

LOS ALAMOS NATIONAL LABORATORY **CURRENTS**



July 2008

Achievement born of collaboration

Making an impact on the region

GEANIE: Fulfilling wishes

Winning an R&D 100 Award

Preserving our past, documenting our future

My View

Talent, focus, and a common goal

In late May, the Laboratory's Roadrunner supercomputer exceeded a sustained speed of 1 petaflop/s. On June 18, the Top500 list of the world's most powerful supercomputers officially designated the Roadrunner system as the fastest supercomputer in the world.

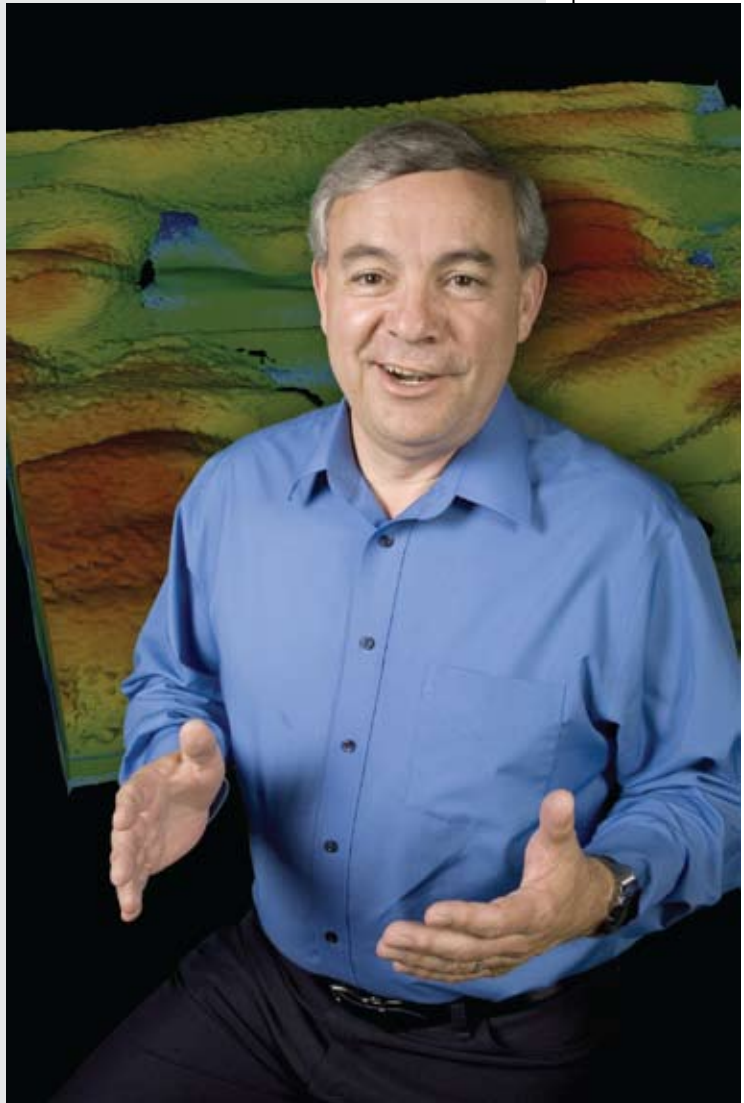
As Roadrunner Project manager, I have been involved in its development from the very early stages when it was just an idea to the selection of IBM to form a partnership to design and build a new supercomputer that would be the first in the world to run at 1 thousand trillion operations per second.

We've progressed during the last two years to achieve this highly visible milestone, overcoming completely new technical challenges along the way. But much work remains to be done on system installation and acceptance, system integration, and application software development before the benefits from using the Roadrunner system are fully realized. The future holds great promise: initial scientific simulations run on the system indicate that Roadrunner will play a key role in the Laboratory's mission in the near future.

I have been a staff member, group leader, and vproject manager at Los Alamos National Laboratory for more than 30 years, including my time here as a student. During this period, I have been involved in a number of important scientific and technical projects that have showcased our Laboratory's world-class capabilities in high-performance computing. With Roadrunner, I feel especially proud and fortunate to be part of this team effort. The success of this project is due to a large team of incredibly talented individuals focused on a common goal.

