Sandia LabNews

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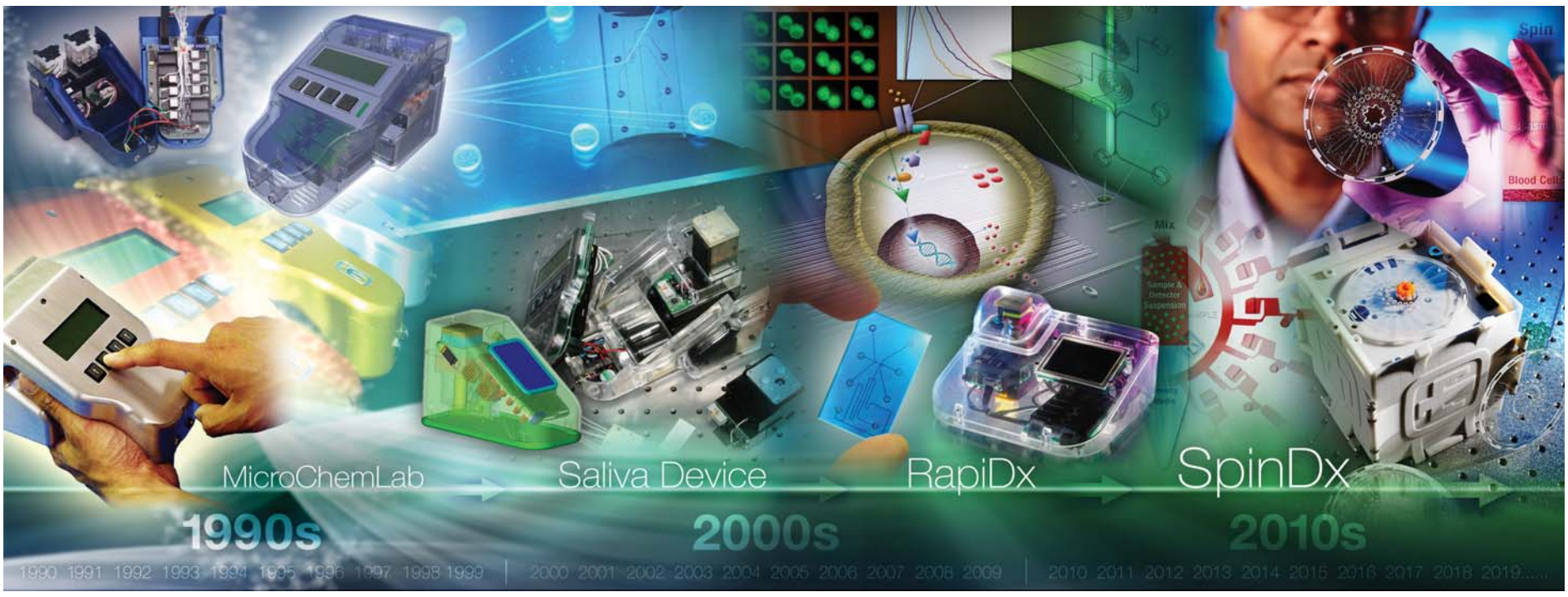
Sandia National Laboratories

SANDIA'S CORPORATE DIVERSITY TEAM

THE WORKFORCE DIVERSITY MOVEMENT at Sandia has a small but mighty ally in its corner . . . see **page 6.**

'Taking it to the next level' for biodefense



Microfluidics platforms and bioresearch have been Sandia hallmarks for years, making a splash in the 1990s with the development of MicroChemLab and continuing through today. The work has led to increased funding from sponsors such as the National Institutes of Health (NIH), which recently funded a new project that takes advantage of and builds upon the Labs' SpinDx technology. For more on the NIH grant and Sandia's work in microfluidic devices, see "'Taking it to the next level' for biodefense" on **page 3.**

(Illustration by Daniel Strong)

Safe By Your Design

New outreach program highlights Engineered Safety

By Cathy Ann Connelly

The division vice presidents will lead the roll-out of Engineered Safety during meetings with their leadership teams over the last two weeks in March. They will be supported by the Labs-wide Engineered Safety Implementation Team, co-led by Charles Barbour (1000) and Sid Gutierrez (4100). The meetings will include a series of interactive presentations, demonstrations, and videos.

These roughly two-hour sessions begin a year-long outreach program focused on Engineered Safety, a maturation of Sandia's thinking about "Safe By Your Design." The critical nature of the program was initially referenced by Sandia President and Laboratories Director Paul Hommert in a December 2012 video (http://tiny.sandia.gov/ufxab).

> *"Engineered Safety is not a completely new activity, but one that is now reaching maturity as an effective, consequence-based application for all members of the Sandia workforce."*
>
> **— Charles Barbour**
> **Safety Implementation Team co-lead**

The division VPs will lead the management presentations, which are specifically tailored to each organization's work planning and controls for Engineered Safety. The VPs are to ensure that the criteria are implemented, and will determine the division implementation plan structure.

The roll-out meetings with management will be followed by implementation and ongoing dialogue about Engineered Safety at the center and department levels.

"Engineered Safety is not a completely new activity, but one that is now reaching maturity as an effective, consequence-based application for all members of the Sandia workforce," Charles says. "Current work planning and control practices are driving a focus on effective conduct of operations. But we would like to get to a point where safety is actually an attribute of safe design and operation of a system of interconnected elements: people, procedures, facilities, equipment, and the hazards inherent in them and the work to which they are applied."

