

Impact

magazine

MICHIGAN TECH
SCHOOL OF BUSINESS
AND ECONOMICS

WINTER 2013-2014 | VOLUME 4 | ISSUE 1





“INFORMATION IS THE OXYGEN OF THE MODERN AGE.

— RONALD REAGAN

Our digital technology infrastructure in the United States has dramatically altered the way we do business in just the last decade. Collaboration is real-time, with teams able to share ideas and develop new strategies on the fly. We collect unfathomable quantities of data, and we are training information specialists to take this data, work with the people and ideas it represents, and build opportunity from it.

Even this, the new issue of *Impact*, is the work of people and data. Our documents were shared between myself, editors, designers, faculty, and others, saved and stored on remote servers around the world. Fingers at keyboards in Michigan, Wisconsin, Oregon, Massachusetts, New York, and Ohio all had a hand in producing the volume now in your hands.

As we prepare students to initiate their careers, we know they are wading into a sea of information. Less-prepared minds can be washed away with data, but the savvy professional is ready for the opportunities these bits and bytes collect. These are opportunities shown by the stories in this issue of *Impact*. Stories about our students working with a lobster company in Massachusetts, our faculty examining issues around Big Data, and new programs in the School of Business and Economics to stay current and help our students get ahead and stay there.

Knowledge is power, but information is empowering. I hope the information in your hands right now shows you where our students and alumni are going. On the cutting edge, staying ahead of the curve: that's how information, and those who master it, make an impact.

R. Eugene Klippel

About

Impact is published semi-annually by the School of Business and Economics and University Marketing and Communications at Michigan Technological University. Winter 2013–2014, Volume 4, Issue 1. Please send correspondence to impact@mtu.edu.

Impact is:

Dean: R. Eugene Klippel (pictured)
SBE Marketing and Communications: Lynn Makela
Creative Director: Brandy Tichonoff
Art Director / Designer: Jackie Johnson
Authors: Kevin Hodur, Erin Kauppila
Principal Photographer: Sarah Bird
Contributing Photographers:
Erik Freeland, Mr. Narayan, Heather McGrath
Cover Artwork: Jackie Johnson





04

12

16

20

08, 10, 24, 26, 30

On the Table: Management Information Systems

The link between people and data offers a treasure trove of opportunity for those poised and trained to seize it. We sat down with MIS experts to discuss this nexus and how it is at the core of business, now and in the future.

Clawing to the Top

How do you ship lobsters around the world when you're a small business? Tech's IT'Oxygen Enterprise sailed to the rescue, building systems and boosting a company that is proud to support its community.

Keeping Watch, Moving Forward

Dow Chemical's Carrie Schaller tackles data security every day. She spoke with Erin Kauppila about her experience, her perspective, and the advancement of women into what was once a male-dominated industry.

Big Data, Big Opportunity

Just a couple of years ago, we talked of global data in gigabytes. Now we've moved beyond, from terabytes and petabytes to zettabytes. This much information breeds knowledge and wisdom for forward-thinking businesses.

Making an IMPACT

08—Abby Koski sees print and digital as partners instead of competitors in the publishing world; **10**—Aurea Rivera talks unmanned aerial systems, the benefits of real-time data, and the dreaded d-word; **24**—RFID, getting the job done, one small tag at a time; **26**—We asked the faculty and students around the SBE's home Academic Office Building for their take on data privacy and ethics. See what they have to say and chime in with your thoughts as well; **30**—News and Notes, a look at updates from around the School.

on the TABLE



Photo | Sarah Bird

The new John Rovano Plaza has opened outside of the Van Pelt and Opie Library thanks to the generous contributions of Michigan Tech alumni.

For this installment of On the Table, our guests came and went as they could, discussing management information systems (MIS) and the implications of—and opportunities in—the flood of data in which we're floating.

I'D MUCH RATHER HANG OUT IN A CAFÉ. THAT'S WHERE THINGS ARE REALLY HAPPENING.

—Joe Sacco, author/cartoonist

The plaza is half-full in the afternoon, bright with sunshine, a few umbrellas helping to calm the glare. This is a thoroughly modern scene, tablets and smartphones everywhere. Visitors are updating statuses, reading the news, sharing photos with friends. But it's only a small sliver of data in the big picture, and industry is still trying to figure out what to do with all of this information. In Paris, the zeroes and ones might be of philosophy or politics. On Capri, of yachts or automobiles. Vienna's *Schanigartens* are closest in nature to the new John Rovano Plaza outside of the Van Pelt and Opie Library, where I'm sitting this afternoon. They are places where the public and the private merge. Today, some of Michigan Tech's experts on management information systems (MIS) stop by to reflect on a similar merging of public

and private to a *Schanigarten*: how data and people come together, and where information and privacy meet.

Mari Buche, associate professor of management information systems, notes the unique place MIS inhabits in the business world. "We're in that space between people and technology," she says.

"We're a bridge," Cassandra Diers confirms, explaining how MIS turns piles of data into information upon which businesses can take action. Diers is an undergraduate student in MIS, and what attracted her to the field was the array of opportunities it provides. "I don't want to be stuck at a computer all day. I want to be out there, talking to people."

Russell Louks, professor of practice in the School of Business and Economics and a veteran of Ford among other industry

The Guestbook



Mari Buche

"They educate the recruiters," says Mari Buche, talking about the experience of MIS students at the annual career fair. "After explaining that we're the ones between people and technology, they perk up. 'We need that!'"

Buche, associate professor of management information systems, sees how her students want to see the entire organization. "Students don't want to be pigeonholed, only doing programming or only doing hardware. They want to see the bigger picture. That's where they can make a difference."



Cassandra Diers

"Even my fellow students don't quite get what it is I do," says Cassie Diers, an undergraduate in the School of Business and Economics. "I was once called into the office by my boss and asked, 'so what is it you do?'"

"The really cool thing is," she explains, "that the tools we get in class are the ones we're really going to use."

Diers has some MIS talent in her family, too. "I'm trying very hard to follow in my father's footsteps," she says. "I look at his project manager duties and I know that's what I want to do."



Russell Louks

Russell Louks came to Michigan Tech after a successful career in industry, including time in management at Ford. That's given him the perspective he has on the needs of business.

"You have to understand the information and technology needs of a business," he says. "Then you can communicate that and get the systems you need in place."

He also sees where information trends are headed. "The real trick is we're accumulating this volume of data, but we have to turn that into usable information."



Ashley Sudderth

Having been around the world and back, Ashley Sudderth has a bit of perspective on business and IT.

"People don't realize how broad this field is," she says. "Having an MIS degree does not mean you have to be a programmer or a business analyst; you are not limited to one job title. My background is IT Audit, not a typical path for an MIS major."

She explains: "I've been working on security and data compliance for years and every day brings new challenges as IT and regulations are always changing; my work is never done."



leaders, takes a moment to pause and reflect on what he looked for while recruiting information specialists. "I recruited for attitude," he explains. "And that's what I'm doing with my teaching. I can teach technology. That takes time, but it can be learned. I can't teach attitude."

