

WP

JOURNAL



*driven to explore
kirk jalbert '98*



[CONTENTS]

28

FEATURES

16

LIFESAVING APPROVAL

LAUREN BAKER '82, '85, '88 STEERS MEDICAL MIRACLES THROUGH THE OBSTACLES OF GETTING TO MARKET.

BY JOAN KILLOUGH-MILLER | PHOTOGRAPHY MATT FURMAN

22

A DYNAMIC MIND

PROFESSOR OF MATHEMATICAL SCIENCES KONSTANTIN LURIE TURNS TO THE NATURAL WORLD FOR NEW EXAMPLES OF DYNAMIC MATERIALS.

BY MICHAEL DORSEY | PHOTOGRAPHY PATRICK O'CONNOR

28

[COVERstory]

DRIVEN TO EXPLORE

KIRK JALBERT '98 KNOWS THAT THE RIGHT QUESTIONS CAN HELP US UNDERSTAND THE WORLD—AND CHANGE IT FOR THE BETTER.

BY ERIN PETERSON | PHOTOGRAPHY MATT FURMAN

36

INBOUND STRATEGIES

JOSÉ LUIS ORTIZ '14 CULTIVATES A NEW BREED OF MARKETING IN LATIN AMERICA.

BY AMY CRAWFORD | PHOTOGRAPHY MATT FURMAN



16



36

DEPARTMENTS

02

LETTERS TO THE EDITOR

ENGAGE WITH THE WPI MAGAZINE COMMUNITY BY SENDING YOUR THOUGHTS ABOUT OUR PRINTED PAGES TO DMANNING@WPI.EDU.

03

A CONVERSATION WITH THE PRESIDENT

LAURIE LESHIN DISCUSSES THE GOOD NEWS OF OUR RECORD-BREAKING INCREASE IN FEMALE ENROLLMENT WITH KRISTIN TICHENOR.

05

GLOBAL IMPACT

OUR PROJECT CENTER FEATURE GOES DOMESTIC THIS ISSUE, WITH A LOOK AT THE PIONEER VALLEY.

06

WPI

COMMUNITY NEWS YOU NEED TO KNOW—FROM THE LATEST RESEARCH TO GRANTS AND AWARDS, PLUS SOME NEW FACES ON CAMPUS TO KEEP AN EYE ON.

15

TURNING POINT

MARK LEFEBVRE '80 RECOVERED FROM HIS IBM RETIREMENT BY HELPING OTHERS RECOVER FROM THEIR BATTLE WITH ADDICTION .

34

WPI INSIDER

DIDI DAI '18 WAS BORN IN THE BIGGEST CITY IN SOUTHWESTERN CHINA, BUT NOW PROUDLY CONSIDERS THIS SMALL PRIVATE UNIVERSITY HOME.

40

FACULTY SNAPSHOT

A VISUAL RUNDOWN OF THE CAREER OF ADRIENNE HALL-PHILLIPS, PROGRAM DIRECTOR, UNDERGRADUATE BUSINESS & MANAGEMENT ENGINEERING.

42

ACROSS EARLE BRIDGE

THE DEBUT OF THE HALL OF LUMINARIES, PLUS A LOOK AT SCHOLARSHIP DONOR JOHN CUNIC '68, '71.

48

CLASS NOTES

OH, SNAP! DID YOU SEE WHAT YOUR FELLOW ALUMNI HAVE BEEN UP TO? IT'S NOT TOO LATE TO ADD YOUR OWN ITEM OF NOTE TO CLASSNOTES@WPI.EDU.

56

COMPLETED CAREERS

IN MEMORY OF ALUMNI, FACULTY, AND OTHER MEMBERS OF THE WPI COMMUNITY.

EDITOR

Doreen Manning
dmanning@wpi.edu

ASSOCIATE EDITORS

Peggy Isaacson
Joan Killough-Miller

RESEARCH EDITOR

Michael Dorsey

CONTRIBUTING EDITOR

Judith Jaeger

ART DIRECTOR

Caryl Guarino Buhler

CONTRIBUTORS

Andy Baron
Amy Crawford
Sharon Gaudin
Sharon Kahn Luttrell
Kathleen Markees
Jessica Messier
Sira Naras
Erin Peterson
Julia Quinn-Szcesuil
Allison Racicot
Colleen Wamback

PRODUCTION MANAGER

Dianne Vanacore

PHOTOGRAPHERS

Ryan T. Conaty
Whitney Curtis
Kathleen Dooher
Matt Furman
Patrick O'Connor
Matthew Healy

ILLUSTRATORS

Vlad Gusev
Lapin
Jonathan Reinfurt
Chiara Vercesi



CORRESPOND WITH WPI JOURNAL

WPI Journal
100 Institute Road - Boynton Hall
Worcester, Massachusetts 01609
wpjournal@wpi.edu
wpi.edu/~journal
508-831-4971
Submit Class Notes: classnotes@wpi.edu

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MARK LEFEBVRE (AND PHOTOBOMBER DOREEN MANNING) IN THE NEW ADDITION TO THE TRIANGLE CLUB, HOME OF THE CLUB'S HEROIN ANONYMOUS MEETINGS. THE SPACE WILL ACCOMMODATE UP TO 120 ATTENDEES AND WILL HAVE ITS OWN RESTROOMS, ALONG WITH CHANGING TABLES AND ROCKING CHAIRS FOR USE BY NEW MOTHERS.

CONSUMED BY FIRE

I read with interest the “Consumed by Fire” cover story in the summer issue of the *Journal*, describing WPI’s research in the use of the Flame Refluxer for burning oil spills in place, in particular its application in cold environs. It brought back memories to 2003, when I was the environmental health and safety director to the support services contractor to the National Science Foundation in Antarctica.

We had a significant spill of aviation fuel saturating several acres of snow on top of seasonal ocean ice at McMurdo Station. It was alongside the airport ice runway. We brainstormed different methods for cleaning up the fuel before the ice melted later in the summer, to prevent detrimental impacts to the aquatic environment. Methods included attempting to burn the fuel in situ, igniting it with more volatile gasoline. We quickly dismissed this method for reasons discussed in the *Journal* story.

Other approaches involved melting the snow and recovering the oil phase. It also was dismissed when energy, time, manpower and environmental impacts of the recovery itself were considered. After locating a research article on the volatilization of fuel on ice surfaces at cold temperatures, we were able to convince the client we could mitigate the spill by “farming” the contaminated snow. This involved turning the snow over every several days with a tractor, continually exposing new surfaces to the summer sun’s radiant effect to volatilize the fuel. After six weeks we were successful in removing more than 98 percent of the fuel from the snow before the ice melted, preventing an environmental calamity. A low-tech solution that worked quite successfully.

Throughout my career I have always enjoyed the challenge of solving complex problems using the technical knowledge and logic instilled as part of my WPI education. These skills were particularly useful working in remote locations, such as Antarctica and on islands in the Pacific.

Thanks for an enjoyable article that brought back memories,

— John Feldman '67 (ChE)

EARLY PROMISES

This digital age thing has got to stop: It seems as though we don’t communicate with one another even within the pantheon of the walls of Education. Yes, that’s Education with a capital E.

Call it accidental, happenstance, or merely coincidental as to the article output for your Fall 2017 *Journal*, but there they were: two arms in a race for the same cause, which, when combined, who knows their strength?

Page 13, “Early Promise,” about Education and utilizing games followed by tertiary means for feedback loops—and then page 15, “Coming in With the Assist,” for students not in the more financially secure familial groups for education, which, while both means to a goal are different, seemingly when manipulated, as only an engineer can do, can help to achieve that very same goal.

Am I missing something here? How could these separate projects not but help one another? If I am lacking in the nuanced differences, wouldn’t these large sums of funds coupled together work that much better towards solution of a problem that seems no end?

Call me Neanderthal with my flip phone and email, no texting, with all this social tech app stuff floating around, there must be one for folks in education who have similar goals with or without outside funds, that can create stronger methods of learning for all folks regardless of household income.

Do they have an app for that?

— Brett Kellerman
son of David Kellerman '87 (MS)

Engage with your university magazine community through your own letter to the editor, by sending your thoughts on our printed pages to dmanning@wpi.edu.

Letters may be edited for length and clarity.

**PRESIDENT LESHIN TALKS GENDER
EQUALITY WITH KRISTIN TICHENOR**

The Class of 2021 represents the most gender-balanced class in WPI history—women students represent 43% of the first-year student body, an increase of 10%. President Leshin invited senior vice president of Kristin Tichenor to talk about this development, which places WPI among STEM institutions with the highest percentage of female students.

LL Kristin, it's great to be with you to talk about women at WPI. This has been a big goal of ours for a long time, to help diversify the pipeline in STEM—and for us that starts early, right?

KT Absolutely. We figured out early on if we waited for students to come to us, they were not necessarily going to be as diverse as we were hoping. So we began to invest heavily in summer pipeline programs and after-school programs for girls and for other underrepresented students. Now these young people have the chance to see how exciting and creative science and engineering can be.

LL It's fantastic, actually. A good friend of mine was telling me this week that her daughter came to Camp Reach, and it has fundamentally changed her outlook on STEM.

KT It does make a big difference, and I think because of this early focus, WPI will feel very different for future young women than it did for those coming to WPI just 10 years ago.

LL There's almost 500 women in the class of 2021. I always talk about that when I meet our alumni. They often ask me about the ratio, and they mention that it was six-to-one when they were here, or it was four-to-one—more recent alumni say it was two-to-one. But now at 43 percent, I think we can safely say there's no more ratio—we're getting very close to one-to-one. It's an exciting time for WPI!

It's also wonderful to know that a WPI education is really powerful for women, and the data we have on the impact of project-based learning on all our students shows that a WPI education is serving diverse populations very well.

KT I agree. And it's one of the reasons I believe that WPI has something special to offer young women, because while they can get a good STEM education at many

institutions, this is the kind of place where they will learn how to take their classroom learning and translate it in positive ways, to impact the communities around them. And we know young women care deeply about making the world a better place, making communities a better place. WPI offers project experiences that allow women to do exactly that, even in their first year.

LL Our women students will be joining the ranks of our alumnae soon enough, and we have a lot of really successful women to be proud of. I can't wait for them to meet Judy Nitsch, as she was inducted into our WPI Hall of Luminaries this year as the first woman honoree. Or Michelle Gass, who will take over as CEO of Kohl's department stores next spring. WPI women are making things happen around the world.

KT Judy Nitsch spends a lot of time and energy talking up WPI to prospective students and encouraging them to follow in her footsteps, which we greatly appreciate.

LL It's all very inspiring. Next year we'll be going even further. Full speed ahead!

To see a video of this interview in its entirety, visit wpi.edu/news/wpjournal.



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James Alfieri '59



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Pioneer Valley

[GLOBAL *impact*]

ILLUSTRATION JONATHAN REINFURT

When Kevin Sweeney left the private sector to join the Foisie Business School in 2012, it didn't take long for him to notice an opportunity to apply WPI's project-based learning model to the socio-economic issues in the region where he used to work.

WPI had project centers in Boston and Worcester, but not in the state's third-largest city, Springfield. And while that region's dozen or so colleges and universities regularly place interns at area employers, none offer WPI's faculty oversight and structure.

"There was nothing being done like what we could do at WPI," Sweeney says. "So, the first thing we had to do was dissuade [potential partners] that this was an internship that requires work of the sponsors. What we offer is more like a consulting model."

Sweeney, professor of practice and area head of finance and accounting in the Foisie Business School, spent nearly two decades as a senior executive at

MassMutual Financial Group in Springfield. He is well-versed in the issues affecting the Pioneer Valley, a mix of urban, rural, and suburban communities in western Massachusetts. Throughout his career, he was involved in economic and community development efforts in the region; before coming to WPI, he served as interim CEO of the nonprofit DevelopSpringfield.

Jay Minkarah, who replaced Sweeney as president and CEO of DevelopSpringfield, embraced the idea of partnering with WPI students on his organization's revitalization initiatives. A project center would bring a fresh set of eyes to the region while providing the framework to achieve meaningful results, he said. Sweeney felt the project center's location, less than an hour's drive from campus, would appeal to cost-conscious undergrads as well as international students who want to do their Interactive Qualifying Projects (IQPs) in the states.

Sweeney won approval from WPI's Interdisciplinary and Global Studies Division to

establish the Pioneer Valley Project Center, and the first group of IQP students arrived in 2015.

Shanshan Xie '18, an electrical and computer engineering major and president of WPI's Chinese Student Association, said the project center's proximity allowed her to stay connected with the campus while working on her IQP. She was among three groups of IQP students in the spring of 2017 focusing on the Springfield Innovation Center, a mixed-use entrepreneurial facility anchoring the city's Innovation District. Her group created a marketing plan for the center while the other IQP students researched and drew up designs for the center's kitchen and project space. Xie used the teams' recommendations and input to create a website for the Springfield Innovation Center. She noted that website design is a passion that often takes a backseat to her major.

"I got to use my hobby, something I'm really interested in, but don't have time to practice in my major," she says.

Nick Porter '17, now a grad

student at Clemson University, did his IQP at the Pioneer Valley Project Center in the spring of 2016. He and his fellow IQP students worked alongside peers from Springfield Technical Community College and MBA candidates from the Foisie Business School to evaluate the top priorities of Springfield's North and South End sections. They conducted surveys and focus groups and attended local board meetings. When the data showed that crime was a primary concern, the students recommended a blue-light safety system as well as beautification efforts, such as benches, green spaces, and road repaving.

"What I enjoyed the most was the communication. We were all either engineering or math majors, so this was something that was new to us," Porter says. "It brought us out of our comfort zone and made us go out on the street. And it was also helpful to the people of Springfield."

—Susan Shalhoub

GETTING THE LEAD OUT

Biology and biotechnology professor **Natalie Farny** participated in the International Genetically Engineered Machine (iGEM) competition as a graduate student, and when she arrived at WPI, she couldn't wait to share the experience with her students.

Held annually in Boston, iGEM is a worldwide event where teams build genetically engineered systems, ultimately producing projects that will have a positive influence on their local communities and the world.

Farny and six undergrads—Locke Bonomo '19, Haylea Northcott '19, Aylin Padir '19, Michael Savoie '19, Edith Sawyer '19, and Catherine Sherman '20—spent most of 2017 working together to create their project, which was inspired by the water crisis in Flint, Mich.

The team's project is twofold. They'll develop a bacterium that will serve as a biosensor and change colors depending on the amount of lead contamination in a water sample. If lead is detected, a second

bacterium can be used to reduce the amount of lead contamination in water that's already been consumed.

A unique aspect of iGEM is that each team's work is shared and open-sourced. Participants are welcome to build upon the work of past teams; collaboration with another team is even required to be eligible to earn a silver medal.

To Farny, this emphasis on teamwork—something that ties in well with WPI's philosophy of collaboration over competition—is the most valuable lesson her students will learn.

"Because, really," she says, "science has to be done openly, or it doesn't get done well."

—Allison Racicot

TURNING UP THE POWER ON SOLAR ENERGY

In an effort to spread the use of solar energy around the world, **Pratap Rao**, mechanical engineering professor, is leading two research teams that are developing materials and technology to generate and store more energy from the sun, with the goal of making solar energy more efficient, less expensive, and more widely available.

Rao has received three grants, totaling nearly \$800,000, to create new materials for solar cells and new catalysts for a process that can store the energy they generate. The most recent is a three-year, \$314,065 award from the National Science Foundation (NSF) to develop photocatalysts to help generate hydrogen from water more efficiently. Rao's co-principal investigator is **Aaron Deskins**, chemical engineering professor.

Though sunlight is a clean energy

source, several stumbling blocks have hindered its widespread use. For instance, it's not always sunny—and when the sun does shine, those periods don't always correlate with high demand for electric power. What is needed is a way to store solar energy in times of low demand.

Batteries are one solution, but they are expensive. Rao is looking to use solar electricity to split water with electrolysis, a process that produces oxygen and hydrogen. The gases can be recombined later in a fuel cell to generate electricity.

Currently, electrolysis requires too much power to be cost-effective. Rao and Deskins are looking to lower that cost with catalysts. One candidate is tungsten disulfide, which forms thin sheets that can channel electrons to the water. With a combination of

computational modeling and experimental work, they are looking to make that transfer more efficient.

With a \$409,274 NSF award, Rao is working with **Lyubov Titova**, assistant professor of physics, to develop new materials to replace silicon in solar cells. Silicon is abundant, efficient, and durable, but it takes considerable energy to melt it to produce solar cells. Rao is experimenting with a number of metal oxides that could make the cells less expensive and simpler to manufacture. Titova is using a technique called terahertz spectroscopy to study how the materials respond to sunlight to produce electricity, with the hope of boosting their efficiency.

With the success of this ongoing interdisciplinary research, the future of solar at WPI is a bright one.

—Sharon Gaudin



ROBOTS TO THE RESCUE

When researchers at WPI think about robotics, they're not envisioning sci-fi machines out of *The Terminator* or *Battlestar Galactica*. Many are already working on machines that could soon become part of real search-and-rescue teams.

As hurricanes recently ravaged areas in Texas, Florida, and Puerto Rico, and as earthquakes spread devastation across Mexico, WPI scientists were working to build robots – swarms of drones, underwater machines, autonomous boats, and snake-like soft robots – that could one day save disaster victims and rescuers.

“You need autonomous robots – and many of them – to do much more in these situations,” says **Carlo Pincioli**, computer science professor, who studies robotic swarm technology.

Pincioli envisions a future where dozens or even hundreds of robotic, autonomous vehicles will fly into an area and relay to responders locations where victims might be trapped, along with the state of buildings and bridges.

Other researchers envision robots that can reach people trapped in flooded cities and send their coordinates back to search-and-rescue centers, while allowing human rescuers to see the victims and even talk with them. That's the role of WALRUS (Water and Land Remote Unmanned Search). It was developed in 2015 by an undergraduate project team (Brian Eccles, Brendan McLeod, Tim Murcko, TJ Watson, and Mitchell Wills).

This vehicle was designed to be equipped with a microphone, speaker, cameras, and screen so rescuers could see and communicate with disaster victims.