The underlying technical basis for design safety features are not highlighted by simply "checking the boxes," Charles says. Checklists are required, useful reminders, but they don't always lead to technical understanding, critical thinking, or due diligence in safety matters.

"Instead," Charles says, "safety needs to be considered in a system engineering context — appropriate for an R&D laboratory — a system where safety is part of the design intent." In many cases, this need not require difficult, time-consuming, or expensive approaches, he says.

The manager roll-out sessions include an Engineered Safety overview presentation tailored to each division, videos of case studies from the past several years of the pilot program, dialogue with managers, and other implementation resources. The sessions are designed as an initial step in the continuing Sandia safety journey, Charles says. More information about Engineered Safety will be provided in a variety of ways to the entire workforce during the coming months. An upcoming issue of the *Lab News* will feature some perspectives on the Labs' safety journey from Mike Hazen, VP of Infrastructure Operations Div. 4000.

Venture forth

Sandians bring lab experience to the world of business

By Nancy Salem

It takes a certain kind of person to leave Sandia for a job at a startup company. "You have to be willing to take a risk, move out of your comfort zone, and do something you might not be able to do otherwise," says Laurence Brown (160).

ESTT

Entrepreneurial Separation to Transfer Technology

Laurence took the risk and it opened new professional doors. Matt Donnelly (2997) stepped away and learned what it meant to be a manager. Jim Pacheco's (6634) foray gave him a first-hand look at the free market.

Laurence, Matt, and Jim left Sandia to work in business through a program that encourages researchers to take technology out of the Labs and into the private sector. Entrepreneurial Separation to Transfer Technology (ESTT) was started in 1994, and since then 144 Sandians have left the Labs, 57 of them to start a business and 85 to help expand an existing one. Ninety-six companies, most of them in New Mexico, have been impacted by ESTT.

The program guarantees Sandia employees reinstatement if they return within

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That's that

Is 2013 turning out to be the year of the drones? All of a sudden this technology, which has been deployed very effectively on battlefields for years now, seems to be the hottest topic on the table inside the beltway and beyond. We've seen Senate filibusters about drone policies, *Time* magazine did a deeply researched, novella-length cover story on the subject last month, and Charlottesville, Va., recently became the first city government in the US to ban drones (at least for now) for law enforcement purposes. It's not likely to be the last.

Over the past decade, drones — unmanned aerial vehicles is the preferred term in the industry — have played an increasingly important role in the nation's warfighting arsenal, and it's not hard to see why: Whether they're deployed as offensive platforms (carrying Hellfire missiles, for example, to go after Al Qaeda leaders) or as reconnaissance tools, drones are far cheaper to acquire and operate than manned aircraft. And they're proving to be lethally effective. According to that *Time* article, the military's drone fleet has grown from 50 remotely piloted vehicles to more than 7,500 in the space of 10 years. And the aircraft are getting more powerful, larger (and smaller), more resilient, and more persistent — they can cover a given area for longer and longer periods of time.

With all their demonstrable benefits it seems certain that drones will soon far transcend their military origins. Inevitably, we'll be seeing drones flying around over our own hometowns, and not just for law enforcement purposes. The applications for UAVs are limited only by the imagination. To cite that *Time* article again, more than 500 companies at a recent UAV tradeshow were selling drones for everything from tornado watching, to crowd monitoring, to delivery of small high-value packages like medicines.

The policy controversies about drones have focused on a couple of hot-button issues:

•Should government be able to use the technology for domestic surveillance and law enforcement? and,

•Does the technology offer policymakers a seductive tool that somehow makes military actions overseas *too* easy. That is, just because we can intervene militarily somewhere without directly risking American lives, does that mean we *should* do it? Maybe not.

In this space last time, I wrote about how transformative technologies like 3-D printing, home-brewed bio labs, and other digital technologies are putting unprecedented power, for better and for worse, into the hands of individuals. Well, drones may be the most transformative technology of all. They're getting cheaper, more capable, and more available all the time. I'd rather not speculate in writing about the ways this technology could be abused by a bad guy. I'm sure you can concoct horror scenarios of your own. Perhaps the scariest thing of all is that it would be preternaturally difficult to stop someone from carrying out a malicious attack.

So for all of the concerns about government abuse of this technology — and I'm not saying the concerns aren't warranted — I think the real worries about drones come from an entirely different direction: the deranged lone wolf, the rogue state, the terror cell, the master criminal.

And that's where Sandia can help. As I noted last time, a central part of our mission is "anticipating and resolving emerging national security challenges." In an urban airspace of the near future, one that may be filled with unmanned aerial vehicles on legitimate missions, going about useful business, how do you sort out, identify, and foil that illegitimate one, that one in a million that may be on a mission of destruction? I think this is a real issue, a tough challenge, worthy of a great engineering laboratory.

See you next time.

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

Albuquerque Academy team wins New Mexico Regional Middle School Science Bowl

By Stephanie Hobby

Students from Albuquerque Academy's Team 1 are headed to the US Department of Energy National Science Bowl in Washington, D.C., after taking the top spot at the New Mexico Regional Middle School Science Bowl at Albuquerque Academy on Saturday, March 2.

More than 130 students from 29 teams representing 12 New Mexico middle schools participated in the annual event. A fast-paced question-and-answer tournament tested students' knowledge in biology, chemistry, physics, and math.

The winning team received an all-expenses-paid trip to the nation's capital to compete against top teams from across the country in late April.

