<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Notes</td>
<td>1</td>
</tr>
<tr>
<td>This short news section looks at recent projects by university researchers.</td>
<td></td>
</tr>
<tr>
<td>Serving Warriors</td>
<td>6</td>
</tr>
<tr>
<td>Analyzing Brain Function to Treat Wounded Warriors</td>
<td></td>
</tr>
<tr>
<td>Mason cognitive neuroscientist Frank Krueger has been studying warfighters’ brain injuries and their long-term cognitive effects by looking at a group of Vietnam War veterans.</td>
<td></td>
</tr>
<tr>
<td>Using Radar Signals to Safeguard Our Troops</td>
<td>8</td>
</tr>
<tr>
<td>Mason electrical engineer Kenneth Hintz has developed landmine and sniper detection technologies that could be used to safeguard U.S. troops, as well as civilians.</td>
<td></td>
</tr>
<tr>
<td>Turning to the Family to Save the Soldier</td>
<td>10</td>
</tr>
<tr>
<td>Mason researchers Keith Renshaw, Mona Pearl, and Patrick McKnight are honing in on mental health strategies to deal with posttraumatic stress disorder in returning combat veterans.</td>
<td></td>
</tr>
<tr>
<td>Youth</td>
<td>14</td>
</tr>
<tr>
<td>Looking at Youth Culture</td>
<td></td>
</tr>
<tr>
<td>Mason sociologist Amy Best takes a closer look at teenage rites of passage through prom, driving, and now food.</td>
<td></td>
</tr>
<tr>
<td>Helping Former Child Soldiers Reclaim Their Lives</td>
<td>16</td>
</tr>
<tr>
<td>Patricia Maulden of Mason’s Institute for Conflict Analysis and Resolution has traveled to Africa and South America to study the postwar life of former child soldiers.</td>
<td></td>
</tr>
<tr>
<td>Testing How Shyness Affects Attention in Children</td>
<td>18</td>
</tr>
<tr>
<td>Mason psychologist Koraly Perez-Edgar has been looking at brain activation and stress hormones to find out whether painfully shy or anxious children are physically different from others.</td>
<td></td>
</tr>
<tr>
<td>Using Computer Game Design to Boost Interest in High-Tech Careers</td>
<td>20</td>
</tr>
<tr>
<td>Mason researchers Kevin Clark and Kim Sheridan use computer game design to help students in underserved communities improve their math and science skills.</td>
<td></td>
</tr>
</tbody>
</table>
Looking at the Past

Bringing Social History to the Forefront ............................................ 34
Mason provost Peter Stearns has written more than 100 books examining life and culture from different perspectives.

Examining the African American Way of Death and Business ............. 36
Mason historian Suzanne Smith explores the role of African American funeral directors and their participation in the civil rights movement.

Researching Slavery in the North during the American Revolution .......... 38
Mason Constitution historian Joyce Lee Malcolm uses the life of a young servant boy to examine slavery in the North during Colonial times.

Presenting and Preserving the Past Using Digital Media ..................... 40
Researchers at Mason’s Center for History and New Media are working to revolutionize the way millions of people experience history.

Place

Examining the Role That Place Plays in Crime ................................. 24
Mason criminologist David Weisburd’s research on crime and location has led to place-based policing strategies that are being used across the nation.

Digging for Clues with Geological Phenomena ................................ 26
Mason hydrologist Sheryl Beach traveled to Iceland with PhD student Douglas Howard to look for evidence of an ancient mega flood.

Merging Space and Time in Four Dimensions .................................. 28
Researchers at Mason’s Center for Geospatial Intelligence are developing techniques that compare live satellite data and video to existing logistical information and rapidly update it.

Improving Wildfire Management with Satellite Technology ............... 30
Researchers in Mason’s EastFIRE Lab are working to diminish the damaging effects of wildfires on states east of the Mississippi.

This Year in Research

Technology Development ................................................................. 44
Emerging Researcher, Scholar, Creator Awardees .............................. 48
2010 Research Funding ................................................................. 49
As vice president for research and economic development, I have the opportunity to observe and sometimes be part of the continuing growth in research at Mason. I am pleased to be able to mention a number of activities in 2010 that reflect the commitment Mason has made to expanding its research base.

Construction was completed on a $48.3 million state-of-the-art research facility on the Prince William Campus that will allow our infectious disease researchers to conduct research in a biosafety level 3 facility. This building was partially funded by a $27.7 million grant from the National Institute of Allergy and Infectious Diseases, a part of the National Institutes of Health.

Mason also received $44 million in Recovery Act funding to support research and, of that amount, $28.5 million was for a single award. That award, funded in fall 2010 by a U.S. Department of Education public–private partnership funding program, will have a significant influence on improving primary and secondary science education throughout Virginia.

Historically, Mason has received a significant portion of our federal funding from the Department of Defense and often that funding supported highly technical projects. This year, we have included a section that describes faculty research that directly affects members of our military. And, as is so often the case, their work and the research described in other sections of this magazine cross both discipline and college boundaries.

The magazine provides summaries of recent funding, which has surpassed the $100 million level and continues to rise. In addition, we have added a new section this year that highlights technologies at Mason. We also proudly announce the winners of the annual Emerging Researcher, Scholar, Creator Awards: Courtney Brkic, Nicole Darnell, and Jessica Rosenberg.

Roger R. Stough
Vice President for Research and Economic Development
One of the surveys conducted by Mason’s Center for Climate Change Communication and the Center for Social Science Research made big news this year. The survey of weathercasters about climate change showed up in a variety of news stories as the networks covered the subject from different angles.

It made the front page of the *New York Times* for starters. The Weather Channel interviewed Edward Maibach, director of the Center for Climate Change Communication, live from his office on the Fairfax Campus to discuss the results. Even “pundit” Steven Colbert, host of *The Colbert Report*, took an interest and had a segment on his show pitting weathercasters against climatologists.

“Our surveys of the public have shown that many Americans are looking to their local TV weathercaster for information about global warming,” says Maibach, who conducts a number of surveys on climate change each year. “The findings of this latest survey show that TV weathercasters play—or can play—an important role as informal climate change educators.”

According to the survey, climate change is already one of the most common science topics TV weathercasters discuss; most commonly at speaking events but also at the beginning or end of their on-air segments; on blogs, websites, and the radio; and in newspaper columns.

Tucked into the rolling landscape near Shenandoah National Park, the 3,200-acre Smithsonian Conservation Biology Institute (SCBI) is home to endangered animals and the scientists who study them. Through the Smithsonian–Mason Global Conservation Education Studies, established in 2008, George Mason University students live and study at the institute near Front Royal, Virginia, where the zoo cares for and conducts research on more than 30 critically endangered species.

From learning about panda artificial insemination to debating conservation policy, Mason students have the opportunity to learn from and work alongside the world’s leading conservation scientists. Combining traditional classroom learning with field work makes this program a truly innovative partnership.
A Better Night’s Sleep? Yes, There’s an App for That

Rough night? A new smartphone application developed by Mason student Daniel Gartenberg might be able to help with that. Gartenberg’s app, the Proactive Sleep Alarm Clock, helps you track the ZZZs you get and develop a healthier and more productive sleep pattern.

The alarm clock features a settable sleep goal and a sleep diary, which you can use to track the hours you’ve slept or the dreams you’ve had. It also allows you to record personal factors—such as mood, alcohol and medication intake, exercise habits, diet, and productivity.

“The behaviors we’ve chosen to include in this application are those most commonly recommended by sleep professionals as the ones you should monitor for healthy and restful sleep,” says Gartenberg, who is working on a PhD in human factors and applied cognition. “We’ve already had numerous sleep clinics and sleep professionals express an interest in the application.”

There is also a simple game, inspired by sleep research, called the Vigilance Task, which allows you to test how groggy you are on waking.

“If you play the game as soon as you wake up, you get more points than if it takes you awhile to wake up. Also, the faster you do the task, the faster the target moves on the screen. This makes your score more sensitive, so you can see how getting a poor night of sleep may affect your performance,” says Gartenberg.

The Proactive Sleep Alarm Clock can be downloaded for a small fee to the iPhone and Google Android. The application has been featured on the CBS Early Show and Discoveries and Breakthroughs inside Science, and by the National Sleep Foundation, among others. It won the 2009 Schoofs Prize for Creativity, an annual competition at the University of Wisconsin-Madison that rewards innovative and marketable ideas.

Gartenberg believes that developing tools such as these for new technologies is the way to go.

“As smartphone technology becomes increasingly ingrained in our everyday lives, we can use these devices as tools for science.”

—Tara Laskowski

New Website Encourages Public Participation in Congressional Redistricting

A team of researchers from Mason, the Brookings Institution, and Harvard University, in collaboration with Azavea, a Philadelphia-based software design company, announced the release of DistrictBuilder, a free, open-source, web-based software that will enable greater public participation and transparency during the upcoming electoral redistricting process.

Funded by a grant to Mason from the Sloan Foundation, the project is led by Michael McDonald, Mason associate professor of public and international affairs, and Micah Altman, senior research scientist at Harvard.

An advisory board of prominent government watchdog groups and redistricting experts is led by Thomas Mann at the Brookings Institution and Norman Ornstein at the American Enterprise Institute. Together, the project’s participants have articulated principles for public participation and transparency in redistricting.

“The drawing of electoral districts is among the least transparent processes in democratic governance,” says McDonald, describing the problem identified by the project’s participants. “All too often, redistricting authorities maintain their power by obstructing public participation. The resulting districts embody the goals of politicians to the detriment of the representational interests of communities and the public at large.”

Project details can be found at www.publicmapping.org.

—James Greif
Advancing Biomedical Research

As part of a nationwide effort to advance the diagnosis, prevention, and treatment of infectious diseases, Mason’s Biomedical Research Laboratory (BRL) is the newest of only 13 regional biocontainment laboratories that have been or are being built through competitive grants from the National Institute of Allergy and Infectious Diseases, a part of the National Institutes of Health. The 52,000-square-foot stand-alone, high-security facility is located on a 10-acre site adjacent to Mason’s Prince William Campus in Manassas, Virginia, and features more than 20,000 square feet of lab space. The BRL is managed by Mason’s National Center for Biodefense and Infectious Diseases, whose mission is to address the ongoing challenges to national and international security posed by the threats of bioterrorism and emerging infectious diseases.

—Marjorie Musick

Talking about Bioterrorism and International Security

With terrorism as one of the major security concerns of the 21st century, governments are developing sophisticated systems to defend against the use of biological weapons, such as anthrax or smallpox. The general public understands little about these weaponized pathogens, leading to fear about our vulnerability to such an attack.

Gregory Koblentz, deputy director of Mason’s biodefense degree programs, has written a new book, Living Weapons: Biological Warfare and International Security (Cornell University Press), which helps clear up some of the mystery.

What are some of the challenges in security related to biological weapons?