Thanks to work by **Jie Fu**, electrical and computer engineering professor, and **Cagdas Onal**, mechanical engineering professor, robotic snakes may one day be able to navigate naturally and easily through the rubble, confined spaces, and rough terrain left behind by an earthquake to send images and information to search-and-rescue teams.

With a three-year, \$400,000 award from the National Science Foundation, they are creating autonomous snake-like robots able to enter areas inaccessible by humans – without supervision – while climbing stairs, navigating obstacles, and even raising their heads for a better view or to capture images.

Built from silicone rubber and made of connected modules, the robots have their own tubing, valves, and pneumatic actuators. Each module, or segment, of the soft robotic body is able to generate its own motion.

Onal is working on low-level algorithms to enable the robots not only to move in a simple serpentine fashion but to lift their heads and move up and over obstacles, including stairs. Fu is working to create high-level algorithms that will handle decision making and autonomy.

– Sharon Gaudin



THE LATEST ADDITIONS TO OUR WPI COMMUNITY



KATHY CHEN, executive director of the STEM Education Center, is excited about taking the leap from being a faculty member at Cal Poly for nearly 20 years to heading WPI's Pre-K to 12 STEM educator hub.

She is engaging with members of the education community around science, technology, engineering, and math, including current and future teachers and administrators. The center focuses its work on supporting educators of all kinds, rather than directly running programs for youth.

JOHN MCNEILL, a faculty member at WPI since 1994, has been named head of the Department of Electrical and Computer Engineering.

McNeill spent nearly 10 years in the electronics industry before joining the WPI faculty, and maintains close ties to industry as founding director of the New England Center for Analog and Mixed Signal Design. He recently completed a year as a visiting researcher at the University of Massachusetts Medical School working on a team developing a wearable wireless sensor for the prevention of bedsores in convalescing patients in hospitals, as well as for those in home care and long-term care facilities or in wheelchairs.



JEAN KING, a widely respected neuroscientist and researcher, is the Peterson Family Dean of Arts and Sciences. She served as vice provost for biomedical research at the University of Massachusetts Medical School, where she was a tenured professor of psychiatry, radiology, and neurology, and director of the Center for Comparative Neuroimaging.

At WPI she oversees seven academic departments (Biology and Biotechnology, Chemistry and Biochemistry, Computer Science, Humanities and Arts, Mathematical Sciences, Physics, and Social Science and Policy Studies).



EMILY DOUGLAS, previously associate professor in the School of Social Work at Bridgewater State University, is professor and head of the Department of Social Science and Policy Studies.

Her research focuses on child and family well-being and on programs and policies that promote positive outcomes. Before joining WPI, she spent a year in Washington, D.C., as a Congressional Fellow with the Society for Research in Child Development and the American Association for the Advancement of Science.

CHARLANA SIMMONS is the director of the Office of Multicultural Affairs (OMA). She changed her original plans of teaching high school English when she returned to her alma mater (University of Rochester) as an academic advisor in the Achievement Program, a PhD prep program for low-income and underrepresented first-generation college students.

"I can use my story to encourage undergraduates to think broadly about what they're going to do next," she says, a theme she hopes to instill across campus.



GLOBAL VIEW

Students in WPI's Global Projects Program (GPP) aren't just hitting the books in another country. More than 70 percent of WPI's students participate in the signature GPP experience, where they solve authentic, community-based problems and use their technical knowledge to make a human impact. Whether the project takes them to downtown Worcester or to a remote Greek village, students develop personal confidence, professional skills, and an essential world view.

With the Global Projects for All initiative, WPI is raising the stakes. Whether for the IQP, the MQP, or the Humanities and Arts requirement, the university is aiming for at least 90 percent student participation. Beginning with the Class of 2022, each student will receive a barrier-blasting \$5,000 scholarship to work in one of 40+ project centers spanning two-dozen countries.

"We are expanding our high-impact undergraduate education opportunities," says Anne Ogilvie, executive director of the Global Projects Program, noting that greater participation necessitates increasing opportunities in existing and new project centers.

Why the push? Because the results are powerful. Alumni routinely cite off-campus project work as a defining opportunity to build character, build team-work skills, and connect their education with the impact they could make in the world.

GPP prepares students for the rigor of completing industry-quality work in unfamiliar settings while removed from structured on-campus supports. Students collaborate with each other, their advisors, and community partners who help them navigate the local customs and norms to deliver meaningful and useful solutions.

Wherever GPP takes a student, the experience lasts a lifetime.

— Julia Quinn-Szcesuil



SEAPORT SATELLITE

One of the fastest growing innovation centers in New England has a new neighbor – Worcester Polytechnic Institute. The university joins Boston's Seaport District as it expands its economic development efforts across the commonwealth. The prominent new location, at 303 Congress Street, places WPI amid some of the nation's leading innovators and technology companies – such as Amazon, GE, and Red Hat – with whom WPI will look to create helpful and strategic partnerships around curricular and research opportunities.

"WPI will use this new space for industry-centric meetings, classes, projects, and events that are tailored to the interests and needs of our neighbors who are working in areas such as healthcare technology, robotics, cybersecurity, and big data," says Stephen Flavin, vice president and dean of academic and corporate engagement. "It will be a top priority to better serve these businesses and organizations by providing them with more convenient access to our high-caliber programs, and to connect them to our students and alumni. We will also work to shine a light on the potential and the expertise that exists right here in Worcester."

The Seaport location will also accommodate WPI's Boston Project Center, where students have engaged in a number of research activities with sponsors including the City of Boston, the Massachusetts Department of Public Utilities, and the New England Aquarium. The new spot will allow easier access to both government and non-government agencies, which could spur new partnerships. The 6,400-square-foot space is expected to officially open this winter.

— Colleen Wamback



PANHELLENIC POWERHOUSES

For the fourth time in five years, the Panhellenic Council at WPI took home the College Panhellenic Excellence Award from the National Panhellenic Conference (NPC), one of the nation's largest advocacy organizations for sororities. With awards from 2013, 2015, and 2016 already in the bag, WPI received the honor again this year, out of the more than 600 colleges and universities across the continent that belong to NPC. On top of that, WPI's Chi

Omega, Alpha Phi, Phi Sigma Sigma, Alpha Xi Delta, and Alpha Gamma Delta sororities scored individual national chapter awards for advising support, chapter excellence, academic achievement, recruitment, and philanthropy.

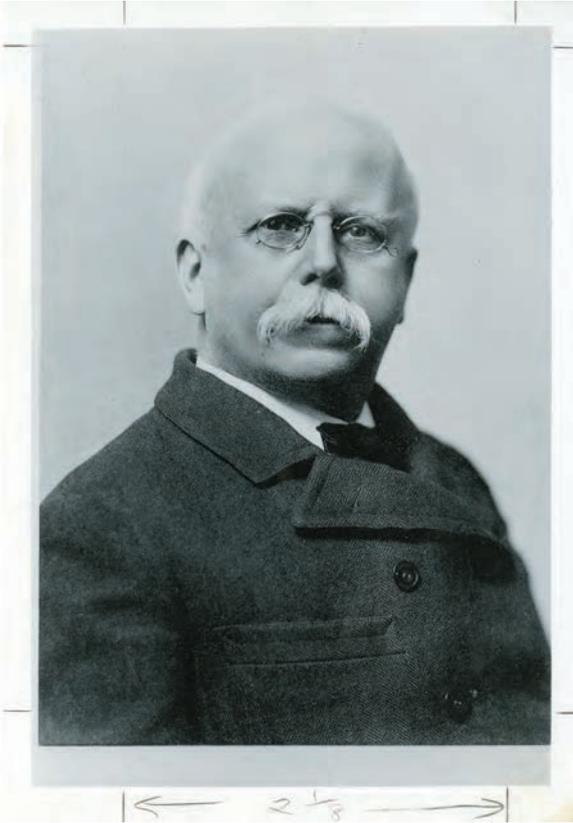
Where does all this girl power come from? More than 600 of WPI's 1,455 female students, representing 44.9 percent of the university's female population, are members of WPI's six

sororities, five of which are part of NPC. During the 2016–17 academic year, these young women pitched in over 11,900 hours of community service and raised nearly \$33,000 for multiple charities, including Alpha Gamma Delta Foundation to support the Fight Against Hunger, Alpha Phi Foundation to support women's heart health, Autism Speaks, and Make-A-Wish Foundation.

"The Panhellenic Council at

Worcester Polytechnic Institute is excited to continue serving the WPI community and Worcester area in a variety of ways," says Abigail King, president of WPI's Panhellenic Council. "We are honored to have been selected for the National Panhellenic Excellence Award and will continue to work hard to provide valuable programming to the WPI community."

—Jessica Messier



ASK THE ARCHIVISTS

Q. “I recently visited the Mendenhall Glacier in Alaska ... wasn’t Mendenhall one of WPI’s presidents?”

A. Yes, Thomas Corwin Mendenhall (October 4, 1841 – March 23, 1924) was the third president of WPI. The remarkable, self-taught scientist made substantial contributions in the areas of meteorology, geophysics, seismology, cartography, gravity, and diplomacy.

The glacier was named in his honor for his work as superintendent of the U.S. Coast and Geodetic Survey from 1889 to 1894. During that time, he was also director of the Bureau of Weights and Measures. In 1893 he published *The U.S. Fundamental Standards of Length and Mass*, which established the international meter and kilogram as the official standards for length and mass in this

country. The now famous publication came to be known as the Mendenhall Order.

As a member of the Bering Sea Commission, Mendenhall studied the declining seal population in the Pribilof Islands of the Bering Sea and contributed to the U.S. recommendation for a ban on pelagic sealing.

Among his many awards in the WPI Archives are his Order of the Sacred Treasure medal from the Japanese government, the Cullum Geographical Medal from the American Geographical Society, and the Franklin Medal from the Franklin Institute in Philadelphia.

The young Mendenhall began his journey as a scientist by delivering a cow to a neighboring farmer. At his lodgings that night, Mendenhall noticed a well-worn copy of Euclid’s *Elements* and was fascinated. The next morning, he asked if he could buy the book, which he did, for the cost of one dollar. That book is one of the many treasured items in our collections.

Do you have a question for WPI’s archivists? Send it to archives@wpi.edu and check out the next issue of the WPI Journal for more interesting facts and information about WPI wonders.





PHOTO WHITNEY CURTIS

IMMIGRATION EXPERT SPEAKS HIS MIND

Steve Legomsky '69 has spoken, written, and taught about issues relating to immigration, refugee, and human rights law for more than three decades. He has testified before Congress and served as a visiting scholar and researcher to foreign governments and the UN. He is coauthor of a textbook (now in its sixth edition) that has been required reading at 185 law schools.

Now retired as professor emeritus from Washington University School of Law, he took time from a demanding schedule of media requests to answer some questions from his alma mater.

What drew you into this specialty?

It was a fluke. Contemplating a career as a legal aid lawyer, I applied to law schools at the last minute, well after most schools' application deadlines had passed, and was accepted by the University of San Diego on the Friday afternoon before the start of Monday classes. On my first day of law school, I asked about volunteering. (I didn't dare reveal that I was a first-year student, let alone a first-day student.) This being San Diego, the immigration clinic based at Legal Aid could always use a warm body, so I went down there the same day and volunteered. I fell in love—with the clients, who at that time were almost all from Mexico; with the Legal Aid attorneys and their exceptional competence and dedication; and with the incredibly complex and fascinating subject matter of immigration law. After law school, immigration was the subject of my doctoral dissertation (in philosophy) at Oxford University. It became a natural focus of my books and articles, and my career.

You worked with several presidential administrations. Was there an obligation to maintain neutrality?

In the Administration of George H. Bush, the Commissioner of the then Immigration and Naturalization Service (INS) asked me to head up what he called his "think tank"—a group of five ideologically diverse private sector immigration experts. We were all encouraged to speak our minds freely and provide candid advice. The same was true in my roles as advisors to the Barack Obama and Hillary Clinton campaigns. Later, in the Obama Administration, my role was more constrained. I served as Chief Counsel of U.S. Immigration and Citizenship Services (USCIS). This is the Department of Homeland Security agency that decides applications for green cards, naturalization, refugee status, asylum, and all other immigration statuses. I supervised 215 attorneys, advised the director of the agency and other agency officials, and was expected to provide neutral, objective legal opinions. After

returning to academia and eventually retiring (or so I thought) in 2015, I received a call from President Obama's new Secretary of Homeland Security asking me to return to DC to serve as his senior counsel on immigration. In that position I was free and encouraged to express my own views on the various policy issues.

Now that you're retired from government and teaching, are you freer to express—and act on—your own opinions?

Much freer. I do a lot of media interviews, mainly fielding calls from national and foreign TV, radio, print, and online media. Keeping up with all the current developments requires a great deal of reading every day. I also do lots of strategizing with nonprofit organizations that advocate or litigate on behalf of immigrants, and I help out with the writing of amicus (friend of the court) briefs that immigrant organizations file with the Supreme Court and the courts of appeals.

I don't suggest that illegal immigration doesn't have any costs; I believe in the rule of law. I merely point out that there are also large offsetting benefits, of which the public is often unaware, and that some of the politically generated hysteria over illegal immigration is way out of proportion to the perceived problems. If there is one point most worthy of emphasis, I guess it would be that immigrants and refugees have enriched our country beyond measure, both historically and today. They have fueled economic growth and have enriched us culturally and spiritually.

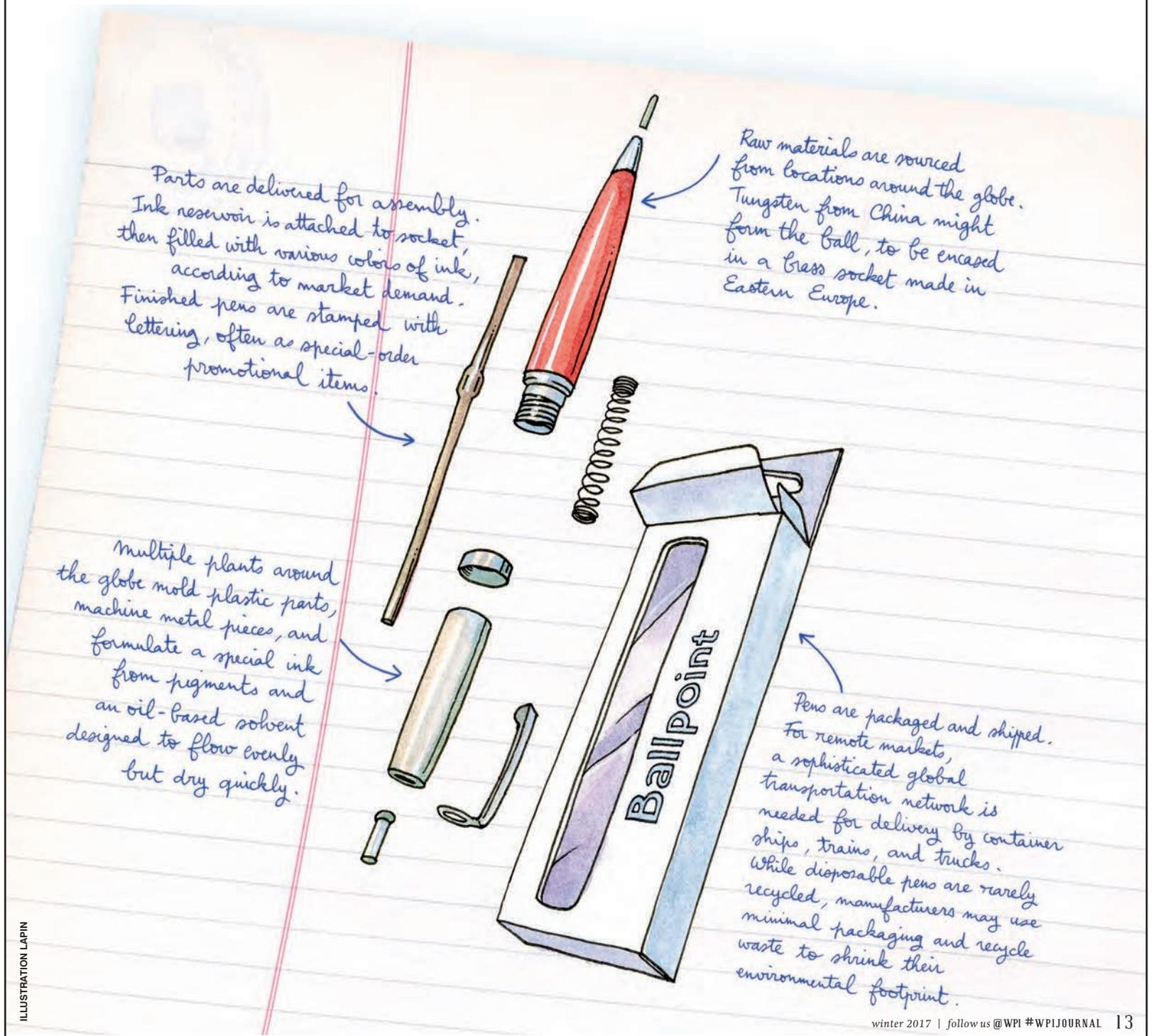
Read the full version of the interview on the *WPI Journal* website, wpi.edu/news/wpjournal.

Mastering the Supply Chain

Every product or service has a supply chain, and every supply chain is so intricate that it requires professional management. With companies clamoring for supply chain experts, especially those with STEM backgrounds, WPI has launched a master's degree program in supply chain management, with a curriculum steeped in skills such as data analytics and applications of technologies, in addition to critical soft skills such as negotiation, communication, and teamwork. Supply chains are built from supply, manufacturing/assembly, distribution, and

recycling—but they're driven by the flow of information, says **Amy Zeng**, assistant dean and interim department head of the Foisie Business School, who directs the new program. Students learn the complex art and science of coordinating a product's life cycle on a global scale as they master the tools and techniques needed to make informed and smart decisions.

Here's how it all comes together for a typical ballpoint pen.



PURSUING CHEMOTHERAPY RESISTANT CANCERS

The chemotherapy drug cisplatin is often the first line of treatment for a range of cancers, particularly tumors of the lungs, ovaries, and testes. The drug works by damaging the DNA of tumor cells. If the damage is bad enough, the cells—unable to make repairs—undergo programmed suicide, a process known as apoptosis.

