DOE to Industry: So Long, Partner

A program to connect the Department of Energy's weapons labs with industry is in shambles after Congress decided that it strayed from their primary mission. What's next for cooperative agreements?

When Wyoming entrepreneur Neal Miller found a way to clean up contaminated petroleum lying in pits across the West, his next step was to find some high-tech help. His technique for separating water and sediment from crude oil was a sure winner, he thought, but it needed a rugged robotic control system not available commercially. Then Miller heard about the Los Alamos National Laboratory. Not only did the lab have the expertise he sought, but it also was looking for industrial partners to help it move beyond nuclear weapons and speed up the transfer of technology from government labs to the private sector. In 1993, Miller and the weapons lab struck a deal.

Three years later, this marriage of entrepreneurial zeal and publicly funded expertise is on the rocks, and the recriminations are flying (see box). "They strung me out," says Miller of the lab's management. "Just when it looked like we were within a hair of doing something good, they shut us off. They didn't keep their word."

Miller's unhappy saga is being played out across the country as companies large and small discover that the Department of Energy (DOE) is backing away from the type of collaboration—known as a Cooperative Research and Development Agreement (CRADA)—that Miller signed with Los Alamos. The retreat has been forced in large part by Congress, which sees some of the arrangements between government and industry as corporate welfare. The attack has already claimed the Defense Department's Technology Reinvestment Program and halted the growth of the Commerce Department's Advanced Technology Program (see page 27).

The sharp rise and sudden fall of the CRADA program at Los Alamos and DOE's two other weapons laboratories, neighboring Sandia National Laboratories in Albuquerque, New Mexico, and Lawrence Livermore National Laboratory in California, is particularly breathtaking. Starting from zero in 1990, it peaked in 1994 with the approval of 185 agreements and a $218 million budget before plunging to 22 new agreements last year and only $59 million in 1997. In the wake of the budget cuts, dozens of agreements are being terminated, many more are being scaled back, and negotiations on new ones are largely on hold. "A lot of people got hurt very badly," says Warren Siemens, who heads the technology transfer effort at Sandia. "It's a mess, and it's a shame we couldn't back out of this gracefully."

CRADA-mania

The enthusiasm for collaboration, one senior lab official recalls, began with "a lot of hype." Amid sobering talk of faltering U.S. industrial competitiveness and Japanese economic might, politicians from both parties rushed to address the perceived problem. A key element was allowing scientists at federal labs to work with industry and university partners. While CRADA partnerships forbid direct public funding of a company, they encourage the sharing of equipment, facilities, and people. The idea is for the private sector to tap into the vast federal scientific enterprise without the need for government subsidies or favoritism.

With the Cold War over and defense budgets declining, the CRADA movement was a godsend to the DOE's three nuclear weapons labs. "It was an important justification for continued funding [of the labs]," says one Republican congressional aide. Besides giving

Turning Bad Oil Into Black Gold Takes a Wrong Turn

The grimy oil fields of central Wyoming, where Neal Miller toils, are worlds apart from the majestic mesa in New Mexico where federal scientists at Los Alamos National Laboratory fine-tune the nation's nuclear stockpile. But in 1993, Miller, a bearded and blunt-speaking businessman with just a high-school diploma, teamed up with the giant federal lab to develop automated equipment for his patented method of turning contaminated oil into a usable product.

CENTECH

Rough ride. DOE has pulled back on Centech's oil cleanup project.

Three years into the partnership, he has no complaints about the quality of the joint work. "They got off their lab benches and did something," he says of the Los Alamos engineers, who worked 24-hour days and angered rental companies when they returned cars covered with grime. "They put their heart into it, and they didn't whine when it was cold and muddy. A whole new world opened up to them." But he has a big problem with their bosses at Los Alamos, who are abandoning his company, Centech Inc., with the technology just months away from commercial viability. "They can't ever finish what they start," he says.

What Los Alamos started with Centech was a Cooperative Research and Development Agreement (CRADA). The $4.1 million agreement was intended to provide Centech with a prototype robotic system and a working field unit, while giving lab researchers a chance to get out in the field and bolster the economy.

