

SPRING BLOSSOMS — Sandia gardeners, from left, Wayne Breeze, Mark Locke, and John Bauer (all 4843-3) prune the fruitless plum trees lining F Ave in front of Bldg. 832. (Photo by Randy Montoya)

Research Quality Standards

Based on real-world case studies 4

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Initiative tackles large problems 5 ▶



Sandia LabNews

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DOE extends Lockheed Martin's M&O contract to manage Sandia

Note: At the beginning of this week, Labs Director Paul Hommert distributed the following memorandum to all Sandia members of the workforce.

Colleagues,

Today the DOE/NNSA made the determination that the Department will move forward with an extension of the Sandia National Laboratories contract for a period of two years with an option to extend for an additional year while NNSA prepares for a full and open competition of the contract. The current contract is set to expire on March 31, 2014, and will be extended one month to allow for negotiations. This is a positive development that offers stability for the Labs and the workforce, and I look forward to concluding the details of this arrangement in the near term.



PAUL HOMMERT

I will provide regular updates as additional details become available. Thank you for your continued focus on our mission work and your service to the nation.

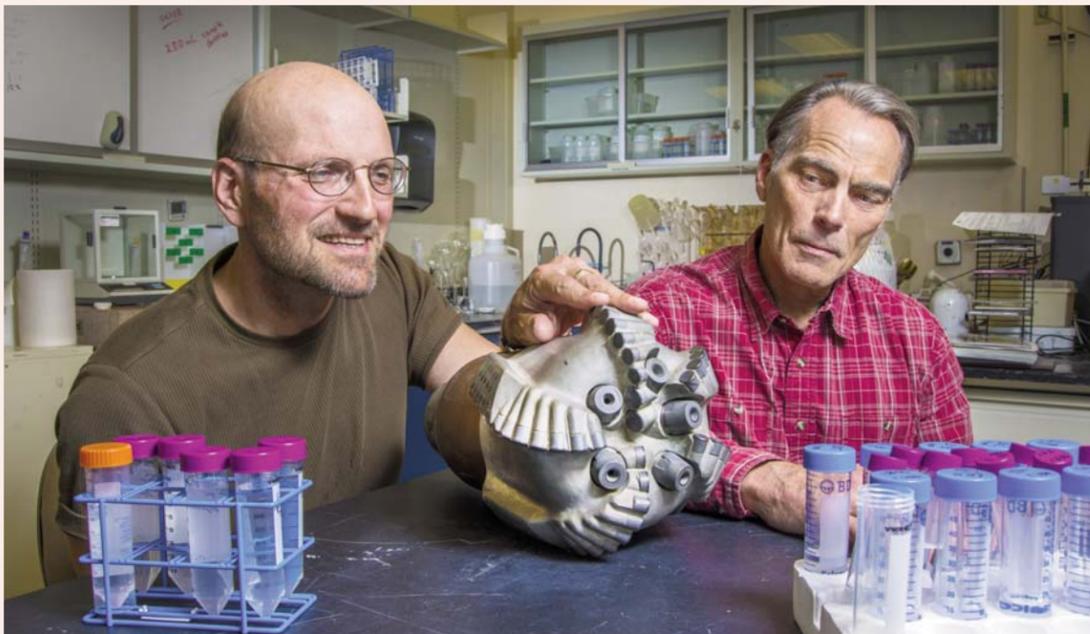
Regards,
Paul

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Drilling for answers

Sandia pioneers nuclear waste disposal techniques



PAT BRADY AND BOB MCKINNON look over a state-of-the-art drill bit used in deep boreholes. (Photo by Randy Montoya)

By Stephanie Hobby

This month, amid growing concerns over what to do about the nation's high-level nuclear waste, *Nature* highlighted a promising concept being developed by Sandia, and the idea could soon become a reality. Early indications are that the DOE Office of Nuclear Energy's proposed budget request for FY15 might include \$3 million to start a deep borehole disposal demonstration project.

Sandia's deep borehole disposal design is relatively straightforward: Using existing oil and gas drilling technology, drill a hole 17 inches wide and five kilometers deep in crystalline basement rock, line it with steel, and lower canisters of waste down into a stack two kilometers high. Finally, seal the top three kilometers of the hole with concrete and other

materials. Each borehole could store about 400 canisters of waste and all that would be left at the surface is a mound of concrete.

Every year, US nuclear power plants generate roughly 2,000 tons of high-level nuclear waste, and the federal government is obligated by law to find workable storage and disposal solutions. "Right now, that waste is sitting in temporary storage, but Sandia researchers estimate the current and projected inventory of spent commercial fuel from the existing reactor fleet in the US could be stored in fewer than 800 boreholes, and more storage could quickly be drilled as new waste is generated."

"Unlike a single mined repository that serves the entire US, boreholes are modular, so you could start

(Continued on page 4)

That's that

Talk about the iron chef! IBM, the brains behind Watson, the supercomputer that defeated the world's greatest *Jeopardy* champions a couple of years back, is turning loose its powerhouse cognitive computing system in an unlikely arena: the kitchen.

For its "Cognitive Cooking" project, IBM, working with four prominent chefs, created the world's biggest cookbook for Watson, "feeding" it tens of thousands of recipes and ingredient combinations from cuisines around the world.

Steve Abrams, director of Watson Life at IBM, says, "From reading that cookbook Watson has learned an awful lot about different ingredients that are often used in different cuisines, and the ingredients that are often paired together." Watson doesn't look at the ingredients as such, but at the chemical compounds of the ingredients. The computer basically says: "Aha, when human entities combine these ingredients they get a result that they say 'tastes good,' whatever that means."

Abrams says Watson has tested quintillions of ingredient pairings, coming up with some "interesting" dishes – a Belgian Bacon Pudding, for example, and an Austrian Chocolate Burrito with lean ground beef and two ounces of dark chocolate.

Hey, Watson, here's an idea from a people perspective: How about skipping the "Belgian" and the "pudding" parts and just serving up the bacon? Or holding the "ground beef" and "Austrian" portions of the so-called "burrito" and simply dish up a double dose of chocolate? Watson may be smarter than a fifth-grader, but he/she/it clearly still has a lot to learn.

This is all interesting stuff, right in line with an item I wrote last time about computers surpassing us by the year 2029. The trends definitely seem to favor the silicon set. But regarding the cognitive cooking project itself, I say, pshaw. My grandma, Granny Grace, discovered an infinite number of flavor combinations working just with the leftovers from Sunday dinner. And when she dished it up, you'd better well eat it . . . and like it. Or else. I never knew what the "or else" actually entailed. I was afraid to find out.

* * *

Do you follow baseball? If so, you may have heard that America's Pastime is piloting a major rule change this year, one that critics say will fundamentally alter the very nature of the game. Here's the issue: Hardly a game goes by that there's not a controversial call by an umpire that arguably affects the outcome of the contest. A close play at home. A missed tag at second base. A ball trapped instead of caught outright. The umpire calls them as he sees them and his word is law. Like the "letters of transit" in *Casablanca*, an umpire's call cannot be rescinded. Or even questioned. Not by a manager, not by a league official, not even by a fellow umpire. In the movie *Gettysburg*, Col. Joshua Chamberlain says, "There's nothing so much like a god on earth as a general on a battlefield." Of course, he said that before he saw a big league umpire in action.

Anyhow, because of a handful of patently wrong calls in big games over the past few years – and fans' predictable outrage – Baseball has finally bowed to long-standing pressure and will allow limited use of instant replay this year. A manager is allowed one challenge per game. If your first challenge is upheld, you get a second challenge, but never a third. There's a bit more to it, but that's the basic idea.

A couple of thoughts: As a lifelong student of baseball, I would argue that a human umpire, Coke-bottle glasses and all, is part of the fabric of the game, like the rain and the wind. Sure, they miss some calls (though far fewer than you might think), but they know when they've blown it. I'm convinced that on the field, umpires follow unwritten rules to balance the scales of justice wherever they can. And there's this: If replays are a good idea, why limit them? This half-measure either goes too far or not far enough and thus, as with most half-measures, won't make anybody happy. And really!? Does baseball need to add yet more minutes to a game that already takes twice as long to complete as it did a century ago, and 25 percent longer than it did just a generation ago? I don't think so. And I'm a fan.

Finally, I absolutely guarantee that no matter what kind of technical fixes, tweaks, and refinements they add to the rules of the game, fans of the losing team are still and always gonna say "We wuz robbed!"

See you next time.

– Bill Murphy (505-845-0845, MS1468, wtmurph@sandia.gov)

Sandia pair honored by Travis AFB

By Mike Janes

Michele Clark (8005) and Heather Egtervanwissekerke (8511) have been awarded a special commendation in recognition of their efforts through Sandia/California's Military Support Committee (MSC) to assist enlisted families in need at Travis Air Force Base (AFB). Michele is the chair of the MSC.

The award ceremony took place on March 8, with Brig. Gen. John Flournoy Jr. and Command Chief Master Sgt. Cameron Kirksey making the presentation.

"Air Force Reservists could not accomplish all they do without the incredible support of our community partners such as those at Sandia Labs," said Gen. Flournoy.



BRIG. GEN. John C. Flournoy Jr. (center left), 4th Air Force commander, presents a US flag to Heather Egtervanwissekerke, in blue, and Michele Clark of Sandia's Military Support Committee at the 945th Aircraft Maintenance Squadron, Travis AFB. The flag, which was flown over Afghanistan on a US Air Force C-17 Globemaster III, was presented in appreciation of Sandia employees' support to the Air Force Reserve squadron during a recent deployment.

(Photo courtesy U.S. Air Force / Lt. Col. Robert Couse-Baker)

Michele and Heather spearhead the Basket Brigade, an annual event organized by MSC. The Basket Brigade delivers turkeys, potatoes, canned goods, and other necessities to struggling service members and their families at Travis AFB during the holiday season. The committee expanded its reach this past year, collecting and delivering about 80 baskets of goods to Travis AFB, the 143rd Field Artillery Regiment in Walnut Creek, Calif., and the Camp Parks Reserve Forces Training Area in Dublin, Calif.

The Basket Brigade's efforts are patterned after the Tri-Valley Basket Brigade, a Thanksgiving food drive that delivers food and clothing items to families in need throughout the region. Reese Ramos (30) and his wife, Katherine Havener, are the founders and organizers of the Tri-Valley Basket Brigade.

