B61-12 team reaches milestones in nuclear deterrence mission

By Michael J. Baker

Sandia’s B61-12 nuclear weapons team has accomplished several milestones, including the gravity bomb’s final design review and the first production completion of several components for the life extension program.

“These are tremendous steps forward for the B61-12 Life Extension Program,” said Jim Handrock, weapon systems engineering director. “Through the hard work of many individuals, this program has successfully met all major deliverables on the path to providing a modernized nuclear deterrent for the nation. I am very proud of the work that Sandia has done over the years to get to this point.”

The B61-12 design was presented for final review by Sandia and Los Alamos national laboratories to an independent peer-review panel of 12 military and civilian experts last fall. The panel met at Sandia and examined electrical, mechanical, thermal and flight-testing data and analysis.

“The review represents a significant milestone for the program and the nuclear weapons complex as a whole,” said Jennifer Franklin, a manager on the final design review team. “It is the culmination of all the program design accomplishments to date and gives us confidence that the B61-12 system is ready to proceed forward with final design and production qualification activities.”

NNSA lists the final design review as one of the remaining major milestones for the B61-12 Life Extension Program before the first production unit, scheduled for 2020, and complete production in fiscal year 2025.

“The final design review assesses the weapon as a whole and the ability of the system to meet customer requirements,” Jennifer said. “A summary of all component-level final designs is provided to ensure previous action items are resolved. The review verifies there are no significant design details in flux, and the design can be reliably produced as defined.”

Refurbishment programs at Sandia

Sandia is the design and engineering lab for nonnuclear components of the nation’s nuclear stockpile, including the B61-12. In addition to non-nuclear component development, Sandia serves as the technical integrator for the complete weapon, assuring that the system meets requirements as a whole and not just as individual parts.

— CONTINUED ON PAGE 3

Future hypersonics could be artificially intelligent

Sandia to lead academic coalition to develop autonomy for aerospace

By Troy Rummler

A test launch for a hypersonic weapon — a long-range missile that flies a mile per second and faster — takes weeks of planning. So, while the U.S. and other states are racing to deploy hypersonic technologies, it remains uncertain how useful the systems will be against urgent, mobile or evolving threats.

Sandia has made and tested hypersonic vehicles for more than 30 years. The Labs’ hypersonics developers think artificial intelligence and autonomy could slash these weeks to minutes for deployed systems.

To prove it, Sandia is forming Autonomy New Mexico, an academic research coalition whose mission is to create artificially intelligent aerospace systems.

“AutonomyNM is a gathering of some of the best minds in autonomous systems technology in a uniquely oriented, collaborative environment,” said Michael Burns, associate labs director for national security programs. “We expect it to make important impacts on a number of research areas.”

AI could accelerate flight planning

A hypersonic boost-glide vehicle — the type tested by Sandia — launches into space aboard a rocket, then detaches and uses only its momentum to sail across the upper atmosphere before finally plunging back to Earth and its target.

“At extreme speeds, the flight is incredibly challenging to plan for,” said Alex Roseler, a senior manager at Sandia who leads the coalition.

— CONTINUED ON PAGE 8
By Johann "Yo" Snyder

“It hurts. Daddy, it hurts.”

It was only a few months ago that my youngest daughter sat on the edge of a hospital bed. The IV lines and pumps and who knows what else made her look like she was hooked up to the Matrix. Her eyes clouded with pain, her voice a strained whisper, her body rigid and hurting — I felt my heart breaking.

And yet, I had to help her to keep going, to endure more pain, because that was the road to recovery. The scene was post-operation day two after spinal fusion surgery to correct her scoliosis. For both of us, it was the very epitome of what it meant to have a hard day.

No parent wants to see their child in pain, and what father can ever bear to watch his baby girl cry out like that. Nothing makes that bearable, but some things help hone the jagged edges so it might — just might — be endurable.

Friends and family always help. Faith is a must. However, there’s something else that I’ve discovered since coming to work at Sandia that I appreciate: deeply the Sandia community. I don’t think I ever really thought about, or maybe I just plain didn’t realize, how special the community of people who work here really is. It certainly never sunk in that I was now a part of it. But as I endured one of the darkest weeks of my life, watching my daughter suffer in tremendous pain, I came to realize how precious it is to be a member of such a close-knit, caring community. Reflecting back on those tough times has only made that glimmer more endurable.

I know that many in this Sandia community understand that being a daddy sometimes comes before being a tech writer. To have that kind of support, that kind of peace of mind, offered by the community of Sandia made a truly difficult period at least a bit more endurable.

