portland's Heavy Metal Workshop

**17** Portland State's Materials Research Laboratory: the one lab on campus where building bridges isn't just a metaphor.

### A Model Fault

**21** Assistant Professor Brittany Erickson develops computational models to simulate earthquakes and explore the geophysical processes associated with them.

### Is this the Beginning of the End for the Serial Number?

**23** With a novel algorithm and a high-resolution terahertz laser scanner, Dr. Suresh Singh might change the way we keep track of our most valuable possessions.

### Research Snapshot

**25** Research & Strategic Partnerships quarterly report: **Awards** (25); **Proposals** (27); **Expenditures** (29); **Publications** (29); **Doctoral Degrees Conferred** (31).

## Research & Strategic Partnerships

*Quarterly Review* · Vol. III, Issue 1, 2016

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# UNLOCKING LIFE'S CODE

For Portlanders visiting OMSI, a traveling exhibit provides an opportunity to learn about the genome and life science research at PSU and OHSU.

By Shaun McGillis



A lot can change in just a few years.

In 2003, the National Human Genome Research Institute (NHGRI) successfully completed mapping the human genome. It took eight years, \$2.7 billion, and over 1,000 scientists from around the globe to chart the 3 billion base pairs of nucleotides contained within a single strand of our DNA.

Today, a single lab can do that work in about a week for around \$1,000. Companies such as 23andMe offer personalized DNA screening services for less than the cost of a new iPhone. And with the latest technologies, scientists can make specific changes to targeted genes in living cells and study the effects of the resulting mutations.

These life science breakthroughs over the past decade have been mirrored by major progress here in Portland. The partnership between Portland State and Oregon Health and Science University has stimulated many developments that could hardly have been imagined in 2003. The neighboring

universities created two popular new graduate programs, the Healthcare MBA and the Oregon Master of Public Health, the latter of which spawned the new OHSU-PSU School of Public Health. Along with Oregon State, the universities built the state-of-the-art Collaborative Life Sciences Building in South Waterfront. The Oregon Translational Research and Development Institute's new Bioscience Incubator joined the Portland State University Business Accelerator as South Waterfront homes for local startup companies fueling the region's diversifying economy. OHSU raised \$1 billion for cancer research and PSU received \$23.7M for EXITO—the largest federal grant in its history—to enhance undergraduate training in biomedical-related fields for underserved populations. And new infrastructure including high speed/high capacity digital fiber linking OHSU and PSU, the Orange Line light rail, and the Tilikum Crossing Bridge established even stronger connections among PSU, OMSI, Portland Community College, and OHSU, all of which lie within the city's newest district, the Innovation Quadrant.

**Opposite:** "Genome: Unlocking Life's Code" by Donald E. Hurlbert and James Di Loreto courtesy of the Smithsonian Institute. **Above:** "OMSI" by Adam Dachis is licensed under CC BY 2.0

**Page 4 photos:** "Genome: Unlocking Life's Code" by Donald E. Hurlbert and James Di Loreto courtesy of the Smithsonian Institute.

Set against this backdrop, OMSI, in collaboration with PSU and OHSU, hosted a traveling exhibit called *Genome: Unlocking Life's Code* this past Fall. Developed by the Smithsonian Institution and the NHGRI, the exhibit was created to celebrate the anniversary of the completion of the Human Genome Project and a decade's worth of scientific and technological advances in genetic research. Visitors to the museum explored the complexities of the genome through immersive and often personalized interactive experiences, which helped them understand what the genome is, why it is important to study, and how it connects us to all other life on earth.

The 2,900 square foot exhibit introduced museum visitors to the DNA molecule, the science of genomics, medical and health applications, and the philosophical and ethical implications of altering an organism's genetic code. The exhibit also connected the public with scientists and educators from OMSI, PSU, and OHSU and their exciting research.

In addition to the traveling exhibit, OMSI, in collaboration with PSU and OHSU faculty and staff members, developed genome-related educational activities for the public. Museum attendees got exposed to research methods by extracting DNA from strawberries. They were challenged to create model proteins using Legos while they found out about protein synthesis and what happens when things go wrong in the nucleus of a cell. They examined the hand bones of different animals to better understand the evolutionary relationships among species and learned about how DNA sequencing can show the connections between organisms as seemingly different as humans and fungi.

During busy weekends, these activities were facilitated by specially trained PSU graduate and undergraduate students recruited from life science labs on campus. While interacting with visitors, the students discussed the research they and their advisors do, and how their studies fit into the context of the exhibit and the life sciences more broadly.

"This has been an excellent way to share with the public the kinds of research going on at PSU and OHSU and why that work is important," said Sean Rooney, OMSI Senior Educator for Life Science.

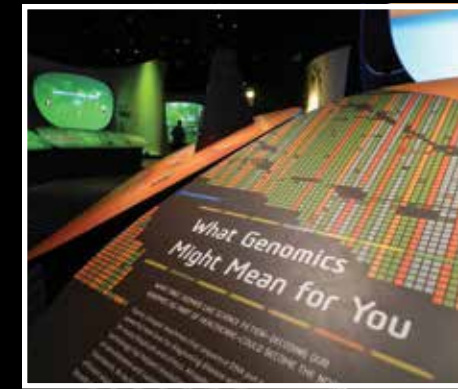
Throughout the fall OMSI also featured weekly "Meet a Scientist" programs in its Life Lab. These events were facilitated by PSU and OHSU researchers participating in OMSI's Science Communication Fellowship Program. Claire Riggs, a comparative physiology Ph.D. candidate and pupil of Dr. Jason Podrabsky, shared with the public her experiences of being a researcher and scientist.

For those who enjoy a pint of craft-brewed IPA and a meal with their science, OMSI also hosted a "Science Pub" event at the Hollywood Theater where PSU Professor of Biology Dr. Anna-Louise Reysenbach captivated the audience with a presentation about her research on the organisms and ecosystems that not only survive, but thrive in the extreme environments created by thermal vents in the cold, lightless depths at the bottom of the sea.

"I think this kind of public outreach is absolutely critical for science and researchers," said Biology Professor Dr. Ken Stedman, who was one of several PSU faculty members that advised and consulted OMSI as the museum developed and prepared activities and programming to accompany the exhibit. "For one, the work we do in the lab is supported by the public through research grants from the state and federal government. I also think it's critical that we help the public understand why research is important and how it affects the public good. Partnering with OMSI has been a great way to accomplish that and I hope this kind of collaboration continues into the future."

The timing of the Genome exhibit was not an accident. PSU's VP for Research and Strategic Partnerships Jonathan Fink, who serves on the boards of the Smithsonian's National Museum of Natural History and OMSI, learned several years ago that the show would begin traveling in 2014. He suggested that OMSI, PSU, and OHSU collaborate to bring it here in Fall 2015 to commemorate the opening of Tilikum Crossing. This exhibit is just the beginning of what will be a growing series of educational, scientific, workforce and economic development synergies among the city, PSU, OHSU, PCC and OMSI emerging within the new Innovation Quadrant.

In coming years, Portlanders will see the skyline on both sides of the Willamette transform with innovation-related developments, with a particular emphasis on the life sciences. OHSU's Schnitzer Campus will add several new research and teaching buildings, some likely shared with PSU, while OMSI and PCC will expand their health science related outreach and training. There will be an increase in the number and diversity of scientists entering biomedical-related fields as PSU fully implements its NIH-funded EXITO program and as a new generation of researchers enrolls in graduate programs in the OHSU-PSU School of Public Health. And collaborations such as the one that brought *Genome: Unlocking Life's Code* to OMSI will provide the public more frequent opportunities to explore the research going on in their backyards.



# RE-EXAMING THE DATA FROM CONCUSSION RESEARCH

Could advanced data mining reveal new insights into treatments for concussions?  
Systems Science Professor Martin Zwick is trying to show the way.

By Shaun McGillis

Over the past decade, medical research, investigative reporting, and the recent Will Smith film *Concussion* have shown athletes and football fans alike that the sport they love to play and watch can have devastating health consequences for its players. Headlines and talking heads alternately praise and castigate organizations such as the NCAA, NFL, and MLS for taking steps to prevent concussions and not doing enough to care for those with brain injuries. Bloggers hail the arrival of high tech impact sensors in helmets as the “Holy Grail” of safety monitoring, while Congress grills league officials on what they knew about football safety.

Every year concussions, also known as mild traumatic brain injuries (MTBIs), result in 2.2 million trips to emergency rooms in the U.S. Athletes of high school age and younger suffer the majority of the injuries. For most, recovery comes in a matter of days. But MTBIs have been shown to cause permanent mental impairment, even in athletes as young as in their early 20s.

Despite an investment of over \$800 million by the U.S. Department of Defense and more than ten years of research, clinical trials have failed to establish intervention effectiveness for brain trauma. Researchers suggest that this lack of definitive results comes from the difficulty in designing and conducting cognitive tests that show the severity of MTBIs and the efficacy of potential treatments.

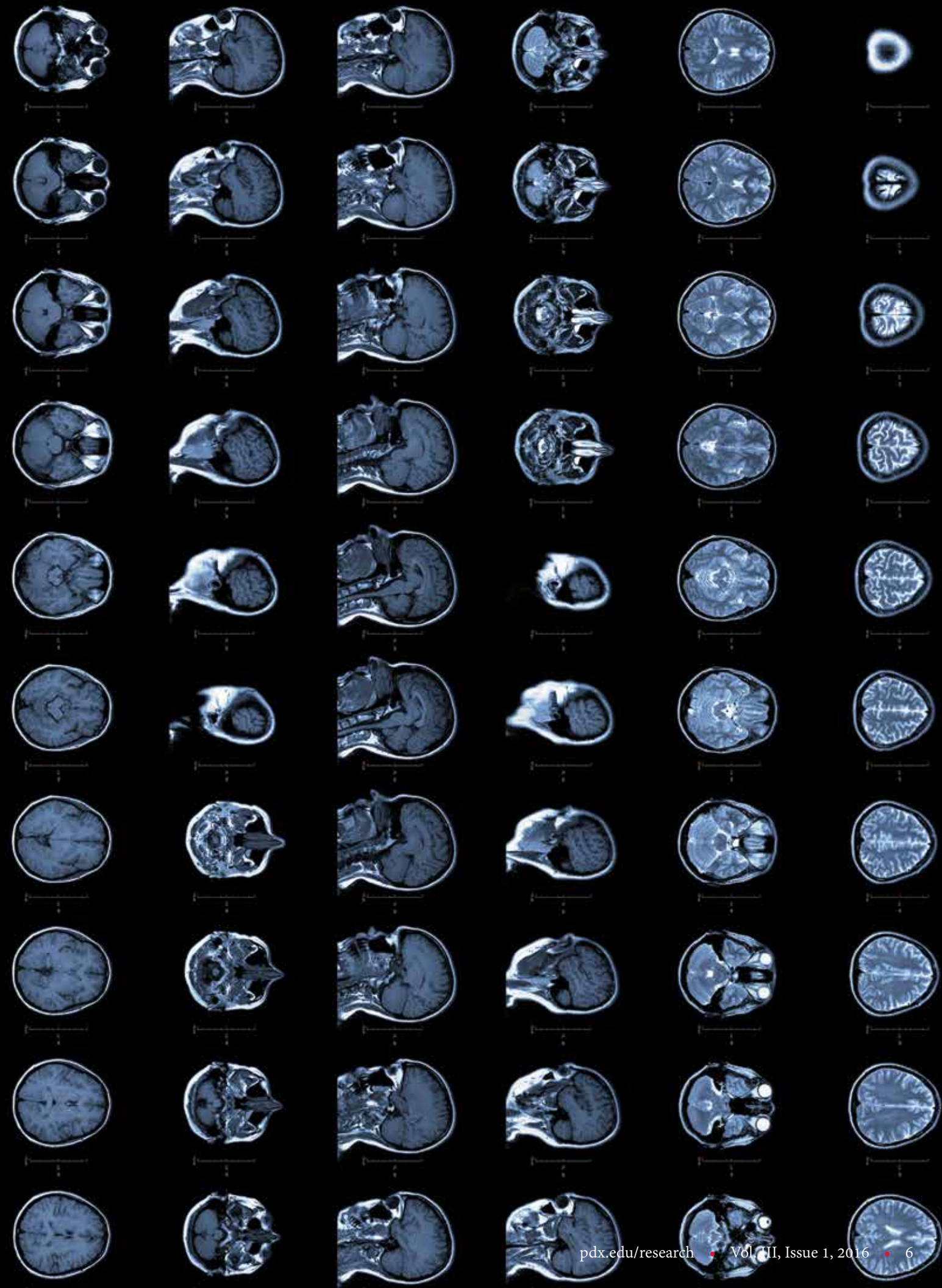
To address such complex issues, Portland State and Oregon Health and Sciences University as well as researchers at the Department of Defense and Stanford University are leveraging their complementary expertise.

Although trained as a biophysicist, PSU Systems Science Professor Dr. Martin Zwick is by his own admission no expert on concussions or other brain injuries. His research explores artificial life, machine learning, exploratory modeling, systems theory, and philosophy. Using his systems science expertise, Dr. Zwick looks for ways to uncover potentially useful information hidden in large datasets.

When, at a meeting of the Brain Trauma Foundation a few years ago, he saw a presentation about the problem of inconclusive data in concussion studies, Dr. Zwick began a conversation with Dr. Nancy Carney. Carney, who directs the Brain Trauma Foundation Center for Guidelines Management at OHSU, learned of previous analyses Dr. Zwick had done of datasets in diabetes studies and thought his unconventional approach of exploratory modeling might lead to the discovery of previously unrecognized relationships in MTBI datasets and point researchers in the direction of effective interventions in the treatment of brain trauma.

To analyze the MTBI records and similar datasets, Dr. Zwick developed a computational modeling program that uses information and graph theory to relate the whole of a dataset to its parts. The software identifies complex relationships among two, three, or more independent variables and ranks the likelihood that these relationships can predict the behavior of a dependent variable.

Imagine you’re conducting a clinical trial on a new therapy, for instance a combination of drugs and electrical stimulation, which earlier studies suggest will improve MTBI patient recovery. You’re funded to test whether other factors, such as diet or mental attitude, will influence the





efficacy of the treatment. You thus have your subjects fill out long questionnaires generating massive behavioral datasets that will later help assess your assumptions.

