Sandia’s Red Storm supercomputer helped the US Navy figure out how to shoot down an errant satellite in February.

The satellite failed shortly after its launch in 2006 and by early this year its orbit was deteriorating to the point where it was about to reenter the Earth’s atmosphere. The satellite posed a potential safety hazard due to the frozen hydrazine propellant on board. The Navy shot down the satellite Feb. 20, 2008. The work had been classified until last week.

For about two months preceding the event, the Sandia team ran Red Storm simulations to assess and plan the complex mission. Researchers used all of Red Storm’s 26,569 processors to perform simulations that allowed the team to predict various details and possibilities. The information contributed to the decision to proceed, and helped DoD plan and execute the shot, as well as conduct analysis after the satellite was brought down.

The work helped planners decide at what altitude to hit the satellite, how to hit it to minimize the spread of debris, including its hazardous fuel, and the best way to make sure the satellite was destroyed with a single shot.

Bill Guyton, director of Center 5400, says the team worked for almost seven years in secret. Most people did not know that the work in Ray Goehner’s (1822) materials characterization department was contributing important information to the FBI’s investigation of letters containing Bacillus anthracis, the spore that causes the disease anthrax — that Labs researchers studied in the course of helping advance an FBI investigation into the 2001 anthrax attack on the US. Five people were killed.

Sandia’s work demonstrated to the FBI that the form of B. anthracis contained in those letters was not a weaponized form, a form of the bacteria prepared to disperse more readily. The possibility of a weaponized form was of great concern to investigators, says Joseph Michael (1822), the principal investigator for the project.
That’s that

Who hasn’t been paying attention to the stock market and all things financial over the past few weeks? Speaking of which, don’t you love how these crises, be they financial, meteorological, or geological, spew so much hot air from the mouths of so very few who pronounce weightily upon the import of these goings on – after they happen.

Hey, I say to the talking heads on TV, I bet you never heard of “mark-to-market” until yesterday afternoon. Sure, we’re all a little bit afraid of what that term means, but – of left and right – of up and down – the cake for bickering self-importance and spurious insight. Reading the papers and blogs, watching the news, and listening to the radio, it strikes me that I’m the only guy in the US who doesn’t have a clue or an opinion as to what happened on Wall Street or how to fix whatever it is that’s happened.

I don’t mind admitting – I’m not proud of it, but I’ll admit it – that my understanding of stock markets, financial markets, and yes, “mark-to-markets,” is pretty slim (and I mean, as a matter of fact, just walked out the door). That’s why I’ve always been grateful for access through our 401(k) program to a professionally managed investment portfolio. Even so, when things go south fast in the stock market, when you look at the sinking numbers and the year-to-date percentage losses in your 401k, your confidence in the professionals begins to waver. Should your money even be in the market right now? What to do? What to do?

Knowing that I work alongside some of the smartest people around, I decided to put the matter to my fellow Sandians. Since I have some latitude in choosing the questions we pose in our online Lab News Interactive polls, I asked: “Do you intend to keep your retirement funds in a 401(k) or move to a different form of retirement investment?” I included these response options: Stay the course. Bail out. Make changes. Don’t know. I answered the poll first and said “stay the course,” but I didn’t know if I was on the right track. As the numbers started to come in, I began to feel a bit better and better. With 99% plus response to the poll question, a strong majority of the smart folks around here chose the same answer I did: Stay the course. Wow. What a relief to see that just 3 percent of respondents chose the “bail out” option. Three percent. Huh?

But then I remembered something, a nagging something, a statistic I’d read somewhere: Mensa estimates that two percent of the population are true geniuses. Hmmm. Here at Sandia, we’ve probably self-selected a higher number than that. Just at a guess, I’d bet that our Sandia genius population is probably 50 percent higher than the national average. Say three percent.

Three percent!! Bail out! Bail out!

Sandia’s ECF and SHARE campaigns are now under way. It says something special about the people here – and about our unique Sandia culture – that we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with the same vigor we embrace our responsibility to our own community with 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Kirtland military blood drive

An Armed Services Blood Program (ASBP) blood drive is scheduled at the Coronado Club on Oct. 14, 7 a.m.-noon; Oct. 15, 10 a.m.-3 p.m.; and Oct. 16, noon-6 p.m. Appointments can be scheduled by going to www.militarylifeforce.com. Type in Kirtland for the sponsor code. Walk-ins are welcome.

The ASBP is a network of blood transshipment centers and blood product depots that ensure support of our military troops in Iraq and Afghanistan. The other half of the blood collected is transported directly to our military bases and blood product depots that ensure support of our military troops in Iraq and Afghanistan. The half of the blood collected is transported directly to our military bases.