But that arrangement began to unravel last year when the Los Alamos engineers were told that CRADAs not directly related to the lab's national-security mission were to be axed. In a recent review that listed projects according to their relevance to the lab's mission, the Centech CRADA came in dead last. "We were cut off in midstream," says Jerry Parkinson, the lab engineer who led the effort with Miller. "They told us it wasn't weapons-related. It came as a shock." Los Alamos managers blame the budget cuts on Congress.

The team managed to scrape together enough funding from other programs to prevent the work from being terminated, but not enough to finish the effort. Last week, Miller and the lab team were in Wyoming testing a prototype, but it will take another 18 months to build a finished unit—if he can find the money.

Miller doesn't plan to give up, but he says he's learned a lesson about working with the federal government. "When we started this, I asked whether this agreement was cut in sandstone or granite. [The lab managers] didn't understand what I meant. Come to find out it was sandstone after all." –A.L.

NIH Works to Rekindle Old Flame

Upjohn Co. was one of the first in line when Congress, in 1986, opened the door for the National Institutes of Health (NIH) and other federal agencies to build partnerships with private companies. Within a few years, the pharmaceutical giant had signed on to almost a dozen joint projects, and NIH as a whole had chalked up nearly a hundred. A decade later, Upjohn, now Pharmacia Upjohn, doesn't have a single cooperative agreement with the government's premier medical research establishment, and NIH is still trying to recover from a contentious debate over pricing that has scared away many of its potential partners.

The NIH's Cooperative Research and Development Agreement (CRADA) effort has been spared the criticism that Congress has leveled against the Department of Energy's program because it never received a separate pot of money for these partnerships (see main text). But NIH's program nevertheless has struggled to remain afloat, with the annual number of new agreements remaining stagnant in the 1990s after a sharp early rise.

For NIH the critical issue was the high cost of drugs identified by NIH scientists but developed and marketed by the private sector. When Congress pressured NIH to keep the public in mind when enforcing a CRADA clause requiring companies to charge a reasonable price for any resulting products, drug companies complained that they would not be able to recoup their considerable investment. In 1994 a panel of NIH officials and pharmaceutical executives criticized the clause, and last year NIH director Harold Varmus struck it from the CRADA template. By then, however, many companies had lost interest. "We were never quite able to recapture the enthusiasm of management," says Edward Gemrich, an Upjohn contracts manager who was a member of the 1994 panel.

NIH officials say the situation has improved slightly in the past year. "Companies are not beating down our door, but they are talking to us," says Barbara McGarey, deputy director of NIH's technology transfer office. But industry officials remain skeptical. "The clause was a disincentive, but you need to provide an incentive," adds Allan Fox, a partner in the Washington law firm Fox, Bennet & Turner.

Fox would like to see NIH modify its CRADAs to give companies, for example, a clear advantage in marketing any products that result. But NIH's responsibility to the public limits its flexibility, says McGarey. "Of course companies are eager to get the best deal," she says. "But it's a negotiation." –A.L.

the labs a new lease on life, he notes, the effort promised a new and powerful constituency and a way to link the labs' insular culture with fast-paced commercial technologies.

To motivate lab managers, Congress in 1991 provided two special funds: one for defense, and one for civilian labs. This arrangement differed from that at other agencies, which funded CRADAs out of existing programs. Despite the fund's rapid growth (see graphic), some lab directors wanted even more. In 1993, Livermore's director at the time, John Nuckolls, asked Congress to quadruple his $50 million budget for CRADAs so that the labs could focus on "industrial grand challenge problems."

The scramble to sign up new partners sometimes led the weapons labs far afield. For example, the labs joined five civilian labs in an industrial consortium called Amtex to improve U.S. textile manufacturing technologies. "It was CRADA-mania," says David Roessner of the Georgia Institute of Technology in Atlanta, who has studied the phenomenon.

To be sure, some lab managers were wary of the blossoming trend. "Technology transfer should not be viewed as a mission of the laboratories," Alvin Trivelpiece, Oak Ridge National Laboratory director, told Congress at a 1993 hearing. Instead, he said, it should occur "as naturally as breathing." And DOE turned out to be less than adept at handling the logistics. A 1993 General Accounting Office report blasted the department's "tightly controlled, centralized" paper trail. "Many labs put all their eggs in one CRADA basket," says Roessner. "And that was a mistake."