The students representing the first-place team above are, from left to right: team captain Thor Larson, Harrison Bay, Eric Swiler, Henry Luo, and Mark Swiler. The team was coached by Barbara Gilbert. Second place was Team 1 from Los Alamos Middle School, and Team 2 from Albuquerque Academy took the third spot.

Sandia coordinates the New Mexico Regional Middle School Science Bowl for DOE's Office of Science. The National Science Bowl for Middle School students was started in 2002 and includes two types of competitions: an academic math and science competition and a model car race. Teams design, build, and race models cars to apply science and engineering principles. DOE created the National Science Bowl for High School Students in 1991 to encourage students to excel in math and science and pursue careers in related fields. More than 200,000 students have participated in the National Science Bowl in the 23 years since its inception.

United Way celebrates a record

The United Way of Central New Mexico filled the Albuquerque Convention Center on March 7 to reveal the results of its 2012 campaign, which was chaired by Sandia Deputy Director and Executive VP for Mission Support Kim Sawyer. The news was good. The charitable organization raised a record $28.2 million in pledges, topping last year's total by more than $1 million, or 3.7 percent. In a touch of drama, motorcycle police rumbled into the room during the announcement — with the dollar figure written on their backs. "People recognized that the community needs our help to make a difference," Kim told the crowd at the UWCNM Campaign Celebration. "We got out there, talked to leaders, ran a strong campaign, and the response was tremendous." Anthony Thornton, campaign chair of Sandia's 2012 Employee Caring Program, and many other Sandians attended the event. Sandia played a big role in the success, raising $5.5 million, up 17.1 percent over the previous year. It was the first time a single organization in New Mexico exceeded the $5 million mark. A large display at the celebration showcased Sandia as one of four companies in the Million Dollar Roundtable. In the photo above, Kim, center, and Anthony, right, are joined by Ed Rivera, UWCNM president and CEO.

— *Nancy Salem*

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‘Taking it to the next level’ for biodefense

Latest NIH award aims for instrument capable of detecting botulinum, ricin, anthrax, other agents of concern

Story by Mike Janes • Photos by Jeff McMillan

First, in the early 1990s, came MicroChemLab. Then, in the early-to-mid 2000s, the “saliva device” and a follow-up technology, RapiDx. Those microfluidics-based platforms eventually led to SpinDx, unveiled earlier this summer as the latest in a line of medical diagnostic tools developed at Sandia. Many were created under the guidance of Anup Singh (8620), acting senior manager for the biological science and technology group located at the Labs’ California and New Mexico sites.

With that string of successes, it was hardly a surprise when Sandia was awarded another major award recently — nearly $4 million over four years — from the National Institute of Allergy and Infectious Diseases at NIH. NIH has funded a number of projects at Sandia over the past few years.

“This was our plan: to build on our successes, hire good people, and not rest on our laurels,” Anup says.

With the latest NIH award, Anup says the objective is very clear: His team is tasked with producing a point-of-care instrument — one ready for the Food and Drug Administration’s (FDA) approval — that can detect a suite of biothreat agents, including anthrax, ricin, botulinum, shiga, and SEB toxin.

“This is currently an unmet need for the nation’s biodefense program,” says Anup. “A point-of-care device does not exist.”

The device, once developed, approved by FDA, and commercialized, would most likely be used in emergency rooms in the event of a bioterrorism incident.

“This will take things to the next level,” Anup says. In addition to the broader suite of toxins and bacterial agents that the device would test for, the other unique aspect of the project is that comprehensive testing with animal (mouse) samples will be conducted.

“Before, with other instruments we’ve developed, we would purchase blood, spike it with toxins, then test the blood. Now, we will take a live animal specimen, feed it botulinum and other toxins, then screen the blood of the mice to see if it can be detected. For shiga toxin, we will also try to get samples from naturally infected humans to test.”

SPIN DOCTORS — From left,Sandia’s Matt Piccini (8621), Chung-Yan Koh (8621), and Anup Singh (8620) lead the SpinDx team. The hope is that a new NIH-funded project that takes advantage of SpinDx technology will take the device to a new level and result in a point-of-care instrument that can detect a suite of biothreat agents.

MATT PICCINI leads design and development of the SpinDx device.

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Closer to the translational elements of research

This is an important step, Anup says, since toxins may behave differently in live animals and humans than they do in laboratory blood samples. “We are getting closer and closer to translational elements of research, which involves testing in animal and clinical facilities. This is part of the maturation of our bioresearch activities,” he says.

The project will also expand the technical capability of the SpinDx platform.

“When you look for bacterial agents, you don’t want to rely solely on proteins because you won’t get the detection sensitivity you need,” explains Anup. “So we are also using other methods that may lead to better detection limits and additional confirmation.”

The new NIH project includes collaborators possessing both animal modeling and device manufacturing expertise.

The University of Texas Medical Branch, with whom Sandia enjoys a years-long partnership, together with the US Department of Agriculture’s Western Regional Research Center in Albany, Calif., will provide Sandia with expert insight into toxins as well as animal lab facilities and expertise on diseases. Bio-Rad, a manufacturer and distributor of a variety of devices and laboratory technologies, will serve as a consultant on the project and will help evaluate plans for product development, assist with manufacturers’ criteria on the device that is developed, and provide important feedback on building a prototype device.

Although the latest NIH award represents a continuing success story for Sandia’s microfluidics/bioresearch work, Anup stresses that it was part of a thoughtful strategy that has been followed for several years.