To participate, whether it’s via regular deduction from your paycheck, a one-time contribution, or some other means, you can take satisfaction in knowing that your contribution is being put to good use in your community.

See you next time.

— Bill Murphy

HR & Communication VP John Slipke happy to be at Sandia

By Iris Aboytes

Sandia National Laboratories

kirtland military blood drive

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See you next time.

— Bill Murphy (505-845-0846, MS0165, wtmurph@ sandia.gov)
Examining aircraft bomb issues

Sandia, Transportation Security Administration taking advantage of supercomputing capabilities

By Mike Janes

When the Advanced Simulation and Computing (ASC) program was established by the DOE in 1995, the end result was a shift in emphasis from test-based confidence in the nation’s nuclear arsenal to simulation-based confidence.

But the ASC program — which is now an NNSA program — and the computer modeling capability at its core are now providing a new, no less vital service: developing a scientific basis for aviation security explosive detection requirements. The findings are expected to lead to revisions to the Transportation Security Administration’s certification standards.

“Today, under ASC, computer simulation capabilities are routinely developed to analyze and predict the performance, safety, and reliability of nuclear weapons and to certify their functionality,” says Sandia’s Jim Pethan (6418), who leads the tri-lab effort. “We’re now able to leverage that capability and apply it to the important problem of damage from explosives aboard aircraft.”

The current requirements for screening checked baggage for explosives at airports were established in 1993 following the Pan Am Flight 103 bombing in 1988. The requirements, however, were based on forensic assessments of historic incidents and actual explosive tests with retired aircraft. Such assessments, says Jim, offer incomplete and limited knowledge of factors that must be considered when trying to mitigate the threat of onboard explosions.

“Today, we have a much better understanding of the range of explosives threats, such as liquid explosives and homemade bombs,” says Jim. “But what we have not had is a more detailed understanding of the difference in explosive power from potential threat materials and the impact on the aircraft structure. That’s where computational modeling comes in.”

Leveraging the high-performance computing capability DOE has developed over the past decade, Sandia and its partners — Lawrence Livermore National Laboratory and Los Alamos National Laboratory — now have access to lightning-fast supercomputers, parallel computing software, and visualization features currently used to support the nation’s nuclear weapons complex.

“ASC tools are very applicable to solving the aviation onboard explosion problem,” says Jim. Computational modeling, he says, offers a scientific basis for the breadth of explosive threats that cannot be derived by the empirical tests historically conducted.

“Those kinds of tests have to be done, because they are the ground truth for actual aircraft explosions,” Jim says. But such tests alone, he adds, can’t adequately examine the multitude of factors that must be considered, including explosives and aircraft types, threat quantity, onboard locations, flight conditions, and other physical details that factor into managing the risks from aviation terrorism.

“You absolutely must do modeling to assess where the threshold is before performing a test,” he says. The tri-lab team’s first order of business when taking on this challenge last year was to “scope” the problem and determine how ASC tools could best go about tackling it. In December, a briefing that included several sample simulation results was delivered to TSA, which then asked the team to reproduce a series of historic experimental tests and determine whether modeling could, indeed, produce valid results. Another briefing, in June, confirmed the modeling capability.

Computational modeling, says Jim, offers several advantages above and beyond the obvious avoidance of aircraft destruction for experimental purposes. Hydrodynamic blast models, which are supported by decades of explosive science measurement and analysis, accurately determine the high pressures caused by detonations. Finite element structural models, which represent the structural components of an aircraft’s airframe, can show the tearing, bending, and breaking of the airframe components.

The tri-lab team is working with a major aircraft manufacturer to use detailed structural information on one of the aircraft in today’s fleet, information that is subsequently used in the computational models. By this fall, the team will provide TSA with a report on the vulnerability to a common fleet aircraft, and revisions to the certification standards are expected to commence shortly thereafter.

Jim emphasizes that the project has been a team effort, with contributions from Dennis Roach (6416) and the Aircraft Airworthiness project; Ken Smith (6418) from Contraband Detection Dept; Jeff Gruda (1524), Kenneth Gwinn (1524), Jonathan Rath (1524), Tim Shetler (1524) and Marlin Kipp (1431) from the Advanced Simulation and Computing program; and Jerry Stofeth (5343) and the Explosives Applications Department.

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Sandia Helps and Reaches Everyone (SHARE) program, which kicked off that day. Everyone enjoyed a barbecue lunch, ice cream, and raffle prizes.

During the team celebration, representatives from more than 40 nonprofit community-based organizations were on site to talk to members of the workforce about the causes they champion. The Tri-Valley Community Foundation coordinates distribution of Sandia’s contributions free of charge.

SANDIA LAB NEWS    October 10, 2008    Page 3

Sandia/California's 2009 SHARE campaign runs through Oct. 22. For more information, see http://public.ca.sandia.gov/SHARE.

