Sandia's other half: ITS mission includes growing set of national security challenges, opportunities

Al Romig describes outlook for Integrated Technologies & Systems (ITS) Strategic Management Group

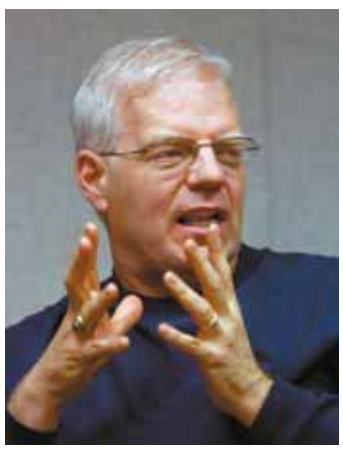
The Lab News *sat down recently with Deputy Labs Director Al Romig to talk about the future of Sandia's growing Strategic Management Group (SMG) known as Integrated Technologies and Systems (ITS), which now accounts for about half of the Labs' revenue. The interview was conducted by John German and Neal Singer. Here's a transcript of their conversation.*

* * *

Lab News: *The latest Sandia Strategic Plan seems to have placed a heavy burden on your Strategic Management Group, Integrated Technologies & Systems (ITS), and you personally to keep the Labs fiscally and programmatically healthy by both diversifying and solidifying the national security program portfolio.*

Al Romig: That's right. This last round of strategic planning resulted in the strongest articulation yet that the Laboratory is more than a nuclear weapons laboratory, that it's a true broad-based national security laboratory. We first began making those statements in the mid-1990s, right after the Cold War, and each time we have reexamined our mission since then, the echoes have become louder in that regard. We're now in a highly interconnected world where there are complex threats — military and political threats

(Continued on page 4)



"Our role is to make sure the people who set national policy and operate according to that policy, for example the military, have the technological resources they need to address these problems. That's a big job, it is an important one, and it is a mission that plays to our strengths."

— Al Romig, Senior VP and Deputy Labs Director for Integrated Technologies and Systems

$3 Million (and counting)

Sandia crosses magic number in annual charitable giving campaign

Details coming in next *Lab News*

Sandia LabNews

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Sandia National Laboratories

TRUPACT-III drop test nets valuable data on waste cask

By Will Keener

GINGERLY, BOYS, GINGERLY — Team members verrrry carefully help guide a TRUPACT test unit into position for a 30-foot test drop. (Photo by Randy Montoya)

Taking a look at TRUPACT-III with David Miller, manager of Sandia's Materials Transportation Testing and Analysis Dept. 6765, the first adjective that comes to mind is "big." The massive transportation container is impressive by any standard. TRUPACT-III is designed specifically to move large items to the Waste Isolation Pilot Plant site near Carlsbad, N.M., David says. The 8.2- by 8.7- by 14-foot stainless-steel, 55,000-pound package is designed with multiple layers to protect its cargo.

Walking around TRUPACT-III, David points out the protected heads of giant bolts that hold its heavy, stainless-steel lid protection panel in place. (The actual lid is buried two feet into the package.) The energy-absorbing foam between inner and outer container boxes can't be seen, but its presence is acknowledged by blowout plugs in the outer package. These plugs allow the foam to expand and escape in case it is caught in a fire, he says.

During the past two weeks, a team of Sandia researchers in remote Coyote Canyon have been testing the mettle of TRUPACT-III for its builder, Packaging Technology, Inc. (a subsidiary of Areva), to determine if it can qualify for Nuclear Regulatory Commission certification. A Sandia team has chilled the giant container to minus 40 degrees F, dropped it 30 feet onto an unyielding surface of battleship steel underlain by 24 feet of concrete, and attempted to puncture it at various angles of address.

Staff members from the Western Governors' Association and the NRC, along with DOE officials, were on hand at Sandia's Aerial Cable Site to view the tests.

The series of tests at the remote site are designed to attack all the weak points in the package, explains Doug Ammerman (6765), project manager for the testing. But the container is designed to take the beating. "It's really a box

(Continued on page 6)

American Indian Heritage Month honors continent's first stewards

SANDIANS AND MEMBERS OF THE KIRTLAND AIR FORCE BASE community gathered at Hardin Field on Friday, Nov. 3, to launch the annual observation of American Indian Heritage Month. In the photo here, the American flag is carried to an honored position on the field, accompanied by an escort of KAFB airmen. See **page 16** for a list of other American Indian Heritage Month events, other photos of the Hardin Field activities, and a story by Iris Aboytes about one of Sandia's own who has been recognized for his technical accomplishments by the American Indian Science and Engineering Society. (Photo by Randy Montoya)

Inside . . .

Defense Systems and Assessments SMU picks up mantle of Labs' long association with DoD. Four-page pullout section begins on ***page 7.***

Also inside . . .

What's what

A couple of retirees wrote in response to last issue's blurb on UnitedHealthcare Group's embattled CEO William McGuire and his — ahem — substantial compensation package.

George Perkins described what seemed to him a complicated serpentine route to starting chemotherapy for the stomach cancer he was battling. "On my first visit," he wrote, "I was asked to pay a coinsurance amount of $1.55. Yes, one dollar and fifty-five cents. It surely costs them far more than that just to process the paperwork, and give me a receipt!"

On a subsequent visit — for the first of five prescribed chemo treatments — "I arrived at the doctor's facility at 9:15 a.m. and signed in for my 9:30 a.m. appointment to begin the treatment. At 10:15 a.m., I decided to check on the delay. I was informed, after the receptionist spent five minutes looking for my file, that the accountant had the file to determine how much my copay would be, based on some calculation (or guesstimate). So I waited 45 minutes past my appointment (for a 15-minute injection of chemo) just because the doctor's accountant had to get online to figure out how much I would be responsible for — after Medicare and UHC paid their amount, a week or two later, not up front — before I could begin my treatment."

Then, in that old can-do, Sandia spirit, George signed off with: "My best regards to all Sandians and their "Exceptional service in the national interest!" President Harry Truman got it right!"

Similarly aggravated, Mike Ford described a billing process, writing, "UHC hires the 'Ancillary Care' company to process paperwork from Sandia (and presumably elsewhere). Walgreen's charges and bills UHC $140 per month for an oxygen concentrator for our home use. UHC bills Sandia for $161.40. My copay is $21 (15 percent of the $140), so Sandia gets ripped off for $21.40 to pay Ancillary Care for processing the paperwork and Walgreen's gets overpaid. What did UHC do?"

And citing a *Wall Street Journal* story about large health care companies paying health care consultants to recommend them to health care consumers like Sandia, Mike signed off with: "No wonder health care costs are high — the middlemen have middlemen who have middlemen!"

Thinking about the two notes, it occurred to me that maybe the $21.40 involved in the billing shuffle for Mike's oxygen concentrator helps offset the $1.55 George, and presumably others, fork over in coinsurance payments that certainly don't seem to be economically feasible.

* * * * *

This popped, uninvited, into a colleague's emailbox:

"In view of Internet swindle high activity Visa International Service Association would like to suggest you Internet-connection protection with the help of VPN. We can give you the guarantee that all your banking transactions will be completely secure. You could start using VPN-connection right now!

"More information about us you may find on Web: [URL omitted here to save the innocent.]"

And you thought Borat was just a slick movie star!

— Howard Kercheval (844-7842, MS 0165, hckerch@sandia.gov)

Sandia LabNews

Sandia National Laboratories

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For the record

In an article that appeared in the Oct. 26 *Lab News* about Sandia's recycling program, the story stated that Sandia began recycling in the mid-1990s. Although many of the current recycling programs were instituted during that time, Sandia has been recycling scrap metal for much of its existence and began recycling office waste paper in FY91 after a pilot study was completed. Even though Sandia recycled several thousand tons of materials, it didn't quite make the FY06 target. Another ambitious yet achievable performance target has been set, and the participation of the entire Labs population will be needed to meet it.

Sandia researchers win 'Better Way' award

Three Sandia researchers together with fellow team members from Delta Airlines, Drexel University, and the Federal Aviation Administration (FAA) William J. Hughes Technical Center were awarded the FAA-Air Transport Association of America (ATA) Non-Destructive Testing (NDT) Forum "Better Way" award last month.

The "Better Way" award — jointly sponsored by the FAA and ATA — recognizes a team of government and airline industry individuals who collaborate to advance inspection or testing of aircraft structure, components, or systems. ATA is the industry trade organization representing more than 90 percent of all US airlines.

Receiving the award from Sandia were researchers Mike Bode (6414), Floyd Spencer (12337), and David Moore (2724).

David says the award was for work done over a two-year period. As part of the project, a Boeing 727, flown successfully by Delta for 28 years and decommissioned, was dismantled so that team members could study lap joints — the locations where the skins of aircraft overlap. They then assessed 20 different NDT inspection techniques used by airlines and emerging inspection technologies developed by NDT researchers to determine which were most efficient and worked in a timely fashion.

"The question we were trying to answer was not if the airplane had flaws, but what was the best inspection technique," Floyd says.

David and Mike were on hand after the plane was dismantled, observed inspections, and gathered data. Floyd assisted with the analysis of the data that showed how well the inspection methods worked.

The results of their efforts have been documented in a database that will provide end-users at airlines and repair stations the information they need to make informed decisions about the capabilities of the various inspection techniques.

This is the third year Sandians have won the "Better Way" award in collaboration with industry. They also won it in 2003 and 2005.

— Chris Burroughs

Recent Patents

Robert Crocker (8125) and Judith Rognlien (8321): Electrodes for Microfluidic Applications

Michael Borden and Jason Shepherd (both 1421): Method of Modifying a Volume Mesh Using Sheet Insertion

Alfredo Morales, Linda Domeier, Patrick Keifer (all 8778), and Terry Garino (1816): Compliant Cantilevered Micromold

F. Michael Hosking, Aaron Hall (both 1813), Richard Givler (1514), and Charles Walker (2452): Method for Controlling Brazing

Charles Andraka (6337), K. Scott Rawlinson (5714), Steven Showalter (2522), Timothy Moss (6337), Douglas Adkins, and James Moreno (ret.): Method of Manufacturing a Heat Pipe Wick with Structural Enhancement

Mark Tucker (6334) and Rita Betty (9112): Reactive Formulations for a Neutralization of Toxic Industrial Chemicals

Steven Thoma (6338) and Tina Nenoff (1114): Synthesis of an Unsupported, High-Flow ZSM-22 Zeolite Membrane

David Carlson (200), Patrick Brady (6316), and James Krumhansl (6316): Inorganic Ion Sorbents

Michael M. Johnson (8960) and Ann Yoshimura (8116): Systems and Methods for Detecting and Processing

New UHC on-site rep

Effective Nov. 6, Beth Ann Seng has replaced Donna Jo Gillingham as the UnitedHealthcare on-site representative. Donna Jo left to pursue other career opportunities. Beth Ann will continue to occupy the UHC on-site representative's office located in Bldg 832, Rm. 34T. Her phone number is 844-0657. Beth Ann is available for walk-ins/appointments 9 a.m. to 3 p.m. Monday through Thursday. To schedule an appointment, please contact the HBES Customer Service Center at 844-HBES (4237).

