

WPI transformations

SPRING 2002

A JOURNAL OF PEOPLE AND CHANGE

From the Ashes

WPI faculty contributed to a new report on why the World Trade Center towers fell

Tales of the Tape

Anna Cushman knows the stories black boxes tell

Bettering Beantown

WPI students are helping Boston, a project at a time

Facing Facts

How technology that can identify you, even in a crowd, is making the world safer

Profiles in **Giving**



Profiles in **GIVING**

Sherri Curria '93

Gift Arrangement: Planned Bequest/Individual Retirement Account (IRA) or other Qualified Retirement Plan

On Planning for the Future

Individual retirement accounts and other qualified retirement plans are great ways to put money aside for retirement and save on taxes at the same time. But while they make excellent vehicles for retirement planning, these investments have a significant drawback when it comes to estate planning. The fact is, retirement funds are typically one of the most heavily taxed assets in any estate. However, by making a charitable institution the ultimate beneficiary, it's possible to avoid the substantial taxes typically incurred when passing qualified retirement plans on to one's heirs. It's easy to do, it can be done at any age, and the decision can be reversed, if so desired, at any time.

On Gift Planning at WPI

That's what Sherri Curria discovered recently when, in the process of changing jobs, she realized that she would have to roll her 401(k) plan into an IRA. Though it hadn't accumulated a great deal of value, she thought it would be a great way to give something back to the university. "It's convenient," she says. "Can I give WPI \$100,000 now? I wish! But can I give the \$100,000 in the future? Sure! And the funds are already separate from my other retirement assets, so it won't take anything away from my family. It's a great way to support WPI in the long term."

1-888-WPI-GIFT

For more information on how to make WPI the ultimate beneficiary of an IRA or other qualified retirement plan, call 1-888-974-4438 or e-mail planned-giving@wpi.edu.

Starting Point

Action!

The sun was sinking in the March sky as the film crew began setting up in Reunion Plaza. A small army of technicians and production assistants quickly assembled a track for the camera to glide along, set up lights and microphones, ran cables, and swept melting snow from the brick walkway.

While the director lined up the shot through his viewfinder, a growing crowd of students, faculty and staff gathered to watch. Finally, there was a call for quiet. The camera and tape recorder were set in motion, the clapper was clapped, and the assistant director called, "Action!"

As several student "extras" ambled across the plaza, Lauren Beaumont '03 addressed the camera. "When tomorrow's innovations are made," she said, "I'll be there." She turned to walk into the distance, but quickly bumped shoulders with another student. "Cut!" cried the director. "Let's try it again."

Several takes later, the final scene for WPI's first television commercial was in the can. The 30-second spot, known as "WPI Was There," paints a portrait of a university with a heritage of innovation that takes a different approach to technological education. It is the most widely visible element in WPI's new marketing program, a multifaceted initiative aimed at making more people aware of this institution and the remarkable education it offers.

The brochure bound into this issue of *Transformations* tells the story of the planning behind this new endeavor, outlines its various elements, and explains its goals. One of the most important of those goals is helping every member of the WPI family understand that they have a role to play in enhancing the university's reputation, and much to gain as more people come to appreciate the qualities that make WPI distinctive.

As you'll see in the message from WPI Alumni Association president Dusty Klauber '67 on page 30, the association has made supporting the university's new marketing program one of its two priorities for the upcoming year. As Klauber put it in his message to alumni at Reunion, "Given the urgency we have placed on the need to become recognized as the leader in undergraduate technological education, we must find a way to leverage the power of our 26,000 alumni. We must engage them in our marketing effort and create an army of WPI missionaries determined to make WPI a household name."

Armies live or die on good intelligence. Through *Transformations*, we will continue to do our best to keep you informed about what's new and exciting here on the home front. But that's just a start. I encourage you to do some reconnaissance of your own. Wade into the sea of information available on the WPI Web site, www.wpi.edu. The new home page and News pages are good starting points. Get back to campus, if you can, to see what a remarkable place your alma mater is today.

And once you have all that good information, don't keep it to yourself. Share it with friends, colleagues, young people. Marketers know that there's no communication vehicle quite so effective as word of mouth. Your 26,000 voices, all telling our story, can do much to advance the mission of WPI—as much, perhaps, as the best television commercial.

Michael W. Dorsey
Editor



Scenes from a shoot: Lauren Beaumont '03 was chosen to deliver the opening and closing lines in WPI's new television commercial. In the first photo, she watches director Michael Grasso line up the opening shot in front of Boynton Hall. In the next two, Kristin Wobbe, associate professor of chemistry and biochemistry, keeps a wary eye out as a camera dolly is wheeled through her laboratory. Finally, Beaumont waits patiently as the film crew prepares to capture her reading of the final line near the end of a long day of shooting.

Sept. 20–21	Homecoming
Nov. 6–9	Frontiers in Education 2002 (Boston Park Plaza Hotel; hosted by WPI)
Dec. 2	Manufacturing Our Future: The Summit
Dec. 4	President's IQP Awards Ceremony

All events take place on the WPI campus, unless otherwise noted.

Up Ahead

Features

12 Hearing Voices

Aviation accidents raise two big questions: what happened, and can we stop it from happening again? Cockpit voice recorder analyst Anna Cushman '91 helps find the answers. **By Ray Bert '93**

16 After the Fall

Jonathan Barnett's expertise in building fire safety earned him a place on an elite team of engineers chosen to study the collapse of the World Trade Center. **By Joan Killough-Miller**

22 More Than a Face in the Crowd

Facial recognition technology made by Viisage Technology, a company led by Denis Berube '65, is helping make the world safer and more secure. **By Laurance S. Morrison**

27 The Unseen City

Whether it's a fog-shrouded bridge in Elm Park late at night or debris in a deserted field, Kirk Jalbert '98 finds beauty and mystery in the Worcester we rarely see. **By Joan Killough-Miller**

On the Covers

Front: In the blink of an eye, facial recognition technology can find one face in a million. Photo illustration by Patrick O'Connor, Steven Pascal and Michael Sherman.

Back: Photography by Patrick O'Connor.

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Staff

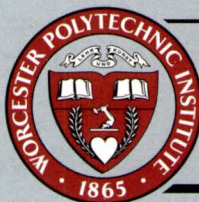
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WPI

The University of
Science and Technology.
And Life.™

transformations

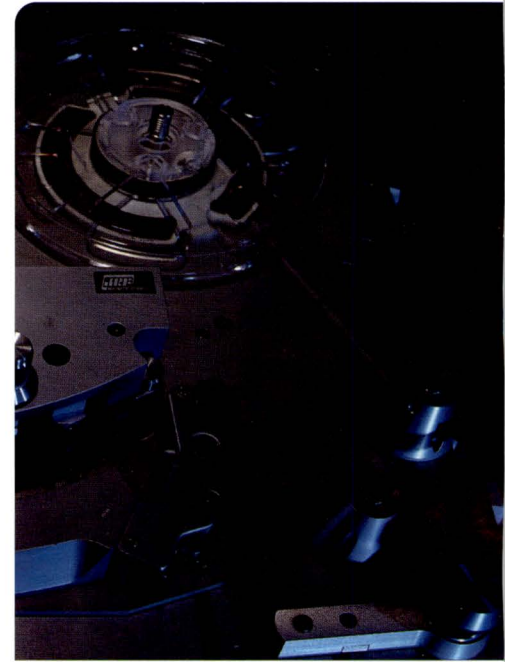
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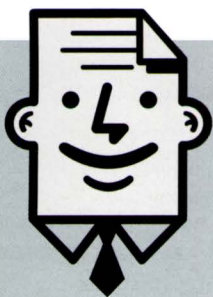
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On the Web @ www.wpi.edu/+Transformations

The online edition of the Spring 2002 *Transformations* has a host of features and links related to the stories in this issue. You will find a link to the full report of the World Trade Center Building Performance Assessment Team, along with details about the extensive news coverage the study earned for WPI. You'll also read about Anna Cushman's analysis of the cockpit voice recording that helped crack the mystery of the plane crash that killed golfer Payne Stewart, and coverage of last November's forward-looking symposium, "Imagining the Future." While you're online, send us your news, write a letter to the editor, or chat with fellow readers in the *Transformations* forum in the Alumni Café.

www.wpi.edu/+Transformations

Letters to the Editor

To the Editor

I just wanted to let you know how much I enjoyed the new WPI magazine. I never read a WPI magazine before, unless it included an article on someone I knew. You have now produced a really worthwhile publication. Congratulations. It is an enormous improvement over anything WPI has produced previously.

Andrew Montelli '82
Weston, Conn.

To the Editor

I was delighted to receive the Winter 2002 issue of *Transformations*. WPI needs to get its educational story told. I have been getting letters from some of my recent students, now in various colleges across the country, and from my former WPI students, whose children are now in college.

What intrigues me is the increased interest in emphasis on the kind of hands-on courses and the number of project-type programs these young people are now taking. While few institutions would want to acknowledge that their programs had their genesis in some other institution, I wish there was a way to let other people know of the source.

I have been gone long enough so that most of the names mentioned in your articles are unknown to me. Still, I am delighted that WPI people are still making a difference in the lives of other people, and it is always a pleasure to find a name or two in the class notes that bring back memories of those I once knew while I was there.

John van Alstyne
Ashville, N.C.
Former Dean of Academic Advising and
Professor of Mathematics

(Continued on page 46)



Campus Buzz

Dean Kamen Addresses Graduates

Technological visionary **Dean Kamen '73** addressed graduates at WPI's 134th Commencement exercises on May 18. A master at turning "what ifs" into lucrative products, he has received numerous awards and honors, including the National Medal of Technology, for such innovations as the first portable drug infusion pump, the IBOT (see *Transformations*, Winter 2002) and the Segway Human Transporter (Kamen rode a Segway in the procession).

Founder and CEO of DEKA Research & Development Corp., Kamen entered WPI in 1969, but left before completing his degree. The university awarded him an honorary doctorate in 1992 and its first Presidential Medal in 2001. His passion for inspiring American youth to pursue careers in science and engineering led him to found FIRST (For Inspiration and Recognition of Science and Technology), which sponsors a national robotics competition that teams professional engineers with high school students from around the country.

Honorary degrees were presented to **George A. Cowan '41**, participant in the Manhattan Project and a leading authority on nuclear weapons diagnostics, **David M. Lederman**, founder of ABIOMED Inc., developer of the first self-contained, implantable artificial heart, and **Sheila Tobias**, leading authority and author on mathematics and science education.



Fisler, Kazantzis Join a Growing Constellation of Stars

The CAREER Award is the National Science Foundation's most prestigious research award for new faculty members. WPI's most recent winners are **Kathryn Fisler**, assistant professor of computer science, and **Nikolaos Kazantzis**, assistant professor of chemical engineering. The grant, which typically includes five years of funding for a major research project, recognizes young faculty members who show unusual promise as researchers and educators. The award supports those teacher-scholars who are most likely to become the academic leaders of the 21st century, according to the NSF.

Over the past eight years, 14 WPI professors have received CAREER Awards, an impressive number for a small university, and a reflection of the university's success in attracting outstanding educators and researchers to its faculty, notes William Durgin, associate provost for academic affairs. "This would be an enviable record for a major university," he says. "For WPI, it is testimony to the quality of new faculty members who have joined us and their commitment to establish solid research programs."

Fisler received her award for the project "A Computational Infrastructure for Timing Diagrams in Computer-Aided Verification." Kazantzis received his award for "Digital Model-based Fault Detection and Isolation for Nonlinear Processes."

Dean Kamen, center, was the speaker at WPI's first indoor graduation since 1989.

Dan Vaillancourt

Patrick O'Connor

Now when I think about the world I think about what is possible, about simple, fundamental ideas, about the building blocks of the ideas.

A Few Words . . .

Curtis R. Carlson '67

President and CEO, SRI International

An Interview by Laurance S. Morrison

A member of two Emmy-winning teams and a professional violinist, *Curtis R. Carlson* heads a 56-year-old organization that has been called "the soul of Silicon Valley." SRI innovations range from household detergents to the siting of Disneyland to the computer mouse to high-definition TV. Carlson spoke with *Transformations* about the interplay of the dynamic global landscape and the SRI passionate turn of mind.

When you look at the rate of progress around the world, what do you see?

In this knowledge-based global economy, where moving ever faster only allows us to keep up, we see the broader truth of Moore's Law: price-performance relationship improves by 100 percent every 18 to 24 months. Internet speed doubles in a year and content doubles in half that time. The way to thrive is to rethink and innovate, always faster, and to foster commercial investment in fundamental developments and discoveries at a significant scale so people everywhere can live improved lives.

What makes a good SRI project?

Our thoughtfully assembled multidisciplinary project teams devote their energy to important problems, not just interesting concerns. Our projects pose a fundamental need, present a sense of urgency, call for existing resources and, often, affect large numbers of people. Because we aim to change for the better the way life is lived, we strive to achieve not just cancer cures, but illiteracy cures. For a sizable subpar K-12 public school system, we developed for students a cheap, light, hand-held, interactive wireless device that works as a teacher's aide. We want our innovative solutions to advance the goals of our clients and partners because their consumers, in turn, can adopt and literally live with the resulting products and services for the benefits they bring. Much of our work has military applications and, now, homeland security applications.

How do SRI project teams function?

The SRI approach and the essence of the WPI Plan overlap. Important questions animate passionate people here 24/7. We propose and critique a short, tight, catchy, compelling picture of what we want to achieve. We call it our value proposition. It enables us to put our finger on exponential opportunity to serve basic human values, which is good business. We brainstorm, feel the tingle of a powerful idea, test its practicality, pigeonhole risk, and readily shuck such undesirable outcomes as unwanted drug side effects. We then position the innovation so its particular publics can embrace its value. Sometimes we spin out a company to lead a newborn industry in a marketplace where needs await satisfaction. We're engaged in large and comprehensive work, because it is fundamental. This springboards innovation. Innovation isn't luck. We see it as a managed process.

In big science, what is the government's role?

It can serve in its traditional role as a significant funder, and as a referee on ethics, although at SRI our process of innovation and value creation naturally tends to resolve many such matters. Science is embarked upon 'species evolution' and artificial intelligence. With the decoding of the human genome, scientists understand more fully the interaction of proteins. Biology can be employed at the information level. A family doctor may view DNA analysis as if it were a software program. We have gene therapy and cloning, and we now look seriously at producing embedded computer chips to monitor our health and dispense medications as needed. Government can help work out standards and procedures. All of us must be concerned with the consequences of our work and debate the emerging issues in depth so that we proceed with our eyes wide open.



Do you distinguish between the artist's intuition and the scientist's insight?

They come from the same thing. It isn't one "Ah-ha!" experience, but a series of incremental steps, little discoveries, a couple of bigger ones and lots of hard work in finding, or fashioning, order and coherence. When one is on to a really good experience in music or science, there is the same sense of joy and euphoria. I have played a Mozart quintet in synchrony with other musicians such that we were fused together. I had chills. At the end of the piece, we were silent, then we hugged each other. I see that in our SRI project teams. It is intensely satisfying to watch as others reach their dreams.

So what is your job?

I get to work with champions. Passionate people who prize their work and their goals. I champion champions. That's my passion.

Has your WPI degree in physics proven useful?

Physics was the perfect subject to study because it involves the basics for how the world works. Now when I think about the world I think about what is possible, about simple, fundamental ideas, about the building blocks of the ideas. I just wish the WPI Plan had been in place when I was a student. I would have loved it. I still look at the theoretical and the practical. In this, WPI offers a perfect balance. I'm drawn to fundamentals and how to apply them deliberately to make genuine contributions. That's why I'm here at SRI.

—Morrison heads a full-service communications firm based in Sturbridge, Mass.



Patrick O'Connor



FIRST LEGO League challenges middle-school students to discover the fun of engineering and science. Thousands of teams across the U.S. compete in tournaments like RoboNautica, held at WPI in March.

Robot Contest Makes Engineering Fun

How do you get boys and girls excited about science and engineering? For the organizers of RoboNautica, the answer is: brick by brick. LEGO bricks, to be exact. The event, billed as a "tech-know-logical voyage," brought teams of middle schoolers from Massachusetts, Rhode Island, Connecticut and Pennsylvania to campus in March to pit their robots, made from LEGO bricks, sensors, motors and gears, against one another in a friendly competition.

The event, sponsored by Intel, was modeled on the events of the FIRST LEGO League, a junior version of the national FIRST robotics competition organized by Dean Kamen '73. "During a 10-week season, each LEGO League team develops its own strategy to solve the year's challenge, then builds robots based on that strategy," notes Michael Sherman, WPI's design director and organizer of the event. "They then compete in tournaments that let them see how different and clever their solutions can be."

"Programs like RoboNautica are a great step toward helping middle school students enjoy the world of engineering," says Robert W. Richardson, East Coast education program manager for the FIRST LEGO League. "It underscores the message that math and science are important subjects in which to excel."

News From the Playing Fields of WPI

Kerri Coleman (above), a junior majoring in biochemistry, became WPI's first female All-American in track and field in March. She secured her place in sports history by hurling the shot 45 feet, 9 1/4 inches (a personal best) at the NCAA Division III National Indoor Track Meet at Ohio Northern University. The toss also earned her 4th place in the event.

Melvin G. Massucco, who during his 29 years at WPI served as director of intramurals, physical education instructor, head football coach and head golf coach, died in March at the age of 76. He retired from WPI in 1996.

Whit Griffith is retiring from his post of more than 20 years as men's and women's swimming and diving coach, director of aquatics and assistant to the athletic director for club sports.

Merl Norcross, professor emeritus of physical education and athletics, won't be hanging up his track shoes any time soon. He recently completed his 50th year of involvement with WPI's track and field program; he has been assistant coach of the men's and women's teams since his retirement in 1994. A member of the WPI Athletic Hall of Fame, he was named Division III New England Coach of the Year in 1987.

Campus



Patrick O'Connor

Speakers at the molecular engineering workshop included, standing, from left, Joel M. Schnur, director of the Naval Research Laboratory Center for Bio/Molecular Science and Engineering, Leonard Polizzotto '70, vice president of international business development at SRI International, Richard S. Quimby, associate professor of physics at WPI, and sitting, from left, John L. LaMattina, president of Pfizer Worldwide Research, Richard A. DeMillo, vice president and chief technology officer at Hewlett-Packard, W. Grant McGimpsey, professor of chemistry and biochemistry at WPI, and Nancy Burnham, associate professor of physics.

A Big Event in the Science of the Very Small

Once the stuff of science fiction, nanotechnology, the ability to construct and control materials at the molecular level, "has already resulted in important breakthroughs that will have a direct impact on almost every aspect of life," says William Durgin, WPI's associate provost for academic affairs.

In March, corporate, government and academic leaders gathered at WPI to discuss what the next five years might bring in nanotechnology, also called molecular engineering, during WPI's second annual International Corporate/Academic Roundtable on Emerging Technologies. Topics of the more than 10 presentations included biological sensors, ethics, leveraging biomechanics, and leveraging the genome. The experts included three WPI faculty members: **Grant McGimpsey, Richard Quimby and Thomas Shannon.**

Durgin says the roundtable was designed to serve the diverse interests of its various audiences. "As scientists and engineers, we want to increase our understanding and improve our ability to use that new knowledge. As policy makers, we want to make sure developments are ethically and morally responsible as well as useful. As academics, we want to make sure we have the creativity and structure to teach newfound knowledge and give our students the tools and resources to expand on these fundamental developments."

Writing the Book(s) on American Literature

By Bonnie Gelbwasser



Patrick O'Connor

Inside WPI

The 10 volumes published by Ljungquist and Mott between 1994 and 2001 cover a wide swath of American literature. For a bibliography, visit www.wpi.edu/+Transformations.

Want to know something—anything—about American literature published in the mid-19th century? Chances are, what you're looking for is somewhere in the pages of 10 reference works edited in less than seven years by Kent P. Ljungquist (above, left) and Wesley T. Mott, professors of English at WPI.

"The literary answer to an encyclopedia, these 10 volumes comprise the standard reference sources on the period for public and private libraries," Ljungquist says. Adds Mott, "Our audience includes high school students, college students and college professors, and we know that these books are standard reading for doctoral exams in American and European universities."

Mott and Ljungquist selected the more than 1,200 writers, theologians, philosophers, educators, scholars, politicians, scientists, artists and reformers to profile in the 10 volumes and handpicked the scholars (including several WPI faculty members) to write the essays. "Most important," Ljungquist says, "we provided a substantial introductory essay for each volume that synthesizes the historical and intellectual background of the period."

The professors brought impressive credentials as "Americanists" to their task. Ljungquist is one of the world's leading authorities on the life and writings of Edgar Allan Poe. Known for his critical analyses of Poe's writings, in 1991 he determined that an unsigned review of Poe's series on "Autography" that appeared in 1841 was, in fact, written by Poe himself. Three of his volumes were part of the *Dictionary of Literary Biography (DLB)* series, published by Bruccoli Clark Layman. The publisher chose his *Antebellum Writers in the South* as the most distinguished *DLB* volume published in 2001.

Mott, an expert on Henry David Thoreau, Ralph Waldo Emerson and other Transcendentalists, is vice president of publications and a member of the editorial advisory board for the 1,800-member

Thoreau Society. He is also president of the Ralph Waldo Emerson Society and publisher of its WPI-based newsletter, *Emerson Society Papers*.

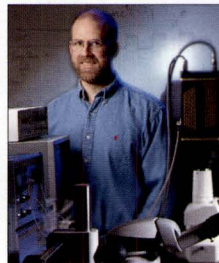
Mott and Ljungquist are part of a group within WPI's Department of Humanities and Arts that has published volumes in the standard edition of works of several 19th century giants. The group includes Joel Brattin, recognized authority on Charles Dickens, and Assistant Provost Lance Schachterle, known for his textual editing of the works of James Fenimore Cooper. "This body of work is remarkable not only for its scope, but for the fact that these works were produced by professors at a technological university," Mott says. "They have created a reputation for a certain kind of hard-nosed scholarship emanating from the English group at WPI."



Helping Diabetics Keep Their Sight

Between 25 and 45 percent of the 16 million diabetics in the United States will likely develop some degree of diabetic retinopathy, the leading cause of blindness. *Ross Shonat*, assistant professor of biomedical engineering at WPI, hopes his research on the role of oxygen in vascular diseases may help point the way to new ways to treat and prevent this condition.