“You’ve got to keep innovating and coming up with the next thing,” says Anup. “Every technology has its lifecycle. As good as SpinDx is, we know there will be other technologies, better technologies, that come along in the next few years. We have to continue to innovate to meet the needs of our customers, understand what other competing technologies are being designed to solve the problems, and develop technologies that provide an improvement.”

The need for diagnostic devices in the biodefense area is not going away any time soon, Anup says, since there are always new diseases springing up for which good diagnostic assays aren’t available.

“Plus, we want these devices to be dual-use,” he adds. “We’re not just going to wait for the next anthrax letter incident to happen for our devices to be used and tested; we want to be useful for other things as well, like infectious diseases. We ask ourselves: Can we use something like this [SpinDx or other, yet-to-be-developed devices] for the next SARS? What about the next swine flu outbreak? When we think of biothreats, we think of man-made problems. But what about nature-made problems?”

Those two areas, he says, will keep Sandia’s bioresearch efforts engaged for years to come.

“That’s where the value of the national labs really comes in. With long-term problems that require a sustained effort, our capabilities and culture are a very good fit. Sponsors like NIH have begun to realize this, which is what they’re essentially telling us with this latest award. It takes more than one grant to solve big problems like these.”

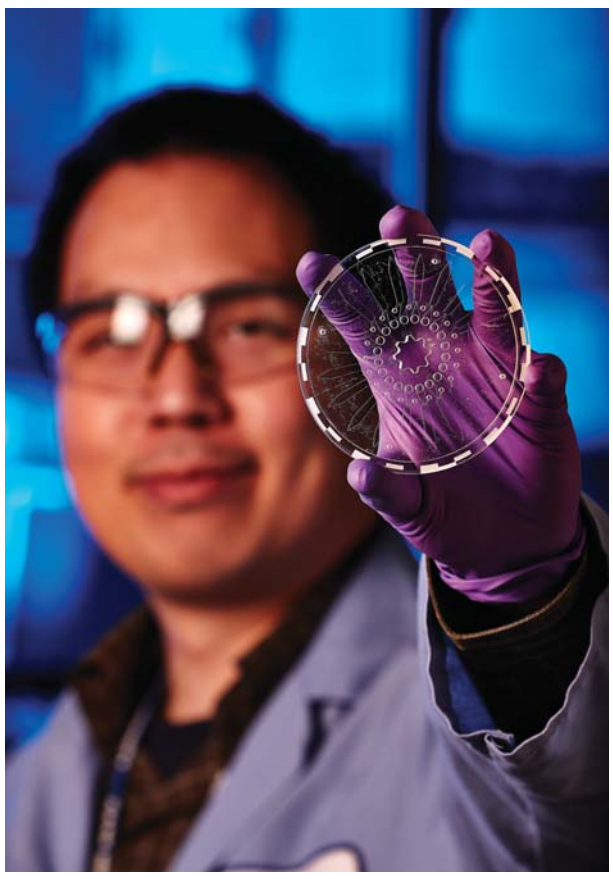
SpinDx a team success

Like so many complex Sandia technical efforts, the SpinDx project would not be a success without important contributions from a number of important team members.

Chung-Yan Koh (8621) leads the development of the assays in SpinDx, while Matt Piccini (8621) leads the design and development of the device and its full functionality. Post-doc Scott Moen (8621) set up a testing facility at the University of Texas Medical Branch, and UTMB’s Johnny Peterson and Michael Leffelholz provided access to facilities and samples for testing of SpinDx.

The US Department of Agriculture (USDA) and University of Massachusetts-Dartmouth have also been key collaborators on the SpinDx project. Larry Stanker and Luisa Cheng at USDA have provided antibodies and animal samples for testing, while BR Singh and Easwaran Ravichandran at UM-Dartmouth have provided substrates and animal samples.

Finally, SpinDx never would have gotten off the ground without the efforts of former Sandians Greg Sommer and Ulrich Schaff, who led the early development of the technology. Greg and Ulrich are both on entrepreneurial leave and have founded a company to commercialize the technology.



CHUNG-YAN KOH leads development of assays in the SpinDx device.

Alloy developed at Sandia has potential for downhole electronics applications in wells

By Sue Major Holmes

An alloy that may improve high-temperature electronics in oil and geothermal wells was really a solution in search of a problem, says Sandia's Paul Vianco.

Sandia first investigated the gold-silver-germanium alloy about 15 years ago as a possible bonding material in a new neutron tube product. But a design change forced Sandia to shelve the material, says Paul (1831).

Then a few years ago, researchers working on projects with applications inside wells, referred to as downhole, asked the Labs' geothermal group to develop electronics that can be used to monitor well conditions to keep field operations running efficiently. Circuit boards placed downhole in oil and geothermal wells must withstand high temperatures and pressures, excessive vibrations, and other harsh conditions.

The gold-silver-germanium alloy would be suitable for that environment, Paul says.

It's technically a solder, but it's at the upper limits for what's considered a solder — materials that melt at no higher temperature than 450 degrees Celsius. The American Welding Society deems materials that melt at higher temperatures as brazing filler metals.

Sandia fills niche in downhole uses

The alloy's potential for downhole electronics gives Sandia a unique niche, Paul says.

Most brazing processes occur at a peak temperature above about 700 degrees C, while most soldering occurs below 350 degrees C, leaving high-temperature electronics few filler materials from which to choose.