Sandia/California's environmental management receives ISO certification from independent auditor

After an intensive two-year effort, Sandia/California has become the first organization at Sandia to receive certification of its Environmental Management System (EMS) to the ISO 14001:2004 standard.

The final audit in September resulted in the recommendation by an independent third-party registrar, NSF International Strategic Registrations Inc., of Ann Arbor, Mich., that the site's EMS be certified to the standard. To retain certification, the registrar will conduct surveillance audits at the site every six months.

The International Organization for Standardization (ISO) is the world's leading developer of international standards. The standards have been implemented in hundreds of thousands of organizations in more than 161 countries. Their standards specify the requirements for state-of-the-art products, services, and managerial and organizational practice.

ISO 14001:2004 is defined as a "generic management system standard" that can be applied to any organization, large or small, regardless of its type of business. It is a system that requires an environmental policy, objectives and targets, programs for implementation, monitoring and measurement, preventive and corrective actions, involvement at all levels, and continual improvement.

"Attaining ISO [14001:2004] certification speaks highly of our site's commitment to protecting the environment," says Gary Shamber, manager of Environmental Management Dept. 8516. "Certification implies that our environmental management system goes well beyond simple regulatory compliance. It is a message to our neighboring community, our customers, our employees, and potential new hires that we are good environmental stewards and use a world-class management system to reduce the impacts of our mission on the environment."

"I'm very proud that our Environmental Management System has achieved ISO certification," says Site Operations Center 8500 Director Pat Smith. "The words in our division ES&H 'Standard of Performance' clearly state our commitment to an efficient and effective EMS. Now, through this certification, we can demonstrate that we are walking our talk. Our challenge will be to sustain an excellent EMS program — and we'll need everyone's continued commitment and active participation as responsible stewards of the environmental resources in our care."

Philip Newman, director of ES&H and Emergency Management Center 10300, says, "This is excellent news for our California site. We have a program plan for certification in New Mexico. I expect we will be on track to follow the lead of California. The team is to be congratulated."

THE CORE TEAM that worked to attain ISO certification for the Environmental Management System included, from left to right: Dept. 8516 members Dee Dee Dicker, Gary Shamber, Lee Gardizi, Mark Brynildson, Barbara Larsen, Robert Holland, Laurie Farren, and Janet Harris. (Photo by Randy Wong)

Sandia CaliforniaNews

Feedback

Struggling with the new PMF forms; policies relative to clearances and DUIs

Q: *Many of us in my department are struggling with the new PMF form. Instructions are very limited, some are wrong, and we're having lots of trouble with it. Whoever designs and publishes these forms needs to understand that all the staff that need to use them are not experts in the form field skills required in Word. Once designed, the instructions should be correct. A sample of users ought to test and evaluate the forms. We should be spending our time on content, not on trying unsuccessfully to use corporate forms, and ending up wasting time designing/modifying our own forms. This needs to be fixed.*

A: Thank you for raising our attention to the issue of usability of the new Performance Management Form.

At issue were two things:

The instructions on how to protect and unprotect the PMF, so that the form can be more easily used, were inaccurate.

The larger issue was the usability of the "fill-in cells" — those grayed areas for user input. You reported that you and your coworkers found them frustrating to use and wondered whether they had to be there at all.

The fill-in cells used on the PMF are commonly used in forms where there are fields for input. They enable the user to quickly tab specifically to the field to be filled in, and not tab into fields for titles or instructions. That makes input efficient and consistent, especially for a single use form.

The challenge you have found is that, first, the instructions on the form weren't helpful, and second, when one tabs to a field where content already exists, the entire field is highlighted and if one were to start typing the previously entered content could be lost (thank goodness for Edit Undo). Trying to position the cursor exactly in the field where the user wanted to add content was frustrating, especially with the incomplete instructions about how to unprotect and protect the form.

Working together with the Compensation Department (the process owner of the PMF), alternative versions of the PMF (while keeping the visual presentation as approved by VP Kim Adams and EVP John Stichman intact) were explored; the forms manager and the forms owner worked to see if a "plain vanilla" form format could be provided that would make it easier to add and update content. Such a form can be rendered without the fill-in cells, thus eliminating the need for usage instructions; the form owner has authorized the replacement of the former version of the PMF with this new version. Users will need to pay attention to where the cursor is before typing. The issue of tabbing into a section that already had content remains: The existing content is highlighted and would be overwritten as soon as the user touches the keyboard.

The revised form is available from the Forms Management website. There is no requirement for any employee to re-do his or her PMF. The forms manager, Carolyn Romero, 844-5152, mcromer@sandia.gov, is always available for any consultation or assistance in getting the most out of this form and any other form.

— Anna Nusbaum (4535), Melissa Eakes (3511)

* * *

Q: *Please summarize for me DOE's and Sandia's policy relative to pulling security clearances of Sandia employees being charged with DUI.*

I recently heard that DOE is pulling security clearances, essentially forcing Sandia to dismiss employees that have been charged with DUI even if it was a first offense, the incident happened off base, off company time, in the employee's personal car, nobody was injured, and the incident was reported to DOE as required. Is this true?

PS: I don't support DUI nor have I ever received a DUI citation. I'm simply interested in learning if the DOE is pulling clearances for DUIs.

A: Your question has to do, primarily, with the federal government process to make determinations regarding whether to authorize access to sensitive and classified materials, facilities, and information — access that is a requirement for many of the jobs at Sandia. This is a process owned and run by DOE, and Sandia does not make determinations as to whether a security clearance is granted or withheld/withdrawn. DOE makes these determinations through application of guidance in 10 CFR 710, and the ultimate test under the regulation is to determine that "granting or continuation of access authorization will not endanger the common defense and security and is clearly consistent with national interest."

Under the DOE requirements that implement 10 CFR 710, Sandia has requirements to report information to DOE that may have a bearing on an individual's access authorization; this is the primary interface that Sandia has with the DOE decisions that your question addresses. The overall process is intended to conservatively provide information of potential significance to the DOE and then to provide for a review of that information to determine whether granting or continuation of access authorization is in the national interest. Alcohol use and arrest records are among the types of information that must be reported to DOE and that DOE considers in making access authorization determinations; since these determinations are internal to DOE, we really cannot comment on how DOE makes these determinations and to what extent consideration is given for circumstances such as first offenses, whether injuries are caused or not, etc.

Since many of the jobs at Sandia require access authorization at some level, removal of this authorization by DOE can result in termination. In addition, in some circumstances, Sandia can and does elect to take disciplinary action (up to and including termination) independent of DOE's access authorization determinations.

Sandia has terminated employees in the past for offenses such as working while intoxicated, working while under the influence of illegal or prescription medications, or other similar actions that are clearly inappropriate for the workplace.

I hope that this helps to clarify the matters that you explore in your question. If you have further questions along these lines, please contact me at 284-8456.

— Corey Cruz (12420)

Al Romig Q&A

(Continued from page 1)

from peer states and potential peer states, nonstate actors and terrorism, regional political instability, rising demand for energy resources, and nontraditional alliances. This Strategic Plan recognizes the changing landscape and acknowledges that only a broad-based national security lab can address these problems. In that context, then, our role is to make sure the people who set national policy and operate according to that policy, for example the military, have the technological resources they need to address these problems. That's a big job, it is an important one, and it is a mission that plays to our strengths.

"In the past some of our programs tended to grow from the ground up — somebody had a colleague, an acquaintance somewhere, and that allowed us to work on a project. And others were more top down . . . but as these programs grew, and they each grew like their own grapevine in the vineyard if you will, we began to realize that we needed to have some order in the vineyard."

What keeps you awake at night?

LN: *What are your priorities as you think about national security, defined broadly? What keeps you up at night?*

AR: When I think in terms of risk and consequence, there are a number of concerns that rise to the top. In the short term I worry about the threat of a major terrorist attack, either on the US, on an ally, or on our strategic interests. I don't mean a small-scale attack such as a suicide bomber or a chemical attack. I think we as a nation are fairly well prepared to deal with smaller, isolated threats. But waking up some morning to find that a nuclear weapon has gone off at the Mall in Washington, for example, is something I do worry about. I worry about a major biological attack. I worry about somebody who has the wherewithal to, for example, detonate 40 conventional bombs or improvised explosive devices (IEDs) in 40 shopping malls or 40 airports at once.

In the long term, I worry about a threat from a rogue state that is reckless enough to use a nuclear weapon. I worry about the rise of near-peer competitors, where a major national power would emerge and begin to threaten us or our interests in some significant way. And I worry about the tenuous nature of global energy supplies and global resources. Much of our energy these days, oil and gas in particular, comes from regions of the world that are politically unstable or geographically problematic. If you look at a lot of our other strategic minerals, they too come from unstable parts of the world. And water scarcity is likely to be a flashpoint of conflict in the 21st century. On top of all that, we have rapid growth in places like India and China, and that puts an additional huge demand on resources. So we've got rising demand around the world coupled with the difficulty of getting the materials. That can become a national security threat.

Finally, I worry about what the nation would do if there was some kind of major natural disaster that severely damaged critical national infrastructures: another major hurricane, a global pandemic, a tsunami, or a major earthquake. So that's also on my list of worries, but it's a different kind of enemy.

LN: *Given such a long list of threats, what should Sandia's role be in addressing them?*

AR: We need to ask ourselves how do we support the policy maker, how do we support the treaty negotiator, how do we support the satellite operator, how do we support the oil rigger, whatever it might be. If you take a look at the operators and the policy makers and the negotiators, they are not technology creators, so they have to rely on others for technology. And there are only three places you can get technology: You can buy it from industry, you can get it from a lab, or you can get it at a university. And each one of these occupies a unique space. Universities are very good at creating the first nuggets of intellectual thought, the very creative ideas, for example. Small companies tend to be good at finding that little bit of intellectual property and turning it into a product for a niche market. Large companies tend to be good at technology integration. But there's a gap in the middle. And the gap is taking that creative nugget and building devices that work.

So you need to have somebody to bridge that gap, who can generate ideas, who can do a certain portion of its own very basic research, and who on the other hand can actually build some number of devices for deployment. You want a nuclear weapons stockpile, for example, that is certified to do its job. You want a satellite payload that is certified to fly in space and carry out a mission. You want a nuclear fuel cycle that is safe and secure — with appropriate proliferation resistance and waste management. So you need to have somebody who can take the really creative ideas and get them to the point where they are ready for maturation in industry, and I think that's the unique space the Laboratory occupies.

Also, and this is important, there are certain R&D activities the nation has chosen to hold solely for its own purposes. An obvious example is nuclear weapons. But there are others. So we have an operating space in this other dimension that you won't find in industry or academia.

