PCAST Advises Bush to Boost S&T Role in New Homeland Security Department

According to the President's Council of Advisors on Science and Technology, sophisticated technology will be an important tool in preventing and responding to terrorist attacks, and the new homeland security department must have a strong, centralized science and technology office to meet the challenge.

Noting that "our terrorist enemies are technically savvy," the President's Council of Advisors on Science and Technology has written a report urging the administration to significantly elevate the role of science and technology (S&T) in the new Department of Homeland Security (DHS). The report, endorsed in late July by Office of Science and Technology Policy (OSTP) Director John Marburger, says the administration and Congress should "give careful attention to the research and development and technological functions of the new department. Decisions made now will affect the nation's long-term technological leadership in the antiterrorism effort."

The PCAST document, titled *Report on Maximizing the Contribution of Science and Technology within the New Department of Homeland Security,* makes recommendations that, if adopted by the White House, would bring the administration into closer agreement with both Congress and a recent National Research Council (NRC) report on the role S&T should play in the DHS (see PHYSICS TODAY, August 2002, page 22).

An OSTP spokesperson noted that PCAST is an advisory group to the president and that the report did not in and of itself represent a shift in the administration's view of S&T in the new department. The report will be forwarded to the White House in the next few weeks. The cover letter, addressed to President Bush and signed by Marburger and Floyd Kvamme, the cochairs of PCAST, was an expression of "the expert views of PCAST members on how to maximize the contribution of science and technology to the DHS mission."

In a phone conference with other PCAST members in early August, Norman Augustine, the former chairman of Lockheed Martin Corp, said S&T is one of the principal issues facing the DHS "not only because of the fact that many of the threats are of a very technical nature, but also the fact that many of the targets contain a great deal of technology." Yet S&T is a "solution to some of these threats. So we felt that technology should be given a position of considerable prominence in the department."

S&T undersecretary needed

The report "strongly recommends" that an undersecretary for S&T be part of the new department. The Bush DHS proposal puts most S&T work under the control of an "undersecretary for chemical, biological, radiological, and nuclear countermeasures." Critics both in and out of Congress worried that there would not be a single person responsible for R&D in the new department, and both the Senate and House versions of the DHS bill have included an undersecretary for S&T. An NRC report released in July also recommended an S&T undersecretary.

The PCAST report adopts the same position and says the undersecretary "should have a strong S&T background, and be responsible for the entire DHS R&D enterprise, including control over the budget" for all research-related programs. In the PCAST phone conference, Augustine, who headed the PCAST antiterrorism subcommittee that wrote the report, said the group wrestled with the question of how centralized R&D should be within the DHS. "One alternative is to let each of the components have its own R&D organization, which has some benefits," he said. "The other alternative, and the one we selected, is to have a much more centralized R&D organization." Centralization, he said, "would provide goal sorting, resource allocation, [and] oversight." Most of the R&D itself, he continued, would be conducted outside of the DHS by other government agencies, the private sector, and academia.

The report also calls for the creation of a federally funded R&D center (FFRDC). The FFRDC essentially would fill the role of the independent homeland security institute called for in the NRC report. The PCAST report says the FFRDC should perform systems analysis, support systems engineering, and support "red teaming." The systems analysis task would be to figure out what systems, such as the US energy grid or transportation networks, are vulnerable to terrorist attack and then propose countermeasures. Engineering would entail developing new concepts for dealing with threats to the systems. Red teaming would involve experts who identify vulnerabilities in potential targets by thinking as terrorists might think.

A key to the FFRDC concept is that such centers are typically private companies and work without the constraints of government procurement regulations. The PCAST report said the FFRDC should "be free of burdensome government contracting constraints, personnel policies, and excessive oversight, and should permit a more streamlined management approach than employed in much of the government's past R&D activity." Currently, the MITRE Corp and the Institute for Defense Analyses provide that type of independent support to the Department of Defense.

DHS needs laboratory

PCAST also recommends that the DHS have its own national laboratory facility that should "be focused principally on extremely high payoff but often high-risk, long-term pursuits." When the Bush administration first submitted its DHS proposal, it seemed to be recommending that Lawrence Livermore National Laboratory be transferred from the Department of Energy to the DHS. The administration quickly backed away from that approach and proposed that only some facilities at LLNL be dedicated to the DHS. Both the House and Senate DHS bills opened up the laboratory issue by requiring that Los Alamos and Sandia National Laboratories in New Mexico also be considered as the primary DHS sites. PCAST noted that the specialized antiterrorism work "could likely be performed by focusing the missions of one or more of the existing national labs, rather than establishing a new one."

The PCAST report also recommends the creation of a new agency patterned after the Defense Advanced Research Projects Agency (DARPA). "A large portion of homeland security R&D can and will be conducted external to the DHS," the report says. "These efforts can be principally marshaled through a homeland security research projects agency." The agency would be small and serve primarily as a "funding conduit to industry and academia to support promising ideas." The Senate DHS bill contains a pro-

posal for just such an agency, with startup funding of $200 million.

Whether the administration will officially adopt the PCAST recommendations is unclear. "PCAST isn't the administration, it's an advisory panel," a congressional staff member involved in the DHS discussions said. So the report by itself isn't a "full reversal" of White House policy on the structure of R&D in the DHS. But, the staff member said, it is likely to influence how the administration supports the role of R&D in the House and Senate DHS bills.