Patrick O'Connor



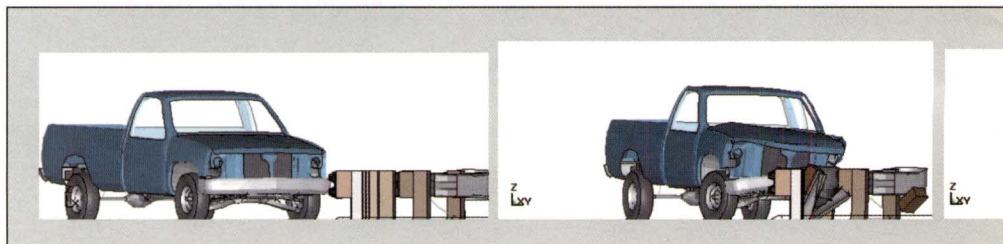
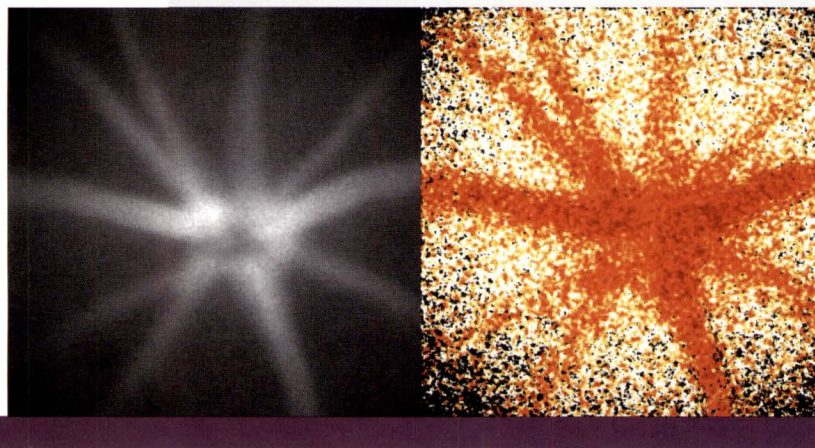
As diabetes progresses, and retinopathy begins to develop, blood vessels lose their shape and leak, and new vessels may start to grow. Shonat, whose research focuses on metabolic function and oxygenation in neural tissues, such as the eye and brain, believes that hypoxia, or low levels of oxygen in the eye, may cause these changes. He hopes to confirm this hypothesis by creating two- and three-dimensional maps of oxygen tension in the eye. He is developing the technology to create these maps with funding from the Diabetes-Endocrinology Research Center at the University of Massachusetts Medical School and the Whitaker Foundation.

Below: the photo on the left is a phosphorescence-intensity image of the blood vessels in the retina of a mouse, which radiate out from the optic nerve at the center. The image on the right, of the same retina, is a two-dimensional map of oxygen tension. Maps like this are helping Ross Shonat gain a better understanding of how oxygen is delivered to the retina and the role that oxygen metabolism and delivery play in the early phases of diabetic retinopathy.

In his laboratory, Shonat uses his new mapping technology to measure the oxygen tension in diabetic and normal mice as they age. The measurements are helping him gain a better understanding of how oxygen is delivered to the retina and the role that oxygen metabolism and delivery play in the early phases of diabetic retinopathy. This research is also helping to uncover the relationship between oxygenation and very early, sub-clinical damage to the tissues of the eye.

“If we can correlate abnormalities in the oxygen levels with the progression of diabetic retinopathy in the animal models,” he says, “we can give ophthalmologists clinically relevant information they can use to better assess when and how to treat this disease. They’ll also have a much better chance of detecting diabetic retinopathy early enough to prevent it from progressing.”

Shonat says he hopes to one day see his technology become the basis for a routine screening tool for this and other eye diseases, including age-related macular degeneration. He says the technology may also be useful for assessing the efficacy of certain drugs that may be used to treat and even reverse the symptoms of diabetic retinopathy.



Curbing Highway Fatalities

Each year, about 300 people die as a result of collisions with guardrails. According to *Malcolm Ray*, the culprits in many of these fatalities are not the guardrails, themselves, but adjacent curbs that can cause drivers to lose control of their vehicles, and cause vehicles to roll over or even vault over the guardrails.

Since the curbs are necessary to channel rainwater and prevent erosion, the solution is not to remove them, but to find ways to make them work in harmony with guardrails and other highway barriers, notes Ray, Ralph H. White Family Distinguished Professor in WPI's Civil and Environmental Engineering Department.

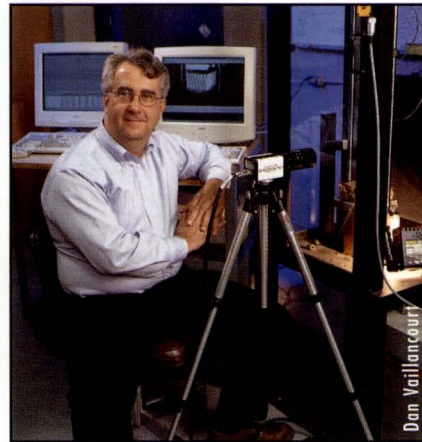
In research sponsored by the National Cooperative Highway Research Program, the research arm of the American Association of State Highway and Transportation Officials (AASHTO), with additional support from the Federal Highway Administration, Ray is determining the optimal combination of curb and guardrail designs and configurations, so each can do its intended job without endangering motorists.

Traditionally, research on highway barriers has required full-scale crash testing, which can be expensive (about \$35,000 for a single test). Ray and his research team complete most of their testing with sophisticated computer models. Using a nonlinear dynamic finite-element program called LS-DYNA, the team models vehicles, curbs and guardrails and performs virtual crash tests. In a fraction of the time it takes to do real tests, they can study multiple combinations of curbs, guardrails, impact angles and speeds.

WPI is a leader among the handful of laboratories around the world that can conduct this type of analysis. In fact, the university is one of just three sites in the United States designated by the Federal Highway Administration as centers of excellence in finite-element analysis modeling. Ray says WPI will also become a leader in education in this field this fall when it inaugurates the interdisciplinary Master of Science in Impact Engineering program, the first of its kind in the world.

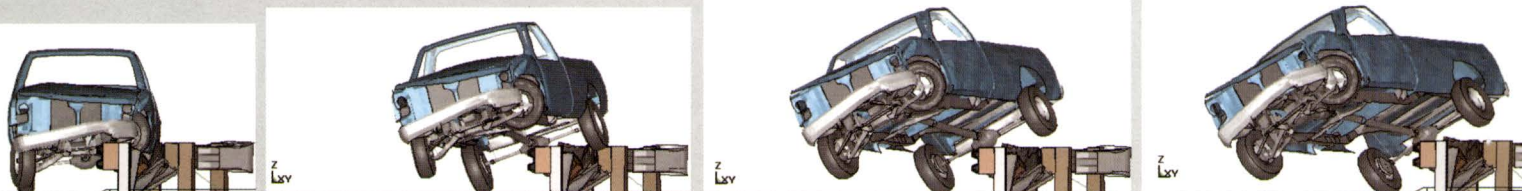
The results of Ray's research will be included in future updates of AASHTO's Policy on Geometric Design of Highways and Streets and *The Roadside Design Guide*. These guidelines for designing safe highways are the basis for design standards in use in all 50 states. Ray says it is gratifying to see his work put to use so quickly to have a real impact on safety.

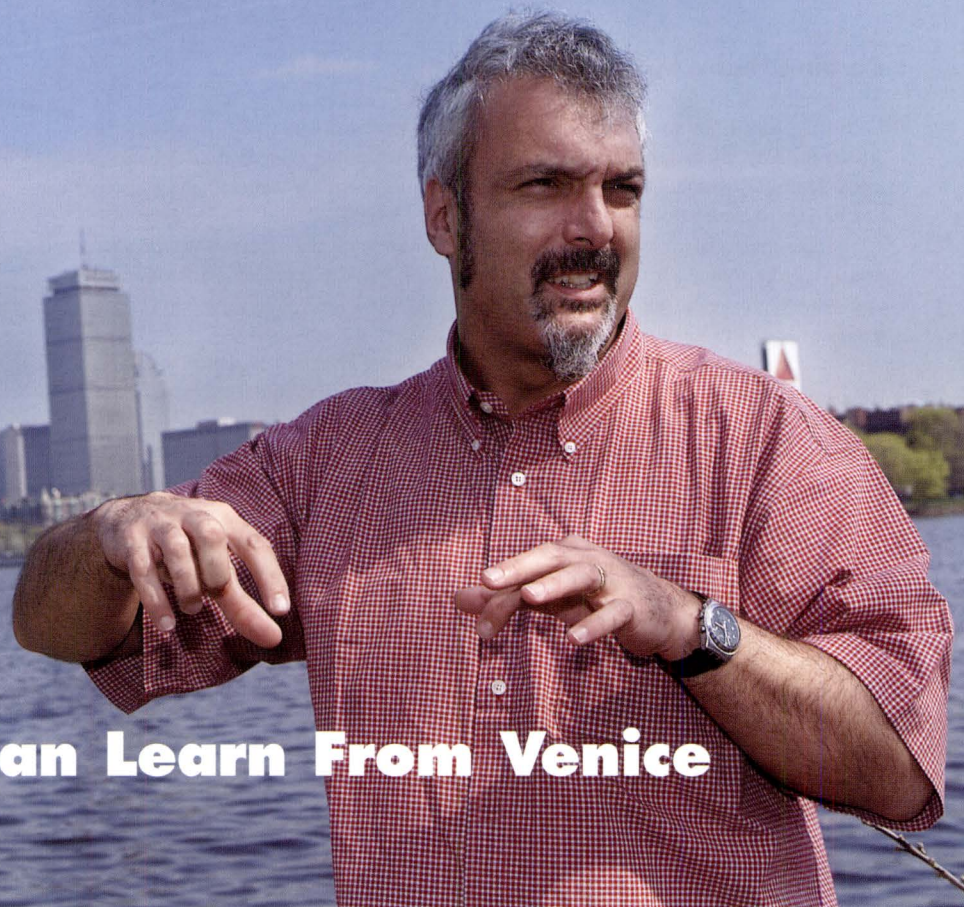
"We take real problems and come up with real solutions that are needed right away," he says. "For instance, the state of Pennsylvania came to us when it found that it had a system of guardrails that no longer met federal guidelines. Within a year of our first involvement, an improved guardrail was being installed on the Pennsylvania highways. Not only do those guardrails meet federal standards, but as a result of their installation, there will be fewer fatal crashes."



In the sequence below, from a computer simulation, a 2000-kilogram pickup truck traveling at 100 kilometers per hour collides with a guardrail and a 100-millimeter curb at a 25-degree angle. Through studies like this, completed with sophisticated finite-element analysis software, Malcolm Ray and his team are searching for combinations of guardrail and curb designs that will lower the incidence of fatal accidents on America's highways.

"Using a nonlinear dynamic finite-element program, the team models vehicles, curbs and guardrails and performs virtual crash tests."





What Boston Can Learn From Venice

What is a city's most precious asset? For **Fabio Carrera '84 ('95 M.S.)**, faculty member in the Interdisciplinary and Global Studies Division, the answer is simple: information. Dispersed among dozens of agencies and government bodies are the facts and figures that make a city work and help it grow. To make the best decisions about a city's future, one needs to see the connections between those bits of information, but in most cities, that's easier said than done.

Carrera is an expert on how cities manage information and how they can do it better. A Ph.D. candidate in MIT's Department of Urban Studies and Planning, he has developed techniques for employing technology to pull information together and make it easier to access. He has developed these techniques over more than a decade as director of WPI's student project center in his hometown of Venice, Italy.

During that time, hundreds of WPI students have completed what a recent documentary on the National Geographic Channel called "an epic survey of the Venetian infrastructure." In dozens of science, technology and society projects, the students have studied and carefully cataloged everything from the city's canal system, to its bridges, to its boat traffic, to its ubiquitous but neglected public art.

For example, under Carrera's direction, students have conducted an exhaustive study of the city's canals, work that led to the creation of a city agency to repair and maintain these byways. Another series of projects focused on the damage done to canal walls by the wakes of cargo boats. Those projects may lead to an overhaul of the city's cargo delivery system that could remove 90 percent of the cargo traffic from the canals.

“By bringing all of these interests together into one computerized system, we can get departments to work together to make better decisions.”

Central to the success of those projects was the use of geographic information systems (GIS), sophisticated spatial databases that enable researchers to overlay data from many sources to create maps that make it easy to see how various types of information interrelate and interact in the real world.

When Carrera became director of WPI's Boston Project Center a few years ago, he brought with him the methods and ideas that have played a major role in Venice's efforts to overcome its environmental problems and preserve its cultural heritage.

This winter, six student teams completed projects for Boston's Fire and Environment departments, the Boston Redevelopment Authority (BRA), the cities of Cambridge and Newton, the U.S. Environmental Protection Agency, and the Boston Museum of Science (*see the online Transformations for summaries of these projects*). A number of these projects planted seeds that may result in important benefits for greater Boston in years to come.

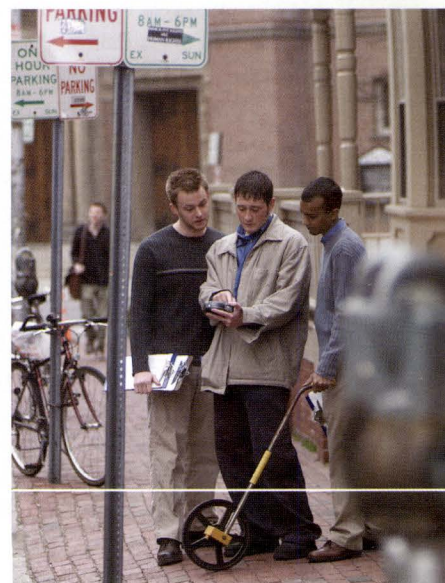
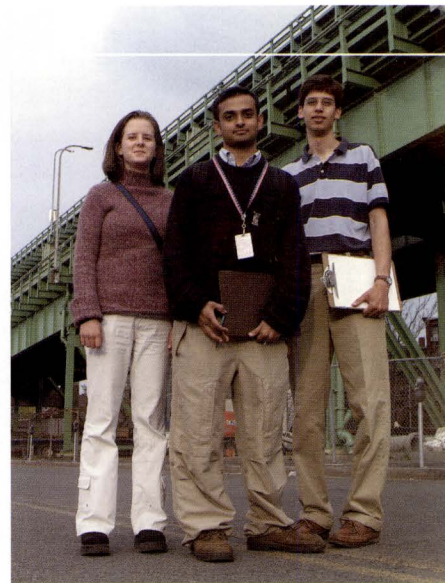
Two in particular, both conducted in South Boston, took important steps toward demonstrating the power of geographic information systems to inform and streamline the decision-making process. The first was sponsored by the BRA and the Boston Landmarks Commission (part of the Environment Department). The BRA helps developers find properties that match their needs; the Landmarks Commission works to make sure that redevelopment doesn't destroy or alter historically significant sites. The students created an information system that not only catalogs the available properties in South Boston, but identifies characteristics, such as landmark status, that can impact the desirability of the properties to developers.

Beneath some of these properties are underground storage tanks for fuel and other chemicals. Leakage from the tanks can cause environmental problems, and the tanks pose hazards for anyone who digs or blasts in the vicinity. It is the responsibility of the Fire Department to know where the tanks are and to periodically inspect them, but the department's methods for collecting and storing information about the tanks are antiquated.

A second student team began the process of developing a computer cataloging and mapping system for the tanks. The system will ultimately be integrated with the system developed by the first South Boston team and with other geographic information systems to create a powerful tool for managing the city more holistically.

“The interests of many city departments intersect, and the connections are usually about space,” Carrera says. “One agency worries about storage tanks, another about historic preservation, another about parking resources. By bringing all of these interests together into one computerized system, we can get departments to work together to make better decisions, which will ultimately benefit the city as a whole.”

WPI undergraduates working at the Boston Project Center this spring collected, compiled and analyzed data to help state and local agencies improve the city. In the field were (from top, left to right): Malinda O'Donnell, Turin Pollard and Marvin Savain, who developed a system to inventory and track underground fuel storage tanks; Brenda Desmond, Vikram Kheny and Christopher Fitzhugh, who studied how traffic impacts the quality and accessibility of open space in Chelsea and East Boston; and Michael Moriarity, Christopher Cullen and Chirag Patel, who studied ways for the City of Cambridge to better manage and monitor its parking resources.





“The first thing that struck me was the devastation,” says Anna Cushman '91 of her first look at the Pentagon on the afternoon of Sept. 11. “The TV shots I'd seen really didn't give you a sense of the magnitude of the destruction.

“The Pentagon is a massive, solid building, and the gaping hole where the roof had collapsed was mind-boggling. The building was completely disintegrated inside. There were piles of debris several feet deep on the ground floor, and where there wasn't debris, there was about half a foot of water or sludge.”

Somewhere in that massive pile of rubble lay two mangled metal containers that might reveal what happened aboard American Airlines Flight 77 in the minutes before terrorists crashed it into America's military headquarters. As a cockpit voice recorder analyst for the National Transportation Safety Board (NTSB), it was Cushman's job to help locate the airplane's black boxes, as the voice and data recorders that all airliners carry are known informally. It was the first crash site she'd visited.

Over the next few days, working the 3 p.m. to morning shift, she and several other NTSB experts struggled to separate airplane parts from office parts. Early on the morning of Sept. 14, while Cushman was at the site, the cockpit voice recorder, or CVR, was found. It was quickly transported across the Potomac to the NTSB lab in Washington, D.C., where Cushman works with three other analysts, and its data was downloaded.

Ordinarily, that would have been just the start of Cushman's association with the device, but this time, it was the end. The events of Sept. 11 had already been classified as criminal acts, rather than accidents, so the FBI, which has its own forensic audio lab, took charge of the box and its data.

Part science, part art and part human relations, **Anna Cushman's** job as a cockpit voice recorder analyst is to help find out what went wrong, and, maybe, keep it from happening again.

Hearing

By Ray Bert '93

Photography by Patrick O'Connor



Voices

That's also why Cushman can't say much more about her role in that investigation, or about the work she did on the recorders recovered from Flight 93, which plowed into a field in Pennsylvania after passengers apparently thwarted another hijacking. Like the Pentagon CVR, the black box from that plane came to NTSB only for the extraction of its data before being turned over to the FBI. The recorders from the two planes that struck the World Trade Center have yet to be found.

Incidents and Accidents

The air disasters of Sept. 11 were anomalies. Ordinarily, the cause of a crash or other aviation incident remains at least something of a mystery until the NTSB conducts its investigation. And for most of the 4,000 aviation incidents and accidents the agency investigates in a typical year, the mystery can be solved without consulting the CVR. "The investigator in charge determines whether it's necessary to download the information," Cushman says. "If you have a good pilot interview and it's obvious what happened, you might not need to."

Cushman's group sees an average of one recorder per week, "though they always seem to come in five at a time," she says. Most come from smaller commercial, corporate and private jets, typically involved in relatively minor events like runway overruns. "Most of the incidents we get don't make the front page of *The Washington Post*—they don't make the *Post* at all," Cushman says.

"The CVR might point the investigation in a particular direction, but it might turn out to be the wrong direction. Because of that, what's on the recorder is considered secondary supporting evidence in an investigation."

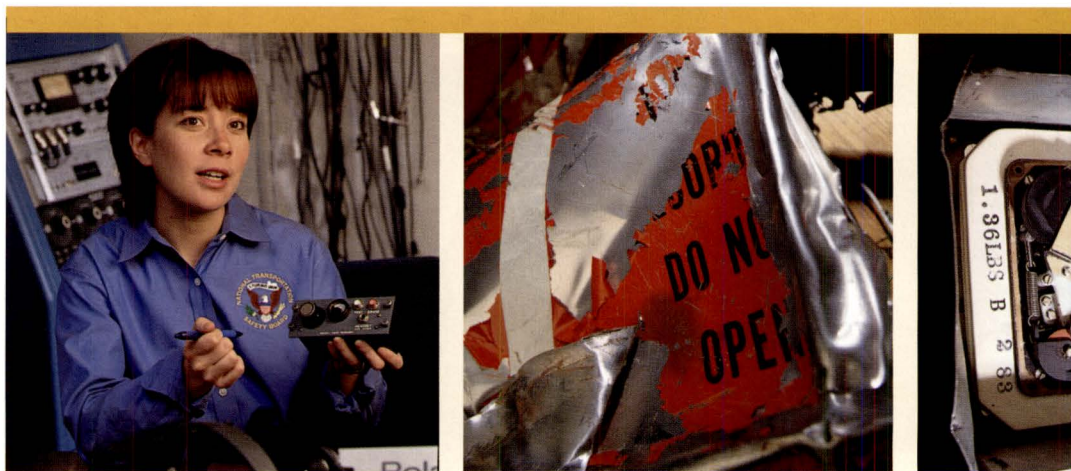
Once a CVR has been delivered to NTSB, Cushman begins work immediately, day or night. Depending on how badly the unit has been damaged, she may have to cut the box open to get at the tape or the memory chip. She downloads the audio information and prepares a sound spectrum analysis and a transcript. The transcript, in whole or in part, may be released at public hearings and in NTSB reports, but because of the sensitive nature of the sounds they contain, Congress prohibits the NTSB from releasing the actual tapes, themselves.

The transcript is prepared by a group, led by Cushman, that includes representatives from the Federal Aviation Administration, the airline involved, the airplane and engine manufacturers, and the pilots union. The process can be

tedious: Cushman says a 30-minute recording can take a day or more to transcribe, due to constant rechecking and the subjective nature of trying to discern words spoken in the loud cockpit environment. For a serious accident, "just the last 30 seconds of the recording can take an hour to do," she says.

Running a CVR meeting is an exercise in group dynamics, which is why all CVR analysts must also be pilots. "It's hard to get a group of pilots to work together when they think you don't know anything about flying," she says. "For instance, if you've never experienced it, you'll have a hard time understanding how a pilot can be upside down in the clouds and not 'feel' upside down. Someone without pilot experience is at risk of being run by the group, instead of running the group."

Cushman's technical expertise comes into play during the sound spectrum analysis, which creates a set of computer-generated waveforms (amplitude vs. time) and spectrograms (frequency vs. time vs. amplitude) that turn the audio information into three-dimensional pictures and help her identify the likely source of individual noises. There's still as much art as science to the process, she says. "You may identify the sound of a hydraulic pump amid the noise on a Learjet. But on the next Learjet you do, even if it's a sister ship, that sound might not record the same way because the mike might be older."



From left, Cushman holds a cockpit area microphone. The battered, bright orange case of a cockpit voice recorder recovered from a crashed airliner. The data recorders and other mechanisms of the CVR.

Learning to Fly

"I've always been interested in airplanes, and I'd always wanted to learn how to fly," Cushman says. Despite her interest in aviation, Cushman passed up the Air Force Academy, where she was also accepted, to attend WPI. "I chose WPI because of the projects. And all of my projects were really cool. I ended up doing two projects for NASA, and my Sufficiency was on photography in flight. Those projects got me co-op jobs at Textron Lycoming."

She played on the tennis team (“I probably hold the losingest record at WPI,” she says. “I can count on one hand the number of times I won in four years.”) and was a member of Alpha Gamma Delta sorority. With a degree in mechanical engineering, she graduated in 1991, a low point for the aerospace industry. Facing a dismal job market, she opted to accept a scholarship and earn a master’s degree at Tufts University. In 1993, she found a job at Sikorsky Aircraft in Stratford, Conn., teaching helicopter ground school hopefuls about hydraulic and electrical systems. She moved on to do engineering work, including waveform analysis in radar cross-section studies, similar to her current sound spectrum work at NTSB.