In time, though, tumor cells seem to adapt to cisplatin, and cancers can become resistant to the drug. In fact, drug resistance is a common problem in cancer therapy, a problem often complicated by deficiencies that inhibit the body's own anti-cancer immune response.

With a \$1.7 million award from the National Institutes of Health

(NIH), **Anita Mattson**, chemistry and biochemistry professor, is pursuing a novel approach to discovering potential new chemotherapy drugs that may not only fight cisplatin-resistant tumors, but boost the cancer-fighting ability of the immune system.

Mattson's focus is on a group of molecules known as dimeric chromanones, some of which, like cisplatin, appear able to induce apoptosis in cancer cells; some also seem to stimulate the immune response. Derived from various strains of fungi, the compounds have high biological activity, which makes them attractive targets for drug discovery.

The challenge, Mattson says, is

that chromanones have proven to be nearly impossible to synthesize. The molecules have stereogenic centers, making it possible for them to form as one of two different but related compounds called stereoisomers, only one of which may have the desired biological activity. Until now, there has been no reliable way to control which isomer forms.

Mattson believes the answer may lie in a group of organic compounds known as silanediols, which are commonly used to create polymers for health and beauty products. In previous research, Mattson and her team became the first researchers to consider using them as catalysts. In the process, they made an important discovery: silanediols have the ability to access and control the molecular structure of a number of

difficult-to-synthesize compounds, which, like chromanones, have stereogenic centers.

With the NIH funding, she hopes, first, to demonstrate that silanediols can control the synthesis of chromanones, and then to build a library of new chromanones that can be tested for their activity against various cancers in collaboration with researchers at the University of Massachusetts Medical School. She says she believes these novel molecules will be useful tools for better understanding the biological pathways associated with chemotherapy resistance, which could open the door to further drug discovery.

Mattson's grant from the NIH, known as an R-35, is a relatively new award reserved specifically for early stage investigators whose research shows exceptional promise.

BUILDING BRIDGES

In search of a remedy to close the national skills gap in manufacturing, President **Laurie Leshin** sat in on a Congressional briefing recently to discuss how WPI's project-based academic philosophy could be a model for the future.

"One hundred percent of students from WPI graduate with multiple, intensive project-based experiences that are based in the real world," Leshin told attendees during the briefing, in which she voiced support for the Department of Defense's new Manufacturing Engineering Education (MEE) grant program.

University and industry leaders are calling for Congress to increase funding in the MEE program to \$80 million for FY 2018, and \$80 million annually from FY 2019 through 2021. Initial funding for FY 2017 stood at \$10 million.

An increase in funding would allow awards to at least 20 universities and organizations of \$4 million each in the first fiscal year.

While core strengths in engineering and manufacturing initiatives may be second nature to WPI, they are lacking across the general higher education landscape. In her remarks, Leshin pointed out that, out of 1.9 million bachelor's degrees awarded annually, only 100,000 of those are in engineering. "If we really want to compete in the global innovation economy, that's not nearly enough," she said.

Leshin hopes that WPI's academic model could spur innovation across the higher education and manufacturing landscape.

"I think that kind of innovative approach [to education], where we're really willing to take the chance in doing something dramatically different in our education programs," she said, "is the kind of thing that new grant programs like this can really encourage and try to foster."

—Andy Baron

COMBATING HUMAN TRAFFICKING

"This stuff keeps me up at night"

Renata Konrad, assistant professor in the Foisie Business School, is referring to human trafficking, an epidemic that, according to the International Labour Organization, has made victims of some 21 million people in countries around the world, including the United States. When faced with such a serious, widespread problem, it's easy to feel helpless and not know where to start when it comes to taking combative measures.

Konrad and two of her colleagues—**Andrew Trapp**, associate professor in the Foisie Business School, and **Kayse Lee Maass**, research associate in the Mayo Clinic Department of Health Sciences Research—co-authored a paper on using industrial engineering, mathematics, and data science to fight the problem.

They applied the same questions to trafficking that they would ask about manufacturing or business: "How do you find a better way to allocate scarce resources? Can you find useful patterns in data? Can you predict trends in behaviors?"

Through these and other techniques, they have been able to assist governments and private nonprofits with finding the most effective locations for shelters, to determine what factors are most important when it comes to rehabilitative care, and to suggest ways to curb labor trafficking in the offshore fishing industry in Thailand. The team is working on this with **Khalid Saeed**, director of the system dynamics program.

"It was really a call to the community," Konrad says of the team's paper. "Here's the problem, and here's some ideas about how to fix them."

—Allison Racicot

[TURNINGpoint]

For many alumni, a turning point can be multifaceted. For **Mark Lefebvre '80 (EE)**, his was a transition from 22 years of executive-level marketing and business roles at IBM to co-founder of Safe Harbor Recovery Center (Portsmouth, N.H.) and recovery coordinator for the Triangle Club (Dover, N.H.). Plus his own personal journey of recovery.

Looking back, Lefebvre attributes his WPI education as instrumental to his roles at IBM—it was also at WPI he learned to accomplish just about anything. “Although I may not have been the smartest person in the room, I am, and continue to be, very resourceful. To this day I still utilize the problem solving and collaboration skills I learned while at WPI.”

His transition into recovery support and rehabilitation services may have begun through his own long-term recovery, but Lefebvre points to the growing opioid epidemic in New Hampshire, where he resides with his wife, Vivian, as the tipping point. “I’ve come to know, personally, individuals who have lost their lives, and families who have lost loved ones,” he explains.

After he and Vivian watched “The Anonymous People,” a documentary about the U.S. recovery movement, they decided it was time to put their combined knowledge and energy toward helping others through the founding of Safe Harbor Recovery Center.

This past summer, Lefebvre increased his impact in the world of recovery when he was hired as the first official employee of the Triangle Club, an opportunity he says will be life changing—not just for him,

but for those he hopes to touch through his work.

The Triangle Club currently hosts more than 45 weekly meetings of Alcoholics Anonymous, Heroin Anonymous, and other 12-step programs. “Over 200 individuals come through our doors every day. We provide a safe place for patrons to come in off the streets, attend meetings, and establish peer relationships with others in recovery,” Lefebvre shares. In addition to meetings, the club provides literature, computers, and peer support for its patrons.

He says that New Hampshire loses nearly 500 sons, daughters, fathers, and mothers to heroin, fentanyl, and prescription opiates each year, and that he’s grateful for the opportunity to be of service to those in need.

Lefebvre’s message for those affected with the disease of addiction is simple: “This is an illness, and there is no shame in admitting it. There are millions of us across the country dealing with substance use disorders, many of us in long-term recovery,” he says. “There are resources to help, but you need to take that important first step. Recovery is possible, if you ask for it.”

For the loved ones of an addict, he has these three words: Don’t give up.

“No one wakes up one day and declares, ‘Today I want to be an addict,’ he says. “It is a progressive illness and needs to be treated as an illness—without judgment, without shame, and with compassion.”

If you or someone you know is ready to make that turning point away from addiction, Mark Lefebvre welcomes you to reach out with a private email to onekaway@yahoo.com.





Lauren Baker

'82, '85 (MS ME), '88 (PHD) STEERS MEDICAL
MIRACLES THROUGH THE OBSTACLES OF
GETTING TO MARKET

Lifesaving Approval

girl lies in a hospital bed, weakened by a heart that can't sustain her much longer. The device that could save her—by assisting her heart until she's strong enough for further treatment—has been widely used in Germany, but has not been approved for sale in the United States.

She passes the days in a hospital room decorated with pin-ups of dreamy actors. She dreams of Doctor McDreamy—her heartthrob from the TV drama *Grey's Anatomy*.

BY JOAN KILLOUGH-MILLER | PHOTOGRAPHY MATT FURMAN

hat story had a happy ending. In 2005 the girl was approved for “compassionate use” of the Berlin Heart—a mechanical ventricular assist device. The pediatric-size pump flown in from Germany kept her alive for six tense months, tethered to a unit the size of small refrigerator. In the long days of waiting, as a constant stream of doctors filed in and out of her room, one slipped in unnoticed, swathed in full surgical garb. He waited until he caught her eye. He dropped his mask. There stood Dr. McDreamy—or rather, actor

Patrick Dempsey. Grinning widely, he clowned, perched on her commode, and brought some relief from the drawn-out ordeal. At last, the pump was removed. The girl went home with her own heart, beating strongly. She became a poster child for the device and went on to study biology in college.

It sounds like a fairy-tale; in fact it was made into a heartwarming documentary narrated by Dempsey. Yet that happy ending eluded other children in need of the life-saving technology from Germany. The manufacturer, a small company based in Berlin, was overwhelmed by compassionate use requests from U.S. surgeons, as the success stories were shared. Without a U.S. presence, the unwieldy unit had to be shipped across the Atlantic along with a specialized medical team. Without FDA approval, there was little hope of insurance reimbursement. After shouldering the burden of more than 70 cases of compassionate use, the Berlin Heart Company did not have the resources to continue on that basis.

That’s when they turned to Lauren Baker.

After decades of experience, she was an expert at navigating the rough waters that lie between a medical miracle and an FDA-approved product. Her company, Boston Biomedical Associates, had a reputation for driving high-tech, high-stakes projects to approval. Baker recalls that first phone call from Berlin, and the CEO’s plea for her to represent his company in its efforts to bring the much-needed device to the United States.

She and her BBA teammates scoured the medical records of patients who’d received the Berlin Heart, traveling to hospitals all over the country. They compiled data, then wrote and rewrote reports. Armed with these findings, she faced down the FDA.

“Seventy cases is a fair amount of clinical data about a product,” Baker says. There were also hundreds of patients overseas who had benefitted. “This was obviously a very high need,” she adds, with no other pediatric model on the market, and fragile patients whose days were numbered.

The FDA withheld approval and requested further trials. Baker dug in her heels. Her company devised and assisted with the trials. Five years later, they faced the FDA again.

“At the final panel meeting, everyone was crying,” she says. “The approval was unanimous, with no conditions. It was the quickest panel meeting ever.”

BOUTIQUE CRO

For all the lives she’s saved and changed, Baker is quick to joke about her work. “We produce a lot of paper,” she says. “Thousands and thousands of pages.” Yet she gets emotional talking about the people she’s met during the testing of the drugs and devices. There are joyous couples who conceived—at last!—with an enhanced IVF protocol. She’s seen patients relieved of chronic pain, and others overcome the crippling effects of heart disease through advances in technologies such as stents and angioplasty.

She speaks glowingly of products in the pipeline in the breakthrough areas of gene therapy and the human microbiome. She even cheers on the work of other CROs (contract research organizations, which take on clinical testing and advisory work for pharmaceutical and medical device companies). She’s almost in tears as she describes a competitor’s study of boys with Duchenne muscular dystrophy who were treated with an experimental biologic. “Those boys got up and walked in front of the FDA,” she says. “That was pretty compelling.”

With a former co-worker from Boston Scientific, Baker founded BBA in 2000—in the same month her second child was born. She saw consulting as a way to downscale from an intensive research career and, as CEO and president, she strives to offer a good work-life balance to her employees. Today BBA has corporate headquarters in Marlboro, Mass., with satellite locations in several U.S. cities, plus an office in Israel.

Baker describes her company as a “boutique” CRO—specializing in high-touch, long-term partner-

BAKER AND HER TEAM COLLABORATE WITH THE INVENTORS OF RESQFOAM (DEVICE SHOWN BELOW), GUIDING THEM THROUGH THE REGULATORY PROCESS FOR SECURING FDA APPROVAL.



ships with small companies that might not get the attention they need from the larger CROs. Larger corporations also seek out BBA for the team's medical expertise, she says, and for the customized meld of services it tailors to each client's needs. That can include everything from pre-submission strategizing, to designing and managing clinical trials, to coaching clients through the all-important presentation to the FDA.

Her voice drags when she contrasts her work to big pharma trials that can involve thousands of patients spread out all over the world. "Those studies take forever and a day," she drones, with patients swallowing a daily pill, and researchers spending years monitoring blood levels or watching for blips in blood pressure. As an engineer, she favors the drama and complexity of rare diseases

and innovative technologies. "The work we do involves conditions that need close scrutiny. We specialize in trials that are small-scale, but very high-impact. Our niche is high-risk diseases with unmet need, and medical technologies that are cutting-edge. That's really the name of the game for us."

It's the perfect place for someone who wandered from chemical engineering (her bachelor's degree) to mechanical engineering (her master's and PhD) at WPI. "There's a crossover in the sector of fluid mechanics, and I was able to integrate them in grad school," she says, and then in clinical research at UMass Medical. She analyzed the material and mechanical properties of blood vessels, comparing the behavior of healthy and diseased arteries. When she taught mechanical engineering courses at

WPI, she liked to jump disciplines to live up her courses. "I threw in examples that were biomedically related, and gave exams with questions like determining the forces on a syringe for a blood pump. I think the MEs liked having something a little different from pipes and valves."

At Boston Scientific in the 1990s, Baker gravitated to the clinical research group, leading the development of test methods and clinical protocols for the company's products. "I ended up being the person who interfaced with the FDA on clinical trials," she says. That experience gives her an edge in her current work: guiding clients through the gauntlet of the approval process, from defining their product's market niche, to designing efficient clinical trials, to presenting the results to the FDA. She and her staff work hard to prep

clients for these meetings. They'll sit beside them during the hearings, much like an attorney during a trial; at times, they even go to the panel for them.

"It's a lot like a thesis defense ... though my thesis defense was easy compared to that!" she quips. In a career that requires rock-solid confidence backed by sound science, Baker is quick to point out the most character-building experience of her life: "The big bad Chem Eng comp!" [competency exam, required for graduation under the WPI Plan in her era]. Even though she had to take it twice to pass (she cites a 75 percent fail rate for her class), she says, "I learned a lot about myself. I learned how to approach problems methodically, how to calm myself down in stressful situations, and how to admit, 'OK, you're not perfect,' and pick yourself up by your bootstraps."



AN AVID ROWER SINCE HER WPI DAYS, SHE STILL FITS IN PRE-DAWN HOURS ON LAKE QUINSIGAMOND. SHE AND HER ROWING PARTNERS TRAIN AND COMPETE IN MASTERS COMPETITIONS, SUCH AS HEAD OF THE CHARLES IN BOSTON EACH YEAR.

That work ethic, along with a competitive drive honed as coxswain on the WPI crew team (she's since taken up the oar and now rows at the Masters level) helped her build leadership ability and a team mentality. It's also why she values WPI graduates as employees, and why she welcomes WPI students as interns.

"I've worked with a lot of engineers, and I know it may sound hokey, but WPI teaches a unique way of thinking. I will hire it every time I can. They're unbelievable project managers, and they understand how to put the package together and present it clearly." Her own communication skills were sharpened by teaching WPI students, "who let you know when they don't understand something, and don't let up until they do."

It's also why she supports WPI by serving on the Life Sciences Advisory Board and working with the Women of WPI alumnae orga-

nization. As a woman CEO with a leadership team that is almost half female, she knows the importance of mentoring young women and encouraging them to stay active in technical fields. She strives to make BBA a place where women feel empowered. That wasn't always the case for her, in previous employment. Gender dynamics still play out in the corporate boardroom, she says, and she encounters this at different levels in her work around the world. (It took persistence to prove herself to all-male boards in Japan, while she calls Israel "quite progressive.") BBA opened an affiliate office in Tel Aviv last spring, to have "boots on the ground" (and in the same time zone) in that fertile crescent of medical and AI innovation. (Baker also raves about Israeli food.)

Her weighty workload is leavened by pure excitement. "We're on the pulse of new technology," she says. "At the root of it all, I like working

with really smart people, and I like seeing us make a difference to patients. It may sound a little hokey, or mom and apple pie, but it's the truth." She's helped in the creation of new families, she's seen dialysis patients freed by an in-home unit, she's seen cardiac patients who have regained the strength to play with their grandchildren again. She laughs heartily when relating an incident from the testing of an artificial spinal disc replacement.

"Those patients are bent over [she hunches in imitation] when they come in for their first visit, and after treatment, they're standing up straight. They're dancing! One guy reported an injury—because he went *hiking!* He stumbled over a rock, and bumped his knee, and we had to report it as an adverse event."

She pauses soberly, and adds, "Those are impactful moments, and they stick with you for a long time." **J**



PURSUE YOUR
PASSION



LEARN HOW
TO LEARN



PROJECT-BASED
LEARNING



GLOBAL
IMMERSION



RESOURCES &
SUPPORT SYSTEM



PERSONAL IMPACT

SIX PIONEERING ELEMENTS.
THOUSANDS OF LIVES CHANGED.
ENDLESS POSSIBILITIES.