JIM DAWSON

Solar and Space Physics Get a Detailed 10-Year Plan

A comprehensive National Research Council study weaves a decade's worth of projects together into a tapestry that could reveal the answers to some of the most difficult questions in solar and space physics.

An array of large, medium, and small spacecraft, including the canceled solar probe flight into the Sun's atmosphere, should be launched over the next 10 years as part of a "time ordered" mix of projects to better understand the Sun and the Sun–Earth environment, according to a National Research Council report. Put together over 18 months by a 15-member solar and space physics survey committee, the report lays out a literal flow chart of NASA, NSF, and National Oceanic and Atmospheric Administration (NOAA) projects based on "scientific importance, technological readiness, and synergy among different programs," said committee member James Burch of the Southwest Research Institute in San Antonio, Texas.

The report, released in early August, contains recommendations for programs separated into three basic categories: moderate programs (mostly space missions costing between $250 and $400 million); small programs (costing less than $250 million); and "vitality" programs that are not missions per se, but recommendations to improve solar theory, modeling, information, and education programs to reenergize the field.

The report also calls for NASA to restore the $650 million solar probe mission, which was canceled last year. That mission was designed to put a spacecraft within four solar radii of the Sun's surface, and is viewed as having "especially high scientific value," said committee chairman Louis Lanzerotti, a physicist with Bell Laboratories, Lucent Technologies, in Murray Hill, New Jersey.

Although the solar probe mission is important, the committee realized that there is no money for the project in NASA's budget, Lanzerotti said, so the committee took two approaches to recommending the flight. "The solar probe is the highest priority as a major mission, but you can't do the solar probe at the same time you do all of the other missions unless you have an add-on of funding," he said. Without extra money, the committee concluded, the solar probe would have to move from the front to the end of the line of committee-endorsed projects. For all of the recommended projects, the committee provided alternative flow charts based on whether the solar probe mission gets new funding and goes early or moves to the back of the queue.

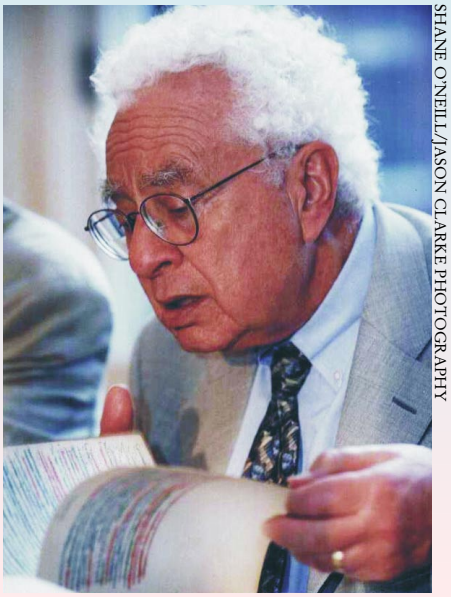
The report, titled *The Sun to the Earth, and Beyond: A Decadal Research Strategy in Solar and Space Physics,* was inspired by the well-

Gell-Mann Meets Muster Mark, Honors Hamilton

Three quarks for Muster Mark!
Sure he hasn't got much of a bark
And sure any he has it's all beside the mark.
—James Joyce, *Finnegans Wake*

There may be no better-known lines of poetry than these, at least among physicists, thanks to Murray Gell-Mann's having dubbed the elementary constituents of matter "quarks." Gell-Mann had come up with the sound "kwork," but then adopted the spelling in James Joyce's *Finnegans Wake*, partly because "the number three fitted perfectly the way quarks occur in nature," as Gell-Mann writes in *The Quark and the Jaguar: Adventures in the Simple and the Complex* (W. H. Freeman, 1994).

In Dublin this spring, Gell-Mann got a privileged peek at some of Joyce's original manuscripts. In 1941, after Joyce died, a friend, Paul Léon, broke into the author's Paris apartment and salvaged his papers, including handwritten notes for *Finnegans Wake* and *Ulysses*. The papers, but not Léon, survived the war. They surfaced recently when Léon's son Alexis was sifting through his father's belongings, and were purchased in May by the National Library of Ireland for roughly $12.2 million.



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MURRAY GELL-MANN peruses James Joyce's blue-and-red handwritten notes for *Ulysses*.

Gell-Mann will be back in Ireland this month to deliver the Royal Irish Academy's inaugural Hamilton Lecture at Trinity College Dublin. "They are celebrating Hamilton's quaternions, which are beautiful and mathematically interesting, even though they never proved to be of that much use for physics," says Gell-Mann. "But Hamilton did wonderful work rewriting mechanics and optics in ways that made them look quite analogous. He foreshadowed quantum mechanics." The lecture is part of Hamilton Day, which will be celebrated on 16 October, the date on which, in 1843, William Rowan Hamilton scratched his formulas for quaternion algebra onto a stone on Broome Bridge outside Dublin. "Hamilton is Ireland's most eminent scientist," says the academy's Pauric Dempsey. "But Irish scientists don't have the same profile that writers have. On the street, people talk about Joyce and Yeats and Beckett. We want to build up Hamilton Day to raise the profile of math and science in Ireland."

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