Organizations around the country are recruiting for attitude, too. We see it at each career fair here at Tech: businesses need not only employees with training, but they need minds who can think beyond just the numbers, who can put the opportunities in that data to work. "You can't run any kind of business without information technology," Louks says, thinking of how the information revolution has changed the playing field. "Anybody with data has the need for MIS."

Yet, much like the different flavors of cafés around the world, each university handles MIS differently. "Other universities handle the balance between people and data as extensions of accounting or

marketing," Buche explains. "Our MIS program is really a STEM (science, technology, engineering, and mathematics) program." STEM is a huge trend throughout education, an attempt to train a new generation savvy in the technical areas future industries will explore. "I call it iSTEM. STEM is an interdisciplinary approach rather than fields existing in silos." By silos, Buche is referring to the way fields can get walled off from each other. This new approach is more educationally holistic and is reflected in the way Buche and Louks have crafted the MIS curriculum. "So many of my classes cross boundaries with each other," Diers explains. "There might be five or six courses all working together on the same project. We're all working on different parts of it, but we also learn what each other does."

"It's cool to actually watch it happen."

One of the biggest challenges to an MIS curriculum—and anyone working in information technology—is the rate

of change. Even textbooks a couple of years old quickly become obsolete.

"We got to data and usage in one class, and the numbers were expressed in gigabytes of data," Louks says, laughing. "That was just a couple of years ago, and now we're talking in terms beyond terabytes (about 1,000 gigabytes) and into petabytes and zettabytes."


For Diers, still a few semesters away from graduation, the fruits of this curriculum are already evident to her internship supervisors. "One of them said, 'How are you this organized? You're just an intern,'" she recalls. "My other supervisor commented that they'd never had an intern jump into a project without being asked. But that's what we're supposed to do, isn't it? When I find a space where I can help, I just do it."

Buche, Louks, and Diers all depart, filtering into the once-hourly sea of pedestrians across campus. The mix of café denizens changes a little bit, taking in the sunshine over social



Photo | Sarah Bird



A young woman with long blonde hair, wearing a dark jacket over a blue patterned top, is smiling and holding a dark blue coffee cup. The background is a blurred outdoor setting with greenery and flowers.

**"DON'T LET
ANYONE SAY THAT
COMMUNICATION
ISN'T IMPORTANT
IN INFORMATION
TECHNOLOGY."**

networking, lab reports, and a few daydreams.

Later in the afternoon, Ashley Sudderth stops by, taking a few moments between meetings to talk data and security. Sudderth is the information compliance officer at Tech, making sure faculty and staff alike are well aware of the heavy responsibilities of data security.

"Don't let anyone say that communication isn't important in information technology," she quips, remarking on her busy afternoon. "We have more meetings than anyone."

Sudderth is local: she grew up in Painesdale, just south of Houghton. Her former next-door neighbor found her way into MIS at Tech as well, and these two professionals met up for dinner, a chance to reflect on their careers.

This dinner was in Shanghai. "Two neighbors from Painesdale, MIS majors, and we find ourselves in the same place in China," she says. "What are the odds, right? But we couldn't have gotten here without our education and the doors that education opened for us."

Sudderth moves on to her next meeting, merging into the flow of traffic, headphones and smartphones, pulses and bytes. Our guests are back to work, trying to tame the flow of information, finding challenge and opportunity in its midst.



mtu.edu/mis

Photo | Erik Freeland

Connecting with Words

Abby Koski and the Renaissance of Publishing.



As newspapers struggle to get by, major booksellers collapse, and smartphones are a more common sight than paperbacks, the future of publishing may seem dubious. Print is dead—that is, if you believe the headlines on major digital media outlets.

I definitely don't believe that," says Abby Koski, a marketing alumna. "In fact, the e-reader trend is leveling off. Now, we're seeing a 50/50 split between people who prefer books and people who prefer to read digital material; many consumers do both."

Koski, working in publishing, has a front-row seat for the renaissance of printed books. While corporate booksellers like Borders have collapsed under economic strain, smaller, independent publishing houses are poised to fill the gap for readers worldwide.

"Independent houses are viable in different ways than large, corporate publishers, which have a prescribed relationship with the end consumer," she says. "Smaller publishers can get more creative with marketing and publicity, so they can connect with readers on a more personal level."

As a publicity assistant at publishing house Farrar, Straus and Giroux in New York City, Koski is learning what it takes to get a new book into the public eye. When she started at Michigan Tech in 2008, publishing was little more than a vague concept. She started as a finance major in the School of Business and Economics, but soon realized that she was "not into numbers." Eventually, she discovered an interest in marketing and added a dual degree in Scientific and Technical Communication to mirror her interest in literature and the humanities.

A turning point for Koski was an internship with PANK, a literary magazine headquartered at Tech. While with PANK, she attended literary conferences and landed internships with the publishers Aitken Alexander Associates, Ltd, Melville House, and

New Directions. By her junior year, Koski had fallen hard for publishing and knew she wanted to pursue a career in the industry.

After graduation she moved to New York City, determined to start her career in the center of the publishing world. After a summer internship with a small publishing house, Koski spent nine months hunting for a job and working in a Brooklyn bookstore, getting a front-line perspective on the state of the contemporary literature market.

Her persistence and determination paid off, and Koski landed her current position in April, 2013. Her multi-disciplinary background was crucial for finding a job in the publishing industry, a haven for English-program graduates.

"My business degree gave me a broader understanding of the industry in terms of economics and marketing," she says. "Books are more than passion projects—they have to make money."

"SMALLER PUBLISHERS CAN GET MORE CREATIVE WITH MARKETING AND PUBLICITY, SO THEY CAN CONNECT WITH READERS ON A MORE PERSONAL LEVEL."

mtu.edu/stc

mtu.edu/mktg

Photo | Mr. Narayan



Pilot Programming

Aurea Rivera and the Benefits of Unmanned Aerial Systems.

“THERE IS A WORLD OF OPPORTUNITY OUT THERE FOR INDIVIDUALS WHO ARE WILLING TO REINVENT THEMSELVES.



After a career dedicated to government service, Aurea Rivera is out to tackle a daunting challenge: increasing world agriculture output to meet the needs of our growing population.

Call them remote-controlled devices or call them remotely piloted equipment—just don't call them drones.

"The word carries such a hostile, fear-based connotation," says Aurea L. Rivera, a 2012 graduate of Michigan Tech's online MBA program. "It has absolutely no relation to the beneficial applications of unmanned aerial systems technology to civilian life."

With her new company, Imagineering Results Analysis Corporation, Rivera is developing ways to use unmanned aerial systems (UAS) sensor data to address the environmental impact of excessive fertilization, a common problem in modern agriculture. Her efforts are aimed at increasing agricultural output; according to projections, global production must double by 2050 to support the ever-expanding human population.

"To do so, we must develop more efficient, effective growing systems that provide a high yield and minimize environmental impact," says Rivera.

