DOE Labs: Is Evolution Enough?

The Department of Energy's laboratories confront shrinking budgets and pressure to define their missions. But can they move fast enough to avoid closings and consolidations?

A wave of anxiety is passing through the Department of Energy's (DOE's) laboratory system, as an independent panel chartered by Congress considers which labs to shut down. The panel was created to break a deadlock among DOE officials, lab managers, and lawmakers over the labs' missions and budgets. The labs had been making an array of deals with universities and industry, which prompted DOE headquarters to freeze their budgets until they came up with a clear strategic plan. The department then decided to close Lawrence Livermore National Laboratory, one of the country's three nuclear weapons labs, plus two large civilian laboratories. But legislators overruled the department and, following a model used to close military bases, insisted that the decision be made by outsiders.

Those events have not occurred—yet. The scenario comes from a recent 2-day simulation of the future of the nine national laboratories, the flagships of the DOE system, conducted last month at a hotel just outside the Washington beltway. The participants—congressional staffers, lab directors, university professors, and industry executives—played themselves and their bosses at work over a 10-year period.

The results of this unusual exercise illustrate one plausible future for DOE's network of 26 laboratories, say game participants. The facilities, owned by the government but generally operated by a university or company with federal funding, have a budget of $8 billion a year and employ more than 50,000 people, many of them scientists and engineers. Shrinking budgets, a push to cut red tape, and calls for more focused missions are bringing uncertainty and change to this diverse and sometimes insular world. But it's not clear whether those changes will be enough—and come in time—to prevent the kind of crisis reached in last month's exercise.

A 2-month investigation by *Science*, including visits to several of DOE's top labs and interviews with their administrators and scientists, has found that lab directors are taking to heart the need for change. They are cutting support staff, reducing costs, and expanding links with industry and universities. Yet their efforts at streamlining are uneven, and their push to make alliances with industry has run afoul of the Republican majority in Congress. In addition, new facilities are eating into already tight budgets. Meanwhile, senior DOE officials are finding that pruning the bureaucracy that oversees the labs is a slow and difficult task. "We're facing an Augean stable of problems," says DOE Deputy Secretary Charles Curtis, who heads the Laboratory Operations Board that is pondering what new direction to give the labs.

Sweeping change. DOE's Curtis sees "Augean stable of problems."

Although some want to shovel out that stable carefully and gradually, others insist on a more Herculean approach. The prophet of radical change is Motorola Chairman Robert Galvin, who chaired a recent blue-ribbon panel on the future of the 10 largest labs (*Science*, 10 February 1995, p. 787). Galvin wants major overhauls of both missions and management of the labs in order to save them. "Without a revolution," he warns, "in 10 to 15 years people will say, 'My God, what are we getting for our money? Let's close them.' "

That nearly occurred in the role-playing game, organized by Marshall Berman of Sandia National Laboratories and designed to provide insight into the future of the DOE labs. Under growing budgetary pressure, the department adopted a plan of closures and consolidations. Although Congress rejected the agency's approach, it created an independent commission and gave it full authority to make the decision.

A few members of Congress would like to see that commission become reality. "It will take the politics out of science policy," insists Representative Roscoe Bartlett (R–MD), who has spent the past 2 years calling for just such a panel and who predicts it will bolster support for the labs. Other lawmakers are more hostile and want to see radical downsizing. Bartlett's proposal has won few converts so far, but lab supporters fear its popularity will grow as budgets contract.

The idea is a nightmare for most lab directors and Administration officials, however. A commission, they say, could be used by opponents to gut an irreplaceable science and technology base built up over a half century. What's needed, they say, is more time for the evolutionary changes already under way to take effect. "The problem with revolution is that the ultimate losers will be the labs and their technical expertise," says Nicholas Samios, director of Brookhaven National Laboratory in New York. Adds Lionel Johns, who heads technology policy at the Office of Science and Technology Policy: "You do need to downsize and redirect the labs. But revolution could be dangerous—there are those who just want a scalp on their belt."