Now imagine that the data you've painstakingly collected is inconclusive, neither proving nor disproving your hypothesis. Using Occam, a Discrete Multivariate Modeling software tool he developed at Portland State, Dr. Zwick can potentially identify key factors you were unaware of or were not looking for given the specific questions your study sought to answer.

"[This] is a great tool to use to look at data from a variety of perspectives. The researchers sharing data with me look at very specific sets of questions. They're working from their own theories and assumptions that suggest one variable ought to predict another, or that two or more data points ought to be associated in a particular way. Their studies are

designed to confirm or disprove those assumptions. In my work, I get into the data and explore it, checking to see if there's anything else we might be able to learn."

This kind of data mining is often applied to data intensive fields like genomics, astronomy, particle physics, or the financial sector, but as Dr. Zwick notes, it is a tool that is increasingly being used to analyze smaller datasets collected in clinical trials and social science settings. In the case of MTBI datasets, there is the real possibility Dr. Zwick will uncover new evidence showing what works and doesn't work in clinical trials, or highlight unrecognized relationships between physical, social, or environmental factors and the efficacy of particular interventions.

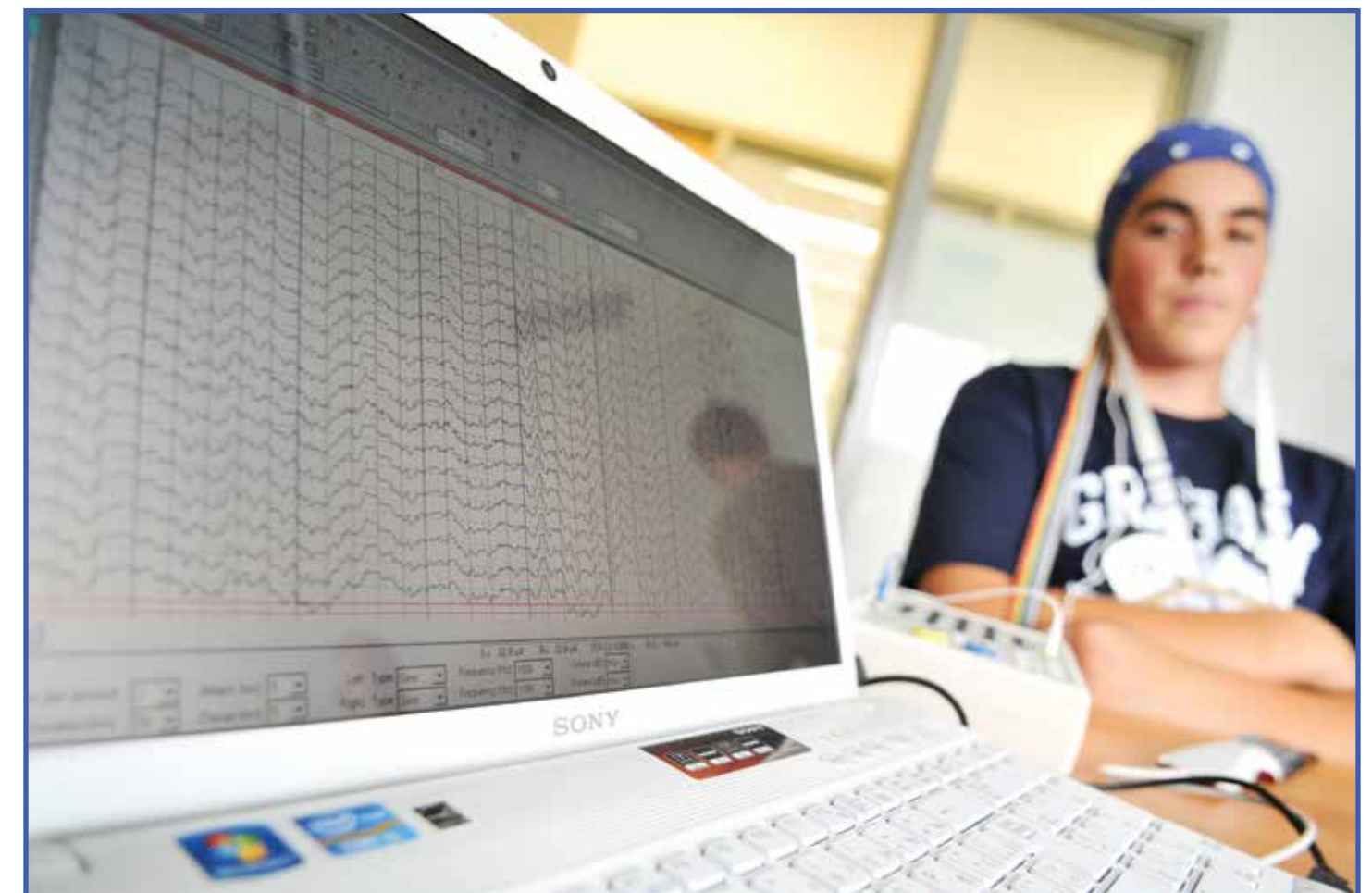
Dr. Zwick cautions that his approach is unlikely to lead to any game-changing revelations about MTBI mechanisms; any new insights would need to be further tested and

confirmed in follow-up studies. Nevertheless, during their first look at the data, he and his OHSU collaborators found that a widely used cognitive test wasn't a particularly helpful measure of brain injury, which will certainly inform how the next study is designed.

The collaboration between Dr. Zwick and concussion researchers at OHSU and the Brain Trauma Foundation is emblematic of ways PSU and OHSU can leverage complementary strengths to address complex health issues. It's not likely that this research will lead all young athletes to give up their dreams of playing contact sports. Nor will advances in protective gear eliminate all injuries from head-jarring hits. But joint investigations like these into concussion treatments may mitigate the long- and short-term physical and financial costs of America's favorite pastime.



Above/Below: "Concussion study with Dr. Michael Gaetz" by University of the Fraser Valley is licensed under CC BY 2.0





# DEVELOPING NEXT GENERATION CONTRAST AGENTS

By Shaun McGillis

Great social, technological, or scientific breakthroughs rarely happen in a vacuum. Rather, they require collaborative environments where ideas and resources can be freely exchanged. Research Triangle in North Carolina, Route 128 in Boston, and Silicon Valley are the three most-often cited U.S. examples of this kind of entrepreneurial hothouse. The anchor universities and spinoff companies in those three regions have flourished because of these creative synergies.

Oregon's best shot at replicating this model is the partnership between PSU and Oregon Health and Science University. As already described in this *Quarterly Review*, these two schools form the core of the Innovation Quadrant, which has a distinctly life science flavor. Co-located classrooms, shared research laboratories, and even a joint School of Public Health are all evidence of this close connection.

However, nothing links two educational institutions together more closely than shared faculty. PSU and OHSU are still in the early stages of developing this mechanism for partnership. One of the early pioneers in this experiment is Dr. Mark Woods, who holds joint appointments as Associate Professor of Chemistry at PSU and Associate Scientist in the Advanced Imaging Research Center (AIRC) at OHSU. Drawing on the resources of both universities, Dr. Woods focuses his research on the development of novel, more effective magnetic resonance imaging (MRI) contrast agents that improve the quality of images in general and target specific diseases in particular.

The use of MRI as an investigative and diagnostic tool in medical and scientific settings has become commonplace in the three and a half decades since the technology first became commercially available. Its applications include the diagnosis of some types of cancer, detection of cardiovascular disease, the characterization of liver and pancreatic disorders, and the study of brain activity.

"When we use magnetic resonance imaging in all of these applications," Dr. Woods said, "what we're measuring, in a sense, is the water that makes up over 60% of our bodies."

During an MRI scan, radio waves transmitted in the presence of a strong magnetic field temporarily knock the atomic nuclei of water molecules in human tissues out of their natural positions. As the nuclei realign, they send out additional radio signals, which can be detected by scanners in the machine, analyzed by a computer and converted into an image. The brighter areas of the scan indicate places where nuclei take longer to return to their natural positions; these tend to correlate with areas where something is amiss.

"The purpose of MRI contrast agents is to accelerate the slowdown of nuclei," Dr. Woods explained. "By hastening the slowdown you can increase the contrast between the brighter and darker areas of the scan, which helps radiologists identify tumors, brain activity, liver damage, or other potential health issues. And while that's great, there are a lot of problems with contrast agents we still need to overcome."

According to Dr. Woods, contrast agents work best in scans performed by low magnetic field machines. In these cases, scientists working in labs can increase the effectiveness of contrast agents between 20 and 30 percent. The problem is that low field machines produce poorer quality images, even when contrast agents are applied, and contrast agents, even those enhanced in the lab, lose all effectiveness in high field scans. A second problem Dr. Woods is working on is one of scale. The molecular structures of current clinical contrast agents are far too large to detect disease biomarkers that may only be present at the nanoscale.

"So the challenge we're working on is how to improve contrast agents at the low field level, to get them to the point where they can detect something as minute as a disease biomarker. At the same time we're trying to develop a contrast agent that can perform as effectively at high magnetic fields as low fields. It's work that takes me back and forth between my lab here at PSU and the Advanced Imaging Resource Center [at OHSU]."

Dr. Woods notes that there are other imaging technologies available to the medical and scientific communities already capable of detecting nanoscale disease biomarkers in the human body. Single Photon Emission Computed Tomography (SPECT) and Positron Emission Tomography (PET) scans are the two most common. There are, however, disadvantages to these modalities. Both require the application of radioactive substances to diagnose and

treat illnesses. Both produce images of far lower resolution than MRI scans. And neither provides radiologists the anatomical information that is inherent with MRI scans.

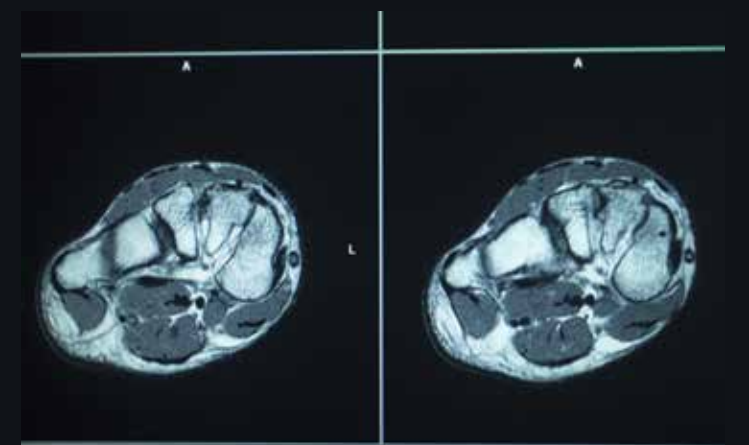
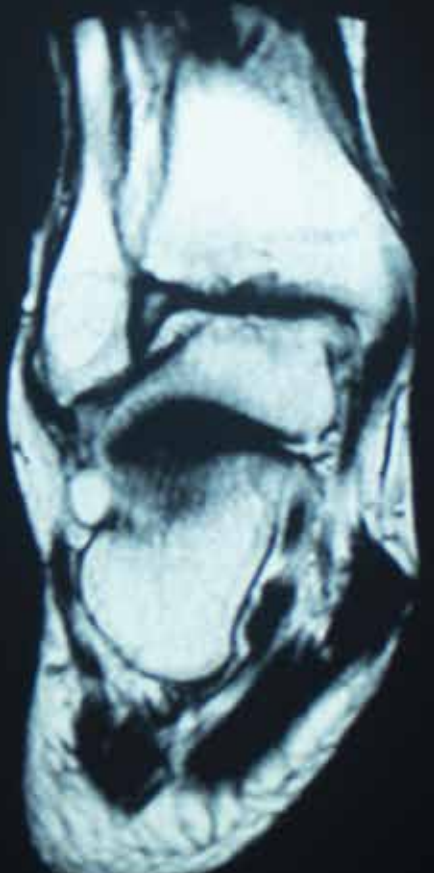
"We don't yet have the technology to dig as deep as radiologists can with nuclear medicine," Dr. Woods said. "But we know MRI is a better tool on many different levels. That's why I think the work we're doing is important. If we can get the combination of effectiveness at the high field and the ability of the contrast agents to perform at the scale of disease biomarkers, we'll be able to really change the way imaging is done in research fields and perhaps even see these agents working in preclinical settings."

Dr. Woods is hard at work on achieving those breakthroughs. He is currently collaborating with OHSU biomedical engineer Dr. John Muschler on developing MRI contrast agents capable of detecting bladder cancer, the sixth most common form of cancer. Affecting more than 200,000 people per year in the U.S. alone, bladder cancer, which usually affects older adults, can be difficult to detect, and even more difficult to treat depending on a patient's age. Dr. Woods' goal is to develop a contrast agent capable of identifying diseased tissue at an early stage before harsh and invasive treatment methods are required.

As OHSU's top research priority, the battle against cancer is sure to be a recurring theme in future news from Portland. Faculty members like Dr. Mark Woods, who serve as ambassadors between OHSU and PSU, increase the likelihood that PSU's scientists and engineers will also play a significant role in these major breakthroughs, just as the Innovation Quadrant itself increases the visibility of Portland's contributions to the solution of society's grand challenges.



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# RESEARCHERS DISCOVER POSSIBLE ONE-PILL CURE FOR MALARIA

By Scott Gallagher

Researchers at Portland State University (PSU) have discovered a possible cure for malaria that could be administered in a single pill.

The compound is based on a natural red pigment that comes from a soil bacteria. The researchers' results, recently published in the *Journal of Medicinal Chemistry*, show that the compound cures malaria in a single oral dose in animal models. Additionally, the compound works against drug resistant strains of the disease.

Principal investigator Kevin Reynolds said the catalyst for his research was an old paper from the 1970s that hinted at the pigment's potential in treating malaria. "Why didn't anyone follow-up on it," asked Reynolds. "Perhaps they didn't have the know-how or technology to make the structural changes necessary to make it more effective."

According to the World Health Organization (WHO) there were 198 million cases of malaria in 2013. Malaria is caused by Plasmodium parasites and is spread through the bites of infected mosquitos resulting in more than half a million deaths each year, the majority of them children under five.