I know that many in this Sandia community in which I’m now so immersed have battled terrible illnesses or deaths of loved ones. I know others face a range of serious problems that may be invisible to those working alongside them. I wanted to write this column about my own experience as a message to them, so that they can come to a realization like the one that struck me last year — that they are part of something greater, a community of individuals who will be there for them, every time.

Thank you, Sandia, for allowing me to be a part of your community, and for giving me the support and care that great communities provide to their own in their time of need.

Mendy's daughter, Sandia's community

Daddy’s girl, Sandia’s community

Enjoy The Ride — Johann Snyder stops to ponder life's unexpected twists and turns during a family trip to Disneyland. Photo by Kay Snyder

By Michael J. Baker

Sandia aerospace engineer to head national institute

By Michael J. Baker

McMasters and his colleagues have been working on projects involving hypersonic vehicles, propulsion systems, and aerodynamic performance. The team has been working closely with the Air Force Office of Scientific Research to develop new technologies for hypersonic flight. They have also been working on the development of new materials for the aerospace industry, with a focus on lightweight, high-performance composites.

In the future, the team plans to continue their research in these areas, as well as exploring new applications of hypersonic technology. This includes developing new propulsion systems for commercial aviation and exploring the potential for hypersonic travel to other planets.

In addition to his work in aerospace engineering, McMasters is also involved in research on renewable energy sources. He has been working on projects involving the development of new energy storage technologies, as well as exploring the potential for using renewable energy sources to power hypersonic vehicles.

Overall, the team at Sandia is looking forward to continuing their work in these exciting areas, and making important contributions to the field of aerospace engineering.
Nanomaterials researcher wins mid-career research award
Former postdoctoral student Kaifu Bian also honored for nanowire work

By Neal Singer

Sandia National Laboratories materials scientist Hongyou Fan is the sole recipient of this year’s Mid-Career Researcher Award from the Materials Research Society, the largest U.S. materials society. The distinction is given midway in a researcher’s career for exceptional achievements in materials research and for notable leadership in the field.

Hongyou was chosen for “outstanding contributions in nanoparticle self-assembly of functional nanomaterials.”

He is widely recognized for pioneering work that employs stress rather than chemistry — the more conventional approach — to form new materials at the nanoscale. The patented stress-induced assembly method uses mechanical force to change the structure of materials, which has produced nanomaterials with structures and properties not achievable using chemical synthesis methods. The results — often finer, cleaner and more flexible than those produced by chemistry — are easily integrated into industrial manufacturing and leave no harmful byproducts, which can be unfortunate residues of chemical methods.

A distinguished member of Sandia’s technical staff and a national laboratory professor at the University of New Mexico, Hongyou is the first U.S. national lab researcher to win the mid-career award, which has been presented annually for the last seven years. Previous winners have been associated with Harvard University, Stanford University, the University of Illinois at Urbana-Champaign and other universities.

In April, Hongyou will receive a $5,000 cash prize, a trophy and a certificate at the society’s meeting in Phoenix.

By Sandia National Laboratories

The B61-12 Life Extension Program will refurbish, reuse or replace all components to extend the bomb’s service life by at least 20 years and improve its safety, security and effectiveness.

The first B61 entered service 50 years ago, and over the decades numerous modifications have been made to increase safety and reliability. The B61-12 consolidates and replaces most of the previous variants.

A life extension program allows scientists and engineers to address the aging of nuclear weapons components. Some components are reused by being requalified to go back into a weapon without change. Others that have aged are remanufactured using the original specifications. Sometimes the original technology is no longer available, and Sandia redesigns those parts using modern technology.

While the complete weapon system goes through a rigorous testing and review cycle before its first unit is produced, each component within the system also goes through a similar process of testing and qualification.

The B61-12 Life Extension Program teams have already produced first units for several components. The milestone marks the end of the design and development process,

IMPACT TEST — A B61-12 test unit slams into a target at the end of Sandia’s 10,000-foot rocket sled track in a complex forward ballistics test. The test, which mimicked a high-speed accident, allowed engineers to examine safety features inside the weapon.

Reaching the first production milestone for a component means it has undergone an extensive set of tests to ensure it always works when authorized and never otherwise.

Impact, vibration, drops, extreme temperatures and massive electrical impulses are just some of the tests conducted to show a component will operate as intended, as part of the overall system.

“They’ve all been put through the shake, rattle and roll testing,” said Jerry, who is now a flight systems project manager. “There are really two conditions for testing, a normal environment and an abnormal environment. Those are both covered with extensive computational analysis and testing.”

