

THE  
UNIVERSITY  
OF RHODE ISLAND  
DIVISION OF RESEARCH  
AND ECONOMIC  
DEVELOPMENT

THINK BIG  WE DO<sup>SM</sup>



# Momentum:

## Research & Innovation



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Spring 2016

# Momentum:

## Research & Innovation



Welcome to the latest issue of *Momentum: Research and Innovation*, the research and scholarly activity magazine of the University of Rhode Island. We are pleased to present to you some of the exciting research, scholarly, and economic development activities going on at the University. We can only show you a portion of the activities that are generating real excitement on the campus, in the community, and with our partners. We believe the University of Rhode Island has a wide range of scholarly activities in progress, and we hope that this sample will not only bring you to eagerly anticipate the next issue, but also motivate you to engage with us to find out more. The University of Rhode Island hopes that this issue brings you pleasure and you will find it to be both an educational and exciting read.

Sincerely,

Gerald Sonnenfeld, Ph.D.  
Vice President for Research  
and Economic Development



Spring 2016

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### THE UNIVERSITY OF RHODE ISLAND

David M. Dooley, Ph.D., President, URI

Gerald Sonnenfeld, Ph.D., Vice President, URI Division of Research and Economic Development

Melissa McCarthy, MA '99, Editor-in-Chief, Director of University Research External Relations, URI Division of Research and Economic Development

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Melissa McCarthy, MA '99, Editor-in-Chief, Director of University Research External Relations, URI Division of Research and Economic Development

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Allison Farrelly '16, URI Department of Journalism, Editor-in-Chief of *The Good 5 Cent Cigar*

### CONTRIBUTING WRITERS

Emma Clarke '15  
Zoe Comingore '18  
Allison Farrelly '16  
Joseph Korzeb '16  
Bruce Mason  
Todd McLeish  
Susanna Pilny '16  
Kara Watts '17

LAYOUT & DESIGN: DesignRoom.co

PHOTOGRAPHY: Beau Jones

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*For more information, contact:*

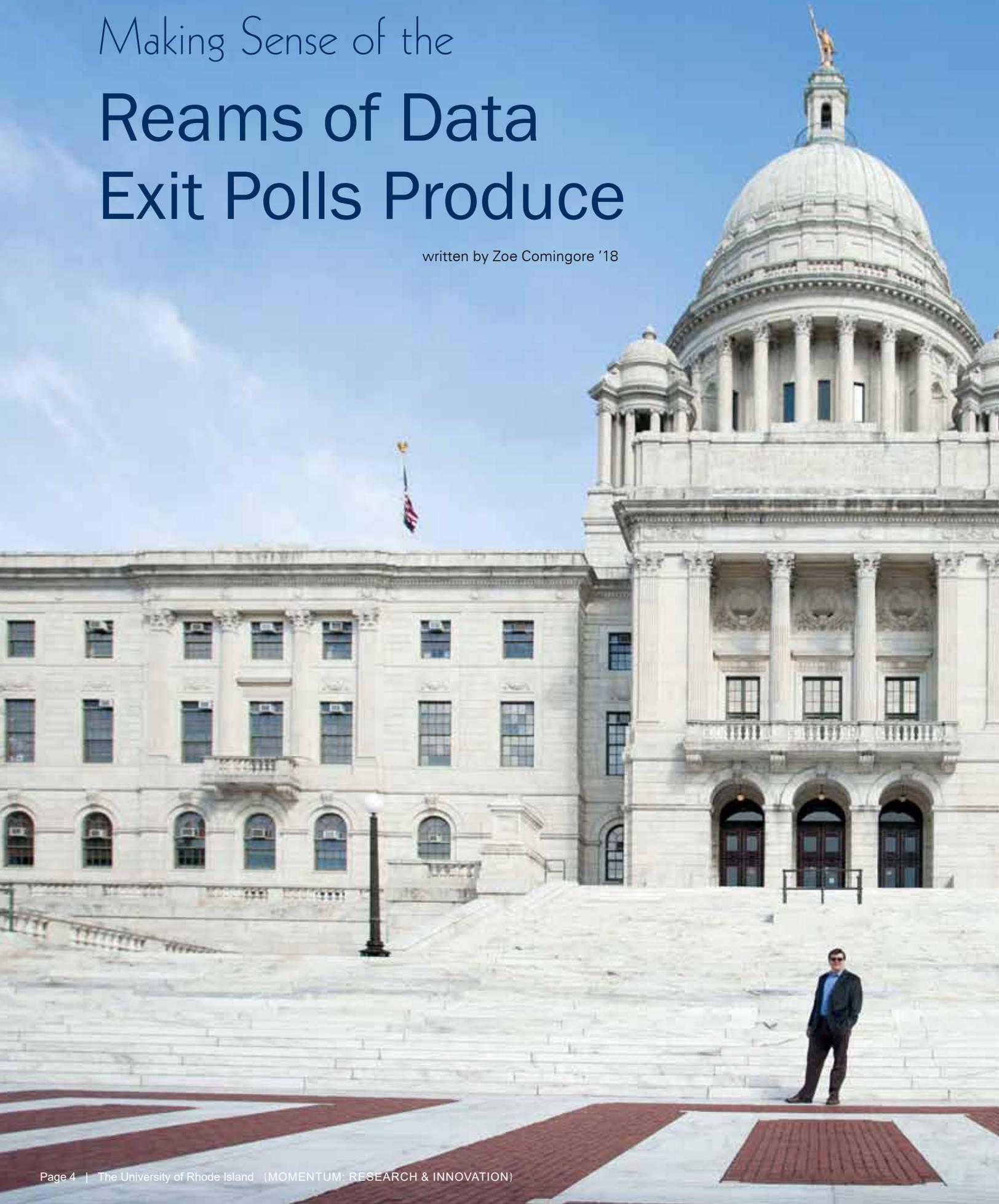
Melissa McCarthy, MA '99, Director  
University Research External Relations  
University of Rhode Island  
70 Lower College Road  
Kingston, RI 02881, USA  
Telephone: 401.874.2599  
E-mail: melissa@uri.edu  
Website: [web.uri.edu/researchecondev](http://web.uri.edu/researchecondev)

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# Making Sense of the Reams of Data Exit Polls Produce

written by Zoe Comingore '18





America will vote for its next president this November. During Election Day, pollsters will scramble to call the election before the government delivers the official results. Those polls and the ones in the decades before them, if properly analyzed, offer deep insight into how Americans tick. For the past decade, University of Rhode Island (URI) political science department Chair and Professor Brian Krueger has sought to make sense of the reams of data exit polling produces.

Krueger focuses on polling because the results can help cultivate a “know-thyself” democracy, in which myths about who votes, what they vote for, and why they vote can be analyzed. Exit polls combine voters’ candidate preferences with more detailed political opinions as they make their way out the door.

“Exit polls open the door to us having a less mythical political discussion, and of course, in a democracy, that’s the whole point,” Krueger says.

Krueger has dedicated time and effort to understanding exit polls and what they reveal about the American public over the years. He collaborated with University of Connecticut political science Professor Samuel Best to write the 2012 book *Exit Polls: Surveying the American Electorate*, the first cumulative collection of exit poll results to show trends and changes in voting patterns over time.

According to Krueger, exit polling as we know it today began as a means for media outlets to gain an advantage over the competition. Not interested in waiting for the official vote count, CBS began using exit polls in 1972 to announce the final results before its competitors. By the end of the 1980s, other news companies followed suit, making much of the reports rushed, frenzied, and redundant until exit poll consortiums, such as the National Election Pool, were created and the competition diminished. In recent years, the consortiums have taken steps to calm the frenzied attempts of networks to call a race first. The result has been that election night has seen fewer erroneous calls. They have made the exit polls more useful for researchers as well.



“Exit polls open the door to us having a less mythical political discussion, and of course, in a democracy, that’s the whole point.”

- Brian Krueger

“Before the consortiums, the myriad of exit polls conducted by the different news outlets were designed independent of each other,” Krueger says. “The result, when combined, was a jumbled, disorganized, scattered mess of this valuable historical information that had no continuity to give it meaning.”

Krueger’s work organized and recoded the disorganized data so that it can be academically analyzed and historically comparable, two purposes never intended for these exit polls.

Krueger’s and Best’s project sought to take advantage of a key benefit of exit polls.

“The sample size is large enough to provide a very detailed, nuanced analysis of many different demographics across the U.S.,” Krueger says.

By identifying questions, and comparing and contrasting different surveys, *Exit Polls* allows readers insight into American politics, in some cases contradicting what the media often portray as fact.

“There are a lot of myths about voters and elections in American politics,” Krueger says.

A common myth Krueger found perpetuated by the media is that lower-income whites, relative to higher-income whites, tend to vote more Republican. This is dispelled by exit poll data, which shows that during the past few decades low-income whites generally give a higher percentage vote to Democrats than high-income whites. High-quality information from exit polls can help unlock myths like this and change the storyline perceived by the American public, which can lead to further understanding as to why, for example, low-income whites are more connected to the Democratic Party, as well as explain support – or lack thereof – for Social Security, universal health care, or unemployment insurance.

“Another myth might be that presidential candidates need to win independent voters to win the White House,” Krueger says. “There is enormous focus on independent voters prior to elections by the media. But in the last election independents preferred Romney to Obama 50 to 45 percent.”

According to Krueger, to be literate and informed is to not only ask what polls mean and find out their uses, but also to ask: What are their limitations? When should we pay attention to them in the election cycle? When should we

be skeptical? These are some of the questions his future research will answer.

Now that Krueger has opened the door to a greater appreciation for high-quality exit polls, his new project focuses on polls taken earlier in presidential elections. In another collaboration with Best, Krueger is looking at how early opinion polls influence media interest in candidates and how they affect politics throughout the election cycle. He also is interested in examining the level of attention these polls receive despite historically having no predictive validity on the eventual winning candidate. Media polls can lead to irrelevant candidate predictions and false narratives about voters.

An example of Krueger's current focus is Donald Trump and the connection between his prominence in the media and his high rank in these early polls. Krueger's new project in exploring and analyzing the relationship between early polls, media attention, and candidate politics aims to answer some of the questions raised above.

"We have good evidence that predictions of general elections are meaningless nine to 12 months before an election, but a great deal of serious media attention focuses on how Senator Clinton or Senator Sanders would do when running up against Donald Trump or Senator Cruz," Krueger says. "Looking back historically, these early hypothetical polls have been as helpful as a coin flip in predicting the winner. We and our news media are wasting valuable time and, worse, voters are making decisions about who to support and who is viable based on empty calorie surveys. We can do better. And if we are going to elevate the level of political discussion in the United States, a key place to begin is an improved understanding of how polls do, and do not, aid in this national discussion."



**Brian Krueger**

Professor and  
Department Chair  
Political Science



Nicolai Petro  
Professor  
Political Science

# Deep Connection

## RUSSIA'S POLITICS AND CULTURE

written by Zoe Comingore '18

As a professor of international politics, focusing on Russia and the United States, University of Rhode Island (URI) political science Professor Nicolai Petro is studying the interactions and changing dynamics between these two countries at a tense time in world history.

Petro's extensive research on the deep connection between Russia's modern government and its culture warranted him invitations to attend summits with world leaders in both Russia and the Ukraine. He is a regular guest at the Valdai Discussion Club, where he has had the opportunity to discuss international politics with diplomats, academics, and journalists who specialize on Russian culture, and meet with Russia's president and foreign minister.

Before coming to URI, Petro was an international affairs fellow on the Council of Foreign Relations, and served as both special assistant for policy for the U.S. Department of State and political attaché in the U.S. Embassy in Moscow. He has been published in media outlets throughout the world, and his commentary on foreign affairs has been translated into more than a dozen languages.

Petro's work originally focused on the influence of culture on politics. Cultural rituals and symbols, he points out, reinforce social unity. Even negative rituals, such as witch hunts and impeachments, can forge solidarity in communities by identifying a common enemy.

"However, to use rituals in social transformation they

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Petro points out that despite having completely opposing points of view on politics, the two governments often find that they need to cooperate in areas such as the exploration of space.

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must be 'wrapped in a web of symbolism,'" Petro says. "If successful, initial attempts to employ symbols for dramatic effect are followed by more structured rites, which become our political institutions."

After writing a book on Russian political culture and a book on Russian local politics, Petro began to look at how dramatic political transitions in post-Communist Russia were shaped by the rituals and symbols of the Orthodox Church. This popular religious institution provides a way to unite public and political sentiment, building back some of the trust that was lost under communist rule between the state and its people. Petro is currently working on a book that compares and contrasts Russian and American values, examining the reasons behind the tension between the two countries.

His research proposal, "Beyond the Values Gap," was recently nominated by URI President David M. Dooley for the 2016 Andrew Carnegie Fellowship, funded by the Carnegie Corporation of New York. In his fellowship proposal he reminds readers that ideological confrontation was supposed to end with the Cold War. One reason it did not end is the "values gap" between Russia and the West. Petro argues that this "values gap" has now become a "values trap" for American foreign policy, severely

Inside the church of St. Paraskeva Pyatnitsa at the Pirogovo National Museum, near Kiev.

photos by Nicolai Petro





Interior of a traditional Ukrainian restaurant in Odessa with Nicolai Petro's mother, Edith Petro.

limiting the United State's options in respect to Russia. Envisioning Russia as an integral part of Western culture, he argues, would allow the United States to break free of containment, and fundamentally transform the international system.

"I don't believe our tensions with Russia revolve around differences of interest or differences of ideology," Petro says. "They're basically rooted in cultural stereotypes about who Russians are and why, 'We really need to not be like them.'"