Unlike nuclear and chemical weapons, biological weapons are composed of, or derived from, living organisms. This unique characteristic is at the heart of many of the security challenges they pose. The diversity of pathogenic microorganisms and toxins that can be used as weapons provides an attacker with flexibility in planning and conducting an attack and greatly complicates the task of the defender. The ability of pathogens to replicate themselves inside a host enables an attacker to use only a small amount of a biological weapon to inflict mass casualties. The overlap between the equipment, knowledge, and materials required to develop biological weapons and conduct civilian biomedical research or develop biological defenses—what I call the
multi-use dilemma—limits the effectiveness of arms control measures, hinders civilian oversight, and complicates intelligence collection and analysis. As a result, it is difficult to verify that biotechnology is not being misused for hostile purposes, exercise effective oversight over biological weapons programs, and obtain accurate assessments of a state's capabilities and intentions. This is a dangerous and destabilizing combination of characteristics for a technology that is becoming increasingly available throughout the world. **Terrorist activity in the past few years has not included biological weapons. Why is that? Is this trend likely to change?**

As we see every day in Iraq and Afghanistan, guns and bombs remain the preferred weapons of terrorists and insurgents. These weapons are cheap, easy to use, and widely available. There are two trends, however, that increase the risk of bioterrorism in the future. The first is the emergence of increasingly lethal terrorist groups that are interested in causing mass casualties. The focus of groups such as Al-Qaeda and its affiliates on causing mass casualties and conducting spectacular attacks is worrisome since it creates an incentive for such groups to explore new ways of causing death and destruction. The second trend is the globalization of the biotechnology revolution, which makes the equipment, material, and knowledge necessary to develop these weapons more widely available. Based on past experience, we are unlikely to receive sufficient warning of a terrorist group that combines the motivation to cause mass casualties with the capability to employ disease as a weapon.

—James Greif
SERVING WARRIORS
Analyzing Brain Function to Treat Wounded Warriors

War is tragic, it’s true. But there is a sliver of a silver lining for those injured by war. Over the past century, our understanding of the brain has improved with every modern war. The reason? Wounded soldiers with traumatic brain injuries (TBIs) have provided neuroscientists with prime examples of how different parts of the brain control different functions, such as attention, impulse control, and emotions.

Mason cognitive neuroscientist Frank Krueger has been studying warfighters’ brain injuries and their cognitive effects since 2006, when he was a postdoctoral fellow at the National Institute of Neurological Disorders and Stroke, a part of the National Institutes of Health (NIH), under the mentorship of Jordan Grafman.

Through this study, Grafman and his colleagues have followed a group of Vietnam veterans since 1967. Krueger, an assistant professor at Mason’s Krasnow Institute for Advanced Study, has been involved in the past two phases of the study. Phase 4 began in 2008, when Krueger became lead investigator on the Cognitive Neuroscience Section of the institute’s longitudinal Warfighter Head Injury Study.

In this phase, about 160 Vietnam veterans who suffer from TBI and about 40 control subjects—veterans who did not sustain TBI in the war—are going through a battery of clinical and neuropsychological tests to analyze the cognitive functions of their brains. These tests are complemented with structural and functional neuroimaging. Molecular genetics evaluations are also being performed, says Krueger.

Because of the way the Vietnam War was fought, Krueger says, most of the soldiers sustained focal-penetrating brain lesions from being hit by low-velocity shrapnel.

“So we have this unique population that has specific brain lesions, so you can make better claims about the functions of the brain,” he explains.

Krueger and his colleagues on the study hope to conduct neuropsychological testing on veterans of the Iraq and Afghanistan wars, as well. Warfighters from these wars typically suffer different brain injuries.

“Now, the war is fought differently. These soldiers have what is called mild TBI; these are blast injuries,” Krueger says. “The typical scenario is you’re in your jeep, driving through, you hit a bomb, and you sustain injuries related to the wave from the bomb detonating. At first, you don’t feel anything. But after a couple weeks, you get worse, suffering from concentration and cognitive decline.”

Rather than focal lesions, this type of injury affects large sections of the brain. Blast injuries affect white matter, the part of the brain that connects gray matter. If you imagine the brain as a computer network, the gray matter would be the actual computers and the white matter would be the network cables that connect everything.

“Our main goal in this study is to help the warfighters,” Krueger says. “It’s unfortunate that they have sustained these injuries, but the fact that they have allows us to do more research and figure out new ways to treat them.”

Krueger also is studying warfighters with this type of injury at the Center for Neuroscience and Regenerative Medicine (CNRM), a federal medical research program that has spearheaded collaborative interactions between the U.S. Department of Defense, NIH, Walter Reed Army Medical Center, and the National Naval Medical Center.
He hopes to have access to and include these warfighters in the NIH Warfighter Head Injury Study. Another war-related issue Krueger hopes to help treat is somewhat controversial: posttraumatic stress disorder, or PTSD. PTSD is an anxiety condition that can occur after a person has experienced a traumatic event.

The CNRM study looks at people just back from the wars in Iraq or Afghanistan. These warfighters will be scanned using functional magnetic resonance imaging (fMRI) several times over one year to see how the brain changes over time.

“It’s a rough estimate that 15 to 25 percent of this group will develop PTSD,” Krueger says.

After this yearlong study is complete, Krueger hopes to take the research a step further into the treatment of the disorder. There’s a new method of treating neuropsychiatric conditions, such as PTSD, called real-time fMRI neurofeedback. This cutting-edge treatment that allows patients to retrain the affected areas of their brains is still being researched.

In PTSD, an emotional stimulus triggers a flashback that occurs in response to reminders of the traumatic event. Using neurofeedback training, Krueger hopes to help those suffering from PTSD to control the part of the brain involved in emotional processing—the amygdala—that causes the flashbacks.

“The idea is, if you develop PTSD, it is because you have hyperresponsivity of the amygdala,” Krueger says. “You could do neurofeedback training, so when you see emotional stimuli, your amygdala doesn’t freak out. You try to control it.”

He compares this sort of neurofeedback training to weight training. Over time, the hyperresponsivity of the amygdala decreases, and the patient gains more control over it and its responses.

“It’s like a muscle,” he says. “You can train it to get better.”

At this time, real-time fMRI neurofeedback training is expensive, and the treatment could take several sessions over weeks or even months. Krueger and his colleagues are submitting grant requests for funding of this translational research.

Krueger says, “Because this sort of research is translational, it can directly help someone, which is great.”

—Leah Kerkman Fogarty
Using Radar Signals to Safeguard Our Troops

The humanitarian consequences of war are often easily forgotten but fortunately not by everyone. Former naval aviator and Mason electrical engineer Kenneth Hintz has spent the past four years developing a technology that aims to make the world a safer place. As the inventor of the Syntactic Landmine Detector and Target Classifier, Hintz has dedicated his research to the efficient detection of landmines and, ultimately, to the safety of military personnel and civilians around the world.

“Landmines are one of the largest causes of casualties to active military in combat and are a lingering threat to civilians even after armed conflict has ceased,” says Hintz. “Landmines are difficult to find, ubiquitous, and emplaced faster than they are removed.”

While the locations of landmines are often forgotten, even by those who planted them in the first place, they remain active for many decades. There are a number of systems dedicated to landmine detection; however, none can match the technology developed by Hintz and his team.

Existing ground-penetrating radar approaches to landmine detection are primarily implemented using anomaly detection, in which the signal processor observes deviations from the normal background to determine whether a landmine is present. In contrast, Hintz’s detector is able to not only detect but also distinguish between a simple anomaly in the ground and a functioning landmine.

“A special-purpose ground-penetrating radar uses reflections from changes in material to characterize landmines as strings of ones and zeros that act much like a word in a language,” says Hintz. “Once this string is produced, a complex, but fast, simple, language recognizer is used to differentiate between the unique pattern of landmines and other objects in the ground.”

Other detection systems have a hard time telling the difference between a coffee mug and a landmine. The Syntactic Landmine Detector not only would be able to do so, but it also would be able to indicate the type. This level of detail is helpful both in streamlining the identification process and the procedures for removal.

Supported by a $1.1 million grant from the Office of Naval Research, Hintz and his coprincipal investigator, Mason bioengineer Nathalia Peixoto, continue to further test and enhance the landmine detection system, for which Hintz recently received a patent.

Landmine detection is just one of the projects on which Hintz is working. He recently received another grant from the Office of Naval Research to address problems with current sniper detection technologies.

“Our goal is to develop methods for analyzing radar signals to detect the presence of a sniper before he fires his first shot,” says Hintz. “Our research is important because it will reduce casualties among our military. It also has civilian security
implications in that it will be capable of detecting individual shooters in crowds.”

The fundamental advantage of the preshot sniper detection system lies within its design. Unlike most sniper detection technologies, this system relies on radar signals as opposed to optical or acoustic sensors, which can only identify a sniper after shooting.

“We have two complementary approaches to processing the radar signals for sniper detection,” Hintz says. “The first is much like our processing of ground-penetrating radar signals for landmine detection in that the rifle produces an identifiable characteristic string that we can detect using syntactic pattern recognition. Our second method is based on modifications of the radar signal that are induced by the interaction of the signal with the rifle barrel itself.”

By processing the interaction of the signal with the rifle barrel, the system is able to measure and appropriately identify the weapon in question. Identifying the weapon is vital to understanding the weapon’s power and maximum range and could very well mean the difference between eliminating the sniper and suffering a casualty.

Although both the landmine detection and preshot sniper detection systems have obvious benefits for the safety of our troops, bringing technologies to market is often complex and labor intensive. As the holder of 13 patents and a board member of the George Mason Intellectual Property Foundation, Hintz is familiar with the process.

To bring these life-saving technologies to market faster, Hintz has teamed up with Mason entrepreneur-in-residence Jim Wolfe. The result of this collaboration has been the creation of a new company, FirstGuard Technologies.

Though the company is still in its early stages of development, it is moving quickly toward the effort of creating a safer world. With the help of the Office of Technology Transfer at Mason, FirstGuard Technologies has already entered license agreements for both detection systems developed by Hintz and his team.

“The mission of FirstGuard Technologies is to protect our protectors,” says Wolfe, who is on the faculty of Mason’s School of Management. “We provide new technology systems and products to enhance safety and security for the people who work to enhance ours—military personnel, police forces, first responders. We turn the latest patents and inventions into breakthrough field applications to safeguard personnel and improve mission success for our customers.”

—Tina Cipara
The horrific nature of war does more than tear flesh, maim bodies, and take lives. It also often scars the mind, leaving scores of veterans locked in emotional battles that sometimes lead to shattered relationships back home and, even worse, suicide.

To help counter this growing problem, a trio of Mason researchers, led by assistant psychology professor Keith Renshaw, is taking a unique approach by examining the role veterans’ family members play in helping sufferers or potential sufferers of posttraumatic stress disorder (PTSD) adjust to life off the front lines.

“One of the strongest protective factors against developing PTSD after a trauma,” Renshaw wrote in the team’s grant abstract to military officials, “is having support from friends and families.”

Approximately 18 percent of American service members who spend time in the war zones of Iraq and Afghanistan show at least some signs of PTSD, such as anxiety, nightmares, and emotional withdrawal. Renshaw gave an extreme example of some severe PTSD sufferers who have awoken in the dead of night to find themselves strangling their spouse—likely the result of a nightmare of their experiences in Iraq or Afghanistan.

While few of these cases result in suicide, the number of service members who have taken their own life has been on the rise of late. According to the recently founded National Action Alliance for Suicide Prevention, which counts the Department of Defense as one of its partners, the military in 2009 had a suicide rate of 12.5 victims out of every 100,000 service members, slightly up from the 2008 rate. The national average was 11.1 in 2009. Between 2005 and 2009, more than 1,100 service members took their own life. That’s one suicide every 36 hours.

Renshaw says the point of the study is to try to understand veterans’ “interpersonal environments” and see how family members react to the veterans’
PTSD symptoms. The goal is to someday use the results to develop better prevention programs for PTSD and, it is hoped, reduce suicides in the military.