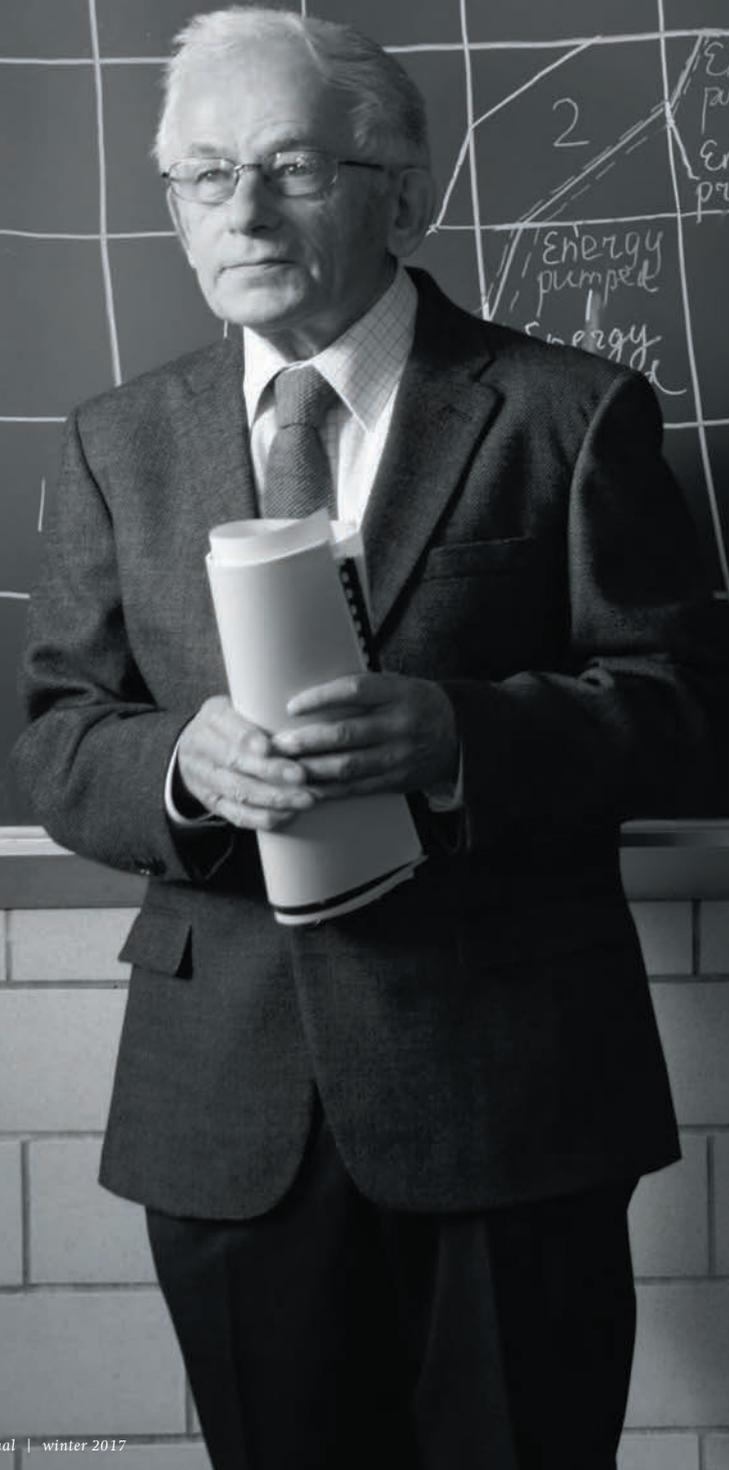
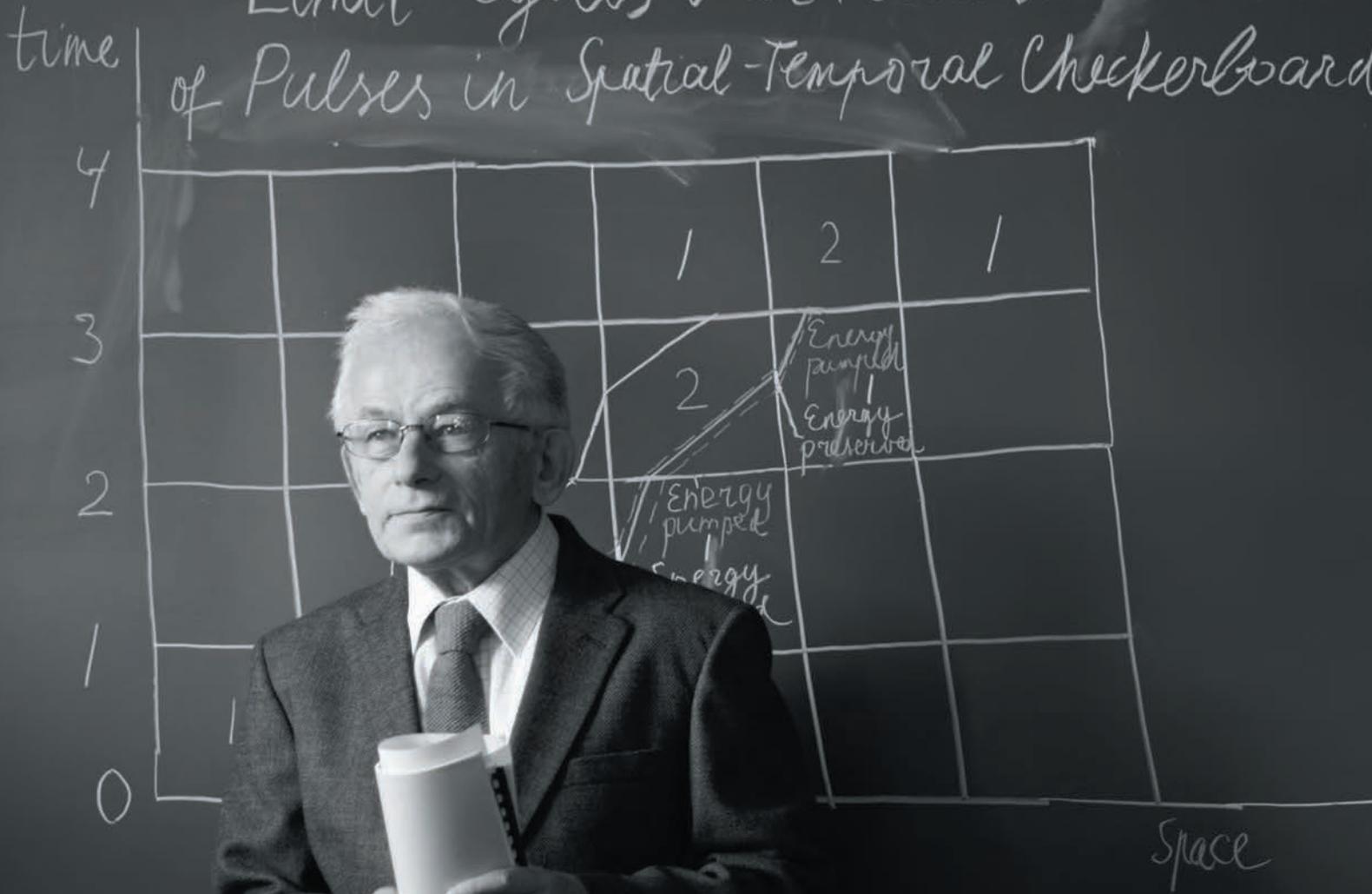
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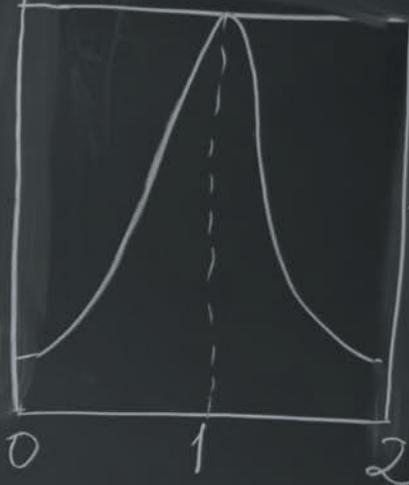
DYNAMIC

Limit Cycles and Formation of Pulses in Spatial-Temporal Checkerboard



MATERIAL STRUCTURE

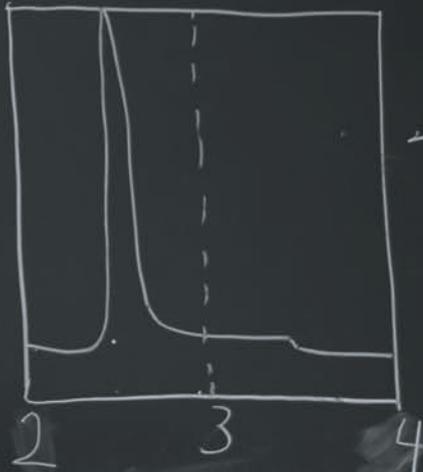
Formation of Pulses (Contour Plots)



Time 1
By Michael Dorsey | Photography Patrick O'Connor



Time 2



On October 4, 1957, an R-7 rocket rose from a launch pad in Central Asia. Less than 10 minutes later it released its cargo: a metal sphere the size of a beach ball, within which was a radio transmitter that announced the dawn of the Space Age with a continuous broadcast of high-pitched beeps.

Some 2,000 miles away, at the westernmost edge of the USSR, Konstantin Lurie was pursuing a BS in radio-physics at the renowned Leningrad Polytechnic Institute. While he could not have known it then, the launch of *Sputnik 1* would become both an inspiration and a metaphor for the two groundbreaking eras in his long career in applied mathematics.

A DYNAMIC MIND

"The world around us is filled with objects that demonstrate variability in their material properties not only in space, but also in time."



Like all machines built for space travel, *Sputnik* and the R-7 were the products of optimization — of refining, honing, and planning until a goal can be achieved with high precision and little waste. They were made from alloys and composites carefully crafted for optimal function. And as it slipped through the atmosphere, exchanging energy, mass, and momentum with the environment around it, the R-7 was a model for a new and remarkably versatile category of materials, ones that change in time as well as space.

Though *Sputnik* plunged to Earth three months after it reached orbit, it had a lasting influence on the trajectory of space exploration. Similarly, nearly six decades after he published his first scientific paper, Lurie not only continues to open new horizons in his field, but to influence and inspire new generations of scholars who are building on the well-crafted foundation he assembled.

Far and Wide

As he recalls the origins of his career, he credits two main influences. The first was his father, Anatolii Lurie, an eminent scholar in the field of mechanics and control. Growing up in Leningrad (today's St. Petersburg), the young Konstantin watched his father toil over 10 influential books. Today, he keeps these volumes (almost all of which have been translated into English) close by in his office at WPI.

Holding up one, he says, "I feel that at his time, it was at the forefront of current research on elasticity, and I am really proud of that." Of a multi-volume work on mechanics, he says, "It's a classical field, but he made it possible to give a composition that is very original and it is surprising how he managed it. So I was very fortunate to have received my upbringing from him, but he was not my only mentor."

After graduating from Leningrad

Polytechnic, Lurie received a PhD at the A. F. Ioffe Physical-Technical Institute of the USSR Academy of Sciences, also in Leningrad. He then joined the institute's mathematics department and became part of a group of applied mathematicians led by Georgii Grinberg, whose scholarship was known worldwide. He says Grinberg believed applied mathematicians should look to the real world for inspiration.

"The natural world is a great source of ideas for applied mathematics," Lurie says, "and that is the main lesson I learned from Professor Grinberg."

Lurie worked briefly on diffraction theory, a general focus for the Ioffe group, but soon began looking, as he says, "for my personal way to go." With *Sputnik* having brought optimization to the forefront, he wondered whether that idea might offer an interesting way forward. "I realized that optimization goes beyond flight — in other words, when and where to correct your orbit or your trajectory," he says. "Optimization goes very far and very wide. It goes, for example, to building things: houses, airplanes, automobiles, and so on."

He decided that optimization, when applied to design and construction, was a fertile field. "Over the millennia, optimization has been an art and not a science," he says. "It was at the level of intuition accumulated through centuries of experience. Architects and designers had a deep understanding of these principles, but it had never been made a part of mathematics."

For Lurie, optimization meant placing only the materials that are absolutely necessary exactly where they are necessary to achieve one's goals. And with the materials, themselves, it meant combining two or more substances into composites so that the layout of the components, at the micro scale, offers the optimal performance at

every point in the construction. He called this optimal material design.

What might seem, intuitively, like an optimal layout often isn't, Lurie says. He provides an example in the form of a thought experiment. Assume, he says, that you have a rectangular space into which heat flows from the top. The sides are made from perfect insulators, so all the heat travels to the bottom, where it exits. Now assume you want to focus that heat on just one section of the bottom boundary. To do so, you can add two kinds of material to the interior: a good heat conductor and a poor heat conductor (though not a perfect insulator). It might seem logical to add triangular sections of the poor conductor at the sides to funnel the heat toward the target, and to then fill the rest of the interior with the good conductor.

But that is not the optimal solution, he says. Instead, you create a structure that looks more like a W. On the outside of the W you place the poor conductor. You fill the middle, upward-pointing triangle with the good conductor. In the other triangles, you install a laminate made of alternating layers of good and bad conductor, slanting inward toward the middle triangle. As heat crosses the borders between the layers, it changes direction, becoming more and more focused on the target.

"There will be as many jumps as you have layers," he notes, "and you need infinitely many layers. In other words, you need to alternate the materials on the microscale. And this is a key idea. This idea came to me at the early stage of my work with optimization. It came about as a result of physical reasoning, and the mathematics was a consequence of that. I realized that to work effectively, to solve a problem both analytically and numerically, you first needed to formulate that problem properly."

Starting in the 1960s, Lurie and

Andrei Cherkav, a former student (Lurie calls him "one of the most inventive, original, and powerful minds I ever met") who went on to become a distinguished professor at the University of Utah, built the mathematical underpinnings for this new subdivision of applied mathematics. Among their discoveries was that to determine the optimal layout of materials, one may consider all possible layouts — a range of possibilities they called the G-closure set. From that set, the ideal combination could be mathematically determined.

Lurie and Cherkav showed that creating these sets is mathematically possible, though technically demanding. They established the sets for a number of important cases, and the growing body of optimal materials scholars around the globe completed others. But Lurie says just as important was the realization that it is not always necessary to know all possible combinations; some design needs can be met with a simpler approach. He likens the G-closure set to a car mechanic's complete toolbox. "To change a tire, you need just a few wrenches, not the whole toolbox."

By extending the formulation of the G-closure, Lurie was able to give designers simpler tools they could use to apply optimal design to particular, narrow problems. These tools helped bring optimal design into the real world, where it has been used by many industries to create materials for applications ranging from automobile bumpers to jet engine turbine blades.

Time and Space

In the late 1980s, Lurie prepared to flee his home city for the second time. As a child during World War II, he and his family evacuated before the start of the German siege. Now, the ethnic nationalism and anti-Semitism that had simmered below the surface in the USSR was

becoming more overt as the empire began to fall apart. In 1988, he decided to move his family to the United States.

His international reputation won him a temporary post as Paul G. Goebel Visiting Professor at the University of Michigan. A year later, Samuel Rankin, recently retired associate executive director of the American Mathematical Society, who was then head of the Mathematical Sciences Department, invited him to join the WPI faculty.

The move coincided with the start of a shift in Lurie's focus. "My work until then had concerned itself with static objects," he says. "Static objects are dead materials. They work in space alone; they are time invariable. But the world around us is filled with objects that demonstrate variability in their material properties not only in space, but also in time."

Consider the R-7 rocket lofting Sputnik into orbit. As it consumes its fuel, heat and combustion products leave the rocket in a jet of exhaust while the rocket loses weight and gains momentum. Friction with the atmosphere warms the rocket's exterior, while the fuel tanks, as they empty, lose some of their stiffness. "So now we deal with a material whose properties are variable in space *and* time."

Lurie called these objects dynamic materials. They are characterized by exchanges, or fluxes, with the environment. They exchange mass, momentum, and energy, and their properties change in the process. Described in physical terms, dynamic materials are thermodynamically open systems. The largest group of dynamic materials are living organisms, including the human body. "Your body is a framework, and this framework is acted upon by fluxes," he says. "This union, of framework and

fluxes, is what I call a dynamic material."

Looked at this way, the notion of a dynamic material encompasses a broad range of systems—physical and conceptual. For example, Lurie says, it can be applied to traffic on a roadway. "That is not a physical system," he says, "but it is a spatiotemporal entity—a dynamic material.

"This is a universally significant idea. It embraces almost everything. And it is consistent with Einstein's theory, which says that space and time constitute a union," he says. "It is, conceptually, a relativistic concept.

"I arrived at this understanding from the gate of optimization," he adds, "from an attempt to work with optimal systems, the properties of which are dependent on space and time. To this end, the necessity appeared to work out the mathematical techniques similar to the G-closure issues. But it turned out that the mathematics of spatiotemporal optimization is very much different."

Lurie began to define those unique mathematical principles in a pioneering 1997 paper in the *International Journal of Solids and Structures*. It was in that work that he first described some of the remarkable abilities that might arise when materials can be controlled in such a way that their properties vary simultaneously in time and space. They include structural materials that can screen out disturbances (imagine a building that can shield its inhabitants from the seismic waves of an earthquake or a vehicle that can protect its occupants from the shock waves of a roadside bomb) and negative index materials that bend light around themselves, rendering objects invisible. (A decade later, Lurie published the definitive book

on the field, *An Introduction to the Mathematical Theory of Dynamic Materials* (Springer, 1997). The second edition was released in 2017 with 50 percent more content.)

What is now considered a classic implementation of the theory of dynamic materials emerged from a collaboration between Lurie and Suzanne Weekes, professor of mathematical sciences. In a 2006 paper in the *Journal of Mathematical Analysis and Applications*, they explored a way to change the properties of an electromagnetic wave as it travels through a dynamic dielectric material. "To change its properties in time, you need to commit work against the propagating wave," Lurie says. "And to commit work, you need an external agent. You need the environment."

The paper explored a new way of creating a transmission line, which electrical engineers define as a linear array of cells, all of which have a specific inductance and capacitance. Lurie and Weekes imagined, instead, a two-dimensional array with two kinds of cells, each with its own inductance and capacitance. They called these combinations "Property 1" and "Property 2." The cells would alternate in both dimensions, spatial and temporal, like the white and black squares of a checkerboard.

To this end, they imagined that each cell could have a switch that would instantly change its properties, so all cells with Property 1 would now have Property 2, and vice versa. At regular intervals, the switches would be activated. Properly designed, this double-periodic array of materials, through the temporal switching, would act on an electromagnetic wave traveling through the array, turning the work supplied by an external agent against the wave and causing it to

accumulate energy.