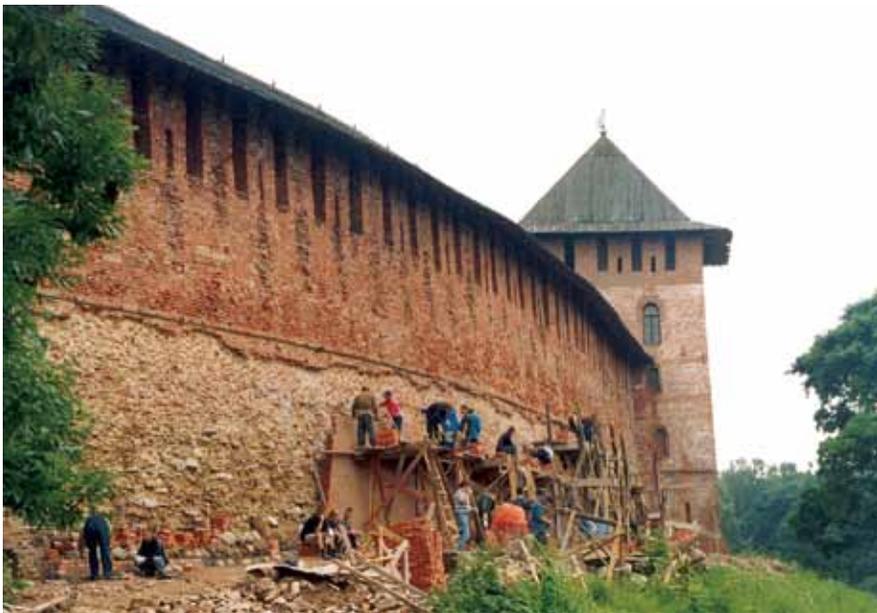
As Russia modernized and became more competitive in the global economy, the change had an important impact on Russian identity that most Americans are unaware of. According to Petro, Russia has settled into a more politically-stable era, characterized by the popularity of Putin and his policies. The friction between Russia and other countries caused by this newfound stability is Petro's most recent area of study.

"Today no one argues that Russian policy is driven by a global ideology," Petro says. "Conflicts now arise not in the Third World, but within the former Soviet Union, an area where the United States has begun to define new interests since the end of the Cold War, since NATO expanded into the former Soviet Union in the 1990s. And Russia has been pushing back."

Petro maintains that the current political debate is about whether to risk a fight with Russia to press America's geopolitical advantage, and thus decisively break the post Cold War truce, or to accommodate vital Russian interests



He has had the opportunity to discuss international politics with diplomats, academics, and journalists who specialize on Russian culture, and meet with Russia's president and foreign minister.



Rebuilding the wall surrounding the city fortress of Novgorod the Great in Russia.



Statue of Armand-Emmanuel de Vignerot du Plessis, Duc de Richelieu, first governor of Odessa.

in order to obtain a more stable postwar settlement.

A large part of this debate in the West is about whether or not to listen to Russia's arguments.

"During the Cold War, we used to be concerned that Western ideas were not getting through to Russia, and they were jamming our radio broadcast signals," Petro says. "Now the reverse is true. Western governments are alarmed that state-supported news outlets like RT (formerly Russia Today) have developed such a large global audience – more than two billion hits on YouTube. And we are telling the western public, 'You shouldn't be listening to that. It's Russian propaganda.'"

Petro points out that despite having completely opposing points of view on politics, the two governments often find that they need to cooperate in areas such as the exploration of space, where the U.S. relies on Russian rocket engines to put its people into orbit, and the exploitation of the resources of the Arctic.

More mainstream communication between Russia and the U.S. will probably have to come through Europe, according to Petro. Since both countries have historical ties

to Europe, this region can bridge the gap. However, Petro says opening up mainstream discourse between Russia and parts of Western Europe involves changing the United States' idea of who belongs to Europe.

That is why the process of opening up to Russia, and creating mainstream exposure for modern Russian values and ideas, is so complicated and difficult. Petro hopes to ease the pain through open-mindedness and understanding. He is working to identify commonalities between Russia and Europe, and illustrate how these can provide a common foundation for meaningful international discourse.

"My argument is that this common ground exists," Petro says. "It's not taught, so we're not aware of it, but it goes back more than a thousand years. Everything that lies at the basis of European politics, economics, cultural thought, also lies at the basis of the Russian politics, economics, and culture. It is my contention that once we all become more aware of this, we will have a much easier time talking to each other."

Petro is currently working on a book that compares and contrasts Russian and American values, examining the reasons behind the tension between the two countries.



Statue of Bulat Okudzhava, famous Soviet poet, Arbat Street, Moscow.

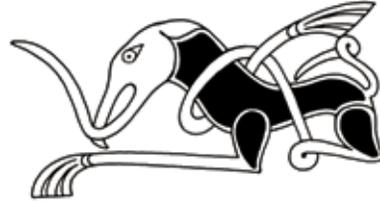
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# Debunking Periodization

## Shining a Spotlight on Secularism

written by Bruce Mason

Kathleen Davis first became interested in medieval studies when she took a graduate course at Villanova University in Old English language and literature.

"I was intrigued by the beauty of the poetry but even more by the language, which is strangely like and unlike English," says Davis, a professor of English at the University of Rhode Island (URI). "The history of the language is fascinating. Unlike the Romance languages such as French and Italian, English first came to be written in the Roman alphabet through acts of translation, literally between the lines of Latin, as in the beautiful page from the Lindisfarne Gospels." (pictured left)

Her early scholarly studies began with her dissertation at Rutgers University. She focused on how

English authors, from the 8th through the 10th century, established cultural and political authority as well as a sense of national identity through translation, which both associated English with the broader world of European Latinate culture and at the same time set it apart.

Davis's investigation into translation studies was at first part of her scholarly activity on medieval texts and culture. Through this effort, she became interested in translation theory itself, a field Davis says was experiencing growing pains in the late 1990s. She found herself becoming particularly interested in the importance of the French philosopher Jacques Derrida to translation theory.

"Derrida was not well understood by many translation scholars at the time," she states. "I wrote

*Deconstruction and Translation* in order to bring the work of Derrida and similar philosophers into the mainstream of translation studies."

In her latest work, *Periodization and Sovereignty*, Davis explores why many people associate the terms medieval and Middle Ages with a period characterized by dark ages of intellectual and artistic inferiority.

"The attitude that the Middle Ages was intellectually inferior – or even barbaric – came from the process of Europe's colonization of other parts of the world such as Africa, South America and India," she explains. "In the 18th and 19th centuries, Europeans defined themselves as on the cutting edge and defined those they colonized as 'backward' and as living in the past that Europe had left behind. They identified this past

“The history of the language is fascinating. Unlike the Romance languages such as French and Italian, English first came to be written in the Roman alphabet though acts of translation, literally between the lines of Latin.”

- Kathleen Davis

with the Middle Ages and attributed a set of negative characteristics such as superstitious, violence, servile, to both the Middle Ages and the colonized.”

Davis notes that it was precisely this characterization of foreign culture and people as backward and primitive that justified the beginnings of the Western European domination that persists today.

“Those who were colonized and ‘living in the past’ were not considered capable of self-rule until they could ‘catch up,’” Davis states. “And it was precisely this rationalization that laid the tracks of a division between religion and secularism that remains a dominant force in today’s society.”

According to Davis, secularism is a hotly debated topic today. Some argue that it champions human rights above discriminatory religious demands, while others argue that secularism restricts religious rights. She explains that although scholars do not agree on how to define secularism, or even what its history is – it is agreed that secularism needs to be defined with respect to religion.

“My interest is not in taking a side in these debates as they stand,” Davis says. “Rather, I am interested in the role of the Middle Ages in these debates, and particularly how colonial history has shaped many of the assumptions underlying all sides of the arguments.”

Currently, Davis is writing about the importance of understanding the colonial idea of the Middle Ages to the so-called ‘clash’ between religion and secularism today.

“The attitude toward the Middle Ages has always been double-edged: it is both the disparaged, dark past and the revered cradle of the nation,” she explains.

From Davis’ perspective, the history of how people came to think in terms of religion and secular division needs to be thoroughly restudied to better understand how societies might move forward productively on this issue. However, we continue to witness unproductive historical distortion in the language of our politics today.

“Indeed, political discourse has become more virulent,” Davis says. “The Taliban, for example, and more recently ISIS, are routinely characterized as medieval, particularly with respect to brutality and the treatment of women. This is bad history, of course! It is an idea that comes not from medieval history, but from the history of colonialism.”

Davis also is working on two major projects, one about time in Old English poetry, and one on secularism and modernity.

Davis’s studies in Old English continues to focus on translation and on attitudes toward time and the past. She strongly believes that Old English literature had an important role in the positioning of a medieval past.

“Old English literature has long been considered dark, brooding, and nostalgic – very backward looking,” Davis says. “My scholarship refutes this reading of the literature, and shows its sophisticated, forward-looking attitude toward time, the past, and the future.”



“I am interested in the role of the Middle Ages in these debates, and particularly how colonial history has shaped many of the assumptions underlying all sides of the arguments.”

- Kathleen Davis

Kathleen Davis  
Professor, English

# Uncovering the Meaning

# *of Architecture*

written by Joseph Korzeb '16

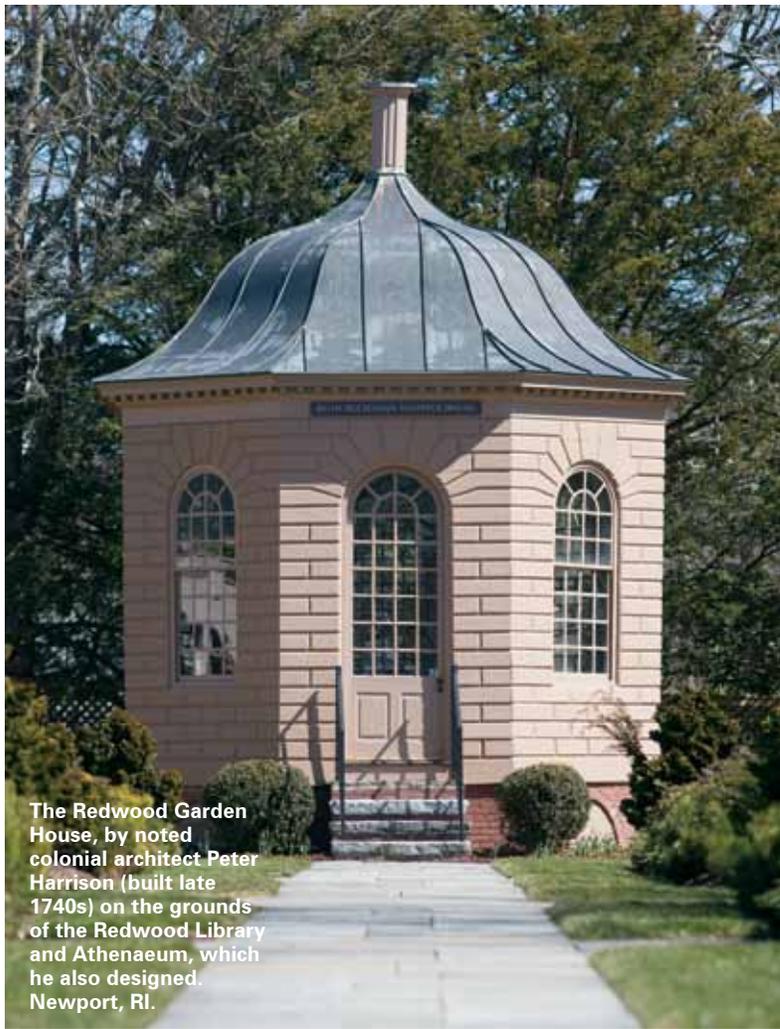




Detail of bronze relief on the 1868 Matthew Calbraith Perry Monument by John Quincy Adams Ward, leading 19th century American sculptor, Touro Park, Newport, RI.

University of Rhode Island Professor Ronald Onorato constantly seeks to uncover new aspects of history through architecture and public sculpture. Chair of the University's Department of Art and Art History, Onorato focuses his research on revealing the sense of a place through the constructed environment of buildings and public monuments, often discovering unconventional meanings in these works.

"You can take the cultural temperature of an era by understanding its architecture," Onorato says. "For example, late 19th and early 20th century skyscrapers tell us about the development of new technologies like steel framing as well as the rapid growth of cities and how real estate in those places became so valuable that buildings had to be built up rather than spread out."



The Redwood Garden House, by noted colonial architect Peter Harrison (built late 1740s) on the grounds of the Redwood Library and Athenaeum, which he also designed. Newport, RI.

A nationally known expert on the architecture and sculpture of Newport, Rhode Island, Onorato strives to examine primary examples of architecture through a lens not typically associated with that city's history. Although the famous Gilded Age mansions have defined Newport's public image, Onorato believes many lesser known buildings, designed landscapes and monuments possess a wealth of often overlooked significance. As author of the 2007 *American Institute of Architects Newport Guide*, he included everything from "The Breakers," the famous seaside villa, to modest workers housing along the waterfront.

More than 30 years ago, Onorato became fascinated with Newport's Common Burying Ground, an extensive colonial era graveyard. Begun in the mid-1600s, it is an important site of Anglo and African American history with perhaps the largest number of African American colonial grave markers in the country.

"While I found the survival of this burying ground important, I was appalled by the physical condition of the place," Onorato says.

In the early 1990s, he helped lead a grassroots effort to call attention to its importance that brought together members of the public, archaeologists, historians and even the mayor, to cut brush, remove

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Onorato strives to examine primary examples of architecture through a lens not typically associated with that city's history.

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trash and take back the site for the community. This collaborative effort happily resulted in the city recommitting funds on an annual basis for landscape maintenance, city signage and even restoration of some damaged markers. Onorato also worked to get the Common Burying Ground recognized as part of Newport's National Landmark District. He accomplished this by writing an addendum to the original boundaries of the district for the federal government through the Rhode Island Historical Preservation and Heritage Commission and its National Register Review Committee.

In 2004, he served as a contributing editor of *The Buildings of Rhode Island*, part of a national series surveying architecture in every state published by Oxford University Press. Onorato continued his approach of mixing well-known structures with little known architectural gems. The book contains entries on more than 1,275 historically significant buildings in the state with a large percentage of 20th and 21st century examples, just the type of architecture that is usually an afterthought in other surveys.

In this book, he wrote about projects designed by architects and others which had been repurposed several times from their original function. Some, like the Griswold House, started as a large 19th century country home designed by Richard Morris Hunt, the dean of American architects, at the end of that century and later became the Newport Art Museum. Another smaller Newport building was once a gas station, then converted to a bakery and now serves as a restaurant. Onorato stresses that it is not just a building's original purpose but its historical evolution that gives architecture accumulated meaning.

To gain a genuine understanding of the significance of a building or monument, Onorato says he considers his subjects to be artifacts of their specific place and time. He takes various contexts into account, adding to his research by talking to the designer or occupants,



## Ronald Onorato

Professor and Department Chair  
Art and Art History

Onorato also worked to get the Common Burying Ground recognized as part of Newport’s National Landmark district.