Roadrunner is a great achievement that every Laboratory employee can be proud of, demonstrating both Los Alamos's technical capabilities and ability to successfully execute large-scale projects. This is what our national laboratory is all about.

**—Manuel Vigil, Roadrunner project manager,
High Performance Computing Division Office**



LeRoy N. Sanchez

About the cover: left to right, Roadrunner Project members Manuel Vigil, John Turner, and Josip Loncaric pose in front of Roadrunner. See Page 4 for story. Photo by LeRoy N. Sanchez



Richard Robinson

Gonzales named director's executive office manager

Peggy Gonzales is the new executive office manager for the Director's Office. Gonzales has been at the Lab for 27 years, most recently as chief of staff in the Weapons Engineering Directorate.

Gonzales joined the Lab as a group secretary in the Physics Division. Since January, Gonzales has been acting executive office manager for the Director's Office and was officially offered the position by Director Michael Anastasio in May.

Lujan Center, West Virginia University garner EPSCoR Award

The Lujan Center at the Los Alamos Neutron Science Center and West Virginia University received an Experimental Program to Stimulate Competitive Research (EPSCoR) Award from the Department of Energy for their joint project, "Hydrogen Absorption in Pd-based Nanostructures." EPSCoR is a federal-state partnership program designed to ensure that America remains the

world leader in scientific research and innovation, and to encourage research that will help meet the nation's energy needs through increased competition in energy-related research and development.

Henson receives three grants and fellowships

Kriste Henson of the Decision Applications Division received an Eisenhower Graduate Fellowship from the United States Department of Transportation, a Geography and Regional Science Dissertation Improvement Grant from the National Science Foundation, and a Doctoral Dissertation Grant from the University of California Transportation Center.

Henson also is a doctoral student in the geography department at the University of California, Santa

Barbara, whose research in modeling and simulation resolution has important applications for homeland security.

Tech Transfer 2007 award winners recognized

More than 300 outstanding researchers recently were recognized by the Technology Transfer Division. In fiscal year 2007, the Laboratory produced 159 invention disclosures. Laboratory patent attorneys submitted 106 patent application filings, and Laboratory researchers received 46 patents overall.

This year's Distinguished Patent Award went to Dipen Sinha of Sensors and Electrochemical Devices. Tim Germann of Theoretical Chemistry and Molecular Physics received the Distinguished Copyright Award.



Michael Demkowicz



Ki-Yong Kim



Pinaki Sengupta

Photos by Sandra Valdez

Distinguished Postdocs recognized

Michael Demkowicz of Structure/Property Relations, Ki-Yong Kim of the Center for Nanotechnology, and Pinaki Sengupta of Condensed Matter and Statistical Physics and the National High Magnetic Field Laboratory recently received the Laboratory's Postdoctoral Distinguished Performance Award, which recognizes outstanding and unique contributions by Lab postdocs that result in a positive and significant impact on the Laboratory's programmatic or scientific efforts or status in the scientific community.

The postdocs were recognized at a ceremony last month and will present their work at a Director's Colloquium scheduled for July 8. Read about their work and more about the award in the *Daily NewsBulletin*.



Achievement born of collaboration

teamwork key to Roadrunner's success

At times when Roadrunner's prospects seemed bleak, John Turner of Algorithms and Applications was reminded of a story Apollo astronaut Ken Mattingly tells of success being met because everyone working on the project said to themselves "It won't fail because of me." According to Turner, Roadrunner has been a success thus far and will continue to deliver for the same reason.

The supercomputer made history as the world's most powerful on May 26 when it exceeded a sustained speed of 1 petaflop/s, or 1 thousand trillion calculations per second. That's the equivalent of each of Earth's 6 billion people using a hand calculator to work together on a calculation 24 hours per day, 365 days a year performing 10 calculations per second—in which case it would take 46 years to do what Roadrunner could do in one day.

The lesson of Roadrunner, said Turner, is that outstanding talent working toward a common goal can achieve incredible things, even in the face of tremendous challenges.