Rivera's solution is to use UAS sensors data to help farmers establish tailored fertilization schedules. In doing so, she will help them expand production, reduce costs, and minimize environmental impact due to over-fertilization.

During the initial stages of the project, Rivera will collect data from UAS-mounted sensors that measure the response of crops to spectral lines of sunlight. Using the results, which indicate the level of health and fertilization requirements for each plant, she will create database signatures and models that are calibrated to specific crops. Farmers can then use the models to create custom fertilization plans.

"I've spoken to the USDA, and there is not currently a place for farmers to get all of this information in one spot—it just hasn't been done."

"Basically, I want to create the structure for the Google of agriculture, the hub for data analytics for the nation."

UAS-based precision agriculture is a work in progress; currently, the Federal Aviation Administration (FAA) is in the process of selecting six UAS test sites around the nation. Rivera hopes that the agricultural analysis systems her team will create will be ready to go when the FAA gives the green light for the UAS integration into the national air space scheduled for 2015.

With her extensive background in government service (she was the technical director for data analysis at the National Air and Space Intelligence Center in Dayton, Ohio) and a wide base of technical expertise, Rivera is uniquely poised to affect change in the agricultural industry. After earning a degree in electrical and electronics engineering from the University of Puerto Rico-Mayaguez, she embarked on a thirty-three-year career as a civilian with the United States Air Force. Starting as a surface-to-air missile analyst, Rivera worked in advanced radar systems, intelligence analysis, target signatures, and air and space intelligence.

"All of my professional experiences are useful in developing precision UAS sensors and its associated data analytics. I am passionate about changing the way we address innovation in agriculture," she says. "There is a world of opportunity out there for individuals who are willing to reinvent themselves. The sky is the limit."

mtu.edu/online-mba



Photo | Heather McGrath

CLAWING TO THE TOP:

MICHIGAN TECH STUDENTS PARTNER WITH A FAMILY-RUN LOBSTER COMPANY TO HARNESS THE POWER—AND POTENTIAL—OF DIGITAL INTEGRATION.

Much like turtles, there is theoretically no upper age limit for lobsters. Scurrying about the sea floor, lobsters do not slow down as they age. An enzyme (telomerase) repairs their DNA sequences, and it isn't uncommon for decades-old lobsters to be more fertile than younger specimens. As creatures, they are long-lived.

But as cuisine, their shelf life is a great deal shorter. "Lobster is a perishable item," explains Michael Kiernan, owner of Marblehead Lobster Company in Marblehead, Massachusetts. "They don't have a great shelf life out of the water."

That means a lobster that might cost \$8 at a seaside restaurant in Massachusetts would be \$80 on a table in Paris, simply because of time and distance. Lobsters have to be delivered quickly, and harnessing the power of digital connectivity is essential for commercial success.

Kiernan takes pride in his catch, but he also takes great pride in helping to support his community. "We're family run, local, and here seven days a week," he says between orders. "We keep our products local whenever we can."

"Sometimes we bring in something like Chilean sea bass, but we try to sell local goods and support our community. I'm proud of that."

The company has a home in the heart of their community, but they needed a boost getting their orders collated and lobsters shipped as quickly as possible. Enter ITOxygen, one of many groups in the Enterprise program at Michigan Tech aimed at giving students real-world experience before they step beyond graduation. Thanks to a connection through Michigan Tech alumnus Paul Dougovito, ITOxygen was able to get right on the case. Dougovito, a bank executive on the east coast, brought ITOxygen and Marblehead Lobster together because he saw an opportunity to help a business he loves and a school he believes in.

Russell Louks, professor of practice in the School of Business and Economics, acts as advisor to ITOxygen and saw a golden opportunity in the blue waters off the Massachusetts coast.

"The company didn't have a web presence before, so we were starting from scratch," Louks explains. "The students were able to experience every aspect



of the software development process. They needed to gather the customer requirements, define the architecture, design the graphics, write/test the software, identify the webhosting service, launch the software, and train the users."

"There was a lot going on."

Scott Ringwelski was one of the students instrumental in getting these information management solutions in place, helping to ship lobsters everywhere from Michigan to Montana.

"The new website allows customers from within the US to purchase lobster and have it shipped to them," he explains. "The site also serves as an online presence for the company."

Kiernan was pleased with the experience. "[Working with the students] went really well," he says. "We checked in every week to make sure we were all on the same page. It was a really enjoyable process."

This wasn't just a collection of emails and conference calls, however. In order to really get the job done, Ringwelski and his team had to hit the road. "At the beginning of the semester I was given the opportunity to fly out to Boston and visit the site," he says. "While in

Massachusetts I met the owner, visited the shop, met some of the fishermen, visited the local area, took pictures for the website, and got an overall feel for the company."

More than just a class project, the goal for ITOxygen was to expose students to something they're likely to experience every day after graduation, with the chance to make a difference at the same time. "The purpose of ITOxygen is to provide the students with real-world information technology experience, so we are always looking to partner with companies that can provide us with projects that will actually be used to support their business when we are done," says Louks.

Richard Berkey, industry projects manager at Tech, is able to view the Enterprise program in a big-picture sense. He sees work like ITOxygen's Marblehead Lobster project as benefitting everyone. "Projects like these not only help the sponsoring companies meet their goals," he says. "They also provide our students a unique opportunity to gain the practical, hands-on experience sought by employers—well before they graduate."

Louks concurs, seeing how this

particular project has come together. "It has given the students hands-on experience with what it takes to deliver a product that will have real customer demands and real users and real support issues," he says. "The Marblehead Lobster project was a perfect fit for us. It was also containable within two semesters of work."

With that short shelf life, ITOxygen's mission was to build the back end of the company's website for ease of order processing, while developing the front end to be appealing to the public and help the company prepare to make a bigger splash on the national and international stage.

Ringwelski, for one, was pleased with the results. "The website turned out great and we were able to complete the entire site—ready for production use—in just the semester," he says. "Last summer, just after the site was finished, we had over \$1,600 in lobster sales."

For Kiernan, who has owned the business for the last eight of the company's 90-year history, the website is just the first step in building a digital presence for Marblehead Lobster. "This website gives us the ability to ship to more people. We're still in the early

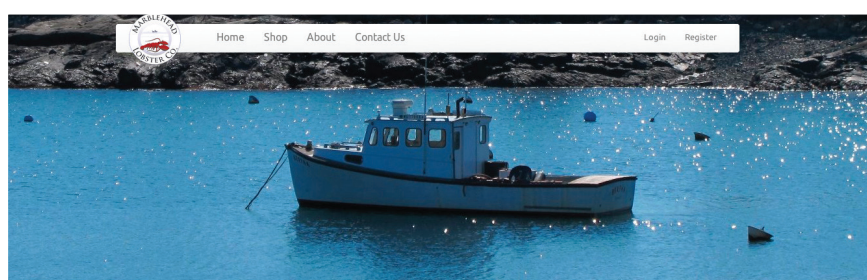
stages of our web presence; it's really going to take off." He's planning to work on search engine optimization and advertising to help the brand gain a digital identity.