Lending a hand to the military community

MSC encourages all employees to create and foster a military-friendly community and culture that supports Sandia's mission. The group supports veterans, active military personnel, guardsmen, and reserves, along with Sandia's own non-military employees who have deployed family members.

"Many families in the military community struggle economically, especially when the enlisted member is deployed and away for long periods," says Michele, a former Critical Care Air Transport Team (CCATT) respiratory therapist who once served at Travis AFB in the 349th Air Staging Squadron. "This is very personal to me."

Heather's spouse and four children assist with the effort even though they don't have a direct military connection. "Sometimes people forget about the service members' families, and it's hard to see them struggle," she says. "Our military service members make very significant sacrifices that should never be forgotten."

Stephanie Beasley (8521), the community relations officer for Sandia's California site, adds, "Much like its legacy of providing excellent service in the national interest, we bring this same dedication and expertise to our local communities. Our employees and retirees give generously, help where needed, and strive to inspire the next generation of scientists and engineers. From donating meals, assembling care packages, or helping to build Habitat for Humanity homes, Sandia employees are passionate about serving our military and veteran families."

The MSC at Sandia's New Mexico site sponsors a variety of activities to engage veterans inside and outside Sandia. "Our main mission is to promote a culture of being military-friendly to enhance the appreciation of our veterans on staff, potential new hires, and veterans in general," says Jody Thomas (2995), a member of the Sandia/New Mexico committee. "We want to show how valuable veterans are to the Sandia workforce."



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Labs' human subject studies work having impact on airport security

By Mike Janes

When people think about Sandia's impact on homeland security, they probably think about breakthrough tools and technologies such as explosive detection devices, chemical and biological countermeasures, border security, and nuclear and radiological security systems.

But, quietly, Sandia has developed a capability in human subject studies that is turning into a game-changer, too.

That's right: human subject studies. That line of work, says Ann Speed (1463), includes disciplines such as cognitive psychology and cognitive neuroscience that might seem foreign to the Labs' engineering-rich landscape and culture. There are two cognition departments at Sandia, 1462 and 1463, that together have 22 technical staff members with expertise in cognitive psychology, neuroscience, and computer science.

"Sometimes, we Sandians seem to want to engineer people right out of the equation," says Ann, who earned her PhD in cognitive psychology from Louisiana State University. "But more and more around the Labs, people are starting to realize that the human element can be just as important as the hardware, software, or engineering."

TSA projects focus on supervisor pressures, image resolution

Ann's Sandia work has largely been funded since 2009 by the Department of Homeland Security's Transportation Security Administration (TSA), with other funding coming from DHS's Science and Technology (S&T) directorate.

In the 2009-2010 timeframe, Ann's now-colleague Andrew Cox (8116) spearheaded a multi-screener experiment that analyzed the effects of transportation security officers (TSOs) getting advice from expert TSOs on the threat status of carry-on bags. Ann led the experiment and was subsequently tapped for a follow-up project that independently manipulated supervisor emphasis on either accuracy or throughput as well as image resolution of screened baggage, and the impact of each on TSOs' decision-making. The study focused on the question of whether higher resolution reduces the effects of supervisor pressures on TSOs by helping them in the certainty of their decisions.

More specifically, the study asked how such pressures influence a TSO's decisions. Does the supervisor stress speed and quantity of passengers and baggage screened? Or is he or she more concerned with accuracy of found threats? With image resolution, the questions are similar: How do the varying degrees of image resolution affect the decisions being made by TSOs charged with detecting threats? Does image resolution slow activity at the X-ray station? Does it improve accuracy?

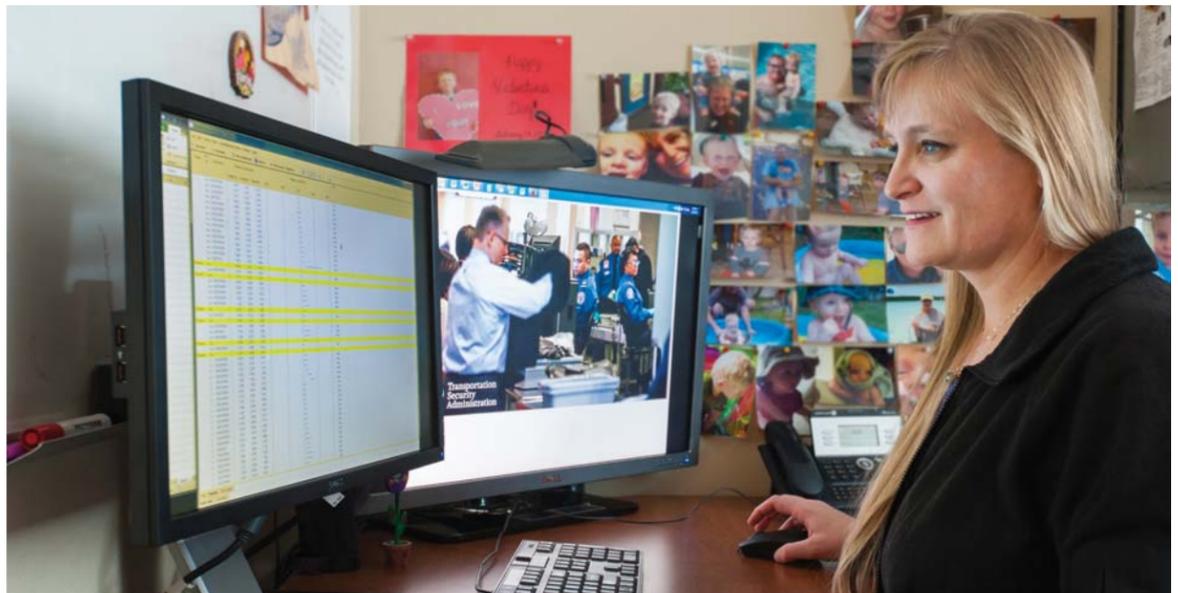
The most recent project Ann and Kiran Lakkaraju (1462) completed for TSA is known as the "lane changing" study, which focused on impacts on threat detection when TSOs are asked to switch between the pre-check (indicated by TSA as TSA Prev) and standard passenger lanes. TSA Prev lanes, introduced only recently by TSA, speed throughput considerably since approved TSA Prev passengers are not required to remove shoes or items from their carry-on bags.

"The interesting question, the one we were asked to examine, was what does it do cognitively to a TSO when he or she switches from the TSA Prev lane back to the standard lane, and vice versa?" says Ann. "We know that expectations have an impact on how people make decisions, and that the actual rate of target items in a sample can also impact decision making. So we designed an experiment to independently test the effects of expectations and threat rates."

Though she can't reveal any details from the TSA lane-changing study, Ann says a subset of mitigations for what was found are likely going to be rolled out to airports across the country. "It's really exciting to know that your work has had that kind of impact," she says. Her earlier work on TSA supervisor emphasis informed some of those mitigations.

Data, data, and more data

The bread and butter of human subject studies is data. As she does with all of her TSA projects, Ann used several computers loaded with software that allowed her to present about a thousand images of baggage to the TSA officers, images captured by actual Smiths



THOUGH SEEN HERE looking at data on a computer, Ann Speed (1463) actually spends much of her time studying humans. A cognitive psychologist by training, Ann's work is aimed at quantifying human behaviors, an expertise highly valued — and funded — by the Department of Homeland Security's Transportation Security Administration. (Photo by Randy Montoya)

Detection AT-2 X-Ray scanning machines used at airport checkpoints. The experiments, performed with between 30 and 200 TSA officers, involve statistical analyses of how effectively the officers identify prohibited items found in some of the images.

"This kind of data collection and analysis can tell us how officers are making their decisions, how accurate they are, and what the rate of false alarms is," Ann says. "We're capturing and analyzing their responses and decision times in different operational environments. In the end, the data inform us and our customer about the factors that impact officers' accuracy."

The work, Ann adds, was — and is always — reviewed and approved by Sandia's Human Studies Board (HSB), by TSA officials, and even by the DHS privacy office.

The success of the previous work has led directly to additional TSA-funded efforts, including a current project that explores how long TSOs can look at scanned images before their performance starts to degrade due to fatigue or other factors. Another project aims to understand the attributes TSOs bring to the table prior to training that may influence their ability to perform duties other than the X-ray interrogation of bags.

"TSOs serve many purposes, each of which requires different kinds of communication skills," says Ann. "For instance, there are duties like communicating with passengers about things to divest [laptops, liquids] and communicating with passengers in the event a pat-down is required. They also need to possess the ability to keep passengers calm and compliant while performing the tasks required by the standard operating procedure."

"This work is unusual for Sandia, but the fact is that we're very good at quantifying human behavior," says Ann. "Scientists have been doing this for 150 years and have learned a lot about human behavior and how to measure it. We don't need to put a person in an MRI machine to understand how the brain is producing the behaviors it's producing." Instead, she says, psychologists regularly design and execute experiments that offer scientific insight into various behaviors and how they come about.

"They [the experiments] do have to be pretty clever, though," Ann reminds us. "Humans are thinking beings who will try to outsmart one another, so we have to be careful about experiment construction and the different variables that go into them. Even the instructions we give subjects can alter the outcome of a study."

In addition to the increased level of attention that TSA is giving to Sandia in this area, Ann says other organizations have taken notice as well. The Labs recently signed a memorandum of understanding with the Paul Allen Institute, for example, and continues to develop relationships with the Department of Defense and others.

It's also worth noting, Ann says, that all of the Labs' program management units (PMUs) have funded human subject studies at some level, either as LDRDs or as work-for-others. "Many decision makers across the Labs recognize the ubiquity of the human dimension to our national security missions," she says.

Sandia California News

An external advisory board made up of distinguished scholars, cognition scientists, and others has repeatedly acknowledged that Sandia has a differentiating capability in this area.

"There is no other place that can do what Sandia can do in the area of human decision-making in high-consequence threat scenarios," Ann asserts. "We are it."

A multidisciplinary, science-based approach

Addressing problems in novel ways for a complex organization like TSA requires a multidisciplinary approach, Ann Speed (1463) points out. Fortunately, the cognition groups at Sandia feature a mix of science-based talents that makes it all possible.