Unique 18th century, six-headed gravestone of Langley children carved by John Bull, Common Burying Ground. Newport, RI.

understanding structural issues and witnessing its scale and surroundings first hand. This same sensibility is offered to his students as he teaches field courses where his students gain direct experience of buildings and monuments.

In one of these courses, students visit a rudimentary 17th century colonial era graveyard in Newport and compare it to Swan Point in Providence, Rhode Island, a beautifully landscaped 19th century cemetery.

“A colonial graveyard has smaller head stones, they’re less ornate than the 19th century cemetery, which has more sculpted monuments, more ornate carved figures and obelisks,” Onorato says.

Given such real-life examples, the students can see for themselves the contrasts between two different attitudes toward death and burial as evidence of artistic and religious shifts between those two time periods. Onorato points out that he and his students are fortunate to be in Rhode Island where there is a large concentration of prime examples in American architecture and public sculpture.

Capitalizing on the wealth of architecture existing in Newport, Onorato is focusing his upcoming research on George Champlin Mason, Jr., an architect he feels has been overlooked in the array of notable architects working there

in the late 19th century. While some of the nationally known firms in the resort city only produced a handful of designs each, Onorato has documented more than 175 projects completed by the Mason firm in Newport and as far as Philadelphia. Onorato’s revisionist study, like much of his previous work, will add to our knowledge of Newport’s architectural heritage and just as importantly reveal another important American architect to a much broader public.

“I’d like to think of myself as a hybrid scholar,” Onorato says. “I’m part architectural historian, part historian of technology and part interpreter of buildings and monuments as the material residue of a culture.”

**“You can take the cultural temperature of an era by understanding its architecture.”**

- Ronald Onorato



A photograph of a person walking away from the camera on a sandy beach, looking out at the ocean under a clear blue sky. The person is wearing a light-colored, short-sleeved shirt and dark pants. The ocean is visible in the distance, and the sky is a uniform light blue.

# Overcoming Statistics:

## The Dire State of Our Nation's Youth Services

written by Bruce Mason

In any given 30-day period, nearly 35 percent of our country's youth drank alcohol, 16 percent smoked cigarettes and 25 percent used marijuana. Among sexually active youth, 40 percent had not used a condom during their most recent sexual experience. Compounding the problem, most youth in need of services for substance abuse and psychological counseling do not get the help they need. And, youngsters in the welfare and justice systems are the least likely to receive such services.

These statistics, from national surveys, demand attention in Rhode Island, says Lyn Stein, professor of psychology at the University of Rhode Island (URI).

"Even when services are available, there is a need to make them more effective by studying what makes them work to improve health," Stein says. "Improving self confidence to change behaviors or helping people find their own reasons to commit to healthier behaviors is effective."

Stein felt a calling from a young age to try and help underserved communities she feels are often overlooked by the system.

She received her doctorate at Kent State University, and has worked in the area of mental health, crime and substance-involved youth and adults for more than 22 years. Having worked and conducted research in the mental health field in several states, Stein came to Rhode Island in 1998 where she worked with justice-involved youth in the care of the Department of Children, Youth and Families (DCYF). In addition to her work at URI, Stein is a Brown University adjunct professor at the Center for Alcohol and Addiction Studies.

"I've been able to work with multiple DCYF directors, Training School superintendents, and juvenile probation

administrators very successfully during my career," Stein says. "Our community partners have really driven the areas we target in our grants and the approaches to address the mental health needs of youth and families."

Stein was awarded a grant by the National Institute on Drug Abuse to examine the impact of Motivational Enhancement Therapy (MET) on teenage youths involved in the justice system. She is collaborating closely with leading practitioners in this field, including Charles Golembeske, clinical director at the Rhode Island Training School, the state's juvenile correctional facility. Stein's group was the first to adapt MET and a form of meditation for incarcerated youth in a large randomized clinical trial. A key objective of this work entails following incarcerated youth after they are released into their respective home communities to evaluate the impact of interventions on health risk behaviors.

"Such follow-up is important so that we can see what interventions work once they return to the communities where they live. That's the real test," Stein says. "In that study we found that a relatively brief MET can reduce an assortment of health risks such as substance use, risky sex, and crime."

Stein has also received grants to study other behavioral interventions. One area of focus in this research program concentrates on cigarette smoking in teenage detainees re-entering the community. Her findings suggest that meditation not only helps to reduce smoking, especially for highly aggressive youth, but in addition, cognitive behavioral skills reduce smoking more than a self-help program such as nicotine anonymous, especially for less aggressive youth.

"We're very excited about what detailed follow-up analyses may reveal, including effects of combined

meditation and behavioral skills,” states Stein. “We were fortunate that our work here led to collaborations with Dr. Jennifer Clarke from Brown University to conduct a study on adults leaving incarceration, where we found that combining MET and coping skills is efficacious in reducing nicotine use.”

Stein is currently working on Healthy Transitions, a grant from President Barack Obama’s Now is the Time initiative, to increase access to mental health services. In partnership with the Department of Behavioral Healthcare, Developmental Disabilities and Hospitals, Community Care Alliance, The Kent Center and DCYF, the program seeks to affect system change so that youth in need of mental health and substance use care do not fall through the cracks, especially during transition from systems serving children to systems serving adults in Rhode Island.

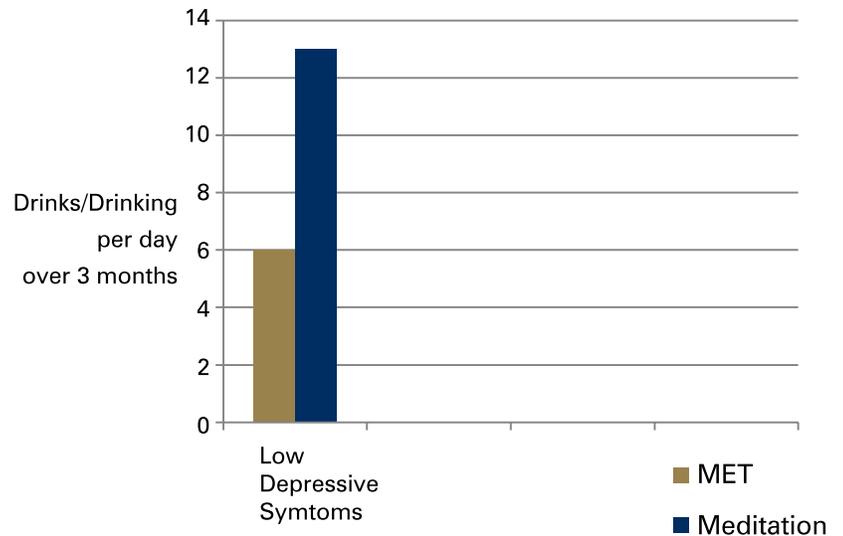
Healthy Transitions utilizes an intensive outreach approach that emphasizes family and community involvement as well as peer support in recovery.

“Our intent is to build a data system that can track the needs of these youths, changes they go through over time and quality of interventions so that Rhode Island can use the data to improve approaches to help clients,” says Stein. “I provide input to our partners on how to build the data system and what to track. URI performs the data analysis with our partners at Brown University.”

Stein is engaged in the Teen Contraceptive Awareness and Reproductive Education (T-CARE) program, which focuses on reducing pregnancy and sexually transmitted infections (STIs) among girls and young women. Stein says the program is receiving a great response from its community partners and local teenagers and young adults.

Still in its data collection phase, T-CARE’s

## EFFECT OF MET ON DRINKING



preliminary analyses demonstrate promising outcomes in the reduction of STIs and unprotected sex. Another program called Enhancement and Screening for Youth, funded by the National Institute on Alcohol Abuse and Alcoholism, evaluates how well community therapists respond to training in evidence-based practices for youth including alcohol screening and behavioral interventions.

“These are challenging and ambitious projects that should yield important outcomes for our state, our agency partners, and the scientific community in terms of knowing what works to improve health, how it works, and how to increase access to services to improve lives,” says Stein.

Substance use, crime and mental health are problems in many communities across the country. However, according to Stein, Rhode Island in particular seems to be in great need of services to address these difficulties and is seeking the best ways to address these issues.

“Rhode Island is working to build our service infrastructure, to provide outreach and engagement to people in need, and enhance the work force,” she says. “These efforts will be greatly enhanced by improving interventions and methods of implementing evidence-based practices. Partnerships involving policy makers, clinical researchers, administrators, clinicians and community members are needed.”

Stein continues to focus her attention on the future and how she can help those in need who have been overlooked by society.

“There are a lot of settings where we can do important work to effect change and study phenomena,” Stein says. “I’ve always wanted to find places that are underserved to collaborate on changing lives, practices and systems. It’s important to study interventions within these underserved settings to reduce health disparities for persons who are otherwise hard to reach.”



**Lyn Stein**  
Professor, Psychology





# Delivering Medication Value

written by Todd McLeish

The pharmaceutical industry is making dramatic advances in the development of new medications to treat and cure diseases that millions of people across the country are fighting. But many of those drugs are extremely expensive. A nine-month course of a new medication to cure chronic hepatitis C, for instance, costs \$84,000, and the price tag for a new cystic fibrosis treatment tops \$250,000 per year.

Drugs like these and many more are raising challenging economic issues at a time when the United States already spends far more per capita than any other nation on health care — \$9,000 per person annually or a total of \$3 trillion each year and growing fast. Concerns about medication cost also raises questions of equity and access to medications that may need to be allocated.

These are questions that Stephen Kogut wrestles with every day. A professor of pharmacy practice at the University of Rhode Island (URI), he focuses his research on pharmaco-economics by using large data sets to analyze how medications are being used across populations. Pharmaco-economics is a growing field that considers both the benefits and costs of medication to optimize how medications are used.

“Once you have robust numbers, you can look at, for example, which individuals might be more or less likely to receive a medication,” Kogut says. “It’s a way to uncover inequities and inefficiencies and identify the value of medication therapies.”

Kogut says that some expensive medications are worth the cost to insurers if they mean fewer patient trips to the emergency room or shorter hospital stays.

“In that case, it’s better for the patient’s quality of life

and better for the payer,” he adds. “But it can be tricky to quantify value.”

According to Kogut, determining the value of a particular medication is at the core of pharmaco-economics. Rather than identifying the least expensive or most effective treatment option, Kogut says the medication with the best value is that which is most efficient.

“If everyone in Rhode Island age 18 and older started on the most expensive statin regimen to lower their cholesterol, we’d probably save a few additional lives from heart attacks and cardiovascular disease,” he says. “But it’s not practical or cost effective because typically the heart risk among individuals in their 20s is very small. We might reduce that already very small risk with statin drugs, but is it worth it? If resources were unlimited, sure, but resources aren’t unlimited.”

As a member of the Rhode Island Medicaid Drug Utilization Review Board and the New England Comparative Effectiveness Public Advisory Council, Kogut brings his research orientation to state agencies, insurance companies and large medical practices to help them deliver the best care possible by understanding how medications are being used by clients and patients.

One such partnership is with the Rhode Island Medicaid Program, which he and URI’s College of Pharmacy Associate Professor Rita Marcoux and Associate Dean Brian Quilliam have maintained for more than a decade. Among their collaborations is a project to analyze the use of antipsychotic medications among Medicaid recipients, initiated after it became clear that many clients were receiving two or more antipsychotic medications when evidence indicates the use of multiple

drugs is generally not superior to using one medication at a time. They are now examining the use of antidepressants among those who are newly-prescribed medication for a recent episode of depression.

“We found that about 50 percent of those who start on anti-depressants do not continue it for at least three months and only one in three continued use of the medication for the recommended duration of at least six months,” he says. “So there is a tremendous opportunity for improvement.”

That finding is not unusual. In fact, the underuse of medications is a serious and complex problem for all health care providers. Kogut says there are numerous overlapping reasons why a patient may not comply with the prescribed medication dosage, so a one-size-fits-all approach to improving medication adherence usually fails.

“Barriers could be health literacy or health belief – if you don’t believe the medication will help or if you think you’ll get almost as good a benefit by taking it sporadically, patients don’t take it,” he says. “It could be issues of dexterity – they can’t open the bottle – or issues of access, like transportation or cost. And there are barriers related to the medications themselves, like needing to take it multiple times a day or it has unpleasant side effects.”

That was the issue he addressed in a project he conducted for Medicare. Kogut analyzed the pharmacy records of people with diabetes to determine how often they refilled their prescriptions. He found that the rate of medication use was well below what it should have been for many patients.

Kogut reported this data to local physician groups to outline their patients’ performance, and shared suggestions on how to improve their medication adherence. He has done other pharmacoeconomic studies for Blue Cross Blue Shield of Rhode Island, Medicare, pharmaceutical companies and other agencies, all aimed at improving quality in medication use by quantifying medication value and adherence.



Stephen Kogut

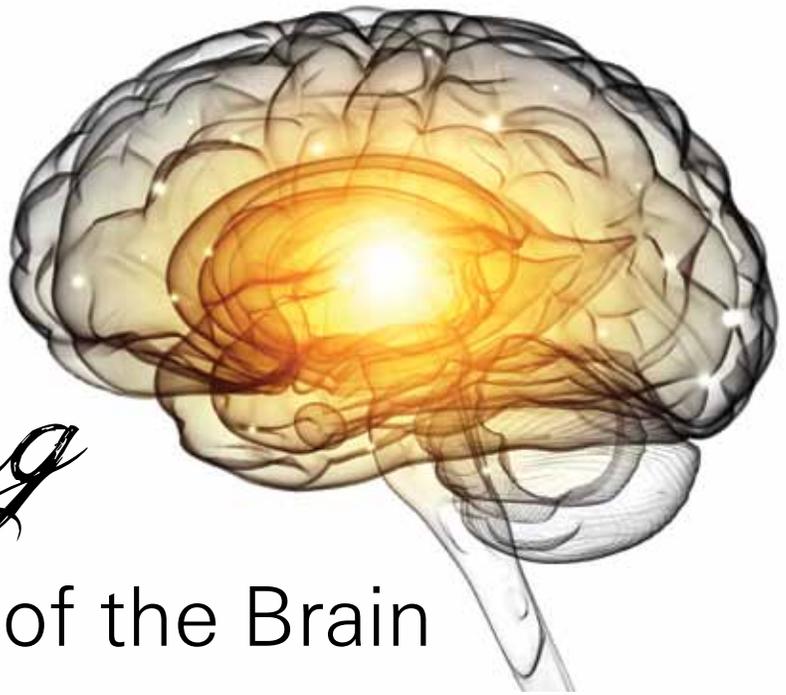
Professor  
Pharmacy Practice

Kogut’s partnerships with numerous health care agencies illustrate the aim of the new URI Academic Health Collaborative. The venture will group URI’s health-related programs into one academic unit. This grouping will spur more cooperation and innovation between URI and the health care industry. It will improve research and outreach partnerships that will help to address real-world health issues. Kogut serves on the steering committee for the Collaborative’s Institute for Integrated Health and Innovation, which will facilitate interdisciplinary collaboration among faculty, students, and professionals in the community through teams of multidisciplinary health experts.

