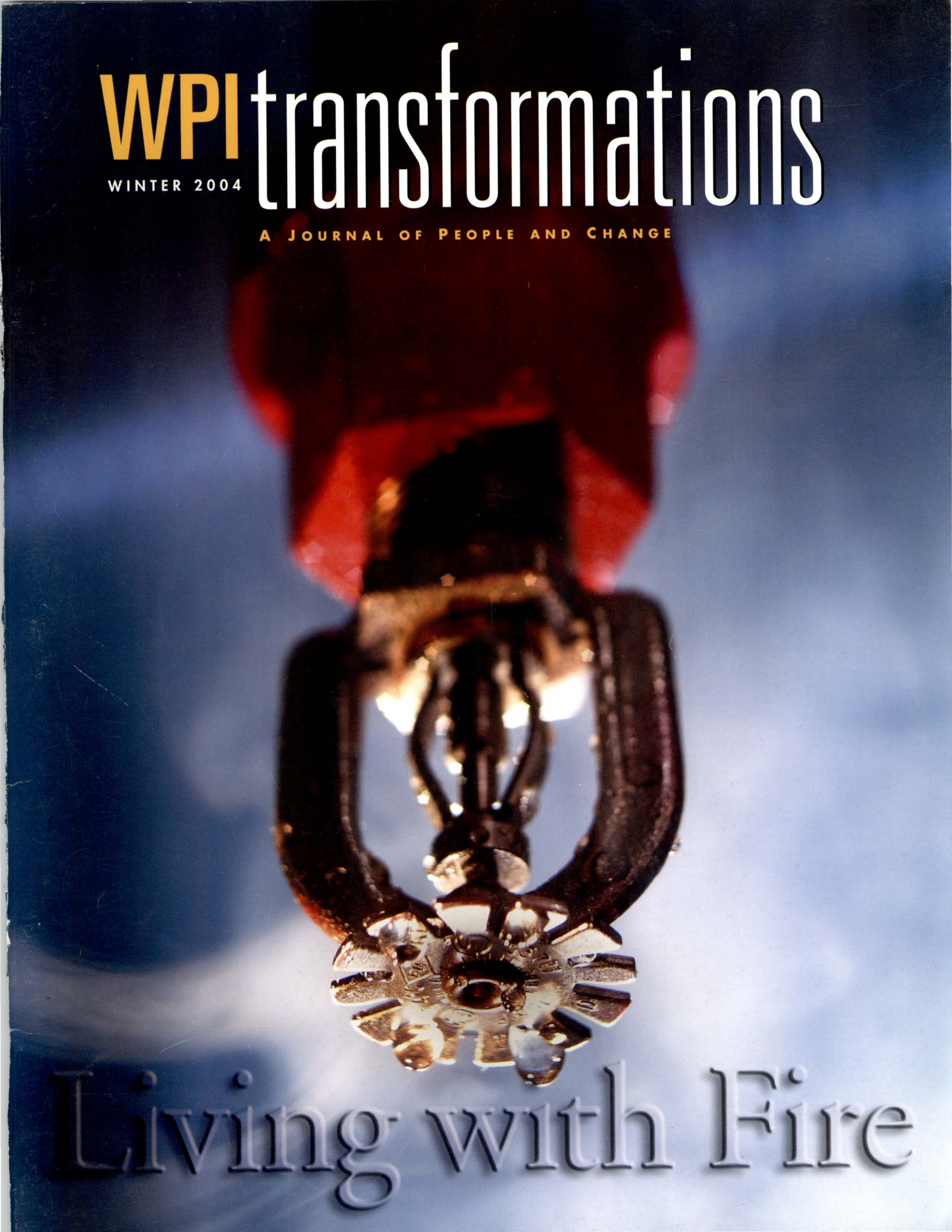
WPI transformations
WINTER 2004
A JOURNAL OF PEOPLE AND CHANGE



Living with Fire

Departments

Features

Zoom In...

From station house to subway station, Paul Donga's work as fire protection supervisor with the Boston Fire Department takes him above and below ground. *Photo by Patrick O'Connor*

On the Cover

Sprinkler head courtesy of Cogswell Sprinkler Co. *Photo by Patrick O'Connor*

WPI transformations

A Journal of People and Change

VOLUME 103, NUMBER 4, WINTER 2004

Starting Point

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WPI transformations

A Journal of People and Change

"I have made fire! Look what I have created!"

—Tom Hanks as Chuck Noland, island-marooned plane crash survivor in the film *Cast Away*

To early humans, fire meant survival. But fire evolved from friend to foe when it threatened our homes and cities, crops and forests. There were rudimentary tools for fighting fires, but water was—and still is—the best fire suppressant. That's why household fire buckets (like the one shown on the back cover) were required by law in colonial America.

The 19th century brought significant improvements in fire protection and suppression. Volunteer fire corps transitioned into paid crews. Steam engines raced to fires under hooved horsepower. The first working fire hydrant was installed in New York City. Most significantly, a patent was issued in 1852 for the first sprinkler system.

In the interim, fires in America raged on. The Great Chicago Fire of 1871 destroyed 17,000 buildings; the following year, a square mile of Boston's business district was leveled. The 1911 Triangle Shirtwaist fire spread so quickly that within 30 minutes, 150 people had either died in the flames or jumped to their death.

Out of such tragedies came change. For instance, the 1942 Cocoanut Grove nightclub fire in Boston, in which 492 people died, led to improvements in the enforcement of fire safety laws and ordinances, including requirements that public places have sufficient exits and that exit doors swing in the right direction.

Flash forward to the present. With multiple lifesaving fire codes, effective fire suppression equipment, and a wealth of fire protection knowledge, America *should* be well protected. Yet fires still occur, sometimes with great loss of life. Consider the 2003 fire at The Station nightclub in Warwick, R.I., in which 100 perished—many overcome by smoke or severely burned in the rush to escape a fire that raged out of control in minutes. After the blaze, discussion of sprinkler systems took center stage; you can read a similar discussion in "An Ounce of Prevention" (page 24), in which we talk with some of WPI's Fire Protection Engineering Program graduates about their work in the field of fire protection.

People pay dearly for our nation's poor record of fire prevention and control, including firefighters. In the 1999 Worcester Cold Storage warehouse fire, six firefighters perished because they couldn't find their way out of the maze-like building. We reflect on this tragedy in "Safe Exit" (page 16), which highlights the efforts of a team of ECE faculty members to develop the First Responder Locator System, designed to track the location of fire and police personnel in a building emergency.

Living safely with fire is key to fire protection engineering today. The university's 25-year-old Fire Protection Engineering Program and Center for Firesafety Studies have come a long way since they began in a small office with one professor. We look back with former director David Lucht (page 33); with new director Kathy Notarianni, we look ahead to the role WPI will play in working toward a firesafe America (page 21).

There's much more in this issue, particularly our first in-depth interview with WPI President Dennis Berkey, beginning on page 4. We hope you enjoy the issue. As always, we welcome your comments.

Amy E. Dean
Editor

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Diverse views presented in this magazine do not necessarily reflect the opinions of the editor or official WPI policies. Address correspondence to the Editor, Transformations, WPI, 100 Institute Road, Worcester, MA 01609-2280. Phone: 508-831-6037; Fax: 508-831-5604.

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WPI The University of Science and Technology. And Life.

Letters

Not Game for a Major

As a holder of two degrees from WPI, I have fond memories of the institution and felt that, above all, it had a strong commitment to pure academics and fundamentals. I was dismayed to learn of a plan to create a new major for the development of video games ("Game Plan," Summer 2004). I think the answer to the question of creating this new major is right in the article itself. Toward the end it profiles some alumni who later went into the game industry. They credit skills in fundamentals—namely, studying programming and projects experience—for helping them in their current jobs.

I feel the world is too broad for universities to pick a few specific applications of technology and create majors for them. Why not have a major in cell phones, DVD players, or motorcycle design? I strongly believe a good preparation, by studying fundamentals, teamwork, and basic problem solving, is a student's best bet.

I don't think it would be a bad idea to have a research area in game design. Students could do projects and steer their degree in this direction. It would be the same if an electrical engineering major decided he liked analog design and steered his courses in that direction. But, he would still be an EE at the end of the day.

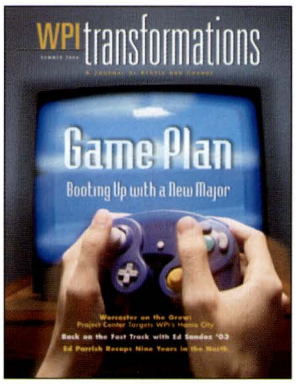
My gut impression is that this is a novel way to make more money for WPI, and I see it as selling out. You can't have your cake and eat it, too. If you want to remain a well-respected institution committed to higher learning, you can't create whimsical degrees just to attract more students.

Jason Byrne '92 (B.S., EE), '94 (M.S., EE)
Boulder, Colo.

Life Issues

I was very disappointed with your recent piece on Vicki Cowart '75 ("A Few Words…" Summer 2004), president and CEO of Planned Parenthood of the Rocky Mountains (PPRM), because

1. WPI devotes so much energy to improvement of life in the community and is so effective in making that orientation a part of the WPI experience that featuring an individual who is the leader of an organization that appears to be, at best, indifferent or, at worst, hostile toward human life is inconsistent with WPI values.
2. At this point in our history, we are involved militarily in defending the lives of the innocent and vulnerable. Why are the lives of our most innocent and vulnerable not defended as well?
3. Ms. Cowart seems to try to downplay the significance of abortion in PPRM's activities. Unfortunately, the infinite value of one human life cannot be offset, especially since most of the other activities are directed against the creation of human life.



It was a pleasant contrast to read the story of Karen Kosinski '02 ("…and life") and her dedication to helping the disadvantaged. A respect for all human life, born or unborn, is our only footing to building world peace. Until we commit ourselves as a society to respecting and protecting human life, we are destined to remain in conflict.

Bob Smialek '70 (B.S., MG)
Galena, Ill.

As we go to press . . .

The WPI faculty approved a proposal to create a new undergraduate major in Interactive Media and Game Development. The interdisciplinary major, which was the subject of the cover story in the Summer 2004 issue of *Transformations*, requires course- and project work in computer science and the humanities and arts. For more information, go to http://www.wpi.edu/+IMGD.

Correction

In the "Campus Buzz" section of the Summer 2004 issue, in the article entitled "Jupiter Aligns with Mars: Former BU Provost Is WPI's 15th President," we incorrectly reported the number of years WPI President Dennis Berkey served as Boston University's Dean of Arts and Sciences. He was dean for a total of 15 years.

Write to us

We welcome your letters. Please include your full name, year of graduation, and current address. The editor reserves the right to determine the suitability of letters for publication and to edit them for accuracy and length. We regret that not all letters can be published.

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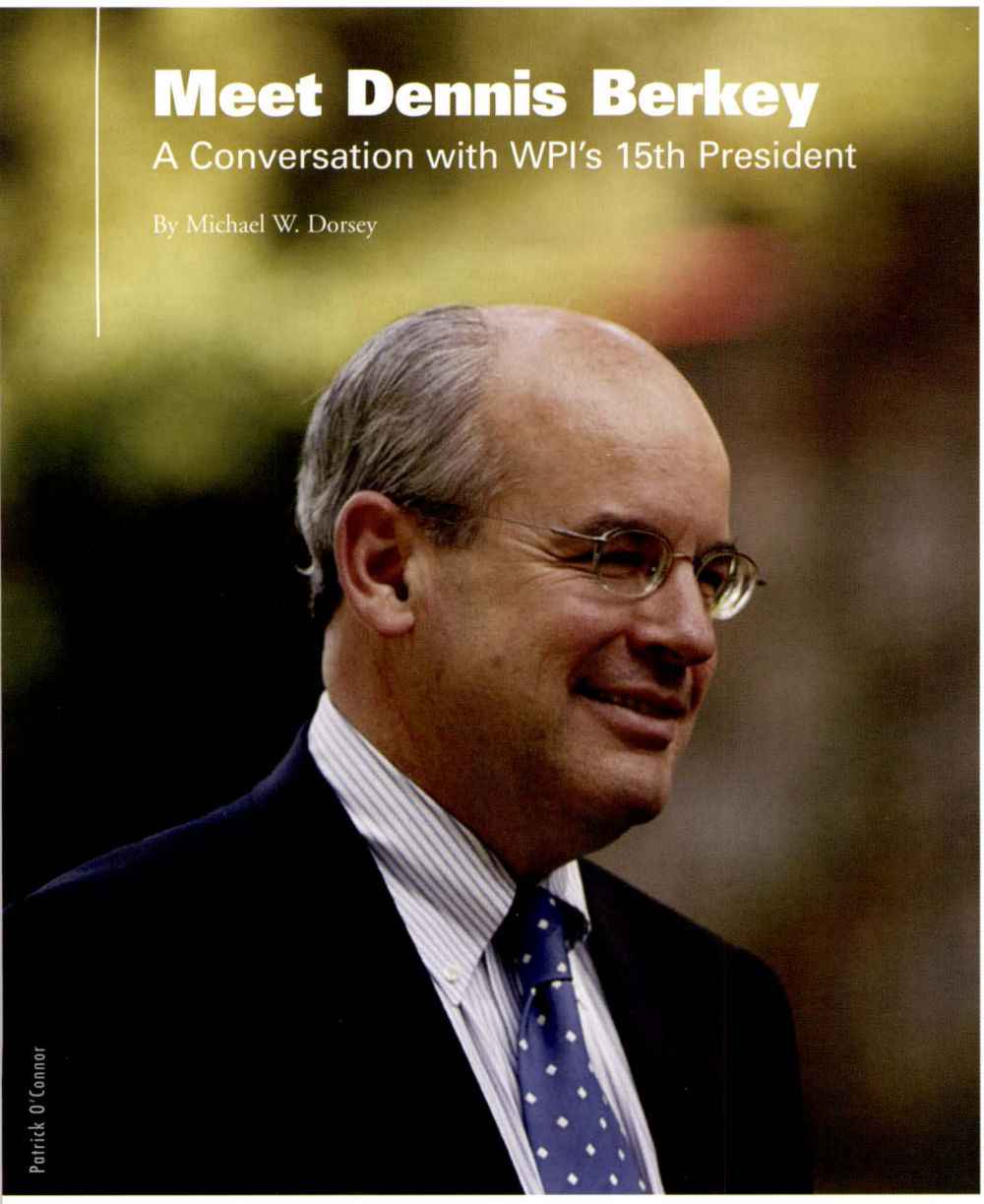
Meet Dennis Berkey

A Conversation with WPI's 15th President

By Michael W. Dorsey



Patrick O'Connor

Arriving on July 1 for his first official day as WPI's chief executive, Dennis Berkey was greeted by a large welcoming committee of staff from Boynton Hall. He quickly settled into the role of host, escorting group after group into the office that presidents have occupied since the university opened its doors in 1868. He took special pride in showing off the room's newest feature: a fireplace that lay hidden for years behind the wallboard on the office's west wall. (He'd discovered it after spotting a chimney rising above the building's granite facade.)

During the first six months of his administration, Berkey has challenged WPI to take a similarly close look at itself, searching for the deeper truths and fresh ideas that may lie behind the facade of preconceived notions and old habits. Drawing on his more than three decades of experience in higher education, he has called on the faculty, staff, students, and alumni to question their assumptions about everything—from how the university does business to how it educates students.

In an address at the year's first faculty meeting in September, Berkey noted that "the vision that has served the university so well for the past 30 years does seem ripe for some degree of reconsideration as we contemplate WPI's future." To set that reconsideration formally in motion, he has established seven commissions that will tackle the following subjects: general education and the first-year experience; the fine and liberal arts and the Sufficiency project; the Interactive Qualifying Project and the global programs; research and graduate education; faculty workloads; WPI's ideal size and the distribution of enrollments between undergraduate and graduate programs, and among majors; and WPI's national rankings.

In explaining the goal of these commissions, Berkey has made clear that his purpose is not to remake WPI, but to enhance and build on the strengths that drew him to the university. In a message to the WPI community on July 1, he said that those strengths include WPI's longstanding emphasis on theory and practice, realized today in the WPI Plan, which produces "graduates well prepared for important work, for leadership, and for fulfilling lives."

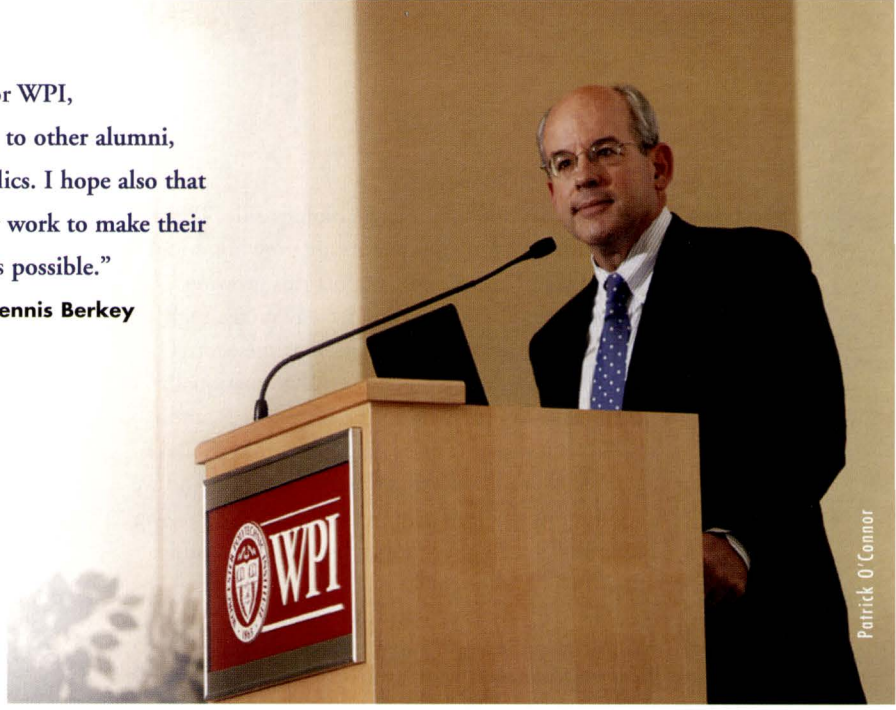
Before joining WPI, Berkey spent 30 years at Boston University, where he served as a faculty member in mathematics, Chairman of the Mathematics Department, Dean of Arts and Sciences, and University Provost. He says the primary lesson he learned at BU that he will apply as WPI's president is that "academic leadership requires both a sense of the potential and a way to go about realizing it—as well as a willingness to encourage dialogue and debate, to listen, and to build on the ideas, passions, and abilities that reveal themselves in these interactions. Success is generally achieved by institutions over sustained periods of time, rather than by individuals."

Berkey's wife, Catherine, is a lecturer at the Harvard Medical School and a research associate in medicine at Brigham and Women's Hospital. The Berkeys have three children.

This fall, *Transformations* caught up with Dr. Berkey to ask him about education as well as his impressions of WPI and his thoughts about its future.

"I ask that alumni be active and engaged ambassadors for WPI, helping identify prospective students, reconnecting WPI to other alumni, and generally promoting the university to all of our publics. I hope also that alumni will be loyal critics and active participants in our work to make their continuing association with WPI as satisfying to them as possible."

—WPI President Dennis Berkey



Patrick O'Connor

What do you think a college education should deliver to students?

As well as preparing a student rather deeply within a particular field or two, an undergraduate education should engage the student with a variety of modes of thought, styles of learning, and general areas of knowledge. A historian or an archaeologist may look at the world in an entirely different way than an economist or a physicist. Religion itself accounts for widely varying beliefs about the world. It's part of the "And Life" component of an education to gain some sense of this diversity of thought, which plays itself out in nearly every aspect of global dynamics.

An undergraduate education should also provide opportunities for students to engage fully in good habits of social and civic responsibility, and simply engage with the world to significant degrees. WPI's programs in public service, and especially the project work in needy communities, are excellent examples of how this happens in our community. I tell students that their WPI experience is part of the real world, not just preparation for it.

WPI often refers to itself as a technological university. Does this description fit your vision of the university?

That may remain our best descriptor, but regardless of the label, I think we must make the case that an education centered on science and technology, if enriched and balanced by the other important areas of learning, is an excellent platform from which to proceed in many directions. These include graduate and professional school, working in a broad range of organizations, and more generally finding fulfillment in life. The notion that WPI prepares students primarily for work in engineering and technical fields sells short the quality and potential of a WPI education. WPI prepares students for leadership and for personal fulfillment, as well as for achievement.

You've asked the faculty to consider a revision to the Sufficiency, WPI's required humanities and arts project, perhaps by replacing it with an interdisciplinary first-year core curriculum. How do you think the educational outcome of a core curriculum would differ from those of the Sufficiency?

I would like us to engage students, particularly the freshmen, more broadly in the humanities, the arts, and the social sciences. Team-taught, interdisciplinary courses can be as much fun for the faculty who design and teach them as for the students who benefit from the shared intellectual experience. Big ideas and great achievements, as well as mankind's struggles and failures, can be the stuff of exciting and challenging courses. I do not have a set notion of what should be done on this, and I do not want to eliminate the students' ability to select a certain number of courses according to their interests, but I think we can do more at the outset to position and enable our students to get the most out of their undergraduate experience.

Are there other academic and research areas at WPI that you would like to see further developed?

Yes, I believe WPI should continue to develop its programs in the life sciences. Over the last decade we've seen the growing contributions of engineering thinking and engineering technology to advances in medical science, therapeutics, and medical devices. We want to continue to support these contributions. This has particular relevance to the future of the WPI Bioengineering Institute and Gateway Research Park at WPI, a science-based development that offers opportunities to both enhance our research facilities in engineering and science and stimulate economic development by advancing the medical device industry.

WPI also has well-developed areas of strength in engineering and science, and we don't want to neglect those. Programs like the Metal Processing Institute are doing important work for whole industries. With new leadership, our Fire Protection Engineering Program is poised to develop its research component in an ambitious way that will redound to the benefit of society as well as to the university. Our mathematics program has had great success with its pipeline programs that reach out to elementary and secondary students and their teachers to help increase the number of students who are well prepared to study math and science at the college level. This work is important for the nation, and we will continue to support it.

What strengths does WPI currently have in the life sciences, and what areas does it need to develop?

We have a strong biomedical engineering department, but it's small. There's good strength on the electrical engineering side, the traditional root of biomedical engineering programs,

but we need more development on the biology side. There is strong student interest, and enrollments are growing, so we need more faculty and facilities to support this growing enrollment base. Chemistry is finding its way increasingly into the role it has always claimed for itself as the central science, but now it is contributing powerfully—nationally and internationally—to advances in the life sciences, and I think that will be important for us going forward. We have strong new leadership in biology and biotechnology. And we are doing exciting work in imaging, including neuroimaging [the application of imaging technology in understanding the brain and its functioning].

Programs like neuroimaging are interdisciplinary in nature. You've indicated that interdisciplinary research is one of WPI's strengths. Why do you think WPI has had more success than most universities in getting faculty to cooperate across disciplines?

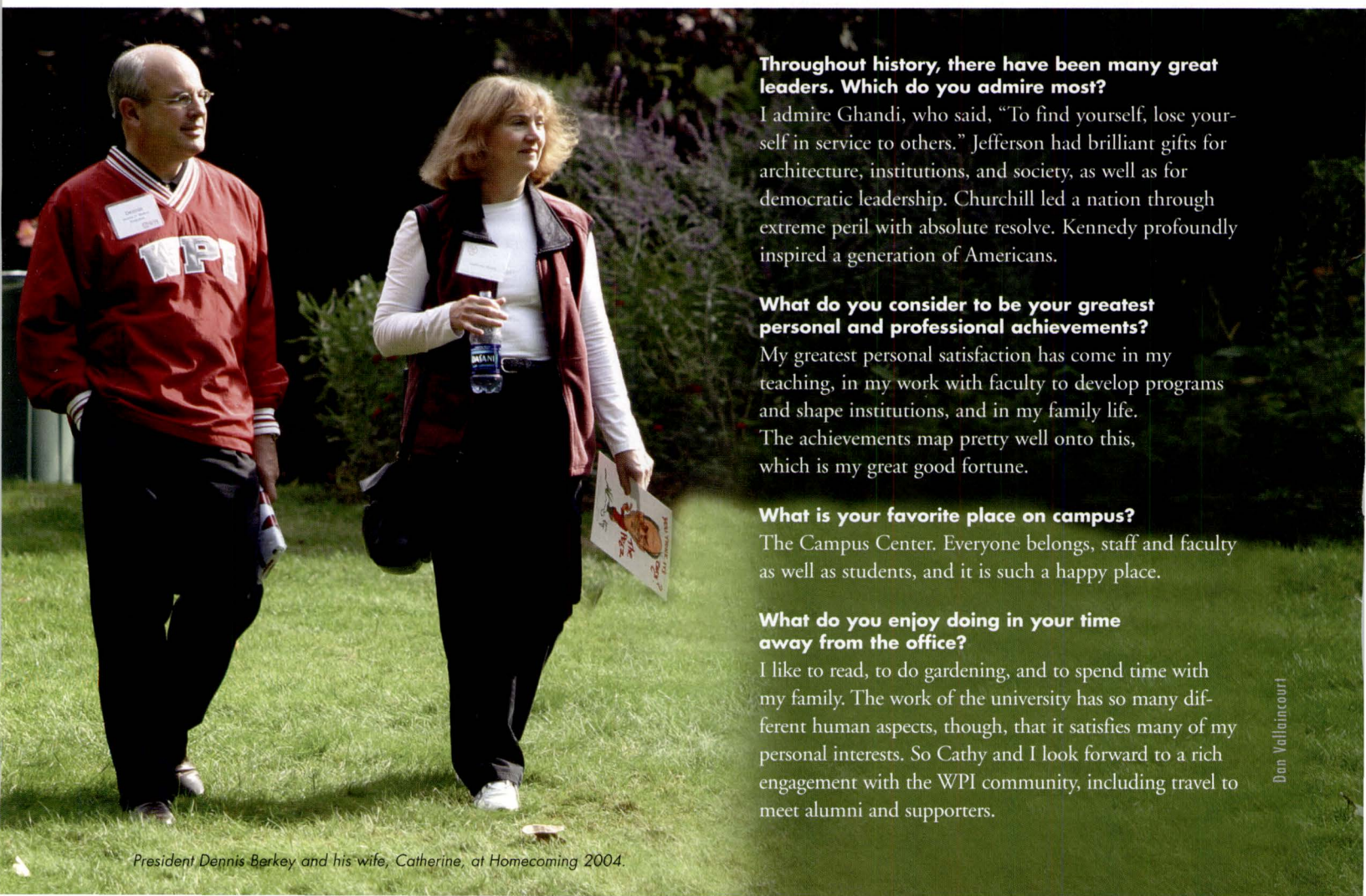
Because of our relatively intimate scale, the barriers that typically exist between departments and schools at larger universities just are not here to any significant degree. WPI's first R01 grant from the National Institutes of Health was received by our Mathematical Sciences Department, rather than one of our life sciences departments, a reflection of the high degree of collaboration between Professor Dalin Tang, the principal investigator, and his colleagues in the life sciences. That kind of thing is much easier at a place of this scale.

Are there educational benefits that will come from strengthening the links between the life sciences and engineering at WPI?