Sikorsky had one especially enticing perk: an education benefit that enabled her to realize her longstanding ambition to earn her pilot’s license. The program produced an unexpected bonus: Cushman met her husband, Jan Fredrik Wold, while at flight school. Actually, she admits somewhat sheepishly, he was her instructor. “We didn’t start dating until he was no longer my instructor—that should be made clear!” she adds with a laugh.

As a pilot in training, and one whose husband flies planes for a living, Cushman found herself developing an interest in flight safety. Checking out the NTSB Web site one day, she saw a posting for a CVR analyst, and after some internal

debate, she applied just before the closing date. “When the offer came my way, I couldn’t refuse it,” she says.

Ironically, her husband’s occupation, which was one of the reasons she ended up at NTSB, now determines which incidents she can investigate. Because he flies for American Eagle, the NTSB requires that Cushman recuse herself from any incident involving American Airlines (including last November’s crash of American Airlines flight 587 in New York) because of the potential for a conflict of interest.

The Human Aspect

Concerns of a different type spring to mind when many people contemplate what Cushman does for a living. “Isn’t it depressing?” they ask.

“Most of the stuff we do isn’t as morbid as it sounds,” she says. “But, yes, on occasion, it can be what you’d expect, what the general public thinks that we do all the time, which is listening to people die.

“There really isn’t any way to train for that part of the job,” she continues. “I’ve done several fatal accidents, and I can’t say that you get immune to them, because that’s not how it works. But most of the time, because of the actions of the crew, you’re able to do your job because they were doing theirs.”

The human aspect of voices recorded on tape, along with the potential for those tapes to hold clues that may help solve an aviation mystery, makes the cockpit voice recorder a sensational part of any accident investigation, even within the NTSB. Cushman says of co-workers, “If they’re not looking over your shoulder, they’re poking their heads in the lab every two seconds, wondering where you’re at.”

Though it’s not uncommon for the media to camp out at the NTSB when they know a CVR has arrived, Cushman says it’s important to understand that the in-flight recording is not the last word in most accident investigations. That’s largely due, she says, to the subjective nature of her job. “The CVR might point the investigation in a particular direction,” she says, “but it might turn out to be the wrong direction. Because of that, what’s on the recorder is considered secondary supporting evidence in an investigation.”

Still, she says she never loses sight of the importance of the work she does, and its capacity to provide answers and, possibly, prevent future accidents. Nor, she says, can she rid herself of the memories of those haunting voices and telltale sounds contained on the tapes of those rare and tragic accidents. “That doesn’t go away,” she says. “Not ever, I think.” ■

—Bert is a freelance writer living in Virginia.

I N S I D E T H E

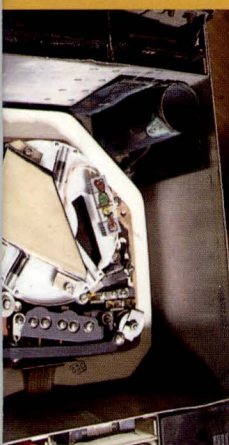
Black Box

The first thing you notice about a “black box” is that it is neither black nor a box. Modern flight data and cockpit voice recorders tend to be flat plates, roughly the size of a shoebox, with cylindrical and squarish protuberances that contain the units’ digital memory modules. To make them easy to spot at a crash scene (or, sometimes, well removed from the wreckage), they’re painted bright orange. They’re also equipped with radio beacons to make them easier to locate under water.

Typically attached to an airplane’s rearmost bulkhead, where they are most likely to survive a crash, the recorders are designed to withstand intense heat and extreme G forces. Still, some arrive at

the NTSB looking like defeated *Robot Wars* combatants. “When we started getting the older recorders back with [extensive] damage, we issued a recommendation to the FAA to change the law and increase the structural and heat requirements,” Anna Cushman says. Most airlines will switch to newer, tougher digital units by 2005.

The data recorder tracks an airplane’s altitude, airspeed and other vital flight parameters. The voice recorder stores four separate channels of audio. Three capture the feed from the pilot’s and copilot’s headsets and a cockpit area microphone usually mounted above the instrument panel. The fourth channel, originally designated for a flight engineer, now often records the announcements made over the plane’s public address system. The microphones pick up engine noises, the sounds of mechanical devices (like landing gear deploying), warning signals, conversations with air traffic control or other pilots, automated weather briefings, and other noises that can provide clues about the causes of a crash or other incident. —RB





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The collapse of the World Trade Center towers left thousands dead and a mountain of debris to clean up. For engineers, it also left behind a troubling mystery:

the fall

what caused two of the world's tallest steel-framed buildings to fall? Jonathan Barnett '74 and a team of researchers from WPI played a central role in helping to find the answers...

Professor Jonathan Barnett is an expert in structural and fire protection engineering, whose research has focused on building performance in fires and failure analysis. But that expertise didn't prepare him for the images that flashed across his television screen on Sept. 11, 2001.

He knew that the world had never seen the collapse of a protected steel-framed building. And yet, there were two of the world's tallest steel-framed towers crumbling into piles of rubble. Barnett's extensive research left him uniquely qualified to understand what was happening inside the blazing structures from the moment they were struck by speeding jetliners to the horrifying seconds when they dropped onto the streets of lower Manhattan, but, in truth, he was as surprised as anyone.

...after

By Joan Killough-Miller

Photography by Patrick O'Connor

In the days following the terrorist attacks, the American Society of Civil Engineers (ASCE), in cooperation with the Federal Emergency Management Agency (FEMA), began assembling a “dream team” of engineers to investigate the causes of the destruction, not only of the main towers of the Trade Center, but of Building 7, the 47-story structure that collapsed in flames seven hours after the loss of the towers, and of Buildings 3, 4 and 5, which suffered extensive damage and partial collapse as a result of fire and impacts from falling debris.

Barnett was approached early on, but was unprepared when his cell phone rang on Oct. 5, in the middle of a meeting, summoning him to join the World Trade Center Building Performance Assessment Team (BPAT) in New York City the next day for a week of fieldwork. “It was 5 o’clock on a Friday,” Barnett recalls, “and I had no steel-toed boots.”

Not one to let a pair of boots stand between him and the professional service opportunity of a lifetime, he scoured the attic of the Auburn Fire Department and found a usable pair. The next day he met up with the 24 other team members—the country’s foremost structural, seismic and fire protection engineers. One was an alumnus, Christopher Marrion, who holds a master’s degree in fire protection engineering from WPI. (See page 35 for a profile of Marrion, who leads a group of fellow fire protection engineering alumni at Arup Fire in New York City.)

Barnett’s credentials to serve as one of the two BPAT core members in fire protection engineering include three WPI engineering degrees (his master’s thesis in civil engineering focused on seismic design of buildings; his doctoral dissertation in mechanical engineering, completed before WPI began granting Ph.D.s in FPE, explored the effect of fire on steel structures). Barnett joined WPI in 1979 as the first assistant director of the Center for Firesafety Studies, and in 1989 became a tenure-track assistant professor in the discipline he helped create. Today he is a full professor of fire protection engineering and co-founder and co-director of the Melbourne (Australia) Project Center.

At Ground Zero, almost a month after the attacks,

the stench of destruction and death was still strong. Across the bay at the Fresh Kills Landfill on Staten Island, recovery teams were at work screening debris down to a quarter of an inch—the size of the smallest human bone. “As an engineer,” Barnett says, “you tell yourself, OK, I have to be professional, I have to take notes, I have to ignore the death around me. At the same time, as a human being, that’s not easy to do.”

Team members toured what was left of the 16-acre World Trade Center Plaza, interviewed officials and eyewitnesses, and examined remnants of fallen structures at the Staten Island landfill and at salvage yards. Steel samples were cut and cataloged for further study, and some were taken back to WPI for analysis (see story, page 20).

Besides asbestos dust and bio-contamination, the investigators faced physical dangers in the unstable buildings. On a walk-through of Building 5, Barnett’s group noticed that the floor slab beneath them was severed. When they checked from below, they discovered that they had been standing on unsupported rubble. Later, while taking measurements in the building’s subterranean parking garage, the roof started to collapse, and they fled to safety.

In addition to his work at Ground Zero, Barnett drove to the Fresh Kills Landfill with teammates Marrion, Venkatesh Kodur and Saw-Teen See (wife of the towers’ designer, Leslie E. Robertson, and a partner in Robertson’s firm) to see the steel recovered from the Trade Center. After showing his pass to the guard at the gatehouse, Barnett was directed to the appropriate area, where he parked his two-week-old Acura.

“I’ve been to landfills,” he says, “and this one didn’t smell right to me.” Knowing that the rubble brought to the site contained human remains, he quickly urged See back into the car, and when Marrion and Kodur resisted, Barnett insisted that he was getting his car and his teammates out of there, right away. As they closed the doors, a dozen workers in full Tyvek biohazard gear walked by. “See that?” said Barnett, feeling vindicated. “I think maybe we’re underdressed for the occasion.”



“New Yorkers were just so friendly and willing to support our efforts in any way they could, even if it was just with a smile.”



Barnett, at left, with other members of the building performance team at the Fresh Kills Landfill, where piles of steel from the World Trade Center towers were stored.

He drove to New Jersey as quickly as he could. “We took out the floor mats and wiped them on the grass, and we all wiped our feet. Then we took the car to a carwash.”

Courtesy of Jonathan Barnett

Despite the grim nature of its task, the BPAT members were warmly welcomed. Barnett was thanked by strangers in the street, and ushered to a seat on a packed subway car when his ID badge slipped out from under his shirt. At the upscale Tribeca Grille, the grimy engineers, still in their work clothes, were escorted to a center table, once the maitre d’ learned who they were.

“New Yorkers were just so friendly and willing to support our efforts in any way they could, even if it was just with a smile,” Barnett says.

The complex science of fire modeling can be reduced to two questions: “How hot?” and “Where?”

Those were the questions facing Barnett and his team back at WPI when he returned to campus to begin analysis of the data—which included two cartons of videotapes, thousands of photographs and detailed construction documents. While other members of the BPAT looked at seismic data, emergency response and evacuation, Barnett simulated the fires, focusing on the floors of impact.

“To understand the collapse, we needed to know how the structural elements of the towers stood up to the stresses inflicted on the morning of Sept. 11,” explains doctoral candidate James A. (Jay) Ierardi ’97 (’99 M.S.), who previously worked with Barnett on the analysis of the 1999 Worcester Cold Storage warehouse fire. As the FEMA report indicates, the twin towers withstood the mechanical insult of the planes’ impact, but were then subjected to interior fires, with temperatures ranging from 200 to 2,000 degrees Fahrenheit.

The WTC fires were remarkable in two ways: first, for their sheer size, and second, for the fact that such a large area was ignited instantaneously. (Typical office fires start small and spread slowly, Ierardi says.) The towers were penetrated by planes canted at a 30-degree angle and a 45-degree angle,

which immediately set four or five floors—each about an acre in area—ablaze. Barnett compares the jet fuel that doused those floors and flowed down elevator shafts to charcoal lighter fluid. With rapid flashover on so many floors, sprinkler pressure

would have been inadequate, even if the water supply lines had not been severed by the aircraft. Ierardi speculates that the hijackers knowingly calculated the angle of their hits to overwhelm the buildings’ fire-suppression mechanisms.

To compute the size of the fires, Barnett needed to know how much oxygen was available to burn the 10,000-gallon fuel load in each 767. His calculations included the enormous holes ripped open by the planes, and the dimensions and location of every window, stairwell, and elevator or utility shaft. He also plotted the layout of offices, the location of partitions and furnishings, and flammability specification of the building materials, furnishings and other contents.

To determine which windows were open during the fire, Barnett examined more than 120 hours of videotape to see where smoke was venting. WPI undergraduates pitched in, taking home tapes to screen over the Thanksgiving break. One of these students was Patrick T. Spencer ’05, son of fallen firefighter Thomas E. Spencer; Patrick came to WPI on a scholarship set up for children of victims of the Worcester warehouse fire. Ironically, he was the one who first informed Barnett of the terrorist strikes on the morning of Sept. 11. Graduate students in Barnett’s failure analysis class helped calculate how much jet fuel the initial fireballs consumed.

To quantify and compute all of these variables in such a large, complex space—a space that no longer exists—is a mammoth task that requires painstaking research and a certain amount of informed speculation. The size and complexity of the problem challenged even WPI’s fastest computers. Barnett says it took one week to simulate 10 minutes’ worth of the fire. During the three weeks of report writing, only 40 minutes of the fire event could be modeled. The complete simulations won’t be available until fall.

(Continued on page 21)

The "Deep Mystery" of Melted Steel

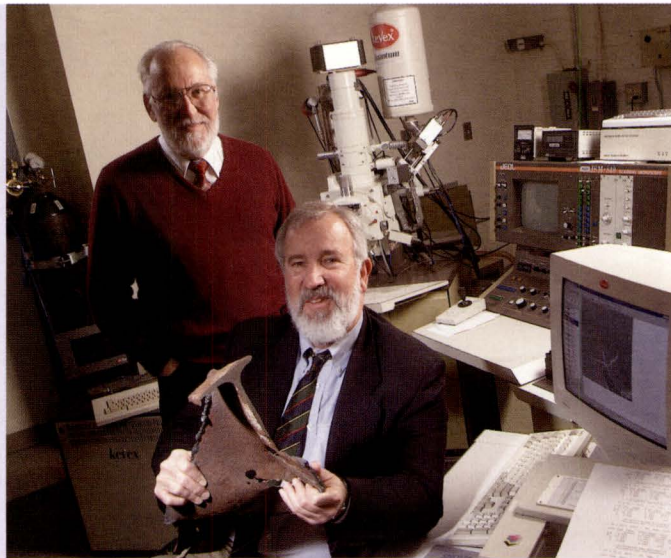
There is no indication that any of the fires in the World Trade Center buildings were hot enough to melt the steel framework. Jonathan Barnett, professor of fire protection engineering, has repeatedly reminded the public that steel—which has a melting point of 2,800 degrees Fahrenheit—may weaken and bend, but does not melt during an ordinary office fire. Yet metallurgical studies on WTC steel brought back to WPI reveal that a novel phenomenon—called a eutectic reaction—occurred at the surface, causing intergranular melting capable of turning a solid steel girder into Swiss cheese.

Materials science professors

Ronald R. Biederman and **Richard D. Sisson Jr.** confirmed the presence of eutectic formations by examining steel samples under optical and scanning electron microscopes. A preliminary report was published in *JOM*, the journal of the Minerals, Metals & Materials Society. A more detailed analysis comprises Appendix C of the FEMA report. *The New York Times* called these findings "perhaps the deepest mystery uncovered in the investigation."

The significance of the work on a sample from Building 7 and a structural column from one of the twin towers becomes apparent only when one sees these heavy chunks of damaged metal. A one-inch column has been reduced to half-inch thickness. Its edges—which are curled like a paper scroll—have been thinned to almost razor sharpness. Gaping holes—some larger than a silver dollar—let light shine through a formerly solid steel flange. This Swiss cheese appearance shocked all of the fire-wise professors, who expected to see distortion and bending—but not holes.

A eutectic compound is a mixture of two or more substances that melts at the lowest temperature of any mixture of its components. Blacksmiths took advantage of this property by welding over fires of sulfur-rich charcoal, which lowers the melting point of iron. In the World Trade Center fire, the presence of oxygen, sulfur and heat caused iron oxide and iron sulfide to form at the surface of structural steel members. This liquid slag corroded through intergranular channels into the body of the metal, causing severe erosion and a loss of structural integrity.



Biederman, standing, and Sisson used this electron microscope and other tools to uncover the unusual properties of steel from the collapsed World Trade Center.

"The important questions," says Biederman, "are how much sulfur do you need, and where did it come from? The answer could be as simple—and this is scary—as acid rain."

Have environmental pollutants increased the potential for eutectic reactions? "We may have just the inherent conditions in the atmosphere so that a lot of water on a burning building will form sulfuric acid, hydrogen sulfide or hydroxides, and start the eutectic process as the steel heats up," Biederman says. He notes that the sulfur could also have come from contents

of the burning buildings, such as rubber or plastics. Another possible culprit is ocean salts, such as sodium sulfate, which is known to catalyze sulfidation reactions on turbine blades of jet engines. "All of these things have to be explored," he says.

From a building-safety point of view, the critical question is: Did the eutectic mixture form before the buildings collapsed, or later, as the remains smoldered on the ground. "We have no idea," admits Sisson. "To answer that, we would need to recreate those fires in the FPE labs, and burn fresh steel of known composition for the right time period, with the right environment." He hopes to have the opportunity to collaborate on thermodynamically controlled studies, and to observe the effects of adding sulfur, copper and other elements. The most important lesson, Sisson and Biederman stress, is that fail-safe sprinkler systems are essential to prevent steel from reaching even 1,000 degrees Fahrenheit, because phase changes at the 1,300-degree mark compromise a structure's load-bearing capacity.

The FEMA report calls for further metallurgic investigations, and Barnett, Biederman and Sisson hope that WPI will obtain NIST funding and access to more samples. They are continuing their microscopic studies on the samples prepared by graduate student Jeremy Bernier and Marco Fontecchio, the 2001-02 Helen E. Stoddard Materials Science and Engineering Fellow. (Next year's Stoddard Fellow, Erin Sullivan, will take up this work as part of her graduate studies.) Publication of their results may clear up some mysteries that have confounded the scientific community. —JKM

(Continued from page 19)

Barnett estimates that on top of his academic and civic activities, he's put more than 600 hours into the BPAT investigation. In the months between the October fieldwork and the May 1 release of the FEMA report, he made one or two trips per week, sometimes flying back and forth between WPI and Washington in a single day to teach classes and attend meetings.

He is the lead author on the section of the report that describes the metallurgy work done by WPI professors Ronald Biederman and Richard Sisson, as well as the chapters about Buildings 4, 5 and 6. He is a co-author on the chapters about the collapse of Buildings 1 and 2 (the twin towers). "I think the most important outcome of the FEMA report is that we've identified areas that need to be studied," Barnett says. "Before you spend millions of dollars [on further investigations], you need to know what to spend it on."

A bigger budget, more time and earlier access to the scrap yards, where steel was being cut up and sold, would have enhanced the investigation, he says. "You do the best you can, with the available resources. I think we did a very credible job." Efforts are under way to address factors that hindered FEMA's BPAT investigation. The proposed "National Construction Safety Team Act of 2002" outlines procedures to ensure that evidence is preserved in the event of another attack of this magnitude.

In interviews, Barnett has repeatedly stressed that the public does not need to worry about living and working in high-rise buildings. "Our buildings are generally safe," he reiterates. "If we were doing things that were unsafe, then periodically we would have had failures. In fact, I would suggest, because we've never had failures, we probably over-design."

On May 1, Barnett accompanied BPAT leader Gene Corley to Washington to respond to questions as Corley presented the team's findings to Congress. FEMA has proposed a \$16-million, multiyear follow-up investigation, to be headed by the National Institute of Standards and Technology (NIST). Two areas earmarked in the FEMA report for further study are the metallurgical examinations performed by Biederman and Sisson, and the fire modeling computations done by Barnett. WPI hopes to obtain NIST funding to pursue these investigations. The report also calls for further examination of the building and fire codes, but recommends against considering aircraft impact as a design parameter for every structure. "I think the lessons for ordinary buildings are few and far between," says Barnett.

The terrorist attacks and their aftermath highlight the importance of fire protection engineering as a discipline, and the need for closer ties with the field of structural engineering, Barnett says. The FEMA report specifically recommends cross training between the disciplines, to ensure that the impact of fire is adequately addressed in the design process.

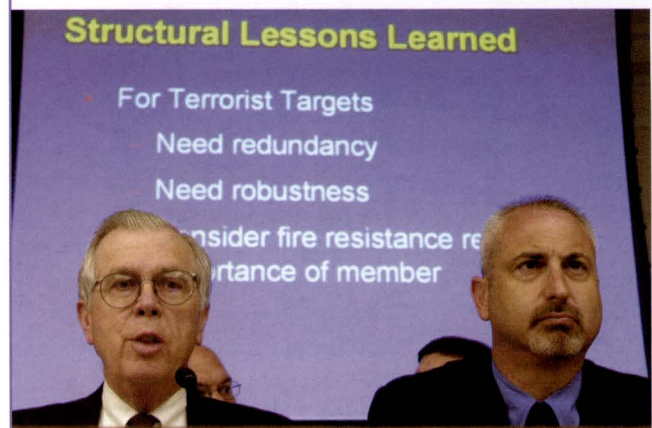
Barnett says he is grateful to have had the chance to participate in an important national study, working with a team of professionals to tackle questions that are important to his profession and the country (and that provide a real-world case study to bring into the classroom). "In my career," he says, "I've never had the privilege of working with so many awesome practitioners." ■

Editor's Note: The online Transformations has links to the full ASCE/FEMA report to Congress and to much of the news coverage Barnett and the WPI team has garnered, including the comprehensive hour-long documentary, "Why the Towers Fell," that aired on NOVA in April.

Why the World Trade Center Towers Fell

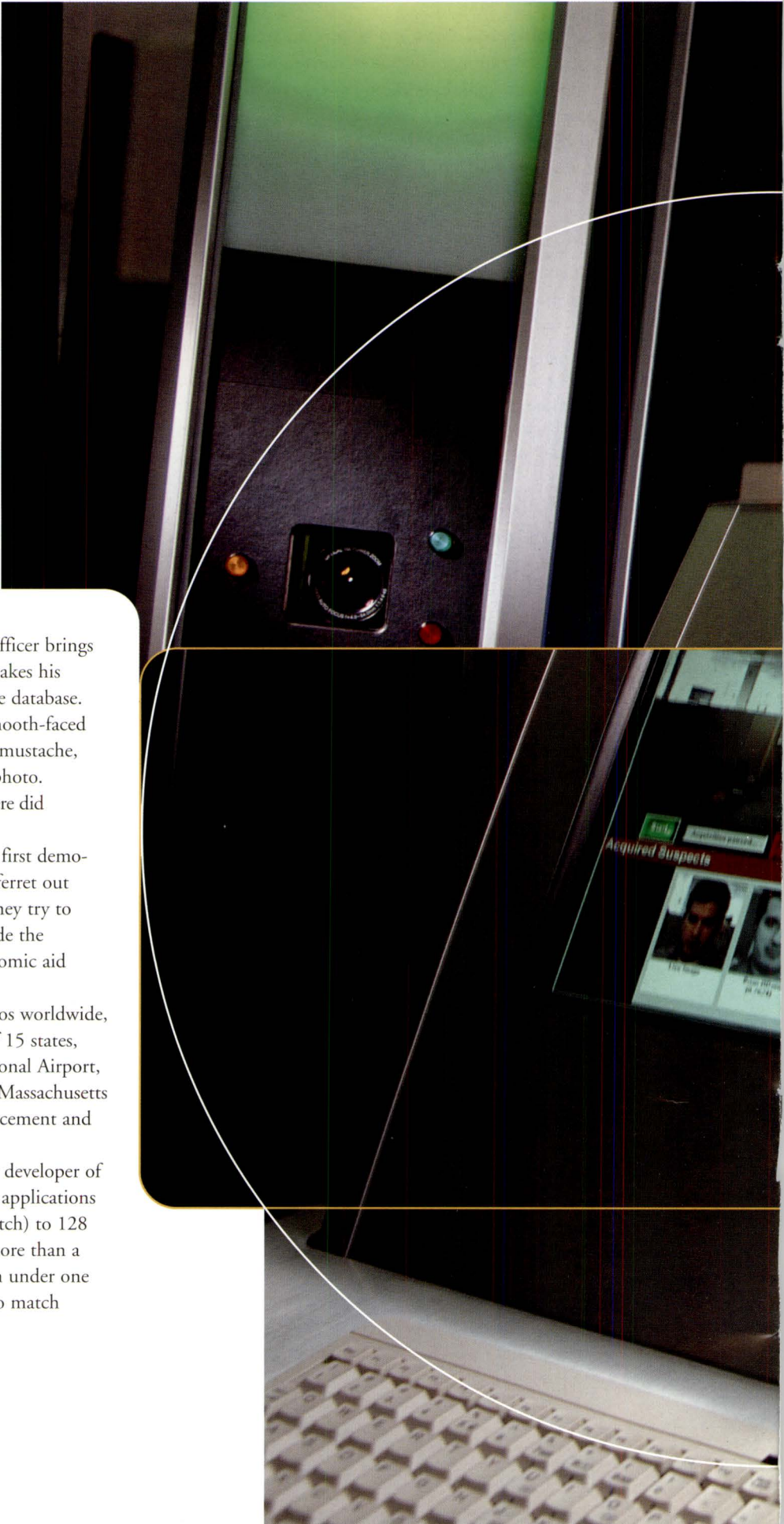
Highlights of the building performance study:

- It was the simultaneous fires, on multiple floors, rather than burning jet fuel (much of which was consumed in the initial fireballs), that weakened the structural steel elements enough to precipitate the collapse.
- Robust and redundant steel framing, adequate and well-lighted stairways, and emergency training contributed to the towers' resilience and the safe egress of occupants.
- Lightweight fireproofing, probably blown off of the structural steel, sprinkler supply pipes severed by flying debris, gypsum wallboard around the stairwells, which collapsed and blocked access, and the grouping of stairwells in the buildings' core, which increased their vulnerability to a single impact, may have contributed to the collapse or hindered the escape of occupants above the impact zones.



