

## SANDIA LAB NEWS

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### Accelerating engineering innovation: Sandia hosts summit of leaders from industry, government, and academia



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By [Julie Hall](#)

Making math and science exciting for young people, rethinking how engineering is done, and exploring what drives creativity and innovation were among topics discussed by some 50 leaders from industry, universities, government, and national laboratories at

Albuquerque's Hyatt Regency May 31. The gathering, hosted by Sandia, kicked off a daylong summit focused on accelerating innovation in engineering and creating a highly qualified workforce of the future as a linchpin to American industrial competitiveness and national security.

"The security of our nation may depend more on a commitment to research and education than on any other factor, including the strength of our military," said Sandia Labs

President and Director Tom Hunter in his opening remarks, summarizing conclusions of a National Academies of Science report released last fall. Compiled by a blue-ribbon panel of business leaders, scientists, and educators led by retired Lockheed Martin Chairman Norm Augustine, *Rising Above the Gathering Storm* made strong recommendations for federal action to enhance US science and technology and maintain competitiveness in the 21st century.

Growing out of the NAS report was President Bush's American Competitiveness Initiative. In February, Tom participated in a panel discussion led by the president at Intel's Rio Rancho plant, along with then Intel CEO Craig Barrett.

The National Academies has identified accelerating engineering innovation as a critical element in achieving the goals of the American Competitiveness Initiative. The initiative calls for \$5.9 billion in FY2007 to increase investments in R&D, strengthen education, and encourage entrepreneurship and also includes additional funding over a 10-year period for research and R&D tax incentives.

Sandia hosted the summit to bring together potential partners to explore ways to improve engineering education and accelerate engineering innovation, and to discuss how government, industry, universities, and the national labs might work together toward this goal, particularly in the area of nanoengineering, building on Sandia's capabilities in high-performance computing, MESA, and CINT.

Tom said one of the challenges the group and the nation faces is doing a better job of promoting engineering as an exciting career with good income potential. Recruiting students to engineering fields can be challenging in a society that doesn't place a strong emphasis in science and engineering, as it did during the time of Sputnik and the US-USSR space race of the late 1950s.

He said a friend who is a professor at a major university jokingly bemoaned the fact that there's never been a television show called "L.A. Engineering" to help glamorize the profession.

Intel Chairman Craig Barrett said the country needs another initiative like the post-Sputnik education push to excite kids about math and science, suggesting that dealing with the energy crisis could be the focus.

"You really need to set a national strategy or priority and show that it can be solved and in fact is important to the government; science and technology is important to us all," he said. "Then you'd get it out of the backwater that it's in and get it on the front page."

### **Role of education**

Of particular importance to Sandia is cultivating a highly qualified workforce to undertake next-generation engineering for its national security missions. This may require rethinking how engineering is done and taught to enable us "to leapfrog ahead" and get to the creative results faster, Tom said. For example, computing needs to be regarded less as a means for calculating and more as a means of learning and idea sharing, he said.

Barrett described concerns about America's K-16 education system discouraging kids who might be interested in math and science. "We're not doing a particularly good job of creating smart people with US passports," he said. One problem is a lack of qualified teachers for science and math.

Another problem is that the US educational system is not setting high enough expectation levels, something you learn right away in running operations for an international company. He talked about the potential of charter schools and competition within the K-12 educational system as potentially a positive force for improving quality.

On the positive side, Barrett said that with both political parties vying for leadership on this topic and an election coming up, the opportunity is ripe.

“We have the best timing in the world to focus on this,” he said.

The schedule for the following day included panel discussions to identify and address key aspects of the engineering innovation dilemma through multi-institutional partnerships, presentations and discussion on Discovery Science and Engineering Institutes, and small group breakout sessions.

Tom Hunter and Div. 1000 VP and Chief Technology Officer Rick Stulen hosted the summit. Sandians led or facilitated various working sessions, presentations, and discussions during the summit.