During the first year of the study, researchers will hold seven focus groups, from which they will collect family members’ thoughts and experiences in dealing with a veteran who either has PTSD or is at risk of developing it. Three groups will be composed of wives of service members, and one group composed of husbands. The final three groups will comprise parents of single veterans, a segment, according to Renshaw, that has seen very little research.

“There is growing literature on spouses and the problems they face, but there is not a lot on single soldiers,” he says. “So one of the things we want to do is tap into that.”

During years two and three of the study, researchers will then conduct surveys of and interviews with both family members and the veterans themselves. The goal is to track their thoughts and experiences with PTSD over time to learn why some families function better than others in dealing with the condition and how the family environment might be able to help protect against the worsening of PTSD and reduce the chances of suicide.

“So what we want to do with this project is identify some of the mechanisms spouses and parents are using to handle [PTSD] better than others,” he says.

Before arriving at Mason in fall 2009, Renshaw worked extensively with obsessive compulsive disorder and panic disorder sufferers to see how their conditions affected their family lives. While an assistant professor at the University of Utah, he then turned his focus in 2006 to studying how family members of the Utah National Guard and reservists dealt with living with a PTSD sufferer.

As Renshaw points out, PTSD can have devastating effects within the National Guard and reserves, in particular, because these soldiers and their families don’t have the same access to mental health support afforded active-duty families who live on a military installation. He hopes to study this group more extensively in the future.

With the present study, though, the team will likely work mostly with active-duty personnel and their families. Renshaw hopes the study will give him an understanding of the factors that contribute “to the stress and resilience” found in relatives of PTSD sufferers and “how those factors play out over time.”

By the two-year mark, Renshaw says he hopes to have enough data to go back to the military with another study idea that would more closely examine techniques for reducing the effects of PTSD.

“My hope is that we will hit on some important variables that we could actually develop an intervention around,” he says.

—Jason Jacks

“One of the strongest protective factors against developing PTSD after a trauma is having support from friends and families.”

U.S. NAVY PHOTO BY MASS COMMUNICATION SPECIALIST SEAMAN BILLY HO/RELEASED
WHEN A MOTHER IS DEPLOYED

As an Air Force colonel, Mason researcher Mona Pearl has been interested in the health and welfare of American service members for many years. In a recent study, “Military Women’s Perceptions of the Effect of Deployment on Their Role as Mothers and on Adolescents’ Health,” she found that a woman’s military deployment affects her health, as well as that of her adolescent children.

“War-induced separation impacts family life with unique stressors related to the dangerous aspects of deployment,” says Pearl. “Additional factors—such as new living arrangements for the children and fear of parental death or injury—exacerbate these stresses.”

Pearl analyzed responses from 77 women who had recently completed a military deployment and were mothers of children ages 10 to 18 years. Participants completed web-based questionnaires based on their experiences at varying times after return. The majority of respondents were in the Air Force and Army, and more than 60 percent of the women had been deployed to Iraq or Afghanistan.

Pearl found that deployment served as a catalyst for health and behavior change of both mothers and their adolescent children—and the longer the deployment, the greater the effect. She also discovered strong correlations between the number of symptoms women experienced during deployment, such as cough, headaches, and joint and back pain, and the number of days deployed.

In addition, Pearl found that a longer deployment leads to increased risk behaviors among adolescent children, primarily with a drop in school grades, poor nutrition, and decreased exercise.

Other risk factors, such as physical fights, drinking alcohol, and illegal drug use, were exhibited in small percentages. Military women could often mitigate these risks on return, but the drop in school grades persisted over time.

Despite the hardships and personal sacrifice, participants expressed deep satisfaction with, and commitment to, their military work and careers. Pearl, who was separated from her daughter several times while deployed, empathizes with the women in the study.

“These military women believe in what they do. They believe in the mission, and what they believe in terms of their commitment and their work is very high. This is very much a personal part of their lives and a personal part of their own self-development that becomes a part of them,” she says.

—Marjorie Musick
Looking at Youth Culture

Most people would probably say returning to their high school cafeteria, gymnasium, or prom is not something they would do very readily. And yet, for youth culture expert Amy Best, these are the spaces that teach us the most about what it’s like to be a young adult.

The meaningful events in a young person’s life are often not what happens during science or English class, but in the social spaces where kids feel they have a sense of control over the course of events.

“There is much educational research that looks at what happens in the classroom, but there is much less that explores places such as the cafeteria, locker rooms, hallways, and homecomings,” says Best, whose book, Prom Night: Youth, Schools and Popular Culture (which won the American Educational Studies Association 2002 Critics Choice Award), explores the cultural implications of prom. “Activities like the prom are spaces occupied by youth—larger cultural initiations that kids invest time and energy in, and reveal to us how they make sense of the broader American culture and their place in it.”

As a youth scholar, Best looks not only at these rites of passage in a young adult’s life, but also at how broader social currents shape and change their everyday lives. “Youth are often sidelined in discussions about larger social issues such as globalization, the changing political landscape, the expansion of the consumer market,” she says. “Take, for example, the study of gender. We usually talk about women, not girls. And yet when you include them in this type of research, a lot of interesting things can happen.”

In her book, Fast Cars, Cool Rides: The Accelerating World of Youth and Their Cars, Best explores the milestone moment of getting a driver’s license as well as the culture of car cruising and car customizing. For her field research, Best went cruising along a popular downtown street in San Jose, California, to get a sense of the scene and the young people who populate it. She interviewed more than 100 kids about their cars and discovered how cars and the relationships surrounding them interplayed with issues of gender, race, ethnicity, and class. She also learned these issues were tied to broader social themes such as freedom, mobility, success, and risk.

Fun research, but as Best gets older, she admits she feels increasingly removed from the folks she studies. When she first started her prom book, she says she felt like she fit in with the high school students because she dressed and looked more like them. “I had slightly more capital in their world—not much, but slightly more than today,” she says.

Several years later when working on the car research, Best spent those nights cruising in a station wagon—with a baby car seat in the back—and says that sometimes she had the motherly urge to give advice to some of the kids about wearing seatbelts, for example. When your life is changing just as rapidly as the youth you are studying, how do you develop rapport with them and not impose an adult view on their world, she asks.
“You can’t pretend you’re one of them,” Best says. “Kids can see right through any kind of posturing, and you have to check yourself, be critical of your own adult perspective.” This is why much of her most valuable work comes from direct, in-depth interviews with kids about these issues. “It’s important to me to solicit their opinions on things, to let them know that I am not a chaperone. I am interested in them, their viewpoint, and their voice.”

Her latest project is taking her both in and out of high schools by observing the way young people interact with and think about food. As part of her work, she is visiting high school cafeterias in the Washington, D.C., metropolitan area and nearby fast food restaurants that kids frequent after school. “I’m not necessarily interested in how often kids go to fast food places and what they eat, but I want to know what they do when they are there and how they use the space. So I go to McDonald’s or Chipotle to observe—and I try not to eat too many French fries,” she laughs.

During observation of the first high school cafeteria she studied, Best paid attention to what foods were stocked in the vending machines, what kids ate, what they brought from home, and how they talked about their food. She noted how kids reacted to healthy menu options, and how they attached value (or didn’t attach value) to being health conscious. At the fast food restaurants, she looks at how kids occupy the space and what they talk about while they are there.

“I observed in a school where healthy eating had a big emphasis,” she says. “In this setting, health comes to mean certain things: health talk, food talk. There is a moral underpinning to it—to how the kids define and categorize each other—that signals a particular food consciousness that is shaped both by setting and the larger community where the school resides.” Best plans to continue observations in school cafeterias to understand the differences between schools that unfold around food consumption.

In the fast food restaurants, Best noted what she calls the "bleeding of school dynamics." “There’s a kind of revolving door. They bring school with them in the ways they talk about school, substitute teachers, homework. There’s this fascinating bubbling up of energy. And you get the sense that school is much more restrained [and] that they see the fast food setting as their place.”

In the same way, kids also define prom or a strip of road for cruising as “their places.” What they do within those spaces and how those spaces shape their sense of identity are the things in which Best is most interested.

“If we want to understand youth, we need to pay attention to the ways in which they exercise influence over their world, what they define as meaningful, [and] how they create meaning in their world in areas that are relevant to them,” Best says.

In other words, we must pay attention to whom they give their French fries.

—Tara Laskowski
Helping Former Child Soldiers Reclaim Their Lives

Mason conflict analyst Patricia Maulden can remember the day she first became drawn to the subject of child soldiers. It was 1996, and she was watching a C-SPAN broadcast on a new report, “Children: The Invisible Soldiers.” The report estimated that more than 250,000 children had been involved in wars over the previous 10 years.

At that time, Maulden, a mother of four who had worked in outpatient mental health, was horrified. She says the topic “literally grabbed me by the throat.” It seemed, she recalls, an indicator of the complete disorder of the system.

“I thought, if I’m going to go all the way through school to get my PhD, which was my plan, I’m going to have to find something I am passionate about, and child soldiers was it,” she says.

Maulden’s research on child soldiers, which did indeed become her dissertation (she earned both an MS and a PhD in conflict analysis and resolution from Mason), focused on the re-integration of children into society postconflict and explored postwar life for boys and girls in Sierra Leone and Mozambique in Africa and Colombia in South America. Now an assistant professor at Mason’s Institute for Conflict Analysis and Resolution, she has since focused on youth and peace building in the African countries of Liberia and Burundi, where she worked with Mason colleague Elavie Ndura-Ouédraogo, and has written a chapter on girl soldiers for a forthcoming book about women and war edited by Sandra I. Cheldelin and Maneshka Eliatamby.

In Africa, status, primarily marked by resources and marriage, traditionally determines whether one is a “youth,” Maulden explains. Thus, the age for “youth” can range from 15 to 35. But this traditional categorization is changing because of the impact of war and economic hardships on social and cultural norms, values, and practices.

Why and how do children or young teens become soldiers? In some cases, Maulden has found, commanders who need troops abduct them, but in many cases, they volunteer. Some want to escape poverty or dysfunctional families; others join to avenge wrongs done to their family or community; some may be attracted to the glamour of soldiering and the security they think it provides; and some may want to fight for their country. Or, all these motivations may factor into their decision.

Once in the army, some of these child soldiers form attachments to their commanders and their units, almost forming a substitute family for the one they left behind.

Whatever their reasons for joining the military and whatever terrible war acts they committed willingly or unwillingly as soldiers, Maulden says she respects the young warriors for dealing with difficult situations. With jobs nonexistent, food scarce, and a sense of belonging missing in their lives, Maulden believes the boys and girls who served in the armies generally did what they did to survive.

Now returned to civilian life, the former soldiers are politically savvy and “do conflict analysis like nobody’s business,” Maulden says. “They understand dynamics and a lot about resolution and practical matters. And they have a lot to offer.”

But with the stigma attached to them for having been soldiers (a double stigma for girls because they stepped so far outside traditional gender expectations), these youths have a difficult time finding a place in traditional societal culture.

Some excombatants have formed organizations to help them deal with their experience as soldiers and feel better about themselves. “They talk about
The U.S. Agency for International Development supports rehabilitation programs that assist former child soldiers, such as those shown here in the eastern Democratic Republic of Congo, in returning to civilian life.

rehumanizing people’s ways of thinking about themselves and others,” she says.

Some returning from wars have bought farmland and are trying to rebuild communities around the farms. Other former child soldiers are working for nongovernmental organizations or establishing their own groups to address the needs they see, seeking funds from larger, global institutions.