The group's current body of work includes important contributions from quantitative psychologist Glory Emmanuel (1462), industrial-organizational psychologist Robert Kittinger (1463), and computer scientists David Stracuzzi (1462), Derek Trumbo, and JT McClain (both 1463). In addition, the Labs' International, Homeland, and Nuclear Security (IHNS) Program Management Unit has funded a three-year LDRD that is using TSOs as one of the subject pools on exploring characteristics of expert visual searchers. Team members on that project include cognitive psychologist Laura Matzen (1463), physicist and biological signal processor Michael Haass (1463), engineer and cognitive neuroscientist Austin Silva (1462), cognitive neuroscientist Mike Trumbo (1462), cognitive neuroscientist Kristin Divis (1463), and systems analyst Andrew Cox (8116).

"Interestingly, the kind of data we are collecting are also unique from a scientific perspective," says Ann. The vast majority of the work done on visual search typically uses undergraduate students (i.e., novices) and basic visual search tasks, she says. Thus, the incentives, motivations, and pressures TSOs experience are not factored into the findings in the peer-reviewed literature.

"Sometimes what we find directly contradicts what the open literature tells us about visual search — which indicates that visual search success is impacted by things that can't easily be replicated in the laboratory," Ann says.

Unfortunately, it is often not possible to publish the TSA work because of the security vulnerabilities revealed. Thus, Ann is working to help TSA bring academic researchers into the fold more closely so that they can benefit from the knowledge gained by sensitive studies. The hope is that they can then attempt to more closely replicate the conditions TSOs experience in the operational environment.

Research Quality Standards make positive impact on Labs

By Chris Miller

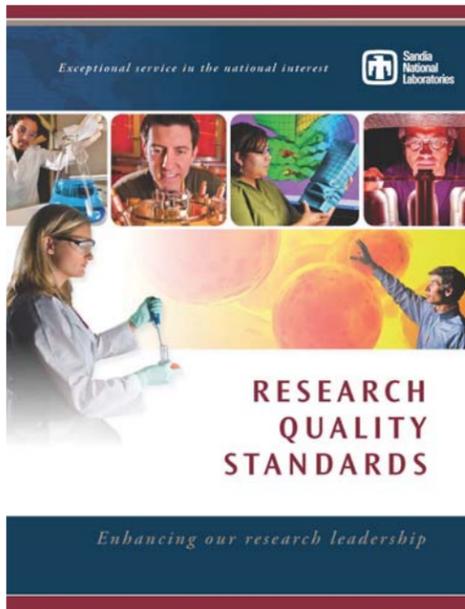
When Sandia researcher Katrina Groth (6231) first saw Sandia's new Research Quality Standards document, she immediately welcomed it with open arms.

"I've been at Sandia for only a couple of years and the standards document was suddenly like having 30 years of mentors," says Katrina, who conducts risk assessment for hydrogen fuel cell infrastructure and nuclear power plants. "It's an incredibly useful document. I've sent it to many of my colleagues at Sandia."

Longtime Sandia researcher and mentor Laura Swiler (1441), who alerted Katrina about the document, says she likes the way it presents useful information using short, interesting vignettes. "It definitely has a Sandia focus to it."

What distinguishes the Research Quality Standards from a typical compliance document is its tone and readability. "The standards are best practices, not a step-by-step set of requirements," says Mike Daily (1740), a defect-prevention expert who with Sandia Fellow Jerry Simmons led the Research Quality Standards Development Team.

The team, consisting of a number of senior managers, managers, and technical staff, was created after Div. 8000 VP Steve Rottler, then serving as Sandia's Chief Technology Officer, chartered the effort to develop a research quality standard for Sandia. The team



researched and wrote the document over nearly a year.

Standards approved in February

The Laboratory Leadership Team approved the standards in February after they had been adopted by the Research Leadership Team, composed of Sandia's Chief Technology Officer (CTO) and directors of the Labs' research centers and Program Management Units, and by Div. 1000.

"This [Research Quality Standards] team thought deeply about the issues that have arisen regarding research quality at Sandia and the kind of standard that would be most helpful in clarifying our expectations," says acting Div. 1000 VP Duane Dimos. "Ultimately, they developed a standards document based on real case studies that address key research quality issues."

Acting Div. 7000 VP and CTO Julia Phillips says she's eager to have the document distributed and read. "I encourage everyone in Sandia's R&D community to read the document and to discuss its content with colleagues," she says. "The standards are not only highly readable, they will help ensure we continue to meet our own demanding expectations and those of our customers."

The document consists of 50 case studies that present, in story form, examples of behaviors that lead to either good research outcomes or bad ones. The case studies are based on real events at Sandia, but details have been changed and names omitted. The case studies cover each of the six phases of research, from planning

One of the 50 case studies . . .

Peer reviewing the work of a well-known researcher

A new staff member was assigned to review the contract work of a well-known university professor who also happened to be the chair of an external review panel. The new staff member was chosen because his research was the closest to the research performed under the contract. His director had been funding the professor for several years.

As a new staff member, he tried to review the proposal fairly but found several problems with the work. When he brought his findings to his director, the director questioned the staff member's review and was uncomfortable bringing the possible mistakes to the attention of the professor. Although pressured to soften his critique, the new staff member held his ground. The director insisted that the staff member fly out for a one-on-one with the famous professor with the director acting as referee. The new staff member felt somewhat intimidated but worked very hard on keeping his interaction professional and focused on the technical issues. The professor was initially defensive but quickly grasped and conceded the issues the new staff member was raising.

A few years later this same professor asked the staff member to join his editorial board for one of the prestigious journals in their field. He was the youngest member of the team and was sure this resulted from the careful but respectful way he handled the critique of the professor's contract.

Moral of the story

You can maintain your integrity, provide critical reviews, and still be successful as long as you handle it respectfully and professionally. In fact, doing so just may open up opportunities that may not have been afforded you before.

and initiating the research to delivering prototypes.

The Research Quality Standards Development team began its work by looking at existing materials on quality standards for research offered by the American National Standards Institute and National Academies.

"After studying these documents and discussing how they apply at Sandia, the team created a list of things we believed our staff should be aware of to be successful in their research careers," Mike says. "We then created the case studies to address each issue."

Adds Jerry, "Sandia has a great tradition of conducting high-quality research. The Research Quality Standards should serve to perpetuate our strong research culture by sharing lessons learned."

Team member Carol Sumpter (1740) interviewed Sandians for each of the document's 50 case stories and served as its principal editor.

The standards are written in a tone that's both instructional and engaging, giving it greater appeal to new research staff and making it ideal for seasoned researchers to use as a mentoring tool.

"I think the standards are helpful and I like the case-style format," says Troy Savoie (1557). "Clarification on issues specific to conducting research at Sandia — legal, review and approval, LDRD, and so on — is where the standards provide the most value."

The Research Quality Standards are posted on Sandia's Office of the CTO website.

Borehole

(Continued from page 1)

storing waste in a matter of months, and could do it around the country, perhaps at the site of nuclear power plants, which would reduce transportation costs," says Pat Brady (6910) who led a three-year LDRD project for further study of deep borehole disposal.

Sandia researchers say deep boreholes could also be an option for disposing of other high-level radioactive waste that meets the size restrictions. For example, nearly 40 percent of the total radioactivity at DOE's Hanford Site is concentrated in fewer than 2,000 capsules of cesium and strontium salts, separated from reprocessing wastes during the 1970s and 1980s. Each capsule is less than 9 centimeters across and less than 56 centimeters long, so potentially, a single deep borehole could dispose of all of Hanford's waste.

Proponents of the concept say it's permanent, more cost effective, more flexible, and more secure than other available options, and is immune to surface effects, such as water movement and climate change. Furthermore, waste stored at that depth is virtually inaccessible, since only a drill rig could access the canisters, and malicious activity could be spotted by satellite.

Andrew Orrell (6100), former director of Sandia's Nuclear Energy and Fuel Cycle Programs, has two decades of technical and managerial experience supporting both Yucca Mountain Project and the Waste Isolation Pilot Plant. He knew that Sandia had the capacity to lead the nation's discussion on the growing problem of waste disposal, and in 2009, met with Pat, Peter Swift (6220), Bill Arnold (6224), and a few others to discuss

"Deep boreholes allow us to design a disposal system that should be faster, cheaper, and better performing."

Andrew Orrell, director of Energy Technologies and System Solutions Center 6100

further study of deep boreholes and asked the team to produce the first performance analysis of the deep borehole disposal concept, which eventually led to the three-year LDRD. Sandia researchers formed collaborations with the University of Sheffield in England and MIT, which were instrumental to how well the analysis was received. "The team took on the challenge and produced a pivotal report that set the stage for enthusiastic discussions among the waste management community, in the US and abroad," Andrew says.

An engineered solution

He says one major advantage of boreholes is that they can be engineered, which avoids the costly and time-consuming task of characterizing imperfections found in a natural setting such as a mountain. "The US invested heavily in Yucca, and one third of that spending went to site characterization of a complex natural system. That's more than the GDP of some countries that have nuclear waste, so we need to find a solution offering high-confidence isolation that can be developed faster and at less cost" Andrew says. "Deep boreholes allow us to design a disposal system that should be faster, cheaper, and better performing."

In January 2012, with Yucca Mountain essentially off the table and Sandia's LDRD wrapping up, the Blue Ribbon Commission on America's Nuclear Future recom-

mended further study of Sandia's deep borehole disposal design. DOE subsequently invested more than \$2 two million in Sandia and its partners to continue studies and develop a full-scale demonstration project.

The team has studied ways to overcome such technical obstacles as how thermal, mechanical, and chemical processes control borehole stability and fluid transport at 5 km depth. In particular, Sandia scientists had to show that the seals would remain intact over a million years.

Peter Swift is the national technical director of DOE's Office of Nuclear Energy Used Fuel Disposition program. DOE is looking at four options as feasible alternatives: mined repositories in crystalline rock, mined repositories in salt, such as WIPP, mined repositories in clay or shale, and deep borehole disposal. "Sandia's LDRD really did go after the major questions short of testing a demonstration, which is the next step," Peter says. "The confidence that it's safe long term will come from a good understanding of material properties at that depth and the behavior of the seal systems installed. We're also relying on smaller-scale experimental work and modeling studies."

Since the initial DOE funding for further study, Sandia received an additional \$400,000 to design a borehole demonstration project, which is under consideration by DOE for implementation. In addition, DOE has provided \$850,000 per year for Sandia's partner MIT through a competitively awarded Nuclear Energy University Programs three-year grant.