Some of those next steps will be taken with ITOxygen as well. "The web team at ITO will continue to grow the site by introducing marketing and new features to increase sales," says Ringwelski.

At the end of the day—when the fishing boats come back to dock and they and their crews refuel—the pride of a job well done is shared across hundreds of miles, from the storefront of the long-lived Marblehead Lobster to the busy hallways of the School of Business and Economics. As Ringwelski notes, ITOxygen has taken a good deal of pride in helping to get the word out on this great catch of a company. "As a team we were excited to have finished a start-to-end product in one semester that found such immediate success."

Michael Kiernan, owner of Marblehead Lobster Company, with some of the day's catch.

Below, the results of ITOxygen's first phase of Marblehead Lobster Company's web presence. Check it out at marbleheadlobsterco.com



Welcome to Marblehead Lobster Co.

Marblehead Lobster Company originated as a shop called a lobster pool. It was started in 1936 by two local lobstermen who supplied the general public and town restaurants during the busy tourist season from Memorial Day to Labor Day.

It was renamed the Marblehead Lobster Company in 1979 when another local fisherman and his friend, a lobster dealer, started wholesaling and air shipping the crustaceans. The business gradually grew, not only in its lobster sales but added a full fish and seafood line as well.

Today, the company is owned by Michael Kiernan who carries on the tradition of locally owned, fresh fish from the ocean, delivered to your doorstep.

[Shop Now](#)

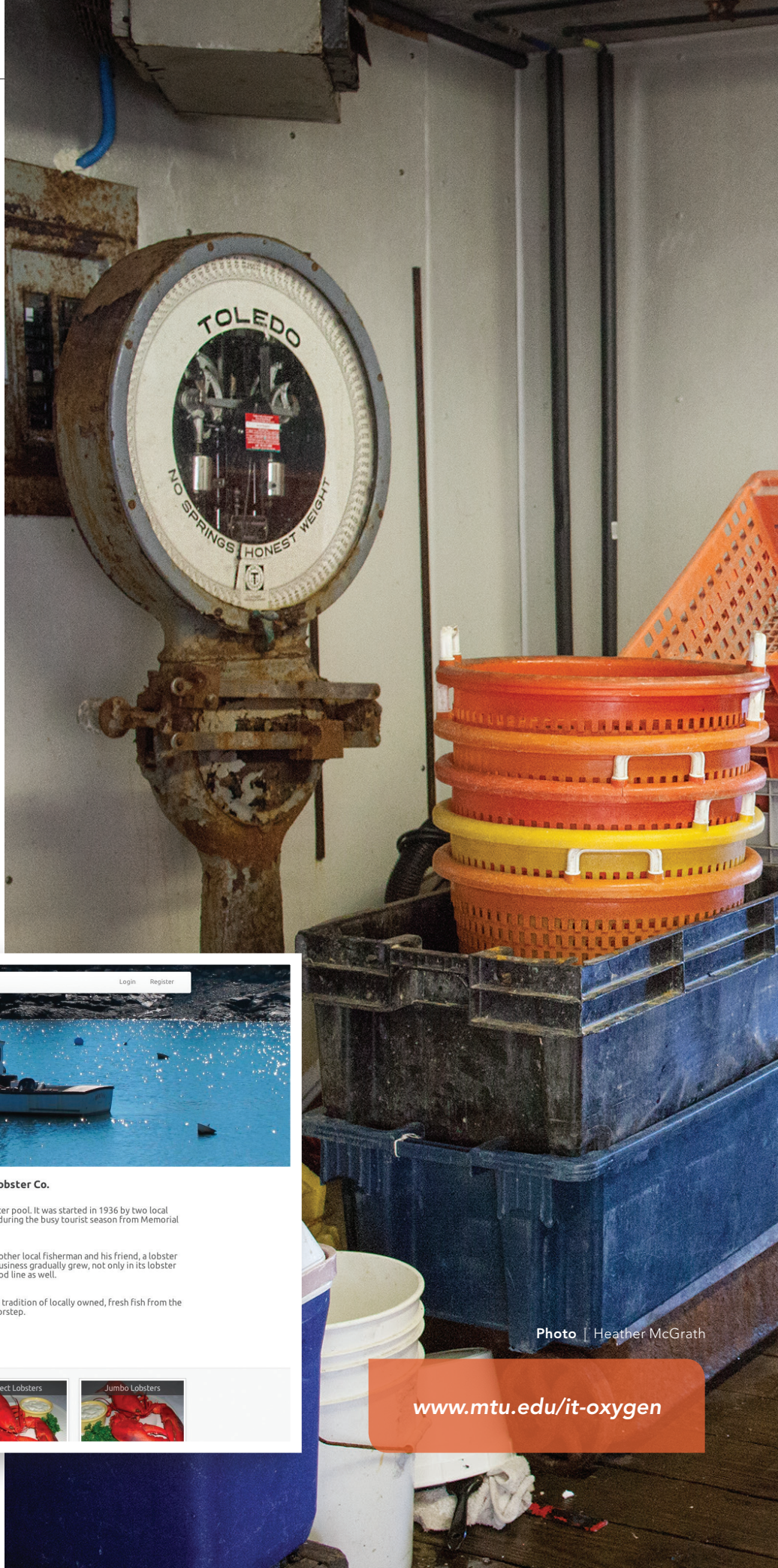


Photo | Heather McGrath

www.mtu.edu/it-oxygen



OUR COPPER COUNTRY COUSINS

Carl Sagan famously explained how we are made of the stuff of stars—literally. Almost everything heavier than helium in the universe has come from the explosions of previous generations of massive stars. These heavier elements, the former cores of unbelievably hot fusion furnaces, make our entire existence possible: the carbon that binds us, the oxygen that nourishes us, and the iron that makes us the blood-red humans we are.

Lobsters, however, have more in common with the veins of minerals that made the Keweenaw famous than we do. The blood of lobsters is not red, as iron-rich blood is. Rather it's blue.

Copper blue.

Yes, the red metal fortifies the blue blood in our long-lived oceanic friends. We have had separate trajectories, our very distant lobster cousins and us humans. While they explore the murky depths, using antennae as sensory devices as we use our eyes, we on land can go about hunting: for minerals, for nourishment, and for the knowledge and wisdom that help us reconstruct our distant past.





Carrie Schaller, a graduate of the School of Business and Economics, stands guard as director of information technology for Dow's manufacturing and engineering.

Photo | Sarah Bird



Keeping Watch, Moving Forward

In 2010, a malicious piece of software called the Stuxnet worm hit Siemens, a global engineering and electronics company. Spreading from computer to computer, the worm infiltrated fourteen of the company's plants, stealing industrial secrets and reprogramming industrial systems.

At Dow Chemical in Midland, Michigan Tech alumna Carrie Schaller is working to ensure that a similar fate does not befall her own company. As IT director for manufacturing and engineering, Schaller leads the manufacturing cyber security team at Dow. Working with a team from across the company, she develops ways to protect manufacturing operations from internal and external intrusion.