W. Gene Corley, left, of the American Society of Civil Engineers, and Jonathan Barnett present the findings of the World Trade Center building performance study to the House Committee on Science on May 1.

AP/Wide World Photos



On a rainy night, a small-town police officer brings in a haggard drunk-and-disorderly suspect. He takes his picture and enters it into the department's image database. Out comes a photo of a curly haired, skinny, smooth-faced teenager. But the prisoner is bald, with a bushy mustache, and 100 pounds heavier than the youth in the photo. Eyeing the image, the prisoner blurts out, "Where did you get my high school picture?"

Uganda, eager to protect the integrity of its first democratic election, uses a similar image database to ferret out irregularities. The system catches 30 people as they try to vote a second time—a success that helps persuade the European Union of the merit of providing economic aid to help stabilize this emerging nation.

At the Super Bowl, in more than 150 casinos worldwide, in the motor vehicle registration departments of 15 states, and in Boston's hitherto porous Logan International Airport, facial recognition technology developed by one Massachusetts company is improving security, aiding law enforcement and helping build public confidence.

Viisage Technology in Littleton is a leading developer of facial biometric systems. Its "face-in-the-crowd" applications convert anybody's picture (even a composite sketch) to 128 coefficients, compare these with a database of more than a million facial images (the world's largest), and in under one second, either make a match or prove there is no match (see sidebar, page 25).



More Than **a Face** in the **Crowd**

By Laurance S. Morrison

Photography by Patrick O'Connor

The events of Sept. 11 brought fundamental issues of security into sharp focus. How can we be sure that people are who they say they are? How can we stop terrorists and others intent on doing harm before they act? The facial recognition technology developed by Denis Berube's company may provide one answer.

According to Denis K. Berube '65, the company's chairman, Viisage's emphasis on facial recognition stems from its belief that our faces are our most reliable and efficient means of identification. Code words and PINs can be lost, forgotten or stolen. Fingerprints are alterable through surgery. Retinal scans require cooperation, and the intrusive procedure must be done one person at a time.

Someone whose aim is to move unnoticed on the way to doing harm will hardly undergo such checks. But someone in a crowd can't avoid his own face. Even modest plastic surgery won't help. In fact, the proprietary algorithms underlying Viisage's security and protection products are so sensitive that they can distinguish between identical twins.

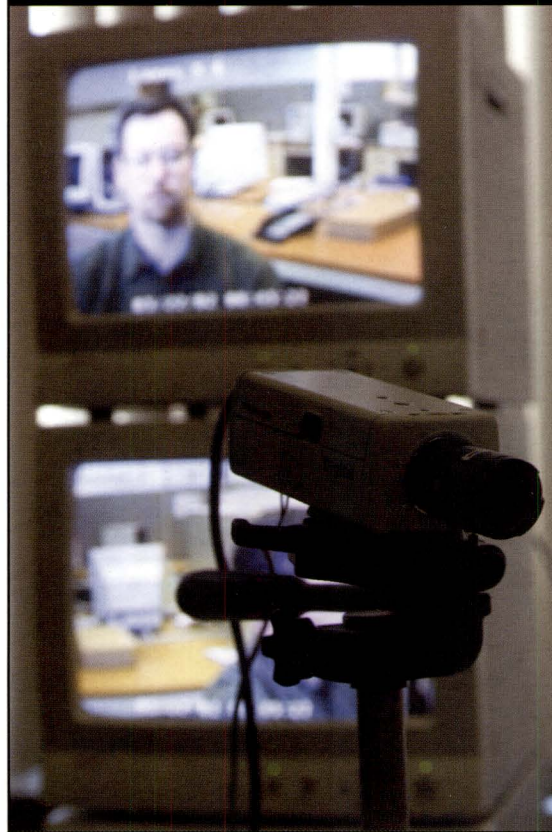
Viisage products offer private verification for point-of-sale transactions, secure authentication for computer, Internet and e-commerce connections, and keyless entry to secure facilities, such as offices, dormitories and government facilities. Annually, they deliver more than 25 million high-quality and high-security digital-identification documents for government agencies responsible for issuing driver's licenses, social services cards and law enforcement credentials.

They have helped detect ATM fraud, identify missing persons, spot deadbeat dads, and pick out fugitives for the U.S. Marshals. Recently, they helped *National Geographic* verify the identity of the "Afgan Girl," Sharbut Gula, by comparing recent photos of her with the famous image that graced the cover of the magazine 17 years ago.

The company is best known for FaceFINDER, the system that provides security at casinos, sporting events and airports. Acclaimed for its fast processing speed, it has become the industry's most widely implemented surveillance and identification system. The U.S. Patent & Trademark Office recently acknowledged Viisage's real-time face recognition technology as one of the 10 most important inventions to improve homeland security.

Standing shirtsleeved in a busy bullpen of offices, Denis Berube sweeps his right arm to take in Viisage's buzzing 142,000-square-foot premises. "The people of Viisage could work anywhere in the world they choose to," he says. "They need the highest level of intellectual stimulation, the excitement of doing important work, and the comfort of knowing they can make a difference for the safety of our country. They're here."

Viisage's emphasis on facial recognition stems from its belief that our faces are our most reliable and efficient means of identification.



Berube manages on the move. He roams. He listens. He talks. He waves. He questions. His eyes rove. He's casual, yet concentrated. "It's no mystery, this walking around," he says. "I can't be much of a leader if I can't influence our culture, and I can't influence our culture unless I'm right in the middle of it."

For more than three decades, Berube has found himself in the middle of a constantly changing panorama of leading-edge technology. Born in Holyoke, Mass., he attended Williston Academy in nearby Northampton, where he is now a trustee. He quarterbacked the football team, played shortstop on the baseball team, and led the ski team to two undefeated seasons. One day, without explanation, the headmaster informed him that he must apply to WPI. "He just told me," he says with a shrug.

"WPI put me in touch with the physical world at the same time that it taught me how to build relationships," says Berube, who majored in electrical engineering. "And my work ethic comes from my WPI days. I remember dying over those motor lab reports!

"But for all of the knowledge I came away with, it was my approach to life, my appreciation for the diversity of physical experiences,

the hands-on philosophy, and the ability to network that make me truly grateful to WPI. I'm proud of the university's high ranking among the world's technology schools."

Recruited out of college to work for General Electric's Ordnance Systems unit in Pittsfield, Mass., he did field service engineering on the missile guidance and fire control systems for the Navy's fleet of ballistic submarines. "Working closely with

Who Goes There?

A Facial Recognition Primer

How does Viisage perform its nearly instantaneous feats of facial recognition? The process begins by reducing the variability of the human face to a set of numbers.

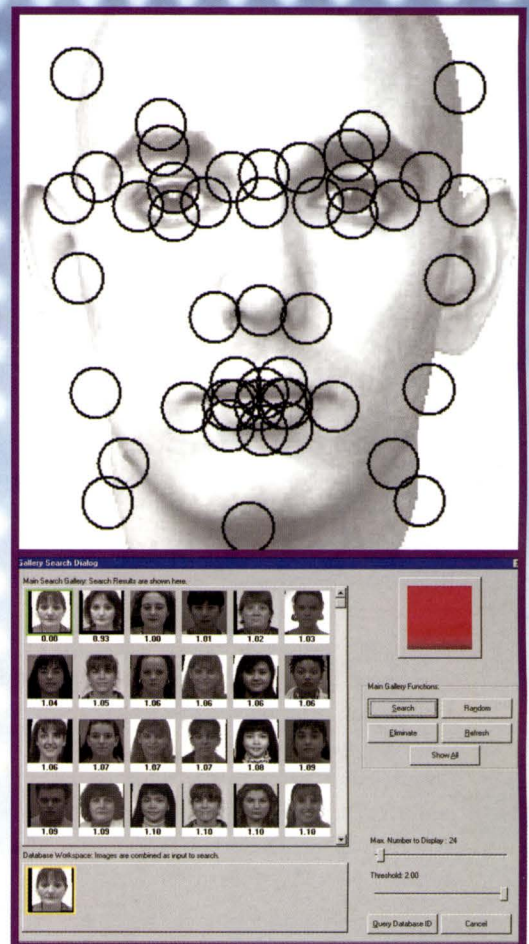
Using a mathematical technique called principal components analysis, one can examine a large group of faces and extract the most efficient building blocks required to describe them. It turns out that any human face can be represented as the weighted sum of 128 of these building blocks, known as EigenFaces. With this technique, the essence of a human face can be reduced to just 256 bytes of information.

The recognition process involves comparing the EigenFace weights for two faces using a proprietary algorithm that generates a match score. Different faces will produce a poor match score; images of the same face will produce a good match score.

In systems that require one-to-one comparison (for example, verifying that you are the person pictured on your driver's license or passport), the EigenFace weights of authorized personnel are recorded in a central database. When someone steps before a camera, his or her face is quickly compared to all of the faces in the database to see if it generates a match.

In a one-to-many search, a database is created containing faces of individuals whose presence would warrant action: known terrorists, most-wanted criminals, or missing persons, for example. Cameras, overtly or covertly deployed at strategic locations, capture, in real time, each face in the field of view and compare it with all records in the database.

With the computational power of a standard personal computer, the Viisage technology can complete the entire facial recognition process in as little as one tenth of a second, with a high degree of accuracy. Independent biometric testing has disclosed that the system has a miniscule error rate. —LM



weapons officers, some of whom I would later meet as admirals, I discovered how to stay in touch with the customer, to understand customer needs and even to anticipate them," he says.

The components of Berube's career were assembling themselves. In the 1970s, he was directly responsible for a large project involving ticklish requirements and improvements for accuracy, launch rate, inertial guidance, and the coordination of databases with the Defense Mapping Agency. It was complex in scope, even by today's standards, he says. He later managed advanced engineering, including fault tolerant flight and fire control design, for a one-of-a-kind "black operations" project involving the B-2 bomber. Meanwhile, in 1971, he earned a master's degree in electrical engineering at Union College.

"Thanks to WPI and Union College, I had a rock solid engineering education," Berube says. "My GE assignments immersed me in some of the world's most advanced engineering opportunities, and I came to appreciate the vital center of customer relationships."

In 1985, Berube was recruited as vice president for marketing at Elbit Computers Limited, an Israeli firm headed by Gen. Benny Peled, the pilot in the famous Entebbe rescue operation. In just 30 months, the company, which produced thermal imaging and tank fire control systems, sprang from zero revenue to \$50 million. By then Berube had married Joanna T. Lau, whom he'd met while both worked at GE. They shared a dream of someday working for themselves.

Born in Hong Hong, Lau is the daughter of the late Gen. Joseph Lau, who served in Chiang Kai-shek's army. She came to the United States in 1976, with her mother and five of her seven brothers and sisters, and got busy. She earned a bachelor's degree in computer science and applied mathematics at the State University of New York at Stony Brook, a master's in computer engineering from Old Dominion University, a certificate from GE's prestigious ABC Program at Syracuse University, and an MBA from Boston University.

While still a student at BU, she organized the purchase of a defense industry subcontractor in Acton, Mass., a unit of an Arizona company called Bowmar. In 1990, Joanna and Denis and 23 Bowmar employees turned the buyout into Lau Technologies.

Then came Operation Desert Storm. Lau Technologies garnered a contract to supply circuit boards to upgrade malfunctioning Bradley Fighting Vehicles, which were being marshaled in large numbers to roll into Kuwait. In just 45 days, the company shipped 8,000 circuit boards to Riyadh, an assignment that would normally take 270 days. Knowing the company's reputation for quality, the U.S. Army bypassed the test-and-check stage and installed the circuit boards for combat; they worked perfectly.

In recognition of this achievement, Lt. Gen. Paul Greenberg, head of the Army Materiel Command, awarded Lau Technologies one of 11 Desert Storm Battle Ribbons conferred nationally. Subsequently, Joanna Lau received the esteemed Nunn-Perry Award for the company's excellent performance in the nation's defense.

Joanna and Denis saw four possible directions for Lau Technologies. "We focused on facial recognition in

verifying driver's licenses, which we expanded into Viisage," he says, "but any one of those possibilities could have succeeded as we diversified from strictly military work."

Taking on the legendary Polaroid Corporation, Viisage acquired from MIT a technology dubbed EigenFace. The young company developed algorithms and spent millions of dollars and more than a hundred person-years in constructing its face-in-the-crowd technology and family of products.

Viisage continues to evolve. Through acquisitions in concert with its own research and development, the company is now marketing three new products that support its facial recognition product lines. Berube sees significant consolidation coming in the biometric and security systems integration industry, a trend that should be a boon to Viisage, currently the world's largest face recognition company, with a revenue market share of 47 percent.

Lau Technologies departed the military marketplace last fall with the sale of Lau Defense Systems Inc. to Curtis-Wright. The parent company of Viisage now stares startups straight in the face and ushers them through their growing pains, Berube says. The engineer-businessman declares Viisage different from the oft-maligned venture capitalists who, in the view of some, care only about profit. "Sometimes," he notes, "even without investing in a company or sitting on its board, we provide friendly assistance, just for the love of it." ■

—Morrison leads a full-service communications firm based in Sturbridge, Mass.

Technology that can identify individuals surreptitiously as they walk down the street or through an airport concourse naturally raises questions. For example, is the way a culprit is caught as important as the apprehension itself? In a nation made nervous by terrorism, must individual privacy be sacrificed? And, perhaps most important, who is watching and what are they doing with what they see?

Denis Berube understands these deep-seated concerns and points out that Viisage's products respond to them. "The Viisage facial recognition technology can only match a bad guy's face because it automatically and instantly throws away any non-matching picture," he says.

"There is no ethnic bias, no nationality bias, no racial or gender bias. The system looks only for people who are known threats to society; everybody else gets ignored.

"The system is positioned in public places where no one expects to receive privacy, or in workplaces, for example, where innocents go ignored by the system and only those who don't belong gain notice. These are, at bottom, peace-of-mind and quality-of-life issues. We're working with Congress to make sure this tool stays in good hands. We can't stand by as those who are determined to break or evade the norms of a civilized society scheme to convert our strengths of openness into a devastating weakness. We can make a difference."

Security vs. Privacy

The Unseen City

By Joan Killough-Miller



Stephen diRado

In his haunting photographs, Kirk Jalbert '97 shows us a Worcester we seldom see. Through his artistry, we take in the beauty of the city in the dark recesses of night, and search for answers amid the discarded remains of our lives.

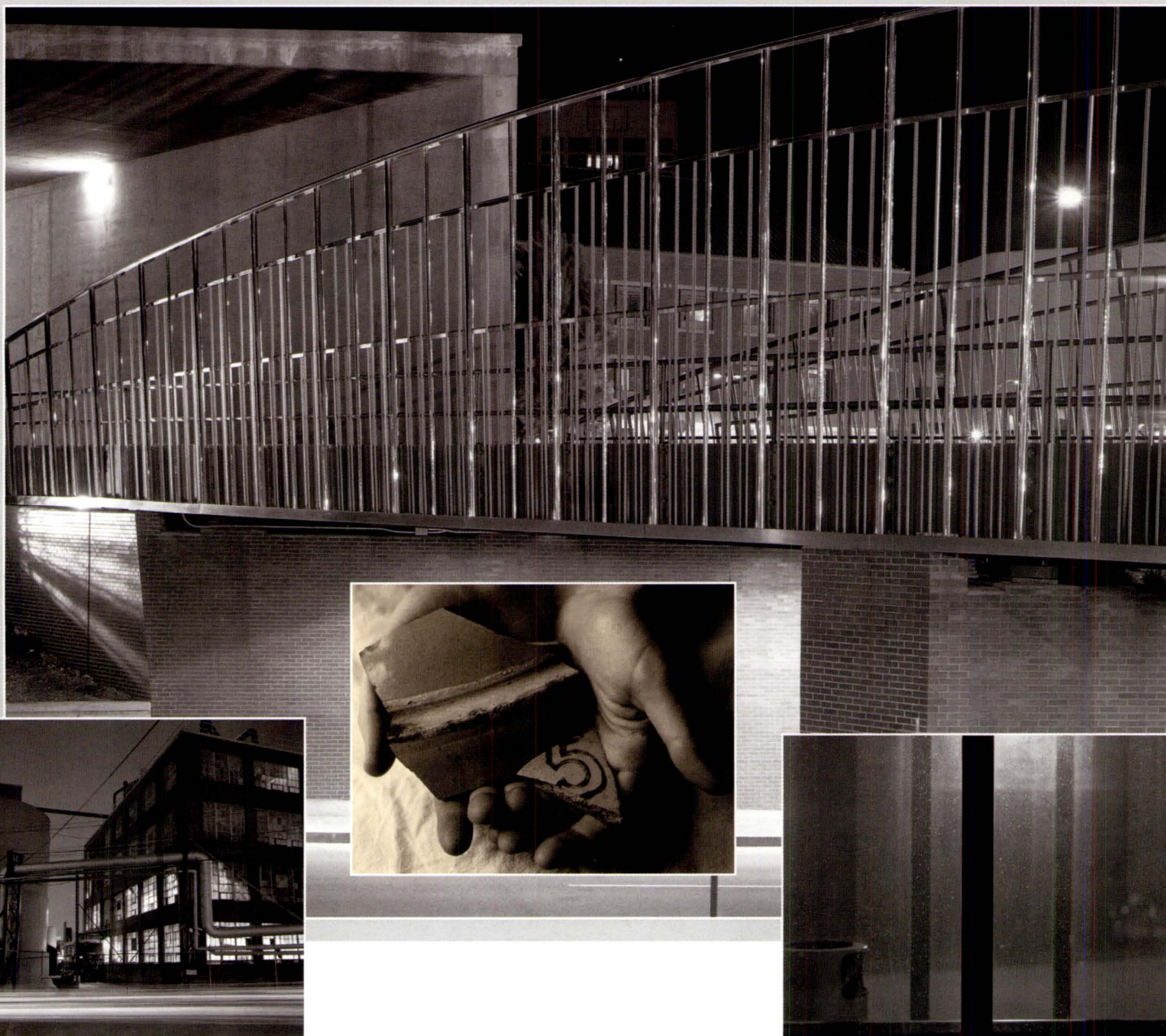
An upended wheelchair rests on a hillside, weeds growing between the spokes. A heap of books slowly decomposes into dust. Who left behind the books? Where is the wheelchair's owner? These unresolved stories, about nameless, absent people, are the subject of Kirk Jalbert's photographs.

After earning a computer science degree at WPI in 1997, Jalbert began to explore the unseen corners of Worcester with his large format camera. His haunting black-and-white images do not editorialize about development or urban decay, nor do they pit the manmade environment against the beauty of nature. His goal is to render the "everyday landscape" that can be seen when we drop our preconceptions.

"Worcester by Night," his show two years ago in WPI's Gordon Library, revealed a realm of surprising beauty, full of light and motion. Captured through long exposures (up to an hour for a single photograph), familiar landmarks took on a surreal quality: trees in Elm Park shrouded in luminous fog (above); neon-lit storefronts ablaze in a sea of darkness.

"I was trying to encourage people to change their opinion of what it means to be out at night in the city—to become more comfortable and realize that it's beautiful," says Jalbert.

If "Worcester by Night" celebrated a city few are brave enough to witness, Jalbert's most recent show, "Urban Remains," zeros in on things we don't



take the time to see. The focus is the relationship between the city's landscape and its inhabitants, as evidenced by places "void of their presence yet marked by their passing."

Like an urban archeologist, Jalbert searches for answers in the detritus of abandoned buildings and trash heaps, and in graffiti, which he says is the ultimate example of learning about people based on what they leave behind. "You're on the trail of an unknown person, looking at their wake and trying to figure out who they are."

Jalbert took his first photography course at the Worcester Center for Crafts in 1997 as a diversion, while recovering from months of hospitalization and illness. "It was like a door opened,

and all of a sudden my creative energies came pouring out," he says, in his quiet baritone voice. "It was almost like therapy."

Today, he teaches photography at Clark University (he also teaches at the craft center and has taught at Atlantic Union College) and sees the same catharsis in students facing difficult family or personal issues. "They pour themselves into their work, because it's the only thing they do where they feel like they have complete control."

At WPI, Jalbert took every art history class the university offered, though he had no idea of how he would use them. After graduation, he wrote software for computer and pharmaceutical companies, but was disappointed because the work



The photography. Page 27: *Elm Park Fog* (1999). Page 28: Clockwise from top, *The Gateway Bridge* (2000), *Bus Stop Booth* (2000), *Number 5* (coffee-tinted gelatin silver print, 2000); *Norton, Ararat Street* (2000). Page 29: Clockwise from top, left, *Left* (2000), *Cloud and Fence* (2000), *Morning Light in a Studio* (coffee-tinted gelatin silver print, 2000), *Gold Street Garage* (2000), *Brite, Webster Square* (2000). All photos © Kirk Jalbert. To see more photos and order prints, visit www.kirkjalbert.com.