Those problems have influenced how industrial leaders view the program. One leading high-tech company, Motorola, struggled with DOE bureaucracy for 20 months before signing an agreement with Lawrence Berkeley National Laboratory in California on electro-optical properties of nanocrystals. Soon after that, the company's chair, Robert Galvin, was named to head a panel examining the future of DOE's multipurpose labs.

The panel's 1995 report contained a scathing critique of the department's technology-transfer efforts and DOE headquarters. "The laboratories should not aspire to become research boutiques for industry," it stated. It also warned of "a sense of drift" stemming from the welter of commercial agreements on a diverse range of topics. The labs should focus on their core work and jettison the rest, the panel concluded, and managers should have more leeway.

Paring back

The new Republican-controlled Congress quickly embraced Galvin's argument. Although CRADAs were less controversial than other technology programs being trashed by lawmakers such as Science Committee Chair Robert Walker (R–PA) because they did not fund industry directly, he and others believed that the agreements should be linked to existing lab programs. So they targeted the special pot of DOE money as an example of wasteful spending. Not all Republicans agreed, however. Senator Pete Domenici (R–NM), chair of the Budget Committee and longtime protector of his state's two labs, was a staunch supporter. As a result, last fall Congress compromised by chopping CRADA funding for the defense

A CRADA Chronology

1986 Federal Technology Transfer Act

1987 President Ronald Reagan issues executive order allowing government-operated labs to enter into CRADAs.


AP/WIDE WORLD

1988

Senator Pete Domenici (R–NM) fails to give contractor-operated labs the power to sign CRADAs.

1989 National Competitiveness Technology Transfer Act allows contractor-operated labs to enter into CRADAs.

1991 Representative John Dingell (D–MI) holds hearings on tech-transfer problems between DOE labs and industry.

1993


DOE

DOE approves CRADA with Amtex, a major textile consortium, and Neal Miller's Centech.

1994 Republicans win control of House and Senate.

1995

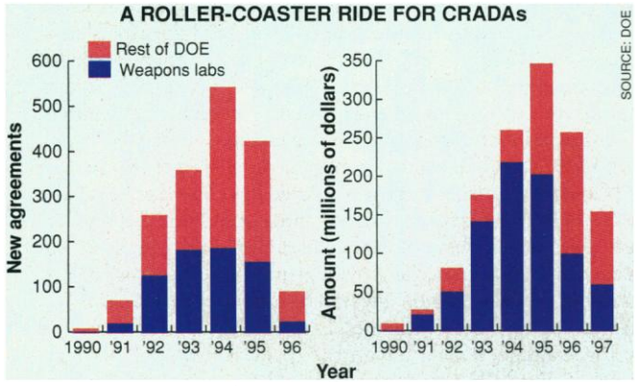

RICK KOZAK

Galvin report slams national competitiveness as DOE lab mission.

1996 Budget cuts force weapons labs to trim CRADAs.

labs from the 1994 peak of $218 million to $150 million.

To the chagrin of program supporters, however, DOE headquarters decided to take $50 million more from that budget to cover a broader general reduction imposed by Congress. And the Administration asked for only $49 million in 1997. "DOE caved in," says one angry lab manager. Department officials, however, say they had to find the 1996 savings somewhere—and the CRADA account had money left over from the previous year. The 1997 request, they add, is low because funding for major CRADAs like Amtex was shifted to other DOE programs.



Fading away. Less money has meant fewer partnerships.

This summer congressional supporters won $59 million for the program in 1997. But out of that amount, Congress has told the DOE to spend up to $10 million each on only two projects—Amtex, and an effort to build advanced computing systems with a consortium of computer companies.

The brunt of the cuts is falling on smaller consortia and businesses like Miller's that don't have much lobbying clout. Sandia is terminating nearly 50 of its 65 cooperative agreements, says Siemens. Budget cuts have forced Livermore to end four CRADAs, halt negotiations with 19 potential partners, and curb collaborations with 33 companies by 20% to 40%. Los Alamos officials, meanwhile, are mulling over a host of terminations.

Did it work?

Measuring the success of the CRADA effort is difficult, in part because its heyday was so brief. Researchers like Roessner say that there are not enough data on resulting commercial products and technologies. David Cheney, acting executive director of the Secretary of Energy's advisory board, argues that CRADAs should be measured in terms of institutional change rather than products sold. "There had been a lot of criticism in the past that the labs did not interact with industry," he says. "That's no longer so."