The pairing of computational analysis and advanced computer algorithms with field testing data, including flight tests at Sandia’s Tonopah Test Range, have added a high degree of confidence in the B61-12 design. Jerry said. “All the evidence comes together — demonstration, analysis and tests — to show that the design meets requirements,” she said.

MATERIALS MAVEN — Sandia National Laboratories materials scientist Hongyou Fan received the Materials Research Society’s Mid-Career Researcher Award.

Photo by Randy Montoya

The B61-12 team milestones CONTINUED FROM PAGE 1

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“That’s why it’s such a big deal,” said Steve Moya, a manager with B61-12 product realization. “These teams have been working on this for the better part of a decade.”

Between now and when the weapon system will have its first units produced, Sandia will ready dozens of B61-12 components for production.

“We’ll hit a crescendo of activity this spring all the way through September,” Steve said.

“All design and development processes are approved, and the components are qualified for high reliability,” said Jerry Stoughton, a former product realization manager with the B61-12 program. “They can be produced with the approved processes.”
Sandia’s Employee Recognition Awards were presented earlier this month to 34 individual honorees and 66 teams who made major contributions to mission success. The honorees are nominated by their peers and go through selection by their divisions, with final approval by the associate laboratories directors. The individual winners were recognized in the categories of leadership, exceptional service and technical excellence.

Individual portraits by Lonnie Anderson
Team photos by Norm Johnson
California (outdoor) photos by Randy Wong
TEAM HONOREES

**DIVISION 1000**

**ALEGRA Radiation Capabilities**

The ALEGRA code was expanded, allowing accurate, 3D, fully coupled radiation-hydrodynamic multiphysics simulations of new and complex materials, components and processes in radiation environments, and made compatible with modern transport codes (e.g., SCEPTRE).

**Annular Core Research Reactor Facility Reactivity Control System Upgrade**

The team successfully completed the Reactivity Control System Upgrade project that will ensure continued reliable reactor operation for nuclear weapons program testing and component qualification at the ACRF Facility.

**Astra Supercomputer**

The Astra supercomputer procured the world’s largest high-performance computing system based on the Arm processor, working on a very aggressive schedule to obtain Sandia’s fastest computer, meeting several important programmatic and technical milestones.

**Building 860 Mechanical Shock and Experimental Impact Mechanics**

The team provided outstanding dynamic mechanical testing services in support of multiple programs, including W76, W79, W80, W87, W88, B61, Conventional Prompt Global Strike, Delivery Environments and Advanced Simulation and Computing.

**Collaborative Design of Thermal Battery Simulation Software**

This multidisciplinary team, including experimentalists, computationalists, customers, managers and validation experts, worked across divisions and with the Joint Munitions Program to release TABS v. 5.0, a multi-physics thermal battery simulator.

**External-facing Unclassified Unlimited Release Publications Database**

Sandia’s UUR External Publications Database is an external-facing web-based application used to collect, manage and publish Sandia’s publicly available research to execute the DOE Order 241.1B mandate to provide public accessibility to scientific and technical information.

**High-Flux Concentrating Solar Reactor for Testing Advanced Materials Under Extreme Environments**

This award was for developing a first-of-its-kind solar reactor, capable of testing materials under high-pressure, high-flux conditions to improve understanding of materials performance. Several technical teams effectively collaborated to deliver a system within technical scope and budget, leading to additional customers.

**Reaplication Self-Checkout Kiosk**

The team improved how customers request and receive items from Reaplication/NM and CA by replacing the time-consuming and manual paper process with efficient electronic self-checkout kiosks. The kiosks save 20 paper sheets and 833 labor hours annually.

**Temperature Diagnostics**

This team applied infrared pyrometry measurements on “low temperature” Z dynamic compression experiments, enabling a new class of diagnostics for interrogating material response.

**DIVISION 2000**

**B61-12 System Final Design Review**

The System Final Design Review team collaborated with teams internal to Sandia and across the nuclear weapons complex to present the state of design verification with technical excellence.

**Code Management System**

This award recognized the CMS team’s outstanding contributions in meeting numerous commitments and exceeding expectations by delivering on several unplanned commitments required in preparation for the CMS Nuclear Explosive Safety Study.

**Electronic Neutron Generators Product Realization (Design Agency and Production Agency)**

The ELNG product realization team successfully completed the 35:0 qualification testing for the B83, B61 Legacy, and B61-12 ELNGs, and released B83 and B61 ELNG Qualification Engineering Releases two months ahead of schedule.