"Roadrunner was a very complex undertaking with many potential pitfalls along the way," said Josip Loncaric of High Performance Computing System Integration. "We had to work very hard to convince ourselves and others that Roadrunner could deliver petascale performance and that such a large advanced architecture machine could be productive."

Those challenges were overcome through collaboration and teamwork on the part of 200-plus Lab employees and management, he said. "Once the go-ahead decision was reached, IBM built Roadrunner in record time and demonstrated petaflop performance on schedule," Loncaric said.

Personality of a computer

An advanced architecture computer capable of solving scientific problems of unprecedented complexity and scale, Roadrunner will help meet the nation's evolving national security needs by performing calculations that vastly improve the ability to certify that the U.S. nuclear weapons



stockpile is reliable without conducting underground nuclear tests.

Its inner workings—powered by a special IBM-developed variant of the Cell processors used in the Sony Playstation® 3—somewhat parallel the teamwork demonstrated by those contributing to its success.

“Think of Roadrunner as a work crew with different skills and tools, collaboratively solving a single problem,” suggests Loncaric. “Specialization enables people to become really good at specific jobs, and the management challenge is to organize the work flow. Roadrunner follows a similar path to enable many thousands of processors of three basic types to work more productively and efficiently.”

To say that Roadrunner “suffers” from multiple-personality disorder just may be a compliment, said Turner, as that’s one of its advantages. “Rather than imposing a single programming model, Roadrunner allows an application developer to choose one, or a combination, most appropriate for his or her algorithms,” he explained, adding that scientific discoveries enabled by Roadrunner could benefit biofuel alternatives and the search for an HIV vaccine.

With its incredible speed and potential for solving new problems that could not have been imagined before, Manuel Vigil, Roadrunner Project manager in the High Performance Computing Division, believes Roadrunner ushers in a new area of computing performance and architecture necessary to continue pushing the forefront of scientific discovery.

“Roadrunner is a huge achievement for the Laboratory in demonstrating that LANL can continue to provide leadership-class computing and manage and succeed at implementing large-scale projects,” Vigil said. “But even more important is the potential Roadrunner brings to bear in solving scientific applications for the weapons programs as well as other scientific areas.”

Potential yet unlocked

“This is only the end of a beginning,” said Loncaric. Roadrunner’s real work still is ahead, and there is much to be done to exploit its capabilities, he noted. The full machine will be moved to Los Alamos beginning this month and housed in the Nicholas Metropolis Center for Modeling and Simulation, with the first computing applications expected to begin running in January 2009.

“In partnership with IBM, we designed and built the world’s first petascale supercomputer. We won’t stop there,” said Loncaric, adding that over the next several years, this machine should deliver new scientific insights and may lead to a new class of hybrid supercomputers.

“At the start of the 21st century, we face enormous challenges in national security, energy, health, global climate, and myriad other areas,” said Loncaric. “Roadrunner’s performance will enable us to gain timely insights and make educated choices in dealing with some of the most important problems we face.”

For more information about Roadrunner, see the Roadrunner Web site at <http://www.lanl.gov/roadrunner>.

—Mig Owens

“We had to work very hard to convince ourselves and others that Roadrunner could deliver petascale performance...”



Alex and Andrew Turner play a game of “MX vs. ATV Untamed” on the Cell-powered Sony Playstation® 3. A similar chip powers Roadrunner.

Photos by LeRoy N. Sanchez

Focal Point

Making an impact on the region *to market we go*

Managing the Laboratory's entrepreneurial programs requires Belinda Padilla to put herself in an entrepreneur's shoes—constantly thinking about the next innovation in technology transfer the Laboratory might initiate. Her role in accelerating economic development in Northern New Mexico earned her recognition this year as a LANL Star.

"Who knew a marketing degree would take me into a career in technology transfer? I thought I was going to be a buyer for Neiman Marcus," said the Technology Transfer Division program manager, who has a bachelor's degree in marketing and an MBA from the University of New Mexico.