Yes, because these areas are increasingly of interest to students. It's also the case that we can succeed in marketing WPI to pre-professional students in the health-related professions more than we have. All of this contributes to a nicely complex set of opportunities in the life sciences.

How would you characterize the role of research at WPI?

It's especially important to continue the WPI tradition of focusing on what's important to do in research, not just what's interesting. The practical side of WPI is that its productivity really makes a difference in the world and I hope that continues to characterize our research programs. We can't do everything in research. We have to focus on a number of areas in which we can be very good. That will be part of elevating the stature of WPI, because we'll not only be doing very good things for the



President Dennis Berkey and his wife, Catherine, at Homecoming 2004.

Throughout history, there have been many great leaders. Which do you admire most?

I admire Ghandi, who said, "To find yourself, lose yourself in service to others." Jefferson had brilliant gifts for architecture, institutions, and society, as well as for democratic leadership. Churchill led a nation through extreme peril with absolute resolve. Kennedy profoundly inspired a generation of Americans.

What do you consider to be your greatest personal and professional achievements?

My greatest personal satisfaction has come in my teaching, in my work with faculty to develop programs and shape institutions, and in my family life. The achievements map pretty well onto this, which is my great good fortune.

What is your favorite place on campus?

The Campus Center. Everyone belongs, staff and faculty as well as students, and it is such a happy place.

What do you enjoy doing in your time away from the office?

I like to read, to do gardening, and to spend time with my family. The work of the university has so many different human aspects, though, that it satisfies many of my personal interests. So Cathy and I look forward to a rich engagement with the WPI community, including travel to meet alumni and supporters.

Dan Vallaincourt

students we educate, but we'll be doing very good things for society and the economy, and that's the larger role we want to play.

Indeed, WPI has been struggling for many years to elevate its stature and broaden its reputation. Is this a worthwhile effort?

Yes. We must press hard on the important work of expanding our reputation. There are many areas of excellence in our faculty's research and important programs outside of science and engineering, such as those in management, that need to be better understood by the public. As I have already noted, the more general value of a science-based undergraduate education is something we must promote vigorously. As we seek to expand our reputation, it will be important to have substantial achievement to talk about, but it will be equally important to get the word out so people can understand what it means and why it's important.

In 2001 you led the visiting team from the New England Association of Schools and Colleges [NEASC] that evaluated WPI for reaccreditation. One area of concern the team identified was WPI's incomplete success in achieving a diverse student body and faculty. How important a priority will diversity be for your administration?

Diversity in the staff and faculty ranks, as well as in the student body, will remain an important goal of this administration. But we must realize that the pool of students applying to technological universities nationally is quite limited, and that within that pool the minority applicants comprise an even more limited number. They are in great demand by the finest universities. The NEASC team was concerned about whether the goals in WPI's Strategic Plan are realistic in this regard. We will work as hard as possible, within the limits of our resources and the constraints I have stated, to develop a more fully representative academic community.

At BU you helped recruit a number of distinguished scholars to the faculty, including one Nobel Prize laureate. How important a role will faculty recruitment play in your efforts to help WPI broaden its academic program and raise its stature?

It is critically important, and one of the most enjoyable parts of academic administration. WPI will settle for nothing less than the very best qualified individuals in those it recruits, retains, and promotes.

You told the WPI community this fall that to put the university on a more stable financial footing, we will need to bring the student body into better balance with the size of our faculty and staff—in part by increasing enrollment. What is the greatest challenge WPI will face should it attempt to enlarge the student body?

Increasing our applicant pool. WPI attracts excellent applicants, but not too many more than we actually admit. The ability to increase enrollment, which I do believe is necessary to bring our revenues into line with our costs, will depend primarily on our ability to attract a significantly larger number of qualified applicants to our undergraduate programs.

From the first days of your presidency, you have invested a great deal of time in civic outreach. Why do you believe this is important?

It's very important that WPI continue to be regarded as a player in Worcester. That's why I've spent considerable time meeting with the mayor and the city manager, and getting involved in a number of organizations in which WPI needs to be visible and needs to be contributing leadership. Much of this has to do with the development of Gateway Park, our signal contribution to the development of Worcester. What's good for Worcester will be good for WPI. I'm encouraged that the colleges have come together with the business community and the mayor's office to form a tri-partied collaboration that will focus on how to leverage these three components to the benefit of the development of the city.

In your conversations with city officials, what do they say they are looking to WPI to contribute to the city during the next decade or so?

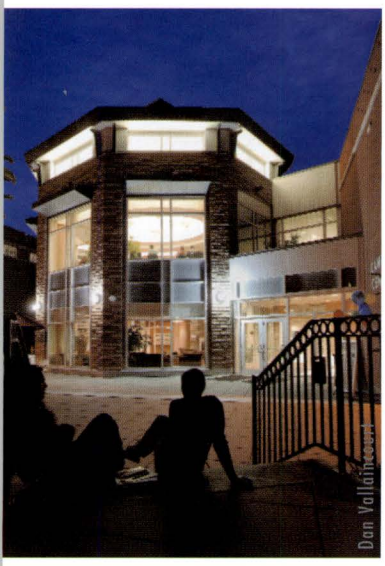
I think they are looking to us for leadership in the revitalization of the economy and the region. We think it will be life science–based industries, in large part, that will lead the next phase of the development of Worcester and Central Massachusetts, and WPI is positioned to provide key leadership.

What is the vision for Gateway Park?

Gateway Park will be a life science–based development that will draw commercial tenants to the facilities in proximity to WPI faculty and with access to the research they are doing in engineering and the life sciences. We would also like to develop housing for our graduate students. What's most important is that the whole project succeeds as a thriving, attractive, interesting component of the development of both WPI and downtown Worcester. The plan isn't complete; the vision needs to be further developed. It's important to get it right before we jump in fully, because this will be seen as a WPI project. Our partnership in this with the Worcester Business Development Corporation is an important one, and the WBDC's role in preparing the site and the opportunity has been essential, but I think WPI will be playing the leadership role going forward, as we should.

To learn more about Dr. Berkey and to read his message to the WPI community, visit www.wpi.edu/+President.

CampusBuzz



Capital Campaign Ends, Exceeding $150 Million Goal

At a dinner event on Oct. 15, WPI celebrated the successful conclusion of *The Campaign for WPI,* the largest comprehensive fund drive in the university's history. The event, held in the Campus Center (one of the most significant outcomes of the campaign), brought leadership donors and volunteers together with some of the faculty, students, and staff who benefited from their philanthropy, which totaled $153.8 million, or nearly $4 million beyond the campaign's goal.

More than 16,000 donors contributed to *The Campaign for WPI,* which ended officially on June 30. More than 11,000 alumni contributed a total of nearly $90 million, while just over $21 million was received from more than 3,800 parents, friends, faculty, and staff. Included in these totals were commitments totaling more than $34 million from WPI's current and emeritus trustees. Also, WPI received more than $27 million in cash and gifts-in-kind from over 1,000 corporations, more than $10 million from local philanthropic foundations, and more than $5 million from national foundations and other organizations.

In addition to the Campus Center, campaign funds supported a new admissions and financial aid building (construction to begin next year), new equipment and classrooms, laboratory renovations, faculty chairs, graduate fellowships, new educational innovations, and major upgrades to WPI's information and networking technology, among other programs and facilities.

In his remarks at the October event, F. William Marshall Jr., chairman of the WPI Board of Trustees, noted that the success of the campaign is attributable to the vision and hard work of the university staff and more than 1,700 volunteers. "Unlike anything WPI has done before, this campaign was powered—and empowered—by the people of WPI," he said. "Tonight it is most fitting to pay tribute to the donors and volunteers who have made WPI a stronger and more vibrant institution. Please know that your contributions of time, talent, and treasure are genuinely appreciated."

Janet Richardson Named VP of Student Affairs

Janet Begin Richardson, whose career in student affairs at WPI spans 24 years, has been named vice president for student affairs; she is the first woman to hold a vice presidential post at WPI. Richardson succeeded her mentor, Bernard H. Brown, who died in August after a 38-year WPI career (see "A Champion for Students" in the Summer 2004 issue of *Transformations*).

In her new post, Richardson is responsible for the delivery of services to more than 3,600 under-graduate and graduate students and for oversight of the offices of undergraduate admissions, enrollment management, financial aid, and student life, as well as the Career Development Center and the Department of Physical Education, Recreation, and Athletics.

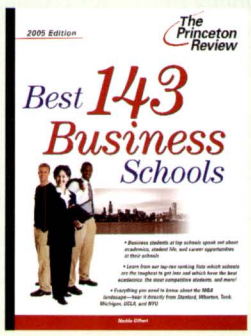
"Janet Richardson has had a long and distinguished tenure at WPI as a truly outstanding student affairs professional," says President Dennis Berkey. "Her exceptional qualities were evident to me long before I joined WPI, and have been doubly evident in the period since my arrival. Her general management abilities, as well as her expertise in the areas within the student affairs portfolio, make this a well-deserved promotion."

Princeton Review Gives WPI's MBA Program High Marks

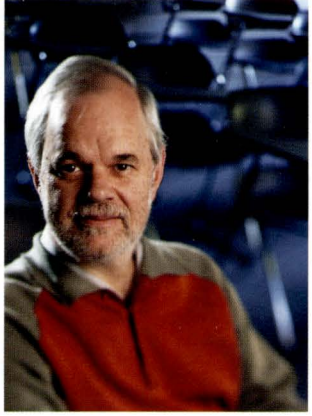
WPI's MBA program was ranked No. 2 in the nation for offering the "Greatest Opportunity for Women" and No. 9 for providing the "Best Career Prospects" in a new publication by the *Princeton Review. Best 143 Business Schools* lists the top 10 schools in a number of categories based on data provided by the schools and surveys completed by 11,000 students attending those schools.

The "Greatest Opportunity for Women" ranking is based on the percentage of students and faculty who are women, student assessment of resources and climate for female students, and whether the school offers course work for women entrepreneurs, among other factors. The "Best Career Prospects" ranking is based on the average starting salary, the percentage of students employed at graduation, student perceptions of the placement office, the quality of recruiting companies, and opportunities for off-campus projects and internships, among other criteria.

McRae Banks, head of WPI's Department of Management, attributes WPI's strong rankings to a number of factors. "We are fortunate to have great faculty members and bright, motivated students," he says. "Just as important, though, is that we recognized nine years ago that we had to distinguish ourselves from the competition. By focusing our curriculum on the management of technology we have educated our students to be effective leaders of organizations operating in today's rapidly changing business environment. Employers have recognized this, to our students' benefit."



To learn more about WPI's graduate management programs, visit www.mgt.wpi.edu/Graduate/.



Three New Department Heads Join WPI

Kathy A. Notarianni '86 (B.S., CE), '88 (M.S., FPE) is the new director of the Center for Firesafety Studies, succeeding founding director David Lucht, who stepped down after more than 25 years in the position (see pages 21 and 33, respectively, for interviews with Notarianni and Lucht). She joins WPI after 15 years as a project leader and research engineer with the National Institute of Standards and Technology. In addition to her WPI degrees, she has a Ph.D. in engineering and public policy from Carnegie Mellon University. At WPI, she will continue as principal investigator for a major study on resource deployment and decision analysis models for local fire departments.

John W. Norbury, new head of the Physics Department, comes to WPI after nearly two decades of academic work, most recently at the University of Wisconsin, Milwaukee. His primary field of research is in protecting astronauts from cosmic radiation, which has led to a strong working relationship with NASA. Additionally, he brings ongoing research projects in theoretical nuclear and particle physics to WPI. Norbury has had nearly 100 peer-reviewed scientific papers published and is a frequent presenter at national and international conferences and professional meetings. He holds a B.S. in physics, an M.S. specializing in experimental nuclear physics, from the University of Melbourne, Australia, and a Ph.D. in theoretical nuclear and particle physics from the University of Idaho.

The new head of the Biology and Biotechnology Department is **Eric Overström**, who comes to WPI from Tufts University, where he taught in the School of Veterinary Medicine, School of Medicine, and School of Dental Medicine. Most recently, he was a member of the Department of Biomedical Sciences. A developmental biologist and a Fulbright Scholar, his research is in the areas of cell/molecular biology of mammalian eggs and embryos, somatic cell cloning, and assisted reproduction technologies. He holds a B.A. in biology from the State University of New York at Oswego and M.S. and Ph.D. degrees in reproductive physiology from UMass, Amherst. He was a postdoctoral fellow at the Harvard Medical School.

As we go to press...

The International Association of Financial Engineers (IAFF) has recognized WPI's professional master's degree program in financial mathematics as a program meeting its standards, and has admitted it as an IAFF member program. The decision was based on a review of the program's curriculum, the contents and quality of the course, laboratory and project offerings, the qualifications of the faculty, employment records of the program graduates, and interviews with faculty. This recognition by IAFF is currently the closest thing to accreditation in the emerging and still unregulated field of financial mathematics. It has also allowed second-year financial mathematics students to attend the Financial Mathematics Job Fair held in New York City this fall and has expanded employment opportunities for program graduates.

Donald Zwiep Named Honorary Member of ASME

On Nov. 16, the American Society of Mechanical Engineers (ASME) recognized Donald Zwiep, emeritus professor and emeritus head of the Mechanical Engineering Department, as an honorary member. The highest award that ASME bestows on an individual, honorary membership recognizes distinguished service that contributes significantly to the attainment of the goals of the engineering profession. Zwiep was one of four individuals named honorary members this year and is the first person from WPI to receive the honor. Since the founding of the society in 1880, there have been fewer than 400 honorary members.

Zwiep joined WPI in 1957 as professor and head of the mechanical engineering department, which expanded and developed under his leadership to offer graduate programs with a strong emphasis on quality education and research. He was also instrumental in establishing the program in 1964 and the university's project-based undergraduate curriculum, the WPI Plan, in the early 1970s. In 1977, he was the advisor to the WPI Project Center in Washington, D.C., and in 1982 became the director and chairman of WPI's Manufacturing Engineering Applications Center. Subsequently, he served as acting provost and vice president for academic affairs.

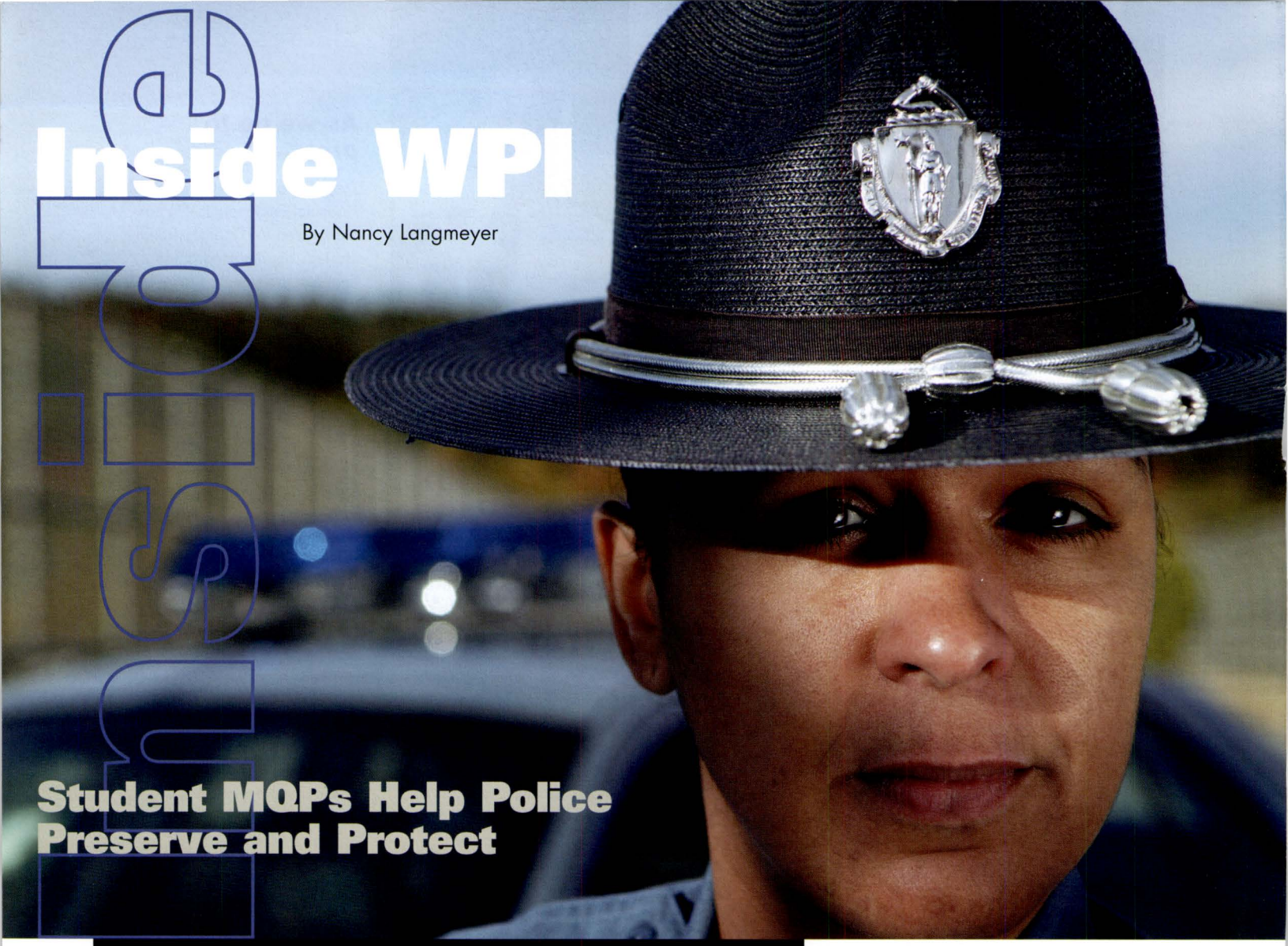
Following his retirement in 1990, Zwiep became involved with student projects in London, at the Technical University in Delft, The Netherlands, and, most recently, at NASA's Goddard Space Flight Center in Greenbelt, Md., and the Johnson Space Center in Houston.

As a member of ASME since 1947, Zwiep has held many local, regional, and national advisory and committee positions. He also served as president of ASME during the society's centennial year (1979–1980).

Read more about Donald Zwiep's ASME recognition at www.wpi.edu/News/Releases/20045/zwiep.html.

Inside WPI

By Nancy Langmeyer



Student MQPs Help Police Preserve and Protect

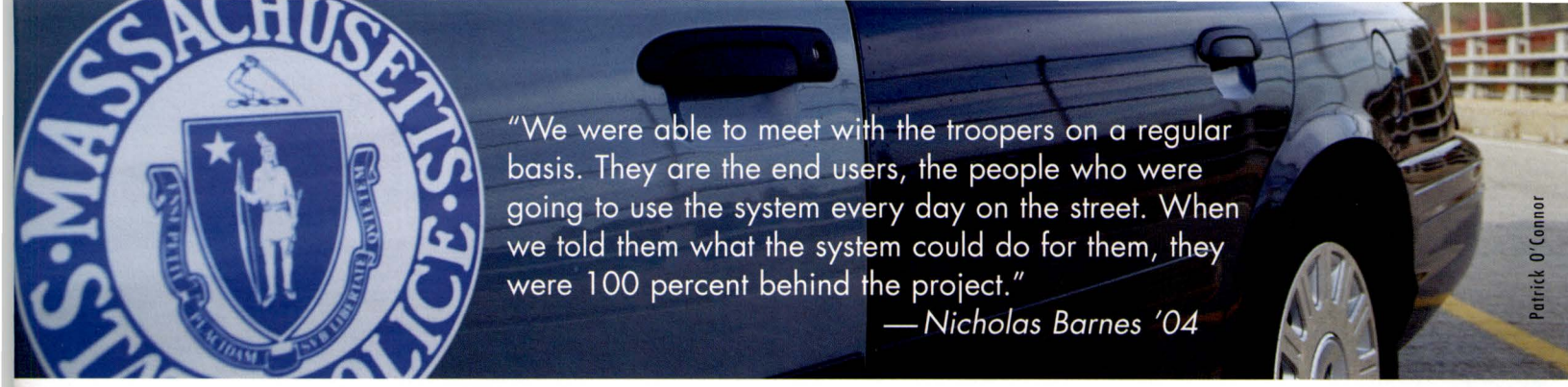
"Case dismissed!"

When a judge utters this phrase during a criminal court case, it may be because police evidence has been compromised by an incomplete paper trail.

But a project completed by WPI students for the Massachusetts State Police may make paper trails—incomplete or complete—a thing of the past. The students, who are MIS (management information systems) majors, developed a new electronic evidence collection database designed to better preserve and protect physical evidence in future court cases.

The Massachusetts State Police, founded in 1865—coincidentally, the same year WPI was founded—is the oldest statewide law enforcement agency in the country, and it's where Michael Newcomb '03 would like to work someday. Newcomb came to WPI to study management, with a minor in law and technology. While serving as a dispatcher for WPI's police, he decided to see if he could get the State Police to sponsor his Major Project. With a referral from WPI Police Chief John Hanlon, a retired Massachusetts state trooper, and the support of Olga Volkoff, assistant professor of management, Newcomb's passion for law enforcement led to the first of many projects that have linked students with the agency's IT department.

In 2001–02, Newcomb teamed with Matthew Trachimowicz '02 and Sam Gutmann '03 on a project that replaced the manual system used by the State Police IT department to track help desk requests with an automated system. The project won WPI's 2002 Provost's MQP Award. A second project sponsored by the State Police won the Provost's Award the following year. That project, by Kyle Mackin '03, Scott Bentley '03, and Jason Gagne '03, helps the police track, statewide, all computer-related inventory from initial purchase to retirement or disposition. The evidence tracking system is the third project sponsored by the State Police.



The Massachusetts State Police Evidence Collection Database MQP would assist state troopers, such as Danielle Pires, in civil and criminal cases.

"The sponsors we work with often don't have enough time or resources for the projects they ask the students to develop," says Volkoff, advisor for the Massachusetts State Police Evidence Collection Database project. "The students bring something very valuable to the table for a negligible cost."

Partnering with the police

Each year, the Massachusetts State Police collect and track thousands of pieces of evidence, such as fingerprints, firearms, drugs, and clothing. According to its Web site, the agency uses the evidence to "tie criminals to their crimes, victims to their assailants and exonerate innocent suspects... to ensure forensic defensibility and admissibility in criminal or civil litigation."

But evidence has to have a complete "chain of custody"—a continual log that details where it is located from the moment of collection through disbursement to others for reasons such as analysis. Prior to the WPI project, the police used a paper-based system that complied with statewide standards and protocols but was prone to breaks in the chain that could cause evidence to be thrown out of court. As a result, the police were anxious to computerize the system to achieve a more secure and reliable method of evidence tracking.

The State Police IT department had a clear vision of what was needed for such a database: a system that not only ensured a more efficient chain of custody but reduced the time required by troopers to log evidence. The department wanted a secure, reliable, and easy-to-use centralized system.

Nicholas Barnes '04 was a junior when he took on the project, fully aware that expectations would be high. "The first two projects had won department awards, so there was a pretty high bar set," he says. He and his project partners, Andrew Bianchi '04, Chris Johnson '04, and Steven Ruo '04, planned, designed, and implemented a complete Web-based front-end and back-end database for evidence collection.

The team first defined user and system requirements and researched appropriate Web technologies. They taught themselves the necessary technical skills and built a prototype of the system. Based on feedback from the troopers and their own reliability testing, they delivered a fully functional database that met every one of the State Police requirements, along with a detailed user manual.

The State Police are currently integrating the evidence collection database with their internal systems and challenging a fresh team of WPI students to find a way to enable troopers to use a handheld device to log evidence in the field, instead of waiting until they return to the barracks. The police had asked Barnes and his team to tackle this task as part of their project. They were enthusiastic, "but," Barnes says, "we had to learn to say 'no' and acknowledge what we could provide in a limited amount of time."

On-the-job training

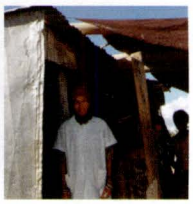
"One of the biggest rewards was when we presented our completed project to the police," says Bianchi. "They loved it. A couple of troopers who saw the system said that this will make their lives easier and make their job better." A core component of the Major Project experience is the interaction teams have with the people who benefit from their work. The WPI team spent extensive time with several state troopers, who helped them understand the processes involved with evidence collection and what they would need to make the system work for them. "We were able to meet with the troopers on a regular basis," says Barnes. "They are the end users, the people who were going to use the system every day on the street. When we told them what the system could do for them, they were 100 percent behind the project. It made us feel good because not only did we have the opportunity to achieve the statewide goal of automating the police system, but we knew we would be able to provide benefits to the troopers as well."

The project also provided the students with the opportunity—and challenge—of working with technologies they had not used before. Familiarizing themselves with the IT department's system, which included the scripting language ASP and a Sequel SQL database, "was like learning a whole new game," says Bianchi. "We had experience with the higher-level theories of it all, but had to learn how to do specific coding. This has made us ready, in the real world, to take any task at hand and know that if we put enough time and dedication into it, we're going to be able to accomplish it."

"We had to overcome many challenges that help me in my everyday work," says Johnson, who now works in ING Financial's IT department. "The steps Professor Volkoff made us go through are the same steps needed to create a system in the business world. I didn't know how similar they'd be until I showed up at work."

Explorations

By Natalie Mello



Jessica Sulzmann '05 with her Namibian namesake.

A Place to Call Home

Photos by Andrew Mumford '05

We travel to learn; and I have never been in any country where they did not do something better than we do it, think some thoughts better than we think, or catch some inspiration from heights above our own.

—**Maria Mitchell**, first professional woman astronomer in the United States, post-Civil War abolitionist, and women's rights advocate

Namibia was not Andrew Mumford's first choice for completing his Interdisciplinary Project requirement. He wanted to go to Zurich. Now, this member of the Class of 2005 admits that if he'd gone to Switzerland, he'd be a different person today—someone whose eyes had not been opened to a world he never knew existed.

Mumford teamed with Jesse Tippett '05 and Jessica Sulzmann '05 to help a community of shack-dwellers in Goreangab, Namibia, improve their shelters. The experience, he says, "increased my appreciation for the necessities of life that we take for granted."

The team's project was sponsored by the Renewable Energy & Energy Efficiency Bureau of Namibia (R-3-E), through the Polytechnic Institute of Namibia. Their objective was to spend two months planning and designing a low-cost, energy-efficient housing cluster (from 50 to 100 structures) using locally available materials capable of keeping the homes cool in the summer and warm in the winter.

No-cost construction

The students, advised by Professors Susan Vernon-Gerstenfeld and Arthur Gerstenfeld, founders of WPI's Namibia Project Center, prepared for their project by corresponding with R-3-E to outline the needs of Goreangab residents. Besides improving the construction of the shacks, they learned that they would need to insulate them. In the summer, the interior of the shacks can reach 104 degrees; during winter nights, the temperature often plummets to 23.