Others express skepticism that the brief flow of cash has altered a system so removed from the rough and tumble of the private sector. "I don't want to whitewash this," adds Siemens. "It's a really tough culture change, and it's going to take a while to recover from this." Karena McKinley, acting head of industry partnerships and commercial programs at Livermore, agrees that "we've exposed a lot of [lab] people who haven't been involved with industry before. But I am not sure there is enough momentum for this to carry through on its own."

Back in Washington, the man who helped lead the charge against the special CRADA funding remains dubious. "These are two very different cultures—labs and business—and I don't think they have figured out a way to work together," says Walker. The weapons labs continue to operate like "black boxes," while industry is repelled by DOE bureaucracy, he adds.

Despite that grim picture, senior lab and DOE officials insist that CRADAs are down but not out. Los Alamos director Sig Hecker says that specific programs can pick up the tab for future CRADAs. "I just won't get any extra money from Washington," adds Hecker, who is retiring next fall. "I feel burned, but we haven't lost the war yet," says Sandia's director, Paul Robinson. Livermore officials say that they will soon announce a major new CRADA with industry.

In the months ahead, lab officials are looking at a mix of approaches to keep the technology-transfer dream alive. Robinson, for example, envisions teams of "hunter-gatherers of technology" who can provide a critical link between the labs and industry. He would also like to boost ties with universities, a sector largely ignored in the CRADA rush. Sandia already allows employees to take leave to start their own businesses based on lab technology, and Siemens hopes to increase sharply revenue from industry for using Sandia's facilities.

Los Alamos and Livermore are similarly seeking other ways to connect with the outside world. Those alternatives range from straightforward licensing of technology to simple contracts for specific services. New CRADAs, meanwhile, are likely to be driven more by industry and less by the labs.

In retrospect, however, DOE officials admit that the department may have gone overboard in promoting partnerships with industry and fixating on CRADAs. "What has changed is any thought of industrial competitiveness as a stand-alone mission," says Cheney. "All partners should be focused on a mission, and industrial productivity is not the driver."

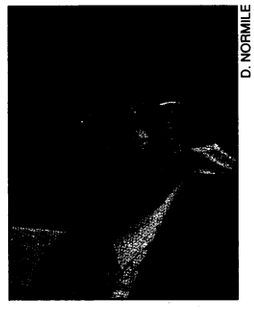
But any successful formula for closer lab-industry ties will have to overcome the recent unhappy legacy of the CRADA program. Concedes Hecker: "There is going to be a lot of bitterness on industry's part that will come back to hurt us in trying to craft future relationships."

–Andrew Lawler

JAPAN

New Funding Helps MITI Reform Labs

TSUKUBA, JAPAN—Japan's Ministry of International Trade and Industry (MITI) may be best known for setting the nation's industrial policy, but it is also an important player in Japan's research enterprise, with 15 national labs that are part of its Agency of Industrial Science and Technology (AIST). And MITI's influence is about to grow: AIST's research budget is scheduled to double next year, and it will implement major changes in how scientists are hired and grants are awarded.


D. NORMILE

Speedy reform. Oishi says MITI labs can change more quickly than universities can.

The work at AIST's labs stretches from basic research in such fields as biosciences and computer science to applied work and the setting of industrial standards. Next year the agency hopes to boost total spending on research at its 15 institutes to $64.5 million (excluding salaries), more than double this year's budget of $30.9 million. Although the Ministry of Finance is likely to insist on a smaller increase, the agency is poised to wipe out a decade of stagnation in research funding. "In 1996 we had the same budget as in 1986," says Takeo Hirata, deputy director of AIST's general coordination division.

However, AIST's growing visibility is not based solely on a fatter budget. The agency is preparing a slew of reforms that seek, in Hirata's words, to "cultivate a spirit of competitiveness." The most significant is a retreat from the practice of lifetime employment.

Over the next several years, AIST's institutes will introduce fixed-term contracts for at least some newly hired researchers. The National Institute of Bioscience and Human Technology (NIBH) in Tsukuba, for example, plans next year to offer 5-year contracts