While the wars ended in the countries Maulden has studied, conflict continues elsewhere, as does the use of child soldiers.

“Child soldiers are just a fact of modern warfare,” Maulden says. “Young boys and men have always been involved in wars, but they were given menial tasks, then they would apprentice, and they would train. When they reached adult status, perhaps they would go into battle. Now they just start them young, give them a gun, and say, ‘Go for it.’”

There are young people fighting in Afghanistan, Pakistan, and Iraq, Maulden notes. “Anyplace there is fighting, you’re going to have kids fighting. They’re very cheap to maintain, there’s a large supply of children, and they’re expendable.”

Even though international agreements promising not to use youth under age 18 in combat have been signed by various countries, emergency situations override those declarations. And rebel factions are not party to such agreements. Even naming-and-shaming campaigns that publicly point to regimes using child soldiers, while having some effect, are not long-term deterrents.

“Realistically,” says Maulden, “I don’t know how it can be stopped unless leaders shift their thinking from short-term expediency and say, ‘The long-term cost is too high.’”

—Robin Herron
Mason psychologist Koraly Perez-Edgar is a voice for all the shy kids out there. Since graduate school, she has studied temperamentally shy children and their psychophysiological traits, such as brain activation, stress hormones, and cardiovascular activity.

Shy kids, she says, have an early predisposition to anxiety, which, if it remains unchecked, puts them at an increased risk for internalizing disorders, particularly clinical anxiety.

“Some kids are just naturally biased toward finding or interpreting threat in their environment and withdrawing as a result,” she says.

For example, imagine you invite a friend to a movie. Say, she declines, saying she’s too tired or too busy. If you have a bias toward threat, then you may interpret this as a slight—that your friend really doesn’t like you or doesn’t want to spend time with you.

Perez-Edgar and her team create this sort of situation in their testing, which they call a “play date.” They lead five-year-old test subjects through a series of “games,” which are really tasks that measure the kids’ levels of attention and perceived threat.

During the play date, kids wear an EEG cap “so that we get their brain response to rejection and acceptance,” Perez-Edgar says. “We see how well they do under both positive and negative feedback so we measure their behavior under stress.”

In addition to this Mason-based study, Perez-Edgar has been involved with a multiperson, longitudinal study at the University of Maryland since 1998, which has followed a cohort of children from the time they were 4 months old until they were 19 years old. Through this study, she’s had the opportunity to see how these temperamentally shy kids evolve over time.

Jerome Kagan, Perez-Edgar’s graduate advisor at Harvard University, and one of his former graduate students, Nathan Fox at the University of Maryland, started these kinds of studies with children at Harvard. “They bring in kids just when their personalities are beginning to show, around four months,” says Perez-Edgar. “You show them novel stimuli: some kids love it, others scream their heads off. So we selected the extremes of those kids, and we followed them over time.”

They’ve been able to determine a lot about these kids.
“We now know they have increased levels of anxiety. They have a greater startle response and greater levels of stress hormones,” says Perez-Edgar. This cohort of children has also provided data for studies on reward processing, social rejection, and the role of genetics.

The team was also able to confirm a long-held assertion about temperamentally shy children: that they have a hyperactive amygdala, the part of the brain that processes threat and is central to the “fear circuit.”

But, overall, the news is encouraging for the future of these shy kids.

“Left to their own devices, most children naturally outgrow their extreme temperamental shyness,” says Perez-Edgar. “It’s only a small subset that stays anxious and becomes clinically anxious.”

So what is it that allows most of these children to be happy and healthy but causes a few of them to remain withdrawn up until the point where they become clinically anxious? Perez-Edgar says it’s partly their attention biases.

“It keeps pulling them back, it tethers them to this initial bias, this initial vulnerability,” she explains. American society doesn’t place a high value on being shy, Perez-Edgar says. “We want outgoing, exuberant kids. In the United States, parents really work at getting their kids to be less shy.”

As a result, most kids will get over their shyness unless, she says, their attention bias to threat is strong. “If you don’t have this attention bias, you’re much more open to parental and environmental forces that say, ’Come out of your shell.’”

“Under neutral conditions, these kids don’t test any differently from children without inhibited behavior,” says Perez-Edgar. But when a level of stress is added—say, by telling them they’ll have to give an impromptu speech that will be videotaped and shown to their classmates if they don’t score a certain amount—then their bias toward threat and sensitivity to stress emerges.

“What we found was that for shy kids, their ability to perform plummeted. So it’s not that they’re normally deficient in attention processes, it’s that, under stress, they can’t really marshal these attention processes for their benefit.”

—Leah Kerkman Fogarty
Using Computer Game Design to Boost Interest in High-Tech Careers

It’s Saturday morning, and some students in the Washington, D.C., area aren’t sleeping in. Instead, this select group is at the city’s McKinley Technology High School learning to create educational computer games.

Funded by the National Science Foundation, the Game Design through Mentoring and Collaboration (GDMC) program aims to increase student interest in science, technology, engineering, and mathematics (STEM) in traditionally underserved communities. GDMC provides an environment in which students learn the basics of professional-level 3-D modeling and animation software, as well as the logic of game design and programming.

Held on Saturday mornings throughout the school year at McKinley Tech, the sessions are offered on a drop-in basis. More than 200 middle and high school students from about 35 area schools have participated in the program since it started three years ago. Students who have been in the program a while have the opportunity to become paid mentors and work with the newer participants.

At the helm is Mason instructional technology professor Kevin Clark, who is the principal investigator on this project. He says mentoring is a large part of the program and helps students master the technology skills they’ve acquired.

“We spend a lot of time teaching the returning students how to be good mentors,” says Clark, who also is director of the Center for Digital Media, Innovation, and Diversity. “We teach them strategies for troubleshooting if someone is having a problem or how to re-engage a student who doesn’t seem to be working. Our big message is, ‘Don’t do it for them. Help them learn.’”

Engaging the students does not seem to be a problem for Clark and his team. “These students come in voluntarily to learn how to make video games. At the end of the day, some of them don’t want to leave their computers,” says Neda Khalili, a doctoral student in the College of Education and Human Development (CEHD) who has been with the program since 2007.

The student gamers range in age from 9 to 19. About 85 percent are African American, and the majority of them are male. These students and their design processes are the subject of Khalili’s dissertation.

“I am specifically looking at students creating video games about science topics,” she says. “How do students think and learn about science topics that are unfamiliar to them when the goal is to create a video game? What would this learning process look like?”

New game designers are first given a basketball game to work on that quickly shows them some of the things they need to consider when creating a game, such as angles and gravity. The introduction of science topics into the game design was added to the program last year. For the 2010 summer session, Clark and his coprincipal investigator Kim Sheridan, who holds a joint appointment in CEHD and the College of Visual and Performing Arts, were working with a specific group of kids for four weeks when they decided to take it up a notch.

(continued on page 24)
Mentoring Makes a Difference

Mason doctoral student Neda Khalili has been working with students in the Game Design through Mentoring and Collaboration program since it began in 2007. The students and their learning processes are the basis of her dissertation research.

Through her observations, she has found that the introduction of the student mentor aspect to the program really made a difference in how the program and the learning evolved.

"[Using student mentors] really helped the instructor because students who were falling behind could get some one-on-one help without holding up the instructor’s lessons," says Khalili. "Likewise, students who were more advanced could get specialized help to learn techniques that had not yet been taught.

"Often we would find students who were working at a higher level would continue their work at home and come in with their own questions to ask the mentors."

Students chosen to be mentors are those working at an advanced level who often have participated in the program for a number of years. Working with the group this summer were a few high school graduates who were already attending college or would begin college in the fall.

The game design program was also designed so students could continue working on their games at home. "We have tried to use software where you can download a learning edition at home for free," says Kim Sheridan, the coprincipal investigator on the project. When downloading isn’t possible because of Internet connections or other technical issues, the participants can get the software on a CD or flash drive.

"With the mentors, we expect them to be working on a project of their own," Sheridan says. "They get bonuses if they upload their work."
They brought in Melanie Stegman, a biologist from the Federation of American Scientists. The gamers broke into teams and were tasked with creating a playable computer game that demonstrated a scientific concept related to immunology. Stegman met with students to provide an overview of immunology and web-based resources. She also consulted with the teams on their specific projects. At the end of the camp, the teams presented their games and explained how they illustrated the scientific concept.

“It was wonderful to see how quickly students readily adapted their minds to focus on a science game,” says Khalili. “They changed from picking ‘good’ guys and ‘bad’ guys to picking the right antibiotic to fight off the infection.”

As the gamers discussed glial cells and neurotransmitters, red blood cells twirled across computer screens. The studio atmosphere of the work space is another component of the program and a part of what Sheridan brings to the project.

“Al lot of my work on the project has been about transforming the classes from a traditional step-by-step technology class into one in which kids work on projects that are more open-ended,” says Sheridan, who is also a visual artist.

The interdisciplinary nature of game design helps make this kind of collaboration happen. As an example, Sheridan recalls one Saturday when the designers were trying to model swords. “So they were talking about what their characters were like and what their stories were about,” she says. The conversation soon moved to how pendulums work and how to make the swords swing in animation mode. “So we began talking about formulas and starting points, and how they have to program in the numbers. In order to make the game they want, they have to use math, science, and art—and put it all together.”

In addition to the mentoring they receive while creating their games, the students are introduced to the professional aspects of the field through what Clark calls STEM summits. Over the years, the young gamers have met with professional game designers, entrepreneurs, and astronaut Bernard Harris to see how the skills they are acquiring can be applied in the workplace and to the college preparation they need to attain those careers.

“By integrating the STEM content, we are creating high-quality learning opportunities and demonstrating that what they learn now is relevant and applicable in their everyday lives,” says Clark.

—Colleen Kearney Rich
PLACE
Traditional criminology has focused on understanding the characteristics and careers of criminals, but Mason criminologist David Weisburd has been an international leader in exploring the implications of where crime occurs and the history of high-crime places.

Weisburd’s research shows that simply steering clear of the bad side of town may not help citizens avoid crime. He also found that by focusing on where crime is concentrated, police and communities are able to target their efforts more effectively.

“Research has shown that in what are generally seen as good parts of town, there are often streets with strong-crime concentrations, and in what are often defined as bad neighborhoods, many places are relatively free of crime,” says Weisburd, who leads the Center for Evidence-Based Crime Policy at Mason.

While police have generally organized their patrols by neighborhoods or precincts that span a large number of city blocks, a “hot spot,” a small area of concentrated crime, can be a single street segment, a cluster of addresses, or even a single building. For example, in a study conducted in 2004, Weisburd and his colleagues found that 86 out of 29,849 street segments accounted for one-third of juvenile crime incidents in Seattle, Washington.

Looking at “crime at place” is a relatively new focus for criminologists, and while targeting crime at the places where it occurs seems like a simple shift in strategy, this shift requires major changes in data gathering and the overall philosophy and actions of the police.

The strategies of place-based policing can be as simple as patrolling hot spots, but they could also include changes in laws and techniques. For example, local policymakers might use nuisance laws to encourage landlords and property owners to aid the police in dealing with crime that occurs in or around their buildings.

“Hot spots provide a stable target for police interventions, unlike the constantly moving targets of criminal offenders,” says Weisburd, who holds a joint appointment as the Walter E. Meyer Professor of Law and Criminal Justice and director of the Institute of Criminology at Hebrew University in Jerusalem, Israel.