“As the University focuses on developing innovative teaching and research models with partners throughout the healthcare industry, Professor Kogut’s efforts are particularly noteworthy,” says Paul Larrat, dean of the College of Pharmacy and chair of the Collaborative’s executive committee. “He has demonstrated the value of academic involvement in addressing some of the pressing health care delivery challenges that we now face.”

Pharmaco-economics is a growing field that considers both the benefits and costs of medication to optimize how medications are used.





# *Unraveling*

## the Mysteries of the Brain

written by Todd McLeish

“Disorders of the nervous system are probably the biggest health concern going forward.”

- Paula Grammas





Scientific understanding of the brain and nervous system are still in their infancy compared to research of other aspects of human physiology. Combine the complicated concept of consciousness with the complexities of neural and cellular communication, and it is no wonder why scientists call the brain the last frontier of medical science.

But thanks to improvements in technology, researchers are poised to make dramatic advances, and some of these researchers are located at the George & Anne Ryan Institute for Neuroscience at the University of Rhode Island (URI).

“Disorders of the nervous system are probably the biggest health concern going forward, in part because most of them are age-associated at a time when Baby Boomers are just reaching the peak age for the onset of these terrible and very costly diseases,” says Paula Grammas, the inaugural director of the institute, who joined the URI faculty in December.

“The numbers are frightening,” says Grammas. “We as scientists have always said that if we don’t invest early in developing therapies, we’re going to pay a lot more down the road in what these diseases are going to cost in lost productivity, not to mention the personal anguish, tragedy and other societal costs.”

“URI is now well-positioned to make important contributions to neuroscience research, thanks in part to the \$15 million gift from alumnus and former CVS Health CEO Thomas M. Ryan and his wife Cathy, which established the Ryan Institute.”

- Paula Grammas

Neurological diseases like Alzheimer’s, Parkinson’s, and ALS cost the U.S. hundreds of millions of dollars each year in medical and long-term care costs. President Obama unveiled a \$100 million brain mapping initiative in 2013.

Grammas says URI is now well-positioned to make important contributions to neuroscience research, thanks in part to the \$15 million gift from alumnus and former CVS Health CEO Thomas M. Ryan and his wife Cathy, which established the Ryan Institute.

Grammas was selected to lead the Ryan Institute due to her international reputation and pioneering research of the role that blood vessels and inflammation play in the development of neurological disease. As former professor of neurology and the executive director of the Garrison Institute on Aging at Texas Tech University, she has received numerous awards for her research on Alzheimer’s disease.

“To answer the really big questions, one person with one perspective can’t do it,” she says. “You need multiple types of investigators who bring different approaches, and URI understands that. The University understands that collaboration is important. And I’m excited to come to a place that wants to build on what it has and take it to the next level.”

Those research collaborations are already beginning at URI. In December, an agreement was signed with Brown University, Care New England, Lifespan and the Providence VA Medical Center to partner on neuroscience research.

“None of these entities can do it alone, but collectively we can,” Grammas says. “I can’t think of any other place with this kind of public-private partnership and this level of enthusiasm for working together.”

As she builds the administrative structure of the Ryan Institute and goes on a “fact-finding mission” to learn about the research being conducted by faculty and

researchers at URI and the partner institutions, Grammas is already thinking about how to raise the visibility of the Institute and recruit new faculty to grow research capacity on campus.

“We have obvious strengths in pharmacology, drug development and drug optimization, as well as in engineering and several other disciplines throughout the University,” Grammas said. “The next challenge is finding funding and expanding our research infrastructure.”

Grammas hopes to provide seed money to those with neuroscience-related research projects to jumpstart their work so they can begin to publish and compete for significant federal funding.

“Being a scientist is like running a small business,” says Grammas. “Even if you have a good idea and you work hard, if you don’t have the funding then it’s difficult to get to the next level. So I’d like to identify faculty who are really interested in trying to move their neuroscience research agenda forward and help them do that, whether they need space, personnel, equipment or new core facilities.”

Grammas recognizes that major advances in this field do not come quickly.

“Every discovery moves the field, moves the needle,” she says. “The idea that we’re going to have one person make one discovery that’s going to change everything, that’s a very Hollywood approach. Instead, we’re going to contribute to this body of knowledge, and with time it will lead to important developments.”

Grammas concludes, “Ultimately, we want Rhode Island to become a leader in the study of neurodegenerative disease. We want this to be the state people think about when they think about nervous system research and the development of new therapies. We’ll get there by being visible, by publishing, by doing good work. We want people to learn about what we’re doing because we’re doing something worth learning about.”



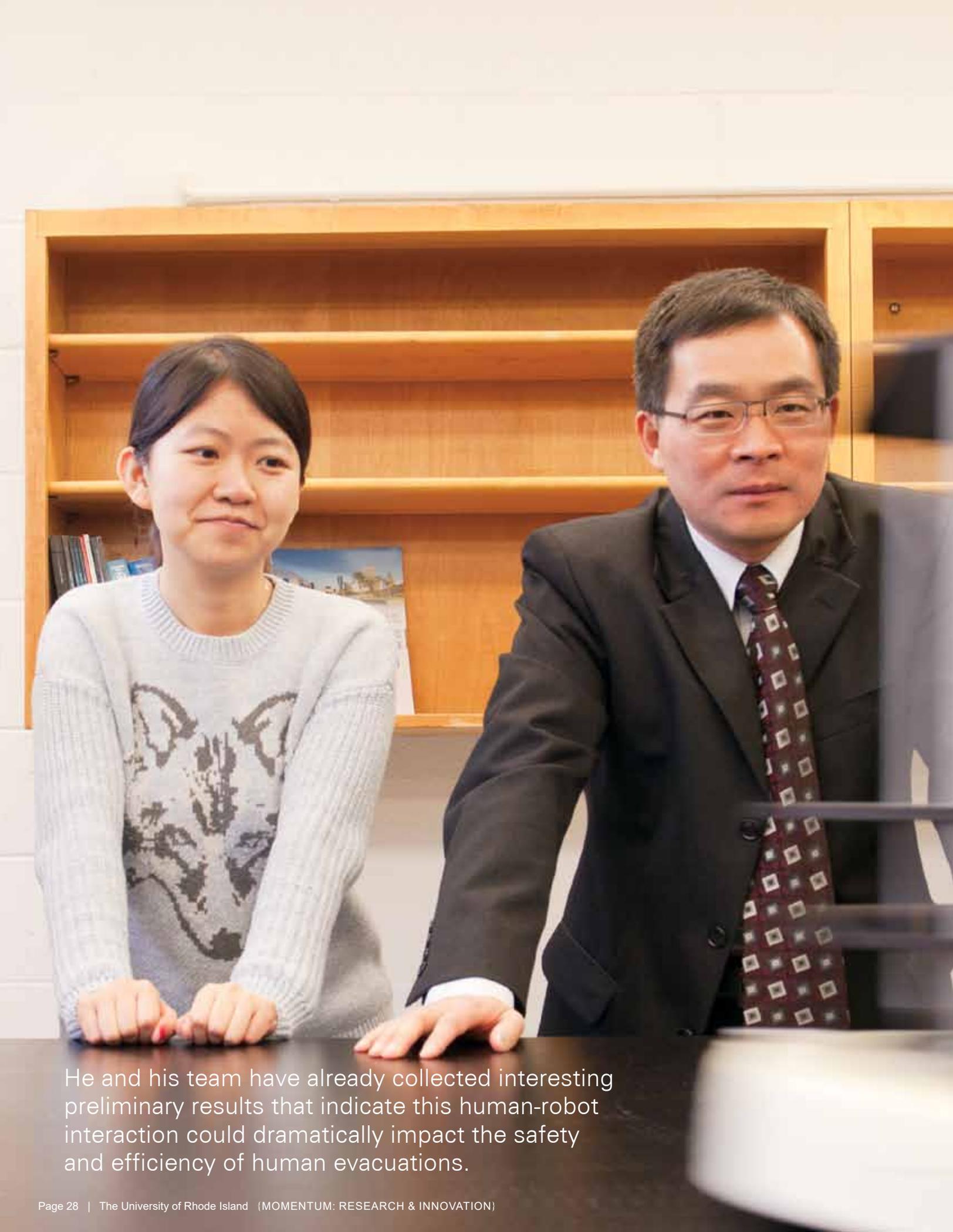


**Paula Grammas**, Director

George & Anne Ryan  
Institute for Neuroscience  
Professor, Biomedical &  
Pharmaceutical Science

**William Renehan**, Associate Director

George & Anne Ryan  
Institute for Neuroscience  
Professor, Pharmacy



He and his team have already collected interesting preliminary results that indicate this human-robot interaction could dramatically impact the safety and efficiency of human evacuations.

# Human Robot Interaction

written by Allison Farrelly '16



Haibo He, (center) with his students.

# Not just any brain, but a self-learning, self-adapting brain, which if successful, will allow human-sized robots to indirectly guide the behavior of humans in emergency situations.

At the University of Rhode Island (URI), an engineering professor is embarking on what may seem like a futuristic endeavor to find – or rather, create – a robot a brain.

And not just any brain, but a self-learning, self-adapting brain, which if successful, will allow human-sized robots to indirectly guide the behavior of humans in emergency situations.

Haibo He, the Robert Haas Endowed Chair Professor of electrical engineering at URI is working on the computational intelligence of a human-robot interaction project through a \$282,000 grant from the National Science Foundation (NSF). The funding will allow He to develop learning-based control algorithms designed to create intuitively thinking brains for robots.

The National Robotics Initiative, launched by President Barack Obama, is on the forefront of developing science. Along this line, He's robotics research has a targeted application: improving human evacuations in emergency situations at congested, contained events, such as games or concerts.

"If something happened and people try to exit the area as quickly as possible, that could cause a stampede," He says. "Currently, there is little way to control the behavior of scared crowds, which can cause disasters."

He envisions a world where rather than sending more humans into dangerous situations, robots could be deployed to assist evacuations. His

robots would be able to anticipate the movements of humans, evaluate changes in the environment in real-time, and make educated decisions on how to evacuate people as efficiently and safely as possible.

"In our current preliminary study, we can evacuate maybe 50 to 100 more people compared to the existing approach in a simulated environment in our lab," He says. "But even one more person is a huge benefit because we are talking about saving lives."

He's robotics-assisted evacuation project was inspired by two events that on the surface may seem quite different, but in which the professor saw natural similarities. Before applying for the NSF grant, He was shocked by news of a stampede at a New Year's Eve celebration in 2014 in Shanghai that killed 36 people. In the same year, an article published in the Journal of the Royal Society Interface ended up in his lap that illustrated how farmers used dogs to herd their flocks of sheep.

"They just placed a few dogs in key locations to ensure the whole flock of sheep moved in certain directions," He says. "Kind of like our robots in these situations."

The NSF grant will allow He to work collaboratively with professionals who can tackle the other two parts of the project's equation: understanding human behavior and building a physical robot on which to test He's brain. He has partnered with URI psychology

Professor Charles Collyer to collect and analyze data on human movement from surveillance cameras.

He is additionally working with Associate Professor Yi Guo at the Stevens Institute of Technology in New Jersey who is developing the physical robots. Their research team has also grown to include doctorate students from both URI and the Stevens Institute.

"Robots are just robots," He says. "It's a mechanical, physical part. How to make it alive, how to make it intelligent – that is what we are working on."

Though the project is just beginning to gain momentum, He and his team have already collected interesting preliminary results that indicate this human-robot interaction could dramatically impact the safety and efficiency of human evacuations.

He hopes to apply the results of his research to URI and the surrounding community.

"Hopefully by the end of the project we can demonstrate the entire concept in a controlled environment such as a student dorm," He says.

When He presented his preliminary results around the globe, he received positive reactions from different entities, such as fire departments, and emergency management agencies, among others.

"When they saw my presentation and they saw these results they were

“We really hope our research, in certain ways, will change human lives and improve our quality of life.”

- Haibo He



**Haibo He**

Robert Haas Endowed Chair  
Professor, Electrical Engineering

super excited,” He says. “They said, ‘Wow this could really be something if it really works.’”

Though the computational intelligence work He is doing has a targeted application, if he can create an intelligent algorithm to control the robots, he foresees a multitude of uses. He believes robots could fill jobs from industrial manufacturing to food service.

In addition to his work with the human-robot interaction project, He has received accolades for his work with increasing the reliability and security of the United States electric grid and was named a rising star innovator of the year by Providence Business News in 2011, and also a prestigious NSF CAREER award that same year.

Working through a grant from the NSF, He is analyzing the electric grid for weak spots to prevent mass power outages caused by weather or cyber attacks.

By analyzing data purchased from electric companies, He and his graduate students are working to predict the impact of electrical power outages. However, He says as the electrical

power grid is one of the largest interconnected complex systems on Earth, making these predictions proves difficult.

“We want to understand if this particular power line fails, what kind of area will lose power and how the outage will propagate,” He says. “Then we can make intelligent decisions in advance to prevent a large-scale cascading failure.”

In addition to these projects, He is leading a team of about 20 people, including Ph.D. students, post-docs, and visiting scholars, working on a wide range of projects from deep learning to big data analytics. Recently, He has also been selected by the IEEE through a global-search process to be the editor-in-chief of the IEEE Transactions on Neural Networks and Learning Systems, a top journal in the field.