"What's unique about our research is the potential to create a one-pill cure for malaria," said Reynolds. "That's huge because it's not an injection that needs to be kept refrigerated and you wouldn't need multiple doses."

Reynolds, co-investigators Jane Kelly and Papireddy Kancharla have moved beyond the "proof-of-concept" stage, but more work needs to be done before human trials. In the meantime, PSU has filed a provisional patent application for their compound.



**Below:** Drs. Jane Kelly, Kevin Reynolds, and Papireddy Kancharla. Photo by Peter Simon, Portland State University.

# Research Shows Access to Primary Care Lacking

By Christina Williams

When the Affordable Care Act passed, Portland State University economists Rajiv Sharma and Arnab Mitra, and Oakland University's Miron Stano saw an opportunity.

The shift in the health care market created something that's exceedingly rare for health economists like Sharma and Stano: a natural experiment. They teamed up with Mitra to create a study that would show how populations are accessing primary care physicians, while examining the effects of federal and state policies.

Sharma's team created the Longitudinal Access to Physicians study, an innovative research model that used simulated patients with distinct insurance, race/ethnicity, and gender profiles. The study's design allowed the team to address deficiencies found in studies based on administrative data, such as billing records, and surveys. Using the patient profiles, student researchers made phone calls to a national random sample of physicians to request information on appointment availability.

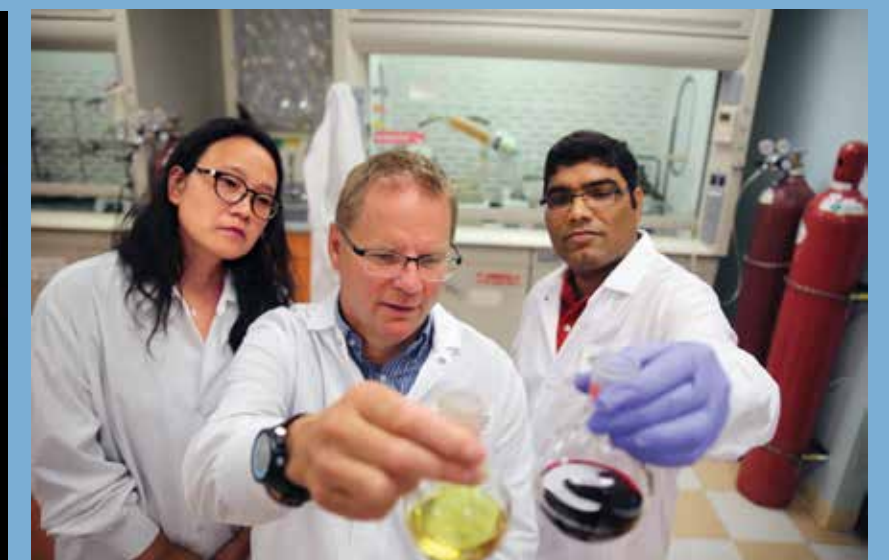
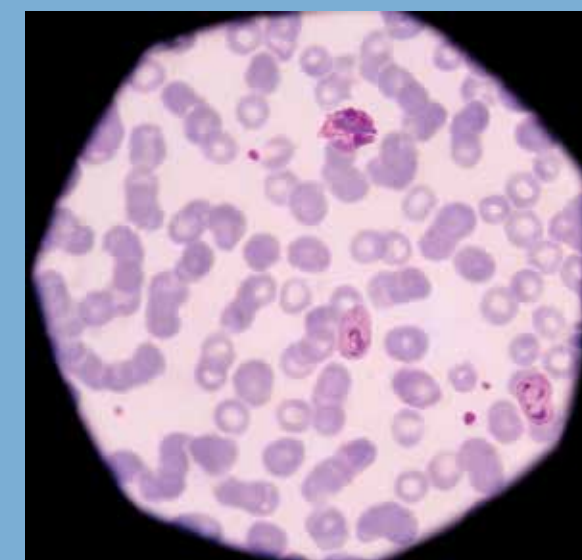
The researchers were then able to correlate the availability of appointments for different types of patients. They found

that the disparities of access were substantially greater than previously reported using different methodologies.

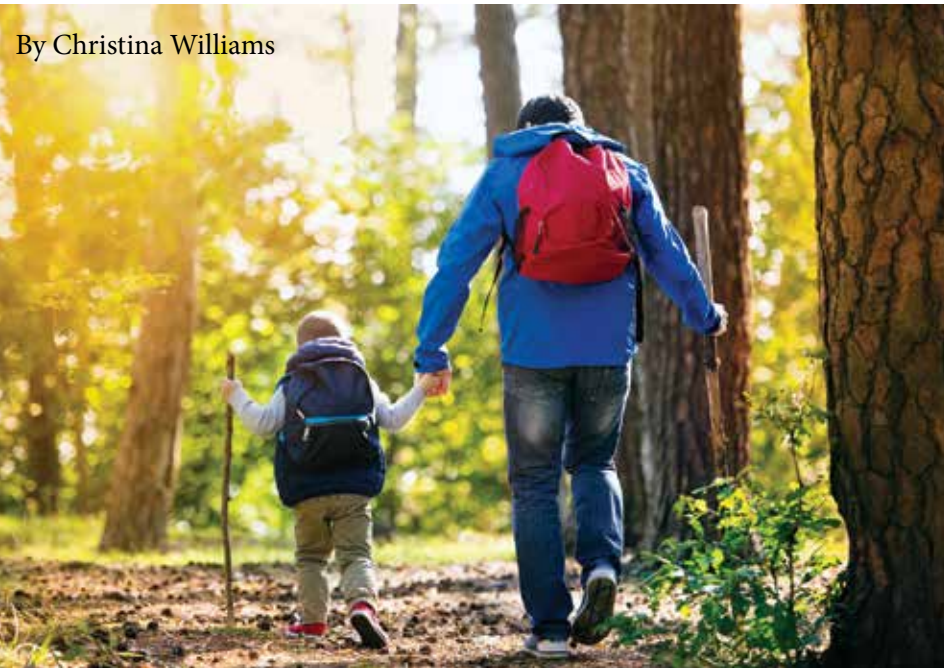
A white male self-pay patient, the profile found to have the highest access, was able to get an appointment 70 percent of the time. Meanwhile, a Hispanic woman on Medicaid, the profile with the lowest access, was offered an appointment only 14 percent of the time.

With support from the PSU Institute for Sustainable Solutions, the College of Liberal Arts and Sciences, and Research and Strategic Partnerships, the Longitudinal Access to Physicians Study this year earned a two-year, \$435,000 National Institutes of Health grant.

Sharma and his team, which recently published their first results in the journal *Economics Letters*, will continue to collect data with the support of the NIH grant. Currently, the researchers are also gathering data with profiles that examine access for patients who are smokers and those who are obese. In future years, Sharma plans to examine patients in neighborhoods with environmental issues, and those who live in poverty.



# COLLABORATIVE PLANS TO GET OREGONIANS HEALTHIER



By Christina Williams

At the Oregon Healthiest State Summit in November, a diverse set of organizations unveiled a plan for getting more Oregonians outside on their journey to better health.

The Oregon Action Framework for Health and the Outdoors will provide direct support for communities to reduce the barriers that prevent people from spending more time outdoors. The framework calls for more research and communications about the health benefits of nature and public policies that support health and the outdoors.

“The science is clear. Being outdoors in nature is a solid pathway to better physical and mental health,” said Bobby Cochran, executive director of Willamette Partnership. “But too many Oregon neighborhoods have less than optimal access to natural settings and it’s taking a toll on public health. By taking action we can begin to get people to spend more time in nature and reap the benefits that time provides.”

The framework was established by a coalition including Willamette Partnership, the Oregon Public Health Institute, Portland State University’s Institute for Sustainable Solutions, Oregon Healthiest State, The Intertwine Alliance, and Solid Ground Consulting.

The Oregon Action Framework for Health and the Outdoors ([www.oregon.healthandoutdoors.org](http://www.oregon.healthandoutdoors.org)) is already halfway toward a fundraising goal of \$100,000, which will be deployed to support community projects across Oregon that improve access to healthy outdoor spaces through park development, public programs, tree planting, and related activities intended to make the outdoors a welcoming place no matter who you are and where you come from.

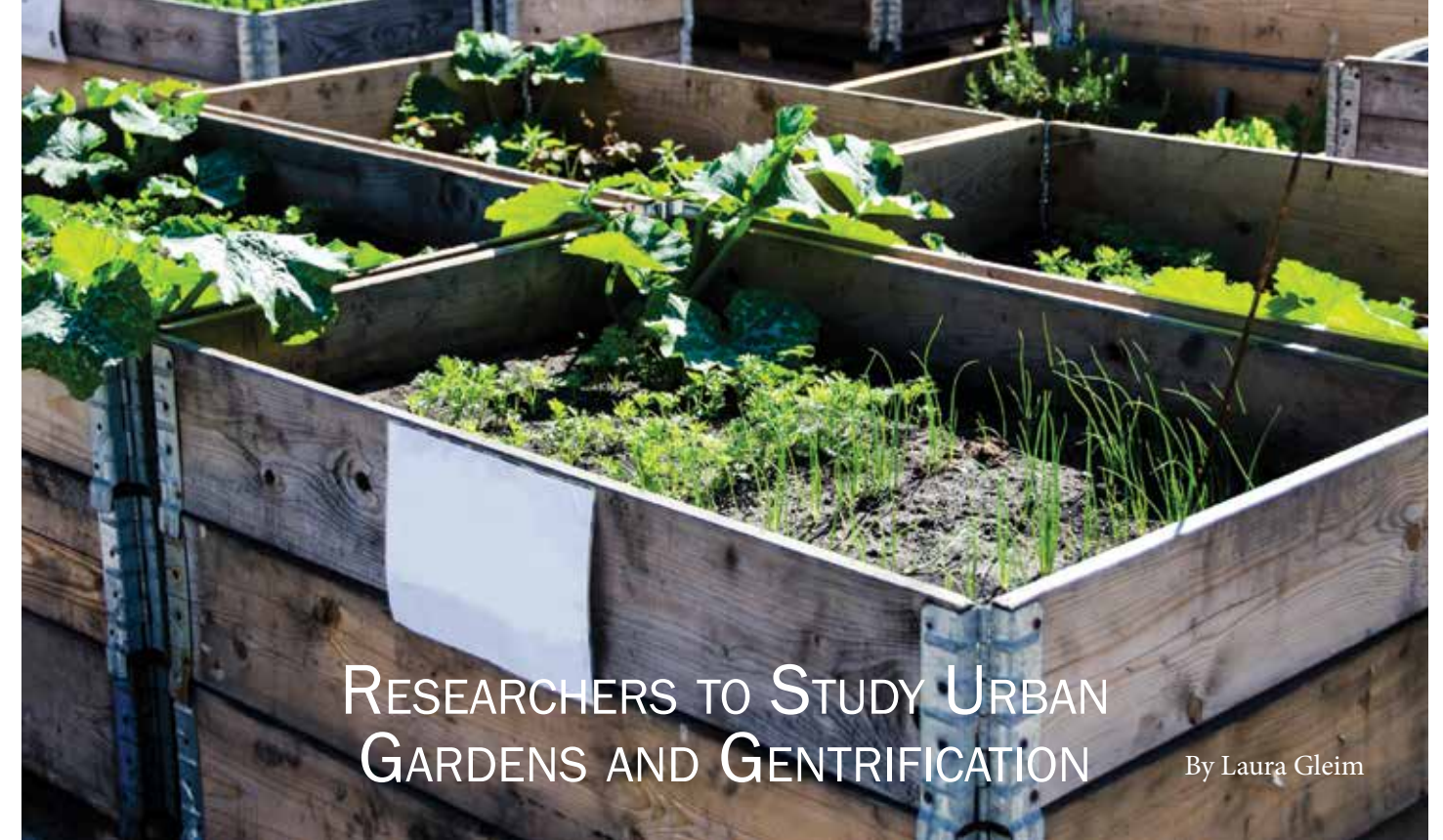
“At REI, we believe that an outdoor life is a life well lived. There’s an increasing body of evidence that shows the important public health benefits that flow when people spend quality time outside. This effort is exactly what we need—businesses and communities coming together to help make that link,” said Marc Berejka, REI’s Community and Government Affairs Director. “REI is providing a grant to

help support the effort and we encourage any organization with an interest in healthy communities for Oregon to consider doing the same.”

“Not every Oregonian has the same access to the outdoors. Parents in the Gorge may have to walk down a rural highway with no sidewalks to get their kids to a park. Veterans may not know about programs for fly fishing and rock climbing led by veterans. The Oregon Action Framework is a bold step toward making the link between health and nature more explicit, making the health benefits available to more Oregonians, and putting forth tangible strategies that communities can put in place,” said Liz Baxter, Executive Director, Oregon Public Health Institute.

“There are incredible actions happening out there to build healthy communities. Time outdoors at school, work, and at home is an important part of healthy living,” Baxter added. “The healthcare community knows how important physical activity is—when we’re outdoors we don’t have to talk about exercise, we can just have fun, which is why being outdoors is just as important, if not more, than a gym membership.”

The framework is one of three initiatives introduced at the second annual Oregon Healthiest State Summit held on November 10th. Oregon Healthiest State is a privately led, publicly supported partnership to engage and inspire Oregonians to create and sustain healthy environments.



## RESEARCHERS TO STUDY URBAN GARDENS AND GENTRIFICATION

By Laura Gleim

It’s no secret that urban farms and gardens are core to Portland’s identity as one of the most sustainable cities in the world. What’s maybe lesser known is that those young patches of kale and cabbage are often entangled in processes of gentrification and displacement.

With a \$249,978 grant from the National Science Foundation, a binational research team led by Nathan McClintock, Portland State University assistant professor of urban studies and planning, will examine the complex relationship between urban agriculture and gentrification in two ultra-green North American cities: Portland, Oregon, and Vancouver, British Columbia.

The three-year study, “Urban agriculture, policy making, and sustainability,” aims to shed light on how urban agriculture policy-making practices both contribute to and resist inequitable access to resources and features that make a neighborhood more sustainable—such as affordable housing, parks, healthy food, and transportation options.