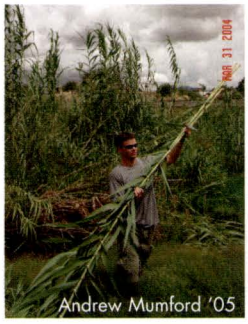
When they reached Namibia, the students were struck by its beauty ("a technicolor dreamscape, a land of swirling apricot dunes and shimmering white flats," according to one travel Web site) and its poverty. "What I saw in settlements took me by surprise," says Sulzmann. "I knew there were many people who lived in poverty, but I had never witnessed it firsthand." Shack-dwellers who live in informally settled areas, or ISAs, such as Goreangab, earn less than $180 U.S. per month; a large portion of that goes to wood and paraffin for cooking and heating.

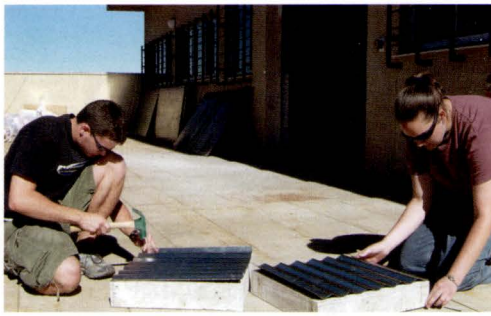
"The people we worked with had nothing," says Mumford. "No running water, no electricity, no cars, no money, few clothes, barely a roof over their heads—just a drive to survive and better themselves. They worried about the essentials of life: food, clothing, shelter."

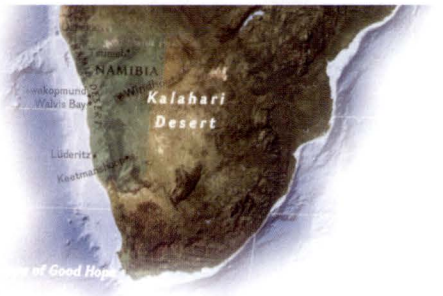
The team set out to develop recommendations the shack-dwellers could implement at little or no cost. First, they met with community members, in groups and one-on-one, to build trust. "We were worried about what they would think of us as foreigners coming into their homes with our ideas," says Sulzmann. Respect for the shack-dwellers' way of life was a key component of this trust building. The team recognized that while the 10-by-15-foot shacks—made from corrugated iron, flattened oil drums, and other readily

Students at the **Namibia Project Center** design low-cost, energy-efficient housing for Goreangab shack-dwellers


Jesse Tippett '05


Andrew Mumford '05





Namibia at a Glance

- Developing country on southwest coast of Africa
- Total surface area of 824,269 sq. kilometers
- Estimated population of 1.8 million (about 1.5 people per square kilometer—one of the lowest population densities in the world)
- Average household has 5.1 members
- Last colony in Africa to attain independence (March 21, 1990); under German control from late 19th century to 1920, when awarded by League of Nations to South Africa; U.N. ended South African control in 1966, but South Africa resisted Namibian independence for decades because of its large mineral wealth (richest source of diamonds in the world; world's largest diamond producer)
- Two deserts: Kalahari and Namib—typical climate yields hot days and cool nights
- Two distinct seasons: summer, or rainy season, from October/November through March/April, and winter

available materials—were not aesthetically pleasing, they were still homes. Mumford described the pride people took in decorating the interiors with wall hangings and in maintaining their properties. The students kept aesthetics in mind as they focused on ways to control the temperature variability of the shacks.

Raising the reed roof

The team found a plant material that was an ideal insulator and was also strong enough to be used in the ceilings of the shacks. Reed cane, also known as "the giant reed," migrated into subtropical and warm-temperate areas from countries along the Mediterranean Sea. It resembles bamboo and grows rapidly; immature plants gain as much as two feet per week for the first few months, and mature canes reach up to 30 feet. The students discovered that, woven together into mats, reed cane would be strong enough to support other insulating materials installed between the ceiling and roof.

But the first reed mat the students created collapsed. While they pondered what to do, the pregnant woman who lived in the shack, a carpenter by trade, gave them the components they needed to hold the ceiling in place. Her shack became the model for the community's other dwellings.

Out of Africa

The students went to Namibia to complete a required project, but each came out of Africa with a new perspective on life. Although Tippett will remember the staggering poverty in Goreangab, he'll also recall that he never saw a homeless person, which to him reflects the importance of community in Namibia. He says his life will continue to be shaped by that experience as he looks for a career where his efforts can "directly benefit people, not just a profit margin."

Once the reluctant team member, Mumford says he continues to wrestle with why he has so much when others have so little. He hopes that thinking about this issue will direct and guide decisions he makes in the future, as both an engineer and a citizen.

Sulzmann plans to return to Africa soon, if only to visit her sister, who is stationed in Ghana in the Peace Corps. In fact, her experience in Namibia has prompted her to consider applying to the Peace Corps herself.

Until she returns, there will still be a part of Sulzmann in Africa. Two days before the team departed, the woman who helped the team figure out how to secure the reed ceiling gave birth to a girl. While she may not remember being held by Sulzmann, the child will be reminded of her every time someone says her name: Jessica.

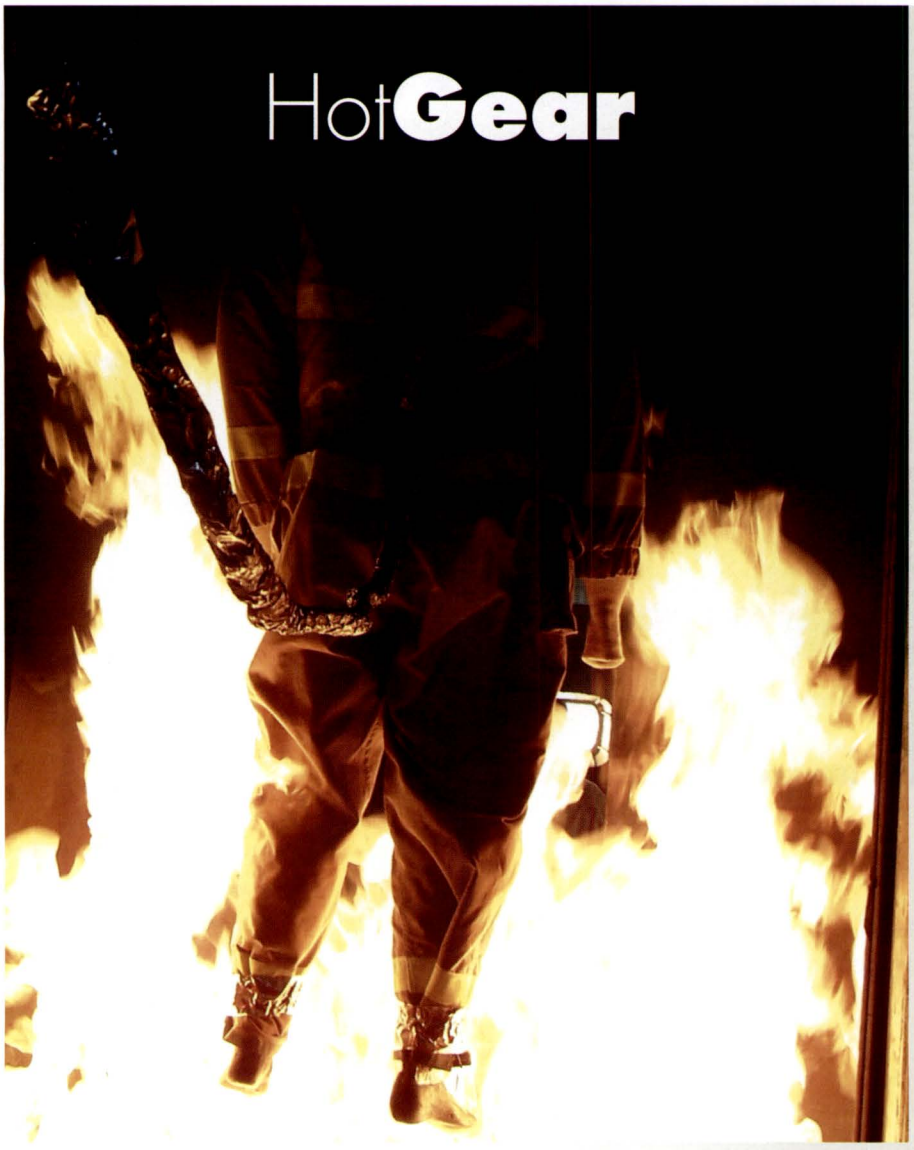
—Natalie Mello is director of global operations in WPI's Interdisciplinary and Global Studies Division.

Note: On Dec. 1, this student project was awarded first place in the 2004 President's IQP Awards.

Investigations

By Eileen McCluskey

Hot Gear



Inside a small room, a fierce fire blazes. Ribbons of heat cascade through the doorway as the temperature builds to 2,000 degrees Fahrenheit. Outside, at the edge of peril, is a figure fully outfitted in firefighter protective gear. It draws closer, hesitates, then enters the room and disappears into the flames.

But this fire—from ignition to extinguishment—is under the complete control of researchers. So, too, is the mannequin thrust into the inferno. The fiery scenario has been carefully planned, designed, and calibrated by WPI's Center for Firesafety Studies to test newly designed firefighter clothing for the U.S. Navy's Clothing and Textile Research Facility located at the U.S. Army Soldier Systems Center in Natick, Mass.

The fire test simulator, or burn chamber, is located at Alden Research Laboratory in nearby Holden. The chamber and its equipment were built by WPI students in 2001; inside, scientists and students can simulate a variety of fire scenarios—from a blazing bedroom to a brush fire.

"This is a good example of what WPI's educational program makes possible," says Jonathan Barnett, professor of fire protection engineering, the lab's director, and the principal investigator. "Students worked together to build it, and students help run it."

The 10-by-15-foot steel-framed chamber sits in the middle of a cavernous warehouse; double doors on either end stand open. Occupying about one-third of the metal grid floor are eight metal boxes filled with sand. These are the burners; vaporized propane feeds through from the bottom of the boxes, as on a gas stove. The burners' configuration can easily be changed to imitate a wide range of fires more realistically than has previously been possible, according to Barnett.

The mannequin is part of the test equipment as well. Hanging from a metal track and propelled by remote control, it can do everything from standing near the flames to zipping through at speeds ranging from a half-foot to two feet per second. Researchers measure heat flux from 40 specially designed copper slug calorimeters—sensors that act as surrogate skin—that are evenly distributed around the mannequin. The measurements indicate whether a firefighter would have suffered skin burns while wearing the protective gear and, if so, the severity and locations of those burns.

What a firefighter wears to a fire is just as important as putting the fire out

Though a handful of other laboratories, such as those at DuPont and North Carolina State University, also test firefighter clothing using instrumented mannequins, they can produce only flash fire conditions in which flames shoot out of walls on four sides, engulfing the mannequins.

"But, realistically, a firefighter's more likely to encounter heated or superheated atmospheres, rather than direct flames during routine activities," says Jonathan Martin '05, who works in WPI's burn lab.

Workplace apparel

Protective clothing has come a long way from the days when firefighters stormed into blazing buildings wearing street clothes. Leather helmets were available by the late 1700s, but it took a century before coats and pants made of rubberized cotton were introduced. These provided no fire protection; they simply kept firefighters dry. A breathing apparatus completed the ensemble by 1908.

"There were no standards for protective clothing until the NFPA [National Fire Protection Association] developed them," notes Harry Winer, an engineer and protective clothing designer with the U.S. Navy's Clothing and Textile Research Facility, who attends the burn lab tests on the new garments with engineer Richard Wojtaszek.

But even NFPA standards are based on bench experiments. "Characteristics like the type of fabric, its density, its heat conductivity, and its moisture content all translate into conductive points within the fabric," says Wojtaszek. "We need the realistic tests done at WPI to see how new fabric reacts and protects."

Suit of the future

WPI students don their own protective gear before performing a fire chamber test. For this test, the mannequin "stands" two feet from the blaze for 30 seconds as heat pulsates through the chamber openings. Lab assistant Jay Kramarczyk '04 points the remote at the mannequin, guiding it to the doorway, and then into the chamber at one end and out the other.

By the end of the test, the students are sweaty and their faces are smudged with soot. Analyzing the data from the calorimeters, laboratory computers determine whether the mannequin's exposure to heat over time would have produced first-, second-, or third-degree burns, or no burns at all. Skin temperature must equal or exceed 44 degrees C (111 degrees F) to burn.

In this test, the mannequin's outfit has come through the chamber unscathed; a heat sensor analysis detects no skin burns. This would have been one well-protected firefighter.

Winer and Wojtaszek are pleased. The Navy's new suit, made from highly flame- and heat-resistant zylon and aramid, apparently works well. The engineers expect to see this gear aboard naval vessels by 2006; it will take another year or two for the suit to filter out to civilian fire departments.

Barnett says he would like to see that happen. Chemical and fire burns accounted for 9 percent of firefighter injuries on the fire ground in 2002, according to the NFPA. Between 1977 and 2003, burns caused 8 percent of on-the-scene firefighter deaths. "My goal," says Barnett, "is for this research to reach the civilian population as soon as possible."

Burns to the lower extremities, visible on a tested firefighter's suit (above), register as torso burns via copper slug skin calorimeters on the mannequin (left). The suit is made from polybenzimidazole (PBI), a material used in most firefighters' suits. "Part of the reason for the extent of these burns," says Jay Kramarczyk '04, lab assistant in WPI's burn chamber, "is that the scenario the suit is exposed to is not practical for a human to endure. In the lab we are given the unique opportunity to expose materials to situations that go far beyond what the wearer of the suit would experience. By designing suits that are far more capable than they need to be, we are assured that they will also perform under normal circumstances."

Photos by Jay Kramarczyk '04

SAFE EXIT

By Eileen McCluskey

Photography by Patrick O'Connor

Lost in the mazelike layout of a massive warehouse filled with thick black smoke, two firefighters gasped for breath. Their air tanks were nearly empty; the men were running out of time.

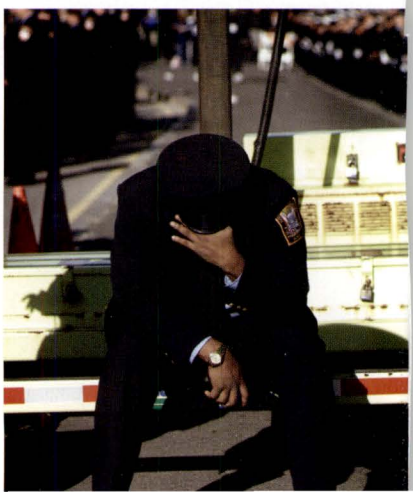
It was Dec. 3, 1999, and Worcester firefighters Paul Brotherton and Jerry Lucey were trapped inside the Worcester Cold Storage warehouse. Separately, two pairs of their brethren had answered their radio distress call, but they, too, became disoriented in the dense smoke and roar of the flames.

Before the night was over, all six lost their lives, each within 100 feet of exits they simply couldn't locate. The Worcester Cold Storage tragedy made international headlines and shone a spotlight not just on the dangers of the firefighting profession, but on the enormous challenge of tracking the whereabouts of emergency personnel when they enter buildings.

From heroic sacrifice, a better idea

Firefighters who lose their bearings typically rely on ropes to find their way out. This system works—if the rope doesn't go up in flames or get lost in the murk. An alarm that sounds when a firefighter stops moving has also proven unreliable; the alarms on Brotherton and Lucey were drowned out by the fire's roar.

In the days after the Worcester fire, John Orr, professor of electrical and computer engineering and then head of the department, began to think that there had to be a better way. On Dec. 9, 1999, he joined tens of thousands of mourners who lined the streets of Worcester to watch a three-mile-long procession of 30,000 firefighters from around the world wind its way to the Centrum (now the DCU Center) for a



After several Worcester firefighters died in a burning warehouse, unable to find their way out, four WPI professors are teaming technology and expertise to prevent future tragedies.

Homing in on the signal

The team first had to determine which communication technologies would help them deliver on the complex criteria required by the First Responder Locator System.

They began by analyzing the Global Positioning System (GPS). "Most people assume that any GPS worth its salt would be able to locate people inside buildings," says Cyganski. But GPS has proven to be inaccurate indoors. Its satellite-broadcast signals are weak, and when those signals bounce off walls and other surfaces, accuracy suffers. It is also incapable of pinpointing location—30 feet is the best it can do, far from the one foot needed for the First Responder system.

The team also reviewed impulse UWB (ultra-wideband), which relies on sharp pulses for tracking; again, there were drawbacks. "The sharper the pulse, the more radio spectrum it takes up," explains Cyganski. "You'd have to disrupt all other radio-related services in the area to use a system based on impulse-UWB, which is, of course, wholly impractical."

The engineers continued their survey and found two communication tools suitable for the job. Super-resolution radar, also called synthetic aperture radar (SAR), extracts great detail

Professors Cyganski, Duckworth, Orr, and Michalson

memorial service for the six firefighters: Brotherton, 41; Lucey, 38; Timothy P. Jackson, 51; James F. Lyons III, 34; Joseph T. McGuirk, 38; and Lt. Thomas E. Spencer, 42.

It was there, in that solemn setting, that Orr decided that he and his colleagues could harness WPI's expertise and come up with a better system for locating firefighters trapped or lost in a building fire. But the idea needed funding. The issue caught the attention of Senators John Kerry (D-MA) and Edward Kennedy (D-MA), and Representative James McGovern (D-MA). By February 2003, the legislators had secured $1 million from the National Institute of Justice's Office of Science and Technology to fund the development of a locator system. Orr mapped out a three-year project, which will culminate with a functioning prototype, and assembled a team of ECE faculty to make the system—intended for firefighters and police—a reality. (Orr, professor David Cyganski, the project co-leader, and associate professors William Michalson and James Duckworth are assisted by graduate and undergraduate students.)

from radar signals by applying sophisticated computational methods that were not practical, especially for mobile systems, before recent innovations in computer technology. And orthogonal frequency division multiplexing (OFDM), another recent innovation, transmits high-speed data via wireless devices and integrates well in the radio spectrum.

Once the team had settled on SAR and OFDM as the technological backbone for the system, they needed to find a way to channel the power of these technologies.

A true team effort

In the labs run by Cyganski, Duckworth, and Michalson, a prototype assembly line has been set up that utilizes the expertise of each team member.

Cyganski is the math guy who's designing from scratch a system that will be able to transmit, receive, and process the signals. In addition, he calculates the best types of signals and

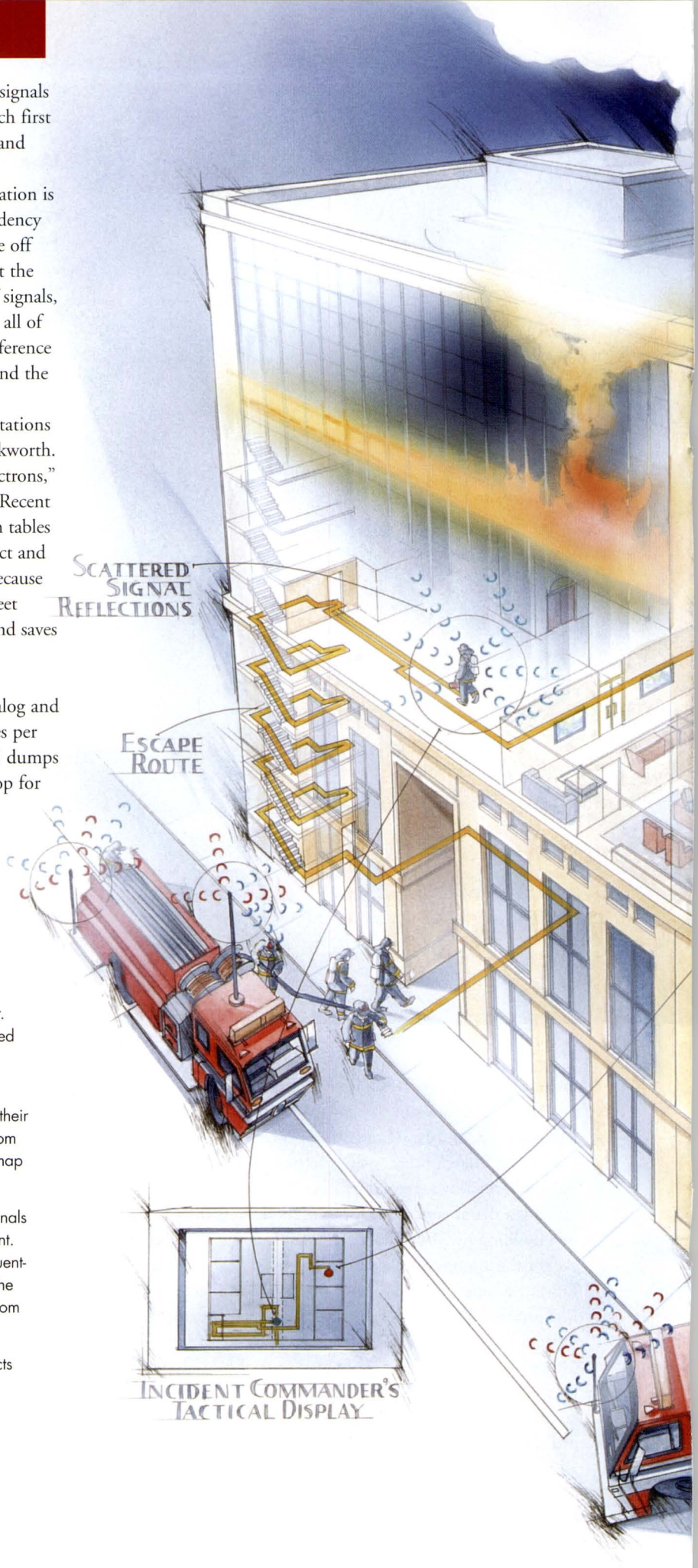
the best way to generate them. The customized OFDM signals are emitted continuously by the transmitters worn by each first responder. The receivers are able to decipher the signals and determine their distance from the transmitters.

The process of identifying the transmitter's exact location is complicated by something known as multipath—the tendency of signals to radiate out from the transmitters and bounce off walls, floors, and ceilings, arriving in a jumbled fashion at the receivers. But while each receiver picks up a multitude of signals, appearing to have arrived via many different paths, when all of the paths are compared some will converge on a single reference point. That point is the true location of the transmitter and the first responder wearing it.

After Cyganski generates the mathematical representations of the signals, he hands them over to Michalson and Duckworth. "We then translate these representations into a flow of electrons," explains Michalson, the team's wireless navigation expert. Recent prototypes, including an analog-to-digital converter, lie on tables in Michalson's lab, along with the tools needed to construct and repair these complex devices. "The models are big now, because fingers are fat," he says, holding aloft a board about two feet square. "Their size makes it easy to change components and saves us a lot of time."

He gestures to a board, to which black boxes and a spaghetti of wire are affixed. "This interface between analog and digital data samples the signal two hundred million times per second. Then the FPGA [field programmable gate array] dumps this data into memory and transfers the data to the laptop for processing."

The FPGA—a small chip critical to the project—is an integrated circuit that the engineers can program to make the transmitter and receiver handle the system's



How the First Responder Locator Will Perform

Fire department personnel arrive at a blazing building. Each firefighter in full protective gear wears a badge-sized transmitter. Three fire trucks equipped with transmitter-receivers are positioned at roughly even intervals around the building to permit three-dimensional maps to be generated on the fly.

Several firefighters walk around the building's exterior, tapping their badges when they reach an entrance/exit. The taps, relayed from the trucks' transmitter-receivers, show up as glowing dots on a map displayed on the site commander's computer.

Firefighters enter the building. Their badges send continuous signals to the receivers, which display lines tracing their every movement. The system senses changes in elevation; at second- and subsequent-floor walk-throughs, the lines on the display change colors. As the lines build up, they create a "picture" of hallways, stairwells, room layouts—a clear, three-dimensional map of the building.

If exits become impassable, the site commander's display corrects for such changes, showing alternate routes out of the building. The site commander knows where each responder is, to within 12 inches, and can help anyone get out while there's still time, whether or not firefighters can see through the smoke.

complex signals with almost no additional components. When the design is complete, the FPGA functions can be mass produced in an even smaller chip, enabling the final devices to be both compact and cheap.

"For the system's next generation," Michalson says, "instead of these prototypes scattered across several feet of boards, we'll have stacks of three boards that you can hold in your hand."

Enter Duckworth, the embedded system designer; his circuit board designs are created on a computer. Using software, he draws thousands of spiderweb-fine lines, color-coded in brilliant red, blue, yellow, and orange, representing the signals to be used by the system. Squares and circles designate components. "This will be our digital controller board," he explains, pointing to a design on his screen, "which goes into the receiver and transmitter systems."

From an envelope, Duckworth removes a small fiberglass square densely packed with lines and shapes matching his computer rendition: it's a newly minted circuit board, manufactured off-site, using his specifications.

Working toward a deadline

Currently the transmitter and receiver are each made up of three circuit boards. Later, only one board will be required for the transmitter and another for the receiver.

In the interim, the team plans a demonstration of the system with four retrofitted laptops—three to act as receivers, one as transmitter—by summer 2005.

Within the next couple of years, issues such as monitoring the physiological status of emergency responders and making the transmitters impervious to the crematory-like fire environments in which firefighters are called upon to work will be addressed. "But those items are for a later pass," says Michalson. "If you try to do everything at once, you end up doing nothing well."

Although Cyganski cautions that "we don't know how many roadblocks we'll encounter along the way," the team believes the final product will be ready within the initially conceived three-year timeline, possibly hitting the marketplace within five years.

"This is a project we had to do," says Orr. "Technology can solve the problem that killed the firefighters in the Worcester Cold Storage warehouse. We think we now understand better than anyone else why precision indoor position location is such a difficult problem. And we remain confident that we will solve it."

—Eileen McCluskey is a frequent contributor. Sources for this article include Sean Flynn's book about the Worcester Cold Storage warehouse fire, 3,000 Degrees: The True Story of a Deadly Fire and the Men Who Fought It.

...and life

By Eileen McCluskey

Guiding Light

The son of a fallen firefighter follows in his father's footsteps

"It's a serene setting, right behind the station where my father worked," Pat says of the future location—in Institute Park, behind the Grove Street fire station—of a memorial commemorating the six firefighters who died fighting the Worcester Cold Storage fire. "I look forward to seeing the memorial there."

"He was a fun-loving, food-cooking, opera-passionate kind of guy," says Patrick Spencer '05 of his father, Lt. Thomas Spencer—one of six Worcester firefighters who perished in the Worcester Cold Storage warehouse fire in December 1999. "I curse him every time I sing *La Boheme* in the shower," he jokes. "I can't help it; I love the music he loved."

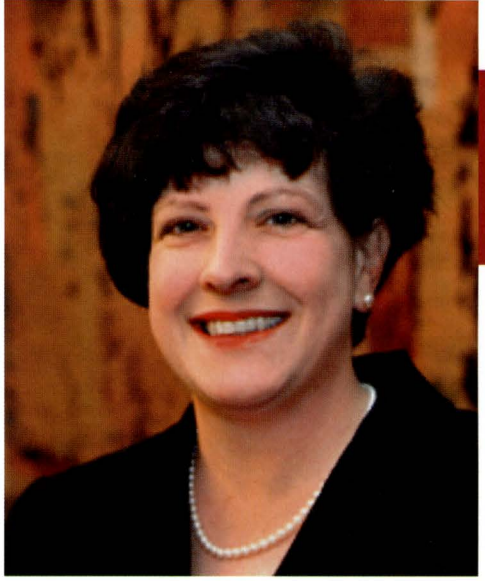
Pat was 16 when he lost his father. A year before his death, Tom had introduced his son around the WPI campus. "My dad knew [FPE professor] Bob Fitzgerald," says Pat. "We called him Fitzy—he and my grandfather knew each other through Fitzy's work with the Worcester Fire Department. My father wanted to be sure I got the best possible engineering education; after he died, Fitzy took me under his wing and made sure I took the right high school courses to prepare me for WPI." That preparation has paid off; Pat is pursuing an undergraduate degree in civil engineering and plans to earn a master's in fire protection engineering by 2006.