Defining the ITS mission space

LN: *What changes at the national level are defining the ITS mission space?*

AR: During the latest round of ITS strategic planning, we looked at the dozen or so key documents from government agencies or special commissions that define where we are going as a nation: documents like the Quadrennial Defense Review, the Nuclear Posture Review, and the National Energy Strategy. There's a strategy for cyber security, there's a strategy for homeland security, and there's a strategy for combating WMD, as well. By the way, in some cases we had an opportunity to contribute to some of those documents. Sandians are very well known around the country, and a lot of us have been heard when the strategy was set at the national level. So, as a consequence of a handful of documents, the nation has reconfigured itself to execute those strategies. You saw the creation of the Director for National Intelligence and the Department of Homeland Security. You saw transformation happening in the Department of Defense, and so forth.

In the past some of our programs tended to grow from the ground up — somebody had a colleague, an acquaintance somewhere, and that allowed us to work on a project. And others were more top down, where legislation defined a set of programs. But as these programs grew, and they each grew like their own grapevine in the vineyard if you will, we began to realize that we needed to have some order in the vineyard. So we took note of the changes in national strategies, the changes in the way the government is organized, and we reconfigured internally to match those changes. And so when we took the grapevines and tried to create order, it produced the three ITS groups that are now the three SMUs [Strategic Management Units]. They are built and designed to be focused on the customers, yet to be aligned with mission space.

LN: *Could you outline those SMUs for us?*

AR: Sure. The largest one is called Defense Systems and Assessments, headed by Jerry McDowell. It does work for the DoD and other special customers. The next largest is Energy, Resources and Nonproliferation, headed by Les Shephard. When we say energy here, what that embodies is all the work we do for DOE in basic science and energy and environment, and almost all of our nonproliferation work. The third is Homeland Security and Defense, now headed by Paul Hommert, which combines the work we do for the Department of Homeland Security and the work we do for the DoD in homeland defense. So if you look at these SMUs, each one of its programs is tightly wired to one or a small number of customers.

LN: *You mentioned Sandians often play a role in advising national policymakers? What is our proper role there?*

AR: As a national security lab, we're partly responsible for anticipating threats and providing solutions to those threats. So we do have a responsibility to contribute to the national debate. When policies are being formulated, Congress, the Executive Branch, and other policymakers may come to us for answers, and we must be ready to tell them what we think.

'Lab is about the right size'

LN: *Let's focus inwardly a bit here. One goal of the Strategic Plan is to keep the Lab roughly the same overall size, but that doesn't rule out some internal turmoil. As our mission adapts to the changing situation, doesn't it follow that people will need to change and adapt as well?*

AR: If you go back and look over history, we've been around this number of employees, plus or minus 20 percent, for the last 50 years. We think this is the size needed to maintain the capabilities we perceive the nation needs us to have, and from a pragmatic perspective, it's a size we know how to manage. So the Lab is about the right size. But it's also interesting that at one time it was all nuclear weapons. And now it's half nuclear weapons and half ITS. So people have adapted over time. In the coming years, though, our business could be a lot more dynamic because

"In the long term, I worry about a threat from a rogue state that is reckless enough to use a nuclear weapon. I worry about the rise of near-peer competitors, where a major national power would emerge and begin to threaten us or our interests in some significant way. And I worry about the tenuous nature of global energy supplies and global resources. Much of our energy these days . . . comes from regions of the world that are politically unstable . . ."

(Continued on next page)

Al Romig Q&A

(Continued from preceding page)

ITS touches so many different customers, and because unexpected events — a hurricane, a terrorist attack, or whatever — are also part of our mission. And so people might find themselves working for any number of customers. Somebody might be working on a satellite payload today and tomorrow they're working on an energy project and the next day they're working on a project involving security at a port. I am exaggerating by describing daily changes, but the fact is, if you want to meet the needs of the nation in the current world, we as a lab need to be more dynamic and more flexible than we are today. And the only way we can do that is for people to be more flexible and fluid than they have been in the past. And so people are going to have to get used to the notion of: "I've been doing this for some length of time, I want to keep doing this, but the country needs me to do that, so that's what I'll do."

Maintaining infrastructure

LN: *How can Sandia maintain its infrastructure, buildings, equipment, and fundamental capabilities if an increasing portion of the Labs' revenue comes from relatively small, perhaps year-by-year programs, and a set of customers that is more transitory than we're accustomed to?*

AR: We have been thinking about this a lot. Right now half of the indirect money at Sandia is paid for by ITS customers. Some of that money is used for buildings. But at a nominally 50/50 mix, we're already at the point where we have to do something different. There are a couple of approaches we can take. First, we need a mindset that the customers aren't transient. It's the projects that might be somewhat transient. Still, even with an established customer it might be difficult to get the customer to make a longer-term investment in us. There have been exceptions. We have two wonderful facilities that have been built by the DOE's Office of Science: the Combustion Research Facility [CRF] and the Center for Integrated Nanotechnologies [CINT]. We have facilities in Area 4 that were built by the DoD 15 years ago or so. We've got the new National Infrastructure Simulation and Analysis Center [NISAC], which was paid for by DHS. So there are opportunities occasionally for that to happen.

But here are two other approaches we are working on. First, we are now looking to Laboratory Transformation, IES [Integrated Enabling Services] in particular, to help us with different financial systems that will help recover capital out of programs. Second, we need to work with DOE to identify other customers who have enough desire to work with us as a strategic partner that they will help support our infrastructure because it's the right thing to do for their mission.

Key strategic partnerships

LN: *What are some current examples that exemplify the type of program or customer that will most help us in the future, in terms of strategic partnerships?*

AR: There are a few that come to mind. WIPP [the Waste Isolation Pilot Plant] and Yucca Mountain are two long-term commitments on the part of DOE that show extraordinary confidence in Sandia to deliver. The DOE's Office of Science, by funding bricks-and-mortar construction of the Combustion Research Facility and the Center for Integrated Nanotechnologies, has indicated it is in this for the long haul. The Air Force has made long-term commitments about satellite programs with timelines greater than five years. The Missile Defense Agency has been around for a very long time. There has been a decades-long history of support from the DoD for its physical security needs. And the legislation that created DHS spells out a special, enduring role for the national labs.

"If you are not careful, the strong desire to manage risk puts you in the position of not wanting to take enough risk. That's also compounded by the fact that historically our roots are in nuclear weapons. The consequences of a mistake in nuclear weapons could be catastrophic, and so that sets a certain standard for risk taking. But risk taking might be highly valuable in some programs. And it is very hard to switch gears."

Differentiating the Labs

LN: *As Sandia becomes more industry-like in its approach to business, how will it continue to differentiate itself from companies in order to attract talented people?*

AR: There are three factors that motivate the kind of people who want to come here. The first is being able to take that really good idea and make something tangible out of it. As I said before, you can't do that at a university and you can't do that in industry the same way we can do it here. The second is that we're blessed with extraordinary facilities for people to use. And the third is the people already here. We've been fortunate over the last 60 years to have created an ethos that the people here are very bright and they are able to tackle very challenging problems that make a difference to the nation. And so we have a momentum going that makes other bright people want to join us. But it is fragile, because if we ever lose the momentum of good people attracting good people, trying to rebuild that ethos will be very difficult, because it's difficult for mediocre people to attract good people.

Risk taking and innovation

LN: *What is management doing to support an environment that encourages risk taking and innovation?*

AR: That's a challenge for any company that's as rich in engineers as Sandia. Engineers by their very nature want to make sure it is going to work when they're done with it. And if you want to make sure it's going to work, you've got to manage risk. And if you are not careful, the strong desire to manage risk puts you in the position of not wanting to take enough risk. That's also compounded by the fact that historically our roots are in nuclear weapons. The consequences of a mistake in nuclear weapons could be catastrophic, and so that sets a certain standard for risk taking. But risk taking might be highly valuable in some programs. And it is very hard to switch gears. So we have to be able to adapt culturally and appreciate that different customers might be willing to accept different levels of risk. Some Sandians will get it, and the people who get it have to be the leaders, and leader doesn't necessarily mean manager, right? The leaders show the way and say it's OK at times to take a risk. We need to recognize situations where risks are OK and be willing to take prudent risks. And a leader is the one who can say we've got to try it.

Delivering the goods

LN: *What are the best ways to enhance the Labs' reputation as a provider of national security system solutions?*

AR: Deliver on the goods. Some of the results we deliver may have timelines of years to decades. Think about WIPP. We worked on that for 30 years until it opened. Or take a look at the work we do in the area of fusion sciences. The payoff is decades away. Or look at what we do in satellites, where it takes many years to build a payload. There also are times we have to react in a week. Somebody calls up and says the warfighter is in this jam somewhere and we need a solution by Friday. We deliver. That's our reputation. That's why customers come to us.

LN: *If you look into your crystal ball and you look at the Lab five or 10 years from now, what do you see?*

AR: More often than not the future is an extrapolation of the present. People will, for example, look back at 9/11 and say how much of a landmark shift that was, but it really wasn't. Because quite frankly, long before 9/11, you heard Al-Qaeda mentioned, and the Lab began moving in the direction of developing technologies to counter a terrorist threat many years before. So my suspicion is that five or 10 years from now there isn't going to be something totally new on the horizon. It's going to be an extrapolation of something that already exists today, but it may appear in a new way. So for us it might mean some new customer or sets of customers. I hope that, for example, we see more customers willing to enter into strategic relationships with us. I'd like to solidify this notion of us being the Lab the nation turns to first. I'd like to see ITS and NW work collaboratively to minimize technological surprise. I'd like to see a workforce that has become more flexible and has a higher appetite for risk than it has today, but never loses sight of the fact that there are some things we do where a mistake is just not acceptable. I'd like to see a Laboratory that is more efficient and can spend more of its resources on doing mission work as opposed to supporting itself.

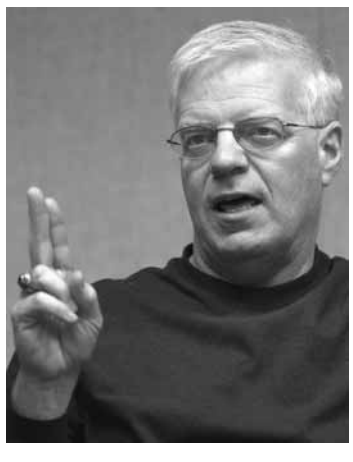
Sandia will play a critical role

LN: *Is there something you'd like to tell Sandians about getting ready for the future?*

AR: If you take a look at this whole series of national strategy documents I talked about, there's no doubt in my mind that nuclear weapons will play, for the foreseeable future, a very critical role in the nation's overall security. And there's no doubt that Sandia and the other labs will play a critical role because we're unique. There isn't anyone else in the country that does the engineering of nuclear weapons. That is our job and it is distinctly our job. But I would also say that if you look beyond that, the nation has recognized that the threats to worry about are more diverse than ever. Everything from the terrorist threat, to rogue states, to peer competitors, to conflict around energy and resources — all this tells us that the threat space is larger. And the DOE laboratories are the only game in town to provide the multiprogram capabilities to take on the high-risk but high-payoff work that industry cannot take on because of the need to satisfy shareholders.