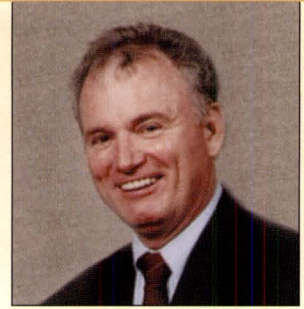
didn't have the creative element he'd hoped for. "Don't get me wrong," he says. "At WPI, I knew people who could make code float on air. They were really artists with what they were doing. But it wasn't my art.

"The whole logical thinking process stressed at WPI is completely applicable to everything I do," he continues. "Photography is a technical art. It's really like one big equation. I have to worry about the concentrations of my solutions and the life spans of my chemicals. I have to know something about the science of optics and how film works. When you can really understand that, I think, you have the ability to use your equipment to a higher level."

For now, Jalbert is firmly rooted in Worcester, energized by its lively arts community and fascinated by its varied landscapes. (He's also pursuing a master of fine arts degree at the Museum of Fine Arts School in Boston.) To those who wonder why he doesn't go after more exotic or pristine settings, he responds, "I don't live in the woods. I live in a city. I photograph the things I encounter on a daily basis.

"There are beautiful and ugly parts of anywhere," he contends. "I've always felt that you can spend a lifetime photographing things that are within an hour of your house and not run out of material." ■

From Your Alumni Association President



WPI has been transforming the academic world's concept of higher technical education for over three decades. Our competitors are paying us the ultimate compliment—they're embracing and mimicking the fundamentals of our approach to teaching and learning. The impact of what WPI has accomplished is finally getting the recognition it deserves. The problem is, WPI is not.

As President Parrish pointed out in the first issue of *Transformations*, WPI has embarked on a comprehensive program to market WPI's unique educational offering. One goal is to make WPI a "household word" in the homes of high school juniors and seniors who are seeking a technical education.

To continue attracting the best and the brightest, we must become better known—in Massachusetts, California and Beijing. With greater name recognition will come many benefits: greater selectivity, more financial aid for students who need it, easier access to federal and foundation grant money, improved job placement opportunities, improved networking opportunities for alumni, and WPI's survival as a private university.

The WPI Alumni Association, and all alumni, will have a role to play in this marketing effort. In this and future issues of *Transformations*, I will communicate information about your association, the role of the association in supporting the marketing plan, and the role you can play in making the world more aware of WPI.

In this message, I'm happy to report that Elizabeth Howland, who has worked as a development officer at WPI since 1998, has become WPI's new director of alumni affairs. Beth holds an associate's degree in medical technology and a bachelor's degree in health education from the University of Vermont, and a master's in professional higher education administration from the University of Connecticut. Before coming to WPI, she was director of development for UConn's School of Nursing and School of Pharmacy.

She says she is looking forward to continuing to build and expand WPI's connections to its graduates through programs, events and personal interaction. On behalf of the association and its leadership, I'd like to add that we're looking forward to helping her succeed at that important goal.

Dusty Klauber '67

2002 Alumni Association Awards

The following awards were presented at Reunion 2002. Text of the citations may be read at www.wpi.edu/Admin/Alumni/Awards/

Robert H. Goddard Award for Outstanding Professional Achievement

Daniel A. Funk '77 Orthopedic Surgeon, Peak Performance Orthopedics
Curtis R. Carlson '67 President & CEO, SRI International
Paul A. Lacouture '72 President, Network Services Group, Verizon Communications
Bruce D. Minsky '77 Professor of Radiation & Oncology, Memorial Sloan-Kettering

Herbert F. Taylor Award for Distinguished Service to WPI

John M. Tracy '52 **Joseph J. Maggi '67** **Paul S. Kennedy '67**
Charles M. Stasey '57 **Robert H. Beckett '57**

Ichabod Washburn Young Alumni Award for Professional Achievement

George R. Oliver '82 President, GE Aircraft Engines
Nancy M. Pimental '87 Script Writer, Comedy Central
Donald P. Zereski '87 President, Streetmail

John Boynton Young Alumni Award for Service to WPI

Joyce S. Kline '87

Albert J. Schwieger School of Industrial Management Award (Presented 2/02)

Preston W. Hall '61 SIM Retired Chairman, Wolf Coach

49 49ers with e-mail addresses that need posting or updating may contact me at wajulian@alum.wpi, or 1-804-744-3654. Good stuff can then be sent to you much faster than by pony express, so crank up your PC pronto!

—Bill Julian

55 **Robert Stempel** was presented with the IEEE's 2001 Golden Omega Award at the organization's Electric Insulation Conference (EIC)'s Electric Manufacturing Coil Winding Association Expo in Cincinnati, Ohio.

57 **Norman Ristaino** is retired from the U.S. Army's Natick Labs. A lifelong resident of Franklin, R.I., he has served on many town boards.

59 **Windle Priem** was elected to the board of directors of EMC Corp. He is currently vice chairman and director of Korn/Ferry International.

60 **Robert Condrate**, professor emeritus of spectroscopy at the New York State College of Ceramics at Alfred University, was made a fellow of the Canadian Ceramic Society. He is also a fellow of the American Ceramic Society, Royal Society of Chemistry and American Institute of Chemists.

61 **Larry Israel** has accepted a part-time appointment as executive director of the Assistive Technology Industry Association (www.ATIA.org). He had been the organization's founding president since 1998, and continues to provide legal counsel and serve on the board of directors. Larry adds that although he does not practice disability law as such, he would be pleased to provide information and referrals to the WPI community based on his 30 years of experience in the industry.

62 **Bill Brutsch '62** ('81 MSM) retired this spring as chief operating officer of the Massachusetts Water Resources Authority. In more than 30 years of service to the state, he has overseen significant changes to the region's water and sewer infrastructure, including the Boston Harbor Project, the Integrated Water Supply Improvement Program, and the MetroWest Tunnel. Among the agency's success stories, he values the Demand Management Program, a rehabilitation and conservation effort that averted the need to divert the Connecticut River to supply Greater Boston.



YIPPEE! YAHOO! I now do ONLY what I enjoy! I watch/attend basketball, baseball and football games, lift weights, run, drink, and travel—and I've become GREAT at napping!

— Steve Sutker '65
on his retirement

63 **Mike Littizzio** has retired from Jamesbury Corp., but continues as a consultant to the company.

Ted Zoli's Critical Lift offshore racing team competed in the APBA Offshore Races in Marathon, Fla., in May. The team's complete schedule is posted at www.critical-lift.com. Ted lives in Glens Falls, N.Y., and works for Torrington Industries.

64 **Leo Pluswick** (M.S. PH) is a wireless security expert with 22 years of experience at the National Security Agency. He currently serves as technology program manager for TruSecure's ICSA Labs division in Herndon, Va.

65 **Thomas Arcari** lives in Plainville, Conn., where he has been active on the town council.

Steve Sutker retired as of Dec. 31, 2000. "YIPPEE! YAHOO! I now do ONLY what I enjoy! I watch/attend basketball, baseball and football games, lift weights, run, drink, and travel—and I've become GREAT at napping! Every day I wake up and ask myself "What am I going to do today to make myself smile????!!!"

66 **Robert Sinuc** is vice president of engineering at Power Plug Inc. in Latham, N.Y.

67 **Rene LaPierre** is vice president, research and engineering, for Precision Combustion Inc. of North Haven, Conn., specializing in catalytic combustors for power generation.

68 **R. Omur Akyuz** (M.S.) joined the faculty of the newly formed Yedi Tepe ("Seven Hills") University in hilly Istanbul, Turkey, as professor of physics and founding dean of the School of Pharmacy. He also serves as a planning advisor to the university's president. Akyuz brings 29 years of experience from his prior position in the physics department of Bogazici University in Istanbul.

Fran Barton was named chief financial officer of BroadVision Inc. in Redwood City, Calif.

A profile on **Ed Cannon's** career as men's soccer coach at St. Anselm College in New Hampshire appeared in *The Union Leader* recently. The former All-American recalled his basketball and soccer days at WPI, and reflected on his 27 years with St. Anselm.

Robert de Flesco was promoted to vice president for facility operations and property development in the Engineering Department of New Jersey Manufacturers Insurance Co.

Kenneth Gminski retired from FM Global (formerly Factory Mutual) after 30 years, including 28 as senior resident loss control consultant. He's now an independent consultant in the P.C. (property/casualty) insurance business. "Recently celebrated 29 years of marriage to Ruthanne (Hazelton). Our daughter, Sarah Beth, is a junior at UNH, majoring in Spanish. Our son, Stephen, is a high school freshman. I'm also on our 35th Class Reunion Committee."

Thomas Kiely joined Gannett Fleming, an engineering and



construction management firm, as a project manager. He oversees design of water systems for municipal and private clients in southeast Pennsylvania.

69 Paul Wolf took early retirement after 16½ years as chief traffic engineer for Cuyahoga County, Ohio, and 16 years in other public traffic and planning offices in Cleveland and Washington, D.C. Not one to sit around idle, he is now a senior traffic engineer with Traff-Pro Consultants Inc. He also served at the Traffic Safety Merit Badge booth at the Boy Scouts' 2001 National Jamboree, and has been active in local recruitment and national service projects.

70 Peter Blackford lives in Naples, Fla., and works for Cable USA, a manufacturer of industrial cable, as director of engineering. His experience on the hybrid car at WPI gave him the confidence to buy a 2001 Toyota Prius, which runs on gasoline and electricity. "It's a good thing to do environmentally and it's something that needs

to be done more," he said in a local newspaper article on the lack of commercial promotion of "green" cars.

Bill Hillner writes from West Africa, where he is managing construction of the Kizomba "A" Tension Leg Surface Well Head Platform Project in Lobito, Angola. The platform will be installed in the deep waters off the shore of Angola, with oil production scheduled to begin in the first quarter of 2004.

71 Jay Linden joined the Englewood (Fla.) Water District as technical support manager. He and his wife, Diana, have three children.

Donald Peterson was named chairman of Avaya Inc. in January. The company states that two of his previous positions, vice chairman and president, will be eliminated. He will continue to serve as chief executive.

Thomas Weil was named a fellow of the American Concrete Institute. He manages the Technical Services group of Grace Construction Products' Specialty Construction Chemical Unit.



72 Howard Levine is senior manager for the East Coast Division of Newport Corp., a semiconductor equipment firm in Irvine, Calif.

Richard Wallace was named chairman of ASTM Committee D08 on Roofing, Waterproofing and Bituminous Materials. Since 1979 he has been employed as technical director of Fluor Corp. He lives in Greer, S.C.



73 Edward D'Alba, president and CEO of Philadelphia-based Urban Engineers, was named Engineer of the Year for 2002 by the Delaware Valley (Pa.) Engineers Week Council. He and his wife, Karen, live in Berwyn, Pa., and have two sons.

Glen Johnson, dean of the College of Engineering at Tennessee Technological University, was named a fellow of ASME International.

Richard Zepp is superintendent of Cyprian Keyes Golf Course in Boylston, Mass. He was profiled in *MassGolfer* in an article on IPM (integrated pest management).

74 Steve Dacri was inducted into the Inner Circle of The Magic Circle, the world's most prestigious organization for magicians. He lectured at the organization's London headquarters in June 2000 and returned in April 2002 with his wife, Jan, who gave an address on "Memory Magic," as part of a nine-week lecture and show tour of the British Isles.

Richard Peterson married Jo Ann Schumacher on Sept. 30, 2000. A member of the technical staff of Sarnoff Corp., he lives in East Windsor, N.J.

75 Peter Schwartz joined United Electric Controls as vice president of sales.

David White received the Miles-Lincoln Award from Children's Friend Inc. He is a longtime volunteer and board member of the Worcester-based agency for children and families in Central Massachusetts.

76 Jay Cruickshank received a law degree from Quinnipiac University in 1999 and was recently named vice president of The Lane Construction Corp. in Meriden, Conn.

Tom McAloon is in Prishtina, Kosovo, working on a USAID training program for water and electric utility management.

77 George Whitwell is manager, technology networks, at Akzo Nobel Chemicals Research in Dobbs Ferry, N.Y., where he serves as a liaison for knowledge management and competitive intelligence.

78 Dr. Raymond Dunn was awarded a Godina Fellowship from the American Society for Reconstructive Microsurgery. The fellowship will allow him to spend a year



visiting centers of excellence in his field, which involves microscope-guided repair

of tiny nerves and blood vessels to restore the function and appearance of damaged tissue. Dunn's work focuses on microsurgical repair of wounds of the lower legs. He is chief of the Division of Plastic Surgery at UMass-Memorial Health Care and associate professor of surgery at the University of Massachusetts Medical School.

Mark Freitas was elected to the board of directors of Zone Labs Inc., an Internet security firm.

Michael Kenniston has moved back to academia, after a 15-year career in industry. He is now a visiting assistant professor of computer science at DePaul University in Chicago.

79 Kevin Halloran works for Control Technology Corp. and lives in Franklin, Mass., with his wife, Kimberly.

80 Dr. Verne Backus is medical director for Vermont Occupational & Acute Care, based in Chittenden County.

Former Chess Club President **David Drevinsky** has advanced to the rank of chess master and was recognized by the USCF in April. "All the Friday night tournaments have contributed to my success," he writes.

Bill Gascoyne married Kristin Kieser of Mountain View, Calif., on April 13, 2002.

David Lesser is director of strategic planning for The Simon Group Inc. He lives in Exeter Township, Pa.

81 **Brian Caslis** works for Synplicity Inc. as marketing director for the company's Certify™ products. He presented a paper at DesignCon 2001.

Glenn Gerecke is vice president and site director for DuPont Pharmaceuticals Co., which has been acquired by Bristol-Myers Squibb Co.

Benson Gould joined Marin Environmental Inc., an environmental-management firm based in Haddam, Conn. He serves as remediation section manager of the company's Southbridge, Mass., office.

Fred Rucker was appointed president and COO of Network Mantra. He lives in Oakton, Va., with his wife, Kirsten, and their five children.

82 **Toma Duhani** is town engineer-highway superintendent for Charlton, Mass.

Richard Welch joined ATG (Art Technology Group) in Cambridge, Mass., as vice president of customer services and support.

Chris Wraight holds the post of director of North American marketing at Sophos Inc., developers of anti-virus software.

We'll provide the conversation

(You provide the coffee)



There's a great new place to go to stay in touch with your classmates and chat about your alma mater. It's called the **WPI Alumni Café** and it's as close as your computer screen. The Café is an online community with dedicated forums for classes, events, news and more. If there's something special you'd like to talk about, you can even start your own forum. So, take a break from the hustle and bustle of everyday life and join your friends at the coziest little spot on the Internet. Drop by whenever you like—*we never close!* Just visit the WPI Alumni home page, www.wpi.edu/+Alumni, and click on the Café icon.

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83 **Sujal Dave** has two sons: Roshan, 4, and Akhil, born Jan. 23, 2001. He is a program manager at The Math Works, in Natick, Mass.

Barbara Haller works for National Grid in Westborough, Mass. Last year she ran for City Council in Worcester's 4th District and received a Girl Scout Gold Award Young Women of Distinction.

Stephen LaFrance was promoted to president of the engineering and planning firm Provan & Lorber Inc., where he has worked for 13 years. He and his wife live in North Stratford, N.H.

Bruce Myers (M.S. EE) joined Systemonics as general manager of the company's Marlborough, Mass., organization, and director of RF Engineering. Myers was the founder and director of Raytheon's RF Networking business, which was recently acquired by Systemonics.

84 **John Bibinski** and his wife, Kathryn, proudly announce the birth of Diana Kathryn on Nov. 1, 2001. She joins her big sister, Christina Rose, born in 2000. "We truly feel quite blessed!"

Ophthalmologist **Kathleen Cronin** joined the staff of Eye Heath Vision Centers in North Dartmouth, Mass. A specialist in the treatment of glaucoma and diabetes, she is a graduate of Hahnemann University School of Medicine in Philadelphia and had a fellowship with Project ORBIS International, an organization devoted to saving sight and promoting education worldwide.

Robert Korkuk married Martha Coughlin on June 23, 2001. He works for BAE Systems in Merrimack, N.H. Shortly after Sept. 11, **Marie McClintock** returned to North Africa, where she has been working as a linguist. She developed an alphabet for KO (a highly complicated tonal Burkinabe language) and has trained a local to teach his people to read. An advocate for oppressed women, she has been searching for startup funds to help them launch home-based businesses, such as making peanut butter.

Joseph Parisi is public works director for the city of Gloucester, Mass., where he has worked for nine years.

85 **William Cass** is a partner in the Bloomfield, Conn., law firm of Cantor Colburn, specializing in intellectual property law.

David Connolly married Lori Miller recently. He is general manager of the Ninety Nine Restaurant in Springfield, Mass.

Craig Falkenham recently celebrated his 10th anniversary with Maxim Integrated Products, based in Sunnyvale, Calif. He currently serves as area director for U.S. field applications, Eastern Region. Craig still lives in Derry, N.H., with his wife, Lisa, and their three children, Ryan, Matthew and Kerri.

Gerard Guillemette works for Mixed Signals Technologies in Culver City, Calif., as a software engineer.

Jon Kaplan spent five years in Salem, Ore., before returning to Vermont in 1995 to work for the state's transportation agency. His passion for road and mountain biking serves him well in his work on bicycle and pedestrian projects, such as setting design standards for sidewalks, bike lanes and multi-use paths.

He and his wife, Anne (Ford), have been married for 10 years and have two children—Jacob, 4, and Isaac, 1½. “We love to get outside for any kind of activity—especially bicycling, hiking, cross-country skiing, snow shoeing and sledding,” he writes.

Virginia (Noddin) Knowles lives in Beacon, N.Y., with her husband, Steven, and their four children, ages 5–11. She recently started VTEK, a home-based CE consulting business, primarily in research and software development. She also volunteers in the local school, the PTA and her church.

Joan Landry married Robert Caponi. She is a senior software engineer with Aspect Communications in Chelmsford, Mass.

Jim Mirabile was promoted to director of optical network solution sales at Acterna. He joined the company in 1992, after seven years as a Navy surface warfare officer. Jim lives in Hopkinton, Mass., with his wife, Brenda, their daughter, Brianna, and their son, Nicholas.

Frederick Moseley was promoted to associate with the engineering firm Fay, Spofford and Thorndike in January. He is based in the company's main office in Burlington, Mass., where he manages a team of 12 engineers specializing in traffic engineering. “I have also developed expertise in the growing field of planning and designing bicycle/pedestrian facilities. My projects range from the South Fork Bikeway in South Hampton, N.Y., to portions of the East Coast Greenway in Maine. Outside the office, I am busy with my wife, Lynn, raising our three children, Patrick, Brandon and Elizabeth.”

Cmdr. **Jim Shea** serves in the U.S. Naval Reserve at Dobbins Air Reserve Base and continues to enjoy his job piloting the

MD-11 for FedEx. In his spare time, he loves being with his wife, Sandy, and their two “kids”—black labs Duke and Duchess.

Jody (Bobbitt) Zolli is a principal technical writer at SeaChange International in Maynard, Mass. She lives with her husband, Pete, stepdaughters Emily and Erica, and one-year-old son, Leo. In her spare time, Jody enjoys making stained glass, reading and sleeping.

86 Todd Becker was appointed managing director, investments, of Next Generation Ventures, LCC, a joint venture between The Phoenix Cos. and Connecticut Innovations. He lives in Ridgefield, Conn., where he previously founded and managed a venture capital firm called PomeGranate.

Robert Gremley was promoted to vice president, CAD software development, at Parametric Technology, where he has worked since 1989.

Michael MacMillan holds the title of epitaxy scientist and program administrator for Sterling Semiconductor's Tampa, Fla., facility. His specialty is silicon carbide epitaxial film growth for power and radio frequency device structures.

87 Gary and Debbie Murphy Allen '88 had their fourth child, Grace Alyssa, on Sept. 28, 2001. She was met with a hearty welcome from her siblings, Zach, 8, Tess, 4, and Ben, 2. Gary is still working at Intel and Debbie is enjoying life as a stay-at-home mom. “Life has never been busier or better,” she writes.

Lisa Barton joined the law firm of Ransmeier and Spellman in Concord, N.H. A former counsel to Northeast Utilities, she will focus on energy and corporate matters.

Curt Duffy worked as a consultant on Paramount Pictures' Y2K and Spelling Merger projects. He joined the movie studio last year as a payroll analyst. Curt also completed an MFA in creative writing at Antioch University and now teaches composition part time at Los Angeles Pierce College. His poetry and short fiction have appeared in literary magazines, including *Crux*, *4th Street* and *51%*. He lives in Hollywood with his red-nosed American pit bull terrier, Lucy.

Stephen Madaus is an associate in the Business Group of the law firm Mirick O'Connell, with offices in Boston, Westborough and Worcester.

Michael Skowron married Ellen Ferland on Sept. 1, 2001. They live in Dover, N.H.

Maj. **Kenneth Viall** graduated from the Army's School of Advanced Military Studies with a master's degree in military arts and science.

88 Allen Bonde recently started a research and management consulting firm, The Allen Bonde Group, in Wellesley Mass., after working in various management and consulting roles at McKinsey, Extraprise and The Yankee Group. He writes, “Would love to hear from other alumni working in the CRM software or e-business space. When I'm not traveling, my wife and I continue to enjoy life in the suburbs with our three (!) kids and our old, but still-untrained black lab.

J. Michael Garvin and his wife, Patrice, welcomed their first child, Andrew John, born Jan. 29, 2002. They live in Chelmsford, Mass.

Doug Smith works for Massachusetts Electric in Brimfield. He was a guest speaker at the town's Brown Bagger program, where he fielded questions from residents on light bills, power outages and energy conservation.

Jim Works and his wife, Karen, announce the birth of a daughter, Helen Frances, on Dec. 20, 2001. Her brother, Colin, is two years older. Jim works for the Department of Defense as an aerospace engineer for the Defense Contract Management Agency. He is still serving in the Connecticut Air National Guard, and was recently promoted to lieutenant colonel.

89 Patrick Brennan married Alyssa Shutack, a graduate of UMass/Boston and a product manager for BrassRing Systems. Patrick works for Adobe Systems as a computer scientist. They live in Arlington, Mass.

“I have come full circle,” writes **Ciro DiMeglio**, who returned to Worcester when his company, BioValve Technologies, moved to the Biotechnology Research Park. He was previously based in Watertown, Mass., after earning a master's degree and a doctorate in Oregon and doing postdoctoral work at Purdue.

David Hatch is director of technical architecture for Peopletreet.

Kerry and Karen (Krikorian) Hennessey announce the birth of their son, Timothy Patrick, on July 12, 2001. He joins his brothers, John, 7, and Zachary, 6, and sister, Rachel, 2. “Tim is a very happy kid who smiles and pukes a lot,” writes Kerry.

Scott Orzell is a senior manager with Cap Gemini Ernst & Young, working with hospitals and health care systems on turnaround and strategic business transformation efforts. He has been with the company for more than four years. Scott lives in Coventry, Conn., with his wife, Karen, and their children, Nicholas and Alyssa.