Cold Warriors

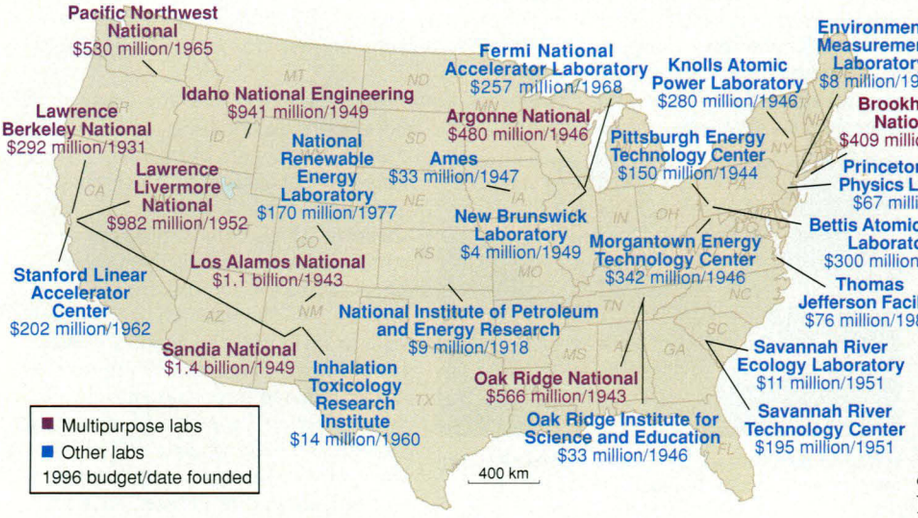
The current complex is a far cry from what began as a small number of facilities created during World War II to build and design atomic bombs. With growth came a broadening of its mission. "A lot of things got shoved under the rubric of the Cold War," says Alan Schriesheim, retiring director of Argonne National Laboratory outside Chicago. Making use of the scientific talent on hand, the labs took on work in alternative energy, medicine, chemistry, and other disciplines.

Today the labs range from city-sized Livermore, with 7300 employees—including 1200 Ph.D.s—and a budget of almost $1 billion, to the $4-million-a-year New Brunswick Laboratory in Illinois, whose staff of 45 deals with nuclear materials certification. Some 6000 DOE employees in 10 field offices oversee the labs' use of tax dollars and the way they handle environmental and safety matters and report to DOE's Washington headquarters. Those administrators, in turn, take their orders from the White House and Congress.

For a half-century, the Soviet threat and the power of pork-barrel politics nurtured the lab system. But the end of the Cold War and growing concern about the budget deficit led lawmakers and outside critics to question the billions of dollars being spent on the labs. The criticism led to the creation of the Galvin panel, which Energy Secretary Hazel O'Leary promised she would not ignore. "I have no interest in putting the Galvin report on a shelf and continuing with the status quo," she told a Senate panel.

Even so, DOE officials, lab directors, and lawmakers quickly rejected the panel's most dramatic proposals—to consolidate Livermore's weapons-design work at Los Alamos National Laboratory and set up a

corporate structure, largely independent of DOE, to govern the labs. O'Leary and Curtis say they rejected the Livermore proposal because it would save little money. And Galvin's proposal to corporatize the labs ran up against congressional opposition to allowing a private entity to spend tax dollars without substantial oversight. "He had a silly idea that he's been trying to defend ever since," says Paul Gilman, a member of the Lab Operations Board who participated in the role-playing game and who heads the National Academy of Sciences' life sciences commission. But Galvin saw the defeat as evidence of timidity. "There just wasn't the political will," he says today.



Research labyrinth. DOE's sprawling network of labs needs to be downsized, say critics.

Identity crisis

Galvin's panel also took aim at efforts by lab managers to find new ways to justify their budgets. "Each laboratory is attempting to keep its options open in all fields of science and technology," states the report, which called for the labs to concentrate their missions.

The post–Cold War identity crisis was short-lived for Los Alamos, Livermore, and Sandia. The three weapons labs have embraced a new program, stockpile stewardship, aimed at preserving the nation's nuclear arsenal (*Science*, 24 May, p. 1092). And it doesn't hurt to have powerful friends in Congress. California's congressional delegation looks after Livermore, and Senator Pete Domenici (R–NM)—chair of the Senate Budget Committee and known universally at Sandia and Los Alamos as "Saint Pete"—jealously guards his two labs. "They clearly enjoy a certain immunity," says one Administration official.

The remaining large labs, which lack a direct link to national security and high-profile political support, are more vulnerable. "The problem is that there is no clear mission for the multipurpose labs," says Burton Richter, director of the Stanford Linear Accelerator Center in California. "And until we get that, there will not be any progress."

Galvin recommended that DOE create centers of excellence, in which labs focus on particular areas of expertise. But the intense competition among labs and their diverse facilities and staff make such a goal hard to achieve. While the Pacific Northwest National Laboratory is banking on environmental science, older labs like Brookhaven continue to conduct a bewildering array of work, from biological research to high-energy physics and oceanographic studies. "If I have facilities in three areas, why should I pick just one to focus on?" asks Samios.