“When we look at urban renewal and gentrification issues, urban agriculture can be part of the problem and part of the solution,” McClintock said. “Gardens offer so many benefits to communities, but what we see is that an increase in gardens often indicates that an area is gentrifying and that longtime residents are getting priced out of their neighborhoods. Often, the gardens themselves ultimately get bulldozed for condo construction.”

But McClintock says many urban agriculture practitioners are aware of how it contributes to gentrification and are getting involved in equity policy and planning efforts.

“We’re interested in how engagement with urban agriculture and food policy differs between various demographic groups and city to city,” he said.

McClintock and his co-investigators Eugene McCann and Christiana Miewald, professors of geography at Simon Fraser University in Vancouver, will also look at how the motivations for gardening differ across race, class, and gender lines, which McClintock says can have implications for the type of outreach and language policy makers and city planners use when deploying resources that support people in a more equitable way to grow their own food.

The study builds upon McClintock’s previous work funded by the PSU Institute for Sustainable Solutions that mapped urban gardens in Portland and revealed that gardens often crop up in neighborhoods experiencing gentrification.

McClintock has also done comparative research on urban agriculture policy and practice in Montreal, Canada, and last September led a binational field course that explored issues of urban gardens, community activism, and gentrification. The course was composed of graduate students from both Portland and Montreal, and was funded by PSU’s Institute for Sustainable Solutions and the Government of Québec’s Ministry of International Relations.

# ISS NAMES ROBERT LIBERTY AS NEW DIRECTOR

By Christina Williams

Portland State University's Institute for Sustainable Solutions (ISS), which supports sustainability-related research, curriculum development, student activities, and community partnerships, selected environmental lawyer and policy expert Robert Liberty as its next director. Liberty started in the position on January 4.

Liberty will focus on cultivating external partnerships and creating and supporting a business plan to ensure the Institute's long-term financial health. He will also continue to lead the PSU Urban Sustainability Accelerator, a program that works with mid-sized cities and regions across the country on the implementation of sustainability plans and policies.

"This university, city, and region have played outsized roles as leaders in sustainability. As climate change and other sustainability challenges rise in public concern, ISS will help maintain and enhance that leadership," Liberty said. "Former director Jennifer Allen and the ISS staff

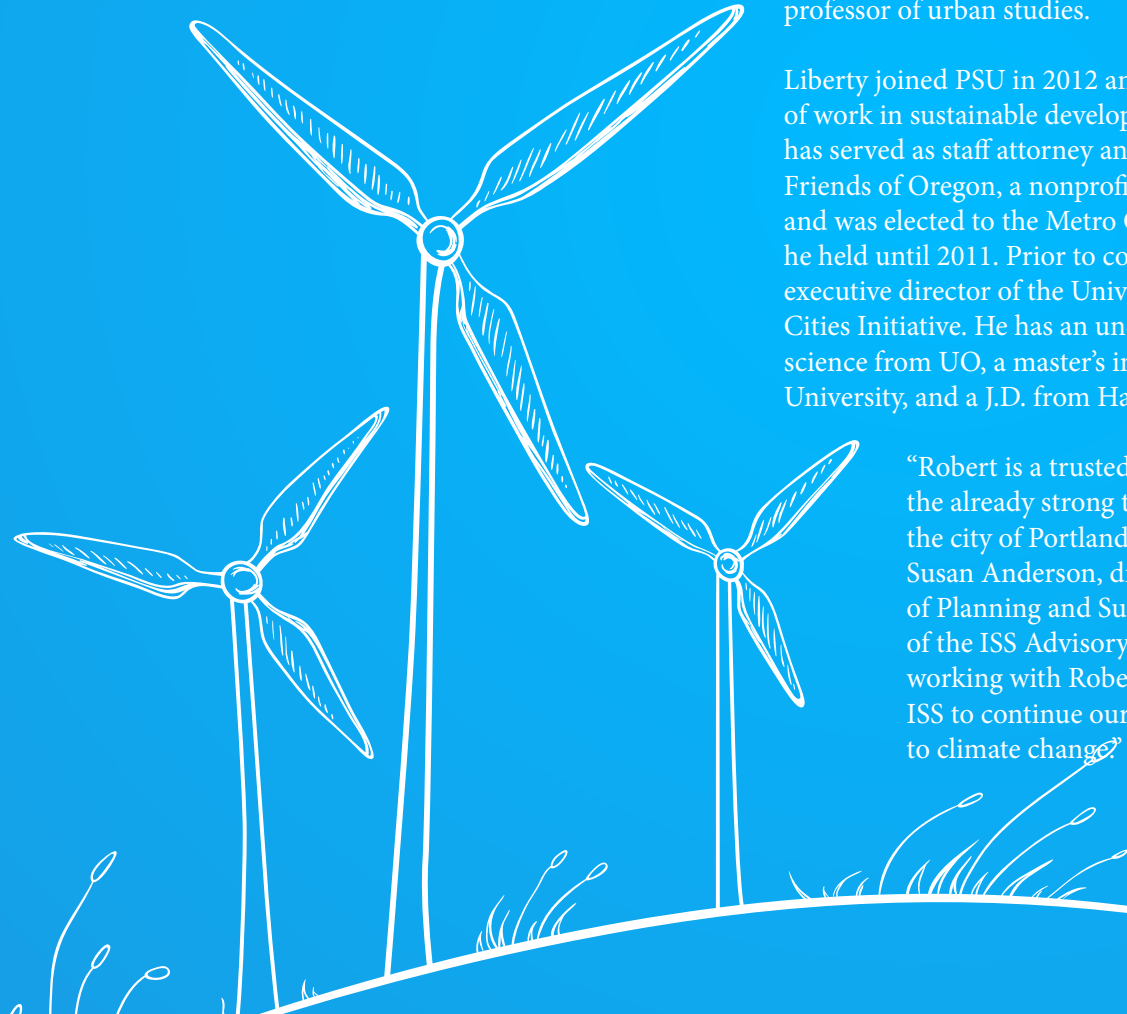
have created a dynamic and integrated system of research, intellectual exchanges, education, business partnerships, and community service that we will continue to build upon. I am excited to have this chance to contribute to the effort."

"Robert's deep experience in urban sustainability, equity, partnership development, and fundraising make him the ideal person to lead the important programs already underway at the Institute and chart a course for future innovations," said PSU President Wim Wiewel. "ISS plays a crucial role as the central portal for sustainability at PSU and a trusted partner in the region. Strong leadership will ensure that ISS can effectively continue this work."

Liberty takes over from interim director Jonathan Fink, who is also PSU's vice president of research and strategic partnerships. As director, Liberty will helm a leadership team that includes Fink, whose research division oversees ISS activities; ISS assistant director Fletcher Beaudoin; and ISS research director Vivek Shandas, who is an associate professor of urban studies.

Liberty joined PSU in 2012 and has more than three decades of work in sustainable development policy and practice. He has served as staff attorney and executive director of 1000 Friends of Oregon, a nonprofit focused on land use issues, and was elected to the Metro Council in 2004, a position he held until 2011. Prior to coming to PSU he served as executive director of the University of Oregon's Sustainable Cities Initiative. He has an undergraduate degree in political science from UO, a master's in modern history from Oxford University, and a J.D. from Harvard Law School.

"Robert is a trusted collaborator and will enhance the already strong ties that PSU and ISS have with the city of Portland and other local partners," said Susan Anderson, director of the Portland Bureau of Planning and Sustainability and a member of the ISS Advisory Council. "I look forward to working with Robert and the rest of the staff at ISS to continue our progress on regional solutions to climate change."



# PSU SELECTED FOR ENTREPRENEURIAL EDUCATION PROGRAM

By Julie Rutherford



Portland State University is one of 14 higher education institutions to be selected to participate in a program designed to help institutions integrate innovation and entrepreneurship into undergraduate engineering education. "Pathways to Innovation" is run by the National Center for Engineering Pathways to Innovation (Epicenter), which is funded by the National Science Foundation. It is directed by Stanford University and VentureWell, an organization that makes strategic financial investments in higher education programs that cultivate new ideas.

Through Pathways to Innovation, participating schools assemble a team of faculty and academic leaders to assess and transform their school's current model for engaging students in meaningful ways that support their entrepreneurial efforts. A typical timeline for transformation is two years.

"Today, engineering and computer science students are expected to enter industry with technical knowledge as well as a diverse set of mindsets, skillsets and attitudes that help them innovate, collaborate and create value," said Tom Byers, director and co-principal investigator of Epicenter and professor at Stanford University. "As educators, we need to better prepare this generation of students for the workforce, position them for success in their careers, and give them more opportunities to bring their innovative ideas to life."

The Maseeh College of Engineering and Computer Science currently offers students a variety of opportunities to explore their own ingenuity and develop the business acumen required to achieve success in the real world. One such program, The Beta Project, awards "Innovation Grants" to students that range from \$1,000 to \$3,000

to develop an original idea from proposal to prototype. Launch-in-9, offers an entrepreneurial alternative to Portland State's award-winning Senior Capstone program. Launch-in-9 pairs undergraduate students majoring in engineering or computer science with MBA candidates who are then coached through an intensive nine-month boot camp to launch a start-up prior to graduation.

Other university teams selected for the 2016 Pathways Program include Binghamton University - SUNY, California State University - Northridge, The City College of New York - CUNY, Florida A&M University / Florida State University, Grand Valley State University, Louisiana Tech University, South Dakota School of Mines and Technology, South Dakota State University, University of New Hampshire, University of North Alabama, University of South Florida, Western Carolina University, and Western Kentucky University.

This new cohort joins a community of 36 other institutions currently participating in the program.

Leaders from each Pathways team met for the first time at Stanford University on November 19-20, 2015. They met again in January 2016 to kick-start the transformation of the engineering undergraduate experience offered at their school.



# PORTLAND'S HEAVY METAL WORKSHOP

By Shaun McGillis

In the early decades of the 20th century, a rapidly growing Portland built many of its iconic bridges. The first high rises crowned the downtown skyline. And the city grid was laid out in a network of streetcar lines linking the burgeoning urban center to nearby towns like Sellwood, Kenton, St. Johns, and Lents.

Expansion of the city's infrastructure was enabled by the strength, durability, and functionality of composite materials like steel and by major advances in welding technology. The fact that so many of the bridges and buildings erected between 1900 and 1930 are still in use today is a testament to the city engineers who made sure that the construction materials were of the highest quality and fit their intended applications. Today, many companies contracted to build and manufacture components for public, commercial, and industrial use outsource the work city engineers once did to laboratories specializing in materials characterization, performance analysis, and welding.

Although it is not widely known, PSU staff members today run one of the most respected of these labs, nestled between one of Portland's oldest bridges, the Hawthorne, and its newest, Tilikum Crossing. Located in a corner of a sizeable warehouse that houses OMSI's exhibit construction department, PSU's Materials Research Laboratory is home to a regionally unmatched collection of state-of-the-art equipment used to test the strength, performance, and durability of steels and other materials. The lab also hosts an ensemble of advanced, high power, robotic and manually operated machines capable of making prototype welds to production scale. Industrial examples include the mind-boggling, 35-foot, top-down continuous weld joining the massive steel structures supporting the weight of the new east span of the San Francisco–Oakland Bay Bridge, as well as micron-scale welds needed to produce microprocessors.



The lab is directed by Dr. Bill Wood, a nationally noted physical metallurgist and PSU engineering professor with decades of experience working with industry partners.

“What we do here is study the structure, properties, and performance capabilities of materials like steel,” Dr. Wood said. “We have a suite of tools with combined capabilities you won’t find at any other lab west of the Rockies. Between this space and facilities on campus, we have the capacity to synthesize materials, study and analyze the structure and properties of samples, and develop methods and prototypes of ferrous and nonferrous welding alloys, all of which our industry partners consider critical to their operations.”

“Critical” because companies contracted to build or provide components for bridges, airplanes, skyscrapers, and other applications need to prove their products are strong, durable, and flexible enough to perform in the structures they’re intended for, perhaps for as long as a century. It is vital to understand the precise kinds of loads, pressure, stress, temperature extremes and corrosive agents a given material or joint can withstand and the ways damage originates and propagates within the materials. This information, produced by Dr. Wood and his colleagues and students in their lab, is as essential to builders and manufacturers responsible for providing quality products at the front end of a project as it is for inspectors tasked with evaluating structures and performing maintenance at the back end.

During his tenure at PSU, Dr. Wood has contracted with industry giants including Boeing, Blount International, Advanced Surfaces and Processes, Precision Castparts, and

the ESCO Corporation. He developed a welding process used in the fabrication of drive shafts of every Virginia Class submarine in the U.S. Navy’s fleet. Drivers on the recently completed eastern span of the San Francisco–Oakland Bay Bridge have had their weight supported by the strength of welds and a welding process developed by Dr. Wood and PSU Senior Research Engineer Bob Turpin, both of whom worked for seven years on the project with American Bridge, the company contracted by the State of California to build the replacement span after the 1989 earthquake.

“I don’t think a lot of people have any idea about the amount of work, research, and redundancy that goes into a project like that,” Dr. Wood said. “In fact, I think it’s pretty common for a lot of people to take materials and materials science for granted. We drive across bridges, live and work in high rise buildings, and ride in trains and airplanes every day, never giving a thought to the materials that make it all possible and how dependent we are on processes like welding.”

To some extent that is the reason why the Materials Research Laboratory is where it is. According to Dr. Wood, the lab was relocated to the warehouse on OMSI’s campus in 2014 as a part of a partnership between PSU and OMSI intended to elevate the “Industry” in OMSI’s name. Together PSU and OMSI hope to become a conduit between the metals industry and the over 1 million visitors the museum receives every year.

The lab has opened its doors to the public during OMSI’s Mini Maker Faire, providing welding demonstrations related to sponsored research including the Bay Bridge

project. Students working on a capstone project in the lab are refurbishing a hundred year old materials testing machine—a one of a kind piece of city history, Dr. Wood noted—that was used by Portland’s engineers to test the strength and durability of manhole covers in the first decades of the 20th century. The students are bringing the 8,500 pound, 9-foot tall machine back to its original working condition. According to Dr. Wood, they also plan to equip it with modern electronics, sensors, and a computer operated motor. At the 2016 Maker Faire the lab will be able to demonstrate how components like steel beams and rivets were tested 100 years ago and then with the flip of a switch demonstrate on the same machine how it’s done today.