Erin Ryan and Donald Gale announce the birth of Connor Jack Gale on Dec. 1, 2001. “He's healthy, happy, and loves his Australian cattle dogs, Sky and Blaze,” they write.

Marrion at the Controls Heads New York Fire Team

Christopher Marrion '89 (M.S. FPE) leads the New York office of Arup Fire, where he manages a group of WPI fire protection engineering graduates that includes Jarrod Alston '99, David Jacoby '95 ('98 M.S. FPE), James Lord '00 ('01 M.S. FPE) and Bob Till '94 (M.S. FPE; '01 Ph.D.). On Sept. 11, they watched with horror as the Twin Towers burned only blocks away. "It was difficult not to think of the impact on the exit stairways and the occupants' ability to evacuate, as well as how the fire was affecting the load-bearing capacity of the structural elements," he says.

Marrion was chosen to represent his field and the Society of Fire Protection Engineers (SFPE) on the Building Performance Analysis Team (BPAT). His role included work on WTC 1, WTC 2, and the performance of various fire protection systems including egress, sprinklers and compartmentation. He spent a significant amount of time

studying the collapse of WTC 7, a complex puzzle that was overshadowed by the drama of the Twin Towers. He also helped write Appendix A—a primer on the fire engineering concepts discussed in the report.

Lessons have been learned from the tragic events of Sept. 11, says Marrion, and WPI's fire protection engineering graduates will play a significant role in the future design of buildings and their fire- and life-safety performance. He believes this includes undertaking performance-based designs to help stakeholders understand the anticipated performance of buildings when exposed to various threats, including fire, impact, explosion, and chemical or biological agents, as well as helping structural engineers understand the interaction of fire and steel.

Marrion and his colleagues have been asked to make numerous presentations to address these concerns. Others at Arup have



From left, Saw-Teen See (Les Robertson's wife and partner at Leslie E. Robertson Associates), Venkatesh Kodur, and Marrion examine steel from the World Trade Center.

been instrumental in forming the company's Extreme Events Mitigation Task Force, which includes Richard Custer, former associate professor of Fire Protection Engineering and former assistant director of the Center for Firesafety Studies at WPI (now technical director for Arup Fire USA), and Brian Meacham '84 ('91 M.S. FPE), who leads Arup's Risk Consulting Group in Westborough, Mass.

For Chris and his colleagues in New York, a quick glance downtown to the void left in the skyline serves as a daily reminder of the tragedy and of the opportunities they have in helping shape the future for fire engineering and building design.



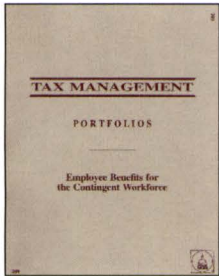
Crane Streamware execs **John Roughneen '89** (left) and **Glenn Butler '89** have a lot to smile about. The company they founded in 1991 was acquired by Crane Co., a \$2.4 billion publicly traded Fortune 300 company. Streamware's flagship products include VendMAX management systems for vending

machines, and InfoVend, a market-data research and analysis service. After almost a decade of the company's growth, Roughneen says he is thrilled to be aligned with Crane, a global powerhouse with a long-term commitment to the vending industry.

90 Al Alonzi married Susan Welch of Augusta, Ga., on June 9, 2001. His brother Roland was best man, and classmates **Ken Comey** and **Kevin Owen** were groomsmen. Al and Susan both work in Washington, D.C., and live in Virginia. **Ken Comey** married Julie Giuntoli on Jan. 2, 2002. Classmate **Al Alonzi** was best man, and Ken's brothers **Thomas '96** and Michael were groomsmen. Ken and Julie currently reside in Bakersfield, Calif.

Jeff Hebert and his wife, Catherine, announce the birth of a son, Daniel Bruce, on Sept. 14, 2001. "Additionally, Jeff gave birth to a 195-page dissertation," he writes, "earning a Ph.D. in electrical engineering from the Air Force Institute of Technology in Dayton, Ohio. I pinned on major last December and reported to Kirtland AFB in February to begin work on testing the USAF's airborne laser." **Rory Welch**, his wife, Nancy, and their two children, Ryan and Lauren, are living in Harrogate, England. Recently promoted to major in the Air Force, Rory is assigned to RAF Menwith Hill.

WPI Bookshelf



Employee Benefits for the Contingent Workforce

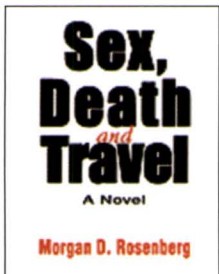
by Alden J. Bianchi '74

Bureau of National Affairs Inc.

This detailed analysis addresses employment issues that arise with contingent or alternative workers, such as independent contractors, leased employees, free-lancers and part-time,

seasonal or temporary employees. "As globalization and e-commerce have changed the employment landscape, employers have increasingly relied upon temporary, contract or other contingent employees, and have been faced with the question of how to compensate these contingent workers," says Bianchi. "Our current employment laws were never designed to cover employment issues of this nature."

Bianchi is a partner and chair of the Employee Benefits practice at Mirick O'Connell. He holds a J.D. from Suffolk University Law School, an LL.M. from Georgetown Law Center and an LL.M in taxation from Boston University's Graduate Tax Program.



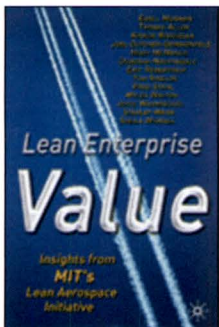
Sex, Death and Travel

by Morgan Rosenberg '95

iUniverse Inc.

"From a one-act play I wrote in college, to a (soon to be) major motion picture, SEX DEATH AND TRAVEL has come a long way," says Rosenberg, who is at work on the screenplay. His Web site,

www.morganrosenberg.com has a link back to the New Voices drama festival site, where it all began.



Lean Enterprise Value: Insights from MIT's Lean Aerospace Initiative

Myles Walton '97 and 12 co-authors from MIT's LAI

Palgrave Publishers

Members of MIT's Lean Aerospace Initiative share their vision for the future of the aerospace industry. The book offers a close look at the history, values and culture of

aerospace, and formulates a new vision, with the concept of "lean" as a framework for transformation.

Walton earned an S.M. and a Ph.D. in aeronautics and astronautics from MIT. He currently covers the aerospace and defense sectors for Morgan Stanley.

91 Bob Beliveau is a product marketing manager at Jetstream Communications, manufacturers of voice-over broadband systems. Bob married Italian-born Deborah Armstrong on June 9, 2001, at St. Simon Catholic Church in Los Altos, Calif. The reception at Los Altos Golf and Country Club included fellow Phi Sigs **Christopher Manton '90, Rick Drulard '92 and Andrew Stern '92.** "And yes, the story of 'Star Crossed Lovers' in *Transformations'* premier issue is true," he notes, "though the full story is a bit more interesting than that."

Peter Breton and his wife, Jenny, announce the birth of their daughter, Nicole Monteiro Breton, on March 30, 2002. They live Westborough, Mass., where Peter works for CTDI.

Michelle Burke is now an associate in the Intellectual Property Group of Perkins, Smith & Cohen, LLP.



The firm joined forces with her former employer, Ricklefs & Co., P.C. in January.

James Fortin was elected treasurer of the Structural Engineering Society of Maine. He works for Harriman Associates and lives in Gray, Maine, with his wife, Julie, and their son, Joshua.

Rexel Gallamoza received a master's degree in electrical engineering from Drexel University. He and his wife, Lunarose Abad, live in Newark, Del., with their sons, Ryan and Brennan.

Karl Goff of Brunswick, Maine, joined Wright-Pierce, located in Topsham, as an environmental engineer.

Troy Nielsen is working on a CD of jazz for children, scheduled for release this fall. He continues playing jazz gigs and working for Philips Medical Systems. Troy and his wife,

Lucy, live in Andover, Mass., with their son, Myles. The two-year-old already enjoys music and likes playing ukulele, drums and piano, according to a profile of Troy in the North Andover paper *Break Time*.

Daniel Whelan was promoted to product line engineer at OFS Fitel Specialty Fiber (formerly Lucent Technologies Specialty Fiber) in Avon, Conn. Dan, who moved to Avon last November, provides technical sales support and develops new markets for the company's multimode optical fiber, cables and assemblies.

92 The last issue of *Transformations* erroneously reported the whereabouts of **Loan Ngo** and her husband, John Jones. They were previously living in N.C., not NYC. They have since moved to Connecticut, where Loan is an executive consultant for Pratt & Whitney in East Hartford.

Marc Paquette married Kimberly Norfleet on Sept. 16, 2001. He is a software consultant for SAP America Inc. in Waltham, Mass.

93 **Christopher Arsenault** is a software engineer at Unisphere Networks. He and his wife, Jennifer (Dellagala), live in Burlington, Mass.

Jeffrey Jorczak married Joan Daignault on June 9, 2001. He is a self-employed Web designer based in Hartford, Conn.

Michael Rzeznik (M.S. FPE) was promoted to principal and



office manager of the Armonk, N.Y., office of Gage-Babcock & Assoc.,

specializing in fire protection, life safety and security consulting. His work on the Star Spangled Banner Conservation Laboratory at the Smithsonian was featured in the Summer 1999 issue of *WPI Journal*.

Kate (Ranum) and Joseph Wenc announce the birth of their second child, Isaac, on March 12, 2002. Big brother Stefan, age 2, looks forward to having a playmate.

Ross Weyman is living in Evanston, Ill., and working as a senior project manager for Bovis Lend Lease. He married Karol Muehleis in May 2000 on Grand Cayman Island, and welcomed into the world a daughter, Anna Marley, on Feb. 12, 2002.

94 **Mary Auger and James Uhrich '98** of Milford, Mass., were married recently. She is a product development engineer for Dupuy AcroMed/Johnson & Johnson. He is a design engineer for Carroll Design and a student in the mechanical engineering master's degree program at WPI.

Andrew Bowman (M.S. FPE)



was named principal and office manager for the Chicago office of

Gage-Babcock & Assoc.

Chris Cogliandro was promoted to product line manager, X-ray, at Timken Super Precision (MPB) in Keene, N.H.

Brandon Emanuel was joined in marriage with Jennifer Harper by Brandon's dad on Oct. 20, 2001, in Bedford, Va.

Dan Mackin, Bob Thomas and James McElroy '95 took part in the ceremony. The couple honeymooned in Prague, Czech Republic, and Edinburgh, Scotland, before returning to Jacksonville, Fla.

Sean O'Connor and his wife, Kerrie, had a son, Jared Michael, on Oct. 3, 2001. Both parents work in the CCC at WPI.

Jon Osborn and his wife, Sue, had their first child, Andrew, in August 2001. Jon is working as a software consultant for S.E.I. in Cincinnati, Ohio.

Kyle Outlaw and his wife, Maureen, announce the birth of Peighton Nabeha, April 23, 2001. "As a first child, she is getting plenty of attention. I think my camera is wearing out," writes Kyle. They are living in New Jersey, after four years at Penn State, where Mo got her Ph.D. in criminology and Kyle got his master's in manufacturing management.

95 **Thomas Berthiaume** is a project superintendent with Whiting Turner Contracting. He and his wife, Lisa, live in Worcester.

Kevin Dowty and his wife, Stacie, announce the birth of a son, Connor William, on Oct. 9, 2001. He was born at 5:41 p.m. in Sturdy Memorial Hospital, Attleboro, Mass.

Greg Marr ('96 M.S. ME, '02 M.S. CS) completed his second WPI master's degree, this one in computer science, in December. He is currently employed as a senior software developer and core team leader at CADKEY Corp. in Marlborough, Mass. He and his wife, **Amy (Plack) '96** (M.S. '00), live in South Grafton, Mass., where Greg serves as scoutmaster for Boy Scout Troop 107.

Kathleen Paulauskas married Gavin Moore on April 28, 2001.

Katie Daly '96 was a bridesmaid. Wedding guests included **Wendy Butkus Kelly, Chad Council '94, Amy Nelson Barker '96, Ian Quinn '96 and Angela Wonsey '96.**

Amy Rich continues as president of Boston-based Oceanwave Consulting. Her Q&A columns appear regularly in *Sys Admin* magazine.

George Roberts and his wife, **Laura Gregory Roberts '93**, announce the birth of their daughter, Anna Claire, on Oct. 24, 2001.

Cory Shimer is a hardware engineer with Quantam Bridge. He and his wife, Jennifer, live in Marlborough, Mass.

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96 **Jessica (Soucy) and Jeffrey Barnes** announce the birth of Summer Grace on April 9, 2001.

Antonio Delgado from Maracay, Venezuela, has left his post at Maersk Drilling Co. in Maracaibo to participate in the Maersk Contractors International Drilling Program in Svendborg, Denmark.

Eric Denoncourt is a junior civil engineer for the town of Shrewsbury, Mass.

Anne Marie Fayan (MM) is alumni director for Bishop Connolly High School in Somerset, Mass., where she has been on the faculty since 1981.

Yi-Chih Huang (M.S. BE) is a medical system engineer with InMedica Development Corp. of Salt Lake City. His work on the company's non-invasive hematocrit system includes design of the pressure control mechanism and the data display unit.

Jesse Parent and his wife, Julia, were blessed with the birth of their daughter, Jasmine Denise, born at home on Dec. 1, 2001. Jesse changed jobs and is now principal engineer at Sorenson Media in Salt Lake City. This spring he performed with an improv comedy group called Knock Your Socks Off

(or KYSOFF) at the 5th annual Chicago Improv Festival.

Brian Pestana married Terri Lewis on July 21, 2001. He is working on an MBA at Bryant College and is employed by V.R. Industries in Warwick, R.I.

Pam Sluter and her husband, Steve, announce the birth of their first child, Isabelle Rose, on March 17, 2002 (a St. Patrick's Day baby!).

Mark Suennen received his PE license after passing the October 2001 exam in Maryland. ("The first time!") He is working on his master's thesis at the University of Maryland, which he expects to complete by May 2003.

97 **Melissa (Allen) and Matthew Leahy '95** are the proud parents of a son, Nathaniel Howard, born on Oct. 10, 2001. Melissa is assistant director of admissions at WPI, and Matt is vice president of lab services at Secon of New England.

Dr. **Nicole Manjerovic** works at Abbott Animal Hospital in Worcester. She and her husband, Brian Metcalf, live in Auburn, Mass.

Sean O'Hearn is a technical consultant for Vistagy in Waltham, Mass. He married Cortney Cope last year.

Heather St. Martin is working on a doctorate in organic chemistry at Boston College. She and her husband, Jonathan Davis, live in Waltham, Mass.

98 David Deacon married Kerri Lanni on June 2, 2001. He is an actuary at Allmerica Financial in Worcester.

Kerry Ann Dubrule wed Paul Verdini, recently. She works for Norac Inc., in Azusa, Calif.

David Giroux married Christine Greenleaf on Sept. 1, 2001. He works for Raytheon and lives in Warwick, R.I.

Kristen Gongoleski and **Jonathan Fairbanks** are engaged. She is a laboratory technician at Wyeth Pharmaceuticals in West Greenwich, R.I., and he is a product engineer at Stanley Bostich in East Greenwich.

Jill Ann Johnson ('00 M.S. FPE) and **Aaron Korthas** '99 are engaged to be married on Sept. 7, 2002. Jill is an associate fire protection engineer at RJA

Group in Framingham, Mass., and Aaron works as an actuarial analyst at Watson Wyatt Worldwide in Wellesley.

Rory Kelleher received an MBA from Georgia Institute of Technology and was inducted into the Beta Gamma Sigma honor society. He works for his family's business, Emerald Excavating Co. Inc.

John Markow married Aino Rentola on Jan. 12, 2002, in Helsinki, Finland. Best man was **Ryan McDaniel**, and **Al Navarro** was an usher. John, who works at the Nokia Research Center in Helsinki, may be contacted at john.markow@ieee.org.

Roger Mazzella (M.Engr.) is East Coast strategic account manager for Onix Microsystems of South Plainfield, N.J.

Molly McCabe and **Brian Gagnon** '97 were married on Sept. 15, 2001, with **Amy Sinyei** as maid of honor and **Scott McDermott** '97 as best man. Classmates **Wendy Jobling**, **Jenn Sapochetti** and **Justin Urban** were there, along

with **Isaiah Plante** '97, **Cory Wajda** '97, and **Katie Gagnon** '01. After a honeymoon in Tahiti, they returned home to Fremont, Calif., where Molly is a quality engineer for Cool Systems Inc., and Brian is a fire protection engineer with Rolf Jensen Assoc.

Josh Mellinger works for Teradyne. He and his wife have been living in Newbury Park, Calif., for the last four years.

Guy Miller is an applications engineer with Accusonic Technologies Inc. He lives in Pocasset, Mass., with his wife, Heather Marie (Lanoue).

U.S. Army Capt. **Frank Townsend** has been stationed in Hawaii with his wife, Kaya Brown, and their two children, Sydney, 3, and Frank IV, born in February 2002. He is leaving his post as civil engineer for the 84th Engineer Battalion to return to the States and get his master's degree before he ships out to his next assignment. Frank's previous deployments have included Thailand, Kwajalein (an atoll in the

Marshall Islands) and other Pacific duty stations.

Chris Wieczorek (M.S. FPE) is a doctoral candidate at Virginia Tech. His research on carbon monoxide production and transmission during house fires was described in the *Roanoke Times* in an article called "Hunting the silent killer."

Keith Wilkinson is a mechanical design engineer with Pratt & Whitney. He lives in Portsmouth, N.H., with his wife, Christina (Butler).

99 Tara Carrie and **Scott Hammond** planned to marry on June 8, 2002. Tara is a fourth-year veterinary student at Tufts, and Scott works as a structural engineer at Odeh Engineers in North Providence, R.I.

Tim Miranda married Liz Stewart on Aug. 19, 2001, in New Rochelle, N.Y. Classmates **Willy Nunn** and **Matt Sartin** were ushers. Tim works for Pegasystems Inc. and lives in Medford, Mass.

Nick Carparelli '90: Patriots point person

"I think the average male in New England would do my job for free," says Nick Carparelli, director of operations for the New England Patriots. "I'd be lying if I didn't say that I enjoy watching the games from the sidelines and being right there among the players and the coaches."

Those are the perks. The headaches can include airport delays, no-show ground transportation, and hotel lobbies jammed with expectant fans. Crunch time begins the Friday before an away game, when Carparelli flies out to prepare for the team's arrival, and doesn't end until he's seen everyone safely back to Foxboro. "When we land at the airport in Providence, and I look out the window and see the team buses, then I relax," he says.

On game day, it's up to Carparelli to make sure that everything works, from the coaches' headsets to the players' parking to the post-game party tent. Between games he works with many other managers and departments and, of course, with Coach Bill Belichick. "He's tremendous," says Carparelli. "He's very, very organized and specific about what he wants, which makes my job a lot easier." During the off-season Carparelli spends months planning and overseeing the Patriots' pre-season training camp at Bryant College.

In a nutshell, operations management of a professional sports franchise entails everything it takes to keep the players and coaching staff happy. "This is a pretty high-pressure business," Carparelli reminds fans.

"Coaches and players get hired and fired all the time. Their careers are very short. They work hard all year long, but it all comes down to just 16 days." To minimize the stress surrounding those days, he runs interference to deflect the many distractions that could affect the team's performance on the field.

Carparelli, who describes himself as a "fanatical sports fan," captained the WPI basketball team as a senior and played basketball and golf. Before joining the Patriots last year, he handled football operations for Syracuse University and Notre Dame. A native of Cheshire, Conn., he grew up with split loyalties, following the Giants, the Yankees and the Celtics. Nick and his wife, Rene, live in Cumberland, R.I.



From left, Quarterback Drew Bledsoe, Carparelli and Coach Bill Belichick.

Laura Pare and **Christopher Milici** were married at Diamond Hill Vineyards in Rhode Island. Laura is a process engineer/supervisor at H.C. Starck. Christopher is a production engineer and health, environment and safety manager at Technics Inc. They live in Wrentham, Mass.

Christina Caverly Wicks was promoted to instigator at the integrated marketing communication firm Smith & Jones, where she coordinates talent, casting and props for the agency's marketing and public relations clients. Her other responsibilities include coordinating production schedules and budgets for audio and film projects.

00 Andrew Cook is an applications engineer in the Dehumidification Division of Munters Corp. in Amesbury, Mass.

Matthew Driscoll married Beth Grissom, a fourth grade teacher, on Oct. 13, 2001. He is an engineer at Telica Inc. in Marlborough, Mass.

Kristina Goesch works for Zaiq Technologies in Marlborough, Mass.

Steve Hocurscak joined Ball in the House, an all-a cappella touring band from Boston. He serves as sound engineer, tour manager and Web master of the site he created for the band at www.ballinthehouse.com.

Tim LaRose is an FPE grad student at WPI. He has continued his charity work for Why Me Inc. with a six-state bicycle ride through New England to raise funds for Sherry's House, a home for children who are being treated for cancer at UMass-Memorial Medical Center.

Michael Lavoie works in the engineering department of UPS in Shrewsbury, Mass.

Christopher Shoemaker and **Crystal Robert '01** were married last year. They took a honeymoon in Europe and now live in Middletown, R.I.

01 Brooke LeClair and **Matthew Daniels** are engaged. She is an analyst at Accenture Corp.; he is an engineer with The Foxboro Co. At press time they were planning a May 25 wedding.

Graduate Management Program

Brian Johnson '00 (MBA) was named managing director and chief financial officer for Zero State Capital of Providence, R.I. He has been with the firm for five years.

Vincent DeGiacomo '01 (MBA) was appointed vice president of business development for Sonexis Inc., a Boston-based voice technology company. He previously worked at Artel Video Systems.

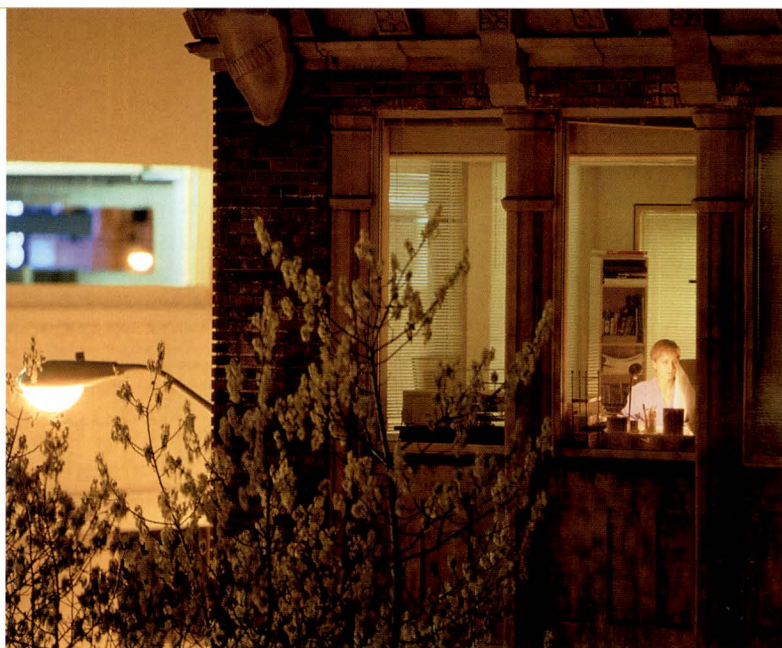
Master of Natural Science

George Sutcliffe '86 left his position as chair of the mathematics and science department at the Tilton School after 24 years of teaching. He is now self-employed as a light-construction/maintenance person in the Squam Lake area. He keeps his hand in education as an adjunct professor of chemistry at New Hampshire Technical Institute in Concord, N.H.