In addition to the Sandia contingent, attendees included industry executives from Intel, Monsanto, Goodyear, Microsoft, Exxon-Mobil, Lockheed Martin, IBM, HP, and Procter & Gamble. Representing academia were engineering deans or their representatives from Harvard, University of Florida, Rensselaer Polytechnic Institute, University of Wisconsin, University of Illinois, University of Michigan, Rose-Hulman Institute of Technology, University of Texas, Harvey Mudd College, Yale, MIT, University of New Mexico, UC Davis, and UC Santa Barbara. Attendees also included science and engineering leaders from DOE, NNSA, Los Alamos National Laboratory, Oak Ridge National Laboratory, and the National Academy of Engineering. -- [Julie Hall](#)

## **Collaborate to innovate, innovate to succeed**

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What a perfect match-up of venue and event.

The just-opened Bldg. 858 East, one of the newest components in the growing MESA complex, welcomed its first-ever outside group, invited to Sandia to participate in the Accelerating Engineering Innovation summit.

MESA itself, of course, is Sandia’s half-billion dollar campus whose underlying vision is to provide the tools, the resources, and the infrastructure needed to advance engineering R&D for the 21st century. As Labs Director Tom Hunter has noted, it is intended to be part of Sandia’s initiative to be leaders in transforming how engineering is done.

The summit participants, a blue-chip group of senior science and engineering officials from industry, academia, and the national laboratories, convened at the Labs last Thursday to lay the groundwork for closer collaboration among the three US R&D research communities to address engineering innovation.

The summit was hosted by Sandia as a response to the American Competitiveness Initiative set forth by President Bush; it calls for a multi-billion investment in R&D, education, entrepreneurship, and pro-research tax incentives. New Mexico's senators Pete Domenici and Jeff Bingaman have been strong champions of the initiative in Congress.

The summit began with a kick-off event on May 31, with Tom and Intel Chairman Craig Barrett discussing the current landscape for engineering in the US, problems with science and math education in K-12, and how to make engineering more attractive to young students (see "Summit tackles engineering innovation" on page 1).

The Thursday session, hosted by Div. 1000 VP and Chief Technology Officer Rick Stulen, featured a series of panel discussions by representatives from the three communities. During the presentations, panelists laid out their views on the obstacles that stand in the way of advancing US engineering to the next level.

Perhaps the single dominant theme of the three panels was that the communities need to get better — much better — at collaboration. Senior executives at the meeting said US industry is increasingly turning to foreign universities and institutes for partnerships to develop advanced technology, in part because it takes too long to develop an agreement here in the US.

The industry panel discussed what is missing from today's engineering graduates. They need employees who can communicate well, understand the competitive market, are strongly grounded in math and science, and are not simply trained but rather have the capacity to think and learn.

There was consensus that effective teaming is vital to innovation. As one panelist put it, "The 'Eureka moment' is not the lone nerd in the corner saying 'Aha!'" but two people — or more — coming to the realization that they can discover and innovate more effectively by working together than by working alone.

Another panelist, responding to a skeptical question about whether innovation is really a group phenomenon, offered the perspective that innovation belongs to the group, while discovery and invention may very well still reside to some extent in the individual.

Rick Stulen, serving as a panelist on the government labs panel, noted that there are pretty decent models for effective partnering between various combinations among any two of the three communities: government and academia, academia and industry, industry and government. The missing model, he said, is a good, sustainable and agile approach to successful partnering among all three communities. Such models exist in Europe and Asia, but because of different funding streams for the universities and different sociopolitical environments, these approaches haven't been as widely successful in the US. Time is the

currency of the future, noted several participants, and in Europe and Asia, partnership agreements can be completed in a matter of days.

Said another participant: "Institutions that learn how to partner effectively are going to win — and nations that learn how to partner are going to win."

The summit initiated planning for a partnership among industries, universities, and national laboratories to establish a series of national innovation institutes to address issues identified during the summit discussions. The participants strongly endorsed Sandia's role to help lead the engineering innovation agenda, beginning with the emerging needs in nanoengineering.

Next steps include a report to DOE on the summit outcome, a follow-up conference to hone the specifics of what an effective government/ industry/academia institute might look like, and related follow-up activities required to make the vision of the summit a reality. -- [Bill Murphy](#)