If police intervene at a hot spot, many citizens and even some police officers believe that the criminal activity will simply move around the corner. Weisburd’s research suggests the opposite is true. In another study, Weisburd and his colleagues found that areas close to the hot spots receiving intervention actually showed a reduction in crime despite the fact that these areas were not the focus.

Weisburd is well-respected by police chiefs and high-ranking law enforcement officials around the world who have implemented his forward-thinking strategies toward policing. He also is a member of the Committee on Crime, Law, and Justice of the National Research Council (NRC) and has served on the NRC working group on evaluating anti-crime programs and its panel on police practices and policies. He also was appointed to the new Office of Justice Programs Science Advisory Board by the U.S. attorney general.

In June 2010, Weisburd was honored with the Stockholm Prize in Criminology for his work. The Stockholm Prize, widely considered the most prestigious in the field of criminology, is awarded for outstanding achievement in criminological research or for the application of research results to reduce crime and advance human rights. This was
the first time the international committee bestowed the award on a single individual.

“While it is wonderful on a personal level receiving the prize, I see the award as reflecting the growing recognition of scholars, practitioners, and policymakers in the importance of place in crime,” he says. “The work that my colleagues and I have done in this area has begun to take center stage, both in the study of crime and in crime prevention.”

Over the course of his career, Weisburd has received more than $12 million in private and public research funds from organizations such as the National Institute for Justice and the U.S. Department of Homeland Security. He is also the founding editor of the *Journal of Experimental Criminology* and serves on a number of journal editorial boards in the criminology field.

Over the past two years, his center, housed within the Department of Criminology, Law and Society, has hosted congressional briefings and research symposiums on the role that location plays in crime and on counterterrorism research. Professors affiliated with the center recently presented at a symposium on drug trafficking, policy, and sentencing, which was organized by U.S. Senator Jim Webb.

In summer 2010, the center hosted the second annual Evidence-Based Crime Policy Symposium, which brought in academics and law-enforcement and policy officials from around the world for a series of workshops, panel discussions, and special lectures that covered topics such as the use of geographic information systems in crime policy and translating research into practice.

Current research topics at the center include the geography of crime and criminal justice, security at airports, evidence-based policing, and technology and policing. The center’s website includes such tools as the evidence-based policing matrix, which allows researchers and practitioners to identify policing programs that work, and a meta-analysis tool to assist in statistical analysis in systematic reviews of crime programs. In addition, the center’s Crime and Place Working Group has created a comprehensive bibliography of crime at place literature and research.

—Jim Greif
Deep in a valley in southeastern Iceland, Mason hydrologist Sheryl Beach spent days hiking over miles of hardened lava searching for evidence.

She and her research team examined rocks, water, sand, and volcanic ash in that Martian-looking landscape, searching for clues of a mega flood of biblical proportion—a phenomenon so powerful it changed the face of the planet. And they found those clues.

On that trip to Iceland in 2008, Beach, Mason PhD student Douglas Howard, and Georgetown University geomorphology professor Tim Beach found evidence of a jökulhlaup, a catastrophic release of glacial floodwaters caused when volcanic activity, similar to the volcanic outburst in early 2010 that disrupted air travel around the world, melts glaciers on top of mountains.

The team, supported by a grant from the National Science Foundation, had three objectives in Iceland: To look for evidence of a mega flood, to model that flood to determine its power and volume, and to compare the landscape features shaped by the flood with similar watershed basins on the planet Mars.

The results were more than any of them could have hoped for. In fact, their evidence suggests this mega flood, which appears to date back more than 8,000 years, was the largest of this type on Earth.

“The sheer power of this flood makes it the largest we’ve ever seen,” says Howard, who completed his PhD in earth systems and geoinformation sciences in 2009 and is now full time with the U.S. Geological Survey. “It may not be the largest spatially, but it was the most forceful.”

Howard, a planetary geologist, is most interested in looking at how these floods can help him learn something about the landscape of the planet Mars. He has developed a hydrologic model that calculated
the areal extent and the peak discharge of the flood. With this model, he was able to reconstruct the event and calculate how deep the channel was and how fast the water was going when the glacier burst.

“In following the footsteps of other researchers who have looked at this channel, we discovered through our field work that there had been a much greater flood than people had calculated before,” says Beach, an associate professor of geography and geoinformation science at Mason. Beach’s research focuses on the history of landscapes and how the Earth has changed over time. Beach and her husband and co-author, Tim Beach, were recently recognized with the 2010 G. K. Gilbert Excellence in Geomorphological Research Award by the Association of American Geographers.

Glacial outburst floods, as opposed to river floods, are much more powerful and destructive to the landscape, says Beach. “The cutting power of a glacial flood is like a bulldozer. It takes rocks with it, plows through the sides of mountains, and picks material up and deposits it in a particular way.”

Glacial ice makes a U-shaped valley, such as Yosemite Valley in California, as it flows. River valleys are often V-shaped because a river cuts them down more vertically over time and then deposits the materials in a well-sorted, orderly manner.

In the case of the Jokulsá á Fjöllum river channel in Iceland, Beach and the team found well-sorted rocks on top of a hill that didn’t match the hill. But the rocks did match an area across the channel that had been gouged out.

“It looked like someone had taken a gigantic fire hose, blasted the side of the mountain, flipped its rocks across the channel and sorted them out on the other side,” she says. “We said to ourselves, ‘That’s what a mega flood looks like.’”

With this new evidence, Beach and Howard hope to prove to the world that the Jokulsá á Fjöllum mega flood was the largest in history. The team has written a paper on its findings, which will be published in a future issue of the journal Geomorphology. They hope their results will help scientists in the future looking at these phenomena—both on our planet and elsewhere in the universe.

—Tara Laskowski

OUT OF THIS WORLD

If you can’t travel to another planet to examine geological phenomena, then the next best thing is to use your own planet. Planetary geologists, such as Douglas Howard, use the Earth as their prototype—comparing similar landscape features on our planet with those on places such as Mars.

In the case of the jökulhlaup, Howard, who was a postdoctoral fellow in Mars research at the University of Tennessee, has used this mega flood as an Earth analog to compare it with the Aram Chaos outburst channel, a specific river channel that flowed from the Aram Chaos crater on Mars.

The channel looked like a former river valley that had flooded, but the features of the landscape called for a much larger source of water than there appeared to be.

By applying the model he developed for Earth and changing it slightly to account for the different level of gravity on Mars, Howard was able to prove that groundwater likely contributed to the surface water source.

“There’s very little vegetation in Iceland, and the landscape is quite similar to Mars, although fluvial geomorphological features on Mars are much larger,” says Howard. “Still, this is possibly the best analog to apply to Mars, and we’ve found spectacular results with our models.”

Howard has traveled to Montana, Idaho, Oregon, and Washington to model other floods. In summer 2010, he continued the work he started at Mason by traveling to Siberia to study a series of mega floods that happened between 45,000 and 13,000 years ago.

“It’s really fascinating and gratifying to be able to apply our knowledge of our own planet to other planets,” says Howard. “It just brings us one step closer to understanding more about the universe.”
One of the huge video monitors in Anthony Stefanidis’s lab displays a computer model of Mason’s Fairfax Campus rendered in Google Earth. All the buildings are easily recognizable and drawn to scale. Every few seconds, the model spins to show another perspective of the campus.

“This is practically a precise three-dimensional map,” says Stefanidis, director of Mason’s Center for Geospatial Intelligence. “It describes what the buildings look like, and the general public can access that through Google Earth. But despite its visual appeal, this representation is static.”

Stefanidis’s group plans to enhance the map by adding complementary information and the “spatiotemporal aspect.” The map could become a user interface and provide access to different bits of existing information. For example, one could click on a building and see what events were taking place there. Stefanidis also sees the potential for safety and security applications. “By linking with class schedules and rosters, the university could have a precise list of all students present in a building in the case of an emergency.”

He adds that video fed through cameras around campus could be overlaid on the model to animate it by showing people’s movement at a given instance or movement patterns over time—information that could be useful for planning.

The campus map project, which resulted from a request by Mason’s Facilities unit, began as a service to the university but actually laid the groundwork for a proposal that recently won Stefanidis and Matt Rice, assistant professor of geography and geoinformation science, and Jana Kosecka, associate professor of computer science, a competitive grant from the National Geospatial-Intelligence Agency (NGA).

Another of Stefanidis’s current grants is from Draper Laboratory, a prestigious independent research and development institution. For this project, he also relies heavily on distributed video information but is considering adding sensor data that can be used, for example, to monitor the presence of pollutants in the atmosphere and where they are moving, in collaboration with assistant professor Guido Cervone.

Stefanidis’s work has evolved from simply looking at buildings and landscapes to incorporating the human activity element of geospatial intelligence. To do this, he has partnered with colleagues in Mason’s Computer Science Department, who use video processing to capture movement, and researchers in Mason’s Center for Social Complexity, who model social networks.

“By linking all these pieces of information, we can make valuable observations relating to, and contributing toward, the automatic capturing of ‘human terrain,’” Stefanidis says. “This is probably one of the prominent research themes that will be emerging in the future in our field. It is the evolution of geoinformatics to be addressing much more dynamic phenomena.”

Peggy Agouris, his wife and partner in science, says she is more traditional when explaining her research. Her expertise is centered on remote sensing; more specifically on automating geospatial information extraction from high-resolution satellite and aerial imagery.

She has developed techniques to automatically take in live satellite images and compare them with existing geographic information systems databases. For example, in a war zone, previously collected data can be compared with current visual data to see whether and how roads or buildings have
changed, especially after heavy destruction. The data can then be quickly relayed to troops on the ground, so they can update their records.

“Embedding our automated approaches in a dynamic environment, with data collection and information extraction integrated in it, and taking into account the ongoing evolution of sensing, visualization, and communication devices, not only allow us to observe events but also incorporate in real time what is actually happening in a way that can provide immediate solutions. This is what we are shooting for,” says Agouris, who directs Mason’s Center for Earth Observing and Space Research and chairs the Department of Geography and Geoinformation Science.

The two Greek natives met as undergraduates, married, and earned PhDs in digital image analysis from Ohio State University. They both worked at the Swiss Federal Institute of Technology in Zurich and the University of Maine before joining Mason in 2007.

The scientists have worked together and separately on papers and research sponsored by the National Science Foundation, NGA, NASA, the U.S. Army, the U.S. Geological Survey, BAE Systems, and the CIA, among others.

While they each have their own areas of expertise, the excitement they feel about their field and the potential it offers is the same.

“We feel very fortunate because the things we do are extremely suitable to be linked with the other things the university is doing,” says Stefanidis, who notes that Mason’s location near the nation’s capital, as well as the faculty’s expertise, ideally position the university to be a leader in geointelligence.

Agouris sees the field as rapidly developing. “For years, we were limited in terms of the applications of our work, but now it’s unlimited.”

Stefanidis adds, “We are working on things now that people will be using in a few years.”

—Robin Herron
As they say in Texas, everything is bigger out west, including wildfires. But, while damaging forest fires in states such as California, Nevada, and Colorado make headlines each summer, the East is far from immune to this raging problem.

“The West has bigger and more intense fires,” says John Qu, director of Mason’s EastFIRE Lab. “But, in the East, the population is so big. Approximately 70 percent of the population lives east of the Mississippi,” which means the potential for loss of life and property is even greater, he says.

Born out of a conference on wildfire management held at Mason in 2005, EastFIRE Lab is a conglomeration of researchers, visiting scholars, and graduate students melding their research talents to help diminish the damaging effects of wildfires on states east of the Mississippi.