SOLDER TEST SPECIMEN —This is an example of a specimen that researchers on high temperature solders use to determine the joint's strength. (Photo by Norman Johnson)

"So there's this no man's land in which the only materials available are aluminum-based brazing alloys that melt at about 600 degrees C," Paul says. But aluminum-based alloys are difficult to process for electronics.

In addition, the gold-silver-germanium alloy is lead-free, making it environmentally friendly for geothermal work in countries such as Iceland, which, like the rest of Europe, is moving away from materials containing lead. The alloy's fundamental mechanical and processing properties also are nearly fully characterized. That's important because it saves about two years of development that would be required to establish how well the alloy makes a reliable solder joint, Paul says.

"All that's done," he says. "We have the preliminary work completed that allows us to consider this material for a range of applications, including downhole electronics."

Alloy developed from earlier work

The alloy originally was developed from the gold-germanium system, which has traditionally been a die attachment material used in microelectronics packaging. But the neutron tube application required a higher melting temperature, so Paul and colleagues John J. Stephens, now deceased, and F. Michael Hosking, now retired, added silver and adjusted the concentrations to reach a near-uniform melting point for the alloy.

RESEARCHER TOM CRENSHAW (1831) sets up a specimen in a test frame that will pull the solder joint apart to determine its tensile strength. Tom co-authored a paper that won the Best of Proceedings category in the Surface Mount Technology Association's International 2012 Best Papers conference. (Photo by Norman Johnson)

"It was so close to brazing that we didn't think that there would be much interest in the electronics industry until the option came up for downhole applications," Paul says.

He'd like to develop the material to a prototype stage for geothermal and oil and gas well tools. "We really think it is a material that's suitable for these higher temperature applications," Paul says. "In this no man's land of filler metal technology, there are really not a lot of options out there other than lead-containing alloys. Companies are exploring lead-bearing solders, albeit begrudgingly so."

When interest in downhole applications arose, information on the alloy from the mid-1990s needed to be pulled together, says Paul, who has worked in soldering and brazing technology at Sandia for 26 years. He and his colleagues resurrected and re-evaluated the data, and Paul wrote a paper assessing its properties. That wasn't as easy as it might sound.

"Photographs were all on film; we had to scan these pictures into an electronic format. Documents and presentations were in unusable formats or archived on software that is no longer supported by the Labs. So everything was brought up to a level that is compatible with current computer resources," he says.

Paper compiled research data

The paper, "Ag-Au-Ge Alloys for High Temperature Geothermal and Oil Well Electronics Applications," won the Best of Proceedings category in the Surface Mount Technology Association International 2012 Best Papers conference announced in January. Paul will receive the award at SMTA's meeting in October in Fort Worth, Texas.

He wrote the paper largely to compile the data in case interest developed within the oil, gas, and geothermal industries, and he hadn't planned to submit it for publication. But SMTA International, aware of Sandia's leadership role in soldering technology, asked the Labs to provide a paper for a session on alternative solders for electronic applications, so Paul submitted it.

He believes Sandia might be able to use the gold-silver-germanium alloy as a joining material in high-precision components.

The paper and the publicity surrounding the award have raised awareness of the alloy as well as the growing need for high-temperature materials for downhole electronics, Paul says. "This is how tech transfer works the best — publish the material and let the folks who have the need become aware of it and then work with their specific applications," he says.

Sandia breaks ground on 13th Habitat for Humanity house

ON SATURDAY, MARCH 2, Sandia Labs Habitat for Humanity volunteers broke ground on the latest house, which will be completed later this summer. The effort is the 13th Habitat home built by Sandia employees, contractors, retirees, and their family members for a deserving family. The site is located at 6424 Trujillo Rd. SW #168. This year, Sandians are partnering with a single mom and her sons who relocated to the US after violence drove them from their home in Mexico. More than 300 volunteers are needed for every phase of construction, and Sandia is continuing a tradition of having every division cover a weekend's worth of labor. For more information or to volunteer, visit the Habitat for Humanity internal Sandia SharePoint site, accessed through http://tiny.sandia.gov/zmljg. Contact Patty Zamora (3652) at 844-2146 with questions.

Spirit awards recognize and honor legacy of entrepreneurship

LAURENCE BROWN

(Continued from page 1)

two years, and a third-year extension can be requested. Forty-one Sandians returned to Sandia from ESTT and 97 did not. Six are currently on ESTT leave.

Laurence, Matt, and Jim all returned to the Labs from the business world. On Feb. 26, acting VP and Chief Technology Officer Julia Phillips honored them at the third annual Entrepreneurial Spirit Awards Luncheon. The event was hosted by Sandia and sponsored by Technology Ventures Corp.

Jackie Kerby Moore, manager of Technology & Economic Development Dept. 7933, says the awards recognize Sandia's legacy of entrepreneurship. "We initiated the Entrepreneurial Spirit Awards as a way to recognize and celebrate Sandia entrepreneurs," she says. "It's also a way to highlight Sandia's ESTT program."

Information highway

Laurence used ESTT in 1995, six years after joining Sandia as a researcher in thin-film and vacuum system design. He and some partners founded Advanced Tribal Integrated Information Networks, or ATIIN, a company offering Internet-based services to Native American tribes and businesses.

"The vision was to use the Web for multimedia purposes, as a tool for national and international native communities," he says. "It was a way to create a presence on the Internet for communities that might not have that infrastructure."