Hired in 1993 as a graduate student, Padilla landed in Technology Transfer in 1995. Two years later, she established the Laboratory's MBA Internship Program, which gives participants an opportunity to work with high-tech startups and access Lab technologies for assessment.

"A robust entrepreneurial community outside and inside the Laboratory enhances our ability to attract the best, brightest, and most talented workforce," she said.

Padilla also was instrumental in creating Laboratory, Los Alamos National Security, LLC, and state-sponsored programs designed to stimulate regional economic development, such as the LANL Visiting Entrepreneur Program, the LANS Venture Acceleration Fund, and most recently the Los Alamos Venture Acceleration Initiative.

"I think it still is true that technology innovation is responsible for the vast majority of economic growth in regions," said Padilla. "We need to be capturing more of LANL's technology innovation in our own

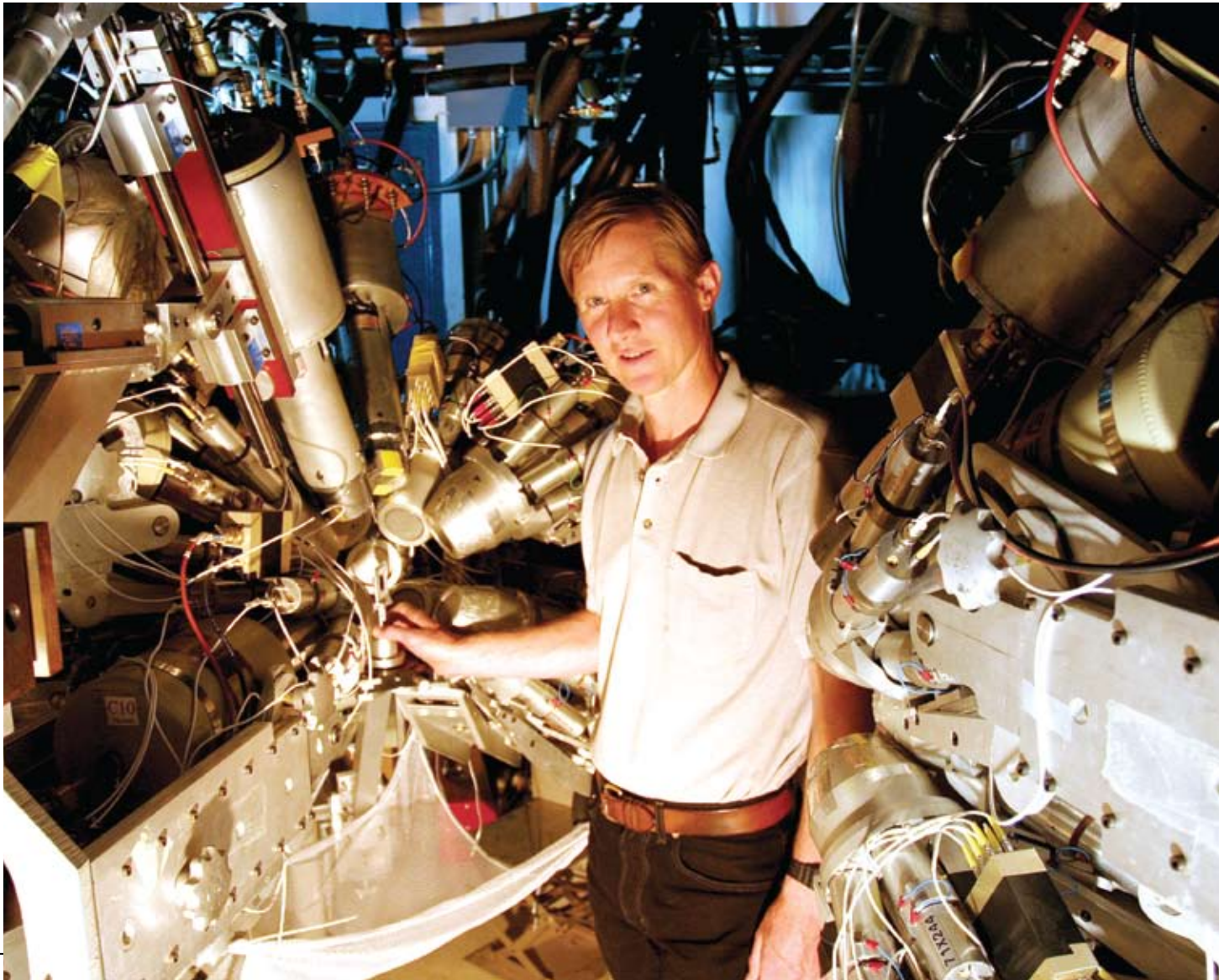
backyard to the extent that it makes sense for Laboratory spinoffs to start and grow here."