Headed by Qu and housed in a small room on the third floor of the Research I building on the Fairfax Campus, the lab is part of the College of Science’s Environmental Science and Technology Center, which Qu also directs. The lab partners with several federal agencies, including the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration, and NASA, and produces work sought by a gamut of federal, state, and local fire officials.

Much of the lab’s research focuses on the factors that are critical to fire risk and fire behavior, such as vegetation and moisture content. But researchers also study the effects of climate on fire potential, the emissions given off by wildfires, and what happens to an area after a fire races through it.

“We get a lot of requests for our work,” says Qu, who, also has expertise in satellite remote sensing, earth system sciences, and climate and environmental sciences.

In the United States, fires scar nearly six million acres of land annually, according to the National Interagency Fire Center. And while the vast majority of fires erupt out west, the East sees its fair share of blazes, according to Qu. In Florida and Georgia alone, nearly 6,000 wildfires sprung up in 2009, scorching 140,000 acres.

As part of its research to counter this pervasive problem, the EastFIRE Lab looks skyward to see where East Coast fire hot spots may lie. The lab partners with NASA’s Goddard Space Flight Center in Maryland to access satellite data that it uses to analyze and estimate moisture and vegetation levels on the ground below.

In terms of identifying blazes, lab researchers also use satellite imagery to gain bird’s eye views of fires as they are occurring, giving firefighters on the ground more accurate location and size information. There are several satellite images on the lab’s website of a particularly large forest fire in Georgia in 2007 clearly showing the orange glow of flames.

According to Qu, though, flames are not always so easily seen from outer space, as fires in the East tend to be “smaller, cooler, less intense,” because of humidity and wetter conditions.

“Sometimes you can only see the smoke and not the fire because it burns so low to the ground,” Qu explains.

With this extensive research and access to NASA technology, one of the functions of the lab, according to Qu, is to maintain the EastFireWatch digital portal. When fires are active, the portal houses near-real-time data on wildfires as they are occurring, plus it keeps historical data and satellite

(continued on page 34)
KEEPING WATCH ON THE EARTH

Want proof that two of the world’s biggest countries can work together for the betterment of the global environment? Then look no further than a small lab on the third floor of Mason’s Research I Building.

Housed there is the Environmental Science and Technology Center (ESTC), a joint venture between Mason and China, where scientists and students are examining ways to better monitor how the Earth is being affected by environmental and climate forces.

“The center offers the opportunity to mix researchers from various cultural backgrounds and give them a high-level approach with an international vision, provide in-depth knowledge in the interdisciplinary field of environmental and climate research, and teach them the skills, tools, and methodologies to support a global approach for solving complex problems,” said Mason provost Peter Stearns in fall 2008, when the center was formally created.

Each year, according to ESTC Director John Qu, researchers and students from China travel regularly to Mason to learn about using remote sensing techniques to monitor drought conditions, forest disturbances, flood potential, and smoke and dust aerosols in the air. “The best students come here,” Qu points out. Conversely, Mason researchers visit China annually to study with scholars there.

The center, which counts the EastFIRE Laboratory as one of its partners, also hosts workshops and forums, where environmental and climate researchers from around the world come together to discuss their latest research. In April, the center will host a drought-monitoring forum.

While China remains an important partner, the center is expanding its partnerships to other countries, including South Korea and European nations. In July, it will host a workshop for several African countries.

For an issue as important as the environment, Qu stresses, “Globalization is critical to the center.”

—Jason Jacks
These satellite photos show wildfires, the Normalized Difference Vegetation Index, and the Aerosol Optical Depth in Virginia and North Carolina in June 2008. Photos courtesy of EastFIRE Lab.
LOOKING at the PAST
Bringing Social History to the Forefront

When Mason provost Peter Stearns was in graduate school at Harvard, social history was in its infancy, yet the future historian wasted no time immersing himself in the field.

“Social history was an invitation to look at aspects of history not seriously considered before,” Stearns says. “The idea that we could learn more about the past if we extend the human record beyond politics, wars, and the formal intellectual life really excited me.”

Stearns was only the second person at Harvard to choose social history as his field of study. He then spent the next decade focusing on the history of the working class.

“I was interested in how groups of people adapted to the huge change that the Industrial Revolution brought—workers, middle class, women,” he says.

For many scholars, their dissertation is often their first book. Not Stearns. It was actually his third. He published his first book, *European Society in Upheaval: Social History since 1800*, in 1967 when he was four years out of graduate school, and he has continued producing scholarly books at a rapid pace. In fact, Stearns has the distinction of being one of the few people in the world to have published more than 100 books. As of January 2011, he was awaiting publication of his 112th book, *Satisfaction NOT Guaranteed: Dilemmas of Progress in Modern Society*, which will be quickly followed by book 113, *World History: The Basics*.

While many of his books deal with world history, a significant number provide an interesting historical lens with which to view such popular culture topics as parenting, dieting, anxiety, being “cool,” and even death. Some of his titles include *Revolutions in Sorrow: The American Experience of Death in Global Perspective*, *Fat History: Bodies and Beauty in the Modern West*, and *American Cool: Constructing a Twentieth-Century Emotional Style*.

It was in the late 1970s and early 1980s that Stearns began exploring this area of history. “I became interested in choosing social topics based on current issues then looking back at the past,” says Stearns who has served as provost at Mason since 2000. “I realized you could make a useful and illuminating connection between the past and the present, and you could also make comments about current conditions based on the past.”

One reason Stearns is published so widely is that he chooses topical subjects. For example, *Anxious Parents: The History of Modern Childrearing in America* is about “helicopter” parents, but it was written before the term was even coined.

“I don’t use the term in the book because I didn’t know it then, but that is what that book is about,” he says. “History is relevant and useful. I am really interested in picking topics that involve current behaviors that are interesting and how history can help us understand them.”

Over the years, he has provided a historical perspective for dieting with *Fat History: Bodies and Beauty in the Modern West*; the post-September 11, 2001, world with *American Fear: The Causes and Consequence of High Anxiety*; and jealousy with *Jealousy: The Evolution of an Emotion in American History*.

Of all the volumes, Stearns doesn’t really have a favorite, but if he had to single one out, it would be *American Cool: Constructing a Twentieth-Century Emotional Style*, published in 1996.

“I think *American Cool* was my most significant single contribution,” he says. “I have had a number of books that have been reasonably widely cited...
I realized you could make a useful and illuminating connection between the past and the present, and you could also make comments about current conditions based on the past.”

Stearns has also written a number of textbooks, which he says he enjoys writing. “Not all the time but some of the time,” he quickly adds. Facilitating the teaching of history is a frequent motivator of his work.

“I do find pleasure in putting things together and trying to convey the big picture,” he says. “One of the things I really love to do is to take other people’s work, and sometimes my own, and attempt a new synthesis, putting things together in a fashion that I hope makes history more intelligible.”

Despite the pressures of serving as the chief academic officer of a major public university, Stearns continues to do the scholarly work almost as a diversion.

“Being able to write a little bit every day is actually relaxing for me,” he says. “Also, it helps keep some of the other issues in perspective and in balance. And I hope, every so often, I do have something to say.”

—Colleen Kearney Rich
When Mason historian Suzanne Smith was in graduate school at Yale University, she took a course in 20th-century African American culture and decided to write a seminar paper on Motown Records. As a native of Detroit, she had a special interest in the record label and how it affected her hometown. “I sometimes jokingly call it the seminar paper that would not die,” she says.

Smith’s professor told her that the paper had the potential to become a dissertation. Smith rose to the challenge and wrote the dissertation, graduating from Yale with a PhD in American studies in 1996. That work, which examined Motown and its relationship to the black community of Detroit and the civil rights movement, became her first book, *Dancing in the Street: Motown and the Cultural Politics of Detroit* (Harvard University Press, 2000). The book received a third place Ralph Gleason Award, a prize sponsored by New York University, Broadcast Music Inc., and *Rolling Stone* magazine that recognizes achievement in critical writing about popular music.

To this day, the decision to write about Motown still influences Smith’s work. It was while researching the history of Motown that Smith learned how musicians would often steal away from the recording studio to a funeral home across the street to relax and unwind among the caskets. This fact intrigued her.

In her most recent book, Smith moves beyond Detroit and the music business to explore the role of African American funeral directors and their participation in the civil rights movement nationally.

During her research for *To Serve the Living: Funeral Directors and the African American Way of Death* (Harvard University Press, 2010), Smith uncovered the rich history of African American funeral directors dating from colonial times to the present. Often revered in their communities for their ability to honor the dead, funeral directors were among the few economically independent African Americans who did not rely on white society.

According to Smith, to understand the importance of the African American funeral, one must look back to the burial and mourning practices in West and Central Africa during the slave trade. Often described as a “homegoing,” slaves believed that death freed the deceased from a life of oppression and that the person’s soul would return to Africa.

“The slave funeral was a powerful refuge where slaves bonded together as family and community, and it helped to lay the groundwork for African American communal life,” says Smith, who is an associate professor of history at Mason. “Funeral directors began to have a very important role in African American culture because they were the individuals who oversaw death and burial.”

Throughout the 19th century, funeral directors and the funeral industry underwent a significant change as industrial America emerged. Funeral directors, instead of family members, were tasked with coming directly to the house and preparing the body for viewing and making other arrangements. The rise of the modern funeral industry, according to Smith, occurred during the Civil War when embalming became popular and necessary to preserve the bodies of soldiers during shipment home for proper burials.

Although the funeral industry was growing at a rapid pace, African American funeral directors and other business leaders realized that, with the rise of
Jim Crow segregation laws in the 1880s, the key to their success lay in securing the African American market for themselves. This loyalty, however, was not always guaranteed, and funeral directors had to actively promote the cultural and economic benefits of supporting African American businesses.

When funeral homes began popping up in the 1920s, the funeral industry and directors took on a more active role in the civil rights movement. Smith found that many funeral homes became sanctuaries and meeting spaces in communities where Jim Crow restrictions were harsh.

Putting themselves at considerable personal and financial risk, many funeral directors supported causes such as the Montgomery Bus Boycott in 1955, the result of Rosa Parks’s refusal to give up her seat on a city bus to a white person. They also aided civil rights leaders and activists by providing inconspicuous transportation to and from rallies and other demonstrations.

“The civil rights movement provided a unique opportunity for African American funeral directors to not only honor the fallen dead, but also show their support by aiding civil rights leaders and activists,” says Smith. “However, this created quite an ambiguous role for funeral directors who were trying to stand up for their race by fighting discrimination at the same time as they were fighting for job security by encouraging individuals to support African American businesses.”

Smith has been traveling around the country to talk about her research and the book. She has been on such radio programs as NPR’s *Morning Edition* and the *Kojo Nnamdi Show* discussing African American funeral traditions. She has even given talks at funeral director conventions. Although she is still publishing and speaking about the African American funeral industry, she is already at work on a new project.

Smith’s new book, tentatively titled “Jesus Was a Capitalist,” will examine the role of entrepreneurship in the modern African American religious tradition, including the business careers of charismatic black televangelists such as Reverend Ike, as well as the rise of black mega churches.

“I think of my work as studying African American entrepreneurship through a cultural lens, using music, death, and now religion.”

— Catherine Ferraro
When Mason legal historian Joyce Lee Malcolm completed a PhD at Brandeis University, she took on a complicated project for the Minute Man National Park in Massachusetts. She was tasked with documenting what exactly the seven miles of park road looked like during the Battles of Lexington and Concord.