We need to be ready to respond because the country needs us. I think Sandians have it in their blood to do the right thing, and that's what we've got to do.

"There isn't anyone else in the country that does the engineering of nuclear weapons. That is our job and it is distinctly our job. But I would also say that if you look beyond that, the nation has recognized that the threats to worry about are more diverse than ever."



THE SEQUENCE of photos on this page of the TRUPACT-III drop test represents a total time interval of one second. *Lab News* photographer Randy Montoya captured the moment in burst mode on a Nikon digital camera. In the photo at top right, also by Randy, project manager Doug Ammerman shows team members where they should deploy during the test. In the background of the photo, the TRUPACT-III test package is still inside a special refrigeration system designed to cool the unit to minus 40 degrees F prior to the drop.

TRUPACT-III test rattles canyon

(Continued from page 1)

inside a box inside a box inside a box," says Doug. Energy absorbers between an outer and inner box will be crushed during the tests as they do their job, and although the package will look damaged, the inner containment boundary is expected to remain leak-tight. This will be confirmed when the test unit is returned to the fabricator, Engineered Products Division, in Carlsbad. Sandians Dave Bronowski (6315), Tom Gallegos, and Terry MacDonald (both 6765) used vacuum testing during the test series to spot-check the performance on an ongoing basis.

Phil Noss, licensing manager and project engineer for the Tacoma, Wash.-based container designer, views the testing as a critical step in a four-year process. The design is based on a French container, called a TN Gemini, with a rigid inner container and an integral overpack structure (see diagram below). "Layers of foam in varying thicknesses and puncture plates with an energy absorbing structure protect the package contents," he says.

Waste won't go directly into TRUPACT-III, but into a "standard large box" that fits in the inner TRUPACT-III container, Noss explains. The company successfully tested a half-scale version of the container three years ago at Sandia. The process had to be repeated at full scale, however, because the NRC did not accept half-scale leak test results as representative of the full-scale package. The current full-scale package is about two-thirds as long as the original Gemini package, allowing it to meet US highway transportation weight limits, Noss says.

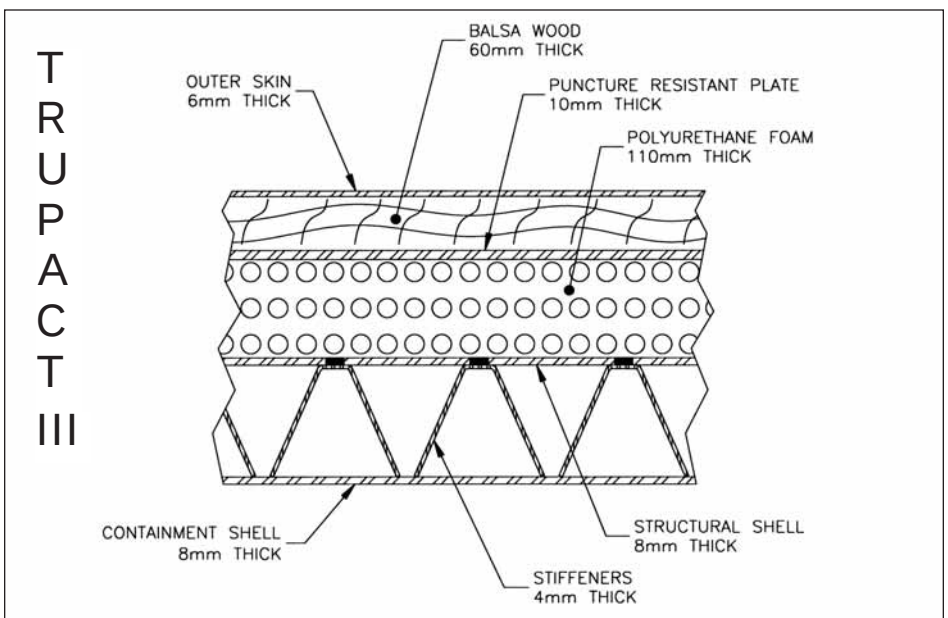
He and his colleagues incorporated these changes and other refinements in the current version. It was fabricated beginning earlier this year in Carlsbad, under a strict quality assurance regimen. Preliminary load testing and leak testing to establish a baseline also occurred in Carlsbad before the container was shipped to Albuquerque for testing.

Marc Italiano, project manager for DOE at Carlsbad, says the containers will be used to move 5- by 5- by 8-foot boxes, containing items such as cut-up glove boxes and other odd-shaped materials from the weapons complex that will not fit into 55-gallon drums. "This will be waste from the old weapons program . . . byproducts from production, maintenance, and disposal," says Italiano. "Most of it fits in 55-gallon drums and that's what we use, but there is also a lot of big stuff that won't fit." Many items in 4- by 4- by 7-foot boxes and quite a few in 5- by 5- by 8-foot boxes remain at DOE's Idaho, Savannah River, Hanford, and Los Alamos sites.

"By using TRUPACT-III, we don't have to size-reduce the stuff, which is a very complicated engineering feat," Italiano says. Size reduction work is expensive and can involve using robots or workers dressed in protective gear. With NRC approval, TRUPACT-III can begin to move wastes to WIPP, he says.

Before gaining NRC approval however, Noss and others at Packaging Technology will write a Safety Analysis Report. The testing process, quality assurance information, and test data will be part of the SAR. Fire testing data is being provided by computer modeling and simulations rather than in a physical fire test, Doug says. NRC officials will then review the report before making a decision on the certification of the container.

"We had a big decision about where to test initially," says Noss. "We had considered testing at Oak Ridge and also in France. But because of the size and the complexity of the container, Sandia became the choice."



LAYERS OF HIGH-DENSITY FOAM, corrosion-resistant stainless steel, and a design that includes multiple protective layers all work to protect cargo in the TRUPACT-III design.

Test Capability Revitalization a boon to testers

A comparison of half-scale testing of TRUPACT-III several years ago with the just-completed series of full-scale tests at the Aerial Cable Site is illustrative of the impact of a Sandia project called TCR. Test Capability Revitalization has made a world of difference to the technologists, engineers, and their customers working on tests at this site.

Two chiller units, wired to "house" electricity — instead of relying on noisy, and sometimes finicky, portable generators — easily pumped out refrigerated air sufficient to cool the giant TRUPACT-III test package to minus 40 degrees F in just a couple of days, reports Jamie Arnold (1534), who oversaw site operations for his crew of four and other support personnel.

Newly installed power also provides the juice for Sandia's MIDAS trailer, used to gather a suite of data within minutes of actual testing. Both MIDAS and the control room, down the road from the site in Bldg. 9838, benefit from a complete refitting of data acquisition cables at the site.

In the old system, signals were occasionally dropped due to the deteriorating cables, says Jeff Cherry, manager of Mechanical Environments Dept. 1534. When a rocket sled is used to pull down a target from the newer, high-capacity overhead cables, or when explosives are involved in a test at "ground zero" at the site, test personnel can safely retreat to Bldg. 9838 and get quality data with the new fiber optic system, Jeff says.

Coming and going are better, too. A road upgrade means that mud in bad weather won't be the obstacle it has been in the past. "We replaced things that were aging, doubled the [weight] capacity of the aerial cable, and achieved our purpose in extending the life of this facility," Jeff says.

Supporting the warfighter, protecting the nation

DS&A SMU applies rich legacy of engineering, science, and technology to today's most pressing national security challenges

Work for defense, other national security communities now a mainstay of Labs' 'exceptional service in the national interest'

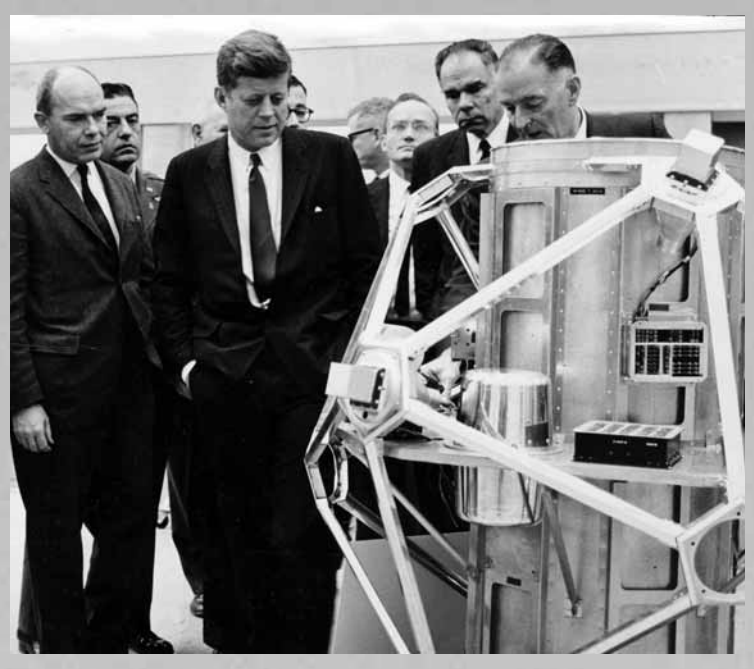
Story by Julie Hall
Timeline on pages 8-9 by Laura Scott • Photos from Sandia archives

SINCE ATMOSPHERIC and flight conditions were seldom identical during any two flight tests, Sandia developed the Advanced Nosetip Test (below) in the mid-70s, allowing four small missiles with different nosetip and heat shield materials to be tested under identical conditions.

The formation of the Defense Systems & Assessments strategic management unit last year from the merger of the Military Technologies & Applications SMU and most of the Nonproliferation and Assessments SMU represents the latest chapter in a long history of the Labs' national security work for agencies other than DOE.

From its humble beginnings in 1950, Sandia's military work for others (WFO) has grown to represent the majority of its "work for others" funding and a mainstay for the Laboratory, where once it was considered peripheral, even controversial, by some who thought Sandia should stick to its core business — nuclear weapons engineering.

Today it represents a growing line of business for Sandia at a time of declining nuclear weapons funding. The 2005 reorganization put most of Sandia's work for the Department of Defense and other national security agencies in the DS&A SMU, with the goal of further enhancing the management and growth of this work.



PRESIDENT JOHN F. KENNEDY visited Sandia in 1963, at the height of the Cold War. On his itinerary was a quick briefing about the VELA satellite package, designed at Sandia to detect atmospheric nuclear detonations. In the Kennedy delegation were McGeorge Bundy, center background, and Glenn Seaborg, chairman of the Atomic Energy Commission, DOE's predecessor organization. At right is Sandia Labs President Monk Schwartz.

