bright scientists—many of them had studied in world-class institutions," she says. "But their knowledge base is old. And they have very little equipment. For Internet access, they go to Internet cafes. Excluding private industry, there are three NMR [nuclear magnetic resonance] machines in the whole country. I didn't expect it to be as bad as it was." She was on a fact-finding mission, she adds, "but I don't know what the State Department will do with the facts."

Intangible benefits

The Embassy Science Fellows Program is part of a larger thrust in the State Department to integrate science into the foreign policy process. "There was concern from the external community that State was losing assets and that there was insufficient scientific and technical know-how to cover a pantheon of issues," says Andy Reynolds, deputy to Norman Neureiter, the science and technical adviser to the Secretary of State—a position born of the same concerns about science at State (see accompanying story). Over 15 years or so, the State Department's overall budget shrank by 35% in real terms, says Reynolds. "A decreasing number of officers were forced to cover a burgeoning number of global issues and cooperative agreements." Things got worse when the US opened 14 new embassies after the dissolution of the Soviet Union, he adds. "We were forced to self-cannibalize to provide core staff for these new embassies. By the mid-1990s, we were so far decimated in science and technology that there was a clamor." One of the conclusions of a 1999 study by the National Research Council was that, of 16 foreign policy strategic objectives, 13 were underlain by science, technology, and health.

Gerd Binnig (left), who shared the 1986 Nobel Prize for inventing the scanning tunneling microscope, was one of many scientists that NSF's Ken Chong visited during his embassy science fellowship in Switzerland.

While it's tricky to measure the impact of the embassy science fellowships, all of the involved parties—the State Department, partner agencies, participating scientists, host embassies, and host countries—laud the program. "It's enormously helpful," says Reynolds. "It's enriching the basis of foreign policy collaborations and allows the technical agencies even more direct stakes in our diplomatic process. And it gives you a multiplier effect—you get the assignment plus intangible benefits."

Hosting NSF mechanics and materials program director Ken Chong in September 2001 "was a great boon to us," says Richard O'Brien, the economics and global issues officer in the US embassy in Switzerland. Chong's presence got the ball rolling to establish a US–Swiss science and technology framework agreement, O'Brien says. "My job at the embassy is to look for every possibility for improving government–government interactions. I noticed that we didn't have any kind of formal collaboration agreement. So we are asking scientists on both sides, who are involved in federally funded research, to decide if they want one." Chong, he adds, "visited centers of science from one end of the country to the other. Because he had been here, a number of Swiss officials were stimulated about the notion of US–Swiss collaborations in a way they hadn't been before. He churned up the waters a bit."

"I became convinced that one of the best ways we can help is to tell an embassy when something is not a scientific question," adds Brad Keister, NSF program director for nuclear and experimental physics, who spent six weeks in Italy as one of the inaugural embassy science fellows. "I think the State Department is best served by learning where science does and does not matter. There is an attitude where they get in a pinch and say, 'Ask the scientists.' But the ambiguities are not necessarily scientific. And the scientific community has to realize that as well. Science is only one piece of what State has to juggle."

Toni Feder

Neureiter Increases State Department Science Acumen Through Salesmanship and Outside Experts

In an era when many international issues involve science, technology, or the environment, the infusion of scientists into the State Department is leading to better-informed foreign policy decisions. But those decisions are ultimately political, not scientific.

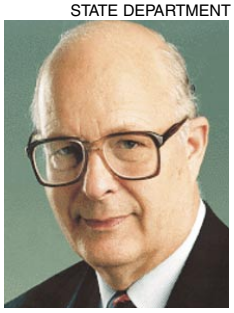
When the State Department's Norman Neureiter showed up at a recent Capitol Hill reception for the US Physics Olympiad team, he did what he has become adept at doing during his past two years in Washington: He saw the science-oriented gathering as a recruiting opportunity and worked the room. Neureiter congratulated the high-school physics students for their achievements, and then urged them to consider the State Department as a career option. As he left for his next event, Neureiter made sure there was a stack of his recruitment brochures on the table just outside the door.

"Calling all adventurous scientists and engineers," the bright blue brochure announces above photos of exotic places around the globe. "Join the Foreign Service and do the most interesting work in the world!"

Neureiter, who retired from Texas Instruments in 1996, was lured to the State Department in 2000 to fill the newly created position of science and technology adviser to the secretary. The job was created in response to a National Research Council report that chronicled a serious decline in the role of science at the department (see PHYSICS TODAY, November 2000, page 44). Neureiter, an organic chemist, linguist, and Fulbright scholar, had extensive federal government experience. He'd been the State Department's first science attaché to Eastern Europe, had helped develop President Richard M. Nixon's science and technology cooperation programs with the Soviet Union and China, and had worked as an international affairs specialist with the old Office of Science and Technology.

When he returned to the State Department, Neureiter had three stated goals. "The first was outreach to the scientific community, and that went fine," he said in a recent interview. "The second was bringing more science resources into the building, and I think we've had some success at that. And the third was to find issues which seemed

STATE DEPARTMENT



Neureiter

to need some help and in which we were interested. I tried to pick issues where I knew there was a political interest to demonstrate that science might be an important part of the foreign policy portfolio."

Neureiter revived some languishing science initiatives with India and Vietnam, and became active in the multiagency effort to involve the US once again in the International Thermal Experimental Reactor (ITER) project, reflecting the strong interest among all the member countries in having the US rejoin the ITER consortium. He also helped to reinvigorate the Joint Committee on Science and Technology Cooperation with Russia, whose US chair is presidential science adviser John Marburger. The committee, which works on common concerns about energy, the environment, technology, and science, began in 1993 as one of Vice President Al Gore's personal projects but collapsed after the 2000 presidential election. "We've reestablished the functioning joint committee under a bilateral science agreement with Russia," Neureiter said.