The close relationship between father and son—Tom was Pat's baseball and soccer coach and his golfing buddy—extended into a mutual love of the firefighting profession, steeped in the family's history. "My grandfather—Blackjack Murphy, they called him—was a Worcester firefighter [for 50 years], as was my dad's brother," says Pat. "I always had this sense of firefighters as special. When everybody else is running out of the building, they're the guys who have to go in."

Once at WPI, Pat found allies among his professors, including Jonathan Barnett, professor of fire protection engineering. Aware of Pat's ambitions to be a firefighter, Barnett invited him to Queensland, Australia, for an introduction to FPE. "I spent the summer between my freshman and sophomore years investigating Australia's own Worcester-like fire tragedy," says Pat. "It was in a hotel where college students used to stay as they traveled through Brisbane. Seventeen kids were killed. We were asked to help establish ranking methods for Queensland's Fire and Rescue Service so it could rate buildings in terms of fire safety."

In 2003, Pat joined the Paxton Fire Department and has since fought dozens of fires. While firefighting "seemed like a logical step," he admits there was a short time after his father's death when he thought it wasn't what he wanted to do. Pat now envisions a future beyond that profession. "I see myself as a teacher and a fire protection engineer," he says. "I want to study fire—understand why it spreads across a ceiling, for instance. There's an inherent educational benefit to that analysis. I'll teach students that fire prevention should never be just about putting out fires. We need to give it less of a chance to start in the first place."

Up Ahead with Kathy Notarianni



Kathy Notarianni '86 (B.S., CE), '88 (M.S., FPE) was for 15 years project leader and research engineer at the National Institute of Standards and Technology. While there, she started and grew a large fire research program and managed a team of scientists and engineers. In addition to her WPI degrees, she holds a Ph.D. in engineering and public policy from Carnegie Mellon University. As the new director of WPI's Center for Firesafety Studies, she will work with the FPE faculty to plan for the future of graduate studies and research and build relationships with off-campus agencies, laboratories, universities, and companies that share WPI's interests in fire protection engineering education and research.

1. Which interest came first for you: engineering or fire safety?

Engineering. I loved math and chemistry in high school. In WPI's chemical engineering program, I was intrigued with fluid mechanics, heat transfer, and thermodynamics. A fire chemistry class introduced me to the fascinating problems of fire and life safety. That completed the picture for me.

2. Fire codes and technologies often face strong political opposition. How can engineers and politicians work together to improve fire safety?

Engineers, scientists, and decision makers (building owners, inspectors, and state and local government officials, among others) need to learn each other's language and begin a dialogue. My Ph.D. has proved invaluable in helping me communicate with politicians and decision makers. WPI's FPE program will increasingly incorporate such subjects as economics, risk assessment and communication, decision analysis, and applied policy analysis into its curriculum. And we will continue to invite decision makers to talk with us about fire safety issues.

3. How do you feel about staffing and funding being cut for fire departments?

Just as in a household, local jurisdictions have to balance budgets and pay bills. Personnel are often the first to be cut because they represent the biggest part of the budget. But I'm uncomfortable with such a quick-fix solution. Budget allocations should follow a complete financial review and an equally thorough analysis of important factors such as coverage areas, response time, and the impact on the safety of the community.

4. What can be done to build safer structures in the United States?

Buildings need to be designed from a multidisciplinary viewpoint, keeping the safety of people as the primary focus. Today, working with fire protection engineers, structural engineers are helping design buildings that will remain standing during a severe fire threat, psychologists and sociologists are learning more about human behavior in fires, and mechanical and electrical engineers are helping create "smart" buildings that can communicate lifesaving information to occupants during an incident. It's an exciting time in the world of building design, and fire protection engineering is at the core of this excitement.

5. You advocate mandating residential sprinklers in one- and two-family homes, mobile homes, and multifamily dwellings. Is this realistic?

It already is happening. Multiple communities across America have passed residential sprinkler mandates for new construction. These mandates require apartment buildings, multifamily dwellings, townhouses, and even some single-family dwellings to have residential sprinklers. This trend will continue.

6. How can other universities assist the center?

I've been building strong relationships with other universities; they will serve as our partners in research and multidisciplinary teaching. There is much important work to be done in designing safe buildings that requires partnerships beyond fire protection and beyond engineering.

7. Is WPI doing a better job teaching and researching in the field of fire protection engineering than other universities?

We offered the first graduate engineering program and the only Ph.D. program in the United States for this unique discipline. Our graduates are highly trained and work in all areas of fire safety. WPI is a world leader in fire protection engineering education, and we will continue to lead the way in engaging engineering students at other universities in fire protection engineering.

8. What is it like directing the center where you were once a student?

I feel that I have a special job, one I was called to do. As a graduate student, I remember clearly the feelings I had coming into the Center for Firesafety Studies; I was choosing not just a field of study, but committing to a career that makes the world a safer

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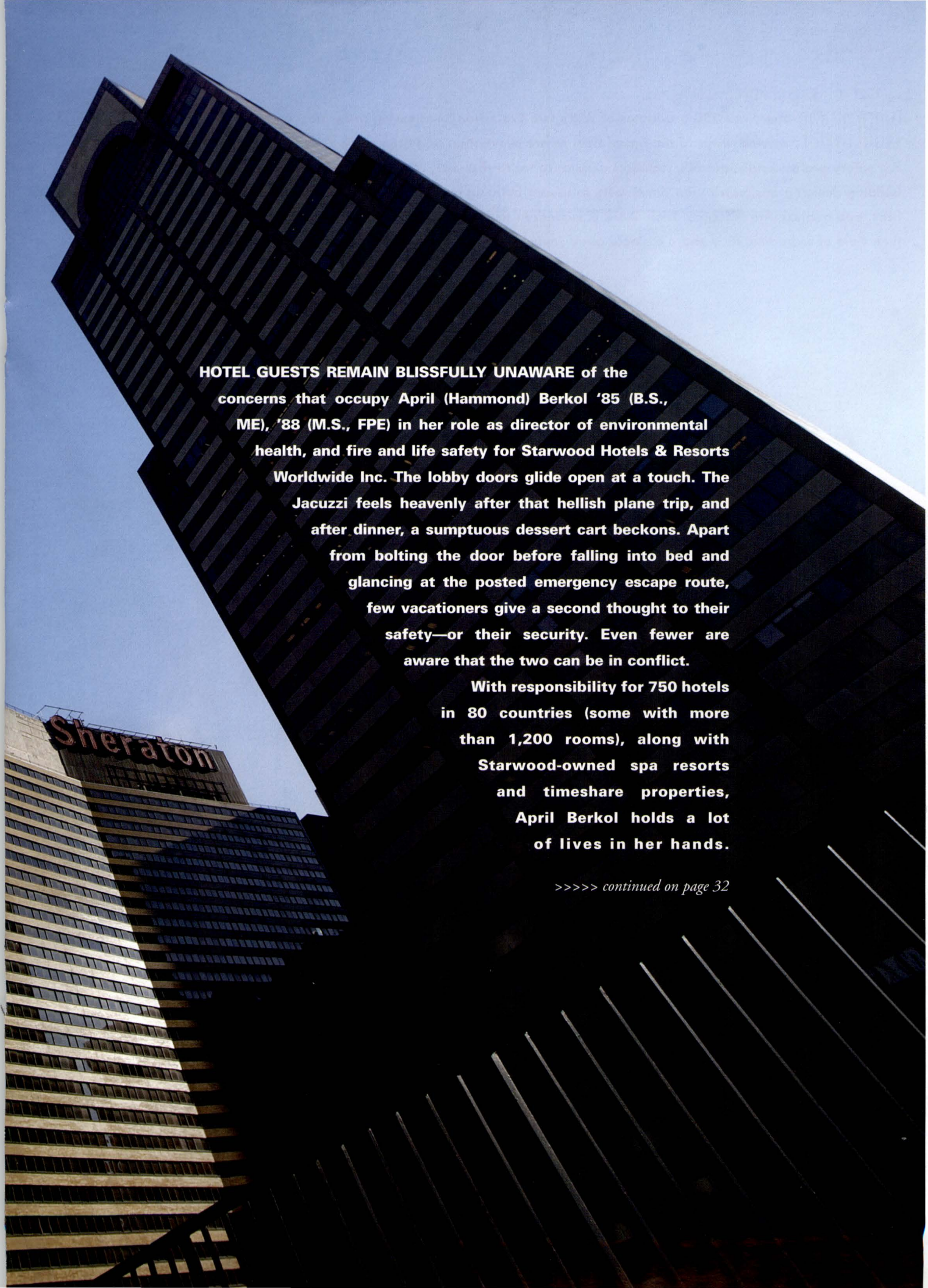
Safe or Secure?

Can your hotel room be both?

By Joan Killough-Miller

Photography by Patrick O'Connor

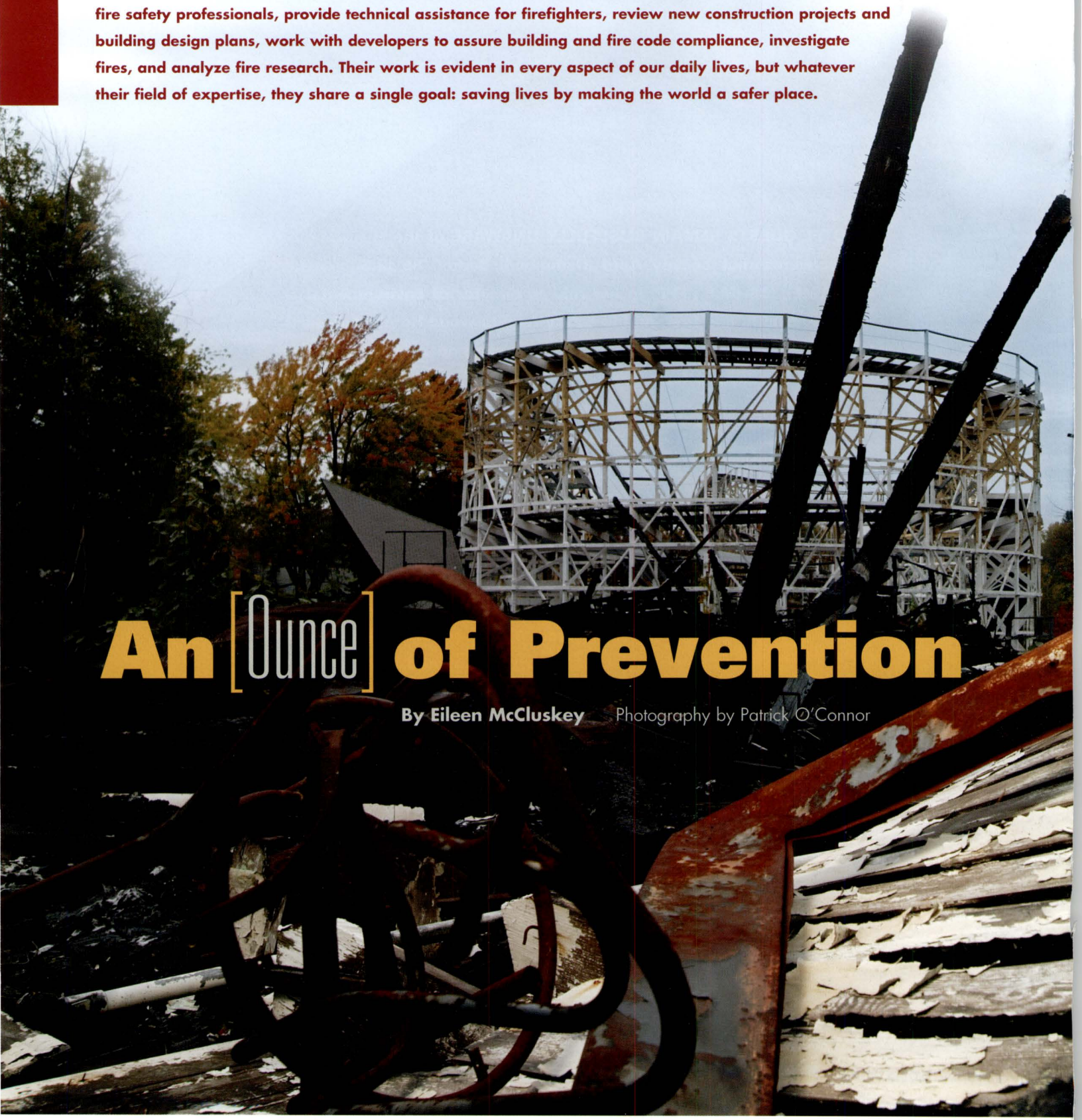


HOTEL GUESTS REMAIN BLISSFULLY UNAWARE of the concerns that occupy April (Hammond) Berkol '85 (B.S., ME), '88 (M.S., FPE) in her role as director of environmental health, and fire and life safety for Starwood Hotels & Resorts Worldwide Inc. The lobby doors glide open at a touch. The Jacuzzi feels heavenly after that hellish plane trip, and after dinner, a sumptuous dessert cart beckons. Apart from bolting the door before falling into bed and glancing at the posted emergency escape route, few vacationers give a second thought to their safety—or their security. Even fewer are aware that the two can be in conflict.

With responsibility for 750 hotels in 80 countries (some with more than 1,200 rooms), along with Starwood-owned spa resorts and timeshare properties, April Berkol holds a lot of lives in her hands.

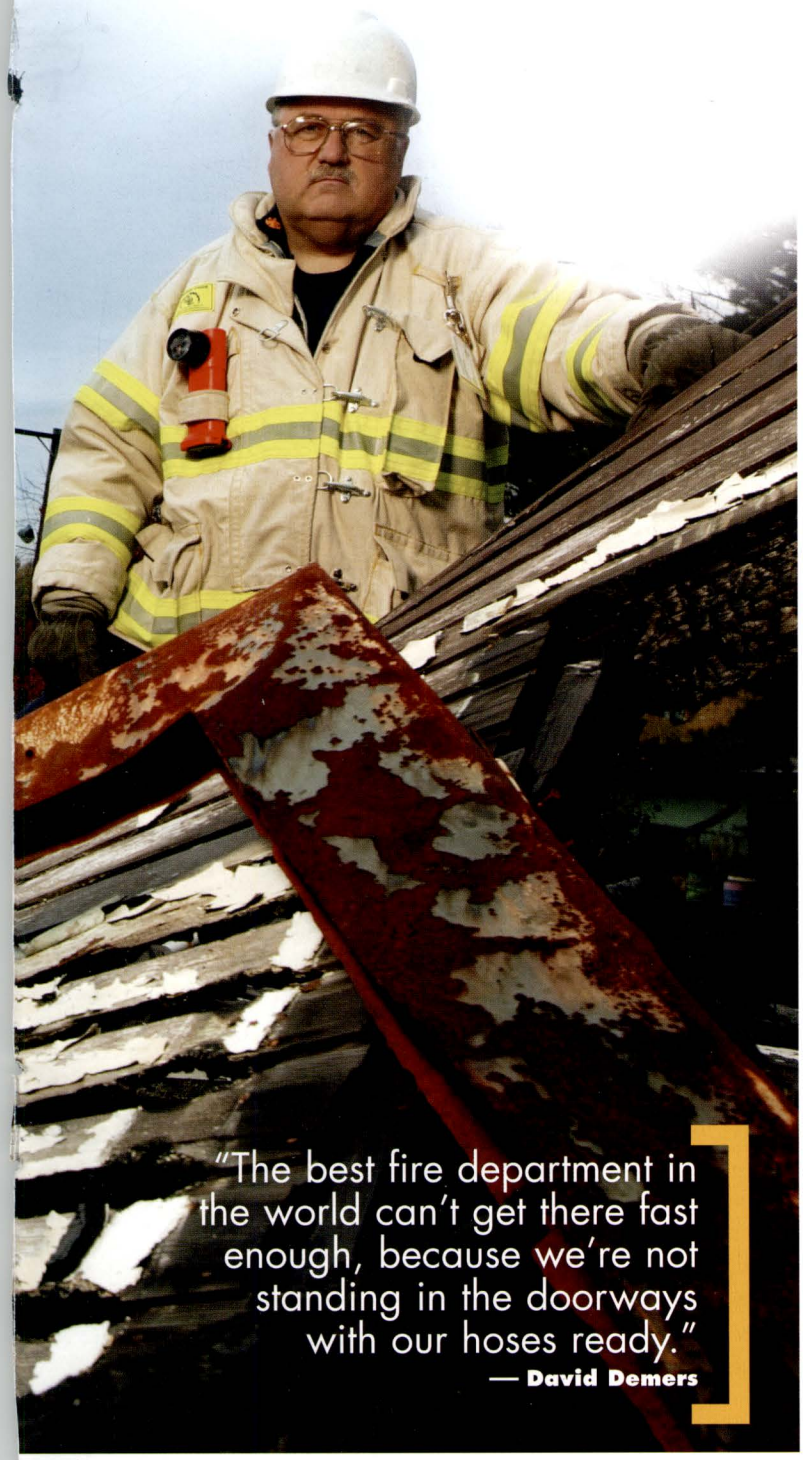
>>>>> continued on page 32

WORLDWIDE, there are 350 graduates of WPI's Fire Protection Engineering program, contributing in myriad ways to the broad field of fire prevention and fire safety. They educate and train fire safety professionals, provide technical assistance for firefighters, review new construction projects and building design plans, work with developers to assure building and fire code compliance, investigate fires, and analyze fire research. Their work is evident in every aspect of our daily lives, but whatever their field of expertise, they share a single goal: saving lives by making the world a safer place.



An [Ounce] of Prevention

By Eileen McCluskey Photography by Patrick O'Connor



David Demers '74 (B.S., ME), '84 (M.S., FPE)

Deputy fire chief, Lunenburg (Mass.) Fire Department; president, Demers Associates, fire protection consultants

If Dave Demers had his way, every building, be it department store, hotel, school—even our homes—would be equipped with a sprinkler system. "Sprinklers are the answer," he says. "Sprinklers put the wet stuff on the red stuff, fast."

Since the mid-1970s, the firefighter and fire investigator has analyzed some of the nation's most notorious blazes and preventable tragedies, including the 1977 jail fire in Maury County, Tenn., which killed 42 people; a Providence College dormitory blaze the following year in which 10 students died; and the 1980 MGM Grand Hotel inferno in Las Vegas, which resulted in 85 deaths and 650 injuries.

As saddening as his work may be, Demers loves what he does. "I've been interested in firefighting since I was a kid," he says, citing a firemanship merit badge he earned as a Boy Scout. He balanced part-time firefighting duties while he was an undergraduate at WPI, worked at the National Fire Protection Association (NFPA) conducting investigations and engineering analyses of some of the country's deadliest fires before embarking on his master's in FPE, and consulted for the Phoenix Fire Department as a grad student.

Fire safety in this country "has a long way to go, even though we've already come a long way," Demers says. "Smoke detectors have helped a lot. But they're just not enough. One giant step forward would be if we required sprinkler systems in all buildings. We have to do this, or we're going to keep seeing multiple-fatality fires. The best fire department in the world can't get there fast enough, because we're not standing in the doorways with our hoses ready." (*Note: The photo at left shows Demers amid the wreckage of a 2002 arson fire that destroyed the 70-year-old ballroom at Whalom Park in Lunenberg, Mass.)*

Glenn Corbett '91 (M.S., FPE)

Assistant professor of fire science, John Jay College of Criminal Justice, New York City; volunteer fire captain, Waldwick, N.J.

Glenn Corbett indulges in his favorite hobby, fire history, through an extensive collection of firefighting memorabilia in his study, an 1850s hand pumper fire engine in his garage, and a privately published book he wrote, titled *The Great Paterson Fire of 1902: The Story of New Jersey's Biggest Blaze.*

But along with his passion for history is his concern for the future of fire safety—inspired in large part by his father, who was involved in the fire service from the early 1950s until his death in 1981. Since 1978, Corbett has been a volunteer fire captain with the Waldwick Fire Department. He also prepares future generations of fire safety professionals as a faculty member at John Jay College of Criminal Justice, where he earned an undergraduate degree in fire service administration in 1982.

"My students are my disciples. I tell them, 'You are the ones who are in a position to move fire safety forward.'" —**Glenn Corbett**

Corbett's knowledge and experience give him a sometimes troubling perspective on fire safety. Though he sees improvements in the United States compared to 30 years ago, he notes that "most of the easier [fire safety] measures have been implemented. It's going to be much more difficult to drive fire deaths down further because we've got the hardest changes ahead of us."

Those changes include retrofitting existing buildings to prevent fire-related deaths. "If we put sprinklers in every building in America, fire deaths would go down to zero," he says, echoing the sentiments of many of his colleagues. The idea faces resistance on financial grounds by owners of restaurants, nightclubs, and single-family homes—places where the majority of fire-related deaths occur. (Corbett is installing sprinklers in nearly every room of his 2,000-square-foot house while it is being renovated. "I believe it will cost me four, five thousand dollars," he says, adding "it's money well spent.")

Aside from saving lives, sprinkler systems can help make up for the fact that "fire services have been decimated financially since the 1970s as the costs associated with keeping fire departments have climbed," Corbett says. Too, there is "a public perception that fires are no longer a big threat." To counteract this, he uses his bully pulpit as a teacher to increase awareness of the issues he sees as most pressing. "My students are my disciples," he says. "I tell them, 'You are the ones who are in a position to move fire safety forward.'"

Richard Pehrson '93 (M.S., FPE), '99 (Ph.D., FPE)

Fire protection engineer, Futrell Fire Consult & Design, Osseo, Minn.

Rich Pehrson conducts fire investigations, trains firefighters in protection issues, and consults on building code issues for complex structures or those with technical challenges. He says he feels confident that "as a profession, we've done a good job moving the science forward—fire protection has become a legitimate and trusted profession, and this has happened quickly." Still, he is dissatisfied with the state of fire safety in America today, particularly in light of heightened security due to terrorism.

"In most cases, building security and fire safety are directly at odds," he says. "With fire protection, you want many ways out, with doors that are under the individual's control. With security, you want one way in and few ways out, with doors locked even from the inside."

Such a disconnect can have disastrous results. "Existing high-rise buildings are designed based on evacuating two or three floors at a time," Pehrson notes. "So there aren't enough stairways to allow the building's occupants to exit at one time. September 11 changed that thinking, although I've yet to see any of our building codes address the issue." Pehrson knows his frustration is shared by others in fire safety. "It's maddening to see fire exits locked from the inside, without an easy and reliable way for people to open them in an emergency."

Solutions to such dilemmas will be hard to find, especially in the tangle of post-9/11 America. "We'll have to balance needs on a case-by-case basis for now," Pehrson admits. "Obviously, we're dealing with huge societal issues here, and we still don't have the vocabulary to iron everything out. Not yet, anyway."

Thomas Izbicki '96 (B.S., CE), '97 (M.S., FPE)

Senior fire protection engineer, Dallas Fire-Rescue Department

Fire had devoured the top floor of a 73,000-square-foot mansion. Slate was sliding off the roof of the three-story structure, and firefighters were battling elusive spot fires inside the walls. Was it safe for them to continue to battle the flames from inside? Or was the roof about to collapse?

Enter Tom Izbicki, who had been called to the scene to check on the structure's soundness. "Sure, send the engineer up there, like the canary into the mine," he laughs, but admits he wouldn't want it any other way.

Izbicki likes to be part of the action. One of his favorite learning experiences, gained from a prior consulting job, was managing a sophisticated series of tests to determine how the hurricane glass in airport buildings would respond to exposure to jet-fuel fires. His goal was to help determine the most effective layout for an airport's sprinkler system.

In the project's final phase, a 50-foot-diameter ditch was lined with plastic, filled mostly with water, and topped off with jet fuel. An array of three four-by-eight-foot panels were placed at varying distances from the ignited fuel while Izbicki and his team recorded the distance at which the glass began to deteriorate or break. "You can talk about engineering issues 'til you're blue in the face," he says. "But to actually watch the dynamics—that's exciting."

When he isn't on the fire ground providing technical assistance to firefighters, Izbicki reviews building proposals and plans to ensure that fire codes are followed. "I work on every kind of structure," he says, "from schools to high-rises, industrial warehouses to simple office buildings," analyzing plans for such fire safety basics as access, egress, and hydrant spacing. "I try to make sure the firefighting operations will be as easy as possible."

Though he may not get the same kind of buzz from analyzing designs as he does from being at the fire ground, Izbicki knows he's helping firefighters do their job. "It's important and interesting to understand what's going to happen to the smoke from a fire in various structures and where, in relation to exits, the heat is most likely to travel," he says. "The goal, of course, is getting everyone out before conditions become untenable."

"As a profession, we've done a good job moving the science forward—fire protection has become a legitimate and trusted profession, and this has happened quickly." —**Richard Pehrson**

David Waller '94 (B.S.), '98 (M.S., FPE)
Fire safety engineer, North Metro Fire Rescue District, Broomfield, Colo.