“Our partnership with OMSI really gives our lab and the university a way to interface with the public, which we might not otherwise have,” Dr. Wood said. “It gives us an opportunity to get kids and their parents engaged with materials science and interested in engineering. Sparking that interest could lead to students entering the STEM pipeline at a time when we need more people in the workforce with engineering skills and knowledge of the science behind the materials that make our modern life possible.”

A century ago, when Portland city engineers used their then-new machine to test the iron and steel with which the city’s infrastructure was built, the city was in a state of flux. Advances in engineering, technology, and science brought electricity, telecommunications, and mass transit to the city, allowed the skyline to rise, unified the two sides of the Willamette, and industrialized the region’s economy.

A century later the city is again changing. New sensor technologies and wireless communications are making it “smarter,” “greener,” and more “livable” than ever. Innovators and entrepreneurs are thriving in the city’s vibrant startup ecosystem, which includes two of the state’s most successful business accelerators. For the first time in 50 years a new bridge spans the Willamette River, connecting anchor institutions at the heart of the city’s Innovation Quadrant: PSU, OHSU, OMSI, and PCC. What hasn’t changed is the fact that behind the new structures and technologies driving Portland into the 21st century are scientists and engineers like Bill Wood whose job it is to make sure our city is strong enough to remain standing for decades to come.





## A Model Fault

Assistant Professor Brittany Erickson develops innovative computational models to simulate earthquakes and explore the geophysical processes associated with them.

By Shaun McGillis

Last summer, when journalist Kathryn Schulz published her *New Yorker* article “The Really Big One” about a Cascadia subduction zone earthquake, the story instantly became topic #1 around water coolers, dinner tables and board rooms throughout the Pacific Northwest. “Our operating assumption is that everything west of Interstate 5 will be toast,” warned one FEMA official quoted in the story.

In contrast to the nearby Cascade volcanoes that send clear signals weeks or months before erupting, earthquake faults can rupture with little to no warning. Most of what we know about earthquakes comes from looking at historical records and geologic maps. For instance, the danger of Cascadia quakes was only recognized relatively recently when geologists determined that partially submerged forests on the Washington and Oregon coast had died suddenly about 300 years ago after dropping several meters. The only explanation for this drop was that a major earthquake had occurred. Further study of geologic layers seen in trenches, and examination of Japanese tsunami records, showed that similar events had happened many times in the past, repeating every few hundred years.

Developing theoretical models that explain the observed frequencies and magnitudes of earthquakes at a given location is thus a top priority of seismologists. Ideally, a well-constrained model could tell us when and where the next quake would occur, but in practice, we are far from that level of understanding. The scale of overall risk from a Cascadia quake is not in question, but how and when specific areas will be affected depends on details of the local geology, including what the bedrock is composed of, and the geometry of the fault itself. To date, even the most sophisticated computational models have not taken into account these critical factors.

A PSU mathematician hopes to change this, shaking up the way geoscientists test their hypotheses about what happens along faults before, during, and after earthquakes. Mathematics Assistant Professor Brittany Erickson, in collaboration with Dr. Jeremy Kozdon of the Naval Postgraduate School in Monterey, California, has received a three-year grant from the NSF to develop a new earthquake simulation framework that takes into account factors such as the irregular geometry of many faults, the complex material properties of rocks within the earth’s crust, and the influence of fractured rocks deep within the fault on future seismic events.

“There are a lot of really good earthquake models out there that can simulate the full [earthquake] cycle in one computational framework,” Dr. Erickson said. “But one of the major drawbacks of those models is that their power and efficiency is based on the assumption that you have a single

planar fault embedded in a homogenous elastic medium. That’s just not how earthquakes work in reality. Our plan is to develop code that achieves a more realistic simulation, including irregular fault geometries, heterogeneous material properties, and the deformation of inelastic rocks within the fault.”

The model, which will be one of the most sophisticated ever developed, combines two separate approaches developed independently by Drs. Erickson and Kozdon. One simulates the “loading” period during which pressure accumulates on the fault. The other replicates the earthquake itself. Together, they’ll be able to simulate the whole earthquake cycle in two and three dimensions for any fault anywhere in the world.

“Ultimately, what we’re trying to figure out is if earthquakes actually conform to our current understanding of the physics we think govern them,” added Dr. Erickson.

Over the course of the three-year study, Drs. Erickson and Kozdon will explore the relationships between the material beneath the surface of a fault and earthquake nucleation. Their model will address how a mix of materials influences the amount of slip that occurs between adjacent sections of the earth’s crust during an earthquake. They’ll investigate how the compositional makeup of materials along faults affects where and when ruptures happen. They’ll study the way seismic waves travel through geometrically complex fault networks as well as survey the ways preexisting damage within faults affect nucleation and the propagation of seismic waves.

With time, a more robust understanding of the spatial and temporal interactions between the physical and material characteristics of faults in general and specific faults, like that along the Cascadian Subduction Zone, could lead scientists, city planners, and state and federal officials to more accurate expectations about the damages that may result from future earthquakes. While science still cannot predict when the next big one will happen, with contributions like those Drs. Erickson and Kozdon are making, we are inching closer to a better state of preparedness. And perhaps with continued work and greater understanding of the geophysical processes at play in earthquake cycles, when the next Cascadia earthquake strikes it won’t be, as Kathryn Schulz puts it in her article, “the worst natural disaster in the history of the continent.”



## IS THIS THE BEGINNING OF THE END FOR THE SERIAL CODE?

By Shaun McGillis

If you've paid much attention to the news lately, you might have come across stories about Portland's problem with bicycle theft. According to *The Oregonian*, 2,100 bikes—valued at over one million dollars—were stolen and not returned in 2014.

To help law enforcement officials reduce crime and return recovered property to rightful owners, the city's Bike Theft Task Force encourages citizens to register their bicycles. The concept is simple: with a serial number, name, phone number, and address in a city database, police can quickly identify owners of recovered property who can then retrieve it.

In a sense, including serial numbers on bicycles or VIN numbers on automobiles is just a way of keeping track of

things. Manufacturers want to know products are making it to market. Retailers need to account for the items they sell. Consumers want to return or exchange products, access services, and protect their purchases from damage or theft. The authorities, meanwhile, are interested in monitoring everything from what's entering and exiting the country through ports to the components used to build airplanes.

The use of serial numbers, barcodes, and radio frequency (RF) identifiers as a means of tracking everything from shipping containers to pets is a time-tested practice. These methods, however, are not without their shortcomings. Barcodes and serial numbers are easy to recognize, alter, replace, or destroy. RF tags are susceptible to human errors in data entry and malfunctions. All three can be removed without causing much damage to the object itself.

At Portland State University, Computer Science Professor Dr. Suresh Singh has developed a method of tagging objects with identifying information that overcomes many of the drawbacks of the existing technologies. When an object is measured by a high-resolution terahertz laser scanner, an algorithm developed by Dr. Singh attributes unique numerical information to tiny bumps and hollows on the object's surface creating a digital identification tag which can be stored in a database. The information in the tag is static and cannot be changed. Nor can it be read without access to a scanner and the image file in the database. The concept, Dr. Singh noted, was borrowed from the cryptographic practice called steganography wherein messages are "hidden in plain sight."

Rather than stamping a serial number or barcode as an identification tag on a bicycle, manufacturers could add microscopic surface modifications imperceptible to the human eye somewhere in the frame. With the file identifying the bike uploaded into a cloud-based registry like Bike Index or Project529, consumers and the authorities would have access to information about the make, model, and ownership of any given bicycle.

Embedding identifying information into surface modulations generated during manufacture is one application of this technology. However, according to Dr. Singh, with a terahertz scanner and his algorithm, this method could be applied to anything with some surface depth to it.

"One of the attractive properties of terahertz radiation is that it can pass through objects like x-rays do, but without damaging the object," Dr. Singh said. "And when you have

objects with some depth to their surfaces, like a boutique handbag, an oil painting, or an engine block, a high-resolution terahertz scan at a particular frequency will reflect subtle changes in the layers of depth on the object's surface. Those reflections are unique to the object, and even unique to the portion of the object scanned. They're like a signature that we can represent as a series of identifying numbers embedded into an image file of the scan. We can then take these large high-resolution files and run them through cryptographic compression schemes, creating a small file containing the object's unique signature."

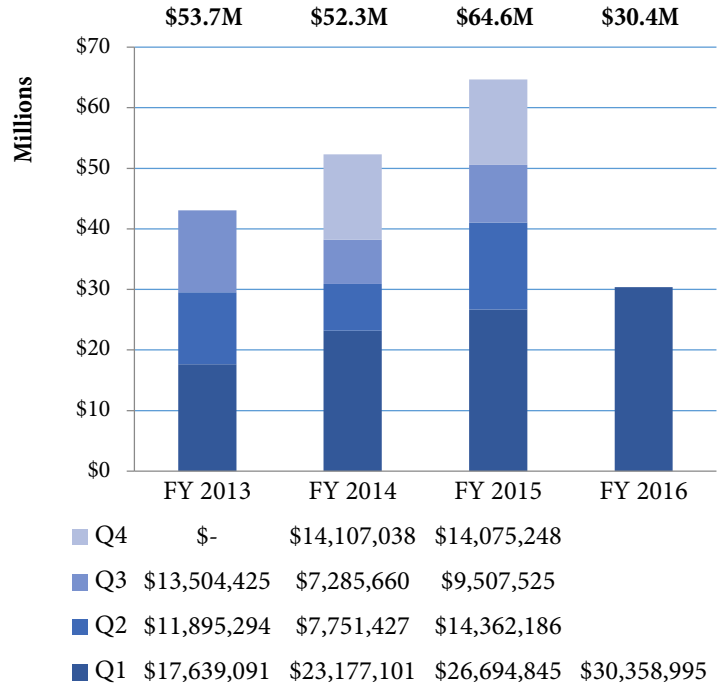
And just like that, Dr. Singh explained, we could create databases of compressed files containing the identifying information of nearly anything we might want to keep track of and avoid the shortcomings of serial numbers, barcodes, and RF identification tags.

This technology could increase the efficiency of scanning the more than 7 million containers that arrive in U.S. ports each year. With a high-resolution terahertz laser scanner museums, galleries, and private collectors could tag and identify the works in their collections. Fashion designers could turn the contours of a button, clasp, or fabric into an invisible brand that protects retailers and consumers from purchasing counterfeit clothing and apparel. And although the technology wouldn't end bike theft, it could help Portland's Bike Theft Task Force and the police return more of the thousands of bicycles they recover each year to their rightful owners.

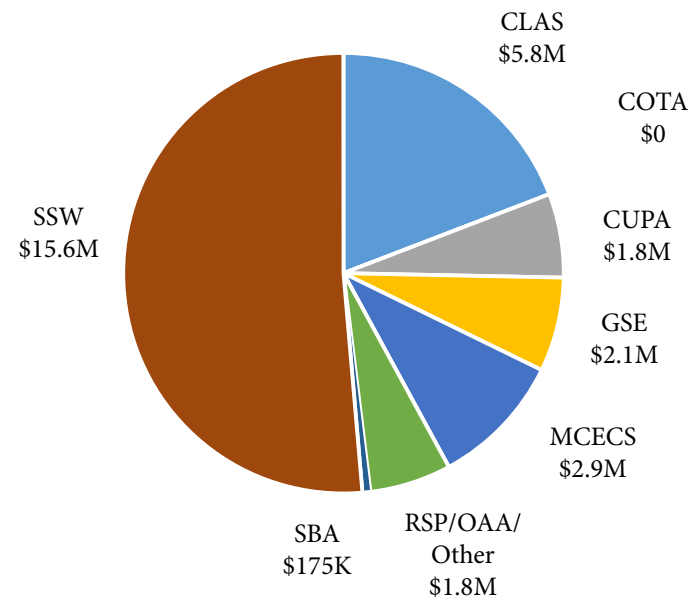




Awards by Quarter



Awards Received Q1



Selected Awards

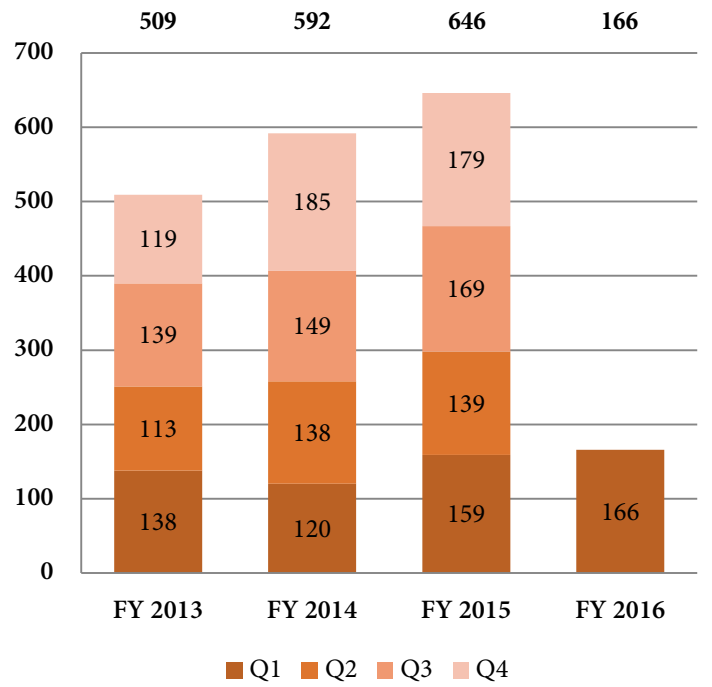


Questions about research development, sponsored projects, research integrity: [pdx.edu/research/university-research](http://pdx.edu/research/university-research)