“My job was to tell them where everything was on April 19, 1775. They wanted to know where the houses were, the barns, the open fields, the orchards—everything,” says Malcolm, who is a professor at Mason’s School of Law. “That [project] was a real plunge into primary documents.”

During her research, Malcolm came across a receipt in some family papers. It was the bill of sale for a 19-month-old "negro servant boy" named Peter. Puzzled by her find, Malcolm made a copy of that document for her own files.

Flash forward more than two decades, Malcolm is now a Constitution scholar and an expert on the second amendment. The author of seven books, including To Keep and Bear Arms: The Origins of the Anglo-American Right, she taught at Boston University and Bentley University, and was a research fellow at Harvard Law School, Princeton University, and the Massachusetts Institute of Technology. Her research has been referenced in Supreme Court decisions. Yet, she still carries around that Xerox copy of a 1765 bill of sale.

Malcolm says she showed the document to people over the years and even shared copies of it.

“I really didn't know what to make of it,” she says. “I had never come across a receipt such as that. I’m sure they existed, but families didn't keep them.” She was also surprised that there would have been a transaction involving a child so young.

When Malcolm decided to find out more about Peter, she really didn't know whether she would be able to find much information at all.

“I didn't know whether he had even lived beyond childhood or who his biological parents were,” she says of starting the project. “There were a lot of things I didn't know whether I would be able to find out. It was a true detective search in that sense.”

But she was able to discover things about Peter and the Nelson family who had acquired him, thanks to the Lincoln, Massachusetts, public library, where records date back to the founding of the town in 1754. She also was able to use the Massachusetts Soldiers and Sailors of the Revolutionary War Registry to track Peter after he joined the Continental Army and moved from regiment to regiment throughout the war. Then, crafting his story was a matter of setting Peter and his circumstances against the background of the times in which he grew up and what was taking place in the newly formed country.

“I've written a lot of analytical history, but this was very different,” says Malcolm of writing her seventh book, Peter’s War: A New England Slave Boy and the American Revolution (Yale University Press, 2008), the result of her detective work. “You really have to put yourself back in time and imagine what life was like then. I really enjoyed it.”

“The law is a wonderful source for historians. To be able to get into those records provides a great source for understanding the thinking of people.”
In an effort to bring Peter’s life to the page, Malcolm adopted a narrative style for the book that described the environs and daily life. She also chose to use an essay on resources at the end of the book rather than footnotes so the text would be more accessible to the general public.

The Peter’s War research has also proved useful in her teaching. “Everyone is so familiar with how slavery was handled in the South before the Civil War. There isn’t that much written about slavery in the North,” she says. “My research did educate me with the rules of slavery in New England.”

In her Constitution Law class, Malcolm has always had her students review the slavery code of South Carolina, but now she also teaches them about the rules in New England. “It was a different paradigm,” she says. “Slaves lived with the family in the same house, they got married in church, and they had legal rights. They could appear in court, and often the all-white jury would find for the slave.”

“The law is a wonderful source for historians,” says Malcolm. “Law deals with large theoretical issues, but it has to keep making decisions. For example, was this person insane? What do we mean by insanity? To be able to get into those records provides a great source for understanding the thinking of people.”

As a result of her new area of expertise, Malcolm has an article on slavery in Massachusetts latest issue of The Journal of the Historical Society.

Of course, research and investigation always lead to new ideas. While researching Peter’s short life (although he survived his service to the Continental Congress, he died before the age of 30, possibly of small pox during an outbreak in the winter of 1791–92), Malcolm came across other documents that piqued her interest. She is now working on a biography of Benedict Arnold, which is yet another departure for her.

“The Arnold biography grew from the background I did for Peter’s War and the battles I researched,” she says. “So one thing I found led to another.”

Excited by her latest project, Malcolm is yet again compiling her facts, soldiers the harsh New England winter with the Continental Army (at least in her mind), and composing yet another life.

“Biography is so different from traditional scholarly history,” she says, “because you want to make the person actually ‘live.’”

—Colleen Kearney Rich
Presenting and Preserving the Past through Digital Media

Dan Cohen agrees that few things compare with the thrill of holding a priceless item, such as an original manuscript of Charles Darwin’s *The Origin of Species*, in your hands. But as the technological world continues to rapidly advance, Cohen and an eclectic group of researchers, historians, and software developers are working to revolutionize the way millions of people experience history.

Cohen, director of Mason’s Center for History and New Media (CHNM), and his colleagues use digital history—history created through new communication technologies such as computers and the web—to examine the past. Founded in 1994 by the late Roy Rosenzweig, the former Mark and Barbara Fried Chair of History and Art History, the center is the largest and most-funded digital humanities and history center in the world.

Each year, CHNM’s many project websites attract more than 16 million visitors and encourage researchers, scholars, historians, students, and teachers to reconsider the ways in which they present and preserve the past. In addition, the center receives millions of dollars in grant funds every year from organizations such as the Andrew W. Mellon Foundation, the National Endowment for the Humanities, and the U.S. Department of Education.

"Just in the past 15 years, the possibilities of experiencing history through the digital realm have grown tremendously as new technologies continue to pop up," says Cohen. "One of the most important things we do at the center is take a comprehensive look at digital media and history, so that we can pioneer new methods of engaging people all over the world to share historical knowledge."

The center has three divisions: education, public projects, and research. The education division is designed to help teachers use new media to teach history more effectively. This division was set in motion with Rosenzweig’s one-of-a-kind project, History Matters. The success of History Matters in helping teachers and students of U.S. history throughout the world led to the creation of other web-based projects, including World History Matters and Women in World History.

Another important project is the National History Education Clearinghouse for which the center received a $7 million contract from the U.S. Department of Education. The clearinghouse is a five-year project designed to help K–12 history teachers access resources and materials to improve U.S. history education in the classroom.

Some of the education division’s other projects include Making the History of 1989, which provides resources on the collapse of communism in Eastern Europe in 1989, and Liberty, Equality, Fraternity: Exploring the French Revolution and Imaging the French Revolution, both of which provide access to essays and rare archives of some of the most important documentary evidence from the revolution.

The center’s second division is devoted to public projects and provides access to online exhibits and archives to the general public. As one of the most popular projects in this division, the September 11th Digital Archive collects, preserves, and presents the history of the 2001 terrorist attacks in New York, Virginia, and Pennsylvania. More than 150,000 firsthand accounts, e-mails, images, and other digital materials exist in this archive.

Another project that, according to Cohen, will have a tremendous impact on the study of the early (continued on page 44)
In 1994, Roy Rosenzweig, the Mark and Barbara Fried Chair of History and Art History, founded the Center for History and New Media (CHNM). With Rosenzweig at the helm, the center became internationally known, with more than a million people relying on its digital tools to teach, learn, and conduct research.

Rosenzweig was involved in a number of digital history projects, including websites on U.S. history, historical thinking, the French Revolution, the history of science and technology, world history, and the September 11, 2001, attacks. His web-based project, History Matters, was one of the first projects of its kind and proved that Rosenzweig was thinking ahead as the online world grew.

In October 2007, Rosenzweig died of lung cancer. As a fitting tribute to Rosenzweig, CHNM used its Omeka software to create an online tribute to Rosenzweig (thanksroy.org) that captures memories, photos, and other thoughts on his life.

His legacy continues and pushes the center toward bigger and better things. As of press time, plans were under way to rename the center for Rosenzweig.

“To have the opportunity to deeply examine issues and have a top-notch staff that thinks about this full time is really amazing,” says Dan Cohen, CHNM director. “It was Roy’s plan and forward thinking that put us where we are today. We hope to keep propelling that vision forward.”

—Tara Laskowski
These files contain the Papers of the War Department, which CHNM is digitizing.

(continued from page 42)

republic is the Papers of the War Department, 1784–1800. This project offers a unique window into a time when a new nation struggled to defend and define itself and includes more than 55,000 documents of the early War Department. These papers were believed lost in a fire in 1800, but an effort to retrieve copies of the files from across the country reconstituted the archive.

Other interesting projects in the public projects division include Gulag: Many Days, Many Lives, which immerses visitors in the varied experiences of the brutal Soviet prison camp system. In addition, the Hurricane Digital Memory Bank includes firsthand accounts, images, blog postings, and other electronic media that recount the stories of Hurricanes Katrina, Rita, and Wilma.

Paving the way for a new generation of scholars and students to conduct research, one of the most popular tools in the center’s research division is Zotero. This software runs in a web browser and improves the way research is stored, shared, and organized digitally. More than one million people worldwide use this popular research tool that has been translated into more than 40 different languages.

Another innovative software tool is Omeka, which helps simplify the online publication of collections and exhibits. Omeka is used by thousands of scholars, museum professionals, librarians, archivists, educators, and students.

“With the development of software tools such as Zotero and Omeka, organizations and individuals now have access to historical information at their fingertips,” says Cohen. “In addition, these tools present the huge gains of moving online such as the ease of searching, discovering, and organizing information.”

In addition to developing revolutionary tools to present history online, CHNM created THATCamp (the Humanities and Technology Camp), a new kind of academic meeting that has been replicated in dozens of states and countries. These “unconferences” invite participants to share their work and knowledge about the humanities and/or technology informally. A grant from the Mellon Foundation allows CHNM to assist THATCamps remotely.

“The [CHNM] staff is always looking for new ways to improve the practice of history in a digital age,” says Cohen. “With the introduction of new technologies such as smartphones and tablets, the exciting future of the center lies in the possibilities of new techniques that can become part of the toolkit of the 21st-century scholar.”

—Catherine Ferraro
THIS YEAR IN RESEARCH
Technology Development

I am pleased to introduce this new section of Mason Research, which includes descriptions of technologies developed by Mason faculty, because it allows me to briefly describe the new direction in which we are taking technology development at Mason. We have moved from a traditional university approach for transferring technology developed by faculty research to the private sector to become one of just a few universities in the country that use a proof of concept technology development center approach.

The Mason Enterprise Initiative (MEI) is an innovative approach that brings together our strengths as a research university with a group of experienced, proven entrepreneurs. The MEI is centered on a vetting group that uses market-based assessment and decision making to identify intellectual property with the potential for commercialization. The vetting group identifies and supports the path that an intellectual property should follow for development: company formation, a patent license approach, or sending the concept back for research for further development. The MEI is led by Jonathan Aberman, managing director of Amplifier Ventures. This arrangement allows the MEI to access local private capital markets to support the commercialization process.

This new approach puts Mason at the forefront of models for the commercialization of university-derived intellectual property. We are excited about this approach because it will allow us to make more productive decisions about the development of intellectual property at Mason and it directly connects Mason’s technology development process with the entrepreneurship and venture capital communities.

—Roger R. Stough
Vice President for Research and Economic Development

Recent Technologies

A SYSTEM THAT KNOWS THE ROADS

As a respected researcher whose knowledge is sought in certain scientific circles, Phil Yang has work that has him traveling often on Washington, D.C., area roads. In other words, he knows traffic.

“It’s kind of a headache,” Yang says of not knowing when and where a backup may occur. “It’s not predictable.”

But Yang, who is codirector of Mason’s Joint Center for Intelligent Spatial Computing (CISC), may have a solution in the form of a system his team developed that uses real-time and historical traffic data to predict congestion hot spots.

Nationwide, according to the Texas Transportation Institute’s 2009 Urban Mobility Report, traffic is blamed for the loss of about $87 billion worth of fuel and productivity annually. That amounts to about $750 for every traveler in the country.