Meanwhile, managers of both the national security and civilian labs have been forced to retreat from efforts to forge new cooperative agreements with industry. Galvin warned against turning labs into "research boutiques" for business, while the Republican Congress has dismissed the program as corporate welfare. Even so, Schriesheim says that research "at some point needs to be converted into something that appears in the marketplace."

Red-tape blues

Although consensus on the labs' mission remains elusive, Congress, DOE officials, and lab managers have rallied around Galvin's call to cut red tape, particularly at the DOE field offices. Lab directors give O'Leary and Curtis high marks for reducing unneeded departmental oversight. "Their intentions are terrific—they really are dedicated to helping us out and fixing this problem," says Los Alamos chief Sig Hecker. DOE officials boast that they have chopped field office staff by 8% in the past year and intend to reduce it another 12% by 2000. Other changes, they add, have eased environmental, health, and safety reviews, simplified audits, and freed labs from some procurement practices.

Despite these changes, many lab directors grumble that the top-level support has not trickled down the bureaucratic chain. Hecker says that "things have actually gotten worse" with regard to documenting efforts to safeguard nuclear materials, and John Peoples, director of Fermi National Accelerator Laboratory in Illinois, complains that "we haven't seen the heavy yoke removed." But some directors paint a more upbeat picture. "We have forged a much better partnership with our field office, and they have given us more control," says William Madia, director of Pacific Northwest. Adds Richter: "DOE's response [to the Galvin report] has been pretty much at the speed of light for a federal agency."

Meanwhile, lab managers are already scoring large, if painful, successes in lowering costs through layoffs and attrition. Pacific Northwest has trimmed its staff from 4600 to 3700 this year, while Los Alamos laid off 209 employees and 706 contractors last fall. Typically, labs have reduced support staff but retained those with technical expertise.

DOE records show that Pacific Northwest and Los Alamos have adopted the most aggressive 5-year plans to cut costs, while Brookhaven, Argonne, and Oak Ridge National Laboratory each project savings of less than 1% through 2000. The smaller labs generally anticipate smaller savings, in part, their managers say, because their overhead traditionally is less.

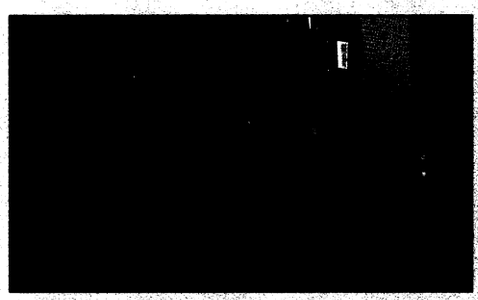
All this cost-cutting may seem at odds with the recent spate of new facility dedications at the labs. But such visible signs of progress are the best insurance against consolidation or closure. Argonne's new $450 million Advanced Photon Source (APS), dedicated this spring, for example, gives the lab a new lease on life. It's a "focal point of activity for a couple of decades," says Schriesheim. A congressional staffer puts it more bluntly: "Without the APS, there would be no Argonne." O'Leary also recently dedicated the $600 million Continuous Beam Accelerator Facility, now named after Thomas Jefferson, in Newport News, Virginia. Officials at Pacific Northwest hope that an environmental laboratory opening next year will serve as the lab's scientific anchor for decades.

Expensive facilities please politicians enamored of ribbon-cutting ceremonies and draw U.S. and foreign researchers from institutions that cannot afford such huge multidisciplinary tools. But their presence also means high operating costs. APS's monthly

Small Labs Make Big Targets

The Department of Energy's (DOE's) nine multipurpose labs may get most of the attention (see main text), but it's the 17 smaller, more focused, and less well-known labs that are more likely to get swamped by the changes washing over the department. "In a smaller organization, you don't have as many pockets to take 10% away from," says Philip Krey, director of the Environmental Measurements Laboratory (EML) in New York City, which researches quality-assurance and environmental issues.

The EML's $8 million budget is 23% smaller than last year's, a cut that Krey says was hard to handle. "We were struggling to make sure that we were able to maintain our commitment to our customers and still not run out of money to pay our salaries," he adds. The lab, founded in 1947 to analyze nuclear fallout, now conducts environmental research on pollutants from power production.



MICHAEL BARLEY/ITRI

Hanging by a thread. ITRI hopes industry will take over its work on cancer-causing fibers.