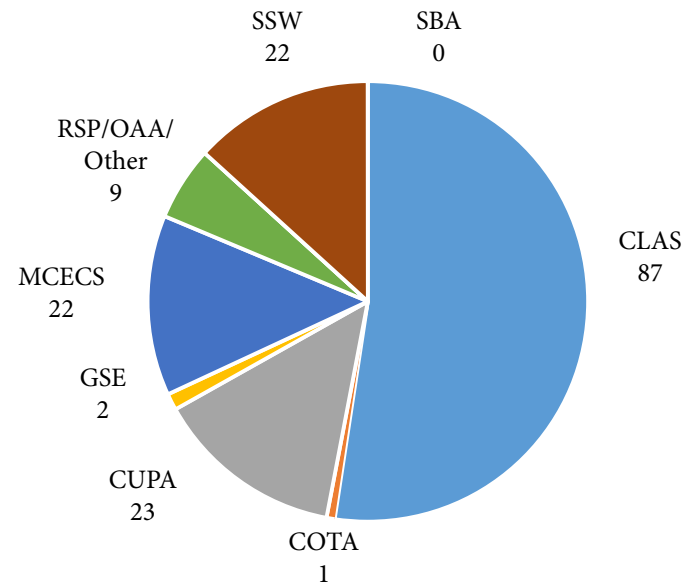
**Antcil, Tina;** *The Clinical Rehabilitation Counseling Education Program (CRCEP)*; US Department of Education; \$199,526; GSE; New Award  
**Anderson, Shelby;** *Analysis, Summary, and Public Archaeology Outreach of Artifacts from an Archaeological Field School at Fort Vancouver National Historic Site*; National Park Service; \$37,576; CLAS; New Award  
**Appleyard, Melissa;** *Improving Outcomes from Interdisciplinary R&D*; National Science Foundation; \$99,100; SBA; New Award  
**Bodegom, Erik;** *Distance Learning Labs for Introductory Physics*; National Science Foundation; \$59,638; CLAS; New Award  
**Cahn, Katharine;** *Knowing Who You Are*; Casey Family Programs; \$200,000; SSF; New Award  
**Clifton, Kelly;** *Affordable Housing Trip Generation Strategies and Rates*; California Department of Transportation; \$400,000; MCECS; New Award  
**Courcelle, Justin;** *Mechanism of DNA Interstrand Crosslink Repair in Vivo*; National Institutes of Health; \$445,500; CLAS; New Award  
**Courcelle, Justin;** *The Completion of DNA Replication*; National Science Foundation; \$460,000; CLAS; New Award  
**Deardorff, Pam;** *Enhanced Rate Program 2014-2015*; Department of Health and Human Services; \$82,394; GSE; Amendment  
**De LaVega, Esperanza;** *Futures Project*; US Department of Education; \$391,725; GSE; Amendment  
**Deur, Douglas;** *An Ethnohistory Study of Native American Land and Resource Use at Whiskeytown National Recreation Area*; National Park Service; \$95,331; CLAS; New Award  
**Dill, Jennifer;** *Strategic Agenda for Pedestrian and Bicycle Transportation*; US Department of Transportation; \$66,759; TREC; New Award  
**Duffield, Deborah;** *Tracking the Role of Human Interaction and Disease in the Northern Oregon/Southern Washington Marine Mammal Stranding Program*; National Oceanic and Atmospheric Administration; \$100,000; CLAS; New Award  
**Eckhardt, Cara;** *Defining Infant Rapid Weight Gain to Best Predict Childhood Obesity*; National Institutes of Health; \$74,590; CUPA; Amendment

**Elliott, Debra;** *2015 NHTSA Program Evaluation Public Opinion Survey*; Oregon Department of Transportation; \$50,685; SSF; New Award  
**Green, Beth;** *Testing the Efficacy of Early Head Start in Preventing Child Maltreatment: A Fifteen Year Longitudinal Study*; Centers for Disease Control and Prevention; \$350,000; SSF; Amendment  
**Hammer, Leslie;** *Graduate Training in Occupational Health Psychology*; Centers for Disease Control and Prevention; \$108,528; CLAS; New Award  
**Karavanic, Karen;** *TWC: Small: System Infrastructure for SMM-based Runtime Integrity Management*; National Science Foundation; \$407,568; MCECS; New Award  
**Liu, Linda;** *Portland State University Student Support Services*; US Department of Education; \$358,546; EMSA; New Award  
**MacArthur, John;** *Pollution Prevention Technical Assistance for Idle Reduction and Electrification*; Environmental Protection Agency; \$94,377; TREC; New Award  
**McClintock, Nathan;** *Urban Agriculture, Policy Making, and Sustainability*; National Science Foundation; \$249,978; CUPA; New Award  
**Monser, Christopher;** *Improved Safety and Efficiency of Protected/Permitted Right Turns in Oregon*; Oregon Department of Transportation; \$70,000; MCECS; New Award  
**Moradkhani, Hamid; Karavanic, Karen; Daescu, Dacian;** *CyberSEES: Type 1: Cyber-Enabled Ensemble Data Assimilation for Drought Monitoring, Forecasting and Recovery*; National Science Foundation; \$264,529; MCECS; New Award  
**Nelson-Marsh, Natalie;** *Collaborative Research: Planning for Renewables: Regional Transmission Organizations Managing Tension and Networking Innovation*; National Science Foundation; \$18,415; CLAS; New Award  
**Nordback, Krista;** *Walking and Cycling Toward Better Transportation Planning: Developing an Online Tool to Estimate Annual Average Daily Pedestrian and Bike Traffic*; US Department of Transportation; \$221,430; TREC; New Award  
**Oswald, Mary; Nicolaidis, Christine; Powers, Laurie;** *Pregnancy and Support Services for Women with Developmental Disabilities(1)*; National Institutes of Health; \$61,851; SSF; Amendment  
**Ovall, Jeffrey;** *Cluster-robust Estimates for Galerkin and Petrov-Galerkin Discretizations of Elliptic Eigenvalue Problems*; National Science Foundation; \$149,936; CLAS; New Award  
**Parnell, William;** *Child Care and Family Support at an Urban University: A Plan for Student Access and Success*; US Department of Education; \$373,871; GSE; Amendment  
**Perona, John;** *Biological Sulfur Metabolism on the Anaerobic Earth*; National Aeronautics and Space Administration; \$297,373; CLAS; New Award  
**Podrabsky, Jason; Chang, Heejun; Fink, Jonathan; Kelly, Kirk;** *CC\*DNI Networking Infrastructure: Research and Innovation Network for Portland State University*; National Science Foundation; \$200,000; CLAS; New Award  
**Rad, Farrokh;** *RUTE Foundations - PSU Structural Engineering*; Oregon BEST; \$66,000; MCECS; New Award  
**Reichow, Steve;** *Mechanisms of Cell-to-cell Communication by the Gap Junctions Visualized by cryoEM*; Medical Research Foundation; \$40,000; CLAS; New Award  
**Rigelman, Nicole; Thanheiser, Eva;** *Developing Elementary Mathematics Instructional Leaders (DEMIL)*; National Science Foundation; \$67,481; GSE; New Award  
**Sale, Tamara;** *Early Assessment and Support Alliance (EASA)*; Oregon Health Authority; \$713,776; SSF; New Award  
**Schrock, Greg;** *CWFA Regional Manufacturing Initiative - Genesis*; Chicago Community Foundation; \$77,801; CUPA; New Award  
**Sharma, Rajiv; Mitra, Arnab;** *Assessing the Effect of the ACA and State Policies on Racial/Ethnic, Sex, and Insurance-Based Disparities*; National Institutes of Health; \$289,968; CLAS; New Award  
**Shrimpton, Thomas;** *TWC: Medium: Collaborative: Distribution-Sensitive Cryptography*; National Science Foundation; \$399,833; MCECS; New Award  
**Spoon, Jeremy;** *History, Ecology, Management, and Restoration of Natural Springs (HEMRNS) at Desert National Wildlife Refuge (DNWR), Nevada*; US Fish & Wildlife Service; \$21,645; CLAS; New Award  
**Strongin, Robert; Barsanti, Kelley; Pankow, James; Peyton, David;** *Toxicant Production and Mitigation in the Electronic-Cigarette Reaction Vessel(1)*; National Institutes of Health; \$171,714; CLAS; New Award  
**Stude, Ian;** *Central Campus Cycle Station*; US Department of Transportation; \$153,316; FADM; New Award  
**Talke, Stefan; Jay, David;** *Historical Data Recovery and Analysis*; US Army Corps of Engineers; \$97,291; MCECS; Amendment  
**Teuscher, Christof;** *SHF: Large: Collaborative Research: Molecular Computing for the Real World*; National Science Foundation; \$209,545; MCECS; New Award  
**Truxillo, Donald; Bauer, Talya; Jones, Mark;** *EAGER: Exploring Job Applicant Privacy Concerns*; National Science Foundation; \$76,055; CLAS; New Award  
**Vassilevski, Panayot;** *Space-Time Discretizations Enabling Parallel-in-Time Simulations*; Army Research Office; \$71,000; CLAS; New Award  
**Wallack, Lawrence; Winett, Liana;** *Identifying Values Supporting a Culture of Health in Media Coverage to Spark Public Dialogue about Making Health a Priority for All Americans*; Robert Wood Johnson Foundation; \$498,765; CUPA; New Award  
**Yeakley, Alan;** *Smith & Bybee Applied Research and Water Management Effectiveness Monitoring*; Metro; \$65,000; CLAS; New Award

Proposals by Quarter



Proposals Submitted Q1



Proposals

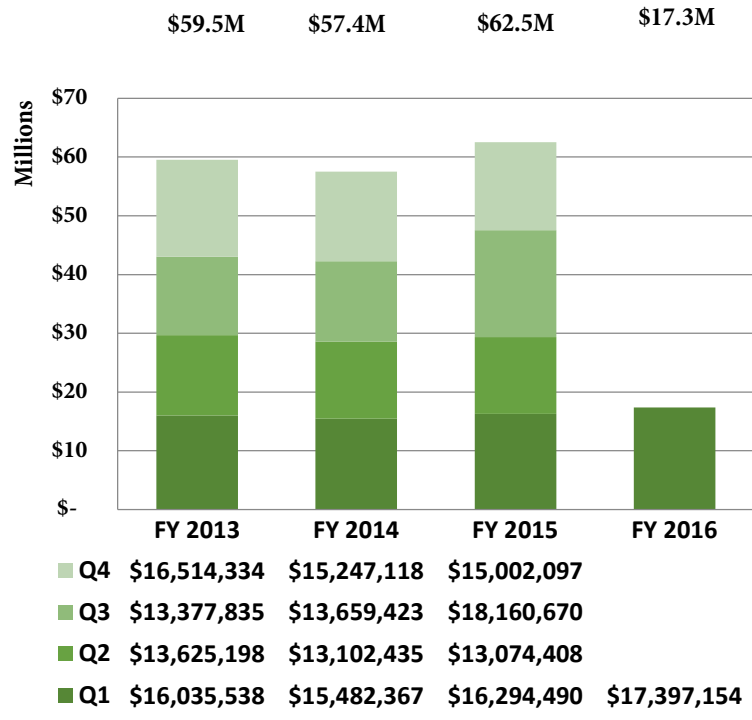


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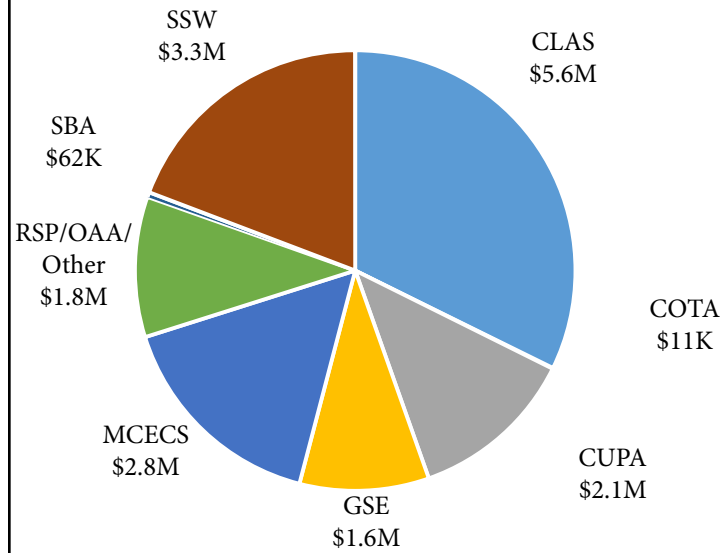
- Ballhorn, Daniel;** CAREER: Exploring the Ecological Role of Fungal Endophytes - a Cryptic, but Hyperdiverse Group of Plant-associated Organisms; National Science Foundation; CLAS; \$1,514,140
- Bartlett, Michael;** Gene Expression at High Temperature; National Aeronautics and Space Administration; CLAS; \$483,715
- Bass, Robert;** GEARED; Department of Energy; MCECS; \$315,000
- Brown, Kim;** ABI Innovation: Combining Machine Learning and Network Analysis for Integrative Quantitative Trait Locus Mapping; National Science Foundation; CLAS; \$212,229
- Brown, Kim;** CAREER: Evolution of Sex Chromosomes in Salmonid Species; National Science Foundation; CLAS; \$1,116,043
- Brown, Kim;** Population and Disease Associated Sequences from Unmappable 1000 Genomes Reads; National Institutes of Health; CLAS; \$408,375
- Cahn, Katharine;** Washington State Systems of Care Expansion Consultation; Substance Abuse and Mental Health Services Administration; SSW; \$251,110
- Chang, Heejun; Loikith, Paul; Talke, Stefan; Miller, Thaddeus;** Climate Change and Urban Flood Risk Management: Building Community Resilience through Multi-stakeholder Engagement; National Oceanic and Atmospheric Administration; CLAS; \$175,000
- Curry-Stevens, Ann;** Healthy Marriage and Relationship Education Grant - Refugee and Immigrant Family Empowerment Project; Administration for Children and Families; SSW; \$587,161
- Curry-Stevens, Ann;** New Pathways for Fathers and Families - Refugee and Immigrant Fatherhood Connections; Administration for Children and Families; SSW; \$274,760
- De Rivera, Catherine; Strecker, Angela;** REU Site: Training Undergraduates in Study Design and Data Management for Biological Invasions Research; National Science Foundation; CLAS; \$372,777