'As if we've awakened from a deep sleep'

"The work that we've done for other federal agencies [besides DOE] has historically been at a relatively small level, a fraction of what we do overall at the Lab," says DS&A VP Jerry McDowell. "Today, it's as if we've awakened from a deep sleep to discover we're a much larger piece than we were in the past . . . so the management of the work that we do deserves more rigor and more interaction at the national level than we've probably ever done before."

Sandia's military WFO represents about 80 percent of DS&A's budget. In FY06, DS&A managed $490 million, or 65 percent, of the Labs' $759 million WFO funding. DS&A's WFO work is expected to continue to grow in coming years, with FY07 projections bringing it to 71 percent of total WFO.

The history of military WFO at Sandia is studded with numerous high-profile programs and accomplishments, such as work on the VELA satellite program in the 1960s, development and testing of reentry vehicles spanning four decades, the invention of the clean room, arms control and treaty verification work, and development of numerous technologies used in conflicts in Vietnam, Bosnia, Afghanistan, and Iraq.

In many WFO projects for defense community customers, Sandia typically plays a supporting role, a small but integral cog in a bigger machine.

"Is there a Sandia thunderbird stamped on the side [of these various systems]? No," Jerry says. "We have contributed key parts and components and in that spirit we're part of a team that serves the interest of the defense community, and that's the theme that pervades everything we do.

"Sandians, both past and present, have to get satisfaction in knowing they influenced a system," he says. "We're likely not to be known as having created a system — we don't do operations work. But we can take tremendous pride in serving as supporters of the guardians of peace and freedom."

(Continued on next page)

Sandia has conducted extensive modeling and testing of materials for reentry vehicles.

"Today, it's as if we've awakened from a deep sleep to discover we're a much larger piece than we were in the past . . . so the management of the work that we do deserves more rigor and more interaction at the national level than we've probably ever done before."

— Jerry McDowell, VP, DS&A SMU

• Defense Systems & Assessments Strategic Management Unit •

Relationship with military an enduring part of Sandia's mission

(Continued from preceding page)

Defining WFO

Many people think of WFO as "nonnuclear" work, such as work for the Nuclear Regulatory Commission or the Department of Homeland Security. But all of Sandia's military WFO traces its roots to capabilities developed through the nuclear weapons program.

"I know of no venue that we are involved with today in the defense and national security community that isn't directly related to a nuclear weapons activity in some way," Jerry says. "Our ability to help these customers has flowed from the investment in the engineering, science, and technology capabilities that underpin the nuclear weapons program."

The widely accepted definition of WFO focuses on the funding source: Basically, any work funded by an agency or entity other than DOE/NNSA is considered to be WFO.

While not disputing the close ties between military WFO and nuclear weapons work, retired Sandian Jerry Allen also sees a reciprocal benefit between the two types of work.

> *"I know of no venue that we are involved with today in the defense and national security community that isn't directly related to a nuclear weapons activity in some way."*
>
> **— Jerry McDowell**

"There's another side of the equation that says . . . the weapons program is greatly helped by the WFO program," says Jerry, who managed both weapons and WFO programs during his Sandia career. "In other words, we couldn't be the lab we are today had we not had the WFO program because it provided the funding to develop these capabilities which are used in the weapons program."

A controversial program

WFO started inauspiciously in 1950 with Sandia's first "reimbursable" project. With the Atomic Energy Commission's permission, Sandia received money from the Defense Department to study nuclear weapons effects. The weapons in existence at that time were low yield compared to later designs, and the military wanted to understand their effects on adversaries.

SANDIA DEVELOPED a large family of earth-penetrating, air-dropped sensors for use in Vietnam.

When the US and the Soviets agreed to suspend nuclear testing in 1958, many worried about its impact on Sandia and its funding. Sandia managers began to explore branching out into other areas. The Labs' early opportunities to diversify came from its partner laboratories requesting engineering assistance for peacetime projects. In 1961, Sandia President Monk Schwartz formed a small directorate to examine a variety of areas of potential work for Sandia.

By 1976, reimbursable projects funded by other agencies had grown to approximately $50 million, or 18 percent of Sandia's $280 million budget at the time. The growth was spurred in part by a concerted effort on the part of Sandia President Morgan Sparks, and later by his successor, George Dacey, to cultivate new business and new sponsors in the wake of a 10 percent "reduction-in-force" that occurred in 1973.

This 1987 test of a two-stage Sprint rocket was conducted at the sled track for the Strategic Defense Initiative.

Despite the funding boost the programs provided, in the 1980s a cadre of people argued "vehemently" against having a WFO program, says Jerry Allen, regarding it as "distracting" to Sandia's core mission. Some supported the program if it was kept to 10 percent or less in dollar value of the Labs' budget. Its champions regarded it as "insurance" against what they saw as inevitable nuclear weapons funding declines and fought not only to keep the program but to expand it.

"I can remember many arguments about whether the satellite program ought to be any kind of mainstay for the laboratory," Jerry says. Much of that perspective was driven by the desire to keep the laboratory small and fears among those who had gone through the painful layoffs of 1973 of taking on a program where funding could fluctuate year by year. With nuclear weapons funding, Sandia had a year or two advance notice on funding based on congressional appropriations, but in the WFO program, "they [the customers] don't have to come back to you . . . We used to say we earn our bread every year," Jerry says.

"It took a lot of the Roger Hagengrubers and Gerry Yonases to say 'Look, industry can manage those kinds of things and so can we.' Do we provide exceptional service to the nation only through the nuclear weapons program or do we take some risks?" Roger (ret.) led Sandia's national security work for others efforts in the mid-1980s. In 1993 the DoD portion was split off and assigned to Gerry, now 7000 vice president and principal scientist.

> *"You'd think it would be easy to detect a nuclear explosion, but when you're in space staring at the earth that's illuminated by the sun, that's a fairly bright object, so the flash from a relatively small, or even megaton-class bomb, is a dim flash."*
>
> **— Andy Boye, Manager, National Space Programs**

GERRY YONAS (third from left), then 9000 VP overseeing Sandia's Work For Others Sector and now principal scientist and head of the Advanced Concepts Group, meets with his "WFO brain trust" in this 1993 photo. Gerry and his team of directors met frequently to share program development ideas and address WFO-specific challenges.

WFO eras

Placed on a timeline, Sandia's major military WFO efforts would mirror capabilities developed at Sandia from the nuclear weapons program, says Jerry McDowell. "It was always deliberately our intent that work we did for the military or national security community drew on the fundamental capabilities of the laboratory that were part of the nuclear weapons program because doing so exercises them and makes them stronger," he says.

Early on, WFO focused on testing because "testing was what was known and understood and we were really good at it."

Missile defense work also started about the same time, growing out of Sandia's experience using rockets to launch instruments used to observe nuclear explosions. In 1962, the Kauai Test Facility, which had been serving as a launch site for these instrumentation rockets, was established as a resource Sandia could use to do research for other agencies as well.

Military space work, which includes Sandia's satellite work, arose in the 1960s from Sandia's capability to detect and characterize "optical transient events," — flashes of light — which in turn stemmed from analyzing the flashes of light accompanying a nuclear detonation.

"You'd think it would be easy to detect a nuclear explosion, but when you're in space staring at the earth that's illuminated by the sun, that's a fairly bright object, so the flash from a relatively small, or even megaton-class bomb, is a dim flash," says Andy Boye, senior manager of National Space Programs at Sandia. "On top of that, the flash lasts only thousandths of a second."

SANDIA'S Airborne Remotely Operated Device (AROD) was developed for use by the US Marine Corps in battlefield surveillance.

Sandia continues to provide sensors to the military to detect atmospheric nuclear tests, supplemented by ground stations for gathering sensor data, and assistance to the military in interpreting the data gathered by the sensors.

VELA signaled the start of Sandia's arms control and nonproliferation-related work, but it picked up momentum during the late 1980s and early 1990s as the Cold War thawed and eventually ended. Sandia provided not only technologies and hardware but also consultation.

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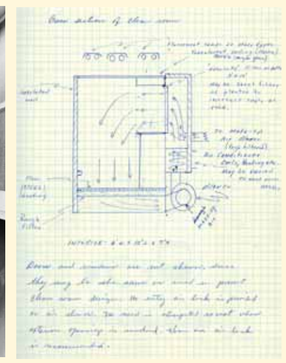
Willis Whitfield and his incredible clean room



WHEN WILLIS WHITFIED came up with the idea for the laminar airflow clean room, it was intended to provide a dust-free environment for close-tolerance weapons parts. Little did he — or anyone else — know that his idea would become a basic enabling technology for the $1.2 trillion microelectronics industry. Willis is seen in the photo above monitoring air quality in an early clean room. A page from his laboratory notebook, at right, shows a cross-section of the proposed clean room design.

Timeline created by Laura Scott

Anticipating, addressing strategic threats to the nation

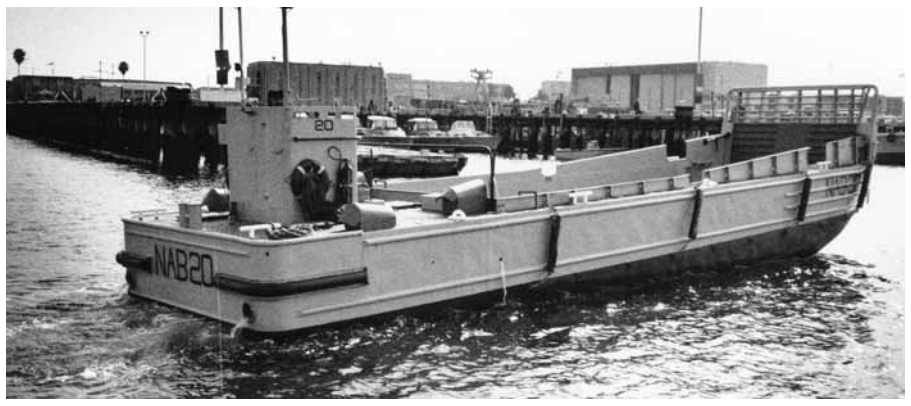
(Continued from preceding page)

Sandians participated in managing and advising on treaties that involved nuclear, chemical, and biological weapons all over the world. In several instances Sandians, such as Paul Stokes, Roger Hagengruber, and Stan Fraley, were directly involved in treaty negotiations in Geneva and the Soviet Union.

"Sandia recognized this obligation as a part of its custodianship of the stockpile. Custodianship doesn't just mean you make them [nuclear weapons] reliable and safe and secure," says John Taylor, manager of Integrated Technologies & Systems Strategic Planning. John joined Sandia in 1975 and began working in nonproliferation starting in 1983. "It also means that you understand that controlling them is an international obligation and you work to do that responsibly.

"I think we can be justifiably proud of this work because it reflects the real classic case of what I consider ultimate stockpile stewardship and that is, we build these weapons but we also understand that you have to work to eliminate them in a reasonable and appropriate way."