School of Industrial Management

Paul Mitchell '57 has moved from California to Chagrin Falls, Ohio.

James Rouse '97 was appointed president and CEO of Arrhythmia Research Technology Inc., a company that sells and licenses equipment for analyzing heart impulses through signal-averaging software. He has worked for Micron Products, a subsidiary of Arrhythmia, since 1996, and was previously its president.



What's News?

Please let us hear from you with news of your career, marriage, family, address change—whatever. Why not send us a photo of yourself for publication. And, please include your spouse's full name when sending wedding or birth announcements.

Check preferred mailing address.

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Company _____ Work Phone _____

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Fax—508-831-5820 **E-mail**—jkimiller@wpi.edu
Web—www.wpi.edu/+Transformations (Class Notes are automatically forwarded to the editor)

Due to publication schedules, your news might not appear in print for 3–6 months from receipt.

Merwin L. Hathaway '25 of Lexington, Mass., died June 12, 2000. He married Burdette Coutts in 1930, and had three sons and a daughter. Hathaway was retired from Raytheon Co., where he served as a product design engineer. He belonged to Theta Chi.

Arnold P. Hayward '26 of Pittsburgh, Pa., died Nov. 28, 2000. He was predeceased by his wife, Alice. Hayward was retired from Duquesne Light Co. He belonged to Lambda Chi Alpha and Skull.

Ejnar Carl Høglund '27 of Belfast, Maine, died July 11, 2001. He leaves his wife, Barbara (Rogers), and a son. Another son predeceased him. Høglund was a World War II Navy veteran and a 1930 graduate of the Harvard Business School. He held management positions at New England Telephone Co. until his retirement in 1970. An active member of the Alumni Association, he served as president of the Boston regional club and chaired his 50th Reunion Gift Committee.

Joseph G. Ardwin '28 of Southbury, Conn., died April 29, 2001. He leaves his wife, Christine (Sargent), a son, a daughter, four grandchildren and a great-grandchild. Ardwin earned an MBA at Harvard University. He served as vice president of plant location for Sperry Gyroscope and later retired as secretary and treasurer of the Pension Fund for Savings and Loan Associations at Pentagra Corp. in New York City.

Frank Fleming '28 of Sharon, Mass., died Aug. 4, 2001. He leaves his wife, Pauline (Goodale), a son, two daughters, eight grandchildren and two great-grandchildren. Fleming managed the patent department of The Foxboro Company and continued as a consultant after he retired in 1974. He belonged to Sigma Phi Epsilon.

Alumni who wish to make contributions in memory of classmates and friends may contact the office of Development and University Relations at WPI.

Holbrook L. Horton '29 of Farmington, Conn., died March 17, 2001.



His wife, Julia (Witherell), died in 1992. Two sons and four

grandchildren survive. Horton was the longtime editor and vice president of The Industrial Press and chief editor of *Machinery's Handbook*, a respected manual for the tool-and-die industry. He was also author of several books, including *Mathematics at Work*, now in its fourth printing. At WPI, Holbrook edited campus publications, played in the mandolin band and belonged to Theta Chi. Memorial donations may be made to WPI's Arthur Knight Scholarship Fund.

Arthur R. Barnes Jr. '30 of Plymouth, Mass., died Oct. 22, 2000. Predeceased by his wife, Jane (Potter), he leaves three sons, two daughters, 10 grandchildren and six great-grandchildren. Barnes was president and co-founder of Barnes and Jarvis Inc. of Boston. He retired in 1982 and continued as a consulting engineer. He belonged to Sigma Phi Epsilon.

Francis J. Burgoyne '31 of Lancaster, Mass., died Jan. 15, 2001. His wife, Alice (Langen), predeceased him by five years. Survivors include two sons, a daughter, nine grandchildren and four great-grandchildren. Burgoyne retired in 1972 as chief construction and project engineer for Norton Co. He was active in town government and served as clerk of the works for the Lancaster Middle School and other municipal construction projects.

Frederic C. Holmes '31 of Elkhart, Ind., died Oct. 2, 2000. Widower of the former Katherine Spinney, who died in 1953, he leaves two sons, five grandchildren and four great-grandchildren. Holmes joined Bird Machine Co. as a sales engineer in 1950 and worked in its Chicago facility until he retired in 1972. He belonged to Phi Sigma Kappa.

Edward J. Odlum '31 of Groton, Conn., died June 5, 2001. He leaves his wife, Mary Fay, two sons, three daughters and 11 grandchildren. Odlum earned a master's degree in electrical engineering at WPI in 1932. He was president of The Edward J. Odlum Co. and vice president of Kaman Aircraft. He belonged to Phi Kappa Theta.

John O. Charles '32 of Dallas, Texas, died Nov. 9, 2000.



Charles earned a master's degree in mechanical engineering at WPI in

1933 and was retired from American Steel & Wire Co. A member of Sigma Alpha Epsilon, he also belonged to Tau Beta Pi, Skull and Sigma Xi.

Henry B. Pratt '32 of Lynden, Wash., died Oct. 3, 2001. Predeceased by his wife, Lois (Hatch), who died in 1994, he leaves a son, three grandchildren and three great-grandchildren. Pratt designed bridges for the New Hampshire Highway Department. He designed a modern prototype to replace an 1852 wooden covered bridge, which is now listed on the National Register of Historic Places. He later worked in the pulp and paper industry as a

consulting engineer. A charter member of the Alden Society and a Presidential Founder, he belonged to Theta Chi.

Lawrence J. Sarkozy '32 of West Hartford, Conn., died



May 9, 2001. He leaves his wife, Clara (Cerqui), a son, a daughter and three

grandchildren. Sarkozy served as a mechanical engineer at Fenn Manufacturing for many years before he retired. In the late 1930s he played for the Torrington Red Wings AAU Hockey team.

John J. Dwyer '33 of Shrewsbury, Mass., died Oct. 14, 2000. His first wife, Marie (Carey) died in 1978, and his second wife, Grace (LaVallee) Petit Dwyer, died in 1995. He leaves two sons, a daughter, nine grandchildren and 18 great-grandchildren. Dwyer retired in 1976 as director of Worcester Boys Trade School, now Worcester Vocational High School. He previously taught calculus and physics at Worcester Junior College and worked summers as a civil engineer for Massachusetts Department of Public Works road construction projects. He belonged to Phi Kappa Theta.

Alden H. Fuller '33 of East Providence, R.I., died July 23,



2001. He leaves his wife, Jean (Stoddard), three daughters and four grandchildren.

Fuller was retired from Mobil Oil Corp., where he served as a superintendent. He belonged to Lambda Chi Alpha.

Leighton Jackson '33 of Esmere, Del., died Aug. 16, 2001. Predeceased by his first wife, Margaret, he leaves his wife, Sadie (Fell), two daughters, six grandchildren, six great-grandchildren and a great-great-grandchild. Jackson spent his career with DuPont Co. and retired as a technical investigator. He belonged to Phi Gamma Delta, Tau Beta Pi and Sigma Xi.

Willard P. Greenwood '34 of Scarborough, Maine, died March 1, 2001. He leaves his wife, Nancy, two children, four grandchildren and one great-grandchild. Greenwood worked for Forbes Lithography Co. for almost 30 years. He joined the S.D. Warren Division of Scott Paper Co. in 1963 and retired as manager of printing research in 1977. A graduate of MIT, he belonged to Theta Chi.

Walter A. Blau Jr. '35 of Middletown, Conn., died Feb. 14, 2001. Predeceased by his wife, Arline (Connery), he is survived by a brother and his family. Blau was formerly president of Blau Building Corp. and a co-owner of Blau Electric and Furniture. He also served as plant engineer for Wallace Silversmiths. He belonged to Sigma Phi Epsilon.

Roger Bliven '35 of Taylors, S.C., died Feb. 24, 2001. He leaves his wife, Ella, a son, three daughters and a grandson. He was a chemical engineer for Draper/Rockwell and also worked for Steel Heddle Co. A graduate of Rutgers University, he belonged to Lambda Chi Alpha.

Herbert N. Hoffman '35 of Sterling, Mass., died April 23, 2001. His wife, Ruth (Peinert), died in 1992. Survivors include a son, a daughter and three grandchildren. Hoffman was a retired senior systems engineer for General Electric Co., where he worked for 42 years. He held 22 patents.

Theodore R. Latour '35 of Las Vegas died April 4, 2001.



He leaves his wife, Irene, six sons, nine grandchildren and seven great-grandchildren.

Latour was retired from DuPont Co., where he served as a chemical engineer. He belonged to Tau Beta Pi and Sigma Xi.

Harry T. Anderson Jr. '36 of Reston, Va., died Jan. 28, 2001. Predeceased by his wife, Marjorie, he is survived by two daughters and six grandchildren. Anderson served in the Navy Civil Engineering Corps during World War II and later worked for Factory Insurance Association of Hartford, Conn., and Philadelphia. He belonged to Sigma Phi Epsilon.

Perry P. Clark '36 of Summit, N.J., died May 13, 2000. He leaves his wife, Louise, a son and two grandsons. Clark was a plant and production manager who worked for American Book Co. and the Reuben H. Donnelley Corp. Division of Dun & Bradstreet Corp. He also owned Perry Clark Realty in St. Croix, and served as a reserve officer in the U.S. Army Corps of Engineers with the rank of colonel.

Robert Fowler Jr. '36 of Worcester died March 11, 2001. His wife, Grace (Kahrman) died in 1984. He leaves a son, a daughter and three grandchildren. Fowler was an electrical engineer with New England Electric Co. for 40 years. A member of Tech Old Timers, he received the group's Distinguished Service Award in 1984, the same year he was honored with the Herbert F. Taylor Alumni Award for Distinguished Service to WPI.

John H. "Jack" Covell Jr. '37 of Winston-Salem, N.C., died



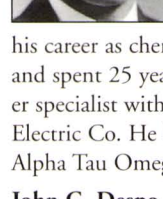
Feb. 25, 2001. He leaves his wife, Yvette, two daughters and two grandchildren.

Covell retired from Western Electric as a department chief in 1978.

Richard R. Leonard '37 of Eau Claire, Wis., died Dec. 25, 2000. Predeceased by his wife, Betty, he leaves two children. Leonard graduated from the School of Industrial Management in 1954. He was retired from Riley Stoker Corp. as a proposal manager.

Frederick B. Banan '38

(M.S. '47) of Sun City, Ariz., died July 5, 2001. He leaves his wife, Betty, a son and a grandson.



Banan began his career as chemical engineer and spent 25 years as a computer specialist with General Electric Co. He belonged to Alpha Tau Omega.

John G. Despo '38 of Westlake, Ohio, died Aug. 25, 2000. He is survived by his wife, Catherine, and three children. Despo was the retired vice president of National Steel and Granite City Steel. He belonged to Sigma Alpha Epsilon.

William E. Eaton '38 of Eugene, Ore., died June 8, 2001. He is survived by his wife, Marjorie (Wilkinson), and a son. Eaton worked for the Eugene Water & Electric Board from 1946 to 1978. After retirement, he donated his collection of vintage electrical equipment to the utility and continued to augment and curate the public display until his death.

Former class president and football captain **John E. "Jack" Germain '38** of West Hartford, Conn., died Aug. 12, 2001. Predeceased by his wife of 50 years, Isabel (Danskin), he leaves a son and three grandchildren. Germain attended WPI for three years and graduated from the University of Missouri in 1939. He began his career at Heald Machine Co., joined New Britain Machine Tool Co. in 1960, and retired in 1981 as vice president of sales and marketing. He belonged to Sigma Alpha Epsilon and Skull.

Stephen P. Stafford '38 of Hayes, Va., died April 22, 2001. He leaves his wife, Clara Fisher Stafford, two sons and a daughter. Stafford worked at Newport News Shipbuilding and Drydock Co. for 40 years and retired as a design engineer consultant. He belonged to Sigma Phi Epsilon.

Former Junior Class President **Robert E. Dunklee Jr. '40** of West Brattleboro, Vt., died



April 14, 2001. He leaves his wife, Esther (Miller), two sons, three daughters,

11 grandchildren and 4 great-grandchildren. Dunklee was the founder and retired president of Dunklee Engineering, a residential septic design firm. A letterman in tennis and cross-country, he founded the Tech Outing Club and wrote for *Tech News*. He belonged to Lambda Chi Alpha, Sigma Xi, Tau Beta Pi, the Poly Club and Tech Old Timers.

Edward R. Fox Sr. '40 of Shrewsbury, Mass., died June 2, 2001. He leaves his wife, Marilyn (Cowland), three sons and six grand children. Fox attended WPI and later earned his bachelor's and master's degrees at Michigan State College. He was retired from Simplex Time Recorder Co. as district credit manager.

Franklin D. Hayes '40, a lifelong resident of North Brookfield, Mass., died June 10, 2001. He leaves his wife, Norma (Hopkins),



a son, a daughter and three grandchildren. Hayes was the owner of Hayes Farm and a former chairman of the board of trustees of North Brookfield Savings Bank.

Joseph V. Smolinski '40 of Worcester died May 20, 2001. He is survived by a niece. Smolinski was a retired manufacturing engineer whose career included positions at Honeywell Manufacturing, Sylvania Electronics Co., Raytheon Manufacturing Co., Whiting Machine Works and Scoville Manufacturing Co. He also studied violin at the New England Conservatory of Music.

Harry Terkanian '40 of Lewisburg, W. Va., died May 29, 2001. He leaves his wife, Mildred, three sons, two daughters, six grandchildren and two great-grandchildren. Terkanian was retired as a senior electrical engineer for Raytheon Co.

Retired U.S. Navy Cmdr. **William G. Thatcher '40** of



Virginia Beach, Va., died April 10, 2001. His wife, Bernice (Clark) predeceased him. Two sons, four grandchildren and a great-grandson survive. Thatcher was commissioned by the Navy in 1940. He commanded several ships and retired in 1961 as assistant chief of staff, COMSERVLANT. After retiring from active military service, he was owner of Seaboard Iron Works. He belonged to Alpha Tau Omega.

James C. Ferguson Sr. '41 of Brattleboro, Vt., died March 8, 2001. He leaves his wife, Ruth (Gordon), a son, a daughter, three grand-



children and two great-grandchildren. A veteran of World War II, Ferguson retired from the U.S. Navy as a commander after 30 years of service. He later worked as a self-employed surveyor and civil engineer until his retirement in 1998. He belonged to Theta Chi.

N. Aaron "Butch" Naboichek '41 of Hartford, Conn., died Feb. 18, 2001. He is survived by his wife, Lois (Salvin), two sons and three grand-



children. Naboichek was president of Gold Bond Mattress Co. from 1950 to 1992, and served as CEO emeritus until his death. He belonged to Phi Gamma Delta.

Douglas A. Reid '41 of Chelmsford, Mass., died May 31, 2001. He leaves his wife, Phyllis (Welch), a son and six grandchildren. Reid was a retired letter carrier. Before joining the U.S. Postal Service he worked for the former Schrafft Candy Co. in Boston for 25 years. He belonged to Lambda Chi Alpha.

E. Curtis Ambler '42 of Newington, Conn., died July 17, 2001. He was married to the late Jacqueline (Palmer) from 1942 to 1970 and



the late Mary Louise (Wilkins) from 1970 to 1986. Surviving family members include two sons, a daughter, two step-children, twelve grandchildren and five great-grandchildren. He also leaves his dear companion,

Florence Augustus. Ambler was retired from Stanley Tool Works as vice president of engineering for the Industrial Hardware Division. He held 19 patents. He belonged to Sigma Phi Epsilon and the Alden Society.

William L. Ames '42 of Mystic, Conn., died Dec. 27, 2001. He leaves his wife, Eileen (Etherington). A Navy veteran of World War II and the Korean war, he designed submarines and remained



in the Naval Reserves for 22 years, retiring as a commander. Ames joined Electric Boat (now a division of the General Dynamics Corp.) and retired as a chief engineer with 30 years of service. A Presidential Founder, he served on his class's 50th Reunion Committee and belonged to Phi Gamma Delta, Skull, Tau Beta Pi and Sigma Xi. **Frederick W. Lindblad '42** Aurora, Ill., died April 10, 2000. Predeceased by his wife, Vera, he leaves two sons. Lindblad started his career with Norton Co. and founded U.S. Diamond Wheel Co. in 1945, and Ultra Diamond Co. in 1978. He belonged to Theta Chi.

Russell C. Proctor Jr. '42 of Houston, Texas, died June 15, 2001. He leaves his wife, De Ja, his two daughters, three grandchildren and two great-grandchildren, as well as De Ja's two sons, daughter and five grandchildren. Proctor was the founder and manager of Proctor Engineering Co. and was retired from Plant Process Equipment Co. He belonged to Sigma Phi Epsilon.

L. Howard Reagan '44 of Williamsburg, Va., died Sept. 19, 2000. Predeceased by his wife, Janice (DeVoe), he leaves a son, a daughter, a grandson and two great-granddaughters. After working for Sylvania and GTE,

Bill Ames and I first met when we pledged to the Phi Gamma Delta House at WPI in 1939. We met again during our membership in the Sailing Club. Bill's life and my life were locked together through the love of water, Worcester Tech, Phi Gamma Delta and the love of our country.

— from **A Celebration of the Life of William Lewis Ames '42**, by Robert Pettibone Seaton '43. The full text is posted on the Alumni Café at www.wpi.edu/+Alumni.

Reagan joined Communications Satellite Corp. (COMSAT), in 1963 and retired in 1983 as manager of documentation.

George D. Williams '44 of East Sandwich, Mass., died March 24, 2001. He leaves his wife, Mary (Hoey), two sons, two daughters and eight granddaughters. Williams retired in 1973 from Bailey Meter Co. as Boston district manager. He later worked for New England Gas and Electric Co., which later became ComElectric, until he retired in 1987 as manager of fuels in Wareham.

George T. "Bud" Brown '45 of Tiverton, R.I., died Dec. 11, 2000. He leaves two sons, a daughter, his former wife, Lucy Brown, and nine grandchildren. Brown was president of the former Whitinsville Spinning Ring Co. before he retired in 1984. He was also active in a number of civic and athletic organizations and served as editor of *Old Rhode Island* magazine. He belonged to Phi Sigma Kappa.

Olavi H. Halttunen '45 of Concord, Mass., died Oct. 13, 2000. He is survived by two daughters. Halttunen was a retired sales manager for General Electric Co. He belonged to Theta Chi and Skull.

Theodore A. Balaska '46 of Bradenton, Fla., died Jan. 15, 2001. He leaves his wife, Barbara, a son, a daughter, and several grandchildren. Balaska was president of Insulated Power Cable Services Inc., which he founded in 1986. A senior life member of the IEEE, he was a past chair of the Insulated Conductors Committee, which honored him with its 1990 Distinguished Service Award. He belonged to Lambda Chi Alpha.

William M. Hovenesian '46 of Worcester died Jan. 5, 2000. He leaves his wife, Mary (Ryan), and a daughter. Hovenesian was a die draftsman for Vellumoid Corp. and later drove a taxi for the IOTA and Yellow Cab companies. He belonged to Lambda Chi Alpha.

William P. Jaegle '46 of Santa Clarita, Calif., died July 28, 2001. He leaves his wife, Shelley (Doran), two sons, two daughters and six grandchildren. Jaegle was a regional sales manager for Wyman-Gordon Co. and the owner of William Jaegle Assoc., an aerospace industry sales agency.

Carroll E. Burtner '47 died March 1, 2001, at his home in Lake of the Woods, Va. His wife, Susan (Burns), survives. He also leaves two daughters and two grandchildren from his first marriage to Patricia Jackman, which ended in divorce. Burtner held a master's degree in engineering administration from George Washington University. His career included work on Boeing Corp. fire protection projects for NASA and government service with the General Services Administration and OSHA. He belonged to Alpha Chi Lambda.

Malcolm S. Hinckley '48 of West Hartford, Conn., died April 16, 2001. Predeceased by his wife, Evelyn, he is survived by a son and a daughter. He also leaves Christine Ntare, who cared for him after Evelyn's death. Hinckley worked for the Connecticut State Highway

Department for 36 years and retired in 1983. After retirement he continued to work as a surveyor. He belonged to Phi Gamma Delta.

Russell D. Turner '48 of Pueblo West, Colo., died May 10, 2001. Survivors include his wife, Evelyn, and two daughters. Turner was retired from Miller Brewing Co. as manager of environmental and energy engineering. He belonged to Theta Chi.

Robert W. Batchelder '49 of Hampton Falls, N.H., died Jan. 26, 2001. His wife, Jeanne (Colt), survives him. Batchelder was a retired sales representative for Aetna Insurance Co., where he worked for more than 20 years.

Former track and soccer team captain **Albert R. DeLoid '49** of Carver, Mass., died June 22, 2001. He leaves his wife, Claire (Nava), two sons, two daughters and nine grandchildren. DeLoid was the retired president and owner of DeLoid Associates Inc., a construction business he operated for 40 years. He belonged to Lambda Chi Alpha, Tau Beta Pi and Skull.

Russell P. Larson '49, a life-long resident of Worcester, died June 12, 2001. His wife, Dolores V. (Pearson), died in 1996. Survivors include his former wife, Charlotte (Field) Larson, two sons, a daughter, a stepdaughter, 10 grandchildren and a great-grandchild. Larson retired from Perini International as a project manager with 15 years of service and later served as a consultant to Douglas G. Peterson Assoc. He belonged to Lambda Chi Alpha.

Charles Theodore "Ted" Layton '49 of Media, Pa., died May 20, 2001. He leaves his wife, Carol (Graham), two sons and four grandchildren. Layton was retired from Bell Atlantic Corp. (now Verizon Communications) with 36 years of service. He belonged to Theta Chi.

John H. Tomalonis '49 of North Hampton, N.H., died Nov. 15, 2000. He leaves his wife, Joanne (McCann), and four children. Tomalonis was a retired American Airlines pilot with 30 years of service.

Russell Norris '50 of Shelton, Conn., died Nov. 21, 2000. He leaves his wife, Dorothy, and one son. Norris was the retired president of Brodsky & Norris Inc., manufacturers representatives. He belonged to Sigma Phi Epsilon.

Edward J. Sydor '50 of Logansport, Ind., and Venice,



Fla., died April 11, 2002. He leaves his wife, Mildred (Nideur),

a son and a grandson, and was predeceased by a son. Sydor joined National Friction Products as vice president and general manager in 1969 and retired as president and CEO. A Presidential Founder and lifetime member of the President's Advisor Council, he and Milly established the Edward J. and Mildred P. Sydor Scholarship Fund. Sydor was a 2000 recipient of the Robert H. Goddard Alumni Award for Professional Achievement.