- Dusicka, Peter; Griffin, Corey;** Achieving Sustainable Urban Buildings with Seismically Resilient Core Wall and Floor System; National Science Foundation; MCECS; \$416,167
- Elkin, Evan;** Improving School Safety, Climate and Outcomes for Youth: A Multi-site Pilot of a Comprehensive, Integrated School Discipline and Public Health Framework; National Institute of Justice; SSW; \$5,209,182
- Gopalakrishnan, Jay;** Discontinuous Petrov Galerkin (DPG) Solvers for Maxwell Equations and Related Wave Propagation Problems; US Air Force; CLAS; \$317,976
- Granek, Elise; Yeakley, Alan; Izumi, Betty; Chang, Heejun; Allen, Jennifer; Gonzales, Kelly; Cal Santiago, Raul B; Dujon, Veronica; Shandas, Vivek;** Widening Interdisciplinary Scholarship and Engagement for Resilient River Basins; National Science Foundation; ISS; \$2,999,978
- Ingle, Marcus;** Higher Education Institutional Development Seminars; US Agency for International Development; CUPA; \$200,158
- Iwata-Reuyl, Dirk;** RNA Modification: Structure and Function; National Institutes of Health; CLAS; \$727,420
- Jaffee, Daniel;** Bottled Water, Commodification, and Contestation in US, Mexico, and Canada; National Science Foundation; CLAS; \$297,680
- Jiao, Jun; Sanchez, Erik;** REU Site: Application of Microscopy and Microanalysis in Multidisciplinary Research; National Science Foundation; MCECS; \$297,858
- Karavanic, Karen;** Trenza - Tying Application and Interface Actions through Dynamic Interfaces; Department of Energy; MCECS; \$529,931
- Keckes, Kevin; Tint, Barbara;** Middle East Partnership Initiative (MEPI) Student Leaders; US Department of State; CUPA; \$290,000
- Lehman, Niles;** Detection of Nucleic Acid Analogs in Situ (DNAS); National Aeronautics and Space Administration; CLAS; \$257,365
- Lehman, Niles;** NetLife - Experimental Evolution of Networks in Abiogenesis; Templeton Foundation; CLAS; \$605,089
- Liu, Feng;** CAREER: Visual Aggregation:Fusing Multiple Methods for Better Image and Video Production; National Science Foundation; MCECS; \$462,116
- Lutterschmidt, Deborah;** CAREER: Glucocorticoids as Mediators of Behavioral Switching; National Science Foundation; CLAS; \$1,395,782
- Mashburn, Andrew;** Oregon Early Learning Research Team; US Department of Education; CLAS; \$4,500,000
- McMillin, Andy;** Using Large Data Sets to Understand Stuttering Variability; National Institutes of Health; CLAS; \$294,796
- Mohr, Cynthia; Hammer, Leslie;** Development and Evaluation of Veteran Supportive Supervisor Training (VSST): Reintegration of the Oregon National Guard and Reserves into the Workplace; Department of Defense; CLAS; \$812,662
- Morse, Jennifer;** Collaborative Research: Terrestrial Denitrification and Environmental Change; National Science Foundation; CLAS; \$273,576
- Morse, Jennifer;** Collaborative Research: Where Does the Nitrogen Go: Denitrification in Agricultural Soils; National Science Foundation; CLAS; \$487,343
- Orellana, E. Roberto;** National HIV Behavioral Surveillance (NHBS); Centers for Disease Control and Prevention; SSW; \$1,177,980
- Percy, Stephen; Spring, Amy;** Creating the Community Engagement Research Academy at Portland State University; Corporation for National and Community Service; CUPA; \$856,819
- Raghavan, Rahul;** Comprehensive Functional and Evolutionary Analyses of Bacterial Non-coding RNAs; National Institutes of Health; CLAS; \$1,590,011
- Reynolds, Kevin;** Pyrrolyl Pyromethane Alkaloid Antimalarial and Anticancer Agents; National Institutes of Health; CLAS; \$2,708,036
- Reysenbach, Anna-Louise;** Evolution and Diversification of Nanoarchaeota and Korarchaeota; National Aeronautics and Space Administration; CLAS; \$799,433
- Rosenstiel, Todd;** Collaborative Research: Urbanization Impacts on Pacific Northwest Epiphytic Nitrogen Cycle; National Science Foundation; CLAS; \$347,104
- Sale, Tamara;** Early Assessment and Support Alliance (EASA); Oregon Health Authority; SSW; \$713,776
- Schmidt, Jessica;** Better Futures Project; Institute of Education Sciences; SSW; \$3,300,000
- Schumacher, Thomas;** CAREER: A Comprehensive Investigation of Acoustoelasticity in Concrete; National Science Foundation; MCECS; \$500,000
- Simoyi, Reuben;** Kinetics and Mechanisms of Thiols and Thiocarbamides of Biological Importance; National Science Foundation; CLAS; \$596,785
- Simoyi, Reuben;** Studies into Traveling Waves, Rayleigh-Taylor Instabilities and Spatiotemporal Chaos Derived from the dissipation of Chemical Energy; National Science Foundation; CLAS; \$436,749
- Stedman, Kenneth;** Giant Viruses in Extreme Environments; National Aeronautics and Space Administration; CLAS; \$874,379
- Strongin, Robert;** Sensing of Pyrophosphate: Paradigm Change in Quantitative Polymerase Chain Reaction (qPCR); National Institutes of Health; CLAS; \$933,389
- Stuart, David;** Synthesis and use of Unsymmetric Aryl(auxillary)iodonium Salts in Chemselective Arylation Reactions; National Science Foundation; CLAS; \$445,950
- Thomas, Evan;** CAREER:Broken Pumps and Promises; National Science Foundation; MCECS; \$500,000
- Yang, Liu-Qin;** Preventing Aggression and Supporting Safety in Work and Life; National Institutes of Health; CLAS; \$642,336
- Zaron, Edward;** High Resolution Mean Sea Surface and Gravity Anomaly: Improved Altimetry and Coastal Tide Models; National Geospatial Intelligence Agency; MCECS; \$218,043

Expenditures by Quarter



Research Expenditures Q1



Q1 Publications



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**Atkinson, D. B.**; Radney, J. G.; Lum, J.; et al; (2015): *Aerosol optical hygroscopicity measurements during the 2010 CARES campaign*, *Atmospheric Chemistry and Physics*, 15, 4045-4061

**Bisson, K. M.**; Welch, K. A.; Welch, S. A.; Sheets, J. M.; Lyons, W. B.; Levy, J. S.; & **Fountain, A. G.**; (2015). *Patterns and processes of salt efflorescences in the McMurdo region, Antarctica*. *Arctic, Antarctic, and Alpine Research*, 47(3) 407-425

**Bluffstone, R.**; Yesuf, M.; Uehara, T.; Bushie, B.; & Damite, D.; (2015). *Livestock and private tree holdings in rural Ethiopia: The effects of collective action institutions, tenure security and market access*. *The Journal of Development Studies*, 51(9) 1193-1209

**Butenhoff, C. L.**; Khalil, M. A. K.; Porter, W. C.; Alshahfi, M. S.; Almazroui, M.; & Alkhalaf, A. (2015). *Evaluation of ozone, nitrogen dioxide and carbon monoxide at nine sites in Saudi Arabia during 2007*. *Journal of the Air & Waste Management Association*, 65(7), 871-886

**Chavarha, M.**; Loney, R. W.; **Rananavare, S.B.**; & Hall, S. B. (2015). *Hydrophobic surfactant proteins strongly induce negative curvature*. *Biophysical Journal*, 109(1), 95-105

**Courcelle, J.**; **Wendel, B. M.**; **Livingstone, D.D.**; & **Courcelle, C. T.**; (2015). *RecBCD is required to complete chromosomal replication: Implications for double-strand break frequencies and repair mechanisms*. *DNA Repair*, 32, 86-95

**Day, N. U.**; **Walter, M. G.**; & **Wamser, C. C.** (2015). *Preparations and electrochemical characterizations of conductive porphyrin polymers*. *The Journal of Physical Chemistry C*, 119(30), 17378-17388

**DeChant, C. M.**; & **Moradkhani, H.** (2015). *Analyzing the sensitivity of drought recovery forecasts to land surface initial conditions*. *Journal of Hydrology*, 526, 89-100

**Faber-Hammond, J. J.**; **Phillips, R. B.**; & **Brown, K. H.** (2015). *Comparative analysis of the shared sex-determination region (SDR) among salmonid fishes*. *Genome Biology and Evolution*, 7(7), 1972-1987

**Freybote, J.**; Sun, H.; & **Yang, X.** (2015). *The impact of LEED neighborhood certification on condo prices*. *Real Estate Economics*, 43(3), 586-608

**Gilley, B.** (2015). *Book review: China's Futures: PRC Elites Debate Economics, Politics, and Foreign Policy* by D. Lynch. *China Quarterly*, 223, 815-816

**Gopalakrishnan, J.**; **Monk, P.**; & **Sepulveda, P.** (2015). *A tent pitching scheme motivated by Friedrichs theory*. *Computers & Mathematics with Applications*, 70(5) 1114-1135

**Hammer, L. B.**; Johnson, R. C.; Crain, T. L.; **Bodner, T.**; Kossek, E. E.; et al (2015). *Intervention effects on safety compliance and citizenship behaviors: evidence from the work, family, and health study*. *The Journal of Applied Psychology*, doi: 10.1037/apl0000047

**Hayden, H.L.**; **Granek, E.F.** (2015) *Coastal sediment elevation change following anthropogenic mangrove clearing*. *Estuarine, Coastal and Shelf Science*, 165, 70-74

**Howard, C. M.**; & **Lutterschmidt, D. I.** (2015). *The effects of melatonin on brain arginine vasotocin: Relationship to sex and seasonal differences in MT1 in Green Treefrogs (Hyla cinerea)*. *Journal of Neuroendocrinology*, 27(8), 670-679

**Izumi, B. T.**; Schulz, A. J.; Mentz, G.; Israel, B. A.; Sand, S. L.; Reyes, A. G.; & Richardson, D. (2015). *Leader behaviors, group cohesion, and participation in a walking group program*. *American Journal of Preventive Medicine*, 49(1), 41-49

**Joler, M.**; Kucan, J. (2015). *Impact of slot parameters on the three resonant frequencies of a rectangular microstrip antenna study of the impact of the slot length, width, and position*. *IEEE Antennas and Propagation Magazine*, 57(4), 48-63

**Kahn, K. B.**; Unzueta, M. M.; Davies, P. G.; **Alston, A. T.**; & **Lee, J. K.** (2015). *Will you value me and do I value you? The effect of phenotypic racial stereotypicality on organizational evaluations*. *Journal of Experimental Social Psychology*, 59, 130-138

**Kancharla, P.**; **Kelly, J. X.**; & **Reynolds, K. A.** (2015). *Synthesis and structure-activity relationships of tamjamines and b-ring functionalized prodiginines as potent antimalarials*. *Journal of Medicinal Chemistry*, 58(18), 7286-7309

**Leung, P. T.** (2015). *On Maxwell's discovery of electromagnetic waves and the gauge condition*. *European Journal of Physics*, 36(2), 025002

**Levenda, A. M.** (2015). *Book review: Cheap and Clean: How Americans Think about Energy in the Age of Global Warming* by Stephen Ansolabehere and David M. Konisky. *Science and Public Policy*, 42(4), 595-597

**Lim, D. J.**; **Jahromi, S. R.**; **Anderson, T. R.**; & **Tudorie, A. A.** (2015). *Comparing technological advancement of hybrid electric vehicles (HEV) in different market segments*. *Technological Forecasting and Social Change*, 97, 140-153

**Marchini, G. L.**; **Sherlock, N. C.**; **Ramakrishnan, A. P.**; **Rosenthal, D. M.**; & **Cruzan, M. B.** (2015). *Rapid purging of genetic load in a metapopulation and consequences for range expansion in an invasive plant*. *Biological Invasions*, 2015, 1-14

**McClintock, N.** (2015). *A critical physical geography of urban soil contamination*. *Geoforum*, 65, 69-85

**Millar, J. A.**; **Valdés, R.**; **Kacharia, F. R.**; **Landfear, S. M.**; **Cambronne, E. D.**; & **Raghavan, R.** (2015). *Coxiella burnetii and Leishmania mexicana residing within similar parasitophorous vacuoles elicit disparate host responses*. *Frontiers in Microbiology*, 6, Article 794

**Nicolaidis, C.**; **Raymaker, D. M.**; **Ashkenazy, E.**; **McDonald, K. E.**; **Dern, S.**; et al (2015). *"Respect the way I need to communicate with you": Healthcare experiences of adults on the autism spectrum*. *Autism: The International Journal of Research and Practice*, 19(7), 824-31.

**Pankow, J. F.**; **Marks, M. C.**; **Barsanti, K. C.**; **Mahmud, A.**; **Asher, W. E.**; **Li, J.**; **Ying, Q.**; **Jathar, S. H.**; **Kleeman, M. J.** (2015). *Molecular view modeling of atmospheric organic particulate matter: Incorporating molecular structure and co-condensation of water*. *Atmospheric Environment*, 122, 400-408

**Phillips, L.**; **Powers, L.E.**; **Geenen, S.**; **Schmidt, J.**; **Winges-Yanez, N.**; **McNeely, I.C.**; **Merritt, L.**; **Williamson, C.**; **Turner, S.**; et al (2015). *Better Futures: A validated model for increasing the postsecondary preparation and participation of youth in foster care with mental health challenges*. *Children and Youth Services Review*, 57, 50-59.