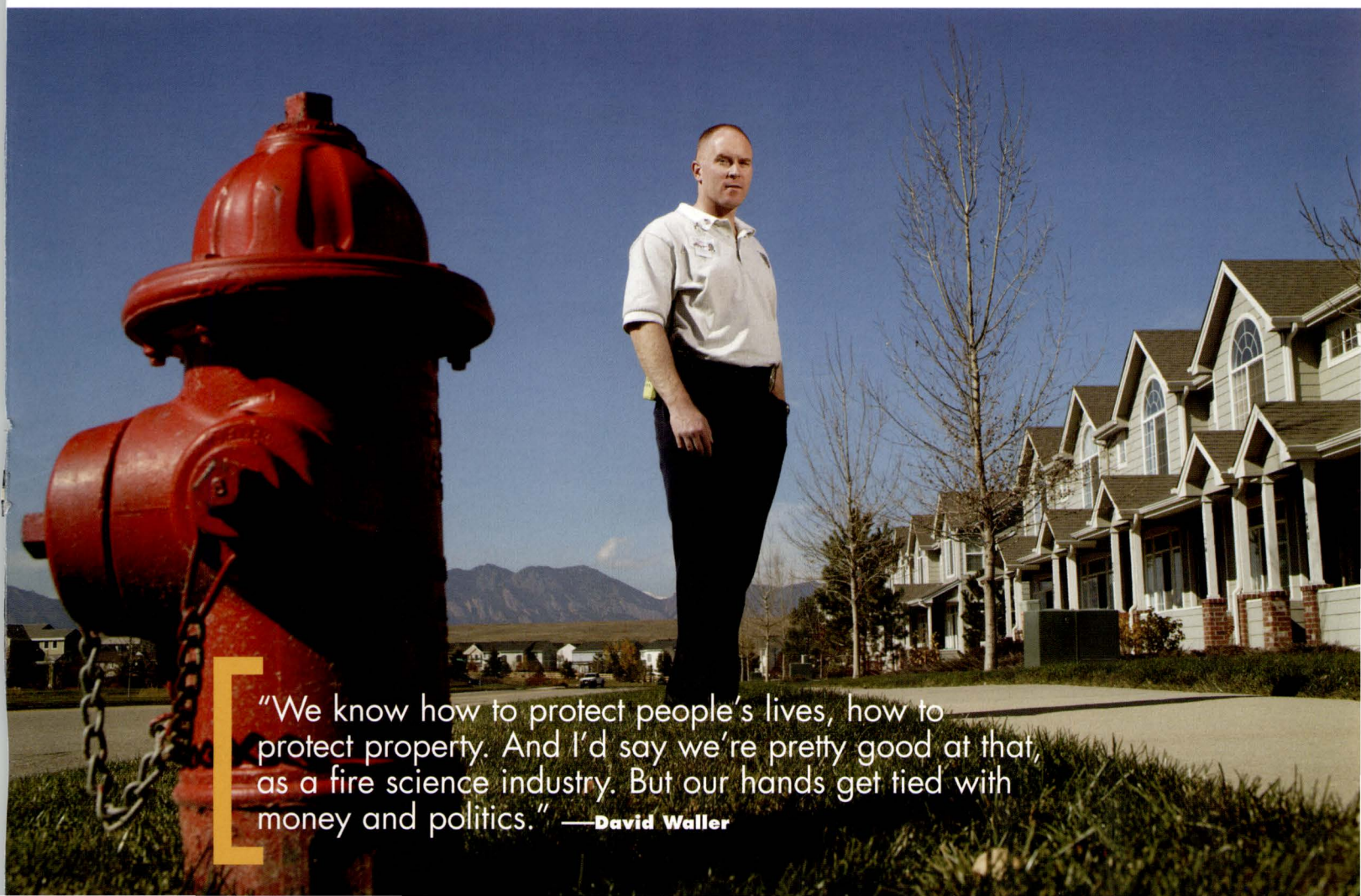
Dave Waller had plenty of friends who'd mapped out careers in fire protection early on: high school buddies who were volunteer firefighters and four WPI frat brothers who were studying fire protection engineering. But he didn't follow in their footsteps until he found himself bored in a mechanical engineering internship. Waller returned to WPI for his graduate degree in fire protection engineering and joined the student firefighter program in the Auburn (Mass.) Fire Department, where he lived with other students in one of the stations and, in return for room and board, worked as an on-call firefighter for the town.

"It was a tremendous opportunity," Waller says. Not only did he get his feet wet dousing flames, but he also became a de facto member of the firehouse's closeknit student community. "We shared responsibilities and our lives depended on each other," he says, adding that he will be "forever bonded" to his Auburn brethren.

Today, in his work as a fire safety engineer with the North Metro Fire Rescue District, Waller reviews building design plans for fire code compliance. Key to this work is convincing often-reluctant developers and owners to go the distance for safety. Unfortunately, even today's best fire codes and the most effective communicator comes up against political and monetary realities, which delay the creation of better codes. "We know how to protect people's lives, how to protect property," Waller says. "And I'd say we're pretty good at that, as a fire science industry. But our hands get tied with money and politics."

After the tragic Station nightclub fire in Warwick, R.I., in 2003, Waller says "state legislators in New England began changing codes. But that hasn't happened in Colorado, because the disaster didn't occur in our backyard." He adds, "Fire protection engineers could prevent most fires, most deaths, today. In a properly sprinklered and maintained building, there has never been a multiple-death fire." But, he says, "society and legislatures are not ready yet to spend the money."

Learning to navigate the thorny paths of financial interests and politics "has been my greatest learning experience," he says. "But it can be very frustrating. To me, as an engineer, things are black and white. But in the fire code world, there's a whole lot of gray."



"We know how to protect people's lives, how to protect property. And I'd say we're pretty good at that, as a fire science industry. But our hands get tied with money and politics." —**David Waller**

Paul Donga '95 (M.S., FPE)

Fire protection supervisor, Boston Fire Department Fire Prevention Division's Plan Review and Acceptance Testing Unit

Paul Donga discovered WPI's Fire Protection Engineering program while working for Boston's Building Department. The city's fire marshal had told Donga of a job involving fire code compliance reviews. "I wanted to get into that area," he says, "but my background was in electrical engineering." Still, he landed the job and then entered the FPE program. "I got exactly what I went for at WPI: tools for analysis," he says, which he uses daily reviewing building plans and overseeing acceptance testing—the final hurdle building owners must jump before occupying their structures.

Donga enjoys analyzing quirky building designs for fire safety. "With unique designs such as arenas or large convention halls, it's not always possible to meet the letter of the fire code," he notes. Design teams try to fulfill the code's intent, but won't always hit the mark. "If they claim a certain measure will work in terms of life safety, but we disagree, we point out where the design falls short and suggest changes," he explains. "Often, the developer will adjust the design to incorporate our feedback. But if they don't, we show up at the appeals hearings and resolve the issue that way." Though he prefers to find common ground prior to the appeals process, Donga won't back down. "Safety always comes first," he says.

Not all fire departments participate in the acceptance testing process; Donga is glad his does. In fact, the unit's creation is one of his most rewarding achievements as a fire protection engineer. "When I started out, Boston's fire department wasn't involved in the Certificate of Occupancy application," he explains. "I got to be part of the team that created the unit I work in today."

While not unique, the Plan Review and Acceptance Testing Unit is one of only a few in the nation. All fire departments participate to some extent with building plan reviews, but few have a say during acceptance testing. In this phase of the building process, Donga and his team—which includes two other WPI alumni—watch as fire pumps and fire alarms are tested, witness sprinkler system installation, see that smoke control systems work as intended, and in general certify that all fire safety systems are in place and operational. "It's very important to identify problems during acceptance testing," says Donga, "rather than discover them in an emergency."

"Fire protection engineers complement firefighters nicely. They're ready to put out blazes, and we try to make buildings safe before they're even built." —**Paul Donga**

Kenneth Miller '95 (M.S., FPE)
Assistant fire protection engineer, Las Vegas Fire Department

Whether a new Las Vegas building will be a typical Wal-Mart or a unique casino with high-rise thrill rides, Ken Miller makes sure it will not be a fire trap by reviewing construction projects of all stripes to ensure the designs meet building and fire codes.

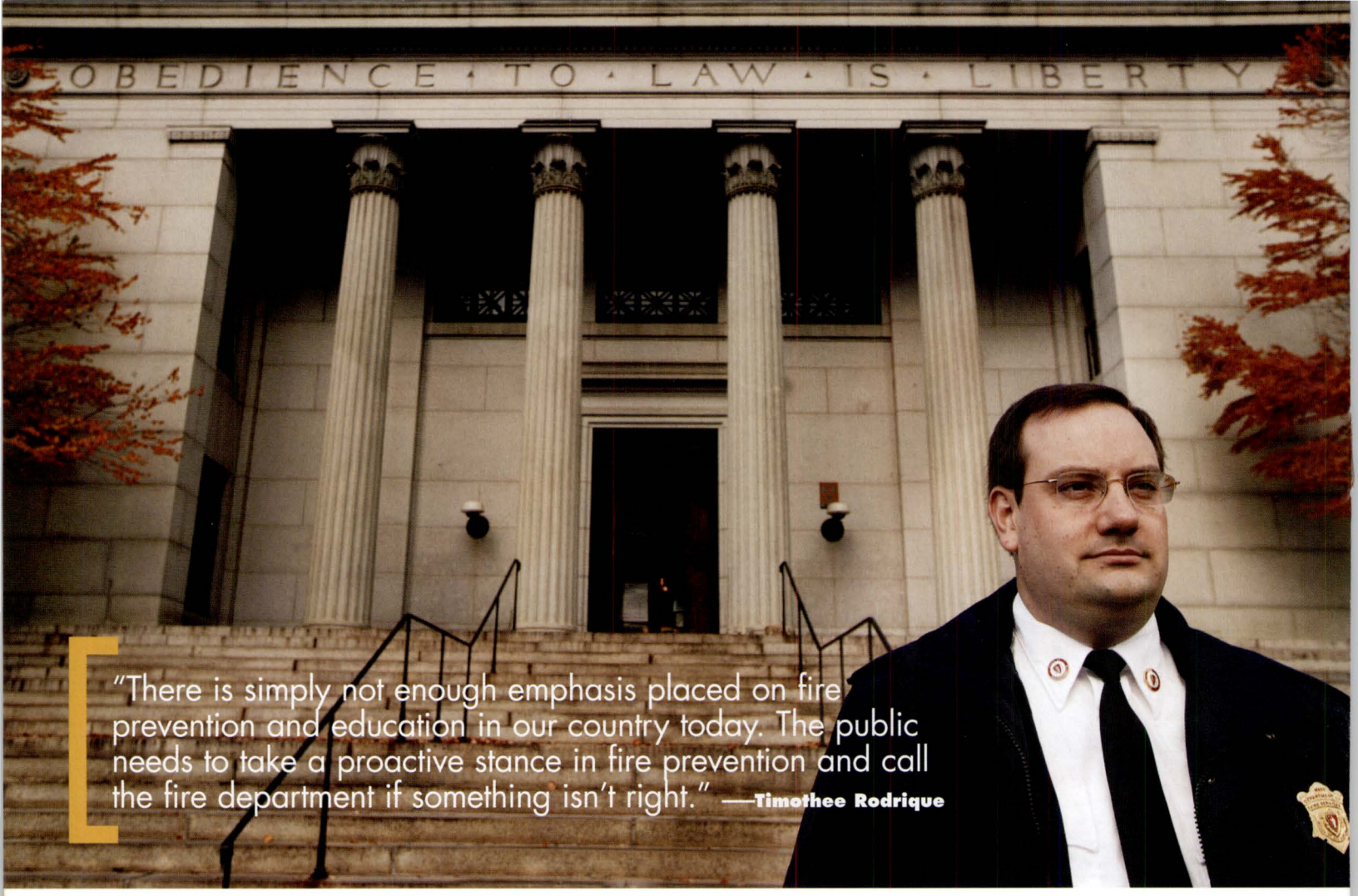
He recalls the 1980 MGM Grand Hotel fire in which the blaze itself killed very few people. "But smoke filled the hotel tower 15 or 20 floors above the fire, and 85 people were killed, most of them from smoke inhalation," he says. New high-rise codes, written with Miller's involvement, use buildings' HVAC systems to keep smoke contained.

Despite improvements he's seen, Miller is frustrated by the sluggish evolution of fire safety codes. After colossal tragedies such as the 9/11 World Trade Center conflagration or The Station nightclub fire in Rhode Island, "everyone beats their drums, calling for code changes," he says. "But change comes slowly."

While Miller acknowledges that politics, bureaucracies, and human nature can get in the way of change, "the pace of change in building codes also depends on your jurisdiction. In Las Vegas and Clark County, codes are relatively good because tourism drives the casino industry. People realize that this valley could never survive economically if there were another MGM Grand fire. So they take proactive steps in developing better building designs and codes."

Sometimes, especially in a place like Las Vegas, that's a tall order. Although most of the buildings Miller works on are typical commercial structures, 25 percent "cannot meet the letter of the code, because the buildings themselves are unique," he says. Take, for instance, the Stratosphere Tower, a casino boasting the world's three largest thrill rides atop the 1,149-foot-high building. For this structure, Miller helped assure fire safety by requiring two sets of backup water supplies for the fire sprinklers.

Miller's satisfied with the progress he's helped facilitate. "In my seven and a half years in Las Vegas, there have been documented cases where buildings I've approved have spared many lives and in which the fire sprinkler systems have helped extinguish dozens of fires," he says. "Minimizing life loss and property loss—that's the way to do the best you can with your knowledge."



Timothee Rodrique '96 (M.S., FPE)
Director of fire safety, Massachusetts Office of the State Fire Marshal

While attending WPI, Tim Rodrique worked for five years as a loss prevention consultant at Factory Mutual Engineering and Research Corporation in Norwood, Mass. "I learned the theory of fire behavior and fire dynamics at WPI," he says. "At Factory Mutual, I got the sprinkler system design experience and learned the ins and outs of fire codes. Combining theory with practice was invaluable to my career."

As director of fire safety with the Massachusetts Office of the State Fire Marshal, Rodrique sits on the Building Regulations and Standards Appeals Board, helping developers comply with codes. His greatest achievement to date has been participating in the state-level task force on fire and building safety, a group convened by Massachusetts Governor Mitt Romney after The Station nightclub fire in 2003 in Warwick, R.I., in which 100 perished. The 32-member panel, which included other WPI alumni, wrote a report addressing sprinkler systems, egress, interior finishes, and training and education, among other code-related issues. As a result of the report, Romney signed into law a new fire safety bill in August 2004. "This law involves some of the most sweeping changes in fire code since 1942," Rodrique says, referring to the year of the Cocoanut Grove nightclub fire in Boston, which killed 492 people.

But Rodrique knows that fire code problems are far from being solved. "The important thing to remember about fire codes is that they set a minimum," he explains. "If you're building a multimillion-dollar structure in a town that has only four firefighters, you may need to install more than fire sprinklers and possibly more than what is required by the code if you want to protect your life and property."

Rodrique also advises that everyone needs to be vigilant about fire safety. "There is simply not enough emphasis placed on fire prevention and education in our country today," he says. "The public needs to take a proactive stance in fire prevention and call the fire department if something isn't right."

"I'm grateful to WPI for its emphasis on the ability to communicate. When I'm talking with clients, whether a sprinkler system installer or construction contractor, I have to be able to explain fire code requirements and engineering methods without making everyone's eyes glaze over."

—David Waller

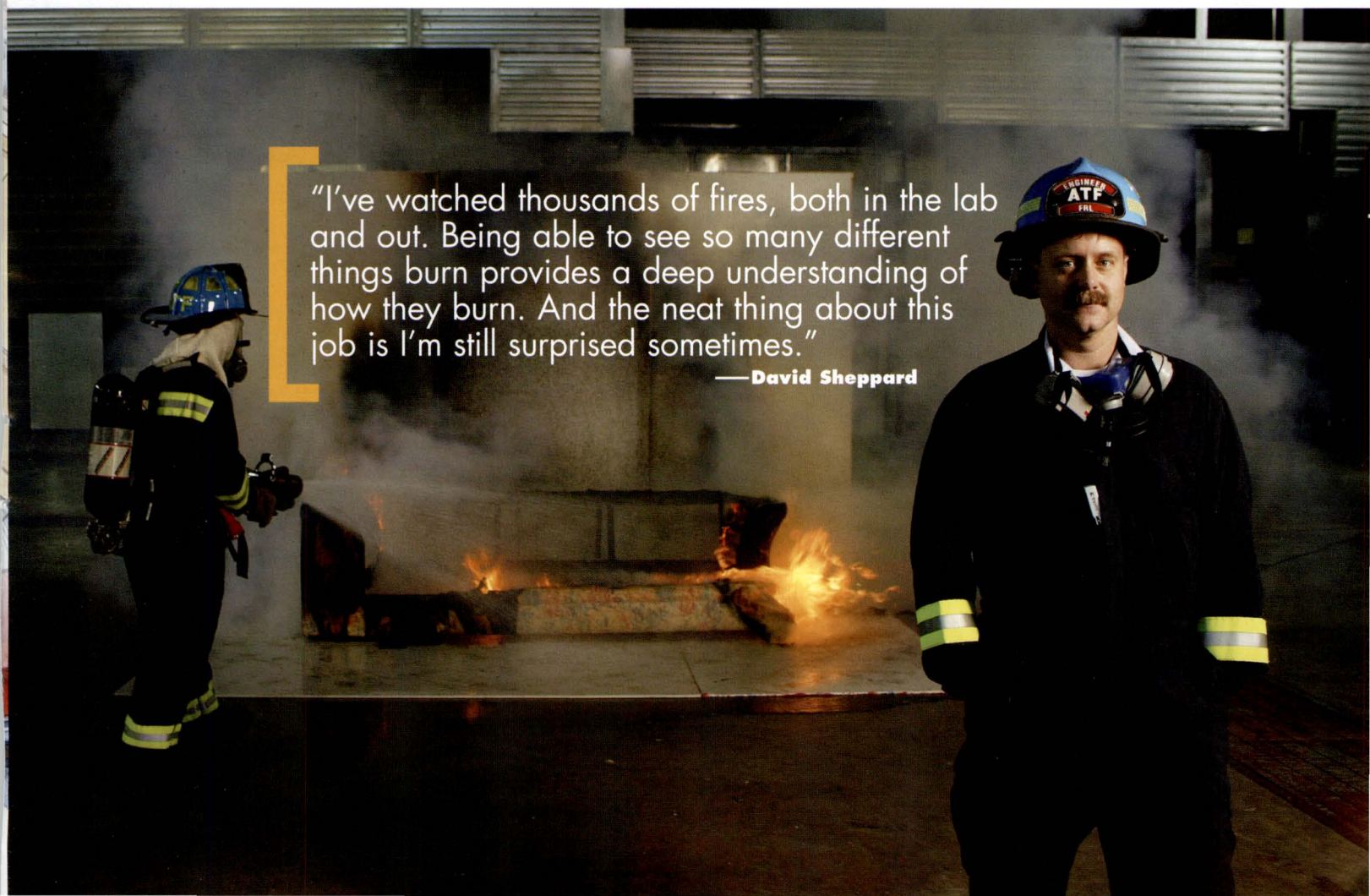
David Sheppard '93 (M.S., FPE)
Senior fire research engineer, Fire Research Laboratory, Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), Ammendale, Md.

Dave Sheppard has one word to sum up his job: fun. He works in a huge laboratory—half of a 176,000-square-foot facility—where materials and fluids are regularly set afire so scientists can study their fire- and smoke-related properties. The place is big enough to fit cars, buses, and even reconstructed buildings for studies. In the other half of the facility, scientists conduct traditional forensics work, such as analyzing blood traces, fingerprints, and bullets.

Sheppard wears three hats at ATF: scientific supporter for arson investigations, trainer, and fire researcher. In criminal case support work at the national, state, and local levels, he applies what he learned at WPI about fire dynamics and heat transfer calculations and analyzing visibility from various vantage points during the fire. These skills help him verify or void witness testimony when cases go to court.

As a trainer, he educates engineers and arson investigators in the latest research findings and computer modeling technology, passing along wisdom gained through fire research—Sheppard's favorite area. "I've watched thousands of fires, both in the lab and out," he says. "Being able to see so many different things burn provides a deep understanding of how they burn. And the neat thing about this job is I'm still surprised sometimes."

Putting the damper on old inaccuracies about fire is not something Sheppard does just for the fun of it. In the relatively young field of fire science, he realizes how vital it is to increase the knowledge base. "Since the 1970s, fire science has come a long way," he says. "Engineers and institutions such as WPI are helping us all make the transition from art to science. We know so much more now about why smoke travels the way it does, for instance, and how visibility will be affected in a given type of fire. That's an amazing accomplishment."



"I've watched thousands of fires, both in the lab and out. Being able to see so many different things burn provides a deep understanding of how they burn. And the neat thing about this job is I'm still surprised sometimes."

—David Sheppard

Safe or Secure?
Can your hotel room be both?

continued from page 23

"Besides our regular hotel guests—'heads in beds,' in industry vernacular—on any given day you can have a wedding, a corporate event, a professional convention, and several smaller conferences going on at the same time," she says. Factor in Starwood's nearly 130,000 employees and the numerous contractors, service people, and delivery trucks that pass through each day, and the result is a mind-boggling population density with wide-open access.

Sometimes the hazards experienced by the lodging industry make headlines, such as the 1976 outbreak of Legionnaires' disease at the Bellevue Stratford Hotel in Philadelphia. Sometimes they drive change; catastrophic fires of the 1970s and 1980s—including the 1980 inferno at the MGM Grand Hotel in Las Vegas—led to the Hotel and Motel Fire Safety Act of 1990, which made fire sprinklers standard in high-rise hotels. And sometimes they provide incredible challenges, as when terrorists target the worldwide hospitality industry, evidenced by bombings at the JW Marriott Hotel in South Jakarta and the Taba Hilton in Egypt.

Behind the scenes

But not all hazards are obvious to the average hotel guest. Berkol's workday can include managing the removal of underground storage tanks on land that once housed a gas station; ensuring that hot tubs and decorative fountains are properly maintained to prevent contamination by *Legionnella* bacteria; and developing training programs that teach kitchen workers not to use the meat knife on the fish or the fish knife on the cake, and remind desk clerks not to call out guests' room numbers to protect them from intruders. Even suicide is an issue: because fire regulations require high-rise hotel rooftops to be accessible for rescue and refuge, they can also attract unhappy people looking for a place to end it all.

Berkol's job is to set corporate policy and procedures for fire and life safety programs, and to monitor compliance. She also works with Starwood's real estate group to review designs for new hotels and oversees environmental inspections of properties designated for new builds, sales, and acquisitions. But, she says, the human element of her industry is as important as the infrastructure; hotel guests are in an unfamiliar environment and can't be trained to use the protection systems. So Berkol ensures that each hotel has crisis management plans in place, with personnel who are prepared to handle emergencies.

And, as a true hands-on manager, she shows up for inspections in flat-soled shoes and long pants so she can climb to the top of the elevator machine room or into the bowels of a building. She will also clamber up to the highest point of a building to see if rooftops are being neglected.

Post 9/11 challenges

The terrorist attacks of Sept. 11, 2001, left the hotel industry with both financial and security challenges. In articles in fire protection and hospitality journals, Berkol has addressed the potential conflicts between life safety and personal security. "Life safety means enabling you to quickly get away from something that might harm you," she explains. "But security tends to restrict people from coming and going freely."

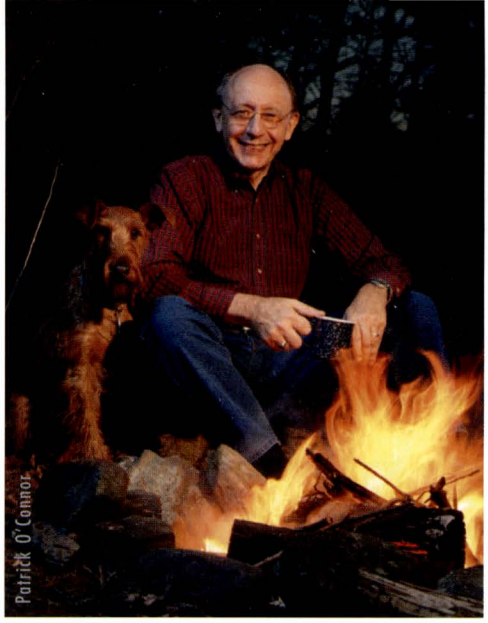
Stairwells provide a classic illustration of where safety and security intersect. A firesafety engineer sees the stairs as an evacuation route. But a robber, rapist, or terrorist can exploit that easy access to all levels of the building. Under certain conditions, fire regulations permit stair doors to allow entry to the stairwell but prevent re-entry onto guestroom floors. In a fire situation, this could trap people in a smoke-filled stairway by preventing them from getting back onto the corridor to seek another escape route. Some solutions include permitting access on alternate floors or every third floor or installing locking devices that revert to the open mode in the event of a power failure or emergency.

Some measures designed to enhance safety and security, such as closed circuit TV cameras on guestroom floors, are considered too intrusive. On rare occasions—for example, visits from important dignitaries or major political conventions—hotels have to restrict access and install metal detectors and X-ray machines as temporary measures to ensure the safety of all guests.

Berkol recognizes that the safety and security of many people is in her hands. "The weight of that responsibility is very great, if you think of it in those terms," she acknowledges. But, she adds with an easy laugh, "I try not to think of it that way too often. It can hamstring you!"

April Berkol is a member of numerous organizations, including the National Fire Protection Association, the Society of Fire Protection Engineers, the American Hotel and Lodging Association, the American Society of Mechanical Engineers, and the Construction Specifications Institute.

10 *Burning* Questions *for David Lucht*



David Lucht has spent 40 years in the fire protection field. In 1975, he was nominated by President Gerald Ford to serve as the first director of the newly formed U.S. Fire Administration. He was reappointed by President Jimmy Carter and held the position until 1978. Lucht left his government position to build and grow WPI's Fire Protection Engineering Program and its Center for Firesafety Studies, which this year celebrated its 25th anniversary. In July 2004, he was succeeded by Kathy Notarianni '86 (B.S. CE), '88 (M.S., FPE) of the National Institute of Standards and Technology. Lucht is now adjunct professor and director emeritus of the center, and associate vice president for university relations at WPI.

1. Your first foray into the field of firefighting was as a member of the Middlefield [Ohio] Volunteer Fire Department. What did you do?

In high school, I was a member of the first class of student cadet firefighters in that rural village. I washed the trucks, loaded fire hose, and barbecued chicken for the annual fund-raising dinner. One winter night, I helped dig through the ashes of a house fire in which five children had perished. I'm sure this experience influenced the direction of my life's work.

2. What's the coolest thing students see in WPI's Fire Science Lab?

Flashover—when a small, localized fire in a room transitions to total room involvement, from floor to ceiling. It marks the time when firefighters start to "lose the ball game" in a building fire and people die. Actually seeing a flashover gives it real meaning for students.

3. What was the most devastating fire in American history? What lessons did it teach us?

The Great Chicago Fire of 1871, which consumed more than 17,000 buildings and left 90,000 people homeless. Chicago was a symbol for similar conflagrations happening in cities all over America. The first national codes and standards for buildings, neighborhoods, fire departments, and public water supplies that were created in response to such disasters eventually put a stop to citywide conflagrations.

4. What has been the most significant improvement in fire safety?

The low-cost residential battery-operated home smoke detector is credited as having had the most profound impact on reducing the U.S. fire death rate—by 50 percent over the past three decades. This device was conceived and developed in the 1970s by Duane Pearsall, who was awarded an honorary doctor of science degree by WPI in 1996.

5. In the preface to *Making the Nation Safe from Fire: A Path Forward in Research* [2003], you state that the United States continues to have the worst fire loss record in the industrialized world. What are we doing wrong?

We are not smart with our fire safety investments. We pile one reaction to a disaster on top of another without stepping back and looking at the big picture from an engineering point of view.

6. The report also states that the threat of fire "is neither well understood nor fully appreciated by policymakers and the public at large." What has caused us to be so blind?

It's a combination of failures by the media and by the fire profession to get the word out. People tend to react to "headline fires" such as The Station nightclub fire, in which 100 people died; the public demanded that policymakers improve codes and enforcement. But thousands of deaths occur each year that do not make headlines or receive national attention.

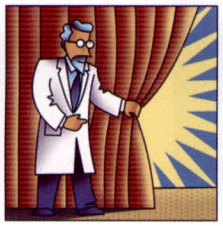
7. How real are Hollywood portrayals of fire—movies such as *The Towering Inferno* or *Backdraft*?

Not very. In a fire, the smoke is so dark and pervasive that you can't see your hand in front of your face, much less breathe. A realistic interior view of a building fire would be a black screen.

8. How will WPI's FPE program influence fire safety in the future?

Our graduates are the best-trained fire protection engineers in the world. Seeing them working in government agencies, engineering firms, fire departments, and industries of all kinds and giving talks at meetings of professional societies is my greatest reward. With the leadership of Kathy Notarianni, the next phase of FPE's future is under way. She and her colleagues will continue to expand WPI's impact on fire safety.

continued on page 34



Illuminations

You ask...we answer.