ATIIN, the Navajo word for "highway," built an online marketplace called Native CyberTrade for Indian businesses and developed educational and language tools. The company installed intranet infrastructure for native communities throughout the Southwest. "It was early in the Internet revolution. It was taking off across the world," Laurence says. "The native community was not yet up to speed. We were early in getting out there."

Laurence, who was CEO of ATIIN and did business and partnership development, sold the company in 1997 and returned to Sandia. He came back with a vast network of Native American contacts. "That's the story of my return," he says. "My contacts and visibility formed the foundation of new work."

Laurence moved from R&D into business development, and built a tribal program at Sandia. "I coordinate technical assistance and partnerships with tribal governments that align with our national security mission," says Laurence, who is now tribal program manager in the Government Relations department. "I develop strategic relationships nationwide."

A better container

Matt joined Sandia in 1988 in mechanical process engineering and moved into plastics applications, including fabrication and use of composites. A group of Albuquerque entrepreneurs wanted to develop an aerospace transportation container made of durable composite materials.

They approached Sandia for assistance and collaboration in 1998. Matt was tapped to work with the group on composites. "I helped steer them to a honeycomb sandwich-panel construction," he says. "The honeycomb was polypropylene and the skins polypropylene glass. Through collaboration we found the right material for the containers."

MATT DONNELLY

The group formed a company, Aerobox Composite Structures LLC. There was commercial interest in the containers, and with funds from an initial public offering Aerobox established a manufacturing plant in Bernalillo, aiming to make 15,000 units a year.

The company needed a manufacturing and engineering manager, and Matt left through ESTT in 2004 to step into the role. "I helped them get set up, get production capability going, and troubleshoot the problems," he says. "My goal was to get them on their feet."

Matt stayed 14 months, at which point Aerobox had 60 employees and was producing containers. "We helped them develop a world-class product," he says. "The standard product is aluminum post-and-beam with aluminum skins. They damage easily and there is a constant need to pull units out and repair them. Ours stayed in the field six to eight times longer."

Matt returned to Sandia with the skills to become a manager, currently leading the Design Methods & Quality Dept. 2997. "Aerobox was the biggest management job I had done to date," he says. "The experience served me well. I learned a lot about managing in the real world."

Follow the sun

Jim's focus at Sandia was in concentrating solar power (CSP). He worked in CSP development programs for 15 years after coming to the Labs in 1987. One of them was Solar Two, a large solar power plant built in the Mojave Desert near Barstow, Calif.

The commercial demonstration project, capable of producing 10 megawatts of electricity, was a joint project of 11 organizations led by Southern California Edison Co. in partnership with DOE. Sandia was the technical adviser.

"It demonstrated thermal storage. You could collect energy during the day and dispatch it in the evening or night, producing power when the sun was not shining," Jim says. "It was a very successful project in that it led to a number of such power plants being built by other companies around the world."

Jim had been involved with Solar Two through concept, design, construction, test, and evaluation. His reputation spread, and he was recruited by several companies when CSP technology took off in the marketplace.

Jim left Sandia through ESTT in 2008 and joined eSolar, a Burbank, Calif., startup that was developing a 5-megawatt commercial demonstration project in Lancaster. He stayed with the company three years. "I helped them with key performance evaluations, developed the thermal storage system, generated several patent applications, and helped them win a DOE contract award," Jim says. "I helped steer the company toward more advanced technology."

He returned to Sandia and the CSP department and later moved to Active Response & Denial Dept. 6634 developing security technologies.

Jim says his ESTT experience taught him how the venture capital system works. "It's really fascinating," he says. "When companies have capital and direction, they can move fast. Things happen quickly. I got a first-hand look at how the free-market system works."

* * *

Jim, Matt, and Laurence all say ESTT was rewarding and educational, and that they would recommend it to anyone with entrepreneurial thoughts. "The beauty of this is that there is a safety net," Laurence says. "You can come back to Sandia."

Jim says he felt he made a difference and helped lead eSolar in a successful direction. "I gave them my experience," he says.

"I'm a big fan of the program," Matt says. "It's a way to help create jobs in New Mexico. It helps the local economy and it benefits Sandia."

Laurence says ESTT is in line with Sandia's philosophy of encouraging people to challenge themselves and try different careers. "I had a goal. I wanted to be a business owner, and I was."

JIM PACHECO

On the job

Six Sandians are currently on ESTT. They are, with the year they left and the company they are working for:

- **David Gaye**, 2010, AMPL Optimization LLC in Albuquerque
- **Paula Sue Downes**, 2012, PRISM Analytics Corp. in Albuquerque
- **Gregory Sommer**, 2012, Sandstone Diagnostics in Livermore, Calif.
- **Benjamin Welch**, 2012, Dynamic Systems and Research in Albuquerque
- **Robert Taylor**, 2013, PRISM Analytics Corp. in Albuquerque
- **Damien Rouson**, 2013, Sourcery Inc. in Albuquerque

Eyes and ears of the Labs

Team puts its spin on key diversity programs

TEAMWORK — From left, George Wagner (6612), Steve Rohde (5965), Elizabeth Lopez (2144), Marie Capitan (3010), Denise Soto (4242), Briana Sanchez (3010), and Cody Ramirez (3010) are all involved with the Corporate Diversity Team. Marie, of the Diversity & Inclusion Department, is project lead for the CDT, and Briana and Cody are graduate student employees. George, Steve, Elizabeth, and Denise are CDT members.