"People have been talking about boreholes for the past 30 or 40 years, but nobody has actually done it, so we wanted to provide the technical basis to allow this to be one of the options for consideration," Pat says, adding that given approval by DOE, work on a demonstration in the US could start as early as a year from now.

Research challenges

By Sue Major Holmes and Neal Singer

Sandia has rolled out three more research challenges, the latest in a string of complex, difficult national security-related research problems the Labs has decided to tackle.

All the challenges share general characteristics. Among other things, they break down barriers based on organization, geography, or discipline by bringing together broad, multidisciplinary teams; the expertise needed ranges from fundamental science to applying technology; and the work has a long life — even up to a couple of decades — but shows a measureable impact throughout that span, acting Div. 7000 VP and Chief Technology Officer Julia Phillips said in introducing the latest challenges in a Feb. 27 forum.

The work also must leave behind a science and engineering legacy for the Labs. “That may be in the tools that we develop, that may be in the hearts and minds of the people in terms of the knowledge that they have as well as the experience they gained from working together on these very large efforts,” Julia said.

The newest challenges to launch, “Resiliency in Complex Systems,” “Science and Engineering of Quantum Information Systems,” and “Revolutionary Approaches to the Stockpile,” join seven others introduced since June 2013. Those are “Beyond Moore Computing,” “Data Science,” “Trusted Systems and Communications,” “First to High-Yield Fusion,” “Engineering of Materials Reliability,” “Detection at the Limit,” and “Cyber Resiliency.” Two additional challenges will begin later this year.

Julia outlined what each challenge needs to become mature, and urged Sandians to attend subsequent workshops, each focused on a particular research challenge, to help focus and guide the challenge that interests them.

Resiliency in Complex Systems



RICHARD GRIFFITH

Senior manager Richard Griffith (6130) said Sandia has studied numerous complex systems for national security for more than a decade, but “Resiliency in Complex Systems” will focus on three key areas: the nation’s energy infrastructure, nonproliferation, and terrorist system networks. The real test will be to understand, quantify, and control the resiliency of those systems, he said.

The goal is to make sure the energy grid functions “in the face of everything that can happen” and can rapidly recover from damage or disruption, Richard said. On the other hand, the research challenge is targeting proliferation and terrorism systems to understand what decreases their resilience and ability to recover, he said.

He appealed to people across the Labs to join the team, calling for expertise in every field imaginable: data calibration and evaluation, computer science, neuroscience, mathematics, engineering, plasma physics, biology, ecosystems, computational psychology, and more.

“It’s a very broad and challenging effort that’s really going to require all of the disciplines represented at Sandia coming together,” he said.

Sandia is in a position to tackle the work because of its pioneering research in complexity theory-based analytics for national security problems; world-class, multidisciplinary research teams; and unique access to both open source and classified data, Richard said.

“Useful, quantitative metrics around resiliency are really at the heart of being able to control any system,” he said. “If you cannot measure it in a quantitative way and express it in a quantitative way, you can’t really control it.”

The US has a great deal of data on its energy infrastructure, but doesn’t have nearly as much hard data on proliferation or terrorist systems, he said.

“So when I stress useful, quantitative metrics, I’m

also talking about metrics that can be evaluated given the data we have, addressing the level of uncertainty that we have, and addressing the fact that we’ll always have missing data in the understanding of those systems,” Richard said.

Science and Engineering of Quantum Information Systems



GIL HERRERA

Using a tag-team approach, directors Gil Herrera (Microsystems S&T Center 1700) and James Peery (Information Systems Analysis Center 5600) explained the research challenge titled “Science and Engineering of Quantum Information Systems (SEQIS).”

Gil, who spoke first, said that the goal of SEQIS is to synthesize the quantum physics that underpins semiconductor microelectronics and photonics hardware with information theory to develop information technologies, sensors, and communication systems based on quantum entanglement.

“The excitement in quantum is warranted,” he said. “We have a pretty broad team that already spans four divisions and nine centers, but we also invite those of you in the audience to join us. All we ask is that you bring your best ideas unconstrained by convention.”

Quantum information theory provides a framework for quantum devices to sense, process, and communicate.

“Resiliency a big challenge,” Gil said. “How do you deal with a stochastic computer and make sure the information is accurate?”

Aims of the challenge are to develop entanglement-enhanced sensors that surpass the state of the art, advanced information storage and processing devices, and to establish long-distance secure communication protocols that leverage unique quantum information-disturbance relationships.

He mentioned three outstanding Sandia capabilities that apply to the quantum challenge.

MESA, he said, consists of “a couple of fabs, hundreds of labs, and a thousand people” who, teaming with scientists and engineers across Sandia, solve difficult technical challenges like building ion traps.

CINT, also part of the challenge and an important partner to the process, said Gil, “can place individual ions exactly where we want, with sub-nanometer precision.”

Third, Sandia maintains world-class computing facilities, and has world-class researchers with expertise in the design of novel architectural systems.

In addition, he said, these capabilities are backed by “our ability to demonstrate to our customers and government sponsors that we are responsible stewards in maintaining a unique research environment.”

In establishing Sandia’s bonafides to pursue the quantum information challenge, James mentioned Sandia’s experience in creating a MESA-based ion-trap foundry for IARPA, the Labs’ research into qubits and quantum computer architectures, and three LDRD Grand Challenges: QIST, for exploring silicon-based qubits; Aquarius, for researching adiabatic quantum applications; and SECANT, for advancing quantum-based secure communications.



JAMES PEERY

“This represents about a \$40 million LDRD investment,” he said. “I will assert that no other lab, federal or private, has the capabilities Sandia has established in pursuing quantum information sciences.”

He went ahead to list a variety of high-level goals. “We’re interested in developing and maturing quantum information devices,” said James. “And then, we want to integrate these devices into functioning quantum systems for our national security customers.

“We want to achieve the perhaps audacious goal of being the national lab the US government turns to for the engineering of quantum information systems. We want to lead in understanding and mastering the theoretical physics involved in these technologies. We want to overcome the significant challenge of maintaining quantum coherence in a physical device.”

The SEQIS 10-year roadmap will focus on few qubit devices, he said. “We’re interested in applying algorithms and protocols and executing applications on these devices. [But] we’re a long way from doing this on many qubits; to date we have only achieved a one-qubit computer.”

He assured his audience several times that there are many challenges remaining.

Revolutionary Approaches to the Stockpile

Deputy Chief Engineer for Nuclear Weapons Gary Sanders (2200) outlined the history of nuclear weapons work in the US and Sandia’s vision for the stockpile of the future in “Revolutionary Approaches to the Stockpile.”

Gary also asked for every part of the Labs to get involved in the challenge.



GARY SANDERS

Nuclear weapons are Sandia’s core mission and the initial foundation of many of its other missions. Gary noted that President and Labs Director Paul Himmert has stated: “If we fail at our NW mission, we fail as a lab.”

Gary outlined the history of the nation’s stockpile, from a rapid increase in weapon system types developed and fielded through the 1950s and 1960s, to the growing awareness and revolutionary approaches to safety, and evolutionary changes in weapon designs as the number of separate systems dwindled in succeeding decades. Then he focused on the technology challenges of the future stockpile.

With the national discussion about nuclear weapons focused on rising costs for fewer weapons, scientists and engineers must ensure a thorough understanding of how weapons age and what that means for reliability in a smaller stockpile in which the current average age of US weapons is approximately 27 years.

“We cannot afford nuclear stockpile maintenance and evolutionary modernization the way we have been doing it,” Gary said. “So therein comes our biggest challenge for our revolutionary approach to the stockpile: How are we going to do this in an affordable, more effective way, given all the technologies we now have?”

The current stockpile has elements of what Gary called “modularity,” or integrating common components across the stockpile. In the near-term, there will be evolutionary options, with more adaptable non-nuclear subsystems. “Adapted, not necessarily different,” Gary stressed.

But the stockpile of the future requires “bold, game-changing approaches” in design, qualification, manufacturing, and surveillance that are still cost-effective, he said.

Those include ideas such as common adaptable architectures that could reduce future development risks with shorter cycle time and lower costs, and new approaches in everything from surveillance to additive manufacturing to computational simulation modeling.

“Sandia is the weapons system integrator” that ensures weapons are designed and qualified to provide maximum reliability and surety at the best value, Gary said.

OUTWARD BOUND

Stories by Nancy Salem

For two decades, Sandians have been able to leave the Labs to start or join small companies knowing they can return, or not. Their work has made a difference. The Entrepreneurial Separation to Transfer Technology (ESTT) program has brought Sandia expertise into the private sector, created jobs, and contributed to economic development, a new survey shows.

"This is an innovative tech transfer tool that has endured for 20 years," says Jackie Kerby Moore, manager of Technology and Economic Development Dept. 7933. "Not only do we have many success stories, but we've measured the economic impact, which shows positive benefits to the local community. Furthermore, entrepreneurs who return to Sandia have a new set of experiences that benefit the Labs."

Take a license, form a company

Thirty-three of the 99 companies involved in ESTT since it was launched in 1994 responded to the survey gauging its economic impact. Respondents said 379 jobs were created by their companies through the program since it began, and that in 2012 they employed 1,550 people at an average annual salary of \$80,000. Their 2012 sales revenue was \$212 million. From 2008 through 2012, the businesses invested \$40 million in equipment and \$277



GENARO MONTOYA (7933), ESTT program leader, says a new round of business training is coming up. (Photo by Linda von Boetticher)

million in goods and services. Two-thirds of them had commercialized a technology as a result of ESTT.

"These are notable numbers and reflect just a third of the companies affected by the program," Jackie says. "ESTT is a tool Sandia has to deploy technology by giving people an opportunity to take a license and form a company. Four startups using Sandia technology licenses came out of the program in the past two years alone, along with a number of company expansions. Of these, three licensed technologies from Sandia."

Jackie says one of Sandia's hottest technologies, the medical diagnostic lab-on-a-disk SpinDx, is being commercialized using ESTT. Greg Sommer, a former Sandian who helped develop SpinDx, co-founded and is chief executive officer of Sandstone Diagnostics in Livermore, Calif., which is bringing the technology to market. "The high-tech environment at Sandia is ripe for innovation and game-changing technologies," he says. "The ESTT program allowed us to launch Sandstone and develop cutting-edge medical products based on technology we originally developed for Sandia's biodefense missions."