Lexton H. Carroll '51 of Fort Myers Beach, Fla., died Aug. 11, 2001. He leaves his wife, Jane, a son, a daughter and five grandchildren. Carroll was owner and president of Carroll Chevrolet in West Brookfield, Mass., until he retired in 1980. A 1993 recipient of the American Water Ski Educational Foundation's Award of Distinction, Carroll was appointed president for life by the American Water Ski Association (now USA Water Ski). He belonged to Alpha Tau Omega.

Arthur H. Gerald Jr. '51 of Bellevue, Wash., died April 6, 2001. He leaves his wife of four years, Alice (Messier), a son,

four stepdaughters and two stepsons. He first wife, Jean Yosuko (Matsumura), predeceased him, as did his father, Arthur H. Gerald '15, and a brother, Clyde Gerald '40. Arthur Gerald Jr. joined Boeing Co. in 1952 as a tool engineer and spent his entire career there, retiring as a manufacturing engineering manager. He belonged to Theta Chi.

W. Evans Johnson '51 of Jacksonville, Fla., died Dec. 19, 2001. He leaves his wife, Jean "Pinky" Johnson, a son, three daughters and seven grandchildren. Johnson was the retired chairman and CEO of St. Johns Chemical Corp., which he cofounded in 1971 and sold to Westvaco Corp. in 1984. He belonged to the President's Advisory Council and Sigma Phi Epsilon.

Walter F. Jaros Jr. '52 of Peabody, Mass., died Feb. 26,



2001. He is survived by his wife, Anita (Socha), and two sons.

Jaros was a retired senior engineer with Raytheon Co. He belonged to Theta Chi, Eta Kappa Nu, Tau Beta Pi, and Sigma Xi.

Norman A. Holm '55 (SIM) of Holden, Mass., died May 7, 2001, at the age of 78. He leaves his wife, Elaine (Fegreus), a son and four grandchildren. Holm was a graduate of the Colorado Engineering School of Mines. He was retired from the former Rex Chain Belt Co., where he served for 44 years as a plant and tool engineer.

David A. Koch '56 of West Bloomfield, Mich., died Sept. 20, 2001. He leaves a son, a daughter and three grandchildren. A graduate of the Chrysler Institute of Engineering, Koch was retired from DaimlerChrysler Corp. as a structural engineer.

Salvatore H. Bello '57 of Milford, N.H., died April 4, 2001. He leaves his former wife, Anne (Nobrega), a son, a daughter and three grandchildren. Bello worked for Henrix Wire and Cable as a senior product engineer for new product development. A saxophone and clarinet player, he belonged to several Worcester-area dance bands.

John H. Porter '58 of Fairfield, Conn., died June 23, 2001. Porter joined the faculty of Fairfield University's School of Engineering as an associate professor in 1994 and was later appointed director of its master's program in software engineering. A member of Alpha Tau Omega, he leaves a sister and several nieces and nephews.

Arthur E. "Bud" Legall Jr. '60 of Sunrise, Fla., died Feb. 5, 2001. He leaves his wife, Sandra, two sons and a grandson. Legall was a sales manager for Hughes Supply at the time of his death. He previously co-owned and operated Shores Supply. He belonged to Phi Kappa Theta.

Michael Errede '62 (MNS), of Middletown, Conn., died Jan. 7, 2001, at the age of 81. Predeceased by his first wife, Victoria (Veronesi), he leaves his wife, Helen (D'Apice), two daughters and a grandson. Errede was a graduate of Central Connecticut State University and the University of Connecticut. He taught at A.I. Prince Technical School in Hartford, served as assistant director of the Evening Division at E.C. Goodwin Technical School, and later was a consultant to the Connecticut Department of Education.

Richard A. Scott '62 of Sudbury, Mass., died June 1, 2001. He leaves his wife, Mary "Pat" (Puffer), and two sons. Scott earned a master's degree in electrical engineering at WPI in 1964. He served in the U.S.

Army at the Department of Defense Computer Institute and later held management positions at RCA Memory Products, Digital Equipment Co. and Home Depot.

Walter H. Holbrook '63 (SIM), 86, of Holden, Mass., died Feb. 19, 2001. His wife, Alice (Canavan), died in 1994. He is survived by a daughter, three grandchildren and two great-grandchildren. Holbrook was a graduate of the New England School of Accounting. A longtime employee of Norton Co., he retired as assistant superintendent of Plant 7 in 1979.

Michael P. Penti '64 of Billerica, Mass., died Dec. 29, 2000, of lung cancer. He leaves his wife, Jean (Sinnamon), and three sons. Penti worked as a civil engineer for New England Electric Co. until he retired due to his illness. He belonged to Phi Sigma Kappa.

George F. Kane '65 (SIM), a retired Worcester public works employee, died April 19, 2001, at UMass Memorial Medical Center-Memorial Campus. His wife, Eleanor (Moschella), survives. A graduate of the New England School of Accounting, Kane worked at Crompton & Knowles Co. for 25 years. He later served as assistant commissioner for administration in the Worcester Department of Public Works for 14 years before retiring in 1991.

Louis G. Matte Jr. '66 (M.S.) of Nashua, N.H., died May 4, 2001. His wife, Pamela (Cluff), survives. A graduate of Lowell Technological Institute (now the University of Massachusetts Lowell), Matte completed a year of postgraduate study at MIT. He was retired from Rockwell International, where he worked as an electrical engineer.

Guenther T. Pollnow '66 of Jensen Beach, Fla., died Dec. 1, 2000. He leaves two sons, two daughters, a granddaughter, and his former wife, Linda DeVeer. Pollnow was a project financial analyst with Pratt & Whitney for 32 years. A member of Lambda Chi Alpha, he served as pledge trainer in his junior and senior years at WPI.

E. Andrew Harvie '69 (SIM) of Grafton, Mass., died June 30, 2001, at age 80. Predeceased by his first wife, Marion (Lincoln), in 1991, he leaves his wife, Jean (Gillespie) Peterson Harvie, a daughter, a son, 15 grandchildren and 10 great-grandchildren. Harvie worked for Bay State Abrasives for 44 years and retired in 1985 as assistant to the vice president of research and engineering.

Richard P. Ludorf '74 died unexpectedly at his home in Southington, Conn., on Nov. 13, 2000. He is survived by his wife, Carmen (McElveen), and two daughters. Ludorf held a master's degree in electrical engineering from RPI and an MBA from the University of Connecticut. He worked for Northeast Utilities Service Co. for 21 years and belonged to Alpha Chi Rho and Sigma Xi.

Oscar O. Westerback '74 (SIM) of Worcester died Oct. 25, 2000, at the age of 79. He leaves his wife, Madeleine (Brodeur), two daughters and two grandchildren. Westerback worked for New England High Carbon Wire Co. and retired as a supervisor in 1980.

Richard H. Morrissey '75 of Framingham, Mass., died May 22, 2001. A 1978 graduate of Suffolk University Law School, he served as a public defender for Middlesex County from 1980 to 1981. He then worked for Verizon Telecommunications Corp. and its predecessors. Morrissey is remembered as an expert on the history of comics. He leaves an aunt and a close friend, Patricia Floss of Brookline.

Michael J. Rocheleau '75 of Lincoln Shire, Ill., died unexpectedly of natural causes on July 10, 2001. He leaves his parents, a brother, a sister, and nieces and nephews.



Rocheleau was mechanical engineer who worked in the hospital equipment industry for many years.

Roy Howard Smith '76 of Holliston, Mass., died March 1, 2001. He was a computer network administrator for United Parcel Service. He is survived by his mother.

Robert P. Flynn '78 of West Hartford, Conn., died Feb. 2, 2001. He leaves his wife, Ann (Murphy), a son and a daughter. Flynn held an MBA from Babson College. A longtime manufacturers' sales representative, he later founded Bob Flynn Assoc. He belonged to Alpha Tau Omega.

Samuel N. Apostola '82 (SIM) of Southbridge, Mass., died May 28, 2002, at the age of 76. He leaves his wife, Genevieve (Soter), a son, a daughter, and five grandchildren. Apostola retired from Hyde Manufacturing in 1989 as manager of quality control. He previously worked for American Optical Co. and, along with his brother, owned and operated Apostola Brothers General Store for 25 years.

Edward J. Jeffrey Sr. '84 (SIM), 59, of Bolton, Mass., died March 28, 2001. He leaves his wife, Jean (Silvester), a son and a daughter. Jeffrey was a purchasing manager for Get Plastic.com. He previously worked for Coz Plastic.

Michael J. Toomey Sr. '84 of Dudley, Mass., died Oct 3, 2000, at age 59. He leaves his wife, Wanda (Turstig), two sons, three daughters and six grandchildren. Toomey was president and CEO of Flagship Bank and Trust Co. A graduate of Clark University and the Graduate School of Commercial Lending at the University of Oklahoma, he earned a certificate in plant engineering from WPI.

Richard W. Masterson '85 (SIM) of Worcester died April 27, 2001, at the age of 65. He leaves his wife, Nancy (Barbour), a son, a daughter, and one grandchild. A graduate of Quinsigamond Community College, Masterson worked for Bay State Abrasives and the Worcester County Courthouse.

Robert D. Pare '86 of Phoenix, Ariz., died May 25, 2001, after a long illness. He worked for Itek Corp. Surviving family members include his parents, two sisters and a brother.

Michael J. Carroll '89 died May 8, 2001, at his home in Westerly, R.I. He leaves his parents, a brother and a sister. Carroll was an engineering specialist in the propulsion department of Electric Boat Division of General Dynamics Corp. He belonged to Pi Tau Sigma.

Karen Sears George '89 of Somerville, Mass., died March 28, 2001, after a courageous battle with breast cancer. Wife of Robert Reed George II '89 and sister of Wendy Sears Hall '91, she also leaves a son, her father and another sister. George earned an MBA from the Amos Tuck School at Dartmouth College and joined Bain & Co. in 1995. She left in 1998 to pursue full-time motherhood, and later resumed her career as an independent business consultant and co-founder of an Internet startup.



Meditation Area Dedicated

About 75 friends of **Adam El-Khishin '99** gathered on campus recently to honor his memory at the dedication of the Adam El-Khishin Meditation Area. This secluded, peaceful area, with its stone benches, natural rock birdbath and plantings, is located adjacent to the Campus Center and is accessible from the footpath at the rear of the building.

Adam, an Australian native, was a first-year medical student at Washington University in St. Louis when he was killed in an automobile accident in January 2000. His grandmother, Ruth Smith (above, center), traveled from Australia to attend the dedication ceremony and to visit the school and city where Adam had lived for four years. Accompanying her were Adam's cousins, Mona El-Khishin (left) and Bernadette Cahill, both of London.

The dedication ceremony included personal expressions by President Parrish, Vice President for Student Affairs Bernie Brown, International Students Advisor Tom Thomsen, Pallavi Singh '01, Anne McPartland Dodd '75 (representing Skull), and Asima Silva '01 and Zareen Mushtaque '00 (representing the WPI Student Muslim Association). Adam's cousins unveiled the memorial plaque, which reads:

ADAM EL-KHISHIN '99
1979-2000
SCHOLAR, LEADER, FRIEND
HE LIVED AS HE BELIEVED

In the Public Eye

Norton Bonaparte '75 was profiled in the **Philadelphia Tribune** in an article that was reprinted in the January/February 2002 issue of **PM** (Public Management), the journal of the International City/County Management Association. He is business administrator for the city of Camden, N.J. . . . **Stefan Hagopian '82**, D.O., was interviewed for **Alternative Therapies'** Nov/Dec 2001 issue. He studied with Jon Kabat-Zinn at the Stress Reduction and Relaxation Program of the University of Massachusetts Medical Center and graduated from the University of New England College of Osteopathic Medicine . . .

Nancy Pimental '87's movie **The Sweetest Thing** opened in theaters in April . . . **Mary (Sexton) Winslow '89** and her husband, Hal, were top bidders on a weekend in Worcester offered during the **WGBH** annual auction. Their package included accommodations at the Beechwood Hotel, dinner at The Flying Rhino on Shrewsbury Street, and admission to several of Wornatown's cultural attractions . . . **Capt. Mike Andretta '96** was featured in an article on the Marine Corps' Mountain Warfare Training Center that appeared in **Outside** magazine. He is the officer in charge of the Instructor Qualification Course, which pits would-be instructors against extreme conditions in California's Sierra Nevada . . . **Myles Walton '97** and his wife, Annalisa Weigel, may have made history at MIT as the first married couple to defend their dissertations on the same day. The May 8, 2002 issue of **MIT Tech Talk** described their intradepartmental courtship and their doctoral research—his in aeronautics and astronautics, and hers in technology, management and policy.

(Continued from page 4)

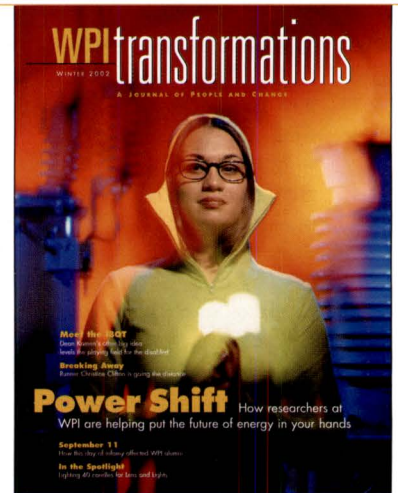
To the Editor:

Never was the timing so right as now for WPI to declare and expand on its commitment to a better future for its students, and for the world they will help create. In my opinion, we are on the doorstep of a world about to be literally transformed from what we now know and the way we now live.

Your new journal, *Transformations*, speaks of a WPI that is fully aware of this transformation and ready to help lead the way in education and production. I could not have been more pleased with the message you wove into the fabric of your inaugural issue. Nor could I have been more delighted with the tone and with the force of its intelligence.

I have always loved WPI, and now you know why. You surround me with wonderful people.

Charles M. Zettek
Planning Consultant



To the Editor:

I have a couple of issues to raise relative to the articles in the Winter 2002 issue about automobile propulsion ("Thinking Small").

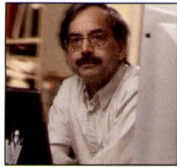
One, the article made no mention that MTBE [an oxygenate added to some gasolines] is a recognized carcinogen, and that it is turning up in the ground water in California. In fact, the state is so concerned that they are phasing it out as an auto fuel additive.

Two, everybody is talking about the fuel cell nirvana, but I have yet to see anywhere the source of all the hydrogen that is assumed to be the utterly pollution-free fuel. How is all this hydrogen to be produced, and what will be the environmental implications of its production? Will it be like ethanol, which consumes more energy in its production than it contains when they get through making it?

And three, if gasoline is to be the fuel of choice for fuel cells, what will happen to all the other goodies after the hydrogen is extracted? I thought one of the virtues of the fuel cell was that it would reduce our dependence on Middle Eastern oil. This doesn't look like the way to accomplish that.

L. C. Brautigam '49
Kensington, Conn.

Ravindra Datta, head of WPI's Chemical Engineering Department and director of its Fuel Cell Center, responds:



I'd like to address Mr. Brautigam's second two points. The source of the hydrogen for fuel cells would depend on the application. For home and stationary applications, it would most likely be natural gas; for automobiles, it would probably be gasoline or similar hydrocarbons. Renewable fuels, such as ethanol, might also be used. There is considerable controversy on the net energy balance in the production of anhydrous ethanol (which involves the removal of 90 percent of the water by volume via distillation of fermentation broths). However, fuel cells can use ethanol from which only 40 to 50 percent of the water has been removed, resulting in an energy savings.

Although the reforming processes that produce hydrogen from other fuels will undoubtedly generate some pollutants, including carbon monoxide and carbon dioxide (a greenhouse gas), fuel cells are about twice as efficient as internal combustion engines. They will, therefore, use less petroleum, extending the fossil fuel reserves, and produce dramatically lower levels of pollutants. However, the best long-term solution may be to use renewable fuels or produce hydrogen directly from water and sunlight, using solar cells or biocatalysts.

To the Editor:

I don't wish to disparage the many accomplishments of Robert Stempel '65, former chairman of General Motors ("Recharged," Winter 2002). However, crediting him with the invention of the catalytic converter deserves further investigation.

In 1953 and 1954, I was chief engineer and plant manager of Oxycatalyst Inc. in Wayne, Pa. This company was the brainchild of Eugene Houdry, a French chemical engineer who was a major contributor to the catalytic cracking of gasoline to improve yield and octane rating of motor fuels. Houdry came to the United States in the late 1930s, sponsored by Sun Oil and Standard Oil of New Jersey. Together, they revolutionized gasoline refining processes.

Following World War II, in the late 1940s, Houdry turned to the problem of automobile exhaust, founding Oxycatalyst to conduct research and development and manufacturing of his concepts. When I worked there in 1953, Oxycatalyst had developed a practical and effective catalytic converter using finely divided platinum deposited on a ceramic base—essentially the structure of most catalytic converters in use today. Unfortunately for Oxycatalyst, these required the use of unleaded gasoline or LPG to avoid poisoning the catalyst.

Oxycatalyst made a poor business decision that ended the company. Houdry believed that a successful converter would have to handle leaded fuel, because the world would not give up cheap high-octane gasoline. Most of our research efforts were directed to developing a catalyst that would not be poisoned by lead, and could be made from metals less costly than platinum. In almost 50 years, these goals have not been achieved and the catalytic converter today is quite similar, in all respects, to the unit of 1953.

Eventually, in the 1960s, Oxycatalyst sold its extensive patent rights to the auto manufacturers, including General Motors, who were under increasing government pressure to reduce air pollution.

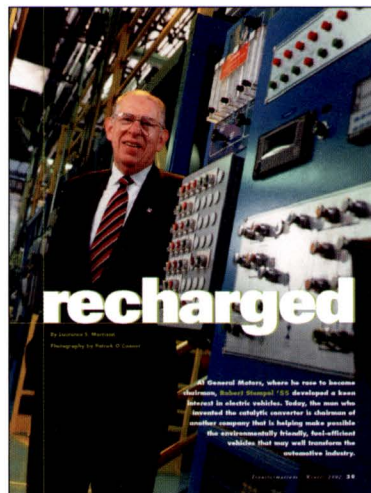
Despite his lack of commercial success, Eugene Houdry should be credited with the creation and reduction to practice of the catalytic converter. The patent record should show this. His was another sad example of a good idea born before its time. Please help to set the record straight.

Nicholas M. Peitzel '79 (M.S.)

Boylston, Mass.

Robert Stempel responds:

Mr. Peitzel is quite correct. There was considerable work done on catalysts before they were successfully introduced on vehicles to control exhaust emissions. The team at General Motors looked closely at catalysts used in the chemical and petroleum refinery processes, as well as at the work of Houdry. We did work with the refiners to get the lead out of gasoline starting in 1971, knowing that lead would render



the catalysts inoperative, as shown by Houdry and others. Many other things had to change, including the special stainless steel to contain the catalyst, the exhaust flow over and through the catalyst for maximum exhaust cleanup, and so on.

Catalytic converters were invented long before the GM team developed the multidimensional solution that allowed the device to be used in the harsh automotive environment

to reduce exhaust emissions over the life of the car. With hundreds of millions of catalytic converters in use since 1975, millions of tons of hydrocarbons and carbon monoxide have been eliminated from the atmosphere, along with the virtual elimination of airborne lead particulates.

Mr. Peitzel also notes that lead additives made low-cost, high-octane fuel possible (an invention of the GM Research Labs that led to the formation of the Ethyl Corporation). Thanks to continuing inventiveness, low-cost, high-octane lead-free fuel is available today, permitting the higher compression ratios found on many of today's low-emission, low-fuel-consumption vehicles.

Alumni Help WPI Build Its History

By Amy L. Marr '96

It's been said that one man's trash is another man's treasure. That's a saying that Rodney Obien can relate to. As WPI's archivist and special collections librarian, Obien spends much of his time collecting treasures from WPI's history. Many of those treasures once resided—one step from the trash—in the attics, garages and closets of WPI alumni.

"archives is a place for people to make a tangible connection with WPI's rich past."

Each year, hundreds of alumni, students and other visitors make that connection, some to do serious research, others just to browse. The archives is also popular with genealogists and others seeking family roots. "Sometimes a yearbook photo is all that exists as a visual record of someone during early adulthood," Obien says. "Helping people find information about their families always makes me feel quite satisfied about what I do."

In addition to cataloging his newfound treasures, Obien spends a considerable amount of time developing new and creative ways to make them accessible. Recent ideas have included displays around the library and setting aside a small room to showcase items that open a window into student life through the years, including yearbooks, issues of the student newspaper, beanies, mugs, signs and T-shirts.

When students visit the archives, Obien likes to show them the library's extensive collection of course catalogs on display, dating back to WPI's days as the Worcester Free Institute. Many of these were donated to the archives by alumni who kept them as treasured mementos of their student days.

"Today's students seem awestruck by the fact that these still exist and that they can hold them in their hands," Obien says. "I tell them to remember that when they're inventing new things; will those new technologies stand the test of time, as these books have?"

Among the WPI artifacts that Obien most enjoys holding in his hands are the Theo Brown diaries. "Brown, a member of the Class of 1901, eventually became the chief engineer for John Deere," he says. "The diaries, which date from 1893 to 1971, contain a fascinating collection of writings, news clippings and drawings that document the life of one of WPI's most distinguished graduates."

Theo Brown's diaries were donated to WPI by his daughter. Were it not for gifts like hers, Obien says, the archives would have far fewer stories to tell about WPI, its history and its people. "The generous gifts of alumni and their families

have added immeasurably to our collections," he says. "I'd ask readers to keep that in mind the next time they're cleaning the cobwebs out of their attics. You never know what kinds of WPI treasures might be lurking there."

—Marr, manager of Web development at WPI, earned a bachelor's degree in technical communications and a master's in marketing at the university.



Patrick O'Connor

A sampling of Gordon Library's extensive collection of artifacts from WPI history, many donated by alumni. Recent contributors include Al Papianou '57 (class memorabilia and antique WPI postcards) and the families of Ed Bayon '31 (photo album and Skull memorabilia) and Joseph Kapinos '33 (classic WPI ruler and T-square, old yearbooks and textbooks).

Each year, Obien says, through the thoughtfulness and generosity of living alumni and the families of deceased alumni, WPI's story grows richer and more complete. In addition to receiving donations in the archives' home in Gordon Library, he says he has visited homes of alumni and their families to accept gifts of artifacts that once held a special place in the memories of graduates.

Items that make their way to the WPI Archives are not simply relegated to boxes in some dusty corner. As Obien puts it, the

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illuminating a Tragedy

When the World Trade Center towers fell on Sept. 11, 2001, they left gaps in the New York skyline—and in the hearts of millions around the world. Six months after the terrorist attacks, two towers of light rose from a spot just north of Ground Zero. Illuminated for a month, this "Tribute in Light" honored the victims of the attacks and served as symbols of hope for the future. Not long after the lights were extinguished, a team of experts appeared before the U.S. House Committee on Science to present the results of a study of the towers' collapse. An article on WPI's involvement in that study begins on page 16.

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