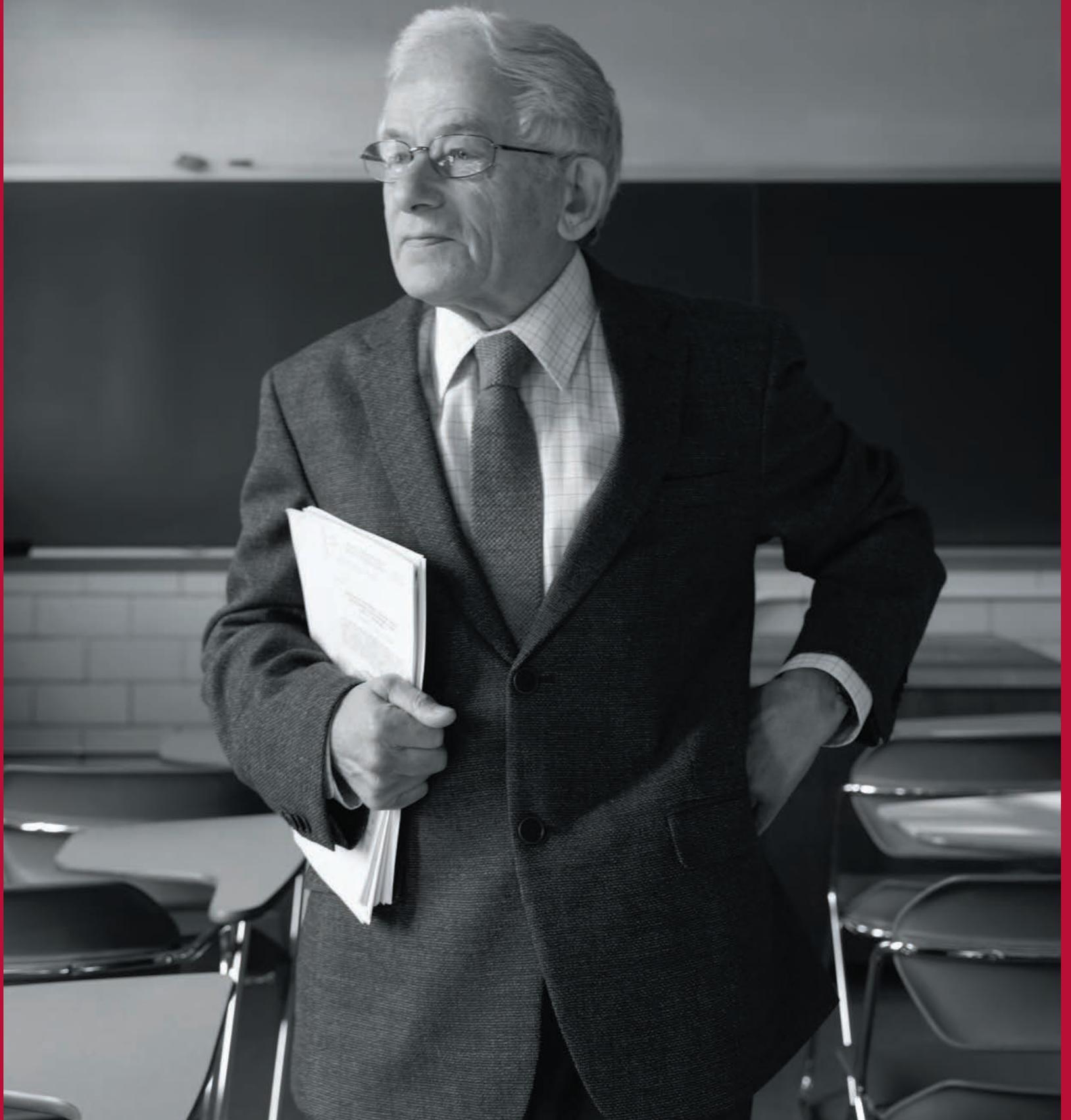
The effect is very much like the energy pumping that happens inside a laser, but "it operates on an entirely different principle," Lurie says. "The checkerboard is, first and foremost, about focusing. And it is a kind of universal principle, in our opinion. We are seeing other applications of this principle, and we expect to find many others." (As one example, a paper presented at the 2017 Institute for Mathematics and its Applications in Minneapolis, where he was the keynote speaker, described a real-world application by mathematicians in Paris involving shallow water waves.)

"So it is not hard to see what is going to happen if we persistently apply these concepts in various directions. Optimization in space and time is an extremely promising trend. It promises a lot, in applications like electromagnetics, power generation, robotics, and more." Lurie, himself, is interested in using the checkerboard concept to gain a better understanding of some of the behaviors of living systems that are not fully understood—for example how worms and snakes propel themselves. Such knowledge could help create more effective snake-like robots.

Lurie becomes energized as he considers the prospect of (as his mentor Grinberg advised so long ago) turning to the natural world for new examples of dynamic materials. Now in his early 80s, he shows no sign of slowing down. "Because the deeper you go, the more interesting things become," he says. "You never know where this interest might exhaust. You never know that."

Indeed, it might be said that among all the materials that surround and fascinate him, Lurie remains the most dynamic of all. **J**

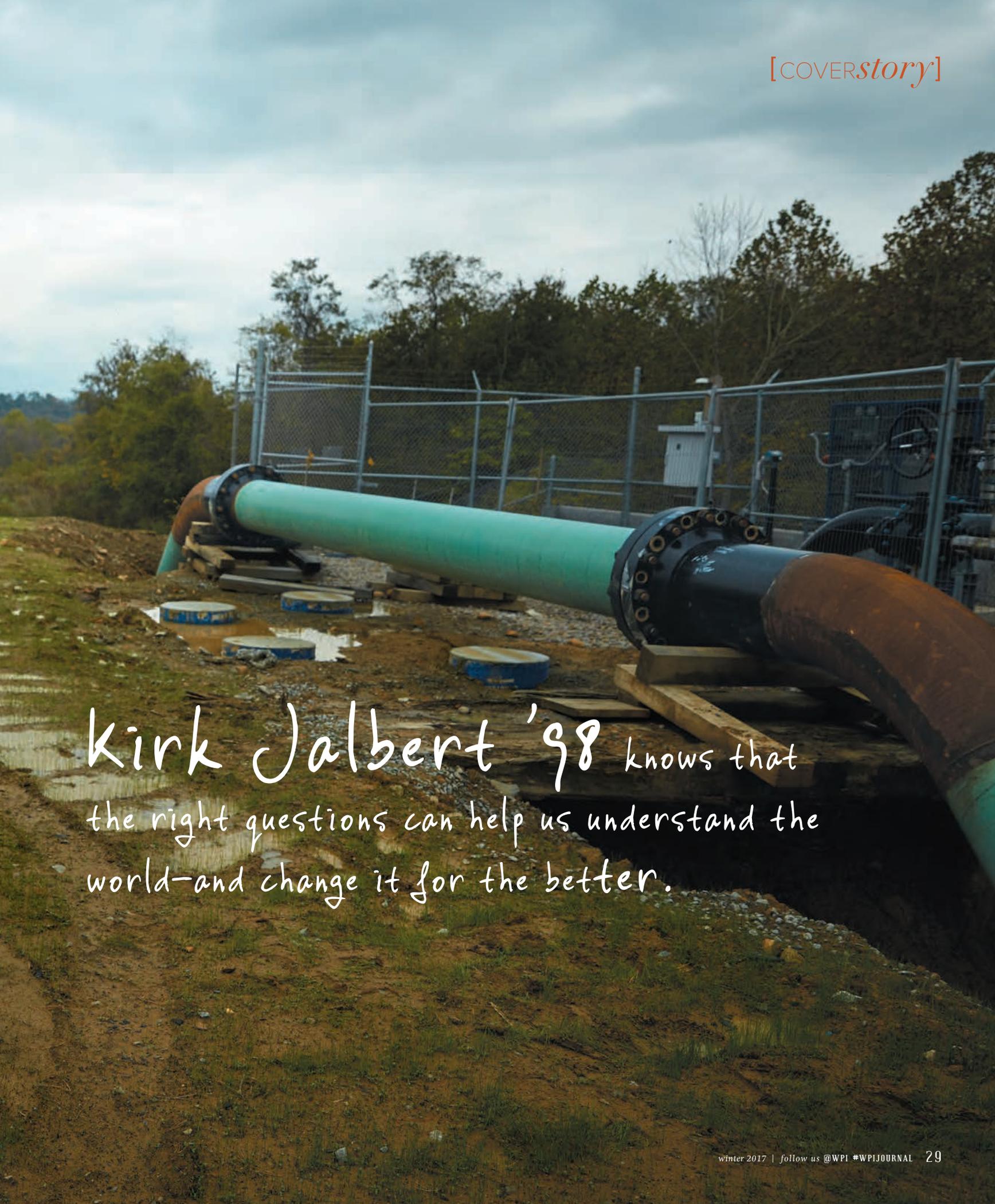
"The deeper you go, the more interesting things become."





driven to explore

By Erin Peterson | Photography Matt Furman

A large green and black pipe is lying horizontally on a construction site. The pipe is supported by wooden pallets. In the background, there is a chain-link fence and some trees. The sky is overcast.

Kirk Jalbert '98 knows that
the right questions can help us understand the
world—and change it for the better.

People in technical fields greatly benefit from reading widely across history, philosophy, politics, and art. One quickly realizes how inseparable these worlds really are. Choices made in the sciences inevitably impact society and we must be attuned to these realities in our work.



When Kirk Jalbert was growing up in Billerica, Mass., he spent much of his time devouring science fiction books: Isaac Asimov's *I, Robot*, Robert Heinlein's *Stranger in a Strange Land*, Frank Herbert's *Dune*.

He loved the feeling of being dropped into an unexpected world and exploring it for a few hundred pages, but he was more excited by the kind of thinking that prompted the stories in the first place.

"Science fiction is a genre that starts with a question," he says. "What happens if you alter the terrain of a planet, and what would that do to its citizens? Or, 'What would you do if you had a time machine?'"

Later, when he began his college search, he knew he wanted to continue exploring the way science and technology intersected with the world. He considered many schools—Cornell and MIT, for example. WPI won him over.

He was intrigued by a new science and society degree that some faculty members were just beginning to develop. WPI made Jalbert's decision easy—with a solid financial aid package. As a first-generation college student, he was committed to making the very most of the experience.

AN EDUCATION DRIVEN BY QUESTIONS

Jalbert majored in computer science, but he leavened his technical courses with humanities classes that allowed him to think about the big questions that had long fascinated him. "I took pretty much all the philosophy, art, and history courses I could get my hands on," he says.

He pulled those threads together for his Interactive Qualifying Project, interning for Massachusetts state senator David Magnani, who was then chair of the Science and

Technology Committee. He listened and took notes as constituents weighed in on an appropriation bill designed to bring more technology into the classroom.

He worked on the project in the mid 1990s—an inflection point for educational technology. "We were debating whether or not there should be laptops in the classroom," he recalls. "It was one of the first times that different agencies were having to grapple with technology in that way."

It was a debate that might have fueled its own science fiction book: "What happens when machines teach our children?" Now, of course, the debate is all but settled. Classrooms today are filled with many types of sophisticated technology.

Later, for his Major Qualifying Project, Jalbert analyzed who was using interactive technologies in the displays and exhibits at the Worcester Art Museum and how it shaped their experiences. His MQP was one of the first at WPI to study the human side of human-computer interactions.

David Samson, associate professor of art history, says Jalbert's ambitious projects on off-the-beaten-path topics reflected a deep curiosity that seemed to be embedded in his DNA. "Kirk was always a more-than-one-discipline pursuer of big questions," Samson recalls, describing Jalbert as a student with strong drive to educate himself.

That curiosity was the thread that nudged Jalbert from one path to the next, pursuing ever-larger questions in increasingly expansive ways.

EXPLORING NEW WORLDS

After graduation he headed into a corporate IT position, a common path for computer science majors. It might have seemed to be a dream

job: the position paid well and he was quickly promoted. But to Jalbert, the work felt less meaningful than the projects he'd been tackling at WPI.

He cast about for other opportunities and was offered a job in a digital printmaking studio. The role required him to do high-end imaging and editing work for artists, and the miniscule salary ("a tenth of what I'd been making," he recalls) didn't deter him. The chance to work in a world sloshing with creativity inspired him, and he left the corporate world without a second thought.

Soon he was more immersed in the art world than he might have imagined, given his computer science background. He pursued his own artistic interests more seriously, and he brought his technical background to bear on photography and other types of art, including interactive sculpture, sound, and video installations. He landed a job as an adjunct professor teaching photography courses at Clark University, and later earned a master of fine arts at the School of the Museum of Fine Arts, Boston.

If the turn to art seemed surprising, the philosophy that propelled it was familiar. Jalbert was using art as a way to explore some of the same questions that fueled his interest in science fiction novels as a kid. "Science fiction is about asking a question and writing a whole book about it to see where it goes," he says. "I wanted to bring that same approach into an arts environment."

As he delved further and further into his art and teaching, his interests expanded. Jalbert shifted his teaching to include more media, culture, and technology studies courses, knowing he wanted to go deeper into these topics.

MAKING DIFFICULT SCIENCE WIDELY MEANINGFUL

In 2010, Jalbert began a PhD program in Science and Technology Studies at RPI, where, in some ways, he found his way back to where he'd started—examining the ways science and technology shape society and culture, and how that process can work in reverse, as well.

One of his first research projects involved designing and deploying "culturally situated" software and hardware tools for STEM education workshops with Navajo school groups. Little did he realize that spending time in the Southwest would radically change the direction of his work. Witnessing the extent to which the coal, oil, and gas industry dominated the Navajo Nation landscape had a profound impact.

"I grew up in Massachusetts where people don't really think about where their energy comes from, or how it impacts people who live everyday with fossil fuel extraction. It's an ethical dilemma that's difficult to ignore once you see it."

As part of his dissertation work, and with support from the National Science Foundation, Jalbert delved into understanding how people in these communities responded to environmental and public health risks. In particular, he studied citizen science water monitoring groups that were popping up in the Northeast in response to shale gas extraction. (Research indicates that such work can have an impact on both groundwater and surface water quality.)

He examined where these groups were being launched, who was supporting them, and why. It turned out they were most likely to be found where there were universities, funding organizations, and retirees who had time to volunteer. In general, impoverished areas did

not have such groups. Equally interesting, he studied how average citizens became fluent in science and used data to tell compelling stories.

During his fieldwork he connected with FracTracker Alliance, a nonprofit that helps the public understand the risks of oil and gas development. The organization specializes in science communication, such as infographics, maps, and digital storytelling.

Jalbert was focused on the academic work that would land him a PhD, but he also deeply appreciated FracTracker's overarching philosophy. By 2015 he had joined the organization full-time as an employee; he is currently the manager of community-based research and engagement. He also now sits on the state of Pennsylvania's environmental justice advisory board.

On a daily basis, he's charged with projects, including mapping, data analysis, and writing, linked to the oil and gas industry. He occasionally leads "difficult data" workshops in communities where oil and gas industry projects, such as pipelines, are likely to have an impact. As part of these efforts, he nudges concerned citizens to share their biggest questions—and he works with them to create a plan to help answer them.

Recently, for example, he helped community members in Greeley, Colo., understand what it meant when an oil and gas company announced it planned to put in a well pad—an area cleared for natural gas and oil extraction—just 600 feet from a middle school playground in a low-income, Latino neighborhood. He and others on the team led a workshop, mapped the area, wrote about it, and translated much of the work for the predominantly Spanish-speaking community. The work attracted national

attention, and the community is continuing to debate the best path forward.

Though the work is time-consuming, Jalbert has appreciated the chance to have a real impact. He sees it in the meetings, and he can measure it when he posts a story on the website that pulls in a thousand readers. In recent years, FracTracker's easy-to-understand data has been cited by one government official as a key source that led New York Governor Andrew Cuomo to ban hydraulic fracturing in the state. "This work gives people real tools to be able to protect their communities and determine their own futures," says Jalbert.

As he came to realize both the pitfalls and the potential of how citizens use data to get more involved in environmental debates, he wanted to be able to move beyond a single application; to use this knowledge to help answer the bigger questions about science, technology, and people.

Soon, he'll be in a role that will allow him to do just that.

Thinking about the future

In June Jalbert will bring his unique skills to Arizona State University's School for the Future of Innovation in Society, where he'll become a tenure-track professor with a joint appointment in the School of Computing, Informatics, and Decision Systems Engineering. The role will connect work in the social studies of science and technology to applications in informatics. He's excited to be able to transport the lessons he learned from facilitating public engagements with extraction issues and apply them to other types of problems.

The move seemed like a clear next step in forwarding his most powerful questions to a much

bigger stage. "Finding pathways to expand civic engagement when people are coming to terms with some of the greatest dilemmas of our time, such as climate change for instance, will require that we rethink our relationships to institutions and each other. How can we utilize novel technologies to enable these transitions, to build a more sustainable and equitable future?"

The questions are lofty, but their implications are real. Jalbert has begun to understand their ramifications in a more visceral way—he and his partner became parents of a son in September, and he thinks constantly about the world that their child will grow up in. He feels the weight of that responsibility, and hopes he can encourage the students he teaches to take their own power as citizens—and the work they do in the sciences—seriously.

"It's often the case that students assume engineering is exclusively about the problem itself and not the application or implications," he says. "But if you work on water systems in Flint, Mich., or you're asked to adjust software in a car to illegally pass emissions inspections, you'll have decisions to make about whether those things are right or not," he says. "How can we ensure that students develop a sense of responsibility about their work and to society?"

Ultimately, he hopes his own story can encourage his students to think broadly about how they can use their education. "There is no obvious path," he says. "But if their careers are guided by a passion for inquiry, a willingness to take risks, and a strong sense of ethics, then I think the next generation of scientists and engineers will truly change the world for the better." **J**





It's hard to believe that 30% of our nation's energy still comes from coal-fired power plants, a technology that dates back to the 19th century. As we transition to renewables, we must also find ways to transition communities that have been dependent on coal production for generations. Part of this will be retooling STEM education to prepare the next generation for careers in sustainable and environmental responsible jobs.



PHOTO MATHEW HEALEY

DIDI DAI '18 was born in the biggest city in southwestern China, but now proudly considers this small private university home.

The Industrial Engineering and Management Information Systems double major came to WPI for its low students-to-faculty ratio, its community-focused atmosphere, and the success many high school STEM graduates find soon after graduation.

Having grown up admiring her father, an efficacious entrepreneur in China, Dai chose to combine her love of engineering with a business facet, to get the most of her education.

So far, Dai says that WPI has improved her academic strengths, enriched her professional knowledge base, and helped her shape a new outlook on life.

Heavily involved in groups on campus, Dai has extended her network and gathered valuable experiences along the way. As the first undergraduate president of the American Production and Inventory Control Society (APICS), she proudly explains that although the organization is new on campus, it already has over 150 student members. “We provide professional certification training, conference opportunities, plant tours, student competitions, networking panels, and professional development meetings,” she says. With a strong connection to alumni, APICS posts many job opportunities for students. She is also the program director for the Institute of Industrial and Systems Engineers (IISE), where she has helped organize the Lean Green Belt and Six Sigma Green Belt certification training.

One of her most satisfying group involvements comes through membership in Alpha Gamma Delta sorority on campus. Here, she says she “feels more confident than before. I tend to be more talkative, and more active in student activities.”