ESTT encourages researchers to take technology out of the Labs and into the private sector by guaranteeing them reinstatement if they return within two years, and a third-year extension can be requested. The survey shows 145 Sandians have left on ESTT, 62 to start a business and 83 to expand one. Forty-one, or 28 percent, returned to the Labs while 98 left for good. Six are currently on ESTT. Of the 99 companies impacted by the program since 1994, 49 were startups and 50 were expansions.

Of the 145 Sandians who left on ESTT, 27 companies licensed a Labs technology.

More entrepreneurial training

Genaro Montoya (7933), the program leader, says a new round of entrepreneurial training will be offered to support researchers considering ESTT. "Anyone at the Labs can take the training," he says. "It gives you an idea of what's involved in starting a small business. We want people to show up and be a part of it."

Classes, scheduled to begin in early April, will be offered by Technology Ventures Corp. in partnership with Technology and Economic Development Dept. 7933. Topics will focus at first on intellectual property, market validation, and capital sourcing. "You can expect to come away knowing how to protect IP, establish customer demand, and find and engage with sources of financing. Those skills reduce risk and increase chances for success," Genaro says. "In previous training, Sandia employees wanted to learn how to organize and finance a business to commercialize Sandia technology. We're really excited about taking key components of the training to a deeper level."

Looking back at 20 years, Jackie says ESTT has been an important piece of Sandia's tech transfer and economic development portfolio. "It is still relevant, and has a lot of life ahead," she says.

Where Are They Now?

Catch up with four Sandians who took the entrepreneurial plunge

Entrepreneurial Separation to Transfer Technology (ESTT) lets qualified Sandians leave the Labs to start or help expand a small technology-based business. They are guaranteed reinstatement if they return within two years, and a third-year extension can be requested. Since the program began in 1994, 145 people have left on ESTT; 41 returned, 98 did not, and six are currently out. Here are two who came back to Sandia and two who stayed in the private sector.

Todd Christenson: A small world

Todd turned his Sandia research into a company that today makes the world's smallest electromechanical switches. He came to the Labs from the University of Wisconsin in 1995 to work in components. His interest was using metal microfabrication to maintain tolerance in mechanical components at small dimensions.

He worked five years with a group that did microelectromechanical systems, or MEMS, for safety and security mechanisms. He later worked in optics, photonics, and electronics, which fit his background in semiconductor physics.

Todd says he was drawn to ESTT because there wasn't a MEMS technology in the marketplace for good miniature switches. And there wasn't one that could make MEMS with high aspect ratio processes. "Those are two distinctive features of the technology our company uses," he says. "Fabrication is based on metal materials versus semiconductor materials like silicon. And the structures have a relatively large thickness compared to the processes used in fabricating MEMS."

Todd left on ESTT in 2003 and formed HT MicroAnalytical Inc., licensing Sandia technology. "I wanted to make and sell product," he says. "The entrepreneurship path that Sandia offered was appealing and the time was right."

He went to the angel markets and got startup capital, and brought in a business partner. They built a prototype facility and put product demos into customers' hands. "That built traction

and attracted strategic funding from companies that wanted specific devices using the technology," Todd says.

HT MicroAnalytical has 15 employees and is growing. It partnered a year and a half ago with Rosenberger Inc. of Germany, a MEMS switch manufacturer with a global marketing and distribution network, and built an 18,000-square-foot facility in Albuquerque that can produce about 20 million parts a year. A distribution partnership was formed recently with Coto Technologies of Rhode Island.

HT MicroAnalytical sells to commercial and military customers worldwide. "They range from the medical industry to classic industrial automation," Todd says. "It's been hard work, but I never looked back. This was what I wanted to do, to apply technology to help people solve problems."

"If you have a passion to get into the marketplace, to build companies, and employ people, the ESTT path is the best I know of."

Todd says he continues to work with Sandia researchers through the New Mexico Small Business Assistance Program, which helps small companies get technical support from scientists at Sandia and Los Alamos national laboratories.

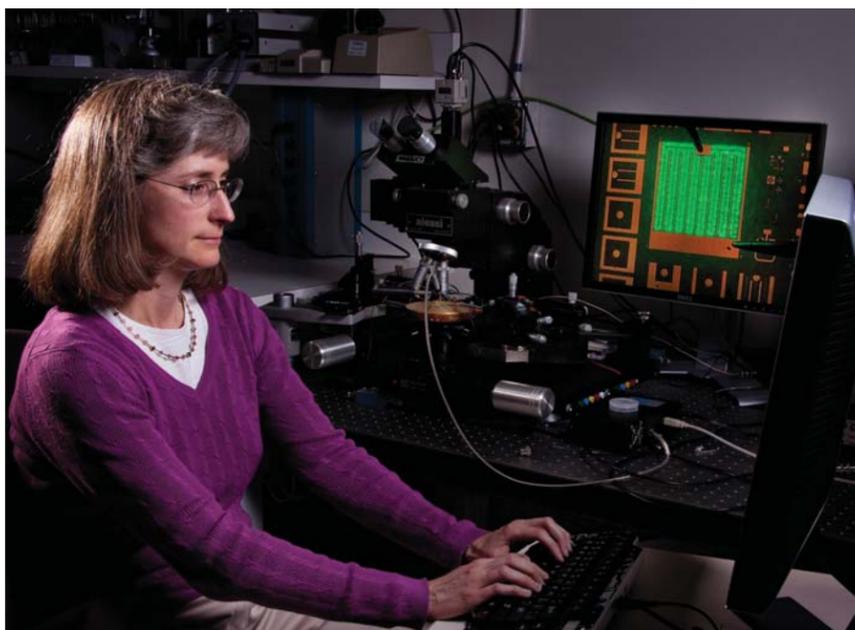
"Sandia does some of the best research in the world," Todd says. "It has the best facilities without any question, and great people. It really is the best place on Earth to work."



TODD CHRISTENSON built a global clientele for his microfabrication company.

Innovative tech transfer program marks two decades of sharing scientific expertise

Mary Crawford: A rare opportunity



MARY CRAWFORD (1120) advanced her LED research in the startup business world.

Mary (1120) describes ESTT as “an exponential learning experience.” She joined Sandia in 1993 and worked in the field of optoelectronics with a focus on light-emitting diodes, or LEDs. “LEDs were emerging as an entirely new type of lighting envisioned to replace conventional incandescent bulbs,” she says. “Companies around the world were starting to work on this and it was an exciting time. Sandia was also engaging in the technology, given the potential for high energy efficiency.”

Mary left in 2000 to join Uniroyal Optoelectronics in Florida, a startup developing LEDs for commercial lighting. She worked for the company a little more than two years, rising from senior scientist to director of research and development. She had come to Sandia as a post-doc, so Uniroyal was her first experience in the startup business world.

“It was an entirely different environment, much smaller,” she says. “But I liked it. It was a small group intensely focused on the same goal. If one succeeded, everyone succeeded.”

She says she learned a lot by working on the growth of LED materials. “My work at Sandia was on the fabrication of LED devices,” she says. “I now have a much better understanding of how the way one grows the LED materials impacts the device performance.”

She decided in 2002 to return to the Labs. “Sandia wanted me back and there were family considerations as well,” she says. “It made sense to return.”

She continued her work in semiconductors and LEDs, and is now a senior scientist. “Working outside the Labs was a tremendous experience and I’m happy I did it,” she says. “I think it’s a rare opportunity to be able to take that kind of risk and have a safety net. And the experience one gains can be very valuable to Sandia.”

Dan Neal: Millions of eyes

Dan says it was daunting to start a company after years at Sandia. “Sandia has enormous resources, incredible equipment, and exceptional people,” he says. “It was quite a transition to start with three of us in a small facility with what we could buy at auction.”

He had joined the Labs in 1984 working on high-powered lasers and optics. In the early 1990s he helped develop a sensor for lasers that had commercial applications. He took entrepreneurial training through Technology Ventures Corp. in 1995, found a business partner, licensed wavefront sensor and binary optics technologies from Sandia, and left on ESTT.

His company, Wavefront Sciences, presented at the 1996 TVC Equity Capital Symposium and got an investor. It made a variety of instruments based on an optical sensor that could measure everything from the flatness of a silicon wafer to the characteristics of a human eye. It contracted with the US Navy and Air Force to build systems to measure supersonic seeker windows for wind tunnel testing, and worked with NASA on the James Webb Space Telescope.

“Of all those applications the ophthalmic one had the largest market traction,” Dan says. “We were the first to introduce a commercial product to take eye measurements that could be used to program the laser in Lasik vision correction.”

Wavefront grew from three to 54 employees. It sold in 2007 to Advanced Medical Optics of Santa Ana, Calif., which bought several companies involved in the lasers for Lasik. “They wanted us for the sensor technology,” Dan says.

Abbott Laboratories of Chicago acquired Wavefront in 2009 and renamed it Abbott Medical Optics. It’s still in Albuquerque, and Dan has remained as a research fellow.

“Oh, man, have I ever learned a lot about business,” he says. “My advice to Sandians considering ESTT is take advantage of every bit of business training you can and don’t be afraid of the future. You don’t know what it holds but it will certainly be different. My technology has helped millions of eyes. It’s been extremely gratifying.”



DAN NEAL’S technology became a key component of Lasik vision correction.

Jim Novak: A full-contact sport

Jim, senior manager of Tailored Operational Support Dept. 5950, says ESTT gave him management skills he hadn’t developed as a researcher. He worked on sensing technologies for tech transfer applications after coming to the Labs in 1988.

One project was a sensor that allowed a robotic arm to track the surface of a space shuttle engine and deposit a paste to fill cracks. It was done through a Cooperative Research and Development Agreement with Rocketdyne in Canoga Park, Calif., which was building the shuttle’s main engines.

Jim left on ESTT in 1996 to commercialize the sensors for Rocketdyne. He founded SenSolve in Albuquerque and got a master’s in business administration from the University of New Mexico. “I licensed the technology and learned how to run a business,” he says. “We developed the product — sensors for robots in manufacturing — and raised venture capital.”

But in the end he closed the company, which employed six people at its peak, and returned to Sandia wiser for the experience. “Technology is only part of what people buy. The product needs to solve a cus-

tomers’ problem, not just be cool technology,” he says. “We had visions of providing full-motion sensing for robots in six dimensions. It turns out the vast majority of robots in manufacturing only need one or two dimensions. Our products were too complicated.”