Photos by Randy Wong

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Sandia/California’s 2009 SHARE campaign runs through Oct. 22. For more information, see http://public.ca.sandia.gov/SHARE.
Some uncertainty in working on this type of project. Researchers signed nondisclosure agreements and agreed to make themselves available to government agencies on short notice when called to give information.

Joseph, transmission electron microscopy (TEM) lab owner Paul Kotula (1822), and a team of roughly a dozen others examined more than 200 samples in those six and a half hours. The samples analyzed at Sandia were confirmed to be nonvi able prior to arriving at the Labs. They received samples from the letter delivered to the New York Post, to former Sen. Tom Daschle (D-SD.), and to Sen. Patrick Leahy (D-Vt.). The samples looked different, in part because of how they were prepared, which made examination initially difficult.

When B. anthracis spores are weaponized, the spores are coated with silica nanoparticles that look almost like lint under the microscope. The “lint” makes the particles “bouncier” and less likely to clump and fall to the ground. That makes the spores more respirable and able to do more damage, says Joe. Weaponization of the spores would be an indicator of state-sponsored terrorism.

“Initially, scanning electron microscopy [SEM] conducted at another laboratory showed high silicon and oxygen signals that led that lab to conclude that the spores were a weaponized form,” says Paul. “The possible misinterpretation of the SEM results arose because microanalysis in the SEM is not a surface-sensitive tool,” says Paul. “Because a spore body can be 1.5 to 2 microns wide by 1 micron long, a SEM cannot localize the elemental signal from whole spore bodies.”

Using more sensitive transmission electron microscopy, Joe and Paul’s research indicated that the silica in the spore samples was not added artificially, but was incorporated as a natural part of the spore formation process. “This had been examined,” Paul says, “lacked that fuzzy outer coating that would indicate that they’d been weaponized.”

The team also supported operation day at Schriever AFB, Colo., to assist in the real-time assessment of the event where decisions were made that a second intercept shot was not required. “Our team did a great job in providing the simulation data necessary to complete this important mission,” said NNSA Administrator Thomas D’Agostino. “This is a great example of the ways that the nation’s investment in nuclear deterrence can be more broadly employed for national security.”

Red Storm (Continued from page 1)

was called upon because of its years of experience in missile defense intercept simulations of near-field vehicles.

Daniel Kelly, manager of Lethality and Threat Dept. 5417, led the team of six staff members who were called upon to perform hundreds of impact simulations in a matter of days and weeks to answer critical technical questions affecting early decisions to go forward with the operation.

“We were contacted on Jan. 11, 2008, by the Missile Defense Agency and asked to deliver in nine days the required ‘hit point’ for high probability of success,” says Daniel. “The team put in a lot of long days, and with help from resources across the laboratory, provided results for several pivotal deadlines during the buildup to the operation.”

SANDIA LAB NEWS • October 10, 2008 • Page 4

Anthrax

(Continued from page 1)

This information was crucial in ruling out state-sponsored terrorism.

In the fall of 2001, the FBI considered how best to investigate the anthrax letters. The agency convened two blue ribbon exploratory panels, and Sandia’s name came up during both panels for its expertise in electron and ion microscopies and microanalysis over the range of length scales from millimeters down to nanometers. The first spore material from the letters arrived at Sandia in February 2002.

The team worked under an Intelligence Work for Others (IWFO) contract with the FBI. Sandia faced the operation.

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Innovative nanotechnology education program struggles towards the light

By Neal Singer

Leaders of Sandia’s fledgling National Institute for Nanotechnology Education (NINE) live in a more complicated life than researchers who only must convince a single agency to fund research. As a first-of-its-kind workshop held at the Albuquerque Marriott not long ago, Sandia management and researchers worked for several days with 60 national lab, industry, and academic management partners to agree on common nanotechnology topics all could support with funds, equipment, or experience.

As Regan Stinnett (1817), NINE program manager, summarized, NINE’s target is to increase “the involvement of DOE labs with universities and industry to jointly help develop the next generation of US global innovators.” The developed program must “not only be compliant with the process” but also “be the basis for it to be used by other DOE labs,” he said.

The goal is to produce a self-motivated, innovative, entrepreneurial workforce. As Regan said, the main thrust is to make sure their people are properly trained for the future, rather than just reacting to it. Regan Stinnett

New Training Accountability System brings consistency, ensures compliance

By Bill Murphy

When Sandia launches its new Training Accountability System (TAS) on Oct. 31, it will mark a giant step forward in helping to ensure that the Labs’ workforce is fully prepared to perform assigned work by completing all requisite training.

The Training Accountability System, or TAS, is a sophisticated enhanced notification tool that is integrated with Sandia’s TDS training system.