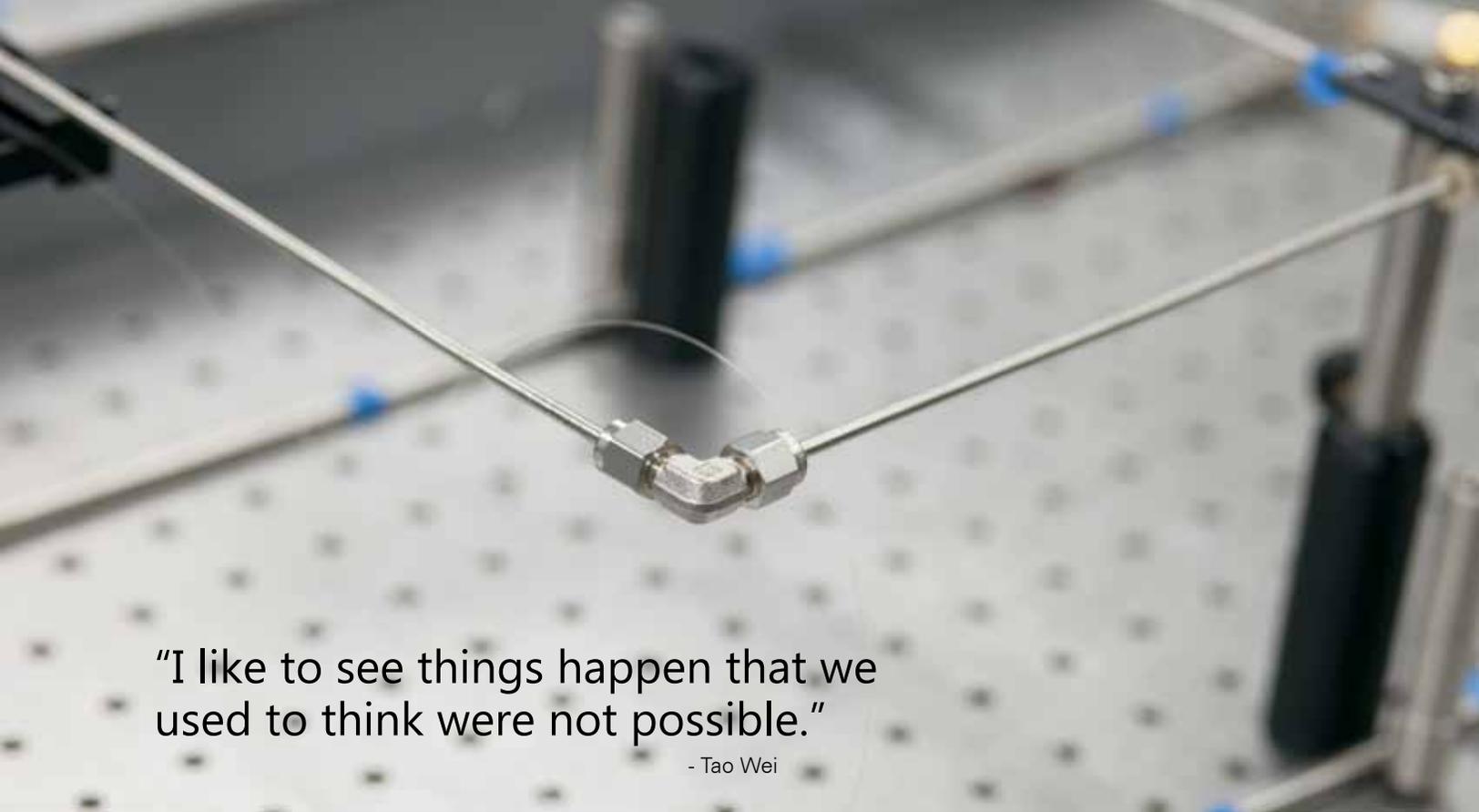
“We are having lots of fun on all these projects,” He says. “We really hope our research, in certain ways, will change human lives and improve our quality of life.”



# Revolutionary Technology: Smart Cities

written by Allison Farrelly '16

Wei's gas pipeline model strung with thousands of sensors and fiber-optic wire.



“I like to see things happen that we used to think were not possible.”

- Tao Wei

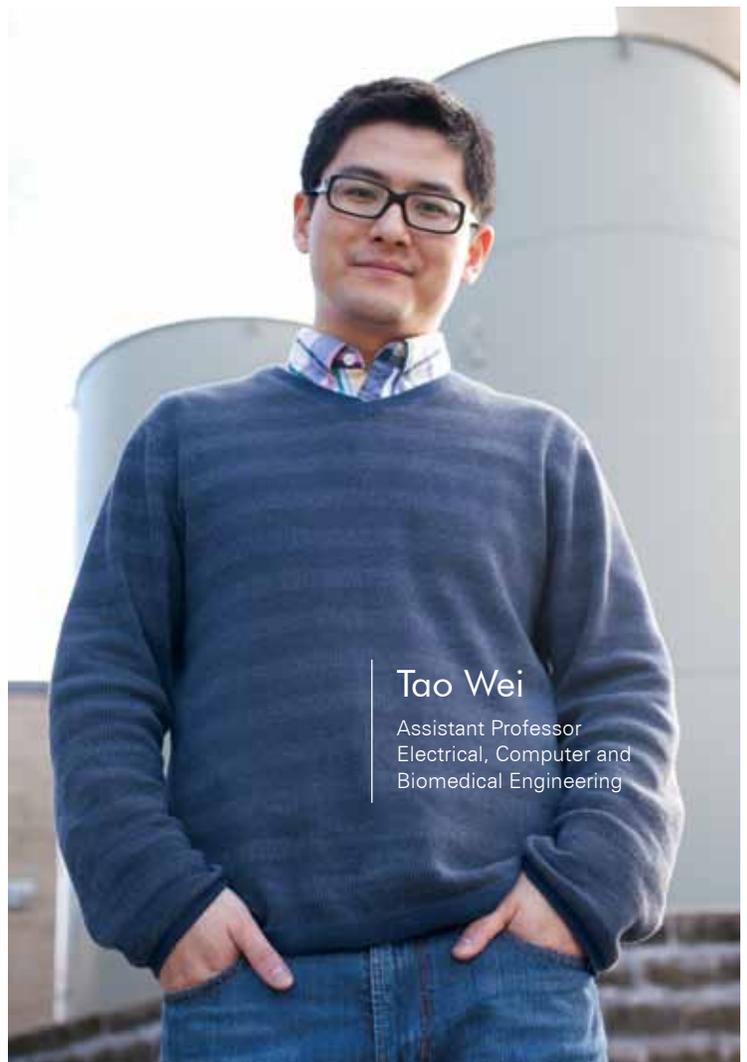
Tao Wei, assistant professor of electrical, computer and biomedical engineering at the University of Rhode Island (URI), is working to advance what he calls “one of the most revolutionary technologies of the future.”

Wei sees a day when structures from buildings to entire cities could rely on a network of sensors to detect problems, replacing trained personnel to create “smart cities.”

For the past year, Wei has been working to advance sensor technology through an \$850,000 grant awarded by the National Science Foundation. His goal is to develop a network of sensors and sensing systems that can translate information such as temperature, strain and stress gathered from the architecture of cities.

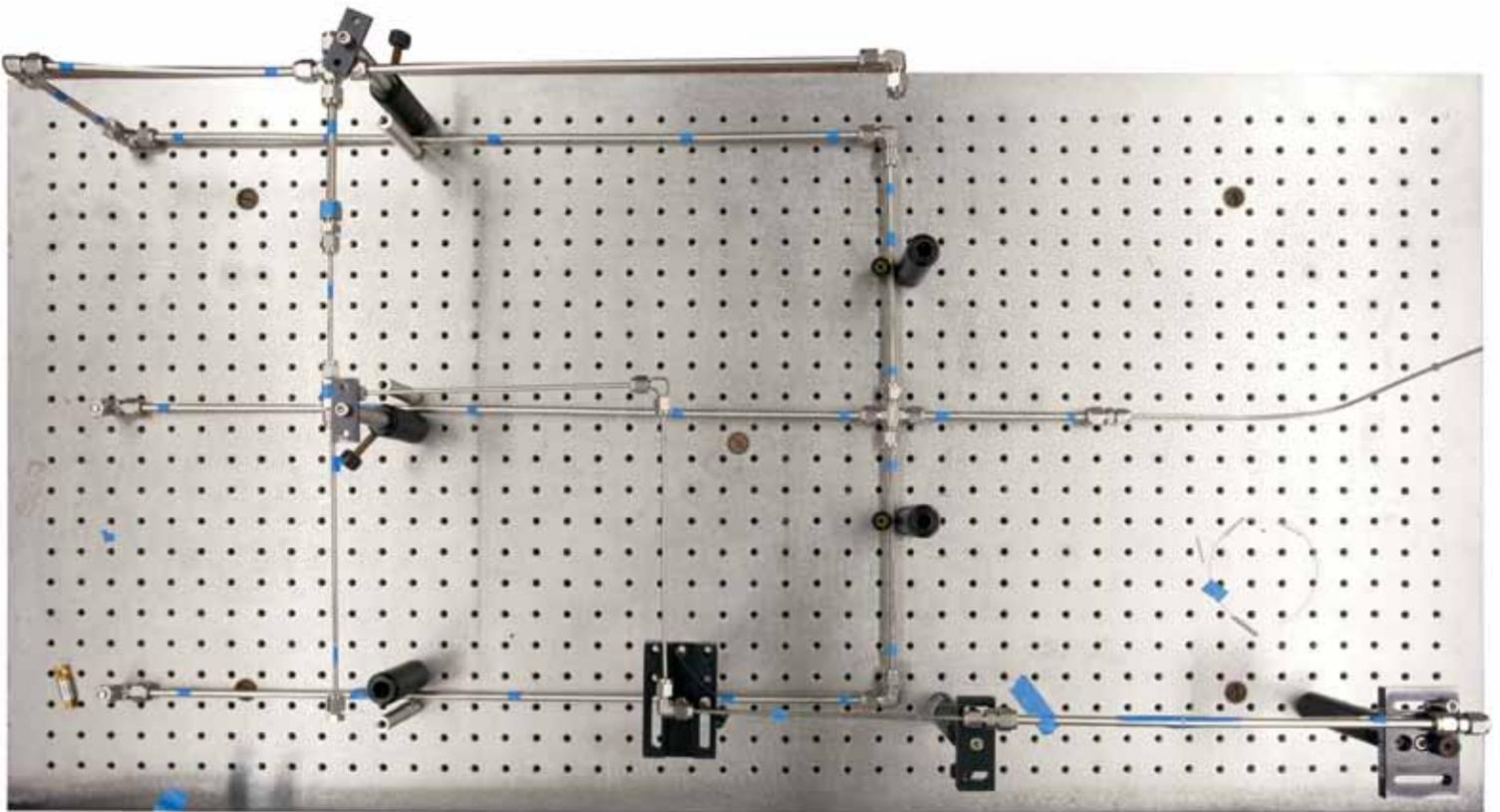
“In the future I believe that the real-time monitoring of all infrastructures, everything from your vehicle to gas pipeline infrastructures, will give you an edge to better manage the whole city,” Wei says.

The ideal smart city would be one layered with sensors that could link everything from highways to homes to sewage systems with a series of sensing systems — computer systems that could not only store the information being gathered in the cloud, but also independently process and react to detected problems.



Tao Wei

Assistant Professor  
Electrical, Computer and  
Biomedical Engineering



Wei's gas pipeline model processes data collected by the distributed sensors.

Wei and URI engineering Professors Qing Yang and Haibo He, with whom he is collaborating, call this reaction a “reflex tree.” The system gains its name from the instinctive reaction human bodies have to stimulation without interaction from the brain.

“When you touch something really hot, you immediately pull your hands back,” Wei says. “Before your brain even gets the signal, ‘this is too hot,’ you already did something.”

The reflex tree would rely on a computer system that could react to a problem in the city detected by sensors before the information even saw human eyes. For example, Wei explains, a broken gas pipeline in a neighborhood could be shut down before data from the sensors even reach maintenance crews.

“You don’t have to send all the information to human beings to be able to do some analysis, because by then it’s probably too late,” Wei says.

To demonstrate the efficiency of sensor technology, Wei developed a gas pipeline example at URI. The lab-sized municipal pipeline structure he built is strung with thousands of sensors, draped in fiber-optic wire, and connected to a sensing system, which processes data collected by the distributed sensors.

Because of the sensors attached to the metal piping, viewers can see in almost real-time the effects

of pressure, temperature, and stress introduced to the system. Wei says that within the year he intends to figure out how to cut down the time delay currently seen between warm fingers touching the metal piping and a thermodynamic reaction on the computer screen’s map of the pipeline. To test the system’s effectiveness, Wei has also pumped compressed air through the system and drilled holes in the piping to create leaks — all of which the sensors have been able to detect.

Though the sensors and the fiber optic wire Wei has modified to connect them are small, the data processing unit is both large and costly. Currently, the interrogation system is laid out across a 4-by-8 foot table in Wei’s lab, and cost \$50,000 to create. Making these sensing systems both a reasonable size and cost is what Wei has to consider before commercializing his research.

“If I can get it from \$50,000 to \$500, that will broaden the possibilities of commercialization,” he says.

For Wei, this research is not about competing with others in his field.

“Making the technology better is always my goal,” he says.

# The lab-sized municipal pipeline structure he built is strung with thousands of sensors, draped in fiber-optic wire, and connected to a sensing system, which processes data collected by the distributed sensors.

URI is slated to break ground on a new engineering complex on the Kingston campus in 2016, and Wei hopes the new complex will be the next test site to apply his work with sensor technology and the reflex tree.