The need for industrial cyber security is relatively new for Dow, says Schaller. Historically, the company has used an internally developed process control environment that is difficult for hackers to breach. As the company moves toward commercial systems—which sit on a Windows platform—they are more vulnerable to attacks. The potential is very real in the minds of manufacturers; Stuxnet, after all, was possible because of a vulnerability in the Windows platform.

Cyber security is crucial for manufacturing companies around the world, particularly those that guard trade secrets and proprietary designs. Viruses and worms that infect industrial control systems have the potential to extract information, cause a plant shutdown, or change operations. In a chemical plant, the potential ramifications are mind-boggling.

"It's an exciting field that is getting a lot of attention, and rightfully so," says Schaller.

At the same time, Schaller is leading a massive SAP platform replacement in Dow's Manufacturing & Engineering division. The process, which is taking place in all of the company's global locations, is scheduled to finish next year.

"In my space, we are replacing all information management systems for maintenance, quality, engineering project management, and operations," says Schaller. "We've been using the same platform for more than twenty years, so it's a significant undertaking."

Schaller has come a long way in her twenty-six years at Dow. After graduating from Tech in 1987 with a degree in business administration, she took a position in the company's information systems division in Midland. Over time, she progressed through the financial and manufacturing support groups, eventually moving into corporate information systems. Four years ago, Schaller moved to her current role in manufacturing and engineering.

One of the biggest challenges for Schaller has been keeping a balance between her personal and professional lives. As a mother of three, she and her husband—an engineer at Dow—have worked hard over the years to balance travel and professional responsibilities.

"You make choices and sacrifices daily. For much of my career, I worked less than full time in challenging positions," she says. "Some of those years are a bit of a blur, but the key is to maintain balance over time rather than keeping score every day."

With her work on the North American steering team for Dow's Women's Innovation Network, Schaller is passing on those lessons to up-and-coming female employees. She manages outreach and coordination among chapter

leaders in North America, ensuring that they have the latest information and literature. The Women's Innovation Network, which has been in place for more than twenty years, helps women invest in their own success by expanding leadership opportunities across the company.

"In the past ten years, it's been wonderful to see the increase in young women leaders at our production facilities," says Schaller. "Although manufacturing and engineering have traditionally been male-dominated areas, it's certainly been changing over time."

Schaller, originally from Hancock, also brings her expertise back to Tech. She

is a member of the Presidential Council of Alumnae and the Corporate Advisory Board for Institutional Diversity. In 2013, she was appointed to the Dean's Advisory Council for the School of Business and Economics.

"I feel strongly about the School of Business," she says. "I am a graduate, my dad is a graduate, and it is exciting to see how the environment has grown over the years."

"In the past ten years, it's been wonderful to see the increase in young women leaders at our production facilities."

An IT Alliance

If the best defense is a good offense, then it makes sense that corporations are getting ahead of hackers, spying on the would-be spies. Organizations like the Red Sky Alliance have formed to help industry leaders collaborate on status, strategy, and solutions to information security. By going on the offensive, these organizations know who is attacking them and what they're after.

Ian Amit, a security consultant at IOActive, recently told *CNN Money* how security experts are infiltrating hacking communities so they know what's coming. "To gain the community's trust and prove themselves as worthy, some even stage hacks of their own company," he explains. "You'll fake compromise a few credit cards and lose a couple of bucks. If that buys your way into a forum, it gives you a heads-up on intelligence on future fraud."

Red Sky, in the membership pitch on their website, explains it this way: "Members work in collaboration with each other and not in silos of 'me against the world', giving each

organization the collective knowledge and power of the group."

This is the world Carrie Schaller and thousands of other IT professionals find themselves in. She has to equip herself and her department to be ready for threats that come from all directions and for a wide variety of purposes.



In the Network

The connections we forge with others go a long way to making a difference, for individuals and organizations. Carrie Schaller has taken full advantage of some opportunities, and in the process is a role model for others following in her footsteps.

At Dow, Schaller is part of the Women's Innovation Network, a group founded to help female employees make the impact their training and talents provide them. Dow sees this as essential, because "women now represent the majority of university graduates in developed economies, control 80 percent or more of all consumer purchasing decisions, and account for 70 percent of new business start-ups in the US. They are a critical, valuable part of the global talent pool." Schaller serves on the North American steering team.

Schaller is also on the fifteen-member Dean's Advisory Council for the School of Business and Economics. In this role, she is able to bring the experience and savvy gained through twenty-five years at Dow to future generations of business graduates.

One other place where Schaller has made a difference is the Presidential Council of Alumnae at Michigan Tech. Inducted in 2003, Schaller advises the University on master plan implementation, giving back to her alma mater by sharing her expertise, giving Michigan Tech that extra edge.

mtu.edu/busadm


BIG DATA, BIG OPPOR

We have the bits and bytes; it's the humans that businesses need.

LIKE A DAM IN A RIVER, IT'S NOT DIFFICULT TO SET UP THE HARDWARE YOU NEED TO GET RESULTS. BUT IT TAKES A HUMAN TO SEE THE WATER AND REGULATE THE FLOW. WE SPOKE WITH MANAGEMENT INFORMATION SYSTEMS (MIS) FACULTY AT MICHIGAN TECH TO SEE HOW THE HUMAN IS KEY AMIDST THE POOLS OF DATA WE'VE CAPTURED.

RTUNITY





The Columbia River Gorge is a natural treasure, with view after amazing view, waterfalls galore, and too many things to see and do for an adventurer's entire lifetime. But these waters, famous from Lewis and Clark and the Oregon Trail, are also helping to create a digital revolution with a torrent of data. Much as the Columbia has been put to work for humans—extensively dammed and collecting full reservoirs aside from its natural beauty—data centers are springing up on its banks, trying to harness the power of information streaming through our lives.

Just east of bustling, trendy Portland, tucked into the peaks of the Cascades, technology companies are buying up land and constructing enormous data centers, taking advantage of relatively cheap hydroelectric power on the Columbia to balance their bits and bytes. Google, Facebook, Amazon, and others have built giant warehouses of servers; the Google facility near The Dalles, Oregon, cost hundreds of millions of dollars alone, helping to form the backbone of our information society and the phenomenon known as Big Data.

Big Data means big business, and the information available to business professionals is literally unprecedented.

"Corporations are dealing with massive amounts of data," explains Mari Buche, associate professor of management information systems. "It's both structured transactional level data, or TLD, and unstructured data of varying sizes and formats—photo imagery, opinions derived from social networks, mp3 files, videos, and more. Big Data is a current hot topic: there has been a dramatic increase in complexity due to high volume, accelerated velocity,

and unpredictable variation. The previous generations of software applications are not scalable and prove inadequate for today's data processing tasks."

The old ways of processing information have become obsolete. We now know so many interests, trends, markets, and demands that industry is begging for more skilled professionals to help understand it all and point the way forward. They need information scouts who can dive in, know what this information means, and can wrangle it into a manageable, tangible opportunity.