Can areas prone to wildfires ever be effectively fireproofed?

"Fireproof may not be the best word to use," says **John Woycheese,** assistant professor of fire protection engineering. "We can fireproof a building if we make it entirely of steel or concrete and allow no combustibles, such as paper, furniture, or clothing inside. But that would be a pretty miserable place in which to live or work. From the wildfire perspective, we'd have to put that building in the middle of a field with no landscaping around it.

"If you focus on the 'pure' wildfires (those with no buildings around), then you have to accept that some trees require fire to release their seeds. Thus: no fire, no new trees. Wildfire is nature's own 'spring cleaning.' It's a fast way of removing old undergrowth and dead trees to make room for new stuff. Unfortunately, because we believe wildfires are bad—considering the costs of fighting the fires and the dangers posed to firefighters and to homes and other structures—we extinguish smaller fires that would otherwise burn this undergrowth, thereby leaving behind copious amounts of fuel. This brush and tinder give a wildfire enough energy to damage even healthy trees.

"Perhaps a better question is, 'Can we stop the devastation caused by out-of-control wildfires?' The short answer is no. We, as a society, are not willing to make the appropriate sacrifices. An example that best illustrates this comes out of California. In 1991, a devastating fire in Berkeley Hills destroyed over 3,000 dwellings, worth about $1.5 billion. Contributing to the devastation were the neighborhood streets: they were too narrow to accommodate fire trucks when cars were parked on both sides. Fast forward eight or nine years, after many of the homes had been rebuilt: people were back to parking on both sides of the street.

"But let me get down off my soapbox and point to some excellent work that's moving us in the right direction. The Firewise program [www.firewise.org] educates the public on how to protect their homes from wildfire. While such safeguards won't make a house fireproof, the program provides information and tools that can help reduce risks and increase knowledge. And knowledge, in all its forms, is a beautiful thing."

Do you have a question on technology, science, the arts, current events, or everyday life? Send us your question, and we'll turn to WPI experts for the answer. Write to transformations@wpi.edu. Please include your name and class year.

Up Ahead with Kathy Notarianni, *continued from page 21*

place. I will remember always having a friend and confidante in David Lucht. He helped illuminate my path, and I want to provide that for the next generation of students.

9. Do you see the center as more than just an academic base?

My top priority is to create a friendly, supportive, intellectually rich, and stimulating work environment for our students, faculty, and staff. We do this by providing a wealth of opportunities for intellectual and social interaction between these three groups. I hope to foster both the recruitment of quality students from diverse backgrounds and opportunities for challenge and success once students are in our programs.

10. What's your vision for the future of WPI's Center for Firesafety Studies?

Building on the current strengths of the program and of the university, I'd like to establish a department of fire protection engineering that has, within its scope, both an industrial liaison center and a fire research center. I envision a department that awards a greater number of Ph.D.s each year so we can meet the country's needs in fire research, scholarship, and teaching. And I'd like to see more funding for full-time graduate study, a larger fire laboratory, and programs that award joint multidisciplinary degrees with other schools.

10 Burning Questions, *continued from page 33*

9. In your career, you have held positions in business, government, and academia. What has your professional journey taught you?

I've learned that the engineering mindset can be extremely effective addressing sociopolitical public policy issues. I wish more engineers would aspire to elected and appointed positions in government.

10. Besides fire, what excites you?

At the ripe old age of 61, I'm a budding artist. It's exciting to paint a portrait that actually turns out to be a good likeness of the subject. When I retire from WPI, I plan to spend a lot of time with my art.

AlumniConnections

Notes from Higgins House

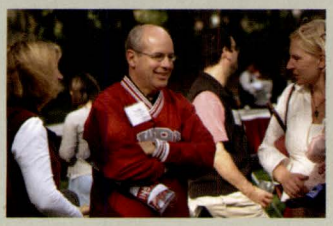
From Boston to Silicon Valley, WPI alumni are gathering to socialize, network, and talk about new ways to further the goals of the university.

At Homecoming 2004, President Dennis Berkey shared his vision for WPI's future direction. The Class Boards of Directors met to assess the effectiveness of the present structure and discuss ways to enhance communication between the alumni and the university. Regional networks and alumni clubs were also on the agenda, with discussion focusing on how they might function and be best supported by alumni. Detailed feedback on these issues is available online at the Alumni Association Web site (alumni.wpi.edu) or from the Office of Alumni Relations.

Off-campus alumni events provide opportunities for graduates outside of New England to reconnect with their alma mater and learn about new university initiatives. This fall, receptions in New York City and Washington, D.C., brought alumni into direct contact with WPI students and staff. At these gatherings, attendees heard firsthand about project center activities on Wall Street and in the nation's capital.

While spring may seem a long way off, please take a minute to mark your calendars for Reunion Weekend, June 9–12, 2005. This event offers a great opportunity to reacquaint yourself with the changing campus, meet with classmates, relive your college experiences, and just have fun. If you have any questions about Alumni Association activities or want to get involved as a volunteer, please contact the Office of Alumni Relations at 508-831-5600.

Fred Costello '59, President, WPI Alumni Association



Scenes from Homecoming 2004. Mark your calendar for Homecoming 2005, Sept. 30–Oct. 1.

Up Ahead

Tech Old Timers Events

Jan. 19. "School Safety Measures," a discussion led by Robert Pazella, safety liaison from the Worcester Public Schools.

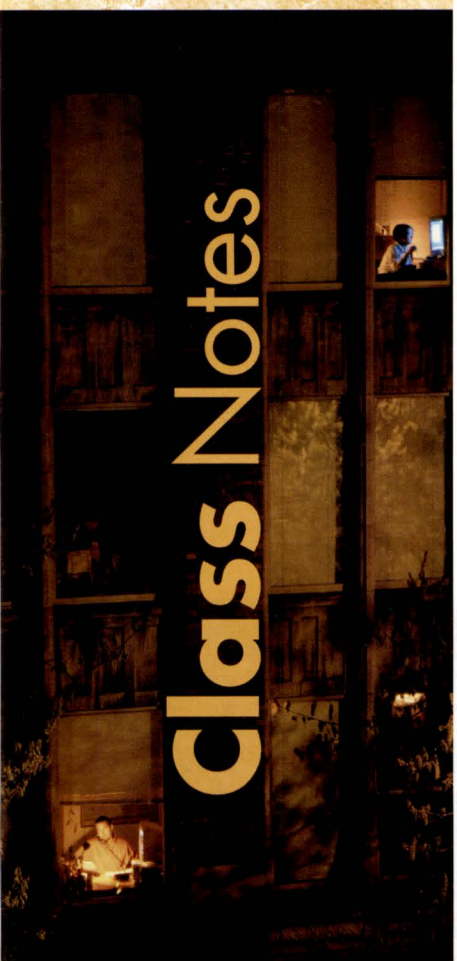
Mar. 9. "Plastics Industry in the USA," presented by WPI Trustee Gordon Lankton.

Apr. 6. "Birds of Prey" with Thomas Ricardi.

Mark Your Calendar

June 9–12. Reunion 2005 features the Alumni College, 50-Year Associates, an awards luncheon, hospitality suites, and more. A detailed schedule will be available in January.

Sept. 30–Oct. 1. Homecoming 2005.



Class Notes

43 **Ed Campbell** and his wife, Jean, live in New London, N.H., where they frequently enjoy short courses at Colby-Sawyer College. "The instructors are local citizens, and it is amazing what a wonderful grasp they have of their fields," he writes. Last winter Ed and Jean took a class called Weather: Fundamentals of Meteorology—Climactic Changes. "Lo and behold, the instructor turned out to be **Frank Bodurtha '42.** Frank is extremely well versed in all areas of weather and the composition of the Earth's atmosphere. Kept Jean and me working to keep up—but it was worth it!"

53 **Henry Vasil** writes, "Spent part of last year in Carmel, Calif., where no snow falls. Headed east on April 1, 2004, with my wife, Louise, following historic U.S. Route 40 for 3,500 miles to Westwood, Mass., my hometown."

54 Congratulations to **Art Nichols,** who received the highest honor in the MetLife

Foundation's 2004 Older Volunteers Enrich America Awards. Art volunteers approximately 400 hours a year through the RSVP program, helping seniors navigate the medical benefits system and preparing meals for homebound individuals. A resident of Kalamazoo, Mich., he traveled to Washington, D.C., to receive the award.

Milton Meckler, chairman of The Meckler Group Companies, was selected as one of four finalists for the Platts Global Energy Awards Lifetime Achievement Award. Other award sponsors include Capgemini, HP, and *Business Week.* Winners were announced after press time, at the Dec. 10 awards dinner, touted as "the academy awards of energy." For an update, visit www.globalenergyawards.com.

56 **Ted Coghlin** received the Governor's Inner City Investment Award on behalf of Coghlin Electrical Contractors and Network Services. The award, which is part of Gov. Romney's "Jobs First" initiative, honors companies that have brought new economic investment and jobs to the commonwealth's urban centers. Ted, former president of the company, is currently treasurer.

58 **Norman Howe** retired from Rappahannock Community College in Virginia last year as professor of chemistry and mathematics.

Artist **Bill Rabinovitch** (below) has been promoting his film

PollockSquared, which has evolved to contain a nested film called *PicassoCubed.* On the third anniversary of 9/11, he spent a cathartic evening filming the scene at Ground Zero, where a crowd gathered to witness the natural spectacle of birds and insects sparkling within the columns of memorial lights.

59 "Just enjoying the good life of retirement with lots of travel, cultural activities, and volunteering," writes **Joseph Vivona** of Atlanta.

64 At the end of 2001, **Bill Ferguson** took early retirement from Bristol-Myers Squibb, after culminating his 23-year career by planning and designing the company's new Pharmaceutical Research Institute. His new job, as director of the Lab Planning Group of architectural firm CUH2A, is "a welcome and interesting change," he writes. Bill and his wife, Dee, recently celebrated their 40th anniversary with a trip to the Caribbean. They have three grown children and two grandchildren.

65 **Venkatesh Rao** writes from Mysore, India, "After graduating from WPI with my M.S. in civil engineering, I returned to my teaching position at the National Institute of Engineering in Mysore. I retired as principal and am now working as a consultant.

66 **Michael Napolitano** is an electrical engineer with Danaher Motion in Westborough, Mass.

68 **John Kraska** was the Quo Vadis Club's 2004 Man of the Year. He was honored for his work in the community and as co-author of *The Polish Community of Worcester.*

Edward O'Hara has worked at Enercon Services since 2002, providing engineering services to nuclear utilities.

69 **Roger Dashner** lives in Marshfield, Mass., where he serves on the town planning board.

Richard Gross announced plans to retire as corporate vice president of research and development for Dow Chemical. Before handing over his responsibilities

to a new corporate R&D council, he will undertake a strategic analysis of the company's future direction. A profile of Rick appeared in the Feb. 23, 2004, issue of *Chemical & Engineering News.*

David Healey received the Citizenship Award from the Holyoke, Mass., Saint Patrick's Day Parade Committee. Since graduation he has worked at Tighe & Bond, where he was appointed president in 1999.

Joseph Senecal is director of the Kidde-Fenwal Combustion Research Center. He was the recipient of the EPA 2004 Stratospheric Ozone Protection Award for his work on international standards for halon alternative fire-suppressant agents.

70

Howard Norcross has joined E. Melson Webster Inc. as a sales associate. A resident of Chatham and Harwich, Mass., he is a longtime builder and real estate developer.

Raymond Paulk is a real estate agent in the Milford, Mass., office of ERA Key Realty Services.

Richard Rock and his wife, Eileen, have lived in Medford, N.J., since 1971. His employer, PECO Energy in Philadelphia, recently merged with Chicago-based Unicom to form Exelon, the country's largest electric utility company. "As senior engineer, T&D reliability, I work to keep the lights on safely, reliably, and economically for our customers," he writes. "Our daughter, Whitney (now a first-year student), chose WPI over seven other colleges because it offers tremendous education, life experience, and a strong biochemistry and biomedical engineering program."

72

Mark Andrews is principal of H&A Services, a Phoenix-based home inspection company. He was previously president of LoDan International and C&M Corp., both international manufacturing companies.

Bruce Eteson is director of IR&D for BAE Systems' Communication, Navigation Identification & Reconnaissance business unit. "If you remember me, shoot me an e-mail at etesonb@earthlink.net. If you don't, I might just publish that group photo I took on Morgan third our freshman year—or details on the quality of your work when I graded you as a TA!" For more memories, see Bruce's note at www.wpi.edu/+Transformations/Classnotes.

73

Lorraine (Lind) Caruso is transportation engineer for the city of Newport, R.I.

Herbert Hedberg is an electrical engineer at CETEK Corp. in Marlborough, Mass., where his son Mason completed an internship project that won first place in the Intel Science Talent Search, sometimes called the "junior" Nobel Prize. Mason's research on telomerase inhibitors in cancer treatment won him a $100,000 scholarship. He is a first-year student at Brown, where his brother William is a sophomore.

Richard Nabb was appointed vice president, global strategic sourcing, at Schering-Plough Corp.

74

The *Telegram & Gazette* reported that **Steve Dacri** pulled a fast one on the Worcester Regional Chamber of Commerce. Posing as a newly appointed city official, he announced plans to consolidate Worcester and Shrewsbury, lease the Worcester Regional Airport to NASA, and open a gambling

In the Public Eye

Michael Dolan '74 was promoted to president of **ExxonMobil Chemical Co.** Dolan returned to WPI last spring to discuss the future of the oil and petrochemical industry, in a forum called New Frontiers in Chemical Engineering ... **Dean Kamen '74**'s Segway continues to garner media attention, pro and con. An **ABC News** "Silicon Insider" commentary predicted that 2006 would be "the year of the Segway" ... **Judy Nitsch '75,** president of Judith Nitsch Engineering Inc., received the 2004 **Society of Women Engineers** Entrepreneur Award ... **Randy Wheeler '79** was the subject of an Entrepreneur Profile in the **San Francisco Business Times.** He is founder and CEO of Oak Systems, an insurance applications software company ... **Will Emmet '80,** a Yale University senior mechanical engineer, developed the astronomical camera used to capture images of Sedna, an enigmatic celestial body nearly the size of Pluto. **The Economist** speculates that Sedna might be proclaimed the 10th planet—or it might cause Pluto to be demoted from full planetary status ... **Olivia Pereira-Smith '81(Ph.D.)** was profiled in the May 28 issue of *Science of Aging Knowledge Environment (SAGE KE),* a companion publication to **Science** magazine. She continues her research on cell aging at the University of Texas Health Science Center at San Antonio ... During the World Series, **Bruce MacWilliams '84**'s analysis of joint stress was used to illustrate **The New York Times**' coverage of Red Sox pitcher Curt Schilling's ankle injury ... Apple CEO Steve Jobs called **Aran Anderson '93** to the podium at the Apple Worldwide Developers Conference in June. Anderson's satellite-tracking simulator won an **Apple Design Award** for the Most Innovative Apple Technology Performance Demo ... **Chuck Cimalore '94,** CTO and CEO of Omnify Software, was profiled in **Mass High Tech** in July ... **Becky Hoffman '98** shared her reactions to the popular advice book *He's Just Not That Into You* on NBC's **Today Show** on Oct. 26. She is director, program operations, cable, for NBC Universal ... **The Wall Street Journal** used **Simon Donkor '03**'s success story to illustrate the career value of professional science master's degrees. After earning his PSM at WPI, Donkor found a lucrative position in financial modeling with Fidelity Investments in Boston.

casino in the Worcester Common Outlets mall. It was all part of the entertainment at the chamber's Breakfast Club meeting in June.

75 **Jeffrey Wnek** writes, "After thinking about it for nearly 29 years, I have finally become a teacher. I started teaching earth science in January 2004 at Weddington High School, located just south of Charlotte, N.C. It is by far the most challenging job I've had, and I am enjoying it quite a bit!"

76 **Greg Cipriano** is vice president of business development at Protonex Technology Corp., a fuel cell development firm in Marlborough, Mass.

Robert Schildt continues as a liquor clerk for the Commonwealth of Pennsylvania. "I have a tough commute," he writes. "I walk two blocks (90 seconds) to work. I am still actively involved with model railroading."

Steven "Krebs" Maynard lives in East Hampton, Conn., with his wife, Pamela. He retired from Wiremold Co. and owns a large hobby shop called The Time Machine. He also teaches in the graduate engineering program at the University of Hartford and has five healthy children—four boys and a girl, ages 4–15.

77 **Gary Babin** is head of the town light department in Marshfield, Mass.

Allan Clarke joined the mathematics faculty of Pembroke Academy in New Hampshire after 18 years at St. Mary Central High School in Wisconsin.

Domenic Grasso is the new dean of the University of Vermont's College of Engineering and Mathematics. He was previously founding director of the Picker Engineering Program at Smith College.

Bruce Minsky received an honorary M.D. degree from Friedrich Alexander University in Erlangen, Germany. He is a professor of radiation oncology in medicine at the Weill Medical College of Cornell University, and is vice chairman of the Department of Radiation Oncology and chairman of quality assessment at Memorial Sloan Kettering Cancer Center. His wife, Connie Kissinger, is a vocalist in Hawaii. They live in Manhattan and Kauai.

Thomas Pajonas joined Flowserve Corp. in Dallas as president of the Flow Control Division.

78 **Paul Angelico,** president of Twin Rivers Technologies, was quoted in a newspaper article about summer jobs. According to the South Shore's *Patriot Ledger,* he spent summers toiling for low wages in his father's metal shop, only to learn that his father had been setting aside a portion of his paycheck for tuition at WPI.

John Bourassa qualified as a Certified Software Project Manager from the Quality Assurance Institute. He is also a Certified Software Test Engineer. A systems engineer for Lockheed Martin Integrated Systems and Solutions, he lives in Perry Hall, Md., with his wife, Jane, and two daughters, Gillian and Alicia. John was also elected a grand knight in the Fr. Burggraff Council of the Knights of Columbus.

John McGee works as a graduate research assistant in the mathematics department of Virginia Tech. He is currently on assignment at the Virginia Bioinformatics Institute, researching stochastic and discrete mathematical modeling of biological systems.

79 **John Arnold** chairs the Massachusetts Board of Library Commissioners. He was appointed to the board by former Gov. William F. Weld in 1994 and has served as a library trustee in his hometown of Westborough.

WPI electrical and computer engineering Professor **Rick Vaz** was appointed a senior science fellow of the Association of American Colleges and Universities. AAC&U President Carol Geary Schneider said, "Dr. Vaz is a national leader in engineering education and has led groundbreaking efforts at WPI to advance more integrative, civically engaged, and global learning for WPI's undergraduate students. We are delighted that he will be sharing his expertise with our staff and bringing his insights to bear on our continuing work in this area."

80 **Richard Mongeau** is vice president and general manager of Lampin Corp. in Uxbridge, Mass.

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.

Please check preferred mailing address.

Name _____ Class _____

☐ Home Address _____ ☐ Check here if new

City _____ State _____ ZIP _____

Job Title _____ Home Phone _____

Company _____ Work Phone _____

☐ Business Address _____ ☐ Check here if new

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Personal/career news for *Transformations:*

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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.

VoxAlumni

We ask...you answer.

What single invention or new technology has done the most to change the quality of your life (for better or worse)?

The cell phone, while useful, is the most aggravating, irritating, and overused invention of modern times. I've been run off the road, cut off at intersections, and almost struck while on foot by idiots on their cell phones. I've listened to other people's loud and mostly inane conversations in drug stores, in supermarkets, and on the street. I've even listened to men talking to their wives or girlfriends from a stall in the men's room. To combat this intrusion upon my privacy in airports, I take out my harmonica and begin playing "O, Susanna." We need cell phone-free zones or, better still, a cell phone shield (Maxwell Smart, eat your heart out!) that prevents their use in certain rooms and buildings.
—Al Papianou '57

How did we live without the Web—more specifically, search engines? I can quickly find answers online without leaving the comfort of my home or hunting through books. No longer do I spend hours going from store to store looking for the best prices; I can search online for the best deal. I can even locate long-lost classmates, former teachers, and relatives with whom I've lost touch. Of course without the Web, I wouldn't have my current job!
—Amy Marr '96,
Director of Web Development, WPI

Here's the question for our next issue:

What job have you held that taught you the most important lessons about life or work?

Send answers to transformations@wpi.edu
or
Editor, Transformations, WPI, 100 Institute Road, Worcester, MA 01609-2280

81

In September 2004 **George Awiszus** held the second annual golf tournament in

memory of classmate **Craig Abraham,** who died in 2002. Proceeds go to a college fund for Craig's three sons and provide a memorial scholarship for an Ashland High School student. Last year Craig's widow, Louise, presented the scholarship to Jared Renzullo, who is now a freshman at WPI. Visit www.craigabraham.com for more information.

Mark FitzMaurice works at Intel in Columbia, S.C. He was recently promoted to hardware design engineering manager in the modular and telecom server division.

James Heighton joined Consigli Construction as a project executive.

82

Charles Kincaid manages bridge and construction inspection services for Popli Consulting Engineers and Surveyors in Rochester, N.Y.

Bernie Mara joined Arrow International as director, engineering development, developing disposable catheters and other products for critical and cardiac care. He will relocate from Atlanta to the Reading, Pa., area with his wife, Susan, and their daughters, Elaine and Christine.

David Rubinstein was named chief operating officer of Invoke Solutions, a Web-services company backed by BAIN Capital. Invoke provides a Web platform for conducting focus group studies over the Internet.

John Tirrell's article on variable speed drives for natural gas preheat systems was published in *Pipeline & Gas Journal.* Since 1996 he has worked at CHI, managing transmission and distribution projects.

Robert Valentine lives in Auburn, Mass., where he is active on the school committee.

83

Wright Line in Worcester promoted **Michael Gagnon** to vice president of marketing and hired **Gary Wong** as field application engineer in the data center marketing group.

Nick Gall (M.S.) is senior vice president and principal analyst for META Group. A former intellectual property lawyer, he leads online workshops on IT infrastructure and consolidation.

Brian McLaughlin and his wife, Teresa, are the proud parents of a son, Sean William, born Jan. 20, 2003.

84

Robert Bunce continues with his career at IBM in East Fishkill, N.Y., where he is currently a senior engineering manager in ASIC development.

Rick Hajec is vice president of marketing and sales at Vectron International. He lives in Windham, N.H.

Jackson Nickerson is associate professor of organization and strategy at Olin School of Business, where his management research on manufacturing

operations in the pharmaceutical industry will by used by the FDA to revise safety regulations and procedures.

85 **Sue (Morgan) Castriotta** writes, "I finished my Ed.D. degree at UMass Amherst in February 2004. I am in my seventh year as a computer science faculty member at Keene State College in New Hampshire, where I work with first-year students and future K-12 technology teachers." She lives in Keene with her husband, **Lou Castriotta '84,** and their two daughters.

Michael Commisso is a software engineer at Nortel Works. He lives in Brookline, N.H., where he has been active on the school board.

Peter Gurney received the Air Line Pilots Association 2004 Presidential Citation for Outstanding Service in Air Safety for successfully diverting a Boeing 777 to Kona, Hawaii, after an engine bearing failed en route to Los Angeles. The three-hour, single-engine divert of United Airlines flight 842 from Auckland, New Zealand, took place on March 17, 2003. Gurney, who finished a three-year Naval Reserve tour of duty last year, is currently assigned as contingency operations officer with the Pacific Command, Pearl Harbor. In civilian life he remains a B-777/200 first officer for United Airlines in Los Angeles.

Eric Peterson is vice president of Innovative Products & Equipment in Lowell, Mass., where he works with fellow VPs (and ATO brothers) **Dale Beaver '82** and **Kevin Prince '84.**

Henry Skinner is CEO of NeoGenesis Pharmaceuticals in Cambridge, Mass.

86 **Karen Berka Bruewer** published "Managing Mayhem in the Midwest: The Indiana State Police Laboratory System," a forensic science column in the Summer-Fall 2004 issue of *NEACT Journal.* She has achieved the title of Forensic Scientist I at the Indiana State Police Crime Laboratory in Fort Wayne.

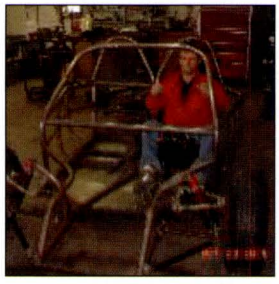
Larry Cardani's second daughter, Anna, was born Jan. 27, 2004. "Big sister Loren loves helping out," he writes.

Craig Malone (M.S.) joined the management team of XTREMEX3 in Chantilly, Va., as chief technology officer and senior vice president of product development.

Liz Mendez returned to WPI in April 2004 to speak at a forum called Scientists in the Federal Government Serving the American People. Liz serves as a GS-14 scientist in the EPA, conducting risk assessments on dietary and environmental exposure to pesticides.

Ed Ortler is vice president of sales for Open-Silicon Inc. in Sunnyvale, Calif.

Chris Whitney is building a two-seater sports car, a minimalist mix between a Porsche 911 and a 914, which he first



envisioned in his senior year at WPI. After years of sketching on dinner napkins and meeting notes, he is finally at work on his dream car. He plans to drive it from Maine to California, including a stretch on the Kancamangus Highway in New Hampshire, over the Colorado Rockies, and up the Pacific Coast Highway. You can track progress on the tube frame and drive train on his Web site, www.xt4.net.

87 Former soccer player **David King** coaches youth soccer in his hometown of Douglas, Mass., where he has been fund-raising and lobbying the town for expanded playing facilities. He works as a program manager at EMC Corp.

Paul Lubas and his wife, Paula, had their first child, Christopher Henry, on March 14, 2004. They live in Chatham, N.J.

After 14 years with General Electric, **Brian Teague** has

changed careers. A summa cum laude graduate of the University of Richmond Law School, he is now a practicing patent attorney with Alston & Bird LLP in Charlotte, N.C.

Karyn Van De Mark continues in the Molecular Technologies group of Biogen Inc., in Cambridge, Mass. Her husband, **Jeff Denker '88,** works for Analogic in Peabody. Their daughters are Katie, 6, and Jenna, 2.

88 **Larry Chisvin** is chief operating officer for PLX Technology in Sunnyvale, Calif.

89 **Ken Descoteaux** and his wife, Leslie DeSimone, announce the birth of their second child, Alexandra Rose, on May 5, 2004. She joins her brother, Marc, 5, in their Stow, Mass., home.

Michael Eldredge was elected a vice president at Morgan Construction Co., where he has worked since 1982, serving in the company's Rolling Mill unit, and in its Spare and Guides division.

Jeff Goldmeer was promoted to manager, Combustion Systems Lab, at GE's Global Research Center in Niskayuna, N.Y. He manages a team of 20+ engineers and technicians, developing and testing innovative combustion technologies for the company's power generation, aircraft engine, and rail businesses.

Rob Laventure and his wife, Elsa, had a son, Nathan Miguel, on Feb. 16, 2004, making 3-year-old Nicolette a proud big sister. Rob joined Phillips Semiconductor in January 2004 as an account manager for the Los Angeles market.

Jodi (Medeiros) McLane

joined Bowditch & Dewey as an attorney in the intellectual property practice. She is based in the company's Framingham, Mass., office.