Technologies such as development of the laminar airflow clean room grew out of internal needs that could not be met by technology available at the time. The advanced manufacturing group needed a way to remove dust that might contaminate close-tolerance weapons parts. Willis Whitfield had the idea to use a uniform flow of filtered air from the ceiling to the floor, or wall to wall, to remove dust from the air. His idea, which was patented in 1964, became the foundation for the $1.2 trillion electronics industry, according to figures from SEMATECH.



A SANDIA CONTRIBUTION to Operation Desert Storm included development of remote-control landing equipment to assist in mine-clearing and beach-assault operations. Though not actually used in the conflict, the technology was successfully demonstrated on a Navy vessel in San Diego Bay.

SANDIA'S SYNTHETIC APERTURE RADAR has become a must-have tool for the nation's military. The photo above, of a small section of the Rio Grande Valley, only begins to suggest the capabilities of this technology, which can image terrain through cloud cover, at night, and in real-time. Sandia continues to refine the technology to meet 21st-century national security threats.

Sandia's current research on synthetic aperture radar and automatic target recognition can be traced back to Sandia's work on radar fuzes and advanced navigation, guidance, and control systems for missile-delivered nuclear weapons applications. Sandia-developed SAR systems and image processing techniques are routinely deployed around the world in high-profile conflicts and have operated under every US military command. Key Sandia firsts that have pushed the envelope in SAR technology include advances in real-time, fine-resolution image formation and autofocus, fine-resolution 3-D terrain mapping, and leading-edge data exploitation techniques such as the detection of ultra-fine changes in the surface of the earth.

Another longstanding program comes from the Conventional Munitions Memorandum of Understanding (MOU), signed in 1985 between DOE and DoD. The MOU provides a funding mechanism for NNSA and DoD labs to jointly pursue R&D for advanced conventional munitions technology. DoD funds are matched by DOE, effectively leveraging DOE/Sandia expertise and funding. Sandia is slated to receive $14 million in FY07 through the MOU.

"It has allowed us to work collaboratively . . . on munitions technology of interest to both agencies," says DS&A Deputy David Keese. "It's an excellent example of cross-agency collaboration.

Looking to the future

Jerry McDowell says the DS&A SMU is at an "interesting junction." While nuclear deterrence remains the principal strategic national security challenge for the US, the DoD and elements of the national security community are undergoing intense restructuring and transformation in response to changing strategic national security threats. For example, one of US Strategic Command's (STRATCOM) new mission areas focuses on protecting the nation's information infrastructure from cyber threats.

"Our military capability depends a lot on our space assets and so if you destroy or deny their use you hinder the military's ability to execute its mission."

— Andy Boye

Sandia is helping the military assess and counter the threats these computer systems and networks face. "We have a rich understanding of vulnerabilities to computer networks because we have historically worried and continue to worry about use and misuse of nuclear weapons," Jerry says.

"Defensive counter space" as it applies to protecting US satellites is another emerging mission area for STRATCOM in which Sandia is involved. This might take the form of a laser threat warning system, for example, that would detect an adversary shooting a laser at a satellite. This could disable or confuse the satellite, potentially affecting precision-guided munitions and global-position systems used by soldiers.

"Our military capability depends a lot on our space assets and so if you destroy or deny their use you hinder the military's ability to execute its mission," says Andy.

Sandia will continue to build on its legacy of success in anticipating, understanding, and addressing such challenges, says Jerry.

"The tradition we've always turned to and will continue to turn to is to anticipate the strategic threats our nation faces, to rely on our rich science and technology community to create new ideas and discover new capabilities, to challenge our engineers to convert that technology into something useful and innovative for our customers, and to be engaged throughout the national security community in helping inform the national debate on security choices, because technology enables a whole new way of thinking about our future," Jerry says. "The DS&A SMU is at the forefront of meeting these new challenges and as this work grows, the DS&A will increasingly be called upon to establish relationships with the defense and national security communities that strengthen investments in science and technology, and Lab infrastructure. This is a great time to be at the Lab and to be involved in the work of the DS&A SMU. As the motto on our seal says, we are the 'new order for the ages.'"

• Defense Systems & Assessments Strategic Management Unit •

‘Create a research agenda for sustainability,’ Noel Brown challenges Sandia audience

By Will Keener

For a species of “eco-shapers” who will create more radical change in the next century than has occurred since the last Ice Age, Noel Brown has some bad news and some good news. The bad news is that while we are making plans to explore the universe, we are on a track to be the world’s “terminal generation, without fully understanding how the Earth works.” The good news: We have the power to project and create a very different, positive future.

NOEL BROWN

Brown, former regional administrator for the United Nations and an expert on the global environment, was keynote speaker at the fall quarter Environmental Management System Awards ceremony Oct. 25 at the Steve Schiff Auditorium in Albuquerque. “We can anticipate a desired state of affairs and shape the future before we actually experience it,” Brown told his audience, which included a video link to California and video-streaming to desktop computers around the Labs.

As the first generation of humans to actually perceive Earth as a whole, the current generation of scientists and researchers has a responsibility to protect the planet from environmental degradation, Brown said. “Managing the planet to maintain a single species is not a sustainable proposition.” Brown outlined a number of factors, including the planet’s six billion people and a growing middle class with its consumption value system in places like India and China. “Technological civilization is on a collision course with nature,” he said.

Focusing on agriculture, Brown warned that climate change could create a situation where the US will no longer be the breadbasket it now is. More powerful storms, dust storms, changing rainfall patterns, and other factors could create shifts that would damage the valuable coastal agriculture lands, with their easy access to most of the Earth’s population. “Acre for acre, the coastal system is the most productive on Earth,” he said. Right now just 11 percent of total land area is the basis of the world’s food supply, Brown noted.

Brown praised Sandia’s efforts in environmental protection and waste minimization (see “Enviromental Management System . . .” above) and pointed out a number of positive collaborations under way throughout the world. He praised an alliance of BP, Amoco, GM, and Monsanto, who have agreed to report generation of greenhouse gases and work to reduce them on a voluntary basis. “Clearly, these businesses see an economic value in creating a sustainable future.”

Brown called for more incentives for sustainability in the marketplace and challenged his Sandia listeners to “create a research agenda to build a culture of sustainability. If we don’t kill ourselves accidentally or intentionally, there is very little we cannot do,” he concluded. “It is too late to be pessimistic.”

Those with Sandia intranet access can see Brown’s speech at:

http://as54snlnt.srn.sandia.gov/mediasite/viewer/?peid=9d76df2e-4ae8-450a-899c-2976287a7286

Environmental Management System Excellence Awards

Projects for replacement of hazardous solvents with vinegar, protection for migratory birds, and saving money with waste minimization approaches were named winners in the third quarter 2006 Environmental Management System Excellence Awards, given Oct. 25.

About 20 team and individual nominations were received, involving about 168 people, including several from Kirtland Air Force Base, said Jack Mizner, Pollution Prevention (10331) team leader at Sandia. Nominees were from California, New Mexico, and the Pantex site in Texas. “The quality of the nominees was excellent,” Jack said in announcing the awards. “It was challenging to pick just four winners.”

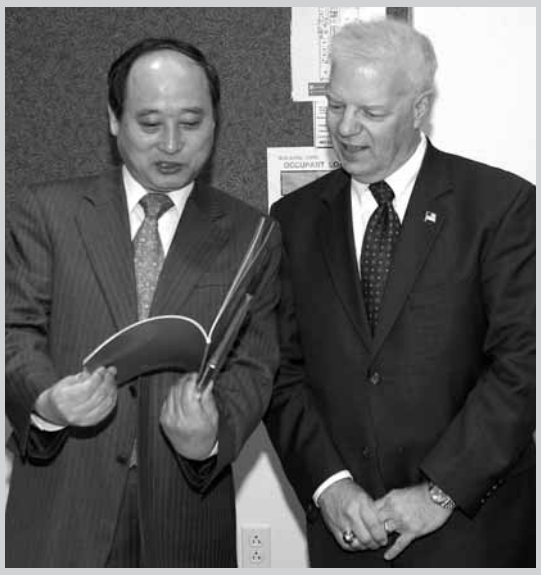
The winners:

Manny Trujillo, 2453-1, won the individual award in the Risk Mitigation/Environmental Protection category for his efforts to replace hazardous solvents with simple household vinegar in cleaning processes in his lab. The team prize in this category went to a group that modified Bldg. 957 to minimize impacts to migratory birds, while deterring pigeons from roosting at the building. Team members include: Richard Dramer (10856), Brad Lackey (10327), Richard Toledo (10843-2), and Rebecca Naranjo (10263-1).

The individual award winner in the Waste Minimization category was Gary Tilley (1342) for HERMES III waste minimization practices. His approach to waste minimization will save thousands of dollars at the HERMES facility. The team award recipients for the Waste Minimization category were: Phillip Cole (2453), Shannon Lacy (2453), Sean Winters (1821), and Joe Lenhart (1821) for their efforts in reducing solvent use. Reductions in materials purchased and disposal costs are estimated at $9,500 per year from the project.

Fourth-quarter EMS nominations are being accepted through Dec. 31, in the categories of Water Conservation and Energy Reduction.

Sandia, Korean atomic energy group sign MOU



SANDIA DEPUTY LABS DIRECTOR AL ROMIG, right, and Seong Won Park, VP of Nuclear Fuel Cycle Development for the Korea Atomic Energy Research Institute look over the Memorandum of Understanding they signed moments before on behalf of their institutions. The purpose of the five-year agreement is to strengthen the technical cooperation in the development and application of technological approaches to reducing the risk of proliferation. Sandia and KAERI will conduct joint research and explore opportunities for the exchange of scientists, engineers, and other experts including short- and long-term visits or working assignments. KAERI, established in 1959, is the Republic of Korea’s sole national nuclear R&D research institution. (Photo by Bill Doty)

Sandia's Jerry Simmons helps lead way to new form of lighting

By Chris Burroughs

A revolution is underway. And no, it's not in some small unstable nation.

Instead, it's in the way the world will soon light houses, office buildings, and schools.

Predicts Sandia researcher Jerry Simmons (1130), "By the year 2025, all incandescent light bulbs will be in museums, with solid-state lighting [SSL] being the main light source."

JERRY SIMMONS points to devices that use the latest LED technology. (Photo by Chris Burroughs)

Jerry has been a champion of SSL and semiconductor-based light-emitting diodes (LEDs) ever since he became manager of Sandia's SSL program. He worked on two-dimensional electron physics in the Semiconductor Material and Device Sciences Department for 10 years after joining the Labs in 1990 with a new Princeton University PhD in electrical engineering.

Solid-state lighting systems consist of LEDs made of semiconductors — the crystals used in computer chips. LEDs use no hazardous materials, last as long as 100,000 hours, and have the potential to be far higher in efficiency, producing less waste heat than conventional lighting.