**Engineering Data Management**

This award is for outstanding collaboration in support of Nuclear Deterrence-related product realization activities and for sustained excellence in customer service. The EDM team processed and released more than 49,000 engineering documents between May 2017 and September 2018.

**Fusion Cell: Nuclear Deterrence and Intelligence Collaboration**

The ND Fusion Cell is a collaborative group of Nuclear Enterprise Assurance and Intelligence subject matter experts from Sandia NM and CA that is developing a threat informed workforce and enhanced skills across Nuclear Deterrence and Strategic Partnerships Programs mission space.

**Magnetics Procurement Index Elimination**

The Magnetics product realization team established considerable mistake-proofing and decreased cycle time by finding an alternate solution and eliminating the use of the problematic Procurement Index.

**Magnesium Oxide**

The MgO team addressed one of the most significant material availability challenges at the Labs. The team partnered across Sandia and at vendors to execute a strategy to ensure MgO supply for commitments.

**Mobile Guardian Transporter Vehicle Electronics**

This award is for outstanding technical achievements in delivering hardware, firmware and software to support both pre-qualification testing and the prototype 1 testbed of the Mobile Guardian Transporter Vehicle Electronics.

**Plan C**

The Plan C team exemplified exceptional collaboration to establish production capability in record time to recover schedule and manufacturability confidence for a critical sub-component.

**SSMP Weapon Activity Capabilities Writing**

This team demonstrated exceptional teamwork in writing 19 weapon capability descriptions over four days for the FY 19 Stockpile Stewardship and Management Plan to meet critical publishing deadlines.

**W76-1 Joint Test Assembly-3 Development**

The W76-1 JT3 team, with Los Alamos National Laboratory and Kansas City National Security Campus, completed a re-scoping study Delta-Feasibility Gate Review resulting in the adoption of an architecture that provides a major increase in data for Sandia and Los Alamos.

**W80-4 Model-Based Definition Project**

Applying Model Based Definition concepts, Design Engineering and W80-4 Systems created and released 3D product definition for a piece part, which represents a major step for improving model quality and manufacturability for nuclear weapon product realization.

**W88 ALT 370 JTSA-LT-12 High Explosive Test Safety Planning**

Proactive planning for unique hazards/test led to identification and successful implementation of facility upgrades, new procedures and Work Planning and Controls. Successful collaboration proved pivotal, given the high impact and high consequences of the JTSA-LT-12 test.

**DIVISION 3000**

**Collective Bargaining for MTC and OPEIU Negotiations**

In FY 18 Sandia’s bargaining teams worked with the Metals Trade Council and the Office and Professional Employees International Union, both of which separately voted to ratify the first collective bargaining agreements negotiated between Sandia/NTI/ESS and the unions.

**Time Away From Work Benefits Proposal**

The team identified, benchmarked, analyzed and proposed options for benefit plan designs to comply with prime contract requirements to meet DOE directives and the needs of Sandia’s workforce.
A key accomplishment of the FMS project is the creation of the Work Coordination and Control team. Facilities Management System Implementation The team developed and implemented of START to enable effective communication and to reduce costs. Sandia Total Access Request Tool The development and implementation of START used newly developed common architecture to make the personnel security clearance processes more efficient, reducing clearance processing times, consolidating and integrating cross-organizational systems and thereby substantially reducing resources.

Advanced Concepts During FY 18, the Advanced Concepts team performed a unique analysis set supporting a national security Strategic Partnerships Projects customer. The team developed, applied and demonstrated unique modeling and simulation capabilities that enabled important analysis regarding future concepts.

Application-Specific Plastic Ball Grid Array Recovery The PBGA team worked closely with stakeholders to overcome numerous technical, logistical and quality challenges and to deliver microelectronics that meet mission needs and maintain schedules.

Carlsbad Control Electronics With a very compressed schedule, this team developed an extremely complex control electronics system. The integration and delivery of the custom control electronics showcased the expert technical abilities of the entire team.

CAVSS Development The CAVSS Development team successfully designed, built and acceptance-tested a field-ready integrated hardware and software solution in under six months (versus original plan of two years) to meet an urgent national security need.

DOE Emulated Experiment 1 The Emulated Experiment 1 for DOE executed analysis and modeling to demonstrate to reduce cybersecurity risk from potential attacks on control systems used in the U.S. electric industry.

HTS Lombardi Code Yellow Resolution The core team successfully executed a Labs-level effort for an aggressive six-month recovery to resolve anomalies in a mission critical microfabrication process and completed six-inch wafer production prior to the fab conversion to eight-inch processing.