While all of these efforts are enormously valuable in and of themselves, he said, they also have increased the visibility of science within the State Department. "We've tried to demonstrate the political value of these science dimensions whenever we can," he said. "What you really want to do to be totally effective is make sure that the science, technology, and health considerations that are relevant to any given policy issue are somehow integrated into the decision making process. I've often been quoted as saying you don't make policy around here by just whispering in the secretary's ear, and believe me, you don't."

Instead of reestablishing the professional career track for science officers in the State Department, Neureiter has used another strategy. He has populated the State Department with scientists brought in from the outside through fellowships and internships (see previous story).

Scientists in the system

"I realized early on that my three-man office, to have an impact on a 25 000-person institution, was going to be pretty complicated," he said. "There are 8000 people in this building alone," he said of the State Department headquarters in Washington. "Then we've got some 268 posts around the world. So I decided what we needed was more scientists in the system." An existing fellowship program of the American Association for the Advancement of Science was providing only four or five scientists each year to the department, he said, so he bumped that number up to the current level of 27. American Institute of Physics fellowships provided more researchers, as did a new partnership with the Institute of Electrical and Electronics Engineers. "We have 32 of those scientists in the building right now and we'll have 40 by fall. I consider that an incredible accomplishment."

The Embassy Science Fellows Program, which is administered by the State Department's Oceans, International Environmental and Scientific Affairs Bureau, takes scientists from NSF, NASA, and a host of other federal agencies and places them in embassies. More than 30 scientists served in embassies for one- to three-month tours last year and, Neureiter said, there is growing demand from the embassies for even more scientists.

The value to the scientists is high, he said, "because everyone in the sci-

ence world has to think internationally because science is a global enterprise." The program helps the State Department, he said, because, "in the minds of our embassies, it demonstrates the value of these kinds of people to the conduct of an active foreign policy. I'd like to see the number of short-term scientists go to at least 50 per year, and I continue to talk to agencies about providing long-term detailees, people who would actually become members of embassy staffs." Add about 20 science student interns, often from graduate-level programs, to the mix, he said, "and we're approaching about 100 scientists that have been added to the system."

What the scientists learn, he said, "is that most public debates are not very technical in nature. Where you have to have the technology input is among the people who are writing the initial position papers." The scientists have to be "bringing their technical background and smarts to an issue on a daily basis, when all of the countless little decisions that end up in a final policy are being made."

Still, he said, scientists working with the State Department have to realize "that the ultimate decision is usually not a technical or scientific one. It's a position taken in a political context, and that can be frustrating for a scientist. But you have to understand that if you're going to be in the policy business, the decisions are ultimately political." **Jim Dawson**

Searching for Scientists With Management Skills, McQueary Builds DHS Science Directorate

In early April, on his first full day on the job as the undersecretary for science and technology at the new Department of Homeland Security, Charles McQueary was on Capitol Hill testifying before both House and Senate committees on how he would spend $803 million in R&D money. A couple of weeks later he was back on the hill, detailing the programs being developed for a DHS cybersecurity center. In between, he hired staff and dealt with a host of headaches as he worked to create his portion of the massive new government agency.

"I'm a problem solver," said the former president of General Dynamics Advanced Technology Systems. "You never know what the future holds in terms of what terrorists could do to us, but I think this [developing technology to protect against terrorism] is a series of engineering problems."

McQueary, a PhD engineer from the University of Texas at Austin, said he has extensive experience building management teams during his years at General Dynamics, AT&T Bell Laboratories, and Lucent Technologies. "I've had some pretty significant success in doing that in the past and I'm looking forward to doing the same thing here," he said.

In an interview with PHYSICS TODAY less than two months after he was sworn in, McQueary discussed his views of the role of science in countering terrorism, including the role of national laboratories, the technology needed, and how the public should view the risk of a terrorist attack.

PT Science at the Department of Defense (DOD) is typically defined in terms of weapons research. At the Department of Energy (DOE), it is primarily energy related, and at the National Institutes of Health, disease related. What is your definition for science at the Department of Homeland Security?

McQUEARY Fundamentally, we're interested in counterterrorism measures that deal with chemical, biological, nuclear, radiological [weapons], and high explosives, as well as cybersecurity. So those six areas of scientific endeavor, and anything that would touch upon those items to help us do a better job of protecting the country, would be important to us. Another piece that is not directly a counterterrorism issue is one of standards. We have the responsibility for developing standards for units that will be deployed as we go forward. It's helpful to have the people who are buying equipment, the people at the state and local level, to have something they can rely upon. We recently signed a memorandum of understanding with NIST and we will continue to work closely with them as we develop these standards.

PT There was some confusion in the legislation establishing DHS about the role of the national laboratories. How will you use the labs in developing technology to counter terrorism?

DHS

McQueary

McQUEARY We have a memorandum of understanding with DOE on our relationship with the labs, and it gives us free access—I should say open access—to work with these labs in order to establish our homeland security agenda. That work is under way and several of the labs I've visited already have strong homeland security research programs under way and in development. We are not going to select one lab as being the lead lab, however. What we intend to do, the way we're referring to it, is have a national laboratory and that laboratory is made up of elements of each of the major national laboratories. We feel that we need the inputs from all the labs and to establish one in the lead position when there is not a good reason for doing that creates the potential for conflicts that I think we can avoid by simply saying that each of the labs has an equal stature.

PT How will you use lab scientists?

McQUEARY We have a few labs people who are on two- to four-year assignments here in the science and technology directorate [in Washington, DC]. There are a half dozen or so scientists from several of the labs here. But when we go to the labs for work, the scientists remain laboratory employees, doing work for us.

PT Much