After being tapped to become manager of the same department in 2000, Jerry's first job was to write an in-house Grand Challenge funding proposal for improving LEDs through Sandia's Laboratory Directed Research and Development (LDRD) program.

He discovered his passion.

"I had to learn fast," Jerry says. "But the idea of SSL got me really excited, and I had a lot of patient instruction by expert staff."

Over the past six years his enthusiasm led Sandia to become a worldwide leader in LED development. He even traveled with Sen. Jeff Bingaman, D-N.M., to Japan and Taiwan to learn about those countries' SSL research and energy policies.

Most recently he led a team that wrote the winning proposal for a DOE virtual Center for Solid State Lighting Research and Development (*Lab News*, Oct. 13, 2006).

The center will be headquartered at Sandia and will receive about $2.6 million of the total funding for research. Other national laboratories that received money and will be participating in the initiative are Los Alamos, Argonne, and Oak Ridge.

"I see this center as a bridge between fundamental discoveries at DOE Nanoscale Science Research Centers and companies that will take these ideas and make them into useable products," Jerry says.

Sandia manager takes alternative route to successful career at Sandia

While forging ahead to make Sandia a world leader in the areas of solid-state lighting (SSL) and semiconductor-based light-emitting diodes (LEDs), Sandia researcher Jerry Simmons (1130) has a whole other job. In 2004 he assumed the position of senior manager in charge of Sandia's DOE Basic Energy Sciences/Materials Science core research program at Sandia, inheriting the responsibility from George Samara (1130), now senior scientist, who had the job for 20 years prior. "George continues to teach me," says Jerry.

It's a position that seemed quite unlikely for the young Jerry who never graduated from high school or got a GED. Jerry left high school after his junior year and never went back. Instead, he took an alternative route and participated in an early-entrance program at a small college in New York City, the New School for Social Research, with a program for students skipping their senior year in high school. Few science courses were available, so he took up anthropology and philosophy.

Wanting more adventure, he moved to Wales, where he briefly attended school. Jerry then returned to the New School and soon transferred to another alternative college in Florida (New College of Florida) where he began studying science seriously again.

Jerry says it was probably the best educational decision he ever made.

"The school had no grades or course requirements," Jerry recalls. "And because of that, it let me focus intensely on projects — something I do to this day."

After receiving undergraduate degrees in physics and philosophy, he went to work as a technician for two years at Bell Labs in Murray Hill, N.J., where he became acquainted with a scientist, Dan Tsui. The scientist left to become a professor at Princeton, and Jerry asked if he could be his student. Jerry followed Tsui to the Ivy League school, where he obtained his PhD in electrical engineering. He subsequently moved to Albuquerque to work at Sandia.

"Sandia was the only permanent job I applied for. I wanted to work somewhere that had growth opportunity," Jerry says. "Plus I liked the New Mexico outdoors."

Jerry continues correspondence with Tsui, who in 1998 won the Nobel Prize for physics. Tsui consults at Sandia, visiting about three times a year, and has collaborations with Sandians Wei Pan (1123), John Reno (1132), and Mike Lilly (1132).

Jerry recalls one funny incident that occurred just as he was finishing his PhD and preparing to join Sandia. Shortly before graduating from Princeton, he called his old high school to ask them if they would finally give him a diploma."They said no," Jerry says. "They said I had to take a GED test. Well, I didn't."

—Chris Burroughs

Manager promotions

New Mexico

Betty Biringer from DMTS, Office of Counterintelligence Dept. 0301, to Manager, Security Risk Assessment Dept. 6441.

BETTY BIRINGER

Betty began her career at Sandia as a One-Year-on-Campus (OYOC) student intern in June 1974. Since then she has been either an employee or contractor.

Her work consists of nuclear safety and physical security assessments. She specializations in developing methodologies for safety assessments, physical security vulnerability analyses, and security risk assessment of national critical infrastructure elements. Betty has co-authored a textbook, *Security Risk Assessment and Management, a Practical Guide for Architects and Engineers,* to be published in early 2007.

Betty has a BS in mathematics from New Mexico State University and a master's in mathematical sciences from Rice University in Houston, Texas.

* * *

Randy Watkins from PMTS, Lab Science, Technology, and Engineering (ST&E) Business Office Dept. 1010, to Manager, ST&E Strategy and University Research Dept. 1012.

Randy began his career with Sandia in 1983 when he worked in the Glass and Ceramics Processing Department. In 1991, he transferred to the Energy and Environment Center working on environmental life-cycle analysis and impact assessment. In 1995 he moved to the Defense Programs Studies Department and worked in systems analysis until 2004. Randy has worked in the ST&E SMU office from 2004 until now, focusing on ST&E strategy development, risk review, LDRD Strategic Objectives investment area management, technical capabilities assessment, and the Integrated Laboratory Management System.

RANDY WATKINS

Randy has BS and MS degrees in ceramic engineering from Ohio State University.

* * *

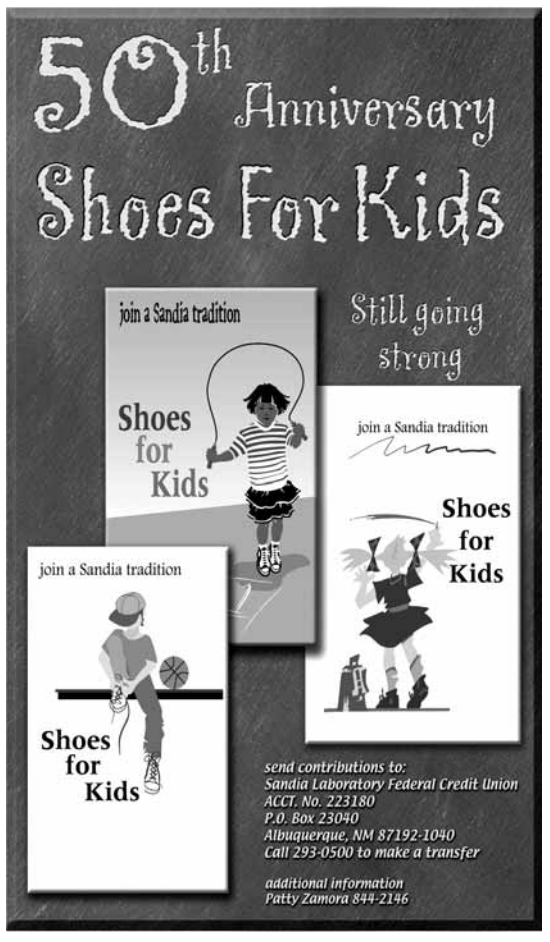
Jose Zayas from SMTS, Wind Energy Technology Dept. 6333, to Manager of that same department.

Jose has been in the Wind Energy Technology Department since 1996 and has centered most of his research on the areas of sensors, active aerodynamic control, wind turbine dynamic modeling, data acquisition systems, and field testing.

JOSE ZAYAS

He has a BS in mechanical engineering from the University of New Mexico and a master's in mechanical and aeronautical engineering from the University of California, Davis.

A Sandia holiday tradition . . .



LDRD Day highlights new research directions

Posters, presentations show research with wide impact

By Neal Singer

Martial arts masters in days of old were reputed to hold practices in difficult places to make sure only the most dedicated students would receive instruction.

So perhaps Sandia VP Rick Stulen (1000) revealed the Zen side of his nature when he chose Friday — a day when half the staff is absent — to hold the first-ever LDRD Day.

"We wanted to see who would come," he says.

One reason to attend would have been to see presentations selected to represent the new, more imaginative trend in LDRD's direction.

"They're beginning representations of the new direction," says LDRD manager Hank Westrich (1011). Although the highlighted research projects were of LDRDs completed last year, "To be chosen, they had to map into the new investment areas."

Sandia Fellow and presenter Jeff Brinker (1002) analyzed, "The direction seems to be to highlight LDRDs that can be explained to the outer world as having impact, rather than another widget."

"One objective [of LDRD Day] is to enhance collaboration between staff," Rick tells the *Lab News*. "Without a public show, there's no visibility between investment areas. This way, staff can come and listen to talks and learn what is going on."

"It's critically important that Sandians learn about each other's work," says Wendy Cieslak, manager of ST&E Strategic Initiatives (1010). "Communication across technical and programmatic areas raises the impact."

A fluctuating audience of approximately 200 Sandians did so learn, alternating among 10 presentations and 23 posters in the Steve Schiff Auditorium.

What were those presentations? The *Lab News* is limited in what it could cover in the few hours, but here were some to give a flavor of the desirable, chosen by happenstance:

• A study of floating-point computing architecture by **Keith Underwood and Scott Hemmert** (both 1423) generated commercial interest by being the first to show that such architecture was feasible.

• **Ann Speed (6341) and her group** compared a Sandia-developed method with a method widely used at universities to track a car driver's reactions in terms of driver brain function and data from the car itself. She found the Sandia method able to handle far more data — a more useful characteristic in real-world domains than the simpler laboratory tests performed at universities.

• **Michael L. Bernard (also 6341) and his group** created a model of how humans react in relatively unstructured situations, rather than the prevalent scripted behaviors that fall apart when scenarios change. The dynamic simulated environments allow for better virtual training environments.

• **Thomas Mattsson** spoke on his work with **Mike Desjarlais** (both 1674) that changed the known range of electrical conductivity of water and rearranged its phase diagram.

• **Chris Apblett's** (1723) poster covered a 2-year grant to develop small, long-term alternatives to chemical batteries. His group developed one the size of three Lifesaver candies that will last 75 years.

• **Anuph Singh's** (8321) poster described how cells respond to being infected, using microfluidic tools and hyperspectral imaging to see how proteins move in cells. The group found previously unpredicted interactions that "would have taken legions of grad students years to collect data" without such capabilities, said Chris Apblett, monitoring the poster for Anuph, who was away.

• **Tom Friedmann** (1112) created thin-film gauges intrinsically connected to target materials in shock physics experiments. They are designed to minimize intrusions by the measuring device on pressure readings, and allow for the first time an accurate, direct measurement of temperature.

• **Julia Hsu's** (1114) poster read that she had explored new approaches for nanomaterials assembly and demonstrated some success in using organic molecules to control surface energy.

Six awards for projects ending in the past three years were given across the self-evident LDRD themes of Discover, Create, and Prove. They were also shared equally across the two major LDRD program areas of Science, Technology & Engineering and Mission Technologies.

ATTENDEES of the first-ever LDRD Day check out some of the 23 posters that highlighted selected samples of LDRD research projects. (Photo by Bill Doty)

The LDRD mission

From the LDRD external website home page:

Sandia's value as a national resource is its world-class science, technology, and engineering. These capabilities must remain on the cutting edge because the safety, security, and reliability of US nuclear weapons depend directly on them. Under the guidance of Sandia's Laboratories Director and with the DOE's concurrence, the Laboratory Directed Research and Development (LDRD) Program provides the flexibility to invest in long-term, high-risk, and potentially high-payoff research activities that stretch Sandia's science and technology capabilities.