Roadrunner The Roadrunner team provided an exceptional example of collaboration, operating under tight constraints, to scientifically prove that Sandia’s Coherent Change Detection capability can have a strategic impact on border security.

Silicon Fab Operations and Improvement The SiFab Operations and Improvement team set all-time records for lot moves in FY 18 through exceptional teamwork, customer service and operational innovation.

Smoke Ring Deliveries A team was rapidly formed to deliver for immediate customer use. The team decomposed a large shipment into easily handled quantities for field operations by a delighted sponsor. Weeks later, same song second verse!

Sandia Restricted Network/Hydra One-Way Transfer The Sandia Field Intelligence Element Special Programs and FIE Information Technology Services organizations implemented an OASIS One-Way Transfer Diode between the Sandia Restricted Network and Hydra.

Conventional Prompt Strike Flight Experiment-1 Project The FE-1 project team conducted a flight test on Oct. 30, 2017. The flight system launched from the Kauai Test Facility, Kauai, Hawaii. The successful test provided data on hypersonic boost-glide technologies and long-range atmospheric flight.

Time Dominant Operations Cell This cell deployed the first ever operational infra-sound detection system so the nation can execute its time-dominant monitoring mission.

X-Ray Toolkit Version 3 X-Ray Toolkit 3 is an update of Sandia’s image processing and analysis tool for emergency responders. XTK has more than 11,000 users across civilian and military bomb squads around the world.

Y-12 Security Improvement Program - Buried Line Replacement Project Sandia completed its first design-build project for NNSA at the Y-12 National Security Complex. The project was part of a Security Improvement Program to replace aging critical security infrastructure.
The core team developed and implemented a new financial model in FY18, significantly reducing cost pools, overhead rates and internal transactions. The team was recognized for providing noteworthy practices, a record for QAS 1.0s. Outstanding assessment results with 10 QAS 1.0 assessment in March 2018, earning Sandia QAS 1.0 reserve stockpile. This team developed and matured additive manufacturing qualification strategies for current and future systems and parts for insertion into the war reserve stockpile.

The team successfully planned and participated in a series of simulated nuclear incident response drills, the RadResponder Nationwide Drill Series. The team from Human Resources Staffing, Legal and Counterintelligence crafted, established and implemented a new process to assess and manage risk introduced by individuals being offered permanent employment at Sandia.

Coby Davis was recognized for extraordinary leadership in the development of the Stockpile Evaluation Working Group, whose work has led to an integration of Nuclear Deterrence and science and technology across Sandia.

The team conducted a flight test launched on Oct. 30, 2017, from the Kauai Test Facility, Hawaii. The successful test provided data on hypersonic boost-glide technologies and long-range atmospheric flight.

Division 11000
Organizational Conflicts of Interest
The Organizational Conflicts of Interest team implemented a robust OCI Program, which mitigated risk in numerous areas for NTESS, enabling critical mission work to continue and providing NNSA with assurance that NTESS is adequately mitigating OCI risk.

EXECUTIVE SUPPORT DIVISION
Pre-Hire Review Process
This team from Human Resources Staffing, Legal and Counterintelligence crafted, established and implemented a new process to assess and manage risk introduced by individuals being offered permanent employment at Sandia.

RadResponder Nationwide Drill Series
The team successfully planned and participated in a series of simulated nuclear incident response drills to evaluate RadResponder software for laboratory analysis response functionality.

Coby Davis was recognized for exceptional performance. His projects and accomplishments have been judged exceptional.

Each division submits one or more of its winning ERA nominations to be considered for the prestigious Laboratories Director’s Award. Labs Director Steve Younger presented the 2019 Director’s Award to one individual and two teams whose achievements were judged exceptional.

Coby Davis
Coby was recognized for extraordinary leadership in the development of the Stockpile Evaluation Working Group, whose work has led to an integration of Nuclear Deterrence and science and technology across Sandia.

Division 10000
Computer Depot
This team developed and implemented a consistent, streamlined Corporate Enterprise process for building and deploying new Microsoft Windows computers. A centralized, dedicated “Builds Depot” located in New Mexico performs builds for Sandia’s NM/CA/NV geographic locations.

The team conducted a flight test launched on Oct. 30, 2017, from the Kauai Test Facility, Hawaii. The successful test provided data on hypersonic boost-glide technologies and long-range atmospheric flight.