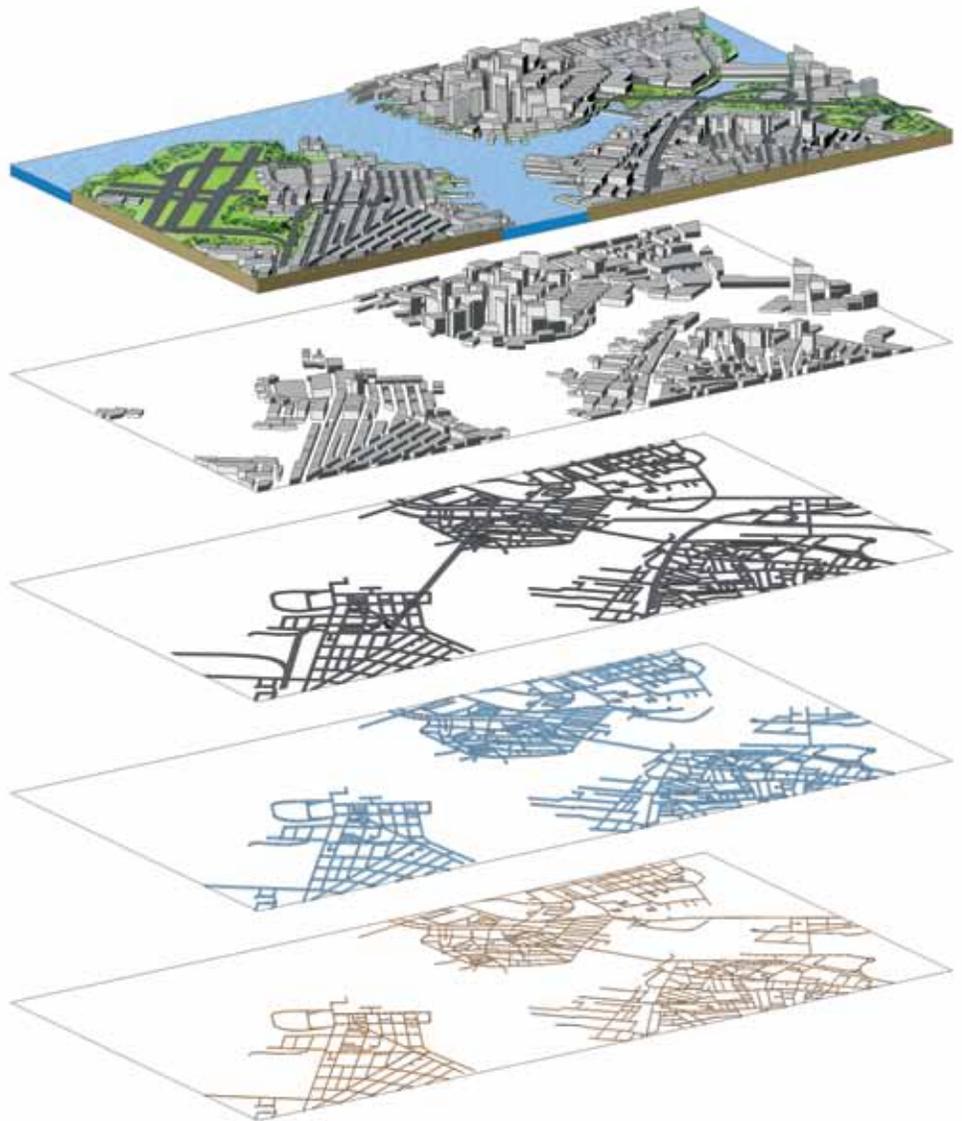
"I'm very excited about this technology and all the achievement we have already done to this point, and about the future of the field," Wei says.

Though one of his feet is planted firmly in the lab, Wei happily keeps his other foot in the classroom, teaching electrical engineering at URI. He acknowledges, however, that teaching in a field like electrical engineering, where technology is changing by the minute, is not an easy task.

Wei says he and his colleagues strive to give their students the solid foundation of an education on which they can build to adapt with the changing technology they will face in their lives.

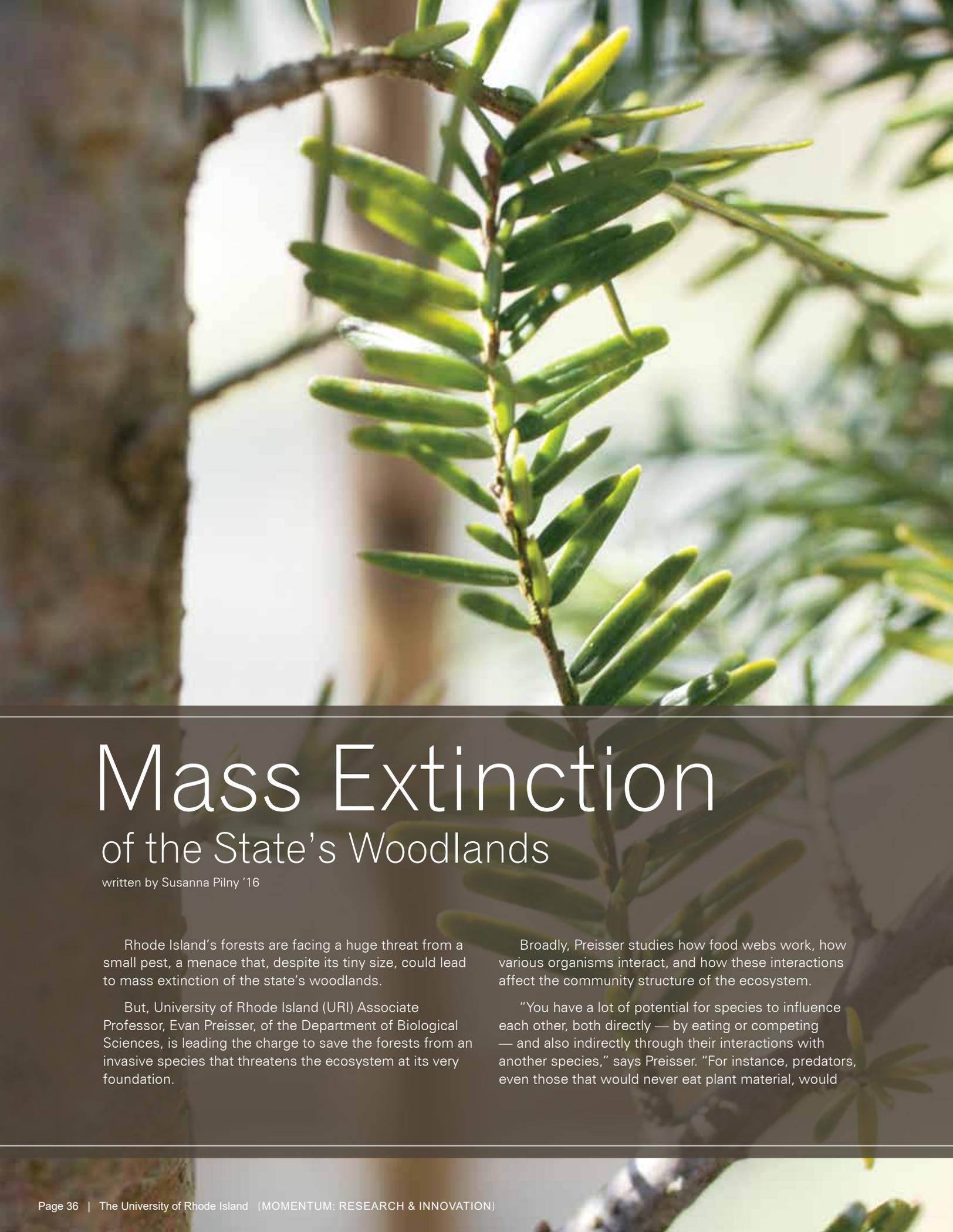
"Physics and math seldom change, but you have to realize everything else is changing," Wei says. "What we can do is teach students how to think so they may be able to keep up with the trends."

For Wei this change is exciting, "I just like what I'm doing," he says. "I like to see things happen that we used to think were not possible."



Layers of city schematics for sensor technology.





# Mass Extinction of the State's Woodlands

written by Susanna Pilny '16

Rhode Island's forests are facing a huge threat from a small pest, a menace that, despite its tiny size, could lead to mass extinction of the state's woodlands.

But, University of Rhode Island (URI) Associate Professor, Evan Preisser, of the Department of Biological Sciences, is leading the charge to save the forests from an invasive species that threatens the ecosystem at its very foundation.

Broadly, Preisser studies how food webs work, how various organisms interact, and how these interactions affect the community structure of the ecosystem.

"You have a lot of potential for species to influence each other, both directly — by eating or competing — and also indirectly through their interactions with another species," says Preisser. "For instance, predators, even those that would never eat plant material, would



Evan Preisser  
Associate Professor  
Biological Sciences

Preisser pictured with his students

## Leading the charge to save the forests from an invasive species that threatens the ecosystem at its very foundation.

often provide a benefit to plant material by consuming herbivores that would otherwise eat the plants.”

In terms of indirect influences, a major factor is what is known as a non-consumptive effect between predator and prey.

“Prey are much more motivated to avoid being eaten than predators are to eat them,” Preisser explains. “It’s what’s called the life-dinner principle. If a predator and prey interact and the predator loses, it loses its dinner. If the prey loses, it loses its life.”

Preisser’s work with food webs led him to become concerned about an invasive species known as the hemlock woolly adelgid and its devastating effects on eastern hemlock trees. The loss of these trees, which can be found primarily in the Northeast, could damage the region’s ecosystem at its bedrock.

“Eastern hemlock is a foundational species — an organism that creates or maintains a unique habitat,” says Preisser. “Eastern hemlock is the only native shade-tolerant conifer on the East Coast. Because of that, it plays

an incredibly important role in creating habitats for a series of organisms that like cooler or moister microclimates and for shading headwater streams — in areas where trout breed.”

If you lose eastern hemlock, you would have other trees replace it, but those would not be trees that would be capable of keeping the water cool enough for trout and other cool water invertebrates. Hence, adelgids are an enormous problem.

Arriving from Japan circa 1950, adelgids settled on one northeastern species alone, the eastern hemlock trees. The tiny pests, which suck out the tree’s fluids, have very few natural predators, allowing their populations to boom.

And if the adelgids attacking trees is not enough to kill them, these insects weaken the hemlocks to a point where another invasive species from Asia, the elongate hemlock scale, can come in and finish the job.

Naturally, this has led to a scramble to mitigate the damage wrought by these insects. Traditionally, according to Preisser, the U.S. Forest Service has taken a lead



role in combating invasive species. Among the series of generalized approaches pursued, one involves developing an effective chemical control for that particular organism. In the case of adelgid, there are some very good chemical controls available. In particular, neonicotinoid pesticides have proved effective against adelgids, but they come with some problems.

“They can’t be used near water, and although they aren’t particularly toxic to mammals or birds, they’re quite broad-spectrum for invertebrates,” Preisser explains. “They have a big effect on pollinators.”

This means that widespread use of neonicotinoids is not possible — so the U.S. Forest Service turned to other methods, including inter-specific hybridization, which would cross eastern and Carolina hemlock with Asian hemlock, a species that coexists with adelgids. That had some moderate success with Carolina hemlock, but

eastern hemlock was unable to inter-breed.

Lastly, the U.S. Forest Service attempted biological controls — wherein a different species is introduced to prey on adelgids. Up until now, there has been little success using this method, but Preisser says it may hold potential for the future.

However, there exists a different method that Preisser has worked on extensively that may offer another means of combating this pest. After surveying hemlock forests, he began to wonder if, in areas ravaged by adelgids, he could find a few trees that survived the onslaught. Such trees would likely possess some sort of rare innate resistance to the insects. Preisser developed a citizens’ science program that searched for these lone survivors.

The program turned up a number of candidate trees,





“Eastern hemlock is the only native shade-tolerant conifer on the East Coast. Because of that, it plays an incredibly important role in creating habitats for a series of organisms that like cooler or moister microclimates and for shading headwater streams — in areas where trout breed.”

- Evan Preisser

from which Preisser and colleagues took cuttings, cultivated them into trees, and spent four years testing them for resistance to adelgids, yielding positive results. Fewer adelgids settled on these trees, and more insects died, likely thanks to the trees exuding more terpenes (the chemicals that give pine trees their “piney” scent).

With such success, Preisser and his colleagues have started to plant these cuttings to test how they will fare in the wild.

“We recently put out about a hundred of our rooted cuttings of resistant trees along with susceptible trees at seven or eight different field sites in six different states on the eastern seaboard,” says Preisser. “And if those field trials work, then we will go to mass replantings.”

These early results mean that Preisser may save the eastern hemlock along with the many species it supports.

Funding for Preisser’s work has come from several sources: two National Science Foundation grants, one for \$500,000 for three years to URI and another for \$586,000 for three years to URI and Tufts University; a three-year \$430,000 U.S. Department of Agriculture grant to URI

and collaborators at Harvard University, University of Massachusetts Amherst, and the Forest Service; a three-year \$110,000 grant from the Rhode Island Agricultural Experiment Station, and a one-year \$10,000 grant from the U.S. Forest Service.

Preisser and his colleagues have started to plant these cuttings to test how they will fare in the wild.



The background of the page is a photograph of a rocky coastline. In the foreground, there are large, dark, jagged rocks. The water is a deep blue, and the sky is a clear, light blue. The horizon is visible in the distance.

# The Impact of Climate Change on Our Oceans

written by Susanna Pilny '16

The impact of climate change on our oceans — rising sea levels, fluctuating temperatures, intensified storm patterns, and altered biogeochemical cycles — promises an uncertain future in and out of the water.

At the University of Rhode Island (URI) Graduate School of Oceanography, Associate Professor Tatiana Rynearson hopes to bring a better understanding of the unknown through her research on diatoms, a species of photosynthetic plankton that drift with the ocean's tides and currents. Covered in beautiful, delicate glass houses, these microscopic organisms are much more than a pretty shell.

"Diatoms are comprised of thousands of species and generate about 20 percent of all photosynthesis on Earth — more than all of the world's tropical rainforests," says Rynearson. "They generate the oxygen in every fifth breath of air that we breathe, so they have a large impact on the composition of our atmosphere. In addition, they supply about 40 percent of all the energy and food to form the base of the marine food web."

This critical role in the food chain means that any changes to the productivity of diatoms results in astounding repercussions. And yet, the impact of climate change on this keystone species is not yet fully known.

"The balance of prey like diatoms with their predators can significantly influence how much food is available for commercially important marine life, like fish and shellfish," says Rynearson. "We are really at the beginning of trying to understand how climate change affects diatom populations genetically."



Tatiana Rynearson

Associate Professor

Oceanography



Field sample of diatoms from Narragansett Bay shows the diversity of species found in just one drop of water.