LDRD supports Sandia's four primary strategic objectives: nuclear weapons; nonproliferation and materials control; energy and critical infrastructure; and emerging national security threats. To meet these objectives, LDRD promotes creative and innovative research and development by funding initiatives that are discretionary, short-term, and often high-risk, and that attract exceptional research talent across disciplines.

Discover. Create. Prove.
LDRD awards recognize cool work

The LDRD Program seeks creative, high-risk, leading-edge R&D with the potential for great external impact and innovation. The LDRD Awards recognize excellence in research and development in the three LDRD project categories: Discover, Create, and Prove. The award nomination process brings recognition to our best researchers, and a nomination for the LDRD Award is an acknowledgment of the outstanding nature of the R&D.

To be eligible for an award, an LDRD project must have finished in one of the last three fiscal years (FY 2004, FY 2005, or FY 2006). Nominations are evaluated for their embodiment of "National Laboratory Challenge, Risk and Creativity," and of "National Laboratory Relevance and Impact."

Discover — Mission Technologies (MT)

Elucidating the Mysteries of Wetting

Principal Investigator(PI): Gary Grest (1114); Program Manager (PM): John Emerson (2453); PI Team: Anne Grillet, Philip Sackinger, Carlton Brooks

Discover — Science, Technology & Engineering (STE)

Beyond the Local Density Approximation: Improving Density Functional Theory for High Energy Density Physics Applications

PI: Michael Desjarlais (1674); PM: Tom Mehlhorn (1674); PI Team: Richard Muller, Ann Mattsson, Alan Wright, Normand Modine, Mark Sears

Create — MT

Infrastructural Development for Flexible Network of Devices

PI: Tan Thai (5625); PM: Declan Rieb (5625); PI Team: Andrew Lydon, Hendrik Brower, Jonathan Margulies, Robert Jung, Pengchu Zhang, Daniel Wachdorf, Han Wei Lin, Matthew Leinhos, Gregory Conrad, Michelle Leger, Wendy Amai, James Liang, Zachary Lovelady, Dustin Locke, Douglas Ghormley, Samuel Mulder

Create — STE

High Throughput Identification Of Molecular Machines Involved In Membrane Signaling And Toxin Pathways

PI: Anup Singh (8321); PM: Malin Young; PI Team: Masood Hadi, Swapnil Chhabra, Sara Gaucher, Rajat Sapra

Prove — MT

Novel Processing, Affordable Motion Compensation, And Mode Multiplexing For Miniaturized Synthetic Aperture Radar

PI: George Sloan (5345); PM: William Hensley (5342); PI Team: Stewart Milton Kohler, Dale Dubbert, Michael Holzrichter, Armin Doerry, April Disch Sweet, Daniel Sprauer, Philip Ortiz

Prove — STE

Nano-G Accelerometers Using Nanophotonic Motion Detection System

PI: Uma Krishnamoorthy (1749); PM: Mial Warren (5624); PI Team: Bianca Keeler, Dustin Carr, Roy Olsson, Albert Talin, Gregory Bogart, Luke Hunter

Mileposts

Photos by Michelle Fleming
California photos by Bud Pelletier


Craig Deshields
30 8513


Andrew Kraynik
30 1514


Leo Mara
30 8224


Tracy Lamee
25 8965


C. Channy Wong
25 1513


David Beutler
20 5923


Gary Tipton
20 1746


Tania Carson
15 6323


Gregory Corbett
15 6452


Todd Culp
15 10328


Elsa Glassman
15 3521


Mary Loukota
15 11500


Benita Montano
15 5993

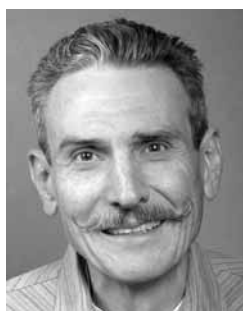

Sharon Ortiz
15 3554


Paul Smith
15 9104


Jackie Von Loh
15 4014

Recent Retirees


Jerry McCorkle
43 2915


E. Keith Mote
40 2431


Gary Jones
39 1824


E. Paul Royer
38 2724


David Dellinger
30 10265


Steven Weissman
30 5520

Suzanne Weissman
25 6006


Barbara Esch
20 6030


Connie Martin
20 10741


Garth Corey
16 6336

Feedback

In safety-focused organizations, shouldn't 'ridiculously hazardous footwear' be banned? And, can't someone please foil carpool parking spot thieves?

Q: *Now that the powers-that-be have banned handheld cell phones so we can drive safely; banned gazing at the scenery so we can walk safely; and banned smoking so we can breathe safely, are they also going to ban spike heels and platform shoes so we can walk safely?*

This is not a frivolous question. Slips, trips, and falls are uppermost in the minds of those who worry about ES&H and are arguably the single largest source of non-construction site injuries on the campus.

In particular, it seems the pebble-filled terrazzo material of which our mall walkways are made is particularly good at catching the tip of a spike heel, but the solution seems to be to remove the terrazzo material, not the shoes. The diggers and fillers are doing exactly that, right now, at the northwest corner of Bldg. 878. At what cost? At what expense to the campus' esthetics? And only so people can continue to wear ridiculously hazardous footwear?

We already have to wear hard hats, orange vests, and substantial-toe shoes on construction sites, wear reflective vests on motorcycles, leave our iPods at home to jog along KAFB's roadways, remove cosmetics to work in a potential contamination zone, and remove jewelry to work with machine tools, so don't tell me Sandia doesn't prescribe what we can wear. Why not proscribe this next piece of hazardous gear?

A: Employees are required to wear clothes appropriate to the work environment. In addition, both employees and their managers should use good judgment. If certain shoes create a safety issue, they should not be worn in the working environment. Some common sense is required in this situation. *— Phil Newman (10300)*

Q: *Can anything be done about people who continue to park in carpool parking without permits? Half of the carpool spaces north of the cafeteria and north of Bldg. 887 are regularly used by non-carpoolers.*

A: The Protective Force has been issuing citations in the area you mention on a daily basis. Since the new parking regulations program went into effect, we have not had any repeat offenders ticketed in that area. Apparently employees aren't getting the message that we are serious about ticketing parking violators. We will continue to monitor this area. Please call the Security Desk Lieutenant at 844-3155 to report any parking violations and they will respond if an officer is available.

— Willie Johns (10322)
Sandia Traffic Safety Committee

Photo by Randy Montoya

American Indian Heritage Month

SANDIA PUEBLO Headstart traditional dancers kicked off the American Indian Heritage Month celebration at Hardin Field Nov. 3. Jingle dress dancers, traditional dancers of fancy shawl, and grass dancers were among others bringing a beautiful day to life.

American Indian arts and crafts and traditional foods were available. Florence Loretto (2112) prepared most of the food served to the more than 200 attendees.

For more information on upcoming events, see box at bottom left of this page.

Chris Cornelius goes from bagboy in grocery store to award-winning scientist/engineer at Sandia

By Iris Aboytes

Chris Cornelius (6338) says he was not much of a student in high school. He was one of the few Native American students in his school at that time. Chris recently received the Technical Excellence Award from AISES (American Indian Science and Engineering Society).

CHRIS CORNELIUS

"As my family grew," Chris says, "I aspired to move from bagger to cashier at our local supermarket. My store manager always told me that there were no openings, but he continued to hire from outside. This did not discourage me and with the help of an assistant manager I became a cashier. After training, I was the fastest cashier in Billings and people waited in my line for me to help them out. That was back in the days paper sacks were used."

With a growing family, Chris tried for a management position, but he realized that he would never be given an opportunity and decided he needed to change his path and attend college. He enlisted in the Army Reserve as an X-ray technician to qualify for the GI Bill so he could attend school. He continued working for the grocery store until he earned a summer internship and scholarship with the NORCUS (Northwest Colleges and Universities for Science) program at Pacific Northwest Laboratory. With AISES and NORCUS scholarships and with the help of the GI Bill, he never returned to his cashier job. He became a full-time student at Montana State University (MSU) and majored in chemical engineering.

Chris's interest and understanding of organic synthesis at MSU came from his work with Professor Bradford Mundy. He spent several summers synthesizing, purifying, and characterizing monomers in Mundy's lab. Chris' success in this area had Mundy calling Chris the guy with "magic hands" because he was able to synthesize a monomer a graduate student failed to do.

Chris worked for Dow Chemical for a year and a half before and after graduation. As a research engineer he was in charge of the development of polyolefin copolymers and terpolymers. He left Dow to work for the 3M company as a process engineer before deciding to go back to school.

He attended Virginia Polytechnic Institute and State University in Blacksburg, Va. Chris was the first Native American to graduate from both MSU's and Virginia Tech's chemical engineering PhD programs with honors.

Chris came to Sandia in July 2000 and has worked as a principal investigator in several technical areas. At Sandia he leads a team in the development of fuel cells for clean power. Chris is also doing research in improved water desalination and works on the development of new polymers and composites for myriad applications.

Realizing the importance of education, Chris volunteers in community programs that help minority students understand the importance of hard work, perseverance, and education. "I like students to know that they have a tremendous potential for success and only need to realize it," says Chris.

Last year Chris developed a class for high school students. The class, based on surface science, is taught through the use of bubbles, exploring the nature of why they are round.

AISES AWARD WINNER Chris Cornelius at work in his laboratory. (Photo by Chris Burroughs)

This course was put together for the American Indian Outreach committee with the goal to meet and teach area students by presentation, group instruction, and hands-on experience.

Chris and Theresa, his high school sweetheart and soul mate, have four children, Rachael, 22, Rebecca, 20, Sarah, 14, and Daniel, 10. Theresa is a Montessori school teacher.

Chris and Theresa were arm in arm as Chris received his award. It was an award that in reality they both earned — together.

FANCY SHAWL — A young girl is a study in concentration as she performs a traditional fancy shawl dance during festivities at Hardin Field. (Photo by Randy Montoya)

Activities during November ~ American Indian Heritage Month

Jemez Feast Experience

Sunday, Nov. 12, 8 a.m. to 4 p.m. Buses will transport at no cost up to 150 participants from KAFB to Jemez Pueblo and back (first come, first serve). Enjoy traditional dancing, feasting, and socializing with the people of one of New Mexico's 19 tribal pueblos. Contact Valerie Renner at 846-8840 to reserve your seat.

Annual Luncheon

Thursday, Nov. 16, 11:30 a.m. to 1 p.m. at the Mountain View Club. Arnold Herrera (Cochiti Pueblo) an accomplished drum maker, composer/singer, and teacher of culture to all audiences, will be the keynote speaker. Tickets for $8.50 per person are available from John DeBassige at 284-9693 or Marie Brown at 284-3171.