Padilla is former president and current board member of the Coronado Ventures Forum and the State and Local Government Committee Chair for the Federal Laboratory Consortium. She has been recognized by the *Santa Fe New Mexican*, *Albuquerque Journal North*, and *New Mexico Business Weekly* as one of New Mexico's top technology leaders. She garnered the Distinguished Student Mentor Award in 2003 and received Distinguished Performance Awards in 1996 and 1998. Padilla also is a two-time recipient of the LANL Achievement Award.

—Mig Owens

Belinda Padilla





Robert W. Kramer

GEANIE: Fulfilling wishes

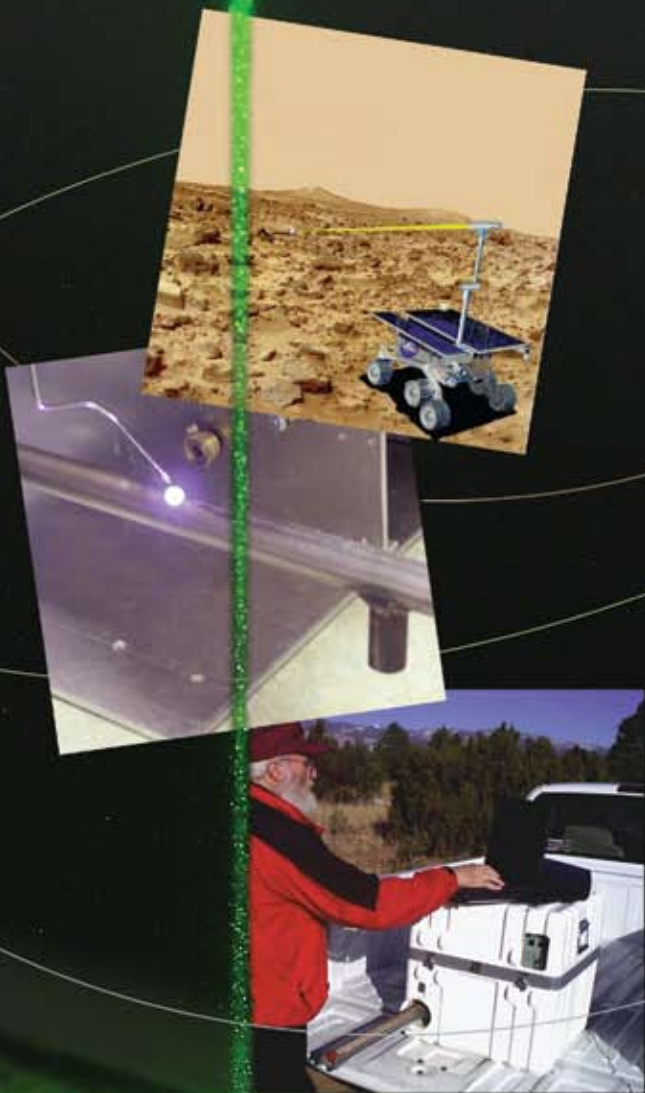
Ron Nelson of Neutron and Nuclear Science at the Los Alamos Neutron Science Center (LANSCE) stands near the center of the Germanium Array for Neutron-Induced Excitations (GEANIE). The GEANIE instrument consists of 26 germanium crystals, an automated liquid nitrogen filling system, and an array of electronics. Its state-of-the-art electronics and detectors are used to address issues of nuclear structure, spectroscopy, and cross-section measurements for both stockpile stewardship and basic science. The GEANIE detector views gamma rays from an encapsulated plutonium-239 sample as it is bombarded with neutrons from the weapons neutron research source.