Through AGD Dai participates in many community service opportunities; she is heavily involved in the sorority’s efforts to raise money for those who struggle with hunger. “All the sisters in AGD live with purpose. We are a group of smart and healthy girls with positive attitudes toward life. With their support, I have no fear in taking on challenges, and trying new things.”

Now in her senior year, Dai took a moment to consider advice for anyone thinking about attending WPI. “I would recommend WPI to potential students who are passionate about their studies and want to really make an impact in their field. If students enjoy being surrounded by like-minded individuals who are invested in their interests and pursue them because they truly enjoy them, then WPI is the place for them.”

HONORABLE MENTIONS: PRESIDENT, APICS WPI CHAPTER • VICE PRESIDENT, ALPHA PI MU HONOR SOCIETY • PROGRAM DIRECTOR, IISE WPI CHAPTER
• MEMBER, ALPHA GAMMA DELTA • DEAN’S LIST • LEAN GREEN BELT CERTIFICATION • SIX SIGMA GREEN BELT CERTIFICATION

ARKADY GOBERNIK '20

Hometown: Tel Aviv, Israel

Major: Mechanical Engineering

Involvement:

Tau Kappa Epsilon Fraternity

CEO of Gompei's Goat Cheese

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josé luis ortiz '14

inbound

strategies

BY AMY CRAWFORD | PHOTOGRAPHY MATT FURMAN



HubSpot



Since signing on as a senior implementation specialist at HubSpot in 2016, José Luis Ortiz has helped businesses throughout Latin America take advantage of the marketing and sales tools the Cambridge-based tech company develops. But there's one client he's particularly proud to have worked with.

"My dad," he says. "He has had his own company for about 20 years."

The official sales representative in Ecuador for a German corporation that makes industrial measurement equipment, Luis Anibal Ortiz had built his business serving major oil companies, and even the water utility, in the capital city of Quito. He didn't need marketing services, but when he learned about HubSpot's free customer relationship management (CRM) software, he figured it was worth a try.

"I went to the HubSpot webpage just to inform me where José Luis is working," the elder Ortiz recalls. "I was surprised to find a free sales

CRM that could fit to my company. We tried it for a short time, testing the free options offered."

José Luis was excited to learn that his father was using the tool. "Our free CRM is a game changer," he says. "He implemented it, and he was in love with it. He tested it out for a few months, and then he was, like, 'Hey, I think I'm ready to buy it. I'm seeing value from this.'"

Soon, his father was a paying HubSpot client, purchasing sales tools that would help his business run more smoothly.

While José Luis works hard to ensure that all the HubSpot clients he works with get the services they need, this business relationship ran deeper, and it helped father and son gain new insights into each other's professional lives. For the elder Ortiz, who had moved his son into a dorm room in far-off Massachusetts just six years earlier, and the younger, who dreams of returning home to Latin America after finding success in the United States, the deal was a source of deep pride.

"That may have been one of my greatest experiences working with customers," Ortiz says. "I'm helping my dad's company—and now he can actually tell people what I do!"

INBOUND LANE

Luis Anibal could be forgiven if he initially had a fuzzy idea of his son's job. HubSpot's specialty, known as "inbound marketing," is a fairly new idea. It was essentially invented with the company's founding in 2006. It contrasts with traditional "outbound marketing," or advertising. Whether it's a banner ad on a website, a poster in a subway station, or even a Super-bowl commercial, outbound marketing sends a company's message out to the world. Cold-calling and email blasts are similarly directed and, like advertising space, lists of leads and email addresses can be expensive. Inbound marketing, on the other hand, lures clients in. It involves publishing content, including blog posts, videos, and educational articles, or providing free services.

"It focuses on creating quality content," Ortiz explains, "so that people are attracted to your brand, as opposed to you just trying to reach out to anyone and everyone."

Inbound marketing offers a less expensive approach, so it appeals to small- and medium-size companies, which make up the bulk of HubSpot's clientele. Ortiz works on a team that serves the company's growing Latin American sector, with a portfolio that includes everything from car dealerships and software companies to universities to NGOs.

"There's a lot of opportunity to revolutionize marketing and sales in Latin America, because they're still pretty traditional," he says. "And inbound works well for a wide range of businesses."

Ortiz's relationship with clients begins as soon as the HubSpot sales team closes a deal for services, and continues for the first 90 days of a contract. His job is to work one-on-one with clients to put together a plan for how they will use HubSpot's various tools—

including the CRM automated emailing and content creation software.

One recent client, an auto dealership in Mexico, wanted to try a different approach from the hard-sell that car salespeople are often known for.

"Auto dealers in Mexico usually work the same way they do here—someone will drop by, the dealer will try to sell right away as opposed to helping first," Ortiz says. "It's funny, because car dealerships are pretty much the antithesis of inbound marketing. 'Sell first, I don't care what you need, or what you think, or even what you are looking for.' Our sales team for Latin America has seen a lot of opportunity with this type of company, because that [way of selling] is not working anymore."

Ortiz helped the Mexican dealer create a blog with information about car maintenance—how to change a tire; how often to replace your oil. Aimed at local drivers, the content was intended to draw in potential car buyers by providing friendly, useful advice. Meanwhile, other HubSpot tools automated the process of contacting people who had given the dealer their email addresses.

"It is something that they hadn't done before," Ortiz says. "They were happy with that, and they will do some good things with it in the near future."

NEW INTERACTIONS

HubSpot recruited Ortiz, who grew up in Ecuador, a country of about 16 million people, in large part because he is bilingual, an ability in demand in the Massachusetts tech industry. But cross-cultural fluency has proved nearly as useful as language skills. Ortiz is often called upon to bridge U.S. tech culture (open offices, casual attitudes, flattened hierarchy) and

Latin America's more formal business code, where relationships and face-to-face conversations are of prime importance.

"They're completely different worlds—the way they consume information, the way they do marketing, and the way they buy and sell," he explains. "In Latin America, personal interaction is a lot more valued and a lot more required."

While he has too many far-flung clients to visit them all, Ortiz does his best, traveling to workshops in Mexico and Argentina and scheduling meetings with clients who attend HubSpot's annual conference, Inbound, in Boston. It's also essential to turn on the camera when conducting a web-conference with Latin Americans, something he has found people in the United States can be reluctant to do. And of course, the fact that Ortiz is Latin American himself also helps make clients comfortable—especially if they happen to be from Ecuador.

"I've had a few big-brand retailers that everyone in Ecuador knows," Ortiz says. "I'm like, 'Hey, I'm from Ecuador. I know you guys!' And they're like, 'Oh, that's so cool!'"

He savors these unexpected connections with the country where he grew up, and where most of his family still lives. The valedictorian of his Quito high school, he had long intended to pursue an education abroad. His original goal was Monterrey Institute of Technology, in Mexico, where his older cousin had studied engineering. He was accepted, but his father encouraged him to apply to some universities in the United States, as well. The U.S. has the best schools in the world, Luis Anibal said.

"So I decided to give it a shot," says Ortiz.

He applied to a few universities

and wound up with a generous scholarship offer from WPI, which sealed the deal.

CULTURE SHOCK

Aside from a few summertime visits to an aunt in Minnesota, Ortiz had spent little time in the United States before he arrived in Worcester in the fall of 2010. Like many international students, he experienced a touch of culture shock.

"My first week, my parents came with me to help me buy all the stuff I would need," he says. "When I had to say goodbye to them, I was crying, 'What am I going to do?' It was definitely a bit of a struggle. But I think I was lucky enough to get a really good group of friends from the start. There is a huge Latin American population at WPI, and everyone was going through the same thing. We all spoke Spanish, and we came from very similar cultures. That made it all easier."

Ortiz settled in, and by the time his younger brother was applying to colleges, he liked WPI so much that he could recommend it wholeheartedly. (Sebastian Ortiz graduated in 2016.)

José Ortiz served as president of the industrial engineering honor society, Alpha Pi Mu; he did his IQP in Melbourne, Australia; and he aced his classes, majoring in industrial engineering.

"He was a wonderful student ... professional, dedicated, creative, and our meetings were actually really fun," says Professor Renata Konrad (School of Business). When she directed Ortiz's MQP, which took him to Billerica-based biotech supply manufacturer EMD Millipore, Konrad was particularly impressed by his ability to communicate with different people. "[He and his team] were 20-year-old students discussing process changes with EMD Milli-

pore employees who have been on the shop floor, some of them for over 30 years," she says. "José did a fantastic job communicating."

School of Business Professor Sharon Johnson was similarly impressed by Ortiz's people skills.

"I remember him as a student who always greeted me with a smile and a big hello," she says. And although he could have succeeded in industrial engineering, she is not surprised that his career took a different course. "Because IE is focused on systems and the interface between people and the systems—and the technologies that support the systems—it provides a springboard to careers in other areas."

In Ortiz's first job after graduation, working as a business analyst for a supply chain IT consulting company based in Andover, Mass., he used many of the skills he learned in his classes. But despite his interest in manufacturing, his real passion is doing his part to help Latin America grow and thrive. While he enjoys his life in the United States—work-life balance is big at HubSpot, and he has plenty of time to travel—he yearns to make what he calls "a successful return." Initially, perhaps, he may be part of a potential HubSpot satellite office.

"But in the long term—not even long term ... medium term," he says, "I definitely want to start my own business down there. The actual concepts and theorems are probably not that helpful, because I'm not doing anything related to them, but I don't think you go to class for that. You go to class to shape your work ethic, and the way you work is different at WPI. So I pretty much hit the ground running when I got out!"

Whatever lies in store, Ortiz is confident that WPI has prepared him well for it. **J**

Adrienne Hall-Phillips

ASSOCIATE PROFESSOR, PROGRAM DIRECTOR, UNDERGRADUATE BUSINESS & MANAGEMENT ENGINEERING

PHOTO. LANGA TOWNSHIP, CAPE TOWN, MARCH 2006. WHEN I FOUND OUT WPI HAD A PROJECT CENTER IN CAPE TOWN, I KNEW THIS WAS GOING TO BE THE PLACE FOR ME.

BALL JAR. ONE OF THE MANY TREASURES FROM MY LATE GRAND-FATHER. HE WAS THE ONE WHO ORIGINALLY SPARKED MY CURIOSITY AND LOVE OF LEARNING.

PHOTO. KÖLNER DOM, JULY 2004. I LIVED AND WORKED IN GERMANY DURING MY PREVIOUS CAREER WITH JOHNSON & JOHNSON. MY LOVE FOR ALL THINGS GERMAN, AND MY APPETITE FOR CULTURES DRAMATICALLY DIFFERENT FROM MINE STARTED HERE.



SWEATER. NORTH CAROLINA A&T STATE UNIVERSITY. MY FIRST ALMA MATER. I CAME INTO MY OWN, FOUND LIFELONG FRIENDS, TRAINED AS A CHEMICAL ENGINEER, AND MET MY ACADEMIC INSPIRATIONS, MENTORS GARY TATTERSON AND KENNETH ROBERTS. AGGIE PRIDE!

PEN & PAPER. AS MUCH AS I LOVE ALL THINGS DIGITAL, MANY TIMES I STILL USE PEN AND PAPER. AS A MARKETER AT A TECH SCHOOL, I AM CONSTANTLY CHALLENGING MY STUDENTS TO REMEMBER THE BASICS, LIKE HOW CONSUMERS THINK, WHAT THEY NEED TO LIVE, HOW THEY USE PRODUCTS/ SERVICES—MORE THAN JUST THE TECHNOLOGY AND SCIENCE BEHIND IT ALL.



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AT THE LONDON HOUSE OF LORDS. FIRST TIME ADVISING AN OFF-CAMPUS IQP, AND I GOT TO ATTEND A WPI ALUMNI EVENT AT THE HOUSE OF LORDS. WOW!

NSBE KEEPSAKE. I ADVISE THE WPI CHAPTER OF THE NATIONAL SOCIETY OF BLACK ENGINEERS. THIS IS A GIFT OF APPRECIATION FROM MY VERY FIRST GROUP OF STUDENT OFFICERS. I WAS VERY ACTIVE IN NSBE AS AN UNDERGRADUATE. IT SHAPED ME AS A LEADER, LED TO MY FIRST JOB, AND IS HOW I MET MY HUSBAND.



ON NOVEMBER 1, WPI hosted one of the most inspiring events in university history—the inaugural WPI Hall of Luminaries Induction Ceremony. More than 400 students, faculty, staff, alumni, and friends gathered in the Sports & Recreation Center to see 11 WPI community members inducted into the hall (see special insert). After the ceremony, the attendees made their way to the upper level of the Rubin Campus Center for the official opening of the permanent Hall of Luminaries exhibit. The celebration continued into the evening with a special dinner in Alden Memorial for the Luminaries and their guests.





LETTER FROM THE ALUMNI PRESIDENT

Dear Alumni:

The WPI Hall of Luminaries celebration on November 1 lived up to its promise of being one of the most inspirational moments for the WPI community. The Selection and Balloting committees did an exceptional job choosing luminaries who exemplify WPI's guiding principles of theory and practice, and who have achieved such a positive, transformative impact on the world. I am so proud to share an association with these remarkable individuals – three of our founders, John Boynton, Stephen Salisbury II, and Ichabod Washburn; George I. Alden, 1926 (Hon.); Curtis R. Carlson, 1967, 2006 (Hon.); Robert H. Goddard, 1908; William R. Grogan, 1946, 1949 MS, 1990 (Hon.); Dean Kamen, 1973, 1992 (Hon.); Judith Nitsch, 1975, 2015 (Hon.); David Norton, 1962; Richard T. Whitcomb, 1943, 1956 (Hon.).

I encourage you to read about them in the special insert in this issue of the *WPI Journal* or online at wpi.edu/+luminaries, where you may also nominate someone for the next induction in 2019. The next time you're on campus, be sure to visit the new Hall of Luminaries exhibit on the upper level of the Rubin Campus Center.

Reunion planning is also well under way for Alumni Weekend 2018, May 31–June 3. Registration will open in a couple of months, so keep this web address handy: wpi.edu/+alumniweekend. You don't want to miss this fun-filled weekend back on the Hill.

Coming up on February 14 is another one of our time-honored traditions – our philanthropy day, this year called #wpiloves, when the WPI community will celebrate love for our donors, love for WPI, and love for giving back. More details will be coming soon, and I invite you to



participate in any way: follow the day and join in on social media; take a look at the emails you receive; if you're near campus – stop by. It's always a fun and informative day about one of WPI's longest and most important traditions: giving back.

The coming months bring many more opportunities to stay connected and get involved. Community Service Day will be coming up before we know it, and many more spring events are in the works – so be sure to keep an eye on your email and check the Alumni Calendar on the alumni website, wpi.edu/+alumni.

If you're not able to make it back to campus this spring, I hope you'll stay connected through Class Notes, following WPI Alumni on social media, participating in a Brazen event, making a gift to the WPI Fund, or attending a WPI alumni event in your area. I also encourage you to email me at wheelerda@alum.wpi.edu with your ideas and feedback.

My best,

David '93'04

David Wheeler '93, '04 MS



HUMBLE BEGINNINGS

John Cunic Offers Support Close to Home

“From the day I learned engineers were the ones responsible for the construction of things, I knew I wanted to be an engineer.” Self-proclaimed Worcester “townie”

John Cunic '68, '71 MS, shared this comment in a recent interview, adding that he set his sights on Worcester Tech and The Hill at a very young age. He says he was a “city kid of humble beginnings,” however, and even with years of scrimping and saving, his family could cover only his first year's tuition.

Fortunately, Cunic was able to rely on the school's great legacy of philanthropy, and with the aid of a generous scholarship and grant support, he earned two chemical engineering degrees at WPI.

Always mindful of his father's advice to do well at whatever he did, Cunic worked hard at his studies and thrived. “We were practical fellows at WPI ... taught to use both theory and practice. We were taught to dig in, to

deduce and move forward, and we learned—regardless of whatever situation we were put in—to take it as a challenge and not allow ourselves to be overwhelmed. That training was invaluable; it prepared me to operate well as an engineer and is one of my proudest WPI legacies.”

With the Clean Air Act of 1970, a newly graduated Cunic found himself working in the then nascent field of air pollution control. **HE DEVOTED HIS CAREER TO PROTECTING THE PUBLIC HEALTH AND WELFARE WITH GROUNDBREAKING WORK IN MITIGATING AIR POLLUTANT EMISSIONS AND IS CURRENTLY A WORLD-RENOWNED EXPERT IN THE FIELD OF AIR POLLUTION CONTROL EQUIPMENT.** He is the quintessential example of WPI alumni who use theory and practice to make a positive impact on the world.

Though Cunic's work has moved him to New Jersey and sent him around the world, with heartfelt words he explains that he never felt far from his alma mater. “WPI was always with me, it always felt like it was part of my family.”

Marion Cunic, Jack's wife of 49 years, shares that following a bridal party pairing at her cousin's wedding and a long-distance friendship, the couple married in 1968. “Jack is a brilliant man, but a hugely humble man,” she says. “He worked very hard and I am extremely proud of him.”

Like many other local students of their day, the Cunic family were the first in their families to attend college; they say they came to understand well the wonderful selflessness of others. Even with the demands of raising four children over the years and the pleasure of enjoying two grandchildren today, they have continuously found a way to share their time, talent, and

treasure. From volunteer firefighting and hospital work to decades of tremendous support to WPI, Jack and Marion are ever mindful of their responsibility to give back. Of special significance to them is the John “Jack” D. Cunic Endowed Scholarship they established at WPI. The intent of this scholarship is to support local students who, like Jack did, have set their hearts on a dream and their eyes on The Hill.

As WPI continues to reach for the stars and impact positive change around the globe, the Cunic family are grateful for the opportunity to support and maintain its precious and hallowed roots by supporting local students closer to home.

“WPI opened many doors for us and enabled our family to enjoy a wonderful life,” says Marion. “We want to make sure that some future students have the same opportunities we had.”

BY SIRA NARAS | PHOTOGRAPHY MATT FURMAN



CELEBRATE YOUR PAST



ALUMNI WEEKEND: MAY 31-JUNE 1, 2018

.....

*The campus has changed since your student years,
but the heart of your alma mater remains the same.*

Join us for the biggest alumni gathering of the year!