Yang’s portfolio of software technologies—collectively called the Road Traffic Prediction System—is designed to ease this mounting problem. By tapping into local sources of weather, roads, construction, and law enforcement information, the system calculates and predicts...
Meanwhile, others can turn a cell phone into an eavesdropping device by surreptitiously turning it on so voices and other sounds can be picked up and transmitted elsewhere. Because of their ability to accept downloaded software, smartphones, like Blackberries and Symbian phones, are most susceptible.

Called VirusMeter, Chen’s program is designed to monitor a phone’s battery life. If it depletes at a more than normal rate, the program alerts the user that a virus may be present. From there, the user could either perform a self-scan of the phone or take it to the provider for service.

Currently, VirusMeter has an accuracy range of 75 to 92 percent, Chen says, but developers are working to improve on those numbers.

Regarding interest in the program, most, he says, is coming from fellow researchers. But his team is talking with several antivirus companies about partnering opportunities.

—Jason Jacks

GETTING THE BUGS OUT

You charge your smartphone in the morning, and by dinner it’s already down to one bar.

Heavy cell phone user or not, that short life-span could be telling you something.

“Battery is something we can measure,” says Songqing Chen, a Mason computer scientist who led a team that created a program that monitors phones for lurking viruses. “If my cell phone battery lowers in a day, and I didn’t use it, that could mean something is wrong.”

There are more than 400 types of viruses, or malware, that can infect wireless devices, such as cell phones. Some are able to send copies of text messages sent from a phone to other devices.

Meanwhile, others can turn a cell phone into an eavesdropping device by surreptitiously turning it on so voices and other sounds can be picked up and transmitted elsewhere. Because of their ability to accept downloaded software, smartphones, like Blackberries and Symbian phones, are most susceptible.

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—Jason Jacks

“BAND-AID” FOR A SLIPPERY PROBLEM

With a wealth of time, energy, and money invested in a project, the last thing scientists such as Daniel Cox want to see happen is it to all go to waste because of a slippery microscope slide.

“It really was a necessity that brought us to this,” says Cox, talking of the invention he and doctoral student, Eswar Iyer, pioneered.

Referred to as a “dehydration” within Mason’s Department of Molecular and Microbiology, where Cox is the graduate program director, Cox’s

(continued)
creation keeps tissue samples in place and protected from the damaging effects of being dumped into various substances.

Without the invention, which also is called a tissue-processing unit, samples, particularly those that are not thin and flat, have a tendency to fall off slides as they are being prepared. Cox says this happens about 20 percent of the time, leaving samples often damaged and unusable.

“This is a constant problem for us,” he points out. Resembling a Band-Aid, the tissue-processing unit is a small mesh sheet with adhesive edges, which is placed over the slide and the sample. Since it is permeable, fluids can pass through it but the sample stays put. Among students, the invention, which was partly funded by a grant from the National Institutes of Health, has so far been successful in retaining samples 100 percent of the time, he says.

Cox says he may have other Mason researchers test his invention.

—Jason Jacks

FY 2006 through 2010

*Disclosures of potentially patentable technologies and copyrights
New Patents

Guido Cervone, Menas Kafatos, Domenico Napoletani, and Ramesh Singh
Wavelet Maxima Curves of Surface Latent Heat Flux

Domenico Napoletani, Timothy Sauer, and Danielle Struppa
Dissipative Functional Microarrays for Classification

Mark Krekeler, Stephen Elmore, and Cynthia Tselepis
Radioactive Material Sequestration

Steven Carlo, Eva Maya, Arthur Snow, and Richard Pong
Fabrication of Polymer Nonlinear Elements for Optical Limiting

Mark Krekeler, Stephen Elmore, Cynthia Tselepis, and Danielle Stoll
Secondary Process for Radioactive Chloride Deweaponization and Storage

Mark Krekeler and Stephen Elmore
Counter Weapon Containment

Yuntao Wu, Alyson Yoder, Jeremy Kelly, and Dongyang Yu
Compositions and Methods for Detecting and Treating HIV Infections

Ramesh Singh, Vinod Tare, Menas Kafatos, and Anup Prasad
Crop Yield Prediction Using Piecewise Linear Regression with a Break Point and Weather and Agricultural Parameters

Ryan Wantz, Jilian Lepp, Mark Krekeler, and Cynthia Tselepis
Asbestos Containment Technology

Domenico Napoletani, Danielle Struppa, and Timothy Sauer
Functional Dissipation Classification of Retinal Images

Chaowei Yang, Menas Kafatos, David Wong, Henry Wolf, and Ruixin Yang
Geographic Information System

Bijan Jabbari, Esmael Dinan, and Rajiv Papneja
Label Switched Packet Transfer Base Station

Steven Noel and Sushil Jajodia
Attack Graph Aggregation

Arun Sood, David Arsenault, and Yih (Ian) Huang
SCIT-DNS: Critical Infrastructure Protection through Secure DNS Server Dynamic Updates

Kenneth Hintz
MultiDimensional Sensor Data Analyzer

Sushil Jajodia, Huiping Guo, and Yingjiu Li
Method and Apparatus for Watermarking Stream Data

Arun Sood
Single Use Server System

Xinyuan (Frank) Wang
Interval Centroid Based Watermark

Sushil Jajodia, Huiping Guo, and Yingjiu Li
Fragile Watermarks

Steven Noel and Sushil Jajodia
Intrusion Event Correlator

Kenneth Hintz and Fred Barrick
System and Method for Automatic Shape Registration and Instrument Tracking

Farrokh Alemi and Valentin Prudius
Assessment of Episodes of Illness

Jennifer Maloney, Barry Kronenfeld, and Allan Falconer
World Basketball

Claudio Cioffi-Revilla
Anthropogenic Event Risk Assessment
Since 2000, Rosenberg has been the primary investigator on nine successful grant proposals, totaling $1.2 million. In addition, she has written 31 peer-reviewed articles, including 9 as first author, and has given 10 invited national and international seminars since 2005 at such places as Yale University, the University of Maryland, and Greenbank Observatory. In 2008, she received much media attention when one of her undergraduate research students discovered a new galaxy.

A former National Science Foundation Postdoctoral Fellow, Rosenberg has a BA in astronomy and physics from Wesleyan College and a PhD in astronomy from the University of Massachusetts. She has held research positions at the University of Colorado and the University of Massachusetts.

COURTNEY BRKIC, author of two books that focus on the Bosnian War, has been an assistant professor of creative writing in the English Department since fall 2006. A first-generation American of Croatian descent, Brkic got the idea for her 2004 book, The Stone Fields: An Epitaph for the Living, while working in the 1990s as a forensic archaeologist in the former Yugoslavia, where she helped identify the dead from the Bosnian War. In this nonfiction memoir, Brkic also interweaves her grandmother’s struggles in Bosnia-Herzegovina during World War II. In Brkic’s other book, Stillness and Other Stories, she chronicles the Bosnian War through a collection of short stories. In 2003, it was named a Chicago Tribune Best Book and a New York Times Notable Book. Most recently, Brkic has been working on a novel, The Sun in Another Sky, which is set in both New York City and Croatia, and a collection of short stories about immigration to the United States. She is also writing a libretto for the opera Sarajevo Vespers.

She is a recipient of a Fulbright Scholarship, a New York Times Fellowship, and a Whiting Writers Award. Her work has appeared in Zoetrope, Harpers & Queen, the New York Times, the Washington Post Magazine, National Geographic, Dissent, and the Alaska Quarterly Review.

She has a BA in anthropology from the College of William and Mary and an MFA from New York University.
The National Science Foundation awarded $3.8 million to Jagadish Shukla (College of Science) and James Kinter (Center for Ocean-Land-Atmosphere Studies) to study the predictability of seasonal to decadal variations of climate and climate change using complex climate models.

The National Institute of Justice awarded $3.0 million to Faye S. Taxman (College of Humanities and Social Sciences) to conduct a field experiment of reentry programs in six sites. In addition, the National Institute on Drug Abuse awarded Taxman $1.0 million to conduct an implementation study in using contingency management in justice settings.

The Virginia Department of Education awarded Michael Behrmann (College of Education and Human Development) $2.3 million to provide professional development training to Virginia special education teachers to improve services to students with disabilities and $1.5 million to produce and deliver accessible instructional materials for local educational agencies in Virginia that have students with disabilities.

Northrop Grumman Corporation awarded $2.0 million to Michael Hieb and Mark Pullen (Center of Excellence in Command, Control, Communications, Computing, and Intelligence) to provide interoperable and actionable geospatial information to a NATO Coalition Command and Control Environment.

The National Institutes of Health awarded $1.6 million to Juan Cebral (College of Science) to use computational modeling of blood flows in brain aneurysms to understand their progression and improve assessment of rupture risk and hemorrhagic stroke.

The National Aeronautics and Space Administration awarded $1.5 million to Lance Sherry (the Volgenau School of Engineering) and George Hunter (Sensis Corporation) to use their simulation of national airspace to examine the effects of performance and safety of modernization proposals in the presence of weather and other disruptions.

The National Institute of Standards and Technology awarded $1.4 million to Krysztof Gaj and Jens-Peter Kaps (the Volgenau School of Engineering), in collaboration with the University of Illinois at Chicago and Virginia Tech, to develop methodology and software for evaluating candidates for new standards in the area of cryptography.

The U.S. Department of Transportation awarded $1.3 million to Michael Bronzini, Kuppusamy Thirumalai, and Mohan Venigalla (the Volgenau School of Engineering) to deliver a method for evaluating U.S. domestic marine highway routes by applying remote sensing and spatial information technologies.

The National Institute on Alcohol Abuse and Alcoholism awarded $1.3 million to Christianne Esposito-Smythers, Jerome Short, and Patrick McKnight (College of Humanities and Social Sciences), in collaboration with Brown University, to develop and test a family-based cognitive behavioral substance abuse, suicide, and HIV prevention program for adolescents receiving community mental health services.

The National Institutes of Health awarded $1.3 million to Yuntao Wu (College of Science) to study how HIV-1, the AIDS virus, affects human blood CD4 T cells through triggering cascades of molecular events that alter cellular behavior.

The National Institutes of Health awarded $1.2 million to Avrana Blackwell (Krasnow Institute of Advanced Study) to use experimental and computational techniques to investigate how dopamine controls activity and learning in the basal ganglia, which has implications for the understanding of Parkinson’s disease and addiction.

The National Science Foundation awarded $1.0 million to Edward Maibach (College of Humanities and Social Sciences) for three research projects focused on exploring the potential of local TV weathercasters to educate the public about climate change.

*Some of these awards are multiyear awards.
George Mason University continues to experience growth in externally funded research. In fiscal year 2010, the value of awards increased 17.1 percent, from a level of $93.2 million in 2009 to $109.1 million in 2010. During the same period, the value of proposals increased 31.2 percent from a level of $320 million in fiscal year 2009 to $551 million in 2010.

This increase in funding is reflected in Mason’s rank as 149th among all universities and colleges in the nation for total funded research and 135th for federal research funding (2010 National Science Foundation annual report).
Expenditures by Federal Agencies

- Department of Defense (DOD)
- Department of Health and Human Services (DHHS) (includes NIH)
- NASA
- Department of Education (DED)
- National Science Foundation (NSF)
- Department of Commerce (DOC)
- Small Business Administration (SBA)
- Department of Energy (DOE)
- Department of Transportation (DOT)
- Department of Homeland Security (DHS)
- Department of Justice (DOJ)
- Other federal

Total: $85.7 million

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