Jim rejoined Sandia in microsensors product development. What he brought from the private sector was management know-how. Within a few years he was promoted to manager and in 2011 to senior manager. “The marketplace is a full-contact sport,” he says. “You learn to run a company. The experience was extraordinarily interesting and extremely useful. It was a great thesis on top of the MBA in preparing me for management. And I’m absolutely glad I came back. This is a great place.”

JIM NOVAK (5950) brought management know-how to Sandia from the private sector.



Sandia recognizes 24 outstanding women



OUTSTANDING WOMEN — VP Becky Krauss (11000), far left, poses with 15 of the 24 Outstanding Women at Sandia who were recognized at a ceremony earlier this month. The honorees, left to right, are Pierrette Gorman, Christine Straut, Kim Sawyer, Lisa Deibler, Melecita Archuleta, Rekha Rao, Toni Leon Kovarik, Susan Rempe, Jo Cunningham, Alice Sobczak, Rita Gonzales, Terri Wallis, Tameka Huff, Jackie Kerby Moore, and Hope Michelsen. (Photo by Randy Montoya)

By Sue Major Holmes

In celebration of Women's History Month 2014, Sandia has recognized two dozen Outstanding Women for awards they received in fiscal years 2012 and 2013 for contributions to the nation, professional societies, or the community.

The honor reflects "an external recognition of your leadership, your accomplishments, for a wide variety of activities," all of which share the characteristics of leadership and commitment, President and Labs Director Paul Hommert told the honorees at a March 10 ceremony.

The Sandia Women's Action Network (SWAN) in New Mexico and Sandia Women's Connection (SWC) in California honored women who received awards or other significant recognition in the past two fiscal years, and created a poster with their names and accomplishments. The poster's unveiling coincided with the March celebration of Women's History Month. SWAN and SWC called for nominations for outstanding women during the performance review period last year.

Paul says Sandia's recruitment of women has made it a more diverse place.

"What that says, more than anything, is for the laboratory to succeed, for the laboratory to continue to be recognized in the way it is, all of your leadership is going to become more and more important. I have great confidence in that because of the examples here," he said. "All I can say is, keep it up, keep demonstrating the flavor of leadership that you can bring to the lab, to your professional arena, and to our communities," both in New Mexico and California.

The 24 women recognized are only the beginning, said one honoree, executive VP Kim Sawyer, who pointed out suffragettes were marching on Washington, D.C., 100 years ago. "We've got decades ahead of us in terms of helping to advance women in the future.

Certainly we have many role models here who can make a difference."

The honorees:

Melecita Archuleta (2720): Samaritan Counseling Center's 2013 Hopkins Award for Excellence in Ethical Practice by a Nonprofit Organization

Jackie Chen (8351): Distinguished Paper Award at the 34th International Combustion Symposium

Jo Cunningham (11011): National Contract Management Association's Blanche Witte Memorial Foundation Award and National Contract Management Association's Fellow

Lisa Deibler (1819): First-place Poster Award in the 2012 International Metallographic Contest

Felicia Durán (6612): Fuel Cycle R&D Excellence Award, November 2012, and Institute of Nuclear Materials Management Southwest Regional Chapter Vice President, October 2012-September 2013

Amalie Frischknecht (1814): American Physical Society Fellow

Rita Gonzales (1750): NNSA Defense Programs' Employee of the Quarter Award, first quarter FY12

Pierrette Gorman (1831): American Welding Society District Meritorious Award 2012

Katherine Guzman (8112): Hispanic Engineer National Achievement Award Corporation 2013 Luminary Honoree

Jill Hruby (6000): 12th Annual Women Worth Watching Award from *Profiles in Diversity Journal*

Tameka Huff (6925): 2012 YWCA Women on the Move Award

Nancy Jackson (6820): American Chemical Society Fellow

Jackie Kerby Moore (7933): 2012 Distinguished Alumni Award, New Mexico State University

Tammy Kolda (8966): Board of Trustees of the Society for Industrial and Applied Mathematics

Toni Leon Kovarik (10243): First Veterans of the Quarter Award, October 2011

Hope Michelsen (8353): Alameda County, Calif., Women's Hall of Fame 2013 Inductee

Sara North Pecak (2626): NNSA Defense Programs' Employee of the Quarter Award, second quarter FY12

Rekha Rao (1513): 2012 Asian American Engineer of the Year

Susan Rempe (8635): Wilshire Fellow for Scientist in Residence, University of Melbourne Department of Chemistry 2012, and Notable Technology Development Award, Federal Labs Consortium, 2012

Kim Sawyer (3): 11th Annual Women Worth Watching Award from *Profiles in Diversity Journal*, 2013 University of Massachusetts Lowell Alumni Award, and New Mexico Governors Distinguished Public Service Award

Alice Sobczak (1118): Laser Institute of America Special Recognition Award at the 2013 International Laser Safety Conference

Dorothy Stermer (5578): 2013 *Albuquerque Business First's* "Women of Influence" Honoree

Christine Straut (6825): 2013 International Union of Pure and Applied Chemistry Young Observer

Terri Wallis (1835): 2012-2013 New Mexico Chapter Safety Professional of the Year by the American Society of Safety Engineers

Women's business group adds Sandia to prestigious list

Sandia made the Women's Business Enterprise National Council's 15th annual list of America's Top Corporations for Women's Business Enterprises. It is the first time Sandia was named to the prestigious list.

The council says the award is the only one that recognizes corporations for supplier diversity programs that break down barriers and integrate women's business enterprises into supply chains.

Ann Riley, advocate for woman-owned businesses in the Small Business Utilization Dept. 10222, says Sandia diligently pursues contracting opportunities for women by engaging with them on a local, statewide, and national level. "We have a variety of matchmaking activities to identify potential suppliers and connect them with buyers," she says. "The goal is

to contract with woman-owned small businesses and grow our economy. We work on it all the time."

Sandia for five years exceeded its goal of 10 percent of total procurement contracts, or about \$90 million, being awarded to woman-owned small businesses.

"New Mexico has a very active women's business community," Ann says. "We partner with local chapters of the National Association of Women Business Owners, Women in Communication, Women in Technology, and other groups that provide recommendations. Women are great at networking."

The top corporations will be honored at the council's Summit & Salute to Women's Business Enterprises March 18-20 in New Orleans. Other honorees include Accenture, Allstate Insurance Corp., Bank of America,

BP America, Bristol-Myers Corp., Coca-Cola, Ernst & Young, Ford Motor Co., General Mills, IBM Corp., Raytheon Corp., United Technologies Corp., Target Corp., and Walmart.

"Our top corporations know that stronger women's business enterprises will drive new sources of revenue, deepen customer satisfaction, and generate a stronger economy," said Pamela Prince-Eason, president and CEO of the council, which was founded in 1997.

The organization promotes women's business development and is a third-party certifier of businesses owned and operated by women. Its certification is accepted by more than 1,000 corporations, states, cities, and other entities. — Nancy Salem

Employee death**Kind, thoughtful, smart student intern Robby Cook was an inspiration to his colleagues**

ROBBY COOK WAS A FIERCE, talented, and determined soccer player, a dedicated student and a good friend. Outside of school and work at Sandia, Robby's interests were those of many young people: robotics, fishing, skiing, gaming, and other outdoor activities. He died in late February at age 21 as the result of a car accident. (Photos courtesy of Daniel Yonemoto)

Robby Cook, whom one colleague described as “ninja quiet” and whom all who worked with him agree was a kind and gentle young man, had been at Sandia for less than a year before having his life cut short at age 21 as a result of an auto accident.

Robby, a year-round intern since last fall in the Materials Reliability Dept. 1818, was a senior majoring in mechanical engineering at New Mexico Tech. Like so many aspiring engineers, Robby's first foray into engineering was by building things with LEGOs.

At the time of his death, Robby was exploring graduate school options, but once told a friend that making a lot of money wasn't a high priority for him. “I just want to be happy,” he had said.

His manager, Jill Glass, says of him, “Robby was a bright light in Sandia's science and engineering future, and it's hard for me to accept that his career and future ended just as they were taking off.”

In an email about Robby's passing, Jill wrote, “Despite the short time that he was with us, I will always remember him for his smile and sense of humor, and for his thoughtfulness, both to people and for his work.”

Friend and colleague Daniel Yonemoto (1815) says the strength of Robby's character shone through on the soccer field. “In the three seasons that I played soccer with him,” Daniel says, “there are a few things I will never forget about his personality that set him apart from the rest of the players: his laid-back attitude, his unrivaled composure, his wonderful smile, and above all else his unwillingness to give up. He completed

whatever challenges he faced with an exuberance that you could only know if you knew Robby. The world would be better off if there were more people like him. It was truly an honor to know him, and it is truly heart-breaking to know that the world has lost one of its treasures in Robby Cook.”



ROBBY COOK

Gabe Shipley (6221), a childhood friend of Robby and fellow soccer player — they played on the same team for eight years — saw the two sides of Robby, the two sides that made the complete man.

“As a fellow defenseman on the team, I knew him to be fierce, aggressive, and extremely dedicated,” Gabe says. “As a friend, I knew him to be kind, soft-spoken, and infectiously cheerful. If ever there were dark moments for the team, I always remember that Robby's mood was never tarnished and helped bring the spirit of the team back from the brink. As a student, Robby was a shining star, always humble and

reserved about the vast quantity of knowledge he had about multiple facets of academics, subject matter, and life. But when the time came for him to apply his know-how to the job, he never hesitated, always giving his utmost and never shying away from a challenge. I can confidently say that his work ethic and academic prowess were among the very best I've ever had the pleasure of knowing, but still paled in comparison to the warmth and kindness of his spirit.”

‘The highlight of my week’

Sandia researcher Mike Dugger, who worked with Robby in Dept. 1818, calls him “a valuable member of the tribology team.”

“We will miss his thoughtful work and willingness to lend a hand,” Mike says.

Brendan Nation (1818) remembers Robby as “kind-hearted, thoughtful, and quiet. I would say that Robby was ‘ninja quiet,’ as there were many times I would walk into the room and never see or hear him there.”

His encounters with Robby, Brendan recalls, “were always the highlight of my week; we always had good discussions about classes, professors, and plans for the future. Robby always spoke of his family and his work on the family home. It seemed to me that Robby was always willing to give of

Robby was a shining star, always humble and reserved about the vast quantity of knowledge he had about multiple facets of academics, subject matter, and life. But when the time came for him to apply his know-how to the job, he never hesitated, always giving his utmost and never shying away from a challenge.