"If you look at the spectrum of information technology, it starts with the hardware and moves through the network layer to the software layer, then into the data layer, and finally ends up with the people layer," says Russell Louks, professor of practice in the School of Business and Economics. "MIS focuses on analyzing and presenting the data in a way that turns the data into information that a business can use to make decisions."

In other words, the story here isn't one of storage, of machines, of technology. That's the stuff, the equipment, but it's not the goal. Much like how we look at the Columbia for how we use it, the technology of MIS is there to be seen in its data. This is a human story; algorithms don't write themselves. Machines collect the data; they don't interpret it.

"We're like a NASCAR driver," says Buche. "We don't build the machine, and we aren't responsible for the workings under the hood." Sure, the latest smartphone or tablet becomes cause for lines and commercials and hype, but the real story is in the data, the applications, what you can do with the technology. "We drive the management of

According to Science Daily, 90 percent of the data in the world has been generated in just the last two years. According to an estimate by EMC, an information product and solution company, 2011 saw the creation of 1.8 zettabytes of data, which works out to 1.8 trillion gigabytes. It would take almost 62 billion 32-gigabyte smartphones to soak up all of that data.

That's an incredible amount of information for the thundering waters of the Columbia to sort out.

these mountains of data, finding the signal in the noise, getting the corporation's objectives across the finish line."

The big benefit of Big Data is that sampling sizes can be enormous, targeted, or scaled in just about any way to suit the needs of business. This revolution has occurred so rapidly, however, that many sectors—and institutions of higher education—are only beginning to respond to the opportunities afforded by Big Data.

"Companies need employees with a combination of business acumen and technical (computer) skills," Buche says. "What that means for universities is that our curricula must evolve in order to address the fundamental needs of industry. One of the ways the MIS curriculum stays current is through strong ties to industry partners."

Lake Celilo is just outside of The Dalles, sixteen miles of water formed by The Dalles Dam. The dam generates power and pools up a reservoir, just as these enormous buildings on the river banks pool up data and generate opportunity. What industry is discovering it needs, now that the raging waters have been calmed back to something manageable, is the MIS experts who can wade out, survey the collection, and tell us just what it is we have.

Louks, who has spent considerable time in industry, sees businesses becoming hungrier for students with an MIS background, able to navigate all of these data pools. "Every year we go to the career fair and hear the same story," he explains. "When we tell them what our students are trained to do, what they can do for them, the lightbulb goes on. 'That's exactly what we need!'"

"COMPANIES NEED EMPLOYEES WITH
A COMBINATION OF BUSINESS ACUMEN
AND TECHNICAL (COMPUTER) SKILLS."





THE INFORMATION REVOLUTION ISN'T ALL MARKETING AND PROFILING.

THE SCHOOL OF BUSINESS AND ECONOMICS SEES INFORMATION AS VITAL THROUGHOUT THE ENTERPRISE, AND HAS INTRODUCED A CONCENTRATION IN SUPPLY CHAIN AND OPERATIONS MANAGEMENT TO PLACE OUR STUDENTS AS HUMANS AT THE HELM OF THE INFORMATION-RICH, SUPPLY-CHAIN MACHINE.

A modern assembly line looks a great deal different from the days of Henry Ford's Model T. Gone is an entire army of workers completing every task, with robotics and automation taking over much of the heavy lifting. This is highly skilled work, a ballet of metal and machine looking like the set of a science fiction film.

At Ford, one Focus might be getting a manual transmission and a sweet lime-green paint job, while the very next one in line will have paddle shifters and be black. How can they possibly keep it all in order?

One little tag does the trick. The same technology that helps stop thieves, keeps toll roads moving smoothly, and returns lost pets to their homes also keeps orders straight on the assembly line. RFID tags, short for radio-frequency identification, have sparked a manufacturing revolution.

“ RFID TECHNOLOGY HAS IMPROVED EFFICIENCY THROUGHOUT THE SUPPLY CHAIN. ”

“RFID technology has improved efficiency throughout the supply chain,” says Greg Graman, associate professor of operations and supply chain management at Tech. “While this helps the bottom line of producers, ultimately this efficiency benefits consumers as well with lower prices and improved availability.”

With billions of dollars in sales each year, RFID technology has proven its effectiveness: survey after survey shows increasing numbers of producers and manufacturers adopting the technology.

In the future, as this technology continues to evolve and its hardware is compressed into smaller and smaller packages, the possibilities for real-time data are almost limitless. For business, this means decision-makers will be empowered with the information they need to make fast decisions, reiterating the importance of reliable data and the education and skills base to make the human decisions out of the zeroes and ones.



**To learn more, scan the QR code above or visit www.mtu.edu/scom.*



As a data professional, you have the access and the opportunity to misuse data and abuse privacy rights. What do you see as your ethical responsibility in maintaining integrity while managing all of this information?

1 Kaylee Betzinger: Student

There are endless possibilities for abuse. You have to look at it from the perspective of how you would want your own information handled. You cannot let the privilege get to you, and abusing data hurts everyone: the person whose data it is, the business—both legally and by reputation, and you yourself. Being unethical means the end of your career. And it should.

2 Theresa Jacques: Registrar

When I am doing FERPA [Family Educational Rights and Privacy Act, a law that protects the privacy of student education records] training, I always say, "Just because you can, doesn't mean you should." Many of us have access to data, but that doesn't mean we should be looking at it. If there is not a need to know, then don't look, and curiosity is NOT a need to know. It really comes down to ethics and the Golden Rule of data: treat others' data how you would want your data to be treated.

3 Ashley Sudderth: Information Compliance Officer

Users are increasingly concerned about the loss of privacy and the inability to control the dissemination of their protected information. It is my job to understand what information is collected—how the information is handled, who has access to the information, and under what conditions the information may be disclosed.

4 David Hale: Senior Security Officer

In my position I have the potential to come in to contact with a significant amount of private data. I try to mitigate the amount of contact by programmatically processing data whenever possible. For those rare times that I do encounter unprocessed personal data I believe that it is my ethical responsibility not only to keep it confidential, but to ensure that it does not bias my interactions with others.



Join the conversation on information security by visiting the Impact website at: www.mtu.edu/business/alumni/impact



SCHOOL OF BUSINESS AND ECONOMICS CONFERENCE

Bill S. Breffle

- » North American Lake Management Symposium, "Economic Values for Lake Improvement Using a Method to Better Reflect the Preferences of Less-wealthy Residents," Madison, Wisconsin.
- » Pathways to Success: Integrating Human Dimensions into Fisheries and Wildlife Management Conference, "Socioeconomic Evaluation of the Impact of Natural Resource Stressors on Human-use Services in the Great Lakes Environment: A Lake Michigan Case Study," Colorado State University, Breckenridge, Colorado.