*Special reunion activities for
undergraduate classes ending in 3 and 8*

.....

For more information

wpi.edu/+alumniweekend

WOMEN'S IMPACT NETWORK: IMPACT GRANT RECIPIENTS

ADVANCING WOMEN ASSOCIATE PROFESSORS WITH MENTORING MINI-GRANTS

Principal Author: Chrysanthe Demetry,
Associate Professor, Mechanical Engineering

THE WOMEN'S RESEARCH AND MENTORSHIP PROGRAM

Principal Author: Ryan Meadows, Associate Director
of Outreach, Pre-Collegiate Programs

ADVANCING WOMEN'S IMPACT IN MATHEMATICS SYMPOSIUM, NEW ENGLAND

Principal Author: Patricia Medina, Postdoctoral Scholar

WINcorps: PREPARING STEM LEADERS

Principal Author: Marsha Rolle, Associate Professor,
Biomedical Engineering

WPI STEM LEADERSHIP BOOK AWARD AND RECEPTION

Principal Author: Stephanie Rudzinski, Associate Director,
Admissions

EXPANDING AND SUSTAINING CAMP REACH

Principal Author: Suzanne Sontgerath,
Director, Pre-Collegiate Outreach Programs

PUBLISH & FLOURISH: A WOMEN'S WRITERS COLONY AT WPI

Principal Author: Patricia Stapleton, Assistant Professor,
Social Science and Policy Studies; Director, Society,
Technology, and Policy Program

EMPOWERING WOMEN THROUGH OPTICS

Principal Author: Lyubov Titova, Assistant Professor,
Physics

THE WOMEN OF WPI FALL CONFERENCE SPEAKER 2017

Principal Author: Brianna Sheldon '15

GOAT TANK: MAXIMIZING VALUE CREATION FOR HUMANITY

Principal Author: Shamsnaz Virani, Assistant Teaching
Professor, Electrical & Computer Engineering

WOMEN LEADERSHIP AND POWER

Principal Author: Sharon Wulf, Professor of Practice,
Foisie School of Business

WOMEN'S IMPACT NETWORK AT WPI

This diverse group of visionary women share a passion for education, leadership, and philanthropy. Through WIN, members are provided the occasion to become more familiar with unique opportunities and challenges at WPI, and to assume an important role to help advance WPI's future. Learn more and join at wpi.edu/+win.



CHANGING THE FACE OF STEM

WOMEN'S IMPACT NETWORK MAKING A DIFFERENCE

On Oct. 7 the Women's Impact Network (WIN) at WPI celebrated its first year of fundraising with "Elevating Women in STEM," a special event honoring the WIN Impact Grant recipients. WIN raised \$225,000 in its first year, and was able to fund 11 of 44 Impact Grant applications from faculty, staff, and alumnae who developed programs aimed at advancing women faculty, graduate students, undergraduates, alumnae, and girls in STEM.

"There's clearly an appetite on campus for new ways to support alumnae and women students, faculty, and staff in STEM," said President Leshin in her opening remarks. "The world needs us [women] to be successful," she added. "We are together changing the face of STEM."

Jennifer (Shiel) Wyse '94, WIN co-chair, described the genesis of the group to the more than 100 alumni, students, faculty, and staff gathered in Alden Memorial, and its purpose of developing opportunities for personal and impactful involvement with WPI.

"I'm grateful that we have President Leshin to lead WPI through this time," Wyse said. "It's a great time to be a woman in STEM."

The event featured a keynote by Urvasi Tyagi '01 MS, director of engineering at Audible, who has recently been assigned to Amazon's Fresh division. Tyagi began her career as the only female engineer in a company of more than 1,000. In her talk, she addressed such statistics as, of the 50 percent of grade school girls interested in STEM, only 18 percent study those fields in college, only 8 percent are in the industry within the first 10 years of their careers, and a meager 2 percent reach executive levels. She shared four key lessons she has learned to "stay in and thrive":

Sustained learning and delivery: "Work on initiatives that impact the balance sheet of the company," Tyagi said. "For a scientist or a technologist, it's not enough to be working behind the scenes. You need to find a way to help grow the company."

Team up: She stressed the importance of asking others for help and collaborating.

Embrace criticism: She cited studies that show women are more likely to receive criticism at work than men, and her advice was to expect and embrace it rather than fight against it.

Manage by delegation: "Women overwork at work and at home," she said, stressing the importance of delegating to others. "At work, it helps team members grow and learn, and at home it's an investment in yourself."

1949

Emily Watson Hillsman shares this reflection on her father, **Burl Watson**, who died in 2013. (His wife, Nita, died last year.) “He loved WPI and spoke of it often, and although none of his children or grandchildren attended WPI, he did succeed in raising two engineers. One of the engineer children of Burl passed on the gene and has an engineer daughter. As Burl’s father was also an engineer, the family now has four generations of engineering students! Quite a record!”

1951

Victor Chun is the author of two books on the U.S. Navy’s PT boat force. The publication of *American PT Boats in World War II* was featured in the *WPI Wire* back in 1990s. Chun published Volume II in 2011. He lives in Los Angeles.



1957

Al Papianou reflects on his and Marcia’s 60th wedding anniversary, which brought together family members from Connecticut, Maine, Massachusetts, New Hampshire, and Vermont this fall. “I met Marcia in February 1955. She was a Becker student from East Barre, Vt. She was my date at a Theta Chi party one Saturday night. I “pinned” her in September that year. We were married on Sept. 14, 1957. Best thing that ever happened to me.”

1960

Richard Brewster writes, “I’m sweltering through my second summer here in Tianjin, China, with Mercy Ships. My position as a volunteer project engineer on the NGO hospital ship being constructed at Xingang Shipbuilding Heavy Industry will keep Susan and me here for at least another year and a half. The 600-foot, 37,000-ton vessel is presently complete up to deck 3. It will have 12 decks in all, two of them devoted to seven operating theatres and a 150-bed hospital. Crew complement will be approximately 600.” He adds, “I don’t miss retirement!”

1963

Bob Magnant shares the news of his eBook, *Know Thy CyberSelf*, available as a free download from his website. He writes, “My personal story celebrates the smartphone’s explosion and the influence of the Internet, which are wielding unprecedented power, greater than automobiles or guns!” He warns, “None should ever be placed into the hands of users and children without giving them adequate instruction and control and guidance first.” Find the full text, which can be downloaded as an ePub or a pdf file, at magnant.org/Today/yourcyberself.html.

1970

Kent Lawson married Linda Booth on July 29, at the Martha Mary Chapel of Longfellow’s Wayside Inn in Sudbury, Mass. “It was a terrific weekend,” he writes, “and a perfect wedding as far as the happy couple is concerned. A Tauck tour of Scandinavia is planned for the honeymoon.” Kent retired from Polaroid Corp. in 2008 after 39 years as an engineer and technical manager. Linda is a partially retired nurse practitioner. They reside in Bolton, Mass.

1972

Bradshaw Lupton and roommates **Ray Coleman** and **Ken Wadland** co-founded piRshared Labs in Buzzards Bay, Mass. They're currently working together on field testing the FSI Doppler Current device designed by Falmouth Scientific, a simulation of a data collection, processing and transmission system, to show how water current velocity data can be collected and transmitted at the Borne Tidal Test Site. The project is being done on a volunteer basis to assist another WPI MBA alum, John Miller '85, who is executive director of the Marine Renewable Energy Collaborative located in Marion, Mass., under a grant from the Massachusetts Seaport Economic Council. The goal is to build, install, instrument, and promote the first dedicated tidal test site in the United States.

1976

Steven Landry writes, "After retiring from the U.S. Army and spending nearly two decades supporting the Department of Homeland Security and the White House as a FEMA contractor, I have launched a third career as a science-fiction and alternative-history novelist. I just published my first novel, *The Legend of Indian Stream*, a time-travel story set in 19th-century New England."

1977

Laima (Pauliukonis) Bendel writes, "After 12 years at Children's Hospital Pittsburgh serving as a pediatric anesthesiologist, I have accepted a new position at WVU Medicine in Morgantown. Never too late to reinvent oneself!"

1978

Steve Tourigny reports that he's been living in California since 1990 and playing ice hockey two or three times a week, year round. "At this year's 42nd Snoopy Tournament in Santa Rosa, over 900 skaters from the USA and Canada participated on approximately 60 teams – all over 40 years of age. Our team, the Folsom Felons (shown above, with Flat Gompei), finished first in a

55+ division and had a great time, as always. I am the goalkeeper and am celebrating my 15th year in the event. Besides hockey, I am still very active in our local tech community, assisting several local startups in the clean tech sector. I have scaled my time back a bit to accommodate the hockey schedule, but still enjoy the technical challenges along with serving as the "goalkeeper emeritus" at our local rink in Roseville.

with New Hampshire state leaders and local seacoast communities to provide services to those in recovery from alcohol and substance use disorders. Mark and his wife, Vivian, co-founded Safe Harbor Recovery Center in Portsmouth, N.H. in 2015, providing recovery support services to area residents seeking to get back on their feet following in-patient or out-patient treatment. "After a career of 37 years in the high-tech industry, I felt the desire to help local Seacoast communities

Sherin and Lodgen. She was named to the 2018 list of Best Lawyers in America compiled by Woodward/White Inc. Her practice focuses on complex real estate property transactional matters such as multi-site sales and acquisitions, assemblages, and representing borrowers in securitized financings and other real estate financing transactions. Paula became a LEED Accredited Professional in September 2008. Her clients include developers, retailers, property managers and corporations, including Fortune 500



1979

Phil Rubin writes, "I retired in May of 2017 and I'm living full-time in Park City, Utah, with my wife, Lynn, and our two Labrador Retrievers. We enjoy the outdoors and amazing views in this wonderful place that sees 300 days of sunshine and 500-plus inches of snow annually. We both work at Deer Valley Resort, where we enjoy free mountain biking and skiing as a job perk. Life is good for this Worcester grad."

1980

Mark Lefebvre recently retired from IBM after 22 years in various executive marketing positions. He now works

address the nationally publicized opiate epidemic in New Hampshire," he writes. "I am grateful for the opportunity to be of service to those in need." Read more about Mark's "Turning Point" on page 15.

1981

Mark Fitzmaurice teamed up with Flat Gompei to cheer on the Hillboro Hops baseball team. "The goat brought good luck – the home team won, 12-0!" he reports.

1982

Paula Curry is a partner in the real estate department of Boston-based

companies. Before beginning her legal career, Paula was a design engineer in the field of wastewater treatment and ultrapure water treatment.

1985

Jim Barsanti, assistant director of water and wastewater for the Town of Framingham Department of Public Works, is serving as the 2017 president of the New England Water Environment Association. NEWEA's membership comprises over 2,100 water and wastewater professionals located throughout New England who volunteer their time, energy, and expertise to preserve, protect, and manage New England's water resources.

Alumni Benefits & Resources

Take advantage of these services and programs offered by the Alumni Association and Office of Alumni Relations. Some, like the insurance program, have special rates for WPI alumni. Several are free, and some benefit WPI scholarships.

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1986

Bill Clemmey reports on the charitable efforts of several '86 lacrosse team members: **John McNamara '85**, **Bill, Tom Denney**, and **Mike Gonsor** participated in the inaugural Team Cork Golf Tournament at Sandwich Hollows Golf Club on the Cape. The charity and event were set up by classmate **Chris "Corkey" Curtis** to support cancer patients. At the event, they met up with **Bob Hyland**, who captained the 1986 baseball team.

Mercedeh (Mirkazemi) Ward writes, "In August of 1982 I walked into my dorm room and met **Donna Barone**. Fast forward to July 2017: I work with her son Jack. What are the chances of that?"



1987

Kevin Austin brought Gompei into the action while restoring a vintage toilet in a vintage home with "vintage" (i.e., fragile/broken) plumbing.



1988

Brian Hamilton was the subject of a "Two Minutes With...." interview in *Worcester Magazine* in September. He holds the newly created post of director of healthcare and life sciences at Consigli Construction. He returned to

WPI to earn his master's in manufacturing engineering in 1997 and has worked for Consigli for 20 years. Asked if he still frequents any favorite spots from his student days, he replied, "I was actually at The Boynton on Saturday night."

1989

Erin Ryan and **Don Gale** write, "**Chris Ribeiro** joined us on our family vacation – an Alaskan Glacier cruise – and Flat Gompei accompanied."

1992

Michael Henry writes, "After 18 years living in Worcester, I decided it was time for a change. Sold my house last October and in April moved into my new co-op in Washington Heights, NYC. From the corner of my block I have a

[CLASSnotes]

view of Yankee Stadium to the left, and a view downtown to the Empire State Building. Been loving wandering the neighborhood and exploring my favorite city."

Bechara Elie Samaha sends appreciation and best regards to classmates, and adds, "Missing WPI."

1994

Jeanne (Sawtelle) Petrangelo, principal software engineer at Sterlis Medical, writes, "I'm the software lead at a startup in Boxborough, Mass. My director of engineering is another WPI grad, **Duane Delfosse '80**. The device we created is getting a lot of attention as a product that improves the world." The patented Sterilis machine uses steam sterilization and grinding technology to transform medical waste, such as dirty needles, into a harmless confetti-like material that can be disposed of in the general waste stream.

1997

Jonathan Gulliver was appointed highway administrator for the Massachusetts Department of Transportation in October. He has over two decades of experience in state government and in managing complex transportation projects. He had been serving as acting highway administrator since May 2017.

Capitola Lau writes, "Working at Honeywell as a product marketing manager for high-tech safety products in Lincolnshire, Ill. My daughter, Isabella, is enjoying summer and looking forward to starting first grade at a Montessori school."

2000

After 10 years in Baltimore, **Bryan and Melissa (Wright) Hayes** moved back home to Massachusetts. Melissa (a PhD) leads an immune-oncology vaccine research team in Cambridge. Bryan (Pharm.D.) is the first pharmacist appointed to Harvard Medical School's faculty in the Department of Emergency Medicine. He practices as an attending pharmacist in emergency medicine and toxicology at Massachusetts General Hospital. "We reside in Braintree with our two beautiful daughters," they add.

2001

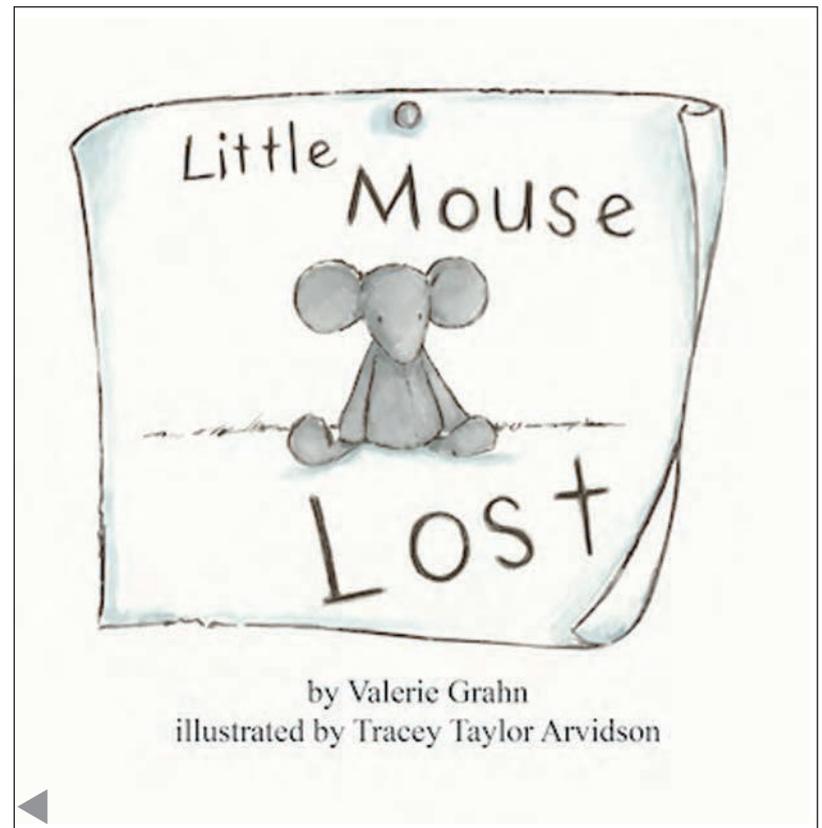
Valerie (Vadurro) Grahn writes of her journey as a medical device industry professional, a mother, a wife, and now, an author. "I wear multiple hats and live a diverse life with multiple competing interests that are important to me. WPI gave me the skills and the education to be better at all those things. I have worked for the past 17 years in the medical device industry, holding various leadership positions within Davol (a subsidiary of CR Bard) and Ximedica. I also created my own LLC, Grahn MedDevice Consultancy Services, and worked on my own as a freelance contractor/consultant." On a plane ride home from a business trip, a new dream took shape. In August, she made her debut as an author with *Little Mouse Lost*, a children's book inspired by real-life, late-night search missions for her middle daughter's favorite stuffed animal. "As I read my rough draft to my three children and saw how excited they were at the prospect of me becoming an author, that was the moment I went all in and decided this was going to be a family affair!" she says. They worked as a team, with the children taking on roles as critics, marketers, and cheerleaders. "I started to educate myself about navigating the world of self-publishing, with my children by my side, teaching them that they can overcome any obstacles to achieve their dreams." She adds, "Little Mouse is a cute and mischievous character; but Little Girl is the true heroine, as she creatively tries to hunt down her best friend and independently solves her own problem." The book, released by SkåneBones Publishing, is available on Amazon or through booksellers.

Asima Silva took part in a campus panel on "Racism & Immigration," part of the #BeAware series sponsored by WPI's Global Humanitarian Alliance. Asima, who founded the organization Enjoin Good to counter Islamophobia, joined student speakers from the Hispanic and Caribbean Student Association and the Black Student Union.

Todd Staples is co-creator of a new dating app called Hey There. In a departure from existing dating apps, Hey There relies on connections between friends to help in the

matchmaking, to reduce the "creep factor," he says. Users can invite trusted friends to become "wingers" to help them broker the introductions. Todd lives in Mansfield, Mass.

named Builder of the Year in 2017, the company's highest honor. The first woman recipient, she was selected from a pool of 300 eligible employees. She was also honored as one of *Worcester Business Journal's* "40 Under 40." She lives in Holden, Mass., with her husband, Dan, and their children, Madilyn and Molly.