SANDIA INFRASTRUCTURE INVESTMENT 2040 STRATEGY
The team created the 2040 Strategy, a single vision for major capital investment to the year 2040, based on mission risk, that provides consistent communication within Sandia and to external sponsors.

W80-4 Weapon Design and Cost Report
The W80-4 team completed one of the largest deliverables for the Labs, the Weapon Design and Cost Report, using programmatic processes and tools more advanced than any previous Life Extension Program.

725-East High-Performance Computing Data Center
Construction of Sandia’s new world-class High-Performance Computing Facility was the result of a highly-effective collaboration between centers across divisions 10000, 4000 and 9000. The facility is LEED Gold Certified and features novel energy and water conservation technologies.

Additive Manufacturing Qualification
This team developed and implemented a new process to see orders in process, including most recent updates, and provides SDRs an aggregate list of their contracts from an easy-to-access Techweb portlet.

The tiered accountability team helped the Labs develop and deploy tiered accountability by the end of FY18. This deployment saved time and effort getting to solutions in safety, security and mission effectiveness.

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Sandia Centralized Enterprise Computer Depot
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Subcontractor Risk Assessments
The Supply Chain Risk Management program delivered more than 500 Subcontractor Risk Assessments during FY18, to help missions meet the increasing demand for mature risk management processes and ensure quality goods and services.

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SANDIA INFRASTRUCTURE INVESTMENT 2040 STRATEGY
The team created the 2040 Strategy, a single vision for major capital investment to the year 2040, based on mission risk, that provides consistent communication within Sandia and to external sponsors.

Financial Model Simplification
The core team developed and implemented a new financial model in FY18, significantly reducing cost pools, overhead rates and internal transactions.

My Procurements
My Procurements allows Sandia Delegated Representatives, requestors and prepares the ability to see orders in process, including most recent updates, and provides SDRs an aggregate list of their contracts from an easy-to-access Techweb portlet.
**NM Legislature marks impact of Sandia Science and Technology Park**

*By Manette Newbold Fisher*


The memorials recognized the park for positively contributing to the local and state economies, for being one of the first research parks developed in connection with a national laboratory and for serving as a model for other laboratories and universities.

The SS&TP is home to 26 buildings and 47 companies and organizations. It provides more than 2,050 jobs. Park officials announced last summer at its 20-year anniversary celebration that it has generated more than $3.1 billion in economic activity since it was established in 1998, and has paid out more than $5.4 billion in wages.

Jackie Kerby Moore, Sandia manager of technology and economic development and Linda von Boetticher, program leader for the tech park, were guests at the Roundhouse during presentations of the memorials.

**Sandia lends expertise to hydrogen center**

*By Sarah Jewel Johnson*

Sandia is building on longstanding partnerships to help found a new global center focused on safety and best practices for the use of hydrogen in the global energy transition. The American Institute of Chemical Engineers, in partnership with Pacific Northwest National Laboratory, recently launched the Center for Hydrogen Safety.

As a founding member, Sandia will build additional partnerships with members from many countries to identify innovative tools, resources and information about traditional hydrogen applications and hydrogen as a fuel source.

The new center stems from a decade-long partnership between the DOE’s Fuel Cell Technology Office and the safety panel. The CHS will enable global collaboration, leverage expertise from the panel and offer a long-term, sustainable hydrogen safety resource to stakeholders, said Chris LaFleur, Sandia’s program lead for hydrogen safety, codes and standards.

The panel reviews DOE research projects on hydrogen technology development. The new CHS will expand the panel’s role to the review of research, products and facilities from many fields and funding sources, in addition to DOE research and projects.

With the help of founding members such as Sandia, the CHS will provide access to educational products, safety resources, hydrogen safety guidelines, conferences, accredited first responder training and safety evaluations by the panel.

The new center also will boost access to Sandia’s Hydrogen Risk Assessment Model, a software toolkit that uses deterministic and probabilistic models to quantify accident scenarios, predict physical effects and define hydrogen hazard impacts on structures and people, based on hydrogen behavior physics and flame properties.

“We can now share Sandia’s hydrogen safety knowledge with a lot of people,” Chris said.

More information about the Center for Hydrogen Safety is available online at aiche.org/CHS.

**Hypersonics could be A.I.**

*Continued from Page 1*

In theory, artificial intelligence could generate a hypersonic flight plan in minutes for human review and approval, and in milliseconds a semi-autonomous vehicle could self-correct in flight to compensate for unexpected flight conditions or a change in the target’s location. A human monitoring the flight could regain control by turning off the course-correcting function at any time.