(Photo by Lloyd Wilson)

By Nancy Salem

The workforce diversity movement at Sandia has a small but mighty ally in its corner. Thirteen people from different regions of the Labs bring their knowledge, sensitivity, and courage to the task of building conversations around the many facets of diversity.

"They are the eyes and ears of the divisions," says diversity workforce specialist Marie Capitan (3010). "They provide input on how we can make this effort more effective and relevant to Sandia."

The 13 make up the Corporate Diversity Team (CDT), formed in 1993 to promote diversity-related activities within divisions. The CDT is a counterpoint to the Executive Diversity Council (EDC) whose 11 directors advise and engage executive management and help develop strategies.

The CDT membership has evolved over the years and currently includes at least one person from each division, either a Level 1 manager, staff, or union representative. Members volunteer their time for three to four years and act as ambassadors between their divisions and the Diversity & Inclusion department headed by senior manager Esther Hernandez (3010).

"They help our office develop the different tools and resources available to the workforce," says Marie, project lead for the CDT.

The team provides guidance on four Diversity & Inclusion programs that work together and have existed in their current forms since 2010: Diversity Cinema, Heart of Diversity awards, Workshops-in-a-Box, and Diversity Dialogues.

"Team members contribute input to the design and flavor of the tools," Esther says. "What is great about this team is that they set a direction and are committed to it."

An opportunity to explore

Diversity Cinemas are held once a month and feature a film and discussion on a particular topic. CDT members help identify films and shape questions. Recent programs have focused on race, gender, sexual orientation, and assertiveness.

"The goal is to gain learning and awareness through thoughtful dialogue that provides the opportunity for questions about things we've always wanted to know but lacked the forum to ask," Marie says. "One discussion was around creating an inclusive environment for people in the GLBT (gay, lesbian, bisexual, transgender) community. What are the experiences of Sandia's GLBT members? How do I feel about having a GLBT member on my team? What is my intent in finding out if someone is GLBT?"

Diversity is …

In alignment with Sandia's Strategic Objective #5 — Commit to a Learning, Inclusive, and Engaging Environment for our People — the Executive Diversity Council created a vision and definitions to set the diversity effort's framework and focus.

Diversity is the mix of differences and commonalities that each person brings to Sandia, and inclusion is the act of recognizing, accepting, and valuing the Labs' diversity for exceptional service in the national interest. The EDC vision is that Sandia will build and sustain a diverse workforce where all individuals know that they are important because they are valued, included, treated with respect and dignity, and are fully productive contributors to mission success.

Esther Hernandez, senior manager of Diversity & Inclusion Dept. 3010, says employees who feel respected, valued, and included are more engaged and productive. "A diverse and inclusive workforce enables us to hear all the ideas at the table," she says.

Another program addressed weight bias. The Health Benefits and Employee Services organization gave Marie and the CDT insights into obesity's biological factors. "This, along with the featured film, inspired thoughtful dialogue that helped dispel myths and stereotypes about people who are overweight," Marie says. "The cinemas enable us to have those kinds of exchanges once a month."

Diversity Cinema is building popularity. In fiscal year 2012, 280 people attended. Not quite half way into FY13, 300 have turned out. "We're identifying topics that are relevant and useful for members of the workforce to have dialogue about," Marie says. "It's an opportunity to learn about something that interests you and that you might not know about."

Recognizing courageous behavior

Heart of Diversity awards recognize individuals, managers, and teams across the Labs who affect positive change in the workplace. The CDT developed criteria for the awards and judges the nominations. "Anyone can nominate someone they work with at any time," Marie says. "The purpose of the award is to recognize individuals and teams for taking positive action to address workplace diversity and inclusion. It can be a hard thing to do. This is courageous behavior, and we want to recognize that."

Two have been given so far. An individual award went to Brent Peterson (3653), audiovisual producer of the "I am a Sandian" diversity video campaign. Oklahoma State University recruiters received a team award for their efforts to increase American Indian representation at the Labs.

Workshops-in-a-Box are one- to three-hour learning modules that dive deep into a range of diversity topics. Among the 15 subjects ready for staff, team, or division meetings are respect in the workplace, generational differences, women working with women, and how to be assertive.

"The CDT designed the Workshops-in-a-Box so that anyone could pick one up and teach it," Marie says. "It comes with a presentation and can include a DVD, handouts, talking points, and suggestions."

Diversity Dialogues are one-line topics such as "What is diversity?" and "What does it mean to be inclusive?" and story-based discussions. Both types can be downloaded from the Diversity website and come with suggested questions to spur interaction. They can be facilitated by any member of the Diversity & Inclusion organization, a CDT representative, or a workforce member.

"You would be surprised at the dialogue that is generated when you just ask the questions," Marie says. "What you think people might answer is very different from how they do answer. The point is to have the discussion and exchange ideas with everyone in your organization."

Raising awareness

CDT contributes to the design and development of all the programs. "They have the resident knowledge on how best to ask these questions. They put their spin on it and we incorporate it as part of the overall design," Marie says. "They also deliver programs and provide feedback. What works in 3000 might be different than what works in 1000 or 5000. I am lucky to work with an incredible team and grateful for this opportunity to work with them in designing useful and relevant tools and resources for the Labs."

Elizabeth Lopez (2144) has been a CDT member for more than a year. She says it means a lot to her to make an impact through diversity. "It's nice to be able to do things in the area of diversity that affect the whole Laboratory," she says. "This is important. What CDT does is help raise awareness. If you are aware then you are more likely to behave in ways that are inclusive."