Mari W. Buche

- » Association for Computer Machinery Computers and People Research, "Inter-Sourcing: Alternative IT Sourcing Solutions Using Student Interns," Cincinnati, Ohio.
- » Midwest Association for Information Systems, "The Elimination of Detrimental Shadow Systems: A Participant Observer Case Study," Normal, Illinois.
- » "The Role of Information Analysts in Business Intelligence," University of Michigan, Dearborn.
- » Academy of Management Meetings, "Gendered Institutions and Women's Persistence in Entrepreneurship," Boston, Massachusetts.

Emanuel Xavier de Castro Oliveira

- » 2013 International Network of Business & Management Journals Conference, "Technology Entrepreneurship in the Presence of Cultural Diversity and Shadow Economy: A Multi-Level Model in the Context of Developing Economies," Lisbon, Portugal.
- » 2012 Global Innovation and Knowledge Academy Conference, "Technology Entrepreneurship in Emerging Economies: The Influence of Intellectual Property Rights, Foreign Direct Investment and Barriers to Technological Adoption," Valencia, Spain.
- » 87th Annual WEAI Conference, "Technology Entrepreneurship in Emerging Economies: The Influence of Intellectual Property Rights, Foreign Direct Investment and Barriers to Technological Adoption," San Francisco, California.

Sonia M. Goltz

- » "Gendered Institutions and Women's Persistence in Entrepreneurship," Academy of Management, Boston, Massachusetts.
- » "Beyond Social Exchange Theory: An Integrative Look at Transcendent Mental Models for Engagement," Academy of Management, Boston, Massachusetts.
- » "Translating the Social Watch Gender Equity Index for University Use," Academy of Management, Boston, Massachusetts.

Soonkwan Hong

- » Consumer Culture Theory Conference, "Incidentally Utopian: Re-imagining the Sustainability in Ecovillages," Tucson, Arizona.
- » "Cruising the Unadulterated Terrain of Consumption: Rural Snowmobilers' Interpellation through Collective Simplicity," Association for Consumer Research, Vancouver, British Columbia.
- » "Mythologized Glocalization of Popular Culture: A Postcolonial Perspective," Association for Consumer Research, Vancouver, British Columbia.

Dana M. Johnson

- » 24th Annual Production and Operations Management Society Conference, "Patient Perceptions of Quality," Chicago, Illinois.
- » 24th Annual Production and Operations Management Society Conference, "Experiential Learning: A Case of Advanced Project Management," Chicago, Illinois.
- » 2012 Decision Sciences Institute Conference, "THE Project Competition: A Case Study," San Francisco, California.

Dean L. Johnson

- » Academy of Finance, "Are There Riches in Reputation?," Chicago, Illinois.

André O. Laplume

- » Administrative Sciences Association of Canada, "Immigration, Social Desirability and High-Growth Entrepreneurship in Developing Countries: A Multilevel Model," Calgary, Alberta.
- » Administrative Sciences Association of Canada, "Sequential and Simultaneous Approaches to Organizational Ambidexterity," McEwan University,

Calgary, Alberta.

- » Academy of Management, "Exploration and Exploitation Approaches for Various Stages of Firm Growth through Diversification," Boston, Massachusetts.

Michele L. Loughead

- » Twelfth International Conference on Knowledge, Culture and Change Management, "Creating a Performance Culture," Chicago, Illinois.

Thomas E. Merz

- » "Risky and Safe Choices in Constant-Sum Games: An Experimental Design," Curtin University, Edith Cowan University, and the University of Western Australia.

Junhong Min

- » Society for Marketing Advances, "Relationship Governance for Marketing Research Service Buyer and Provider," Orlando, Florida.
- » Academy of Marketing Science, "A Study of Understanding When Technology Attributes Can Increase Preference," New Orleans, Louisiana.

Emanuel Oliveira

- » 2013 Global Innovation and Knowledge Academy Conference, "The Impact of Freedom From Corruption and Individual Attributes on Entrepreneurial Intentions in Transition Economies," Valencia, Spain.

Saurav Pathak

- » 2012 Annual AIB Southeast USA Conference, "Informal Institutions and Technology Entrepreneurship in Emerging Markets: A Multi-Level Model," Fort Lauderdale, Florida.

Karol I. Pelc

- » 20th Annual Conference of American Society of Business and Behavioral Sciences, "Global Dynamics of Innovation in Social Networking," Las Vegas, Nevada.

Latha C. Poonamallee

- » "Beyond Social Exchange Theory: An Integrative Look at Transcendent Mental Models for Engagement," Academy of Management, Boston, Massachusetts.

PRESENTATIONS • NOVEMBER 2012–OCTOBER 2013

Howard Qi

- » 2013 Midwest Finance Association Conference, "A Structural Approach for Predicting Default Correlation," Chicago.
- » 2013 International Academy of Business and Public Administration Disciplines (IABPAD) Conference, "With or Without Hilling and Value of Technology," Orlando, Florida.
- » 2012 US-Vietnam Workshop on Multiple-hazard, "Valuation of Insurance: Insurance, Self-Insurance, or Maintenance," NSF of the USA and the Vietnamese Government, Hanoi, Vietnam.

Maria G. Schutte

- » Financial Management Association Conference, "Comovement's Rise and the Information Diffusion View," Atlanta, Georgia.

Manish K. Srivastava

- » Academy of Management Annual Conference, "The Impact of Knowledge Structures on Alliance Formation," Boston, Massachusetts.
- » Academy of Management Annual Conference, "Network Dynamism and Firm Innovation: A Knowledge Based Perspective," Boston, Massachusetts.

Tang Wang

- » Industry Studies Association Annual Conference, "Capability Stretching," Kansas City, Missouri.
- » Darden & Judge Entrepreneurship and Innovation Research Conference, "Capability Stretching," Charlottesville, Virginia.
- » "Opening the Black Box of Upper Echelons in China: TMT Social Attributes

and Firm Flexibility," Beijing Normal University, Beijing, China.

- » International Conference on Business, Management and Governance, "Trade Money for Guanxi: When do Venture Capitalists Underprice IPO Shares in China?," Hong Kong, China.
- » "Capability Stretching," Ocean University of China, Qingdao, China.

Grow With Us

Roll Up Your Sleeves and Dig In with the SBE

Alumni: You are our greatest ambassadors, spreading the value of a business education at Tech far and wide. Please get in touch and let us know how you're doing and what you're up to:

mtu.edu/business/alumni/get-involved

And when you're sharing your stories of how your degree has paid off for your career, consider lending a hand:

mtu.edu/business/school/giving-opportunities

Students: Knowledge is power, and you're gathering a ton of power with every course. Stay connected with what's happening in the School and see the opportunities for you to get involved:

mtu.edu/business/more/orgs-activities

Prospectives: Business is all about what's next. You're what's next in the business world. Learn more about our programs at:

mtu.edu/business/school/prospective

www.mtu.edu/busblog

NEWS AND NOTES



FEDERAL RESERVE BANK OF MINNEAPOLIS PRESIDENT MEETS WITH STUDENTS

Narayana Kocherlakota, president of the Federal Reserve Bank of Minneapolis, spoke to students in the School of Business and Economics about monetary policy and its ability to influence employment and prices in the US economy.