LANSCE has two spallation neutron sources: the Manuel Lujan Jr. Neutron Scattering Center and the Weapons Neutron Research facility in which GEANIE resides. Together they provide neutrons over an unprecedented range of energies—extending from sub-millielectronvolts to hundreds of megaelectronvolts—that are used for both neutron scattering and nuclear physics research.

Winning an R&D 100 Award

innovation meets entry submission

CARISS Integrated Elemental and Compositional Analysis



Bryce Tappan and his brother grew up interested in science and were “partners in crime for all the backyard experiments,” he recalls. So when Tappan, a technical staff member in Explosive Applications and Special Projects, learned he had won an R&D 100 Award, his brother, now a staff member at Sandia National Laboratories, was among the first with whom he shared the good news.

Tappan’s team took home the 2005 award in the process category for nanoFOAM. When his postdoc mentor encouraged him to submit the entry, Tappan wasn’t convinced his team had a chance but decided it was worth a shot. “There wasn’t much anticipation, as I hadn’t counted on winning anyway,” he said.

Winning the award came as no surprise to Lab staff member Nely Trintinella Padiál-Collins of Computational Physics and Methods. Her team also won in 2005 for CartaBlanca. Though she admits the submission itself was a lot of work, Padiál-Collins said the award “is certainly a top accomplishment because it is recognition of our work by the research community.”

Tappan and Padiál-Collins are in good company. Since 1978, the Laboratory has won 105 R&D 100 Awards. In an effort to oversee entry preparation and to give submissions a distinct look, several years ago the Laboratory introduced an internal process for the submission of R&D 100 Award entries.

Kim Sherwood of Los Alamos’s Technology Transfer Division oversees the process and teams with various Lab organizations to ensure that all steps are completed and entries meet the budget and timeline for the competition.

“There is a call for proposals from the Technology Transfer Division,” Sherwood explains. “Scientists who want to enter the competition prepare a rough draft to answer the competition questions. Writer-editors work with the scientists to complete and polish the written entry, designers work with entrants to create the covers, and then the entries are printed and submitted.”

According to Lab researcher Craig Taylor, the process is rigorous. “The Lab assisted a great deal, but it still was up to us to write the entry and all supporting documentation,” he

At left is the cover for Compositional Analysis by Raman-Integrated Spark Spectroscopy (CARISS), which garnered Roger Wiens and his team a 2003 R&D 100 Award.



Sandra Valdez

Kim Sherwood, R&D 100 Award coordinator in the Technology Transfer Division

said. Taylor led two winning R&D 100 teams: Drywash in 1997 and Supercritical Carbon Dioxide Resist Remover in 2001.

Thomas Claytor of Applied Engineering Technology led the team that won in 2003 in the instrumentation category for Flash CT. His previous team won an R&D 100 Award 20 years earlier for a high-temperature acoustic sensor for use in nuclear reactors.

One of the primary purposes for an R&D 100 Award entry, Claytor explains, is to introduce a technology or product that otherwise might take years to creep into the consciousness of the scientific and business community.

Scientist Roger Wiens of Space Science and Applications agrees that competing for an R&D 100 Award is a great opportunity to show some of the exciting scientific research the Lab is doing. Wiens's team won in 2003 for Compositional Analysis by Raman-Integrated Spark Spectroscopy. The R&D 100 Award is one of Wiens's better achievements,

he said. "We of course mentioned the award in subsequent proposals to potential sponsors," he added.

Receiving the award itself can be a unique experience. Claytor's team received its R&D 100 Award at a ceremony at Navy Pier in Chicago. Thomas Sampson, a retired technical staff member, received his award in 1988 at a formal dinner presentation at the Museum of Science and Industry in Chicago.

"First time in a tux since I was married," said Sampson. "Pretty impressive ceremony. Several Lab bigwigs attended because the Lab received the most awards of any organization."