Michael Moser and **Lisa (Desrochers) Moser '90** returned to New Hampshire, after 13 years in Pennsylvania and Virginia. Mike works with BAE Systems, and Lisa continues to relish keeping up with their three kids.

Scott Orzell is chief operating officer of Women's Health Connecticut, which he says is the country's largest group practice, with 150 OB/GYNs and mid-level practitioners throughout the state. He lives in Coventry.

Erin Ryan and **Don Gale** announce the birth of their second child, Maeve Anora, on Nov. 4, 2003. Their 3-year-old, Connor Jack, is enjoying life as a big brother.

Carl Schwarz and his wife, Rebecca, wed in 2001, announce the birth of their son, Carsten, in April 2004. Carl continues to work as a senior project engineer at Phoenix Electric Corp. in Canton, Mass.

Glenn Washer, his wife, Karen, and their children—Maggie, Bailey, Tobey, Jack, and Beau—have relocated to Columbia, Mo., where Glenn joined the faculty of the Department of Civil and Environmental Engineering at the University of Missouri. He can be contacted at washerg@missouri.edu.

90

John Erickson was appointed building inspector for the town of Milford, Mass.

Greg Harrington and his wife, Cathy Brown, are happy to announce the birth of their first child, Emily Grace, on July 14, 2004. Greg was promoted to principal fire protection engineer at the National Fire Protection Assoc., where he co-edited the 2003 editions of its *Building Construction and Safety Code Handbook* and *Life Safety Code Handbook.*

Paul Kirkitelos was appointed to the advisory board of Falcon Natural Gas. He is co-founder and COO of Rabbitt Capital Management, LCC.

Patti Newcomer-Simmons and her husband, Stan, are thrilled to announce the birth of their first child, Margaret Kathleen (Megan), on May 8, 2004. They live in Glenn Allen, Va.

Ron Skoletsky and his wife, Marie Morel-Seytoux, announce the birth of Blaise Eddy, born June 23, 2004. Three-year-old sister Freya welcomes Blaise as her new squeeze toy.

Jennifer (Lambert) and **Brian Smith** have two children—Timothy (1999), and Katelyn Rose, born April 17, 2004. Brian is director of transportation at Staples Inc. Jennifer left an exciting career in the electronics manufacturing industry to be a full-time mother and a fitness instructor. She competes nationally in NOVA fitness competitions, which involve military-style obstacle courses and other fitness skills. She placed 13th overall in the U.S. Championships and hopes to attend the World Championships. "Thanks to the loving support of my biggest fan and coach (Brian), I am able to pursue these goals and serve as a positive role model for other women," she says.

Vincent Tyer is president of Taconic Builders Inc. A 2002 MBA graduate of the Stern School of Business, he has two daughters, Caitlin, 5, and Kerry, 3.

Demetrios Venetis writes, "I am thrilled and overjoyed to announce the birth of our first child, Sophia Irini, on April 22, 2004. Both Mom (Val) and baby are doing great, and Dad is on an emotional high." They live in Storrs, Conn.

91

Michael Maglio joined Tibbetts Engineering Corp. as a project manager in the civil engineering division. He lives in Plainville, Mass., with his wife and two daughters.

Robert Millington married Kerrin Lauria on April 25, 2003. He is a project manager at Pratt & Whitney in Cheshire, Conn.

Cris Pierry is vice president, product development, for the online music service provider MusicNet. He is based in the Seattle office.

92

John Adams relocated to Taipei, Taiwan, for a two-year assignment as Asia factory operations manager for Teradyne Inc. He is there with his wife, Rhonda, and their two daughters, Jessica, 4, and Brooke, 1.

Magued Barsoum and his wife, Mariette, are proprietors of Divine Kitchens LLC in Westborough, Mass. To celebrate the September 2004 opening, they hosted a series of culinary events featuring local chefs preparing and serving their specialties.

Where in the world? Visitors to the Roman Coliseum are commonly accosted by representatives of various tour companies trying to induce them to take their tour. Surprisingly, **Jeff Goldmeer '89** and his wife were approached by a young man who said, "So, you went to Worcester Poly Tech? I'll give you a discount for your tour." It turns out the tour guide was raised in Boston and is now living in Rome. "The discount was only one Euro," says Jeff, "but it was a great tour!" Membership has its advantages, after all.

Send us a picture and tell us where you've worn ***your*** WPI letters lately.

Antonio Daniele married a fellow Sikorsky Aircraft employee, Anna Maria Kazmierczak, last summer.

Jennifer (Wood) and **Michael Mastergeorge '93** announce the birth of Caroline Rose on May 4, 2004. She joins her siblings—John, 5, and Eliza, 3—in their Amherst, N.H., home.

Robert Rosenblatt married Susan Erne on Oct. 12, 2004. A graduate of the Philadelphia College of Osteopathic Medicine, he is completing his residency in internal medicine at the University of Connecticut Medical School.

Dorothea (Carraway) Wong was named director, strategy and development, for Pratt & Whitney, where she has worked since graduation. She holds a master's degree in metallurgy from RPI and an MBA from the Harvard Business School.

93

Matt Boutell and his wife, Leah, had a son, Elliot Matthew, on Aug. 8, 2004. His siblings are Jonathan, Caleb, and Elise. Matt is finishing his Ph.D. in computer science at the University of Rochester.

Al Grasso was promoted to senior vice president and director of the Command, Control, Communications, and Intelligent (C3I) Federally Funded Research and Development Center (FFRDC), operated by MITRE for the U.S. Department of Defense.

Brian Kuchar joined Frisella Engineering in Wakefield, Mass., as a project landscape architect.

Kathleen Lamkin-Kennard and **Scott Kennard '98** had their third child, William Dylan, on March 31, 2004. They live in Brockport, N.Y.

Bill Lewis continues to grow his Internet-based real estate company, propertysites.com, and his software development company, Enobis. He and his wife, Julie, live in Ellicott City, Md., with their daughters, Caroline and Jillian.

Mark Russell is finishing his eighth year in the Navy, currently serving as an instructor pilot in VT-27 with **Michael Lohan '94.** "I am also privileged to be going on my eighth year married to the lovely and beautiful Katherine Connery, whom I met while attending WPI. We have two great kids—Emma, 6, and Owen, 2.

Michael Thibodeau writes, "Eleven years and two doctorates (DMV and Ph.D. with board certification in anatomic pathology) after graduating from WPI, I have begun my first permanent position as a senior scientist (toxicologic pathologist) at Boehringer Ingelheim Pharmaceuticals in Ridgefield, Conn. I live in the beautiful hills of New Milford with my wife, Kate, and two children, Ryan and Brooke."

94

Christine (Jesensky) and **Benjamin Bennett '96** live in Bedford, Mass., with their son, Timothy Orlean, born in 2003. "Tim is always into mischief and keeps us (and our poor dog, Emily) on our toes!" they write.

Scott Boulay, an enrolled actuary, was named a principal at Boulay, Donnelly & Supovitz Inc. He lives in Shrewsbury, Mass.

Jennifer Charland is a project manager for the Boston law firm Ropes & Gray.

Peter Demarest married Julie Dienno on April 24, 2004. Best man was **Roger Dufour.** They live in Bowie, Md.

Jason Makofsky is in his third and final year at Boston College of Law. He expects to pass the bar in July 2005 and practice in the Boston area, focusing on real estate, construction, regulatory, and intellectual property law. He and his wife, **Kelly McQueeney '92,** live in Natick. Kelly received her master's in environmental engineering from UMass Amherst in 1993 and is now a senior project manager at Shaw Environmental & Infrastructure in Stoughton.

Yvonne (Bergstrom) Proulx and her husband, Jeffrey, are proud to announce the birth of a daughter, Catherine Jeanette, on June 3, 2003. They live in Grafton, Mass.

Bethany Salek and her husband, Andrew, welcomed their first child, Lindsey Grace, on Aug. 3, 2004. Bethany celebrated her 10-year anniversary with Saint-Gobain, in Worcester, where she is a product and production manager.

After completing postdoctoral work with the Centers for Disease Control and Prevention in 2003, **Kristina Zierold** joined the faculty of the Department of Environmental Health Sciences in the University of South Carolina's Arnold School of Public Health. Using her training in exposure assessment and epidemiology, she focuses her research on the human health outcomes of pollutant exposures.

95

Derek and **Cynthia (Stachura) Adams,** and big sister Charlotte, announce the arrival of Marcus Edward on June 11, 2004. They live in Skippack, Pa. Cynthia has passed her PE exam in Pennsylvania and is now a project engineer in the Kulpsville office of Schoor DePalma Inc.

Marie (Meier) and **Greg Aviza '93** welcomed their first child, David Gregory, on May 15, 2004. Greg works as a project engineer for Gillette, and Marie is a principal engineer at American Superconductor. They live in Burlington, Mass.

Alexis (Kirk) and **Ryan Clement '96** happily announce the birth of a son, Max Ryan, on Dec. 18, 2004. Ryan is plant manager at Matheson-Trigas, and Alexis works at Ibis Technology. They live in Danvers, Mass.

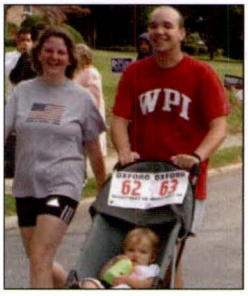
Jennifer (Anderson) Crock and her husband, Karl, had a baby boy, Philip Ezra, on July 26, 2004. Big brother Nathan welcomed him to their Wilmington, Del., home. Jen, in addition to being a proud mom, is a program manager for space propulsion and ordnance products at Alliant Techsystems.

Lisa (Caponi) de Mars and her husband, Robert, had a son, Owen Lane, on April 24, 2004.

Heather (Linnehan) Desmarais and her husband, Dale, have a daughter, Kyla Rose, born March 1, 2004. The happy family lives in Hampden, Mass. Heather received her master's degree in engineering management from UMass Amherst in 2003.

It's been a busy year for **Jeralyn (Clouart)** and **Chris Haraldsen '96.** Almost a year after the birth of a daughter, Kate Denise, Jeralyn received her Ph.D. in molecular microbiology from Tufts University School of Medicine in September 2004. The family moved to Waterbury Center, Vt., where Jeralyn is pursing postdoctoral research at the University of Vermont, and Chris works for PPT Vision.

James LaGrant, his wife, Trish, and daughter, Sophie, became



poster children for Oxford, Pa.'s annual 5K race, held Sept. 25, 2004. "Little did I know that our picture (and my prominent WPI letters!) would be used for the organization's Web site banner and headline photo," he writes.

Jeffrey Mullen and his wife, Kerry, are pleased to announce the birth of their daughter, Julia Rose, in April 2004. Jeff is a technical support engineer for Optos Inc. They live in Tewksbury, Mass.

Eric Pearson is assistant vice president, eServices, for Enterprise Bank and Trust Co. in Lowell, Mass.

96

David Boulanger works at Babcock Power. He and his wife, Alicia, live in West Warwick, Mass.

Michelle Bruneau wed Jeffrey Atchison on April 24, 2004.

Bridesmaid **Alison Kmiecik** flew in from the Netherlands for the special occasion. After a Caribbean honeymoon on a tall ship, the couple resides in Woodlyn, Pa.

Ryan Daly is finishing his training in internal medicine at Boston Medical Center in preparation for a cardiology residency at the Cleveland Clinic Foundation.

After moving to the Sacramento area in 2002, **Krysten Laine** has accepted a position in the Oakland office of Fugro West, part of Fugro International, where she will develop a GIS enterprise for data analysis, asset management, and product support.

Cynthia Mitchell recently relocated to Spring Lake in western Michigan. She continues as a senior project engineer for Pratt & Whitney.

Jesse Parent returned to his former position as a principal engineer with Sorenson Media in Salt Lake City. He has been touring international improv festivals with his newly formed group JoKyR and Jesster.

97

Ralf Bruyninckx (M.S. FPE) recently stepped into the management seat at FPC (Fire Protection Consultants), the pioneering Belgian firm founded by his father, Ed Bruyninckx. Last year the company managed the installation of safety and sprinkler systems in theme park resorts throughout Europe.

Cindy (Young) and **Mark Burke '95** welcomed their first child, Jared Alexander, in February 2004. Cindy is a

family physician at Moses Cone Hospital, and Mark manages bioinformatics and IT for the Department of Plant Pathology at North Carolina State University.

Peter Gobis married Maria Ribaudo last year. He works for Senior Aerospace in Sharon, Mass.

Shannon Hogan received her degree in osteopathic medicine from the University of New England in June 2004. She is currently a first-year pediatric resident at Connecticut Children's Medical Center.

Alison Possas married Christopher Johnson on April 18, 2004. **Terri Green '99** performed "The Rose" during the wedding procession, with **Jimmy Pavlat, Mike Fyrberg, Kevin Osborn '98,** and **Kiki (Dreyer) Abraham '00** in attendance. After a honeymoon in Lake Tahoe and San Francisco, the couple returned to their new home in Tolland, Conn.

Douglas Reilly is vice president of operations for NanoOpto Corp. in Somerset, N.J.

William Spratt is facilities director for the Nashoba Regional School District in Bolton, Mass.

Jami Walsh is pleased to announce that after four years with Prism Environmental she has joined the Water/Wastewater Engineering Dept. at Earth Tech Inc.'s Concord, Mass., office.

98

Julie Davis and Keith Richard were married Sept. 5, 2004, with **Sarah Furey, Carolyn LaCamera, Erica Lotz, Jessica Sands,** and **Jeremy Richard '96** in the wedding party. Julie and Keith purchased a home in Shrewsbury, Mass., in April. Julie was promoted to staff scientist at Genzyme Corp. in July.

Jill Baryza LeFevre and her husband, Gene, are happy to announce the birth of their daughter, Gabriella Maria, on Aug. 11, 2004. They live in Peekskill, N.Y.

A. J. Meuse (Ph.D.) is president and CEO of Associates of Cape Cod, manufacturer of endotoxin and beta-glucan detection products for the pharmaceutical industry.

Christopher Pacitto manages the Fort Myers branch of GFA International, a geotechnical engineering and materials testing firm serving all of Florida.

"Life will never be the same again!" writes **Jennifer Childs Smith** on the birth of her twins, Benjamin Fuller and Connor Matthew. They weighed in on Feb. 7, 2004, at 5 pounds, 15 ounces, and 6 pounds, respectively. She lives in Niskayuna, N.Y., with her husband, Jeff, and the twins' big brother, Austin.

99

Mark LaRochelle married Laura Schonback last year.

Lisa (Angle) and **Garren Walters '98** announce the birth of their first son, Justin, in November 2003. They live in Nashua, N.H.

00

Kristin Connarn and **Frederick Toy** were married on Sept. 4, 2004, in Hampstead, N.H. Their best man was **Keith Berard.**

Matthew Dube and **Erica Tworog** were married July 18, 2004, on Town Neck Beach in Sandwich, Mass. They live in Westborough, Mass.

Maureen Hamilton (M.S.) was named project manager, specializing in molecular biology, at ECI Biotech in Worcester.

Wes Marcks was promoted to field application engineer at Vision Systems.

An engineering scholarship in memory of **Trevor Martin** was established by the Greater Gardner Chamber of Commerce. Trevor was employed at Tyco Safety Products when he died at age 27, after a lifelong battle with muscular dystrophy.

Brian Morgan left his post as conservation commission chairman for Billerica, Mass., to attend law school at Syracuse University.

Ben Newton married his longtime sweetheart, Camelli Voci, last year.

1st Lt. **Stephen Sacovitch** married Michelle Swiderek last year. He is stationed at Wright-Patterson Air Force base.

James Valis works for Edward Jones Investments in Massachusetts. He was recently involved in opening a new branch in Narragansett, R.I.

01

Lauren Golmanavich (M.S.) is a quality control manager at EqualLogic Inc. She married Scott McIver on April 24, 2004.

Brynn Hart and **Matt Hanson** were married May 29, 2004, in Seattle. They honeymooned in Bora Bora before returning home to Omaha, Neb. Matt is serving as an Air Force lieutenant stationed at Offutt AFB. Brynn sells diagnostic imaging equipment for GE Healthcare.

Amanda Kight and **Paul Muller** were married on June 19, 2004.The wedding day was

made even more special (and fun!) by the attendance of classmates **Matt Cattel, Ernie DiMicco, Adam Covati, Alex Knapp, Shane Wilhelmsen, Ben Carl, Mike Fluet** (with wife Maurissa), and **Ben Leclerc.** See wedding pictures at www.paulandamanda.com. Paul is a 1st lieutenant working on his master's degree in physics at the Air Force Institute of Technology. Amanda is a Ph.D. candidate in engineering at Wright State University and also works as a contractor for the Air Force.

Ryan Kilgore has moved to Canada with his wife, Lauren Kennedy, to begin a Ph.D. in

human factors at the University of Toronto.

Tracy Patturelli and **Antonio Troncoso** were married May 8, 2004. They live in Boxborough, Mass., where they are continuing their engineering careers.

02 **Esteban Burbano de Lara** of Quito, Ecuador, started his own business intelligence company, NOUX, (www.nouxbi.com) in May 2003. He has partnered with IBM and Business Objects Corp. to develop data warehouses for key clients in Ecuador and the South America region.

Elizabeth Sarah Cash and **Jeremy Hitchcock '94** were married last year in a small double-ring ceremony at Gethsemane Lutheran Church near their home in Manchester, N.H. Jeremy's attendants included Tim Wilde. Also present at the ceremony were **Sarah Themm, Meri Campbell, Jon Graham '01,** and **Ben Parks 03.** More WPI alumni were able to join the festivities at a celebratory barbecue the next day. Liz and Jeremy plan to take a honeymoon cruise in the Mediterranean later in the year.

Lori Luiz became engaged to James Dascoli on Nov. 8, 2003. The wedding will be on Sept. 17, 2005, in Easton, Mass.

Jessa Thomas married **Eric Marshall** on Aug. 28, 2004. They honeymooned in Fiji and live in Webster, Mass.

Sean Nelligan works for UPS in Worcester as an industrial engineering supervisor. He and his wife, Sarah, live in Clinton, Mass.

Mark Szela works for Goldmith, Prest & Ringwall Inc. He and his wife, Kelly, live in Webster, Mass.

03 **Kerry Lee Anderson** and **Benjamin Kennedy '00** were married on July 17, 2004. She is working on a Ph.D. in biomedical optics at Boston University, and he is a hardware engineer at Emulex Corp.

Mark Anderson works at the Naval Undersea Warfare Center. He lives in Westport, Mass., with his wife, Jill.

04 **Leslie Clayton** (M.S.) works in the civil engineering department of Seamon, Whiteside & Assoc. in Mount Pleasant, S.C.

Graduate Management Programs

Joaquim Ribeiro ('58 MBA) joined the board of Kadant Inc. in Acton, Mass.

Master of Mathematics for Educators

Whitney Biafore '98 earned National Board Certification in secondary mathematics. She teaches at Toll Gate High School in Warwick, R.I.

Dan Seltzer '02 teaches high school math in Waterford, Conn.

Master of Natural Science

Stan Kundra '74 has announced his plans to retire from Farmington (Conn.) High School, where he has taught for 35 years. He will stay on as a part-time consultant managing the school's computer system, and will do some traveling in South America.

Donna Ray '80 joined the science faculty at Pembroke Academy in New Hampshire.

School of Industrial Management

Francis Elliott '78 received the 2004 Award of Merit from the Armed Forces Committee of Worcester County. A Navy veteran who served in the Pacific and Far East, he is commander of the Worcester Veterans Council and has been active in the American Legion and other veterans groups.

Obituaries

Everett D. Collins '31 of West Springfield, Mass., died June 13, 2003. His wife, Arline (Riggs), died in 1996. Survivors include a brother-in-law and a nephew. Collins was an engineer at Spaulding Sports Worldwide. He belonged to Phi Sigma Kappa and Tau Beta Pi.

Otis E. Mace '31, a longtime Baltimore resident, died May 12, 2004. He was the founder and retired president of Mace Electric Co. Inc. His wife, the former Eleanor "Dilly" Dilworth, died in 1991. Mace attended WPI through the generosity of an aunt, Florence Mace Putnam, who allowed him to board with her in her Harvard Street home and helped with his expenses. Mace later honored her by establishing the Putnam Memorial Scholarship Fund. A Presidential Founder and lifetime member of the President's Advisory Council, he belonged to Alpha Tau Omega.

Hugo P. Borgatti '33 of Woodstock, Ill., and Dunedin, Fla., died Nov. 13, 2003. Predeceased by his wife, Catherine (Monahan), he leaves two sons and a daughter, seven grandchildren, and seven great-grandchildren. Highlights of his 35-year career with United States Rubber Co. (now Uniroyal) include the design of barrage balloons, which were flown over England to deter enemy aircraft, and rubber life rafts used by downed pilots.

John A. Henrickson '33 of Sun City Center, Fla., died April 12, 2004. A longtime employee of U.S. Steel Corp., Henrickson started at the former American Steel and Wire Division in Worcester and later served at the company's research laboratories in the Cleveland and Pittsburgh areas. He leaves his wife, Evelyn, a son, a daughter, four grandchildren, four great-grandchildren, and his brother, Harold F. Henrickson '36. He belonged to Theta Chi.

Transformations recently learned of the death of **Paul S. Grierson Jr. '34** of DeKalb, Ill., in 2002. A member of Phi Gamma Delta and Tau Beta Pi, he was retired from Gibbs & Cox Inc. Grierson and his wife, Dorothy, had two sons and two daughters.

Plummer Wiley '35 died Jan. 29, 2004, at his Baltimore residence. His wife, Jean (Larash), predeceased him. Wiley joined Chesapeake & Potomac Telephone (now part of Verizon) in 1939 and retired as an engineering manager in 1975. A charter member of the Alden Society, he received the Herbert F. Taylor Alumni Award for Distinguished Service to WPI in 1980. He belonged to Theta Chi, Tau Beta Pi, and Skull.

Theodore C. Andreopoulos '38 of Buffalo, N.Y., brother of George Andreopoulos '42, died

Nov. 20, 2003. Other survivors include two sons and his close friend Helen Maldovan. His wife, Doris (Woolff), died in 1984. Andreopoulos earned a bachelor's degree in aeronautical engineering at MIT in 1940, and a master's degree in theoretical and applied mechanics at the University of Buffalo. He was a structural analyst whose 45-year career included positions at Boeing and numerous other aviation companies. He belonged to Sigma Xi.

Donald M. Burness '39 of Pittsfield, Mass., died April 26, 2003. Predeceased by his wife, Helen, he is survived by two sons and four grandchildren. Burness was retired from a long career with Eastman Kodak Research Laboratories, where he helped develop color film for consumer sales and devised a method for synthesizing vitamin A. He belonged to Lambda Chi Alpha, Phi Lambda Upsilon, and Sigma Xi.

Frans E. Strandberg '39 of Venice, Fla., died March 16, 2004. A Navy Sea Bees officer during World War II, he worked on naval construction projects and later retired from USG Corp. as a mechanical engineer. Survivors include his wife, Elsie (Olson), a brother, a niece, and a nephew. Strandberg belonged to Lambda Chi Alpha.

Harold E. White '39 (SIM '55) of Kennebunk, Maine, died April 26, 2004. He leaves his wife, Betty (Wallace), a son, two daughters, four grandchildren, and three great-grandchildren. White spent his career with Norton Co., starting as a factory engineer and rising to research director. He retired in 1982 as a vice president. A member of Theta Chi, he belonged to the President's Advisory Council.

Eric S. Anderson '40 of Laconia, N.H., died May 5, 2004. His wife, Hazel (Casperson) died in August. Surviving are a son, a daughter, two grandchildren, and two great-grandchildren. Anderson worked for many years as a service manager for Turbo Power and Marine Inc., a division of Pratt & Whitney. He belonged to Lambda Chi Alpha.

Willard J. Riddick '40 of San Diego, Calif., died Jan. 3, 2004. He was predeceased by his wife, Mary Jane. A U.S. Navy veteran, he was retired from employment with the federal government. He belonged to Sigma Alpha Epsilon.

Raymond L. DeLisle '41 of Leominster, Mass., died Feb. 8, 2004. He leaves his wife, Marie (Thibodeau), two sons, and four grandchildren. In 1948 DeLisle joined his father at the former DeLisle Fashions, which he later owned and operated until his retirement in 1982. He belonged to Phi Kappa Theta.

George W. Knauff '41 of Colorado Springs, Colo., died Feb. 8, 2004. He is survived by his wife, Alice (McKee), a son, and a daughter. Knauff was a retired major with 37 years of service in the Marine Corps Reserves. He worked as a sales representative for Buffalo Forge Co. for 40 years and later retired as a steam locomotive engineer for the historic Cumbres & Tolter Scenic Railroad between Colorado and New Mexico. He belonged to Phi Sigma Kappa and Skull.

Albert S. Goodrich '42 of Sandy Hook, Conn., died Jan. 19, 2004. He was predeceased by his wife, Mary (Kinghorn). Goodrich was retired from Smith-Corona as a mechanical engineer. He belonged to Lambda Chi Alpha.

James L. Loomis Jr. '43 of Bethany, Conn., died Dec. 13, 2003. He married Eleanor Jones in 1943 and worked for Farrel-Birmingham Co. and Pryer Corp. He belonged to Alpha Tau Omega.

Robert Pettibone Seaton '43 of Norristown, Pa., died Oct. 21, 2003. He leaves his wife, Ruth (Howley), two daughters, two stepsons, a stepdaughter, 11 grandchildren, and two great-grandsons. A naval aviator who served in the Pacific theater during World War II, Seaton retired from Allen-Bradley Co. in 1985 as manager of the Mid-Atlantic area. After losing his left leg, Seaton devoted his time to the AMP-PEER program at Magee Rehabilitation Hospital, counseling fellow amputees. He belonged to Phi Gamma Delta and Skull.

Robert C. Brown '44 of East Rumford, Maine, died April 5, 2004. A longtime sales service engineer for Boise Cascade Paper Co., he retired in 1983. His wife, Ann (Colby), died in 2002. Survivors include three sons, two daughters, 16 grandchildren, and 10 great-grandchildren. Brown belonged to Phi Sigma Kappa.

Transformations recently learned of the death of **Robert B. Foster '46** in 2002. A resident of Windsor, Conn., and North Port, Fla., he leaves his wife, Sally (Buccheri), five sons, two daughters, and seven grandchildren. Foster was an actuary for Travelers Insurance Co. for 39 years before he retired. He belonged to Alpha Tau Omega.

James B. Evans Jr. '47 of Andover, Mass., died Feb. 15, 2004. He leaves his wife, Elizabeth (Stohlman), four sons, four daughters, and eight grandchildren. Evans received a master's degree in electrical engineering from WPI in 1949. He worked for Bell Labs until he retired in 1981.

Harold L. Cole '47 of Topsham, Maine, died Feb. 8, 2004. Predeceased by his wife, Harriet (Clark), he leaves two sons, two daughters, nine grandchildren, and one great-grandchild. Cole began his career at General Electric Co. and later retired from Raytheon Corp. He belonged to Tau Beta Pi.