Kocherlakota's district is the second largest geographically and least populated, he said, stretching from Montana to the Upper Peninsula. As one of twelve districts, he is part of regular meetings of the Federal Reserve open market committee.

When asked about global market inflation and decision-making, he commented, "it's another factor for us to think about, that could influence our performance, but we are not like New Zealand where it's all they think about. The US is a relatively closed economy."

And does he think about the fiscal health of his own district over that of the US?

"We all provide information about our districts, but we make policy for the country," he said. "Officially, Kansas City, San Francisco, and Minneapolis get one vote to represent all three. We vote on national matters."

As for his district's economy? "It's doing well, but I don't think the Fed can take credit," Kocherlakota said. "The Upper Peninsula faces challenges that are historical in nature. Montana and Minnesota have unemployment around 5 percent. North Dakota has the oil boom and is around 3 percent. They can't find people to work in McDonalds! South Dakota is below 4 percent and a bit of a mystery. The labor market could actually be stronger, the economy could be stronger. There are still some 2008 effects."

Roger Woods has been selected as the 2013 recipient of the coveted School of Business and Economics Teacher of the Year award. "I am honored to be selected given the great faculty that we have in the School of Business and Economics," he said. "It has helped that I have had some great mentors and support of other faculty to improve my teaching." Woods



Nathan Sturos, an accounting student, received an AICPA/Accountemps Scholarship for 2013-14. AICPA and Accountemps offer the AICPA/Accountemps Student Scholarship to provide financial assistance to outstanding accounting students who demonstrate potential to become leaders in the CPA profession. It is a very competitive scholarship program, with only ten awarded nationwide. A task force, comprised of AICPA and Robert Half Accountemps representatives, will review all qualified applications. The task force will select ten scholarship recipients based on demonstrated outstanding academic achievement, leadership, and future career interests in accounting and business.

Sturos is the first recipient of this scholarship from Michigan Tech. He also completed an internship this summer with Bemis, which included a trip to Finland to help with an audit.

Membership in Beta Gamma Sigma, the international honor society serving business programs accredited by AACSB International, is the highest academic recognition the school can provide to those students who have demonstrated outstanding academic achievement. Given the importance we place on membership in this organization, we are extremely pleased that Beta Gamma Sigma has recognized our chapter as a premier chapter.

first won the Teacher of the Year Award in 2011 and received the campus-wide Distinguished Teaching Award in 2012. Additionally, Woods was one of five new members inducted into the University of Puget Sound Athletics Hall of Fame this fall. He earned notoriety for the Loggers as a three-time NAIA national swimming champion.



James Trethewey,

a 1967 alumnus in business administration and longtime friend of the School of Business and Economics, passed away this fall.

An Ironwood native, Trethewey began his career with Copper Range and soon joined Cleveland-Cliffs (now Cliffs Resources), advancing through management positions over the years. From Ishpeming

to Ontario to Cleveland, he worked in positions of increasing responsibility and became vice president-controller and chief accounting officer. Along the way, he also earned his MBA from Baldwin-Wallace College.

In his final years with Cliffs, Trethewey was senior vice president of business development and worked with the senior corporate team in reshaping the company, adding international experience to his career. He was a member of the American Mining Association, the Society of Mining Engineers, and other organizations, retiring in 2007.

After his retirement from Cliffs, Trethewey remained active in social, business, and industry activities. He served on the board of two charities, participated as a member and CEO of the limited partnership DJD Investments, and was a board member of Steel Dynamics Inc., a major US steel producer, where he also served as chairman of the audit committee.

Trethewey has long been a friend and supporter of Michigan Tech and the School of Business and Economics. He joined the Advisory Board for the School of Business and Economics starting in 1994 and served as a trustee for the Michigan Tech Fund. He and his wife have funded the James and Dolores Trethewey Applied Portfolio Management Program (APMP) Professorship, given to APMP creator Dean Johnson, and have supported students through scholarships. He was honored at the 2013 Michigan Tech Alumni Reunion, receiving the Distinguished Alumni Award, presented to alumni "who have made outstanding contributions both in their careers and to Michigan Tech over a number of years."

Trethewey leaves behind an admirable legacy. His loss will be felt deeply by everyone at Michigan Tech.

Each year the Student Leadership Awards celebrate the

hard work of everyone involved in student organizations across campus. Within the School of Business and Economics, senior lecturer Emanuel Oliveira was named Student Organization Advisor of the Year. Oliveira was honored for his work with the Finance Club and their FinanceU event.

Yu Summer Gu, an MBA student, was also selected as an award recipient. Gu was the driving force behind Chinese Night, which had a notably larger attendance this year.

NEW CONCENTRATIONS FOR MANAGEMENT DEGREE

Two new concentrations have been added to the School of Business and Economics' BS in Management: supply chain and operations management, and entrepreneurship. Both hold great promise.

"Businesses want employees with the knowledge and expertise in supply chain," says Greg Graman, associate professor of operations and supply chain management in the School. "Distribution systems are important to customers and wholesalers, and they need to be managed before they get out of control."

That importance is evident in co-op, intern, and job opportunities from companies such as Raytheon, Target, Kohler, Union Pacific, Dow Chemical, Oshkosh Truck, Mercury Marine, and Polaris.

"I get asked directly by these companies, 'Tell me about your supply chain program.'" Graman says.

"It's more than logistics," says Dana Johnson, professor of operations and supply chain management. "It's using information technology in a fashion to facilitate timely decision making with quantitative data, for example. It's an important process in manufacturing or service industries."

And, it's multidisciplinary, Johnson says. Students who transfer in from engineering or computer science are bringing quantitative aptitude, and that skill set is emphasized throughout the concentration.

But there's also emphasis on data analysis, finance, strategic skills, global perspective, and communications.

Elsewhere, future entrepreneurs can now get focused training in the SBE. The new concentration is the result of work by Saurav Pathak, Michele Loughead, Russell Louks, and Tang Wang, and experiential learning in entrepreneurship will be the focus.

Several entrepreneurial entities on or around the Tech campus—including the Office of Innovation and Industry Engagement, the Enterprise Program, the Senior Design Program and the MTEC SmartZone—have been identified and integrated into what could become a sustainable "entrepreneurial ecosystem," Pathak says.

"These entities have contributed a total of eleven technology-based projects for the Business Development course, whose commercial potential is to be ascertained by our business school students."

Currently, forty-three students are enmeshed in all things entrepreneurial.

"The two-content-based course sequence—entrepreneurship and entrepreneurial management—fits in as an introduction and connection for the management students in the new concentration," says Wang, "At the same time they are taking the business development courses in sequence."

"And the students will be working on real projects with commercial applications, producing real business plans," Pathak adds. "In essence, the concentration benefits from the predominance of technology on campus."

Michigan Technological University
School of Business and Economics
1400 Townsend Drive
Houghton, MI 49931-1295



Michigan Tech

School of Business and Economics

Michigan Technological University is an equal opportunity educational institution/equal opportunity employer, which includes providing equal opportunity for protected veterans and individuals with disabilities.