— Gabe Shipley (6221)

himself to ensure that others had the help they needed. That serves as a daily inspiration to me. He will be sorely missed both as a colleague and as a friend.”

At Sandia, Robby was just beginning to make his mark. According to Mike, who worked closely with and mentored Robby on the tribology team, “He used his mechanical engineering skills and curiosity about materials to investigate the friction and wear behavior of diamond-like carbon thin films. He joined the tribology group knowing very little about these materials, but he carefully reviewed the related literature and conducted his own experiments to gain a better understanding of them. Robby had begun an investigation aimed at discovering the mechanisms responsible for anomalously high friction coefficient in inert atmospheres for some films. Confidence in his knowledge and abilities had reached the point that Robby was genuinely enjoying the process of discovery, and discussing his observations and ideas with colleagues. In his relatively short time with Sandia, Robby had become a valuable member of the tribology team.”

At New Mexico Tech, Robby was a member of the Space Structure Design Clinic Team that was part of a successful rocket launch at the New Mexico Spaceport late last year. His teammates in that effort recall Robby as “the smartest one out of us all. He had that secret sort of smart that no one knew about until they got him to talk. We will remember Robby fondly as a friend, colleague, expert presenter, and all-around good guy.”

In a statement about Robby's death, New Mexico Tech President Daniel Lopez said, “Our thoughts go out to Robby's family and friends for their tragic loss. Robby was an excellent student and his professors and student colleagues all spoke highly of him. Any time we lose a member of the Tech family, it's a very sad day and all we can offer is our thoughts and prayers.”

Away from work and school, Robby's interests were those of many young people: club soccer, robotics, fishing, skiing, gaming, and other outdoor activities.

He is survived by his parents, Robert (6913) and Juanita Cook, of Rio Rancho, N.M., a brother and sister, and several other close relatives.

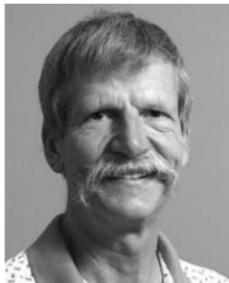
— Bill Murphy



ROBBY COOK at the New Mexico Spaceport as a member of N.M. Tech's Structure Design Clinic team, which was part of a successful rocket launch late last year.

Mileposts

New Mexico photos by Michelle Fleming



William Davidson
35 5786



Mike Hightower
35 6114

Recent Retirees



Jeff Everett
33 260



Debra Jaramillo
28 1800



Jose P. Lopez
35 2136



Arlo Ames
30 6612



Mary Bonner
30 2995



Andy Boye
30 1720



Charles Brusseau
30 6633



Ray Dukart
30 5417



Marianne Walck
30 6900



Rick White
30 422



David Clements
25 2159



Peggy Desko
25 6800



Doretta Liyai
25 851



David Bliss
20 1675



Rose Gehrke
20 10617



Scott Jones
20 5792



Lucy Sepulveda-Chavez
20 1342



Darren Talley
20 1344



Elaine Garcia
15 1719



Peter Geib
15 422



Michael Morgan
60 1718



Fabian Ortiz
15 2712



Steven Pope
15 3653



JC Powell
15 10265



Marissa Ramirez
15 10501



Rick Romero
15 4236



Gary Simon
15 9342



Nora Stoecker
15 249



Christine White
15 10502



Steve Wimpy
15 2734

New Mexico MESA Day opens doors to science, engineering, and math



SANDIA NATIONAL LABORATORIES Community Involvement/Lockheed Martin sponsored the New Mexico MESA Day competition in February. Len Duda (5782), seen in center of photo at left, judged the Food Distribution System prepared design challenge. Other Sandia judges included Blythe Clark (1111), Tommy Goolsby (6812), Esther Baldonado (6923), Richard Kottenstette (6824), David Scrymegeour (1728), Barbara Stirrup (1741), and Drew Woodbury

(5572). New Mexico MESA's mission is to prepare students from historically underrepresented ethnic groups for college majors and careers in math, engineering, and science. In the photo at right, Katrina Wagner (3654) explains how nonpoint sources contribute to pollution, impacting the quality of shared water resources. The theme of New Mexico MESA Day was "Sustaining Our Future," with a focus on water management. (Photos by Randy Montoya)

Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads Sandia Classified Ads

MISCELLANEOUS

BREAST PUMP, Medela; rectangular table, beautiful, ornate, light medium golden brown; both in excellent condition. de la Fe, 903-0717.

DINING SET, 4 rolling chairs, cloth seating, light wood accents, octagon-shaped table, w/leaf extension, \$200. Williams, 459-3691.

PROM/BRIDAL DRESS, w/bolo, gathered waist, maker: B2, size 14, spaghetti straps or strapless, color: celadon, \$125. Blickem, 323-6832.

MASSAGE CHAIR, w/calf massage ottoman, ijoy-100, great condition, w/manuals, \$400 firm. Keller, 922-9008.

ANTIQUA SONORA RECORD PLAYER, 1900's, beautiful quarter sawn oak, plays, 22" x 22" x 49", excellent condition, \$1,100. Olbin, 275-2681.

ACER NETBOOK, Aspire One, 10 in. screen, webcam, \$80; Kindle reader w/case, \$75; Garmin E-Trex Venture, \$50. DuBay, 268-0307.

HIGH CHAIR, Cosco, \$20; Contours stroller, \$25; new Bower monopod for camera/video, \$20. Schwartz, 294-1113.

WICKER DORMITORY STARTER KIT, dresser, desk, headboard, end tables, painted white, will sell separately, \$350 OBO. Walker, 505-994-0555.

WOMEN'S CLOTHING, suits, blouses, etc. sizes 10-12; shoes/heels, sizes 8-8.5, possibly a 9; retiring, no longer need. Brown, 232-2626.

GRAPHING CALCULATORS, TI-84 Plus, \$45; TI-83 Plus, \$35; scientific calculator TI-30xa, \$10; all good condition. Martinez, 440-2398.

SLEEPING BAG, children's REI, for age 6-10 yrs., pink/black, mummy-style, brand new, never used, \$35. Martinez, 792-3608.

MATTRESS, queen size, w/box spring, Sealy Posturepedic, excellent condition, \$350. Hennessey, 915-241-8634.

LADIES BOOTS, by Gwyneth Paltrow, black, size 7.5, nearly new, retails for >\$200, asking \$50 OBO. Dodge, 379-9971.

ENTERTAINMENT ARMOIRE, w/side shelf, purchased from American Furniture for \$1,200, asking \$550. Tafoya, 291-8252.

SPRING GARAGE SALE, ABQ Mother of Twins, April 5, 7:30 a.m.-2 p.m., 7201 Montgomery NE, tons of children's items. Dorsey, 286-4544.

YARD TOYS, spring plastic riding horse; Step 2 plastic sandbox; First Years red stroller; \$25 ea. Nimmo, 296-0855.

JORDAN FLIGHT CLUB 91 SHOES, almost new, size 10, \$80. Brewster, 238-4740, ask for Julie.

GOLDEN RETRIEVER PUPPIES, AKC registered, Lic. # LL0021, \$700. Fullmer, 916-4825.

COFFEE/END TABLES, chrome & glass, 1/2" beveled edge, tempered glass, photos available, excellent condition, \$75 OBO. Roesch, 281-9751.

BLU-RAY PLAYER, w/WiFi, LG-BP200, perfect condition, \$35; Sony S-Air receiver, streams audio to remote receiver, \$35. Cocain, 281-2282.

SECTIONAL, 3-pc., blue, w/pull-out bed & 2 recliners, photos available, \$75 OBO. Wimpy, 822-0223.

BED, full size, w/double side shelving/drawer cabinets; entertainment wall unit, both oak finish, excellent condition, make offer. Kimbrell, 270-3534, ask for Debra.

GAS STOVE, Kenmore, white, \$85. Gonzales, 505-296-8006.

CLOCKS, vintage and antique, working, excellent condition, check local Craigslist post ID 4372559505. Ross, 332-0659.

SOLAR PANEL, hot water, Zomeworks Big Fin, 33" x 75", \$50. Hansche, 281-5623.

SOFA, Pottery Barn, Charleston Grand slipcover sofa, dark blue velvet, 96"W x 36"D, gently used. \$350. Gelet, 505-797-4599.

SOFA AND LOVESEAT, solid oak Mission frame, SW design fabric cushions, excellent condition, \$550. Martinez, 702-6767.

TV ON WHEELS, Phillips, 60-in., \$375; sectional couches, \$350; call for photos & more info. Gomez, 877-8482, ask for Terrie.

TRANSPORTATION

'99 JEEP CHEROKEE, roof & tail racks, lifted, tinted, tow hitch, 7-pin connector, ~104K miles, \$4,000. Dinger, 505-818-8933.

'01 OLDSMOBILE SILHOUETTE MINIVAN, V6, FWD, ~131K mile, looks & drives great, \$3,750. Laiche, 505-681-7262.

'99 BUICK PARK AVENUE, leather seats, nice stereo, silver exterior/interior, 171,600 miles, \$1,800. Crozier, 505-286-0696.

How to submit classified ads
DEADLINE: Friday noon before week of publication unless changed by holiday. Submit by one of these methods:
 • EMAIL: Michelle Fleming (classads@sandia.gov)
 • FAX: 844-0645
 • MAIL: MS 1468 (Dept. 3651)
 • INTERNAL WEB: On internal web homepage, click on News Center, then on Lab News link, and then on the very top of Lab News homepage "Submit a Classified Ad." If you have questions, call Michelle at 844-4902. Because of space constraints, ads will be printed on a first-come basis.

Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

'06 CHRYSLER SEBRING, salvage title, photos of work done on hand, professionally done, runs great, \$3,800. Deen, 270-0601.

'10 TOYOTA COROLLA LE, leather seats, cruise control, blue, 23K miles, excellent condition, \$13,500. Nguyen, 217-778-9378.

'11 HONDA CRV EX, 4WD, sunroof, dark gray, certified, service contract, 48K miles, \$20,000 OBO. Sena, 508-8765.

'06 HONDA RIDGELINE RTL, crew cab, AT, all power options, premium sound, 99K miles, maintenance records, looks/drives excellent, \$13,000. Lioce, 697-9521.