The EML's fight for survival is typical of life these days at the smaller labs. The DOE has begun privatizing two, is closing at least one more, and is laying plans to consolidate and close others. Nearly all suffer from shrinking budgets. The National Renewable Energy Laboratory in Golden, Colorado, for example, will receive about $170 million from the DOE this year, down from $237 million in 1995. And the $280 million budget for Knolls Atomic Power Laboratory in Schenectady, New York, which performs classified naval research, is 30% lower than in 1992. One lab director who requested anonymity told *Science* that his facility will almost certainly close if it takes another cut in federal funding like the 15% cut it sustained this year. Other lab managers report that some of their workers have decided to flee the uncertainty by retiring early or taking another job.

DOE divides these labs into two categories. The first is the eight single-purpose facilities with specific missions, including two naval research labs. Their combined budget and size this year—$821 million and a staff of about 7900—is smaller than the $1.4 billion budget and 8494 staff at Sandia National Laboratories alone. There are also nine program-dedicated laboratories with a combined annual budget of $1.8 billion and 7930 staff. Those labs tend to be larger and typically have a facility used by researchers around the country and the world, such as Fermi National Accelerator Laboratory in Batavia, Illinois.

In the push for budget savings, the single-purpose labs are the favored targets. "The single-purpose labs are clearly candidates for consolidation and outright closure," Deputy Secretary Charles Curtis told *Science*. "They are the first-order candidates for examination, though this has to be done very carefully." The Laboratory Operations Board, composed of DOE officials and outside advisers, will soon begin to review what steps to take, and how quickly to take them.

But changes are already under way. Last year the department slashed funding for its Laboratory of Radiobiology and Environmental Health on the campus of the University of California, San Francisco, and now intends to close it. Officials at the Inhalation Toxicology Research Institute in Albuquerque, New Mexico, have asked DOE to privatize ITRI, created in 1960 to research inhaled particles from nuclear weapons and diesel fuels. The DOE's primary interests in health research have shifted to the Human Genome Project and structural biology, and ITRI officials "realized they were going to lose their core competencies and their core people," says DOE spokesperson Joe Rudolph. "It was a matter of survival." The DOE will phase out its lab funding over several years. The private Lovelace Biomedical and Environmental Research Institute in Albuquerque, which currently runs the lab, will pick up a larger share of the tab.

The DOE is also privatizing the National Institute of Petroleum and Energy Research in Bartlesville, Oklahoma, and moving its project office there to Golden. The 25-staff-member field office oversees DOE's national oil program. And if DOE gets its way, one office will oversee work done by Pittsburgh Energy Technology Center and Morgantown Energy Technology Center, both of which are operated by DOE.

But even though the labs are not behemoths, they can still attract the attention of powerful politicians intent on retaining a slice of the federal pie for their constituents. When Congress got wind last month of the proposal for combined oversight of the Morgantown and Pittsburgh centers, Senators Robert Byrd (D–WV) and Slade Gorton (R–WA), whose state is home to two large DOE facilities, sent DOE Secretary Hazel O'Leary a letter ordering the department not to take any action without their approval. "Closing offices is very, very difficult," Curtis admits. "We'll have to fight."

–Kim Peterson

electric bill, for example, tops $700,000, says its director, David Moncton. Cash-strapped Argonne is struggling to run the facility full-time, but Moncton says he may be forced to lay off staff and stop buying spare parts unless he finds additional funding. "There could be dead bodies all over the place," he warns. DOE and White House officials worry that scientific productivity will plummet if the labs curb use of the facilities or cut technical staff and research programs to save money.

But lab managers also see big machines as a way to attract paying customers. So far the payoff is small, but some say it reflects a more open and entrepreneurial spirit that will survive any slowdown of cooperative industry agreements. Some labs, for example, will grant employees extended leave to pursue business ventures based on lab research. "It used to be the labs were a bastion of inertia," says Gilman. "Now they are out in the real world, making deals."

None of these evolutionary changes were enough, however, to stave off the lab-closing commission in the role-playing game. "The laboratories will not survive if they cannot demonstrate to the American taxpayers and Congress some societal value," says Schriesheim. Nor should they, say some politicians. But the intertwined interests of the DOE bureaucracy, the lab operators, and Congress make radical shifts unlikely. "You're going to see improvements rather than reform between 1996 and 2000," says Richter. For Galvin, that cautious path makes even the best labs vulnerable and threatens to diminish the nation's capacity to do basic research. "And that," he says glumly, "would be a great tragedy."

–Andrew Lawler