2002

Naveen Selvadurai married Diana Marie Hardeman, owner and founder of MilkMade Ice Cream, on Aug. 19, 2017, at Casa Romantica Cultural Center and Gardens in San Clemente, Calif. A co-founder of Foursquare, he is currently a partner at Expa, a Manhattan- and San Francisco-based software technology company. The couple's offbeat romance was the subject of a *New York Times* story called "Turning Over a New Leaf, and Finding Love."

2003

Jodi (Kenniston) Staruk joined Consigli Construction after graduation, and is now a senior project manager. She was

2004

Meredith Furhman Smith is the founder of MetroWest Family Acupuncture (est. 2013) in Wayland, Mass.

2005

Greg Krane, DVM, DACVP, achieved board certification as Diplomate, American College of Veterinary Pathology. He works at the National Toxicology Program in North Carolina's Research Triangle Park, and he is concurrently pursuing a PhD in comparative biomedical sciences at North Carolina State University.



Katherine (Dunn) LaBella writes, "This summer, some members of the 2004 Namibia IQP group reunited to reminisce about our awesome African experience." The gathering also included classmates **Samantha Wakefield Michalka, Justin Braga, Patrick Salmon, Lindsey Robbins, and Drew Campbell.**

Paul Liberman, founder and COO of DraftKings, made the *Boston Business Journal's* "40 under 40" list for 2017. The honorees were recognized at an evening ceremony on Oct. 19, at the YMCA of Greater Boston, and their inspiring stories were featured in a special supplement to the paper.

Mary Schubert ('10 MS ME) was recently promoted to program manager for one of the advanced jet engine programs at UTC Pratt & Whitney, based out of Hartford, Conn. She also continues to run marathons, most recently in Waterford, Ireland, in June.



2007

We may know **Sam Feller** as The Awkward Engineer, but he's also the head of product development for WrightGrid, based in Somerville, Mass. "We make solar-powered cell phone charging kiosks, capable of charging up to 10 phones at once and providing local wifi hotspots, with a backup battery of several days without sun. Early last week, we packed up a shipping container full of these charging kiosks, and it is currently making its way to Africa, where the units will go to various countries." As The Awkward Engineer, Sam is taking his Analog Voltmeter Clock to New York City to exhibit at World Maker Faire 2017.

Bihter Padak (MS ChE) is among AIChE's first roster of "35 Under 35" honorees, announced in August. She is an assistant professor at the University of South Carolina in Columbia, where her work focuses on reducing the environmental impact of generating electricity from fossil fuels. In addition

to her master's from WPI, she holds a bachelor's degree from Istanbul Technical University, Turkey, and a PhD from Stanford.

2008

Sofie (Kniazeva) Bambrick writes, "Friends and family gathered for a fun beach day in Madison, Conn., to welcome classmates **Lisa (DiTroia)** and **Adam Haines** back to New England, along with their daughter, Kennedy, and son, Paxton. We also celebrated Kennedy's and Adam's birthdays. Gathered for the occasion were **Nick Ambrosino** with wife, Sarah, and daughter, Sophie; **Rob Pantalone**; **John Niewola '07**; me with my son, Ari, and daughter, Talia; a glowing and expecting **Martha (Addorio) Mayo**; **Victoria Richardson**; **Jacquelyne DiTroia '16**; **Alex Venditti '16**, **Alicia (Bridgewater) Ridge** with daughter, Emily; and **George Chyoghly** with fiancée, Kinga.



Mary Kate Toomey married **Tom Daly** on Jan. 21, 2017, in their hometown of Worcester. The wedding, on a 60-degree, sunny winter day, was at Saint John's Church, and the reception was at Mechanics Hall. The celebration brought together 23 WPI alums (and one staff member) and included a rousing rendition of the alma mater. The revelers ranged from the classes of 2002 to 2010, including maid of honor **Krystal Parker Henry**, and bridesmaids **Jess Balesano** and **Erin Ellsworth '06**.

2009

Elisabeth Beinke-Schwartz is a senior-level designer at Certain Affinity. She was featured in a story, "Women Breaking Barriers in the Video Game Industry," in the Cogswell College careers blog "Perspectives."

Anthony Del Vecchio writes, "Just another day at the office! I took pictures with Gompei above 70,000 feet, flying in a U-2S over central California on a training mission. I am a captain in the U.S. Air Force, currently serving in the

99th Reconnaissance Squadron at Beale AFB, California. I commissioned from ROTC at WPI when I graduated, finished pilot training at Columbus AFB, Mississippi, in 2011, then instructed in the T-6A Texan II. After that, I was hired to fly the U-2S Dragon Lady at Beale in 2015. We fly all over the world providing leaders with High Altitude Intelligence, Surveillance, and Reconnaissance. Putting Aerospace Engineering to practice!"

2010

Shucheng Yu (PhD) joined the faculty of Stevens Institute of Technology as an associate professor in the Department of Electrical and Computer Engineering, where he specializes in cybersecurity. He previously taught at the University of Arkansas at Little Rock.

2011

Sarah Conlin and **Jeffery Wong '14** were married April 22, 2017, at Church Landing on Lake Winnepesaukee in Meredith, N.H. Many WPI alumni

shared in their day, including NROTC alumni, Alpha Tau Omega brothers, and Phi Sigma Sigma sisters. The couple honeymooned in the Bahamas and now resides in Newmarket, N.H.

Matt Runkle was elected to the Board of Trustees of Phi Kappa Theta fraternity for a term that extends until 2021. He has held numerous volunteer positions with the fraternity at the local and regional level, including vice president of Operations and trustees of the Aquinas Association; member of the Massachusetts Lambda chapter's alumni board and housing corporation; and chapter adviser and facilitator for the Fraternity's Regional Leadership Conferences. He also served as a member and chairman of PKT's Peer Accountability Committee for multiple years. Matt is senior security consultant at Veracode, a Boston-area software security firm, where he explains how attackers can compromise applications and the steps developers can take to protect themselves. He recently graduated from New York University with a master's

degree in cybersecurity. He lives with his boyfriend, Blair Clarkson, and three dogs in Hudson, Mass.

2013

Danielle Payne writes, "I have been working at Benhaven Academy in Wallingford, Conn., as a math teacher for the past two years and enjoy every minute of it. I recently started working on a master's in special education at Southern Connecticut State University."

2014

Benjamin Clark joined Tighe & Bond as a project engineer in the Portsmouth, N.H., office. His career includes five years as assistant engineer for the City of Dover, where he oversaw multimillion-dollar projects including neighborhood reconstruction and the Makem Bridge, a \$4.5 million federally funded project. He's also been head coach of the men's lacrosse team at the University of New Hampshire for eight years.

Shahbaz Soofi is co-founder of WooRides, a pedicab start-up that serves the city of Worcester. He's showcased the service at many area events, such as the annual George Street Bicycle Challenge for Major Taylor, held on one of the city's steepest streets, and on the Mass Central Rail Trail, where his pedicabs ferried passengers between events at the trail system's 20th anniversary celebration. His goal is to provide car-free transportation in the downtown area, to reduce traffic and parking issues, and to encourage more people to enjoy the city.

2015

Mary-Lee Barboza and Michael Gifford '16 (MS MG) were married on June 23 in Bristol, R.I., surrounded by family and friends. Many WPI alumni attended the wedding—10 members of the wedding party were WPI graduates. "We are so thankful for our time at WPI, where we made lifelong friends," they write. Mike is an engineer at NUWC in Newport, R.I., and is pursuing his MBA at WPI. Mary-Lee is a veterinary student at Cornell University. They recently bought a house in Marion, Mass.

Grace Berry visited **Andres Monterroso '16** in his home country of Guatemala this summer. She reports, "We hiked in the early morning with Flat Gompel to the top of Indian Nose overlooking Lake Atitlán for beautiful views of the sunrise, the towns, and surrounding volcanoes."

Angela (Davis) Jimenez writes, "Just celebrated my six-year anniversary and one-year marriage anniversary with Edison Jimenez. So thankful that we met each other through Connections (EMSEP) at WPI!"

Laura Merrill writes, "This was an exciting year as I finished up my second year of graduate school at the University of Notre Dame! I published my first paper, presented at the Electrochemical Society meeting in New Orleans, and finally finished up my coursework. Now, after all the excitement of the past year, I'm back to my normal lab work and moving towards my next few papers and exams."

2016

Alexander Zitoli sends this update. "My WPI degree has positioned me at the forefront of the burgeoning cannabis testing industry in California with Steep Hill Labs. I am utilizing my multi-disciplinary education to establish good lab practices, work in diverse project teams, and help prepare the cannabis testing industry for the upcoming year. Our lab has been scaling up recently to accommodate regulatory testing for the medical cannabis market in the state of California for 2018. Regulatory testing for cannabis has never been required in the state of California until now, and there are a myriad of challenges and issues facing cannabis testing labs as we look forward to the tidal wave of testing we will be doing once 2018 comes around the corner. It has been a wild ride so far, and I would not have been able to do the work I am doing without my experience and education from WPI."



Matthew Puksta writes, "I accepted a job at Putnam Investments as a business analyst. I am part of a two-year rotational program to prepare me as a future leader of the company, as Putnam attempts to lead the financial industry's shift towards technology in

the Boston area. Putnam admits only 10 recent graduates every two years for this program. My colleagues are all engineers or CS majors. Finding highly qualified and motivated persons that have an engineering degree and an understanding of the financial world creates an interesting problem for Putnam.

It's not an easy role to fill, and that's where I believe WPI's IQP program made a difference. It allowed me the opportunity to take a lifelong passion and make a career out of it, even with a mechanical engineering degree. I've always had a passion for finance and economics. In fact, I have been a subscriber to *The Wall Street Journal* since the age of 7. I was never sure that I wanted to be an engineer, but I have found my calling in day trading. The keynote piece of my resume was my project on Fixed Income Portfolio Management and Currency Trading. (In my senior year, I spent 55 hours a week continuing the work I did on my IQP.) It helped me qualify for a job that pays \$25,000 more than the average starting mechanical engineering salary." He extends thanks to Professors Hakim and Radzicki for their help on his IQP, and to his academic coach/adviser, Tally Reverts.

2017

Lucas Muntz is employed as a project manager at Riverdale Mills, in Northbridge, Mass., a manufacturer and distributor of welded wire mesh fabrics.





Harlan B. "Willie" Williams '50, an energetic volunteer and the first and only alumnus to be elected an emeritus member of the WPI Alumni Association Board of Directors, died July 20, 2017. He leaves his wife, Catherine, and his daughter, Cynthia. He was predeceased by a son, Harlan Jr.

With a bachelor's degree in electrical engineering from WPI and an MBA from Columbia University, Williams began his career at General Electric, working in marketing and management in the company's Rome, Ga., offices, and later in Pittsfield, Mass. He received two managerial awards from the company.

Upon retirement from GE in 1989, he devoted himself to volunteer service. Beyond his alma mater, he donated his expertise to SCORE (Service Corps of Retired Executives) and the National Archives. He was also a district coordinator for Berkshire County AARP Tax-Aide program, helping low- and middle-income senior citizens complete tax returns.

His dedication to his WPI classmates took many forms. He kept them con-

nected through a class newsletter. He represented the class on the Alumni Council, and later on the Class Board of Directors. He also chaired his class's 45th and 50th Reunion Committees.

He left his mark on WPI's alumni communications programs as a member of the editorial board that critiqued and supported the *WPI Journal*. In the 1990s, he helped usher the Alumni Association into the digital age by working to establish an electronic bulletin board for alumni to exchange information on the nascent World Wide Web. He traveled to other colleges to research successful endeavors, and chaired the ad hoc Alumni Computer Network Committee and the Alumni Online Committee in the quest to create a model that would best serve WPI's needs. The result was Alumni Gateway, a pioneering system that allowed WPI alumni to connect online and to post updates, photos, and messages.

In 2000 Williams was honored with the Herbert F. Taylor Alumni Award for Distinguished Service to WPI. He was a brother of Phi Gamma Delta and served as the fraternity's historian.



Nicholas L. Onorato, director of WPI's former School of Industrial Management, died Aug. 29, 2017. He joined the faculty in 1955 as an instructor in the department of Economics, Government, and Business; he taught for almost 50 years before retiring as Professor Emeritus, Social Science and Policy Studies and Management. His wife of 67 years, the former Betty Lettegren, died in 2014.

He is survived by five children and his grandchildren. He was predeceased by two sons and a grandson.

A. Fattah Chalabi, professor emeritus of civil engineering, died Aug. 3, 2017. He was a resident of Naples, Fla., and was predeceased by his wife, Beatrice. A graduate of the University of Baghdad and the University of Michigan, Ann Arbor, Chalabi joined the WPI faculty in 1959. In 1978 he was appointed the George I. Alden Professor of Engineering. The WPI Alumni Council elected him an honorary alumnus in 1969.

Philip D. Giantris '65, a key figure in the launch of WPI's Albania Project Center, died Oct. 19, 2017, in Tirana, Albania. The founder and executive director of the country's Water Supply and Sewerage Association (SHUKALB), he sponsored the Project Center's inaugural project in 2013 and continued to sponsor a team each year. He was president of Valu Add Management Services, specializing in the water utility sector. A civil engineering major at WPI, he belonged to Phi Gamma Delta fraternity. He leaves his wife, Sally, two children, and three grandchildren.

Complete obituaries can usually be found online, by searching legacy.com or newspaper websites. *WPI Journal* will share information from our files and assist classmates in contacting surviving family members. Contact jkmiller@wpi.edu or call 508-831-5998 to request further information.

- ORVILLE RANGER '46
- BERNIE VIOLETTE '46 ME, ALPHA TAU OMEGA
- JACK HARDING '47 EE, PHI SIGMA KAPPA
- NORMAN CLARK '49 EE, PHI SIGMA KAPPA
- VERN RUSSELL '49 EE, LAMBDA CHI ALPHA
- WALT BRETTHAUER '51 CHE, SIGMA PHI EPSILON
- WARREN PALMER '52 EE, SIGMA PHI EPSILON
- JOHN FLOOD '53 CE, PHI SIGMA KAPPA
- BOB MENARD '53 ME, PHI KAPPA THETA
- HARRY CHAPELLE '54 PH, THETA CHI
- EDWIN SHIVELL '54 CM, '57 MS CM, PHI SIGMA KAPPA
- FRANK HORAN '55 CE, PHI KAPPA THETA
- LAURENCE BLOMSTROM '56 ME, SIGMA ALPHA EPSILON
- BERNIE DANTI '56 ME, PHI KAPPA THETA
- TOM STAMOULIS '56 EE, SIGMA ALPHA EPSILON
- HERB HEMENWAY '57 ME, SIGMA PHI EPSILON
- BOB SCHMIDT '62 CHE, SIGMA ALPHA EPSILON
- WILLIAM WARR '62 ME, SIGMA PHI EPSILON
- ROLAND BOISVERT '63 MS EE
- RAYMOND JOHNSON '64 EE
- EARL BERRY '67 SIM
- HARKANT SHAH '70 MS ME
- DOUGLAS DE BOER '80 ME, LAMBDA CHI ALPHA
- HAROLD RIDDAR '80 SIM
- EDWARD FICHERA '99 EE
- MARC ST. JEAN '01 ME

THE WPI COMMUNITY ALSO MOURNS THE PASSING OF **STEPHEN KNAPP**, THE ARTIST WHO CREATED THE LIGHTPAINTING THAT ILLUMINATES THE FRONT OF THE GEORGE C. GORDON LIBRARY. THE PRISMATIC INSTALLATION HONORS STEPHEN'S FATHER, THE LATE **WALTER KNAPP '38**, A LONGTIME ADVISOR TO WPI'S PHI GAMMA DELTA FRATERNITY CHAPTER, AND OTHER FIJI BROTHERS. THE ARTIST CALLED GORDON LIBRARY "A GREAT CANVAS" AND SAID, "I WANTED PEOPLE TO LOOK AT ART, TECHNOLOGY, AND INNOVATION AND SEE HOW THEY CAN ALL COME TOGETHER."

"This year's gift will establish the Class of 2017 Global Passport Scholarship. For the next several years, we will help fulfill President Leshin's 'Global Projects for All' initiative, which aims to support all students, regardless of personal finances, who want to pursue an off-campus project."

— Kelly Slabinski '17,
presenting the Senior Class Gift
to Laurie Leshin at Commencement



The Class of 2017 raised a record \$21,400 from 54 percent of the class and earned generous matching funds from trustee emeritus Win Priem '59 and his wife, Susan. The Class of 2017 gift supports Global Projects for all, a key component of *Elevate Impact: A Strategic Plan for WPI, 2015–2018*. Beginning with the class of 2022 (entering in August 2018) every full-time, degree-seeking student will receive a Global Project Scholarship—a credit of \$5,000 to defray the cost of an off-campus project.

Help shape tomorrow's great minds.

Empower engineers and scientists to solve problems no one person can solve alone.

Join the Class of 2017 and support Global Projects for All.

For more information:
Kate Renaud
508-831-6163, kereaud@wpi.edu

GREAT MINDS MULTIPLIED

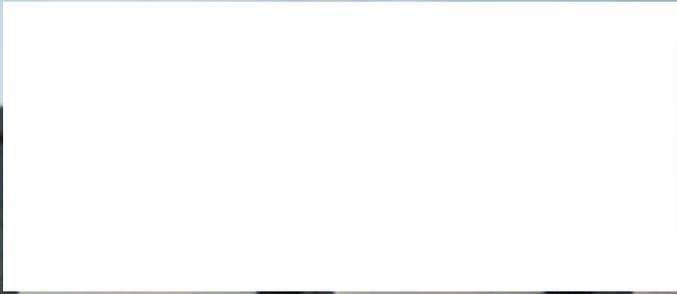
GLOBAL PROJECTS FOR ALL

A key component of *Elevate Impact: A Strategic Plan for WPI, 2015–2018*



WPI

Worcester Polytechnic Institute
100 Institute Road,
Worcester, MA 01609



ON THE COVER: Kirk Jalbert stands on coal train tracks in Pittsburgh, PA. The track leads to a facility that converts 6.6 million tons of coal a year into coke for steel production.