**Ruzicka, A.**; **Hugo, R.**; & **Hutson, M.** (2015). *Deformation and thermal histories of ordinary chondrites: Evidence for post-deformation annealing and syn-metamorphic shock*. *Geochimica et Cosmochimica Acta*, 163, 219-233

**Sailor, D. J.**; **Georgescu, M.**; **Milne, J. M.**; **Hart, M. A.** (2015) *Development of a national anthropogenic heating database with an extrapolation for international cities*. *Atmospheric Environment*, 118, 7-18

**Schecklman, S.**; **Laws, N.**; **Zurk, L. M.**; & **Siderius, M.** (2015). *A computational method to predict and study underwater noise due to pile driving*. *The Journal of the Acoustical Society of America*, 138(1), 258-266

**Schrock, G.** (2015). *Remains of the progressive city? First source hiring in Portland and Chicago*. *Urban Affairs Review*, 51(5), 649-675

**Swartz, N.**; & **Clare, T. L.** (2015). *On the protective nature of wax coatings for culturally significant outdoor metalworks: microstructural flaws, oxidative changes, and barrier properties*. *Journal of the American Institute for Conservation*, 54(3), 181-201

**Swobodzinski, M.**; & **Jankowski, P.** (2015). *Evaluating user interaction with a web-based group decision support system: A comparison between two clustering methods*. *Decision Support Systems*, 77, 148-157

**Taylor, L. A.**; **Hasenkopf, E. A.**; & **Cruzan, M. B.** (2015). *Barriers to invasive infilling by Brachypodium sylvaticum in Pacific Northwest forests*. *Biological Invasions*, 17(8), 2247-2260

**Virca, C. N.**; & **McCormick, T. M.** (2015). *DFT analysis into the intermediates of nickel pyridinethiolate catalysed proton reduction*. *Dalton Transactions*, 44(32), 14333-14340

**Wang, C.**; & **Wamser, C. C.** (2015). *NMR study of hyperporphyrin effects in the protonations of porphyrins with 4-aminophenyl and 4-pyridyl meso substituents*. *The Journal of Organic Chemistry*, 80(15), 7351-7359

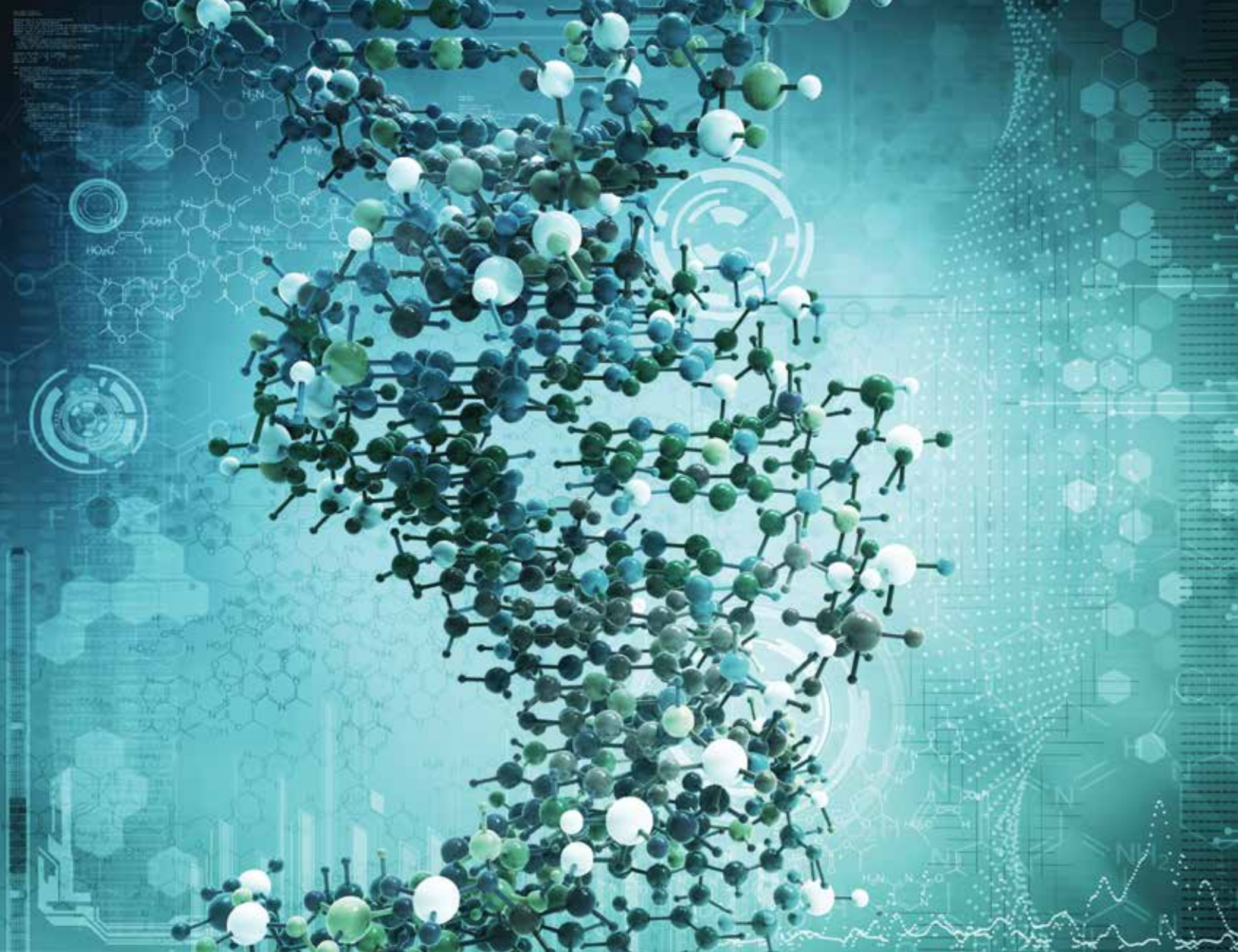
**Wright, R. R.**; **Mohr, C. D.**; **Sinclair, R. R.**; & **Yang, L. Q.** (2015). *Sometimes less is more: Directed coping with interpersonal stressors at work*. *Journal of Organizational Behavior*, 36(6), 786-805

**Zapata, M. A.**; & **Bates, L. K.** (2015). *Equity planning revisited*. *Journal of Planning Education and Research*, 35(3), 245-248

**Sarah Noel Arpin, Ph.D.**Dissertation Chair: **Cynthia Mohr**Dissertation title: *Intrapersonal and Interpersonal Consequences of Loneliness: Health Behavior, Social Interactions, Self-Disclosure, and Perceived Responsiveness***Karen Chichetu, Ph.D.**Dissertation Chair: **Kevin Reynolds**Dissertation title: *Characterization, DNA Binding and Cleavage Activities of New Prodigiosin and Tambjamine Analogues and Their Cu<sup>2+</sup> and Zn<sup>2+</sup> Complexes***Sheng-Kuei Chiu, Ph.D.**Dissertation Chair: **Andrea Goforth**Dissertation title: *Photoluminescent Silicon Nanoparticles: Fluorescent Cellular Imaging Applications and Photoluminescence (PL) Behavior Study***Adolfo Gabriel Cuevas, Ph.D.**Dissertation Chair: **Kerth O'Brien**Dissertation title: *Mistrust: An Exploration of African Americans' Attitudes and Perspectives Toward Healthcare***Joseph Nicholas DeFilippis, Ph.D.**Dissertation Chair: **Ben Anderson-Nathe**Dissertation title: *A Queer Liberation Movement? A Qualitative Content Analysis of Queer Liberation Organizations, Investigating Whether They are Building a Separate Social Movement***Kevin Patrick Dyer, Ph.D.**Dissertation Chair: **Thomas Shrimpton**Dissertation title: *Novel Cryptographic Primitives and Protocols for Censorship Resistance***Michael Steven Ellison, Ph.D.**Dissertation Chair: **William Becker**Dissertation title: *Ninth Grade Student Responses to Authentic Science Instruction***Joe Fusion, Ph.D.**Dissertation Chair: **Martin Zwick**Dissertation title: *The Role of Environmental Dynamics in the Emergence of Autocatalytic Networks***James Arthur Gambrell, Ed.D.**Dissertation Chair: **Susan Lenski**Dissertation title: *A Critical Race Analysis of Travel for Transformation: Pedagogy for the Privileged or Vehicle for Socio-Cultural Transformation?***Farzin G. Guilak, Ph.D.**Dissertation Chair: **James McNames**Dissertation title: *A Spline Framework for Optimal Representation of Semiperiodic Signals***Julian Saunders Haigh, Ph.D.**Dissertation Chair: **Mark Woods**Dissertation title: *Investigation into the Effect of Spin Locking on Contrast Agent Relaxivity***Navaneeth Prasannakumar Jamadagni, Ph.D.**Dissertation Chair: **W. Robert Daasch**Dissertation title: *Evaluation of Data-Path Topologies for Self-Timed Conditional Statements***Nitin Venkat Mayande, Ph.D.**Dissertation Chair: **Charles Weber**Dissertation title: *Network Structure, Network Flows and the Phenomenon of Influence in Online Social Networks: An Exploratory Empirical Study of Twitter Conversations about YouTube Product Categories***Kathleen Mary Melhuish, Ph.D.**Dissertation Chair: **Sean Larsen**Dissertation title: *The Design and Validation of a Group Theory Concept Inventory***Adam Thomas Murry, Ph.D.**Dissertation Chair: **Keith James**Dissertation title: *Training "in a Good Way": Evaluating the Effect of a Culturally Responsive Pre-training Intervention on Learning and Motivation***Sudhaprasanna Kumar Padigi, Ph.D.**Dissertation Chair: **Raj Solanki**Dissertation title: *Multivalent Rechargeable Batteries***Kristan D. Parman, Ed.D.**Dissertation Chair: **Micki Caskey**Dissertation title: *School Reform and Coaching: Identifying Structures for Successful Implementation of a Data Informed Decision-Making Program***Jessica Danielle Schmidt, Ph.D.**Dissertation Chair: **Thomas Keller**Dissertation title: *Assessing the Impact of Restrictiveness and Placement Type on Transition-Related Outcomes for Youth With and Without Disabilities Aging Out of Foster Care***Donna Lynn Sinclair, Ph.D.**Dissertation Chair: **Carl Abbott**Dissertation title: *Caring for the Land, Serving People: Creating a Multicultural Forest Service in the Civil Rights Era***Kevin Eugene Spooner, Ed.D.**Dissertation Chair: **Amy Petti**Dissertation title: *Leadership and Decision-Making Skills of High Poverty Elementary School Principals in an Era of Reduced Resources***Natasja Alexandria Swartz, Ph.D.**Dissertation Chair: **Tami Lasseter Clare**Dissertation title: *Rational Design of Materials for the Protection of Outdoor Metalworks***Robert Seth Terashima, Ph.D.**Dissertation Chair: **Thomas Shrimpton**Dissertation title: *Tweakable Ciphers: Constructions and Applications***Qi Tong, Ph.D.**Dissertation Chair: **Erik Johansson**Dissertation title: *The Influence of Surface Chemistry on the Photoelectrochemical Properties of FeS(2) Photoanodes***Jeffrey David Waid, Ph.D.**Dissertation Chair: **Bowen McBeath**Dissertation title: *Investigating the Impact of Sibling Foster Care on Placement Stability***Zhenkun Yang, Ph.D.**Dissertation Chair: **Fei Xie**Dissertation title: *Scalable Equivalence Checking for Behavioral Synthesis***Janice Marie Adams, Ed.D.**Dissertation Chair: **Deborah Peterson**Dissertation title: *Principal Leadership Practices in High Poverty K-5 Model Schools in Oregon***John George Anasis, Ph.D.**Dissertation Chair: **Mohammad Aslam Khan Khalil**Dissertation title: *A Combined Energy and Geoengineering Optimization Model (CEAGOM) for Climate Policy Analysis***Nicholas Upton Day, Ph.D.**Dissertation Chair: **Carl Wamser**Dissertation title: *Polymeric Porphyrins as Solar Photocatalysts***Teresa Marie Greene, Ph.D.**Dissertation Chair: **Ellen Skinner**Dissertation title: *The Development of Personal Resources in the Academic Domain: Age Differences in the Evolution of Coping and Perceived Control and the Process Structures that Facilitate Academic Engagement***Frankie Guros, Ph.D.**Dissertation Chair: **Charlotte Fritz**Dissertation title: *Thinking About Work at Home: Implications for Safety at Work***Paulina Andrea Gutierrez Zepeda, Ed.D.**Dissertation Chair: **Dannelle Stevens**Dissertation title: *Exploring Relationships Between Entrepreneurship Education and Students' Entrepreneurial Intentions: A Mixed Method Study of Entrepreneurial Pedagogies at Chilean Universities***Eric Alexander Iverson, Ph.D.**Dissertation Chair: **Kenneth Stedman**Dissertation title: *A Genetic and Biochemical Analysis of Sulfolobus Spindle-Shaped Virus 1***Gina Lola Marchini, Ph.D.**Dissertation Chair: **Mitchell Cruzan**Dissertation title: *Mechanisms of Adaptation in the Newly Invasive Species *Brachypodium sylvaticum* (Hudson) Beauv.***Joseph Stephen Morelock, Ed.D.**Dissertation Chair: **Deborah Peterson**Dissertation title: *Effective Technology Implementation in Schools: Differing Perceptions of Teachers, Administrators, and Technology Staff***Lanfranco Muzi, Ph.D.**Dissertation Chair: **Martin Siderius**Dissertation title: *Advances in Autonomous-Underwater-Vehicle Based Passive Bottom-Loss Estimation by Processing of Marine Ambient Noise***Linda Mary Newton-Curtis, Ph.D.**Dissertation Chair: **Thomas Kindermann**Dissertation title: *The Peer Network as a Context for the Socialization of Academic Engagement***Hoon Park, Ph.D.**Dissertation Chair: **Xiaoyu Song**Dissertation title: *Formal Modeling and Verification of Delay-Insensitive Circuits***Lucas J. Redmond, Ph.D.**Dissertation Chair: **Michael Murphy**Dissertation title: *The Biology of Eastern Kingbirds at Malheur National Wildlife Refuge: Survival, Reproduction, and Testosterone Secretion***Claudia Sellmaier, Ph.D.**Dissertation Chair: **Julie Rosenzweig**Dissertation title: *Fathers Caring for Children with Special Health Care Needs: Experiences of Work-Life Fit***Josiah Tad Wagner, Ph.D.**Dissertation Chair: **Jason Podrabsky**Dissertation title: *Developmental Mechanisms that Support Genome Stability and Embryonic Survival in Stress-tolerant Embryos of the Annual Killifish *Austrofundulus limnaeus**



Research & Strategic Partnerships  
*Quarterly Review, Volume III, Issue 1, 2016*



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