To better gauge what will happen to the ocean and its inhabitants as water temperatures warm and alters nutrient levels, Rynearson collaborates with colleagues across the Ocean State as part of the statewide Rhode Island NSF Experimental Program to Stimulate Competitive Research (EPSCoR) grant. In many cases, her work cuts across disciplines and campuses, earning seed funding from the state for catalytic projects that hold promise of follow-on funding.

From 2012-2015, Rynearson participated on five different teams that earned RI Science and Technology Advisory Council (STAC) grants and served as lead investigator on two of the four. The STAC grants, which provide a year's worth of funding, are the state's match to the EPSCoR grant. Rynearson's most recent STAC involvement came in two 2015 grants:

- Diatom Community Composition as an Indicator of Coastal Ecosystem Change studied the regional biogeochemical responses to climate change and sought to develop novel tools for monitoring such changes. This work was done in collaboration with researchers at URI and Brown University.
- Canaries in Narragansett Bay: Untangling the Ecological Response of a Key Diatom Genus to Environmental Change researched how environmental changes affect the base of the food web in Narragansett Bay. This work was done in collaboration with the U.S. EPA.

"One of our recent studies showed that diatoms subjected to a few months of projected ocean acidification underwent rapid evolutionary change," Rynearson says. "In essence, there was a change in their genetic composition and this led to a change in their growth rates in response to ocean acidification."

In that project, diatom growth rates increased by 30 percent in response to ocean acidity — a change that can upset the delicate balance of marine ecosystems. In other instances, diatom populations have seen decreases as a result of climate change stressors. Often, Rynearson says, it is difficult to tell which way the population will go.

"That's the challenge of climate change research — it's ultimately a multi-stressor event and that is very hard to simulate in the lab under controlled conditions," she explains.

Rynearson and her colleagues aim to make such changes easier to anticipate, trying to understand the predictability of the evolutionary response and whether that can be incorporated into models of environmental change.

Her research also takes her beyond Narragansett Bay to look at the effects of climate change on a global scale through work to design a national network to monitor marine diversity. In April 2013, Rynearson published an article in the journal *BioScience*, where she and colleagues called for a national network to monitor the diversity of marine life as a means to assess ocean health.

In response to her call, the National Oceanographic Partnership Program made \$17 million available for regional test networks in the Florida Keys, the California coast and the Arctic Ocean. After this test period of five years, the goal is to create a national network. Such a network, Rynearson explains, would track marine diversity at all levels of the food chain — be it microbes or whales — and link changes in diversity to physical changes in ocean ecosystems, such as a rise in water acidity.

Her future research will include studying the effects of climate change on plankton in the Southern Ocean and creating new tools to aid in understanding complex organisms and food webs. She and her colleagues, including URI Associate Professor Bethany Jenkins, have developed and are applying a metabolic fingerprinting technique, which requires cutting edge genomics and bioinformatics methods, to look inside the plankton and ask questions about their health, especially in response to stress.

Rynearson says, "This will give us new insights into what influences the engine that ultimately keeps marine food webs running."

**"Diatoms are comprised of thousands of species and generate about 20 percent of all photosynthesis on Earth — more than all of the world's tropical rainforests."**

- Tatiana Rynearson



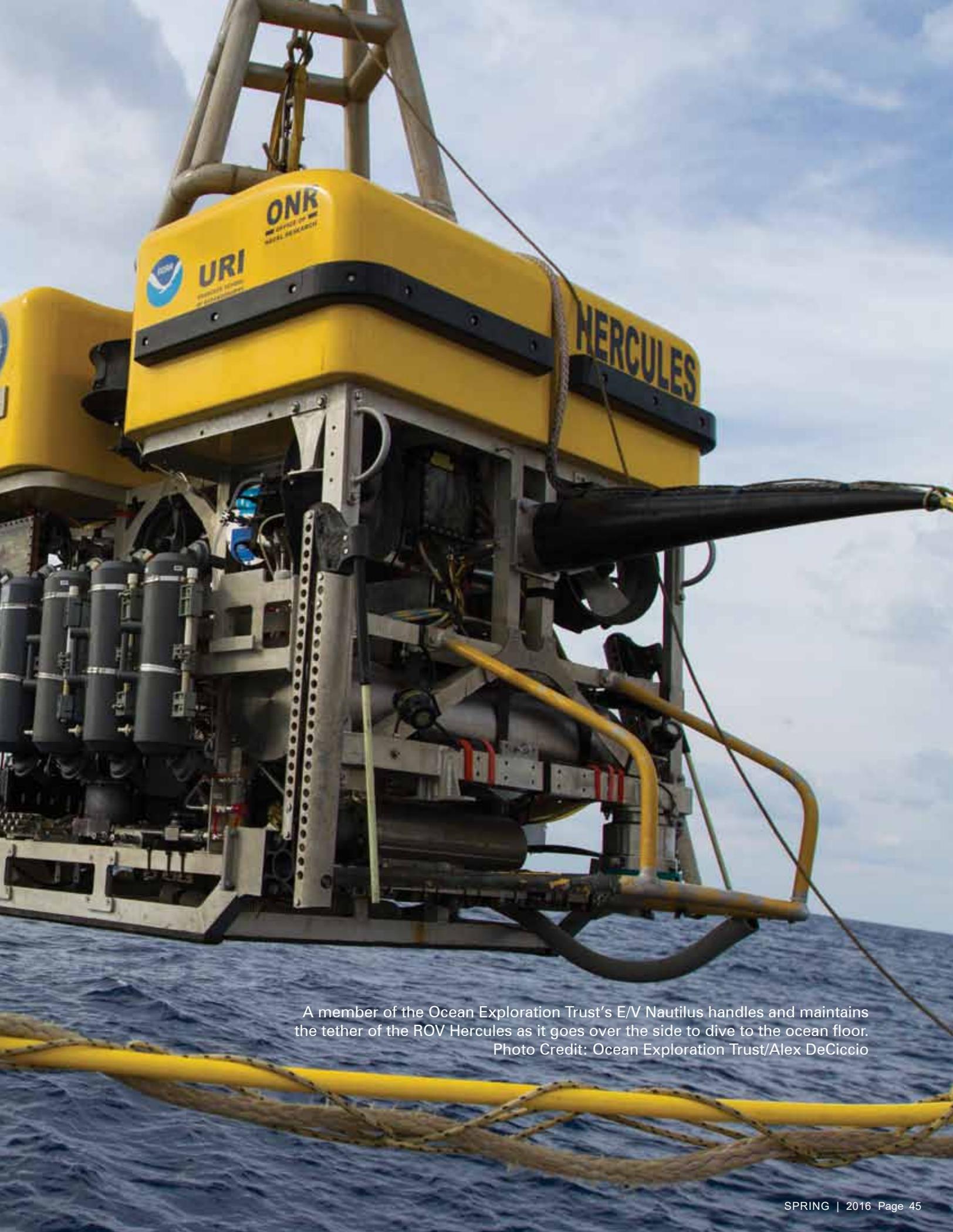
Such a network, Rynearson explains, would track marine diversity at all levels of the food chain — be it microbes or whales — and link changes in diversity to physical changes in ocean ecosystems, such as a rise in water acidity.



# The Huge Impact of Explosive Volcanic Eruptions

written by Emma Clarke '15





A member of the Ocean Exploration Trust's E/V Nautilus handles and maintains the tether of the ROV Hercules as it goes over the side to dive to the ocean floor. Photo Credit: Ocean Exploration Trust/Alex DeCiccio



## “Explosive volcanic eruptions impact the global climate and human populations.”

- Steven Carey

Submarine explosive eruption from the West Mata volcano in the western Pacific Ocean.

When Mount Tambora in Indonesia erupted in 1815, the impact rippled across the world. Spewing gas and ash into the air, the volcanic explosion blocked sunlight and ushered in a spell of global cooling. In North America, 1816 became the “year without a summer;” newspapers reported frost into July and failed crops.

“Explosive volcanic eruptions impact the global climate and human populations,” says Steven Carey, professor of oceanography at the University of Rhode Island’s (URI’s) Graduate School of Oceanography. “They can trigger the spread of disease and cause famine.”

Although alarming, the destruction these eruptions cause is not unique.

“When I was a graduate student in

1980, Mount St. Helens erupted and I went out there about a week after the eruption. I was blown away by the scale and magnitude of this event,” he says. “It was an ‘aha’ moment for me. I made the decision that I wanted to study this type of volcano.”

For the first 20 years of his career Carey studied many aspects of volcanoes and their eruptions, including the factors that determine the style and magnitude of the blasts, a practice he refers to as “forensic” volcanology.

“A detective goes to a crime scene and tries to unravel what happened,” Carey explains. “That’s exactly what we do. We look for clues about what the volcano did in the past, to try to figure out what it’ll do in the future.”

Forecasting is critical. If experts

make the right predictions they can save lives.

Many people know the infamous story of Mount Vesuvius, the volcano that erupted and destroyed the Italian city of Pompeii in 79 AD, which killed more than 15,000 people.

Carey was part of a team that traveled to Vesuvius in the late 1980s to study the eruption to understand why this event killed thousands of people. “How did the city become entombed and how did those people die?” were among the principal questions researchers sought to answer. They were able to reconstruct the timing of when hot blasts of gas and ash struck Pompeii and killed its inhabitants.

More recently, Carey is taking his expertise to new depths – underwater

volcanoes. One may not think that a landmass at the bottom of the ocean could mean much for people on land, but underwater volcanoes affect our lives, ecosystems and economies. Explosive blasts from submarine volcanoes can cause tsunamis, such as the 1883 eruption of Krakatau in Indonesia that killed about 36,000 people. Tsunamis can be devastating to coastal communities, especially today since an increasing proportion of the world's population is developing and living in these areas.

Carey explains that the most exciting thing about underwater volcanoes is that so little is known about them.

"Our understanding of land volcanoes is sophisticated," he says. "The ocean is the new frontier for volcanology."

To perform his research on these volcanoes, Carey has teamed up with Robert Ballard, a URI professor of oceanography, who is perhaps most famous for discovering the *RMS Titanic* shipwreck in 1985. Carey and Ballard, along with other oceanographers, geologists and scientists, use robots to explore the ocean floor and collect rock samples, which they bring back to URI to study.

"We've been looking at why and how these volcanoes erupt," Carey explains. "But now I'm also very interested in hydrothermal venting."

Hydrothermal vents are cracks in the ocean floor, where water heated from inside the Earth escapes. On land such vents include hot springs and geysers. Underwater, they can host biologically exotic communities of giant tube worms and clams of great interest to researchers for their ability to survive in extreme conditions. These vent systems usually occur where tectonic plates are separating, near volcanically active locations, but are also present where plates are colliding such as around the "Ring of Fire" in the Pacific Ocean. In addition to the strange biology, the vents are also sites where new mineral deposits rich in gold, silver, and copper are being formed.

According to Carey, these hot



Steven Carey  
Professor, Oceanography



Submarine lava flow from West Mata volcano in the western Pacific Ocean.

vent mineral deposits create a new frontier of economic opportunity and are likely to become the basis for an entirely new industry. Although, he says, there are concerns about the methods used for mining these minerals; some mining methods could wipe out entire vent communities that need to be studied.

These vents also can provide insight about how climate change will affect our planet in the future. Water around hydrothermal vents typically is highly acidic, allowing researchers to study how organisms react. These

conditions provide a window into what may happen with ocean acidification brought on by buildup of green houses gases in the atmosphere.

"When you go to these submarine volcanoes, you get a sense of how species are impacted by acidic water," Carey says. "Organisms can't survive because it's toxic."

Carey's research shows how truly significant this vast, unexplored frontier — the ocean — really is.

Hydrothermal vents are cracks in the ocean floor, where water heated from inside the Earth escapes.





# A GUIDING STAR

## for Rhode Island Manufacturing: Polaris MEP

written by Kara Watts '17

The numbers do not lie – manufacturing is getting big in Rhode Island.

The state's economy can credit \$1.68 billion in manufactured goods exports in 2014 to its in-state manufacturers. And, even more noteworthy, of all the state's exporters 88.7 percent are small businesses, according to the National Association of Manufacturers.

While these numbers cannot match the manufacturing peak in past decades, they still indicate promise for the state's economic future, a future that Polaris MEP, Manufacturing Extension Program, a statewide nonprofit organization designed to position state manufacturers for success, is counting on.

A unit of the University of Rhode Island (URI) Research Foundation located at the Kingston Campus and CommerceRI in Providence, Polaris provides competitive manufacturing business improvement programs to aid in growing Rhode Island's manufacturing industry. Programs range from public workshops to in-house training on subjects that include technology acceleration, change management, ISO/Six Sigma/Quality and workforce development.

This momentum is keenly felt by Christian Cowan, the director of Polaris since 2014. "We're shaping up to have a productive 2016. The economy is picking up, and lots of companies are asking for our help in executing programs that really make a difference for helping those companies grow," he says.

When the URI Research Foundation absorbed what was formerly the Rhode Island Manufacturing Extension Service (RIMES) in 2013, the program emerged as Polaris MEP as part of the rebranding effort. The name was chosen to echo the project's message, to serve as a guiding star for businesses.

Since then, the recently-launched Rocket Program has truly put Polaris on the state's business map, offering manufacturing consortia an all-access bus tour, which takes business owners and entrepreneurs to successful companies across the state.

"Our center has received a lot of interest across the state from companies," Cowan says. "I see our center growing in our capabilities but also utilizing partners from the Governor's Workforce Board-Rhode Island Industry Partnership Network, as well as leveraging partners with additional capabilities around the state."

If a company approaches Polaris for assistance, Cowan and five project managers – who, Cowan enthuses, "live and breathe manufacturing, and executing our projects" – head to the manufacturing floor to assess and strategize for productivity.

"My job really takes me on the road," says Cowan. "I visit manufacturers to figure out what programs can help



Christian Cowan  
Director, Polaris MEP

them, and to get a good view on what's happening with manufacturing in the state as a whole."

Once an issue has been identified, Polaris offers expert solutions. For instance, a few companies recently reached out to Polaris looking for ways to troubleshoot their need for more space.

"We supported their work to consolidate facilities and move toward one larger facility, one of which was looking to relocate to Quonset," Cowan says. "It's a good example of our capabilities – we supported a new manufacturing layout, optimized the material and process flow in the new facility and streamlined hiring processes to satisfy their needs, and ultimately helped successfully move these companies to larger facilities to increase production."