Sampson and his teammates won in the category of sampling systems and monitors for Nuclear Material Solution Assay System. The R&D 100 Award, he said, ranks near the top of his career accomplishments because he competed against what he considers to be the best and the brightest.

With success, though, comes frustration, as he said, "Never could figure out how to get the award plaque away from the Lab's PR people so we could put it in our group conference room."

Editor's note: This is an excerpt from an article published in the June 2008 issue of R&D Magazine by Mig Owens

Winners to be announced this month

Winners of the 2008 R&D 100 Award competition will be announced this month. This year's Laboratory submissions include the following:

- "ECAS—Equal Channel Angular Sintering: A process for forming ceramic nanopowders into nanocrystalline parts" submitted by Ching-Fong Chen of Materials Technology-Metallurgy
- "Gloveport Retrofit: Upgrading Enclosures with 21st Century Technology" submitted by Michael Cournoyer of TA-55 Operations (jointly submitted with Philippe Madelaine of Getinge-la Calhene)
- "Laser-Weave®: A new approach for synthesizing inorganic fibers and textiles" submitted by James Maxwell of Applied Electromagnetics
- "3D Tracking Microscope" submitted by James Werner of the Center for Integrated Nanotechnologies

Call for submissions for next year's competition is in September. For more information, contact Kim Sherwood at 5-1305 or ksherwood@lanl.gov.



New Fire Safety Web page

With wildfire season in full swing, the Lab reminds employees that its new fire safety Web page has important information on such things as stovetop safety and prescribed burns. The Web site also provides links to the U.S. Forest Service, Bureau of Land Management, and the National Park Service Fire and Aviation Program. Visit <http://www.lanl.gov/emergency/fire/>.

Avoid heat-related illness

An employee recently experienced a heat-related illness during warmer-than-usual weather. Lab employees doing work that puts them at risk for a heat-related illness can contact their deployed industrial hygienist to help establish controls to prevent such problems. These controls need to be considered when planning the work. For more tips on surviving the hot weather, go to <http://www2.nsc.org/library/facts/hot.htm> online.

Office of Equal Opportunity and Diversity relocates

The Office of Equal Opportunity and Diversity has a new home. The five-person office is now on the second floor, north wing, of the Otowi Building. The office is part of the Human Resources Division.

New rental-car service for Laboratory travelers

Hertz and National are now serving the Laboratory at all major airports and at the Los Alamos County Airport. Go to <http://cfo.lanl.gov/travel/default.shtml> to sign up for the Hertz and National programs.

Reporting alcohol-related arrests and convictions

Employees are reminded that, under the recently revised substance abuse policy, alcohol-related arrests and convictions must be reported immediately to Personnel Security (PS-3). The immediate reporting of criminal drug statute arrests and convictions to PS-3 continues to remain a requirement as well. For related frequently asked questions, go to <http://int.lanl.gov/orgs/hr/relations/subfaqs.shtml>.



Roadrunner, more on You Tube

View short videos about the Laboratory on its You Tube channel (<http://www.youtube.com/user/LosAlamosNationalLab>), including a video about Roadrunner breaking the petaflop barrier. For full caption information, click on the "More Info" link in the upper right column. If you have potential materials to upload, contact Nancy Ambrosiano of the Communications Office at nwa@lanl.gov.

Password protection

Employees are required to follow established Laboratory password guidelines. Do not share computer user IDs, passwords, or PINs with anyone. Passwords must be changed at least every 180 days, and it's important to have different passwords for each application. Passwords must contain at least eight characters and three of the following four elements: English upper-case letters (A, B, C), English lower-case letters (a, b, c), Arabic numerals (1, 2, 3), and non-alphanumeric characters (!, <, #, \$). For more information, go to <http://policy.lanl.gov/pods/policies.nsf/MainFrameset?ReadForm&DocNum=P218&FileName=P218.pdf> online.

July service anniversaries

Find the July service anniversaries online at <http://www.lanl.gov/news/newsbulletin/anniversaries>.