Autonomous technologies, such as self-driving cars, are designed to perform complicated tasks without human intervention. They require a broad range of technologies that work in tandem, including advanced computing, artificial intelligence and machine-learning algorithms, sensors, navigation systems and robotics.

The Sandia-led collaboration integrates leading expertise from throughout the country in these areas with its own knowledge in high-performance flight vehicles. Sandia makes hypersonic glide vehicles for research purposes and operates a hypersonic wind tunnel.

The academic collaborators represent the Georgia Institute of Technology; Purdue University; the University of Illinois, Urbana-Champaign; the University of New Mexico; Stanford University; Texas A&M University; the University of Texas at Austin; and Utah State University.

AutonomyNM assembles for first conference

The coalition converged last week on the University of New Mexico campus for its first general meeting. For two days, members presented experimental results, proposed new ideas and discussed progress toward their shared goals.

“The research objectives of AutonomyNM are similar to those being studied for self-driving cars and other autonomous system technologies, and we’re building off that groundwork,” Alex said.

“Unfortunately, you can’t put an algorithm developed for a car into a high-speed aircraft, so we’re working with our partners to create new technologies for a new application.”

AutonomyNM’s broader ambitions are to serve as a wellspring for other industries by developing ideas that could lead to safer, more efficient robots in, for example, autonomous transportation, manufacturing, space or agriculture. If the group reaches its goals, it will have created computing algorithms that compress 12 hours of calculations into a single millisecond, all on a small, onboard computer.

Sandia is aiming to complete the foundational technologies of new autonomous flight systems by 2024. In addition to hypersonic flight systems, AutonomyNM plans to explore other applications of autonomy in aerospace, emphasizing solutions to national security challenges.

AutonomyNM is partly patterned after similar collaborations formed by other government agencies, like the Defense Department. The Sandia-led organization differs in its focus on academic partnerships and its objective to develop autonomy customized for hypersonic flight.

“I am excited to announce that funding for AutonomyNM research is provided by Sandia’s Laboratory Directed Research and Development and Academic Alliance programs.”

**Mission Planning**

Involves offline flight planning

**Mission Analytics**

Inform tactics & engagement strategies

**Path Planning**

**Perception**

**Localization**

**Flight Controls**

**ON-BOARD AND OFF-BOARD**

A diverse set of technologies to be developed at Sandia National Laboratories could strengthen future hypersonic and other autonomous systems.

**Sandia Science and Technology Park**

By Linda von Boetticher

The memorials recognized the park for positively contributing to the local and state economies, for being one of the first research parks developed in connection with a national laboratory and for serving as a model for other laboratories and universities.

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By Linda von Boetticher

It’s National Volunteer Month

The City of Albuquerque has new volunteer opportunities available at www.cabq.gov/chs-volunteers
Materials scientist joins 2019 class of 40 Under Forty honorees

By Valerie Alba

It’s only April, but 2019 is shaping up to be a big year of professional recognition for materials scientist Olivia Underwood. She recently was named to this year’s class of Albuquerque Business First’s 40 Under Forty honorees.

Now in its 18th year, 40 Under Forty honors young professionals from around New Mexico. Community leaders judge nominations submitted by the public, evaluating the nominees on their professional achievement, leadership and community involvement, according to the program’s website. The top 40 nominees are profiled in Albuquerque Business First and recognized at a dinner ceremony in May.

“This award confirms that my hard work has been validated by my community, peers and Albuquerque Business First,” Olivia said.

With bachelor’s and master’s degrees in metallurgical engineering from the University of Alabama in Tuscaloosa and a doctorate in materials science from the University of Alabama in Huntsville, Olivia is a first-generation college graduate. In 2015, she became the first African-American to earn a materials science doctorate at the Huntsville campus.

Olivia started at Sandia as a postdoctoral appointee, and now as a product realization team lead, she manages the technical and programmatic aspects for components throughout the product lifecycle.

Olivia has a passion for inspiring students to pursue science, technology, engineering and math studies and careers. She volunteers as an instructor with Sandia’s Hands-On, Minds-On Technologies program, an initiative of the Black Leadership Committee that sparks middle and high school students’ interest in STEM through hands-on activities. She’s also the outreach co-chair of the Sandia Women’s Action Network, and last year she established the Dr. Olivia D. Underwood Scholarship at her alma mater, Bibb County High School in Alabama, to help female African-American students pursue STEM degrees.

Olivia’s work has drawn the attention of other organizations as well. This year she has received the 2019 Black Engineer of the Year Award as Science Spectrum Trailblazer, and the 2019 Frank Crossley Diversity Award from the Minerals, Metals and Materials Society.