Everyone at Sandia is familiar with the TDS notifications, but the new messages that remind you that you have until a particular date to complete a specific training or compliance issue is resolved.

Given the current state — those 300 to 400 individuals who are out of compliance with some training at any given time — it has become clear to management that Sandia needs to have a better way to ensure that needed training is being completed. That’s where TAS came in.

The TAS, Jodi says, is not a new requirement placed upon managers; they are already required to make sure their people are properly trained for the work they perform. Rather, Jodi says, TAS is a tool to help managers ensure that their people are up to date on all compliance training and also allows managers to document efforts made to improve compliance for required training or to document and track workplace restrictions.

The new system takes notification processing a couple of steps further by bringing managers more proactive role in the process if and when individuals become out of compliance.

The system, which is automated, has escalating measures built in. That is, if an individual remains out of compliance with required training, the system first brings the manager into the equation and then escalates the manager’s level and so on until the training/compliance issue is resolved.

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Ron Moya honored for professional achievements that have broken barriers and opened doors for others

SEEN THE SIGHTS — Ron Moya with wife Mary, daughter Raquel, and son Xavier in San Francisco.

Sandia, Kirtland celebrate Hispanic Heritage Month

Sandia and Kirtland joined to conduct a series of special events to mark Hispanic Heritage Month 2008, including Entertainment Day held Oct. 2 in the Stave Schiff Auditorium. Among the groups performing on the festive day was Mariachi San Jose, featuring Michael Mccarthy (on trumpet) and Alissa (on guitarron) Oihlhauen, daughters of Sandians Robin (2736) and Tony (3813) Oihlhauen. Other events during the month included writing and art contests, Latin Night, and a Hispanic story-time for children. Upcoming events include a bilingual mass and dinner at the KAFB chapel at 6 p.m. on Oct. 11 and a Youth Fiesta Oct. 15 2-4 p.m. at the Kirtland Youth Center.

Hispanic Heritage Month is observed annually in the US as the period to recognize the contributions of Hispanic Americans to the US and to celebrate Hispanic heritage and culture. In 1968, President Lyndon Johnson proclaimed the first Hispanic Heritage Week. It was expanded by President Ronald Reagan in 1988 to cover a 31-day period starting on Sept. 15 and ending on Oct. 15. Sept. 15 marks the anniversary of the independence of five Latin American countries: Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua. They all declared independence in 1821. Mexico and Chile celebrate their independence days on Sept. 16 and Sept. 18, respectively.

(Photos by Randy Montoya)

About HENAAC

HENAAC was established in 1989 as a means of identifying, honoring, and documenting the contributions of outstanding Hispanic American science, engineering, technology and math professionals. Corporations, government agencies, academic institutions, the military, and the business community have submitted thousands of nominations over the past 19 years for HENAAC recognition.

The HENAAC acronym stood for the Hispanic Engineer National Achievement Awards Conference. In 1996 HENAAC became a 501(c)3 educational programs nonprofit organization. This new classification allowed HENAAC to develop additional educational programs beyond the conference. In 2000, HENAAC introduced the College Bowl, an innovative, competitive two-day workshop for college students preparing to enter engineering careers.

In 2003, HENAAC launched Vivu Technology, a K-12 educational program designed to introduce precollege students to careers in science, engineering and technology. This same year, HENAAC launched its Scholars program, providing scholarships to college students pursuing engineering and science careers. In addition to these programs HENAAC puts on a yearly National Career Conference and Awards Show, provides travel grants to college students, conducts research and has a Hispanic Hall of Fame exhibit.

The HENAAC Board of Directors voted in 2005 to drop the use of the acronym and changed the official name and tag line to "HENAAC, Promoting Careers in Science, Technology, Engineering and Math."

Feedback

Public transportation, allowable time

Q: How can a nonexempt employee account for their time when they use public transportation, which sometimes requires arriving a few minutes late and/or leaving a few minutes early from work. It’s just how the ABQ RIDE is set up. I either option is waiting an additional 20 minutes for another route, which eliminates the commuter option. I can’t arrive at the office on time. Is there any procedure or company who are subject to buses running late or leaving the office a few minutes early to catch a bus? How are these “minutes” to be accounted for? If I were an exempt employee, I don’t see this as an issue.

A: Ordinary commuting time between home and work is not considered compensable time for non-exempt employees. However, employees may round their time up or down if the shortage or overage is substantial and insignificant. Further, riding on public transportation is something that Sandia wants to encourage. Therefore, “arriving a few minutes late, and leaving a few minutes early” to use public transportation is allowable if approved by your immediate manager. However, there are some positions at Sandia where late arrivals and early departures, even of only a few minutes, can have significant consequences, so it is important to discuss this with your manager.

— Melissa Eakes [002]