The relationship with URI, which houses both Polaris and the Rhode Island Small Business Development Center (RISBDC), generates productive results. Research and development and URI's intellectual property are tied in with manufacturing companies to provide them with new products, processes or a workforce.

"We have good current examples of companies who have applied for Rhode Island's Innovation Vouchers," Cowan says, referring to state grants intended to spark innovations in technology or other fields. "The state provides funding to allow research and development activities that happen at manufacturing companies who otherwise probably couldn't afford them. We're leveraging the state program's funding resources to connect manufacturing with URI's intellectual development resources."

This means that not only manufacturers, but also URI faculty and students, see gains from Polaris. While URI maintains multiple mechanisms to connect with state industry

and to national businesses, Polaris, the RISBDC, along with the Business Engagement Center in the URI Foundation, are excellent conduits for faculty and students to connect to the business environment. In doing so, Polaris fulfills one of the URI Research Foundation's key missions, to connect URI resources to the business climate of the state.

"URI is a great host for us," Cowan says. "The connection with URI and the business community is huge right now. There's so much potential, it's a great time for us moving forward."

Though he credits his team and URI, Cowan provides a guiding force for Polaris. He possesses more than 20 years of experience managing small organizations of varied industries and an extensive background in engineering and business, and exudes a passion for industry.

"The best part of my job is being on the manufacturing floor," Cowan says. "It's always a lot of fun to be on the floor, and know that we're adding value into a product or service that's going to help another person or company. The value creation process is fun for me."

Previously, Cowan was vice president of marketing at Asure Software, and a product line director for American Power Conversion.

"My background is all in manufacturing. My degrees are in engineering and business," Cowan explains. "I've worked in several manufacturing companies in Rhode Island where I have had a variety of roles, from engineering, to marketing, to some management roles. I came to Polaris at a good time, when the center is growing with support from URI and has a lot of potential to help Rhode Island businesses, so it's exciting."



THE  
UNIVERSITY  
OF RHODE ISLAND

**SBDC**

**SMALL BUSINESS  
DEVELOPMENT CENTER**

P  
U  
S  
H

# Small Business **is Big**

for Rhode Island's Small Business Development Center

written by Kara Watts '17

It is no secret that craft brewing is a booming industry, and Whaler's Brewing Company of Wakefield, RI, is poised to be the next big player on that stage here in the smallest state. What began as a hobby for founders Andy Tran, Wesley Staschke and Josh Dunlap has grown into a unique and highly regarded microbrewery start-up business. Walk into the converted space in the old Palisades Mill in Peace Dale on any weekend and you will find a lively crowd enjoying samplings of their flagship ales and newest creations on tap.

But the Whaler's team faced the same challenge as other burgeoning start-ups: how to finance growth to meet booming customer demand. That's when the owners came to the Rhode Island Small Business Development Center (RISBDC) at the University of Rhode Island (URI). Working with Southern Regional Director Josh Daly, Tran and Staschke were able to successfully understand and navigate the funding landscape, exploring various financing options before finding an investor and negotiating a deal. The RISBDC worked with the company through each step of the process, helping to develop and refine financial projections, translating financial jargon and investor-speak, and ultimately, giving the owners confidence that they have developed a strong foundation for growth. The investment the company secured enabled the owners to purchase new equipment that will enable them to increase their capacity by five times.

"The RISBDC was an incredible resource for knowledge and guidance," says Tran.

Whaler's Brewing Company's success story is not unique for the RISBDC, whose mission is to aid local small business owners and entrepreneurs with the advice, services, and resources they need to succeed in the state. Services include no-cost, one-on-one business

counseling for entrepreneurs looking to start or grow their businesses. The RISBDC also conducts training programs, workshops, and seminars that cover popular subjects such as financial planning and market research for existing and prospective business owners.

"Ideally, the entrepreneur will have the potential for growth in terms of employment, sales, and profitability," says RISBDC Executive State Director, Edward Huttenhower.

Huttenhower joined the center in September 2015, with an MBA from the University of Pittsburgh and more than 28 years of experience with

state Small Business Development Centers in Maine, West Virginia and Pennsylvania.

Huttenhower expresses confidence in the center's focus on small business.

"Small businesses are a critical part of every state's economy and Rhode Island is no different," he explains. "More than 95 percent of the businesses in the state are considered to be small businesses. National studies prove that when these businesses take advantage of the assistance available to them, such as the RISBDC, they'll have a higher success rate compared to those that don't."



Edward Huttenhower  
Executive State Director  
RISBDC



**Whaler's Brewing Company, Wakefield, RI co-founders: Josh Dunlap, Edward Huttnetower (RISBDC), Andy Tran, Wes Staschke, Joshua Daly (RISBDC).**

It is precisely this model of partnership and success that was envisioned when the University received a 2013 grant to house the center. As the U.S. Small Business Administration (SBA) looked for a new home for the RISBDC, URI recognized the value of bringing the center to campus, thereby combining the resources and talent at the University to help small businesses in the state.

Currently, URI receives \$650,000 in funding from the SBA, as well as \$250,000 in state funding and additional support from CommerceRI. These funds support the center's operations as well as outreach and assistance to the state's small business community.

By combining the resources of the RISBDC and the Polaris Manufacturing Extension Partnership (Polaris MEP), which is based at the University of Rhode Island Research Foundation, URI is poised to help invigorate Rhode Island's business profile. In addition to these resources, the RISBDC also has access to the URI Foundation's Business Engagement Center, as well as faculty and students from URI's College of Business Administration, College of Engineering, and others.

"Overseeing the Rhode Island Small Business Development Center is another opportunity for the University of Rhode Island to serve the people of the state," says Gerald Sonnenfeld,

URI vice president for research and economic development. "By reaching out to small businesses that will find useful advice on how to operate and fund their businesses, we hope we will be able to contribute to the economic development of Rhode Island. We look forward to this opportunity and to assisting our fellow Rhode Islanders."

Besides advice, the RISBDC can link business owners to a variety of resources related to employee training, problem solving, loans and lines of credit, developing new markets and products, and a host of others. In addition, the center's commitment to business ventures headed by women and minorities is one of its founding goals and remains steadfast.

"The demographic make-up of the state is ever evolving," says Huttenhower. "We aim to make sure that all groups have the assistance that is needed for their businesses to have the best possible chance for success."

Ruben Ogando, originally from the Dominican Republic and owner of Reymond's Brother Tailor Shop in Cranston, RI, turned to the RISBDC for help in preparing a business plan and loan application for a business expansion. Ogando worked with RISBDC business counselor Manuel Batlle, who is bilingual English/Spanish, to successfully secure a \$45,000 loan from the Providence Economic Development Partnership that enabled

him to add a laundromat to his services.

"We were extremely satisfied with the help we received from the RISBDC, it was a smooth-sailing process," Ogando says. "Manuel is an excellent counselor and it was a pleasure working with him."





RISBDC's Edward Huttenhower and Manuel Batlle, with Reymond's Brother Tailor Shop, Cranston, RI, owners Alba Baez and Ruben Ogando.

The counseling services that the RISBDC provides help businesses and manufacturers of all types and sizes, from one-person businesses, to mom and pop operations, to businesses that employ 100 people. As long as the business meets the SBA's size standards (up to 500 employees in most cases), for a small business, they are eligible to take advantage of the RISBDC's services.

The center will have more great projects in the coming year. Cooperation has begun between the center and a value-added food incubator, Hope & Main, located in Warren, RI, which promises to be a fruitful and innovative endeavor.

The RISBDC will add new staff members in 2016, enabling the center to better reach underserved areas of the state. In the long-term, accreditation of the RISBDC network from its national association is under way, as is obtaining additional external funding to continue the center's commitment to serve Rhode Island.



The RISBDC worked with the company through each step of the process, helping to develop and refine financial projections, translating financial jargon and investor-speak, and ultimately, giving the owners confidence that they have developed a strong foundation for growth.

"While the RISBDC focuses on small businesses, its impact remains large," Huttenhower says. "The work that the RISBDC does enables the state to have a more vibrant small business sector, which in turn, improves the whole state's economy."





Yuwen Chen

Associate Professor, Marketing  
and Supply Chain Management

# Calculating Business Success

written by Emma Clarke '15

Many science researchers require large amounts of funding for equipment, assistants and travel to investigate their area of expertise. However, this is not the case with Yuwen Chen, an associate professor of marketing and supply chain management in the University of Rhode Island's (URI) College of Business Administration, whose research requires little funding.

But little money does not mean small impact. Chen helps businesses of all sizes answer some of the toughest questions they may face.

"My research uses economic modeling to capture the new technological or economic changes facing businesses, and provides some answers and guidelines to overcome those challenges," he explains.

"When a crisis arises, such as when the Dot Com Bubble burst in the early 2000s, I used math to answer the business leader's question, 'What should I do now?'"

His equations translate economic changes into mathematical language, allowing him to plug business questions into the equations and get answers.

"I use mathematical assumptions to create models," says Chen. "As long as the assumptions are valid, I can derive certain results."

Chen published two papers that discuss multifunction products, such as a printer that also has scanning and faxing capabilities. He found that selling one multifunction product as opposed to multiple separate, single-function products is more profitable for businesses. He proves this intuitive conclusion with math.

It may seem as though the process should be simple – write an equation, plug in variables, get answers. However, developing an effective model takes time and can require countless revisions to be valuable.

"It has to be intuitive, natural, acceptable, and at the

same time appealing,” Chen explains.

It has to be simple.

“You have to address the concerns of business people,” says Chen. “They’re going to ask, ‘Can you take your math and use it to tell me what to do?’ If the answer is ‘Yes,’ then people will care.”

Chen’s research intends to answer the newest challenges that businesses face. For example, mobile devices change people’s behavior of accessing information. Content providers must address this behavior change when designing mechanisms to deliver information: Too few notifications and users forget about an application (apps). Too many and users get annoyed.

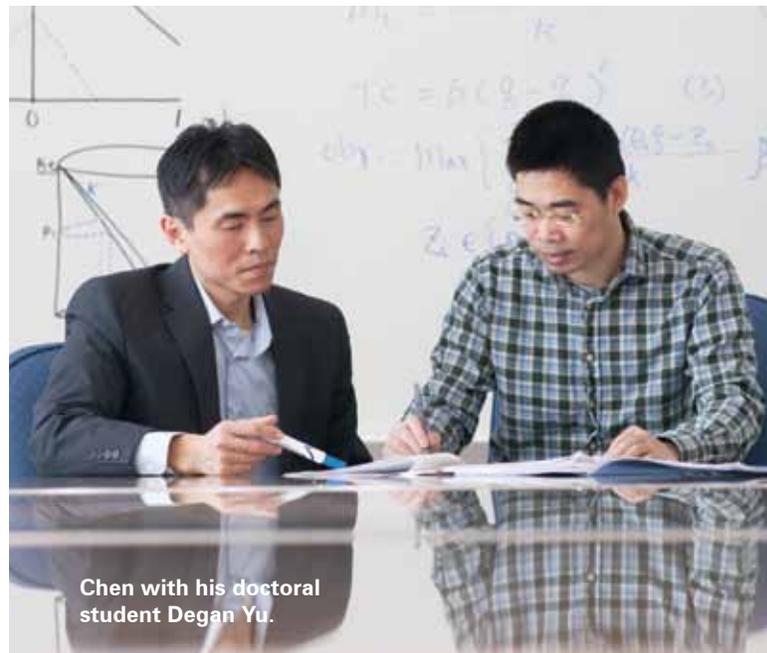
In his paper on the subject, Chen and his coauthors, Sean Marston, a College of Business assistant professor at Western Kentucky University and Hong Guo, an assistant professor of management at the University of Notre Dame found the optimal information delivery mechanism and push/pull frequency for content providers to maximize their profits. He currently is working on a mathematical model that will tell application developers whether to release their product on multiple platforms, such as an iOS and/or Android platforms, or stick to a single platform.

“The way information providers distribute information is complicated,” says Chen. “Companies need to figure out how much push and how much pull they should be doing. That’s where the math comes in.”

Chen, along with two of his URI College of Business Administration colleagues, Professor Ruby Dholakia and Assistant Professor John Ni, are investigating how to position products with multiple attributes in a market to maximize profits. For example, should a car manufacturer market its car as luxurious, sporty or safe? This interdisciplinary research team seeks to help business owners strike the right balance between hedonic attributes, such as “sporty” and utilitarian attributes, such as “safe.” These parts of a product trigger emotional responses like “euphoric” or “satisfied” and can affect consumers’ choices.

Chen majored in accounting at National Taiwan University in his home country before moving to the U.S. in the early 2000s to work at a Silicon Valley Internet start-up company. He thought he was destined for a career in engineering, but fell in love with business while studying information systems during his time in California. He then enrolled at the University of Florida to pursue business. It was there he decided to pursue a career in academia.

“I like to think about questions,” he says. “Doing business and knowing business are two different things. When you’re running a business, you have a daily routine that you get stuck in. Doing this type of research is fun because I can still be a free thinker.”



Chen with his doctoral student Degan Yu.

**“My research uses economic modeling to capture the new technological or economic changes facing businesses, and provides some answers and guidelines to overcome those challenges.”**

- Yuwen Chen

Chen says URI was at the top of his list when searching for a balance between teaching and research opportunities. URI’s an ideal fit for Chen, and many others.

“Teaching in URI’s Strategic Innovation MBA program has been a career highlight for me,” Chen says. “It’s an honor. I’m proud to teach in this program because our students are very successful.”

For Chen, teaching is a process during which he is constantly evolving and learning. In the classroom, Chen enjoys the interactions he gets to have with his students. He appreciates the challenge of figuring out how students think and coming up with ways to explain things to them. For example, teaching business basics to high school students during URI’s summer Business Academy is very different than teaching doctoral students the intricacies of supply chain management. But Chen revels in the challenges of both.

As for future plans, Chen says he will keep thinking about questions.

“Your research ideas come from what you wonder when you’re daydreaming,” he says. “I’m going to keep daydreaming.”



THE  
UNIVERSITY  
OF RHODE ISLAND

DIVISION OF RESEARCH  
AND ECONOMIC  
DEVELOPMENT

**Gerald Sonnenfeld, Ph.D.**

*Vice President for Research and  
Economic Development  
Professor of Cell and Molecular Biology*

75 Lower College Road  
Kingston, Rhode Island 02881 USA

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