“My goal is to always leave every person and space that I encounter better than I found them,” she said. “My focus areas for the future are to help to ensure that we have a more inclusive environment at the lab, to improve the onboarding process, to increase the number of minorities in the science, technology, engineering and mathematics field and to also change the face of STEM.”

Sandia employees frequently appear on the 40 Under Forty list. Previous honorees include Valerie Peyton, manager of Travel and Treasury Services; procurement managers Jake Sena and James Burt; Fabian Aragon, business management manager; Isaac Romero, senior manager; Katie Esquibel, project controller; Kenneth Armijo, energy researcher; Rafael Antonio Gonzalez, operations manager; and Jonathan Madison, materials scientist.

STEM MENTOR — Amy Halloran shows off one of Sandia’s solar research projects. Amy’s mentoring activities were recognized by the New Mexico Technology Council.

Photo by Randy Montoya

Sandia leader recognized for STEM mentoring

By Luke Frank

Amy Halloran, senior manager in renewable energy, was recently honored with the annual Women in Technology award by the New Mexico Technology Council.

The council gives the award annually to outstanding women making a difference in science, technology, engineering and math fields in the state. Halloran, who has a master’s in civil and environmental engineering from the University of Illinois, was recognized specifically for her work mentoring numerous professional women who work in STEM fields in program management.

All Women in Technology honorees have found ways to give back to their communities and mentor other women along the way, according to the council. Throughout her 30-year career, Amy has actively mentored and advocated for women in tech fields. At Sandia, she has actively recruited, hired and mentored numerous technical women into the Labs, the council added.
Last year, Sandia’s National Solar Thermal Test Facility brought in a gold-edged heliostat to collect data on the strength and direction of light reflected from the concentrating solar power field at the solar tower. Labs engineer Cliff Ho and Cianan Sims of Sims Industries have developed a new software, the Tower Illuminance Model, that simulates a field of heliostats and lets users interactively calculate irradiance, glare hazard and potential hazards to birds caused by concentrated sunlight. Solar glare and avian hazards are an important concern for concentrating solar power installations, and the new software in the validated solar test tower lets users select a range of aiming strategies and field configurations and then navigate the simulated airspace above the heliostat field in real time to identify configurations that help mitigate the hazards.

Testing solar irradiance
Mileposts

New Mexico photos by Michelle Fleming
California photos by Randy Wong

Walt Gill 35  Cory Ottesen 35  Bobby Rush 35  Charles J.E. Montoya 30
Randy Peterson 30  Patty Smith 30  Amy Tapia 30  Ginger Hernandez 25  Becky Keanan 25  Lori Montano-Martinez 25
Adam Green 20  Dina Howell 20  Rich Jepsen 20  Mary Ana Moniz-Archuleta 20  Renee Mueller 20  Jacqueline Ramsey 20
Brian Rigdon 20  Amy C. Sun 20  John Van Scyoc 20  Ana Baca 15  Robin Brown 15  Dennis De Smelt 15
Daniel Garcia 15  Lisa Garcia 15  George Hokusson 15  Margaret Jaramillo 15  Antonia Latts 15  Steven Neff 15
Noota Rattan 15  Steve Rudisell 15  Anna Marie Ryder 15  Ben Schenkman 15  Krista Smith 15  Amy Sundermier 15

SANDIA LAB NEWS | April 26, 2019
Scores of Labs employees in Albuquerque, joined by outside emergency response personnel, were immersed in a simulated crisis April 17 as part of the annual emergency management full-scale exercise.

Under the guise of an explosion involving radioactive material at the Annular Core Research Reactor in Tech Area V, Sandia’s Emergency Operations Center was activated, and every level of response tested: from initial evacuations and medical response through getting information to the Labs workforce and the public.

Adding a dose of realism, responders dressed out in full personal protective equipment, and victims were made up in moulage to simulate injuries. A rare New Mexico rainstorm provided an unexpected twist to the exercise, creating impromptu access challenges.

“These annual exercises are specially designed to target current response procedures and improve our future responses,” said Ben Huff, emergency preparedness manager. “Throughout this event, evaluators from Sandia and outside federal agencies took copious notes that will enable us to really drill down on the efficacy of our policies and protocols, and compliance with the DOE order covering the comprehensive emergency management system. Front to back, it’s quite an experience.”

Annual Sandia simulation strengthens emergency response

By Luke Frank
Photos By Randy Montoya
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