George W. Allen '48 of Glastonbury, Conn., died April 8, 2004. He leaves his wife, Joyce, two sons, two daughters, and six grandchildren. Allen began his career with Pratt & Whitney, where he served as a mechanical engineer for seven years. He then became a guidance counselor and math teacher, first at East Hartford High School, then at Penney High School. He belonged to Phi Sigma Kappa.

Lennart M. Berg '48 of South Lyme, Conn., died May 7, 2004. He was the husband of Irene (Walton) and the father of Pamela Berg McNary '85. He also leaves two sons and three grandchildren. Another son predeceased him. Berg was a self-employed builder of custom colonial homes, who joined his father in the trade after graduation. He belonged to Phi Sigma Kappa.

Charles D. Rehrig '48 of Barrington, N.J., died Jan. 30,

2004. He is survived by his wife, Janice (Ridley), a son, two daughters, and four grandchildren. Rehrig was an instrumentation engineer for United Engineers & Constructors. He belonged to Phi Sigma Kappa and Skull.

Edmund J. (Salatkiewicz) Salate '48 of South Hadley, Mass., died March 12, 2004. A mechanical engineer for the U.S. Government, he was retired from the Department of Housing and Urban Development. He previously worked for NASA's Electronic Research Center in Cambridge. A son, a daughter, and three grandchildren survive.

George M. Thomson '48 of Wayne, N.J., died Sept. 25, 2003. A retired staff engineer at MIT-Draper Laboratories, he and his wife, Dorothy (Marino), had two sons. Thomson belonged to Sigma Phi Epsilon.

Saverino Ciani '49 died May 13, 2004, in his Shrewsbury, Mass., home. A graduate of Clark University, he spent his career with the Mutual Fire Insurance Association of New England. He leaves his wife, Bergie (Bolstad), and several nieces and nephews.

John I. "Ive" Logan '49 of Delmar, N.Y., died April 10, 2004. He leaves his wife, Barbara (Shaw), a son, three daughters, seven grandchildren, and two great-grandchildren. Logan earned a certificate in traffic engineering from Yale University and served as traffic engineer for the city of Providence. He retired from the Federal Highway Administration in 1987. He belonged to Phi Sigma Kappa.

Francis W. Norton '50 of Augusta, Ga., died May 24, 2004. He was the husband of the former Eleanor Carr, and the father of John P. Norton '81, who survive him, along with two grandchildren. Norton was a retired site superintendent for Monsanto Co.

John W. Peirce '50 died April 9, 2004, at his home in Sherborn, Mass. He leaves his wife, Susan (Davenport), two sons, a daughter, and four grandchildren. Peirce graduated from the Massachusetts Maritime Academy and served in the Navy during the Korean War. He retired from The Foxboro Company after 30 years as manager of price policy. He then became owner and president of H.R. Prescott and Sons. He belonged to Phi Gamma Delta.

Gary Geissler '51 of Placida, Fla., died Nov. 12, 2003. A retired chemical consultant, he worked for Merck & Co., Chemtron, and SCA Chemical Services. He and his wife, Eleanor (Delaney), had a son and three daughters.

Roger W. Lane '51 died at home on Vashon Island, Seattle, Wash., on May 7, 2004. Predeceased by his wife, Sara (Sprinkle), he leaves two sons, a daughter, and seven grandchildren. A former engineering supervisor, Lane was retired from Boeing Aerospace Co., where he worked for 38 years.

Charles R. Holland '52 of Summerville, S.C., died March 1, 2003. A longtime engineer with Monsanto, he earned an MBA at American University. Holland is survived by his wife, Lynn, five daughters, three stepchildren, and 25 grandchildren. He belonged to Theta Chi.

John D. Coupe '53 died Feb. 11, 2004. His survivors include his wife, Mavis, two sons, a daughter, four stepsons, seventeen grandchildren, and two great-grandchildren. He was predeceased by his first wife, Sylvia, and a stepson. Coupe earned a master's degree and a doctorate in economics from Clark University. He was professor emeritus at the University of Maine, Orono, where he taught for many years, and also served as vice president for finance and administration. He belonged to Phi Sigma Kappa.

Robert H. Paine '53 of Honeoye Falls, N.Y., died May 14, 2004. A 1951 graduate of the University of Rochester, he earned his master's degree in chemistry at WPI and his Ph.D. at the University of Rochester in 1961. Paine was retired from Eastman Kodak. He also taught chemistry at several colleges and earned tenure at Rochester Institute of Technology in 2003. Survivors include his wife, Barbara, a son, a daughter, and two grandchildren.

Leonard V. Mello '54, formerly of Louisville, Ky., died Sept. 14, 2003. He retired from National Homes Corp. and later lived in Florida. He belonged to Phi Kappa Theta.

Richard P. Quintin '55 of Bradenton, Fla., died May 5, 2004. He is survived by his wife, Jeanne, three sons, a daughter, and eight grandchildren. Quintin received an MBA from the Hartford Graduate Center and was retired from Hamilton Standard as director of materials.

Peter J. Stephens '56 of Audubon, Pa., died Feb 13, 2004. His wife, Mary, survives him, along with a son, a daughter, and four grandsons. Stephens spent his career with Exxon and retired in 1987 as a marketing executive. He belonged to Lambda Chi Alpha.

Fred C. Magnuson '57 of Blandon, Pa., died Feb. 5, 2004, leaving his wife, Eleanor (Hynes), three daughters, and five grandchildren. His career in the Bell Telephone System included Western Electric, Bell Telephone Laboratories, and New Jersey Bell Telephone. He later served as a nonstipendiary clergyman at All Saints Episcopal Church. He belonged to Lambda Chi Alpha.

Transformations recently learned of the death of **Richard E. Lorenz '58** in 1996 in California. He married Sallie Coons in 1958 and worked for Dravo Corp. and Factory Mutual Insurance Co. He belonged to Phi Sigma Kappa.

Harold W. Taylor '58 died at home in Pocasset, Mass., on Feb. 20, 2004. He worked as a salesman in the family business, Lofstedt & Taylor Fine Furniture, and for Jordan Marsh in Worcester. He is survived by three sons, a daughter, and two granddaughters. He belonged to Phi Sigma Kappa.

Charles H. Rodenburg '59 of Lynn Haven, Fla., died April 5, 2004. He leaves his wife, Bonnie, and a son. Rodenburg was retired from Northrop Grumman Corp., where he worked as a quality control engineer for many years. He belonged to Phi Sigma Kappa.

Ernest F. Woodtli '59 of Tucson, Ariz., died May 19, 2003. He leaves his wife, Anne, a son, two daughters, and four grandchildren. Woodtli was retired from General Electric Co. He belonged to Pi Tau Sigma.

Joseph A. DiGiallonardo '61 of Millbury, Mass., died May 4, 2004. A mathematician, he earned a master's degree from the University of Michigan and completed advanced graduate study at Michigan State University. His federally funded research on oscillation theory was published by the Society for Industrial and Applied Mathematics. DiGiallonardo worked for Digital Equipment Corp. for eight years. Despite his struggle with mental illness, he continued his mathematical research and his volunteer tutoring. Survivors include a sister and two nephews.

Transformations recently learned of the death of **Alfred H. Kastberg '61** in 2002. A resident of Stafford, Va., he was the retired executive vice president of the Henry L. Hanson Co. His wife, Lilly, died in 1996. Surviving family members include a son, two daughters, three grandchildren, and three great-grandchildren.

Richard H. Eriksson '64 died Feb. 15, 2004, at his home in South Windsor, Conn. He leaves his wife, Alice Kaptonak, a son, a daughter, and four grandchildren. Eriksson was retired from Pratt & Whitney as a senior engineer. He held a master's degree from RPI and belonged to Lambda Chi Alpha and Pi Tau Sigma.

James Higginbottom Jr. '66 (SIM) of Venice, Fla., died March 8, 2004. He was 91. Predeceased by his wife, Marguerite (Striebel), he leaves a son, a daughter, four grandchildren, a great-grandson, and a close friend, Phyllis Higgins. Higginbottom was the retired president of New England High Carbon Wire Corp., where he worked for 48 years.

Joseph L. Paquette '68 died Jan. 26, 2004, leaving his wife, Linda, two sons, a daughter, and three grandchildren. Paquette was the owner of Sir Speedy Printing Center in Windsor Locks, Conn. He belonged to Phi Kappa Theta.

George P. Allendorf Jr. '70 (Ph.D.) of Billerica, Mass., died May 7, 2004, at age 64. A graduate of Boston College, he earned his doctorate in chemistry at WPI. Allendorf was retired as vice president of M/A Inc. He also taught at Mass Bay Community College. Survivors include his wife, Elizabeth (Fuoco), three sons, and a daughter.

Richard E. Bergeron '70 of Malvern, Pa., died April 26, 2004. He was the founder of Bergeron Solutions and a volunteer fundraiser and spokesperson for his disability, amyotrophic lateral sclerosis (Lou Gehrig's disease). He leaves his wife, Wendy, a daughter, and three stepdaughters. Bergeron belonged to Phi Sigma Kappa.

Richard Diamond '70 of Worcester, Mass., died May 1, 2004. He leaves his wife, Barbara (Marten), and two daughters. Diamond was owner and operator of R. Diamond Distributors, handling auto parts and specialized tools.

Robert H. Spring '72 (SIM) of Holden, Mass., died March 15, 2004, at the age of 83. Predeceased by his wife, Mary (Kastberg), he leaves two sons, a daughter, and six grandchildren. Spring was retired as a time-study engineer for Henry L. Hanson Co.

Thomas L. Girard '76 (MSM) died Feb. 26, 2004, at his home in Centreville, Va. Survivors include his wife, Claire, a son, and a daughter. Girard was a financial specialist for Lockheed Martin.

Joseph J. Lucchesi '76 of Tewksbury, Mass., died Nov. 2, 2003, after a 10-year battle with muscular dystrophy. His wife, Lori (Francoeur), and two sons survive. Lucchesi worked as a chemist for Fisons, Copley Pharmaceuticals, and Boston Analytical Corp. before he retired due to his illness.

David E. Green '81 of Granby, Mass., died June 6, 2004. He was president of A.R. Green & Son Inc., a position held by a family member for four generations. Survivors include his wife, Roberta (Lepak), and three daughters. Green belonged to Phi Gamma Delta.

Transformations recently learned of the death of **Waleed Mohammed Hajjar '81** (Ph.D.) in 2002. He was a sales manager for Quantum Medical Systems. He and his wife, Linda, had a son and two daughters.

Harold E. Errington '82 (SIM) of Belgrade, Maine, died June 5, 2004, at the age of 77. He leaves his wife, Tamara, two sons, two daughters, 17 grandchildren, and 21 great-grandchildren. Errington was retired from Bay State Abrasives Co. with 37 years of service.

Stephen Sciarro Jr. '83 (SIM) of Westborough, Mass., died May 26, 2004. He was 76. He was an industrial engineer for Bay State Abrasives Co. for more than 40 years before he retired. His survivors include his wife, Beverly (Smith), a daughter, two sons, and a grandson.

J. Alan Bill '85 (SIM), 62, of Shrewsbury, Mass., died Feb. 3, 2004. He leaves his wife, Mary (O'Malley), three sons, and four grandchildren. Bill was a retired sales manager for Sandoz Chemical.

James R. Bandlow '92 of Winter Springs, Fla., died Jan. 9, 2004, at the age of 39. He leaves a daughter, a son, and his mother, Constance Sheldon, of Palm Bay, Fla. Bandlow was a senior structural engineer for P.S.I. Inc.

Michael F. Buvarsky '93 died April 24, 2004, in his Brooklyn, Conn., home. He was 47. His wife, Joan (Barton), survives. A 1978 graduate of Wentworth Institute of Technology, Buvarsky came to WPI in 1991 and earned a bachelor's degree in computer science with high distinction in two years. He was a software engineer at S1 Corp., and the owner of a Web site design company, Westfield Designs. He belonged to Upsilon Pi Epsilon.

John S. Grossi '95 of

Waltham, Mass., died March 13, 2004. He was a senior quality assurance engineer for Funk Software and a member of Alpha Phi Omicron. He leaves his fiancée, Kyle Montouri, and his parents.

Carlo M. Cioffi '99 of

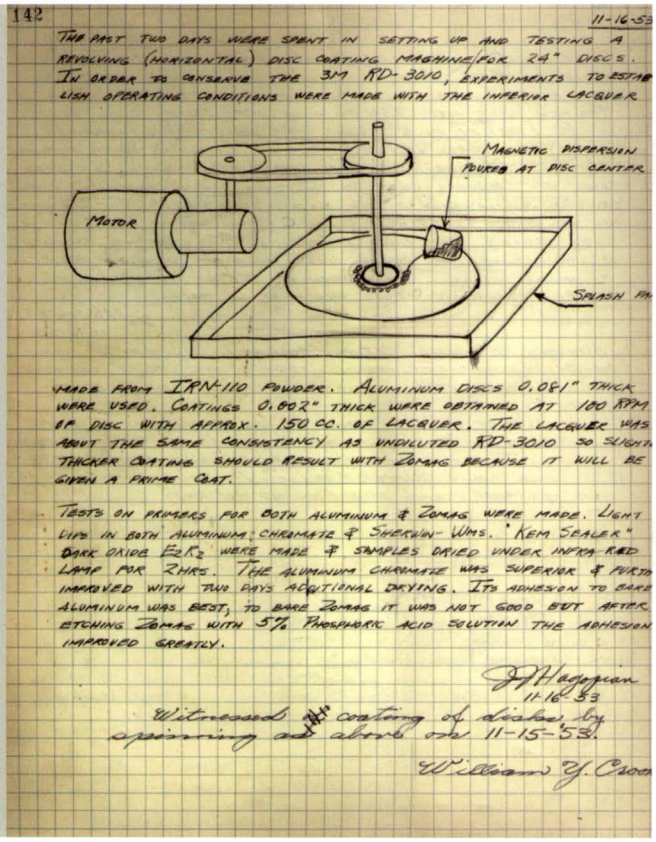
Brookline, Mass., died May 3, 2004. He worked as a chemical engineer for Nuvera Fuel Cell. His survivors include his parents, Elaine and Pietro Cioffi of Milan, Italy, and a brother.

Correction:
Our obituary of **Tsu-Yen Mei '49** in the Fall 2003 issue reported that Mei earned a master's degree in liberal arts at Illinois Institute of Technology. His friend Yunting Kwan '52 informs us that Mei's degree was actually in mechanical engineering. *Transformations* regrets the error.

TimeCapsule

Every time you access your computer's hard drive, you're tapping into the innovative work of Jake Hagopian '39.

As an advisory engineer in IBM's Research Laboratory in San Jose, Calif., Jacob J. Hagopian perfected the spin-coating method for making computer disks, which revolutionized both how and how quickly files were read from magnetic media.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11-16-53

THE PAST TWO DAYS WERE SPENT IN SETTING UP AND TESTING A REVOLVING (HORIZONTAL) DISC COATING MACHINE FOR 24" DISCS. IN ORDER TO CONSERVE THE 3M RD-3010, EXPERIMENTS TO ESTAB LISH OPERATING CONDITIONS WERE MADE WITH THE INFERIOR LACQUER

MAGNETIC DISPERSION POURED AT DISC CENTER

MOTOR

SPLASH PA

MADE FROM IRN-110 POWDER. ALUMINUM DISCS 0.081" THICK WERE USED. COATINGS 0.002" THICK WERE OBTAINED AT 100 RPM OF DISC WITH APPROX. 150 CC. OF LACQUER. THE LACQUER WAS ABOUT THE SAME CONSISTENCY AS UNDILUTED RD-3010. SO SLIGHTL THICKER COATING SHOULD RESULT WITH ZOMAG BECAUSE IT WILL BE GIVEN A PRIME COAT.

TESTS ON PRIMERS FOR BOTH ALUMINUM & ZOMAG WERE MADE. LIGHT LIPS IN BOTH ALUMINUM CHROMATE & SHERWIN-WMS. "KEM SEALER" DARK OXIDE Fe_2R_2 WERE MADE & SAMPLES DRIED UNDER INFRA RED LAMP FOR 2HRS. THE ALUMINUM CHROMATE WAS SUPERIOR & FURTH IMPROVED WITH TWO DAYS ADDITIONAL DRYING. ITS ADHESION TO BARE ALUMINUM WAS BEST, TO BARE ZOMAG IT WAS NOT GOOD BUT AFTER ETCHING ZOMAG WITH 5% PHOSPHORIC ACID SOLUTION THE ADHESION IMPROVED GREATLY.

J J Hagopian
11-16-53

Witnessed # coating of discs, by spinning as above on 11-15-53.

William J. Crook

Jacob Hagopian's work on a method for coating magnetic disks is detailed on a page taken from his IBM journal, an item that is part of the Hagopian papers held in Special Collections in WPI's George C. Gordon Library.

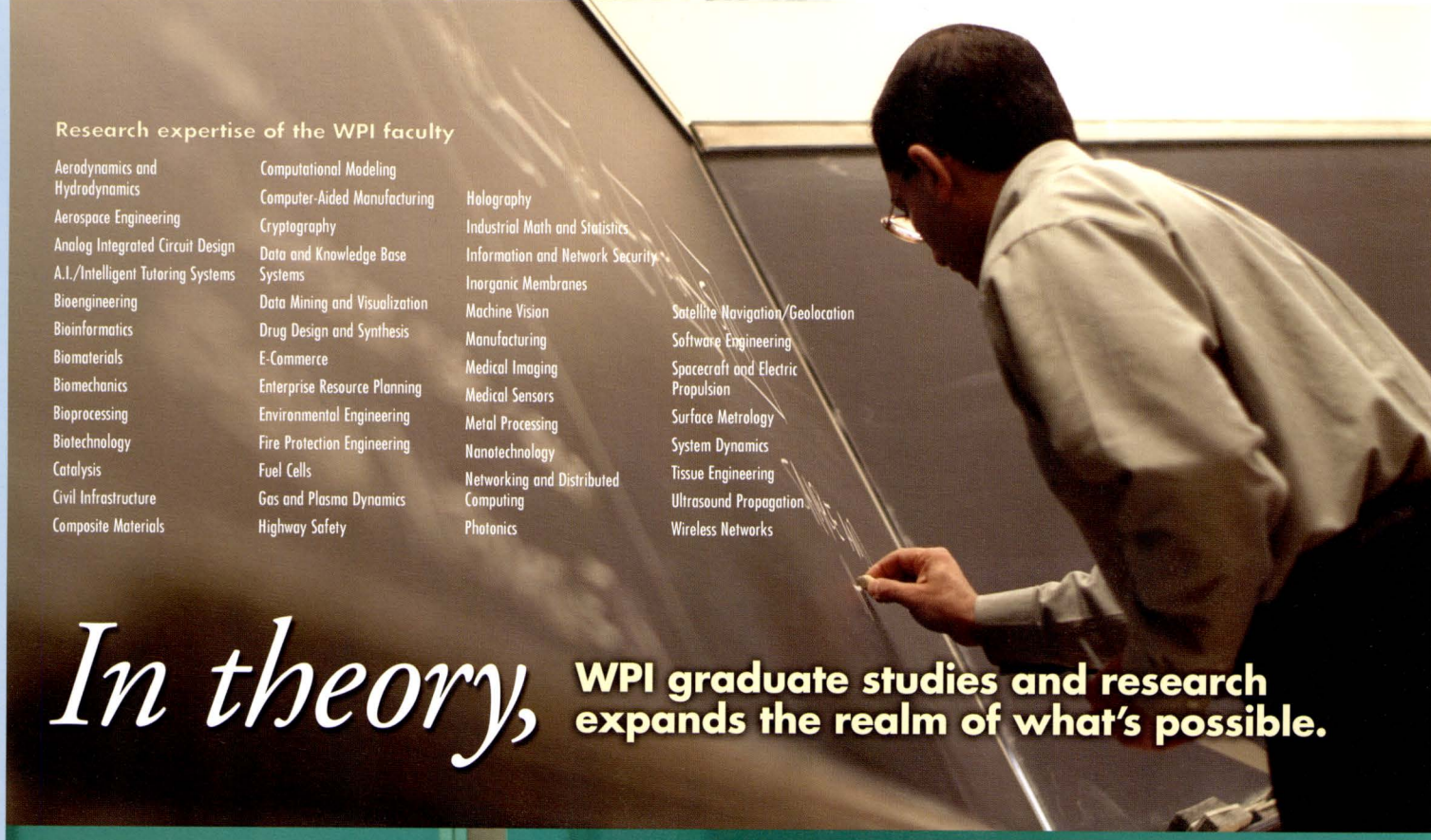
In 1953, work began at IBM on RAMAC (Random Access Method of Accounting and Control), the first computer with a disk drive. The drive, or disk file, as it was called, contained 50 disks stacked one-quarter inch apart, on a rotating, vertical shaft. A single pair of magnetic heads moved in between the disks to read or write the tracks. To move to another disk, the arm containing the heads had to pull out completely and then travel up or down. Designers solved the problem of maintaining constant spacing between the magnetic head and the slightly fluttering disks, but Hagopian noticed two problems with their method. First, a bulky air compressor was needed to supply the large volume of air required to "float" the heads and keep them from crashing into the disks. Second, with just two read-write heads, scanning an entire file was an extremely slow process (it took about eight minutes to search through all 50 disks).

Flying heads, spinning disks

Hagopian reasoned that if the heads could be made to float without the use of air compressors, 100 heads could be ganged to scan each of the disk surfaces simultaneously. "I recognized that the rotation of the disk pulled along air molecules, creating its own pressure layer without the need for air supply," he explained in an IBM report on the project. "This simple but very important effect is fundamental to slider air-bearing design principles." He created an elementary form of the "flying" head by placing the taper-flat, polished face of a circular aluminum capsule down on a rotating magnetic disk; the capsule floated on a self-generated film of air. "I was elated by the flying head and what it could do," he said. "I immediately submitted a patent disclosure describing the two basic air-bearing surface shapes needed for stable operation."

Before the RAMAC could become a commercial product, another problem had to be solved: how to apply the magnetic coating to the disks. "We tried dipping, spraying, and silk-screening techniques to apply the magnetic ink to the disk," Hagopian said, "but none gave a smooth, uniformly thin coating." So he took his work home. According to his daughter, Anita, he used one of his wife's stockings and the family's record player to control the flow of paint as it poured onto a record turning at 75 rpm, using centrifugal force to evenly coat the album. This spin-coating method was later patented—one of 24 patents under Hagopian's name.

Hagopian died in 1998 at the age of 80. His family donated a small collection of his papers, including one of his notebooks, to Gordon Library's Special Collections.



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Drug Design and Synthesis
E-Commerce
Enterprise Resource Planning
Environmental Engineering
Fire Protection Engineering
Fuel Cells
Gas and Plasma Dynamics
Highway Safety
Holography
Industrial Math and Statistics
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In theory, WPI graduate studies and research expands the realm of what's possible.

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Mitchell Sanders, founder, president and CEO of ECI Biotech, earned his M.S. in biology from WPI in 1988 and his Ph.D. in biomedical engineering in 1992.

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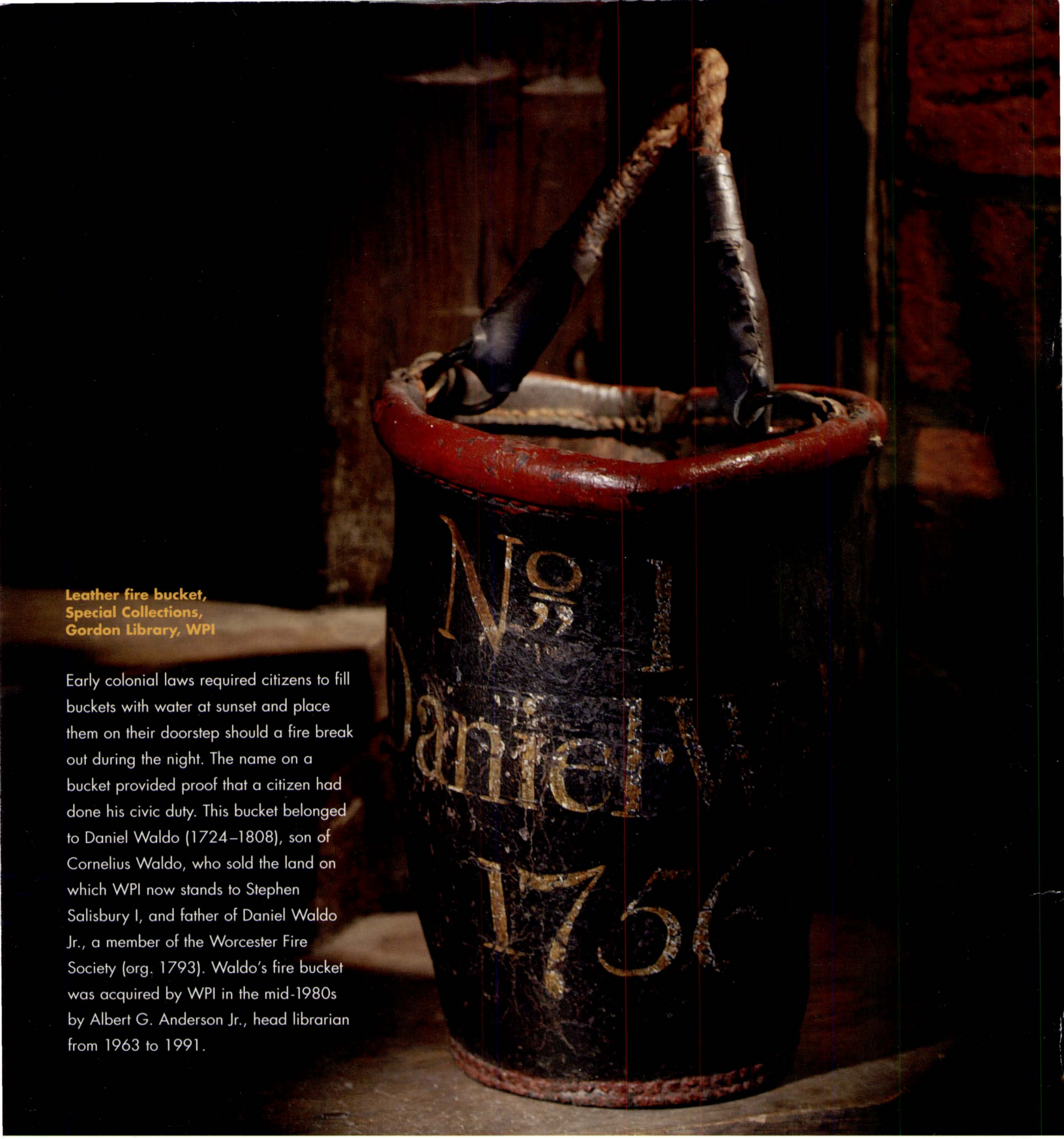

Leather fire bucket, Special Collections, Gordon Library, WPI

Early colonial laws required citizens to fill buckets with water at sunset and place them on their doorstep should a fire break out during the night. The name on a bucket provided proof that a citizen had done his civic duty. This bucket belonged to Daniel Waldo (1724–1808), son of Cornelius Waldo, who sold the land on which WPI now stands to Stephen Salisbury I, and father of Daniel Waldo Jr., a member of the Worcester Fire Society (org. 1793). Waldo's fire bucket was acquired by WPI in the mid-1980s by Albert G. Anderson Jr., head librarian from 1963 to 1991.

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