'93 F150, extended cab, 4x4, 1 owner, clean, Leer shell, view at Lemon Lot, \$3,800 OBO. Mitchell, 850-7307, ask for Mike.

'94 TOYOTA 4RUNNER SR5, V6, everything works, fair condition, \$2,200. Willmas, 281-9124.

'06 HONDA CIVIC EX, manual transmission, sunroof, black, service records, great gas mileage, 68K miles, \$9,500. Levine, 980-7846.

'02 MUSTANG, V6, 5-spd., upgraded stereo, red, 129K miles, very good condition, great school car, \$4,975. Woodall, 797-7702.

'06 F150 CREW CAB, 4X2, customized, lots of extras, 45K original miles, excellent condition, \$20,000. Garcia, 505-515-4462.

RECREATION

'95 HONDA GOLDWING, 20th anniversary special, 50K original miles, w/trailer hitch, great condition, \$5,500. Hole, 505-350-1250.

'12 TRAVEL TRAILER, Forest River Flagstaff V-Lite, 30WRKSS: 2 slides, 1-1/2 baths, extras, mint condition, \$27,500. Sandoval, 505-792-7883.

'05 BIG DOG CUSTOM CHOPPER, black, 117cc motor, 6-spd., 6K miles, great condition, \$13,500. Ricketts, 340-6442, ricketeer33@hotmail.com.

'00 KOMFORT FIFTH WHEEL, 24-ft., fiberglass, fully loaded, slide out, storage cover, excellent condition, \$12,000; truck available. Horton, 505-507-0127, ask for Ray.

CYCLOCROSS BIKE, Fuji Cross 2.0, 53 cm, 105 components, Ultegra rear derailleur, excellent condition, \$800. Raether, 505-363-1631, ask for Jess.

BIKES, triathlon, Kuota K-Factor, ultra light, high performance; never used: M 26-1/2 wheel, \$1,800; barely used: XSM 24-1/2 wheel, \$1,500; OBO. Scott, 505-269-3285.

'11 HEARTLAND TRAVEL TRAILER, 27-ft., spacious, lots of extras, satellite dish, tow hitch, 1K miles, \$22,500. Martindill, 573-673-5079.

'06 SUZUKI BOULEVARD C50T, great light touring bike, lots of accessories/add ons, 55-mpg, 9K miles, \$4,150 OBO. Johnson, 505-967-7992.

REAL ESTATE

4-BDR. HOME, 4 baths, 3,200-sq. ft., 3 living areas, huge open kitchen, updated, pool, Four Hills, \$365,000. Cordova, 505-604-5307.

FOUR HILLS HOME, 4,200-sq. ft., swimming pool, hot tub, separate kitchen & living quarters, \$455,000, seller will negotiate. Ramos, 972-951-0290.

2-BDR. TOWNHOUSE, 2 baths, 2-car garage, Wyoming & Paseo area, vaulted ceiling, MLS #808808. Steele, 275-8611.

3-BDR. HOME, 1,608-sq. ft., Stillbrooke, study, refrigerated air, pitched roof, Synlawn. Well-maintained, \$195,000. Padilla, 505-515-9059.

4-BDR. HOME, 3 baths, 2,292-sq. ft., new carpet, new stainless appliances, fresh paint, Juan Tabo/Constitution area, \$259,000. Martinez, 453-3080.

2-BDR. CABIN, 2 baths, 2-car garage, 2 acres fenced, vaulted ceilings, paved road, Manzano mountains, 20 mins. to Albuquerque, MLS# 809251. Mora, 505-286-6485.

3-BDR. HOME, 1-3/4 baths, 1,800-sq. ft., 2-car garage, Wyoming & Menaul, beautifully maintained, immaculate, \$207,000. Mozley, 884-3453.

WANTED

WOOD BOOKCASE, 32" W x 6'-8"H. Lujan, 890-8956.

ROOMMATE, 3-bdr. home, non-smoker, near Juan Tabo/Menaul, extra security, washer/dryer, sauna, large pool, \$450/mo. Hannah, 293-1450.

MOVING BOXES, packing materials. Kallio, 507-2914.

GOOD HOME, 2 small dogs, Chiweenies, 2 yrs. old, brother & sister, email for photos. Knight, 505-235-7498, Marchavus@yahoo.com.

PERMANENT HOME, male tabby, gray, 2 yrs. old, affectionate, neutered, all shots, microchipped, litter box trained, indoors only. Moyer, 298-1778, ask for John.

DONATIONS, to Long Leash on Life's animal rescue yard sale, collecting until May 17, sale on May 18. Olsberg, 291-9786.

VACATION RENTAL, in California/San Diego, 5 nights in April, spring break. Segura, 573-4608.



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Welcome aboard!

Div. 5000's People Initiative enhances onboarding experience, bolsters career development

Onboarding is the art and science of successfully bringing new employees into an organization. Done correctly and creatively, it goes beyond the obvious new-hire processes of filling out paperwork and assigning office space, phone numbers, and web and email access privileges. It's more than a buzzword; it's the real thing, and organizations that do onboarding effectively have a leg up in a competitive hiring market.

Sandia's Defense Systems and Assessments (DS&A) Div. 5000 has launched an ambitious People Initiative to do onboarding the right way. But the People Initiative is about more than onboarding, which is just one piece of a coordinated effort to make sure the division's people have growth opportunities and enjoy job satisfaction throughout their careers at Sandia.

The People Initiative is aligned with the division's Strategic Plan and Sandia Strategic Plan objectives 4 and 5: "to excel in the practice of engineering" and "to commit to a learning, inclusive, and engaging environment for our people."

To ensure the program stays on track and accomplishes what it aims to do, best practices and tools are identified and documented, with metrics established.

What makes the People Initiative unique and effective, says project manager Dominique Foley Wilson (5001), is that "staff become aware of all the division has to offer and develop a line of sight between personal contribution and overarching mission."



MARLO MAXSON, manager of DS&A Mission Assurance Dept. 5212, says, "I'm hoping we will educate our new employees on the importance and relevance of Mission Assurance to their work."

The variety of customers and their respective needs, she says, "spans a literal continuum of time and space, from atomic clocks to sensing solutions — each has a protocol unto itself."

Maintaining employee satisfaction in a complex work environment, Dominique says, requires diligence in the areas of recruiting, hiring, onboarding, professional development, skills retention, and succession planning. To bring order and synergy to

these related but discrete functions, the People Initiative evolved to take a lifecycle approach to the division's talent management efforts.

Essentially a grass roots movement

Senior Manager David Gallegos (5540) says he thinks one of the reasons the People Initiative has been effective is that "it has essentially been a grass-roots movement by a number of individuals invested in taking personal ownership in improving and enhancing the division and corporate workplace. The intent has been to address and improve all phases of the employee lifecycle for all employees in the division."

Early career Sandian Nadia Martinez (5517) agrees. "I think DS&A goes above and beyond," she says, "to make sure that a new employee's onboarding experience goes smoothly and they really do care to hear your feedback so they can continue to make improvements."

The DS&A Strategic Onboarding Program, launched last year, runs quarterly. All staff who have joined Div. 5000 during the prior quarter — new hires, transfers, technical and support staff, Critical Skills Masters Program and Masters Fellowship Program candidates, its Div. 3000 and Div. 10000 partners — are included.



SAM FELIX, senior manager of Div. 5000 Business Operations (10650), includes representatives from Supply Chain, Controller, Safety & Security, and HR in his presentation DS&A Gets Down to Business. "Anything we can do for our staff in DS&A to enhance their understanding of our technologies, tools, and culture," says Sam, "is a sound business practice and helps accomplish our mission. The People Initiative has received broad support and acceptance from staff and management. We continue to look for ways in which we can add value and grow our workforce."

Components of the orientation onboarding experience include:

- A welcome video from VP Jeff Isaacson on the Div.5000 homepage
 - DS&A Organization & Structure briefing
 - DS&A Gets Down to Business briefing
 - Mission Assurance briefing
 - National Security Technology Gallery tour
 - Strategic Alliances briefing
- Professional and competency development curricula

"The People Initiative onboarding was a really good way for me to learn not only about the division's capabilities, but also some of the important problems we are working to solve."

target teaming, web-based tools, communication, and funding and are linked to the corporate New Employee Orientation, Strategic Education Initiative, and Knowledge Development Program tools. Rick Harrison (5754) says, "The People Initiative was immensely helpful in learning about what was going on in our division, including past successes, culture, and overall goals."

New staff members are given an opportunity to further acquaint themselves with one another and with the work of DS&A. It all starts on day one during new employee orientation, where they are met by the program manager and lunch as a group.

Former participant Will Rice (5953) says, "The People Initiative onboarding was a really good way for me to learn not only about the division's capabilities, but also some of the important problems we are working to solve."

The People Initiative SharePoint site (<http://tiny.sandia.gov/s5x27>) offers a one-stop reference utility for the program. In addition to information about onboarding, the website provides links to the individual centers, important documents, candidate pipeline resources, center hiring needs, recruiting, workplace satisfaction surveys, professional development, perks, and archives.

A feedback form is incorporated for the purposes of gauging usefulness and effectiveness, as well as incorporating improvements.

Earl Creel, manager of Navigation Guidance and Control Dept. 5416, says, "The Div. 5000 People Initiative is really helping me identify and connect with qualified applicants for my hard-to-fill job postings."

Top-down engagement and support are key success factors, as is total inclusion, Dominique says.

The program has been vetted and endorsed by center directors. It has technical management-level representation from all centers and includes additional support from 7900 and 10000.

The program supports Computer Science/Computer Engineering recruiting efforts, the TITANS pipeline institutes, and the Critical Skills Masters Program.

Via coordination with the line and HR, gaps and outreach mechanisms and strategies to more effectively promote Sandia overall — and DS&A in particular — will be developed to ensure long-term staffing needs are met.

All in all, Dominique says, the People Initiative represents a movement toward an inter-divisional, inter-agency synergy of people and has become a hallmark of Defense Systems & Assessments Div. 5000.



DS&A TECHNOLOGY & PROGRAMS Deputy Anthony Thornton (5220), far right, says, "My intent in providing the DS&A Overview to new staff is to get them energized and excited about our work by sharing some of the accomplishments performed in our national interest. I want them to believe that their talent and contribution matter to our country."