In Memoriam

- James Rayford "Ray" Nix, 70, died May 8
- Richard Kenneth Van Vleet, 90, died May 11
- Glenn Robert Harry, 83, died May 26
- Marjorie Elizabeth Lark, 83, died May 29
- John Benjamin Cole, 88, died June 2
- James Andrew Bridge, 86, died June 6
- Burt Kenneth Davis, 59, died June 9
- Richard Ray Gomez, 41, died June 12



Deliver improved business processes, systems, and tools that meet the needs of our employees, reduce the cost of doing business, and improve the Laboratory's mission performance

Preserving our past, documenting our future *implementing business process improvements*

There is a strong business need at the Laboratory to standardize processes for managing “active” documents. Implementing cost-effective systems to document work, obtaining copies of documents needed to perform work, and retrieving documents/records for legal and other purposes is part of any company's good business practices.

At the Laboratory, the Information Resource Management (IRM) and Information Systems and Technology (IS&T) divisions are developing an electronic document management system, or suite of tools, that will replace more than 30 disparate document management systems across the Laboratory. IRM and IS&T are working with customers to implement interim solutions until the Labwide tool is available.

A pilot Electronic Document Management System recently was completed at Technical Area 55, where IRM services are being centralized under one IRM manager to standardize document-control processes, implement efficiencies, and centrally manage documents and records.

In response to concerns that valuable records and documents have been abandoned over time in various places at the Laboratory, IRM studied the breadth and depth of conditions encountered at the Laboratory where records appear to have been abandoned. A report from this study concluded that the abandoned records problem is smaller than previous estimates have indicated, poses no clear threat to national security, and appears to be decreasing due to records training for points of contacts. Additionally, the report, which was issued to management last month, offers cost-effective solutions for gradually reducing the Laboratory's remaining abandoned records.

IRM and Central Training divisions developed three new training programs to support the Laboratory's document-control and records-management programs. For managers and Lab employees, computer-based training courses were created that effectively communicate basic document-control and records-management requirements. A classroom training program for employees with specifically assigned document-control and records-management responsibilities started in April. More than 80 points of contact have been trained.





Sandra Valdez

Brenda Montoya, left, and Marissa Anderson, a new student in Advanced Measurement Science, review the mentoring checklist for student interns.

Providing interns a meaningful experience is coordinator's goal

Every year, almost 1,000 students come to the Laboratory to work as high school co-op, undergraduate, or graduate research assistants. Some work as interns during the summer months; others have longer appointments. Regardless of their tenure, the one constant for students and the person from whom they most likely will receive their first introduction to Laboratory life is Brenda Montoya.

Montoya, the Lab's Student Programs coordinator in the Education and Postdoc Program Office, knows something about students. Montoya joined the Lab in the early 1980s as a student in what was then Energy Division. Her

inspiration to work as student coordinator came from the student coordinator Montoya met when she was an intern. "I recall saying to myself that I'd like to someday perform the type of work that she did," said Montoya.

For Montoya, making a student's internship productive and fulfilling is her main goal. "The goal of the Education Program Office is to provide students with a meaningful experience that they can take with them to their next internship," she said.

To that end, Montoya works with the Students' Association at the Lab and her colleagues in Student Programs to develop special events, such as trips, picnics, luncheons, and breakfasts, which allow students to socialize and get to know each other. They also learn about facilities and the extraordinary scientific research done at the Lab by participating in lectures and meeting senior managers, including the Laboratory director.

The culmination of many students' summer experience is the annual Student Symposium, this year scheduled for August 5-6 at University of New Mexico, Los Alamos.

"The Symposium allows students the opportunity to showcase the work they have accomplished during their internships," Montoya said. "They present their work to Laboratory scientists and researchers who act as judges, to fellow students, and to the public. I am responsible for recruiting judges for the symposium and matching judges' expertise with students' presentations."

Montoya said students are enthusiastic about the symposium. "Students are judged and critiqued on their presentation, and awards are given for the best presentation," she said, adding, more than 200 students are expected to participate in the symposium.

Her advice to Lab interns? "Take advantage of every opportunity that comes your way, whether big or small," said Montoya. "You will learn from them all."

—Erika L. Martinez

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