Longtime CDT member George Wagner (6612) says promoting diversity lets him interact with different people and become a better person and employee. "I see how Sandians care about one another just as much as they care about their jobs and technology," he says.

My uncle. My hero.

'I thought I was going to set the world on fire'

Uncle of retired Sandian Sandy Smallwood is still setting off sparks at age 104

RETIREE SANDY SMALLWOOD and her 104-year-old uncle Carroll Stewart. (Photos courtesy of Sandy Smallwood)

By Iris Aboytes

Note: Iris Aboytes retired from Sandia in December 2011 after a long and varied career, including more than a decade as a writer for the Lab News. *She took a timeout from retirement recently to write this story after meeting Carroll Stewart, the unforgettable uncle of fellow retiree and friend Sandy Smallwood.*

Sometimes as we get close to retirement, we wonder what we are going to do with the extra time on our hands. Happiness is knowing we don't have a have-to schedule. Carroll Stewart, 104 on March 21, has never thought of that. He just keeps on doing what he is doing.

He works five days a week at a senior citizen's home reading and pushing wheelchairs. He helps those who are vulnerable and unable to help themselves.

Stewart's niece, Sandia retiree Sandra Smallwood, says, "My uncle is pretty amazing, doing what he does at his age. I retired in 2011, and he can run circles around me when it comes to his energy level."

He is completely independent: He lives by himself and still drives his own car, does his grocery shopping, and cooks his own meals.

"I'm a pretty good cook," he says. "I can make real good soup. I enjoy a good cucumber, tomato, and salmon sandwich on bread that I bake. I don't eat too much red meat. I'm a little particular about where I buy my groceries. I like my vegetables and my foods to be without additives."

Upon meeting Stewart, his age does not enter into the picture. He is aware of the world around him.

"I don't take much medication," he says. "I wake up every morning and drink water with honey and vinegar, as hot as I can stand it. Sometimes I drink it more than once a day."

Does he do any exercises? "I am going to start today," he says with a small grin. The discussion about exercise ends there.

"I moved here to be with my brother [Sandy's father], who wasn't doing well," says Stewart. "He died a few years ago, but I decided to stay. I was home." He does have other options — his 77-year-old son, Darrell, lives in Connecticut. "I don't like the weather there," says Stewart.

Stewart grew up on a farm in North Dakota. He wanted to be a real farmer, just like his dad. He was the oldest of three brothers. He and his brothers took turns with the chores. There were chickens and hogs to feed, cows to milk, and wheat and corn to harvest. He was 10 years old when he began driving the tractor to pull the wagon and hay loader. "I've been driving for a long time," he says in a matter-of-fact way.

"Unfortunately there was no money in farming and my family moved to Geneva, Ind., where my father went into the milling business. The mill he operated had four milling machines that made breakfast cereals, Snow Drift flour, and bran."

Stewart's father sold the mill and by 1926 moved the family to Shelbyville, Ind.,where he went into furniture manufacturing.

"There were 50 furniture factories in Shelbyville," says Stewart. "We learned to build all types of furniture. In the farm my dad fixed anything that broke, so it wasn't too hard to build furniture."

Stewart went to business college in Kansas, then went to work at a refinery. With World War II, he went to work for the Veterans Administration.

"I helped service personnel with their insurance," says Stewart. "For a few months I lived in the basement of a building across from the White House but was transferred to New York City.

'Thought we were really something'

"By that time, I had gotten married and needed a second job to make ends meet. I moonlighted at the Roxy theatre as a ticket taker. We [ticket takers] thought we were really something. We wore great uniforms with matching caps."

After World War II, Stewart went to work in Dallas. Still intrigued with a donut maker he used to see on his way to the Roxy, Stewart quit his job. He withdrew his retirement funds, bought a donut-making machine, and opened his own donut shop, the Donut King.

"I thought I was going to set the world on fire," says Stewart. "But, that didn't happen. We added soft ice cream and hamburgers but ended up selling the shop.

"I moved to Arlington, Texas, and worked in an aircraft plant in Grand Prairie for about 17 years. I was the lead in the landing gear department. "

Stewart retired from that plant, but not before he took a leave of absence and went to Gunnison, Colo., to take a course in hotel management. "I was preparing myself for retirement," says Stewart. "After I retired from the plant, I went to work for my brother, who was a hotel manager in Gallup."

Stewart eventually ran his own hotel and then retired and stayed retired.

Stewart plays the accordion and harmonica in church. The harmonica is his favorite. As a young man, he had his own band and was featured on the radio.

Besides studying the Bible and his music, Stewart paints, sketches, builds cabinets and model airplanes, and pretty much is his own handyman. He recently designed a water filtration system for his apartment.

Reminiscing, he says, "The only thing I wish I would have done is learned to fly. When I was a young boy still on the farm, a plane landed in our field and I got to ride next to the pilot. I really enjoyed that. But I guess it is getting too late to do that.

"I think my faith in God has kept me safe all these years. I don't stop to think what will happen next. I just live life — one day at a time."

"I'm a pretty good cook. I can make real good soup. I enjoy a good cucumber, tomato, and salmon sandwich on bread that I bake. I don't eat too much red meat. I'm a little particular about where I buy my groceries. I like my vegetables and my foods to be without additives."

The wisdom of Carroll Stewart

"I don't take much medication. I wake up every morning and drink water with honey and vinegar, as hot as I can stand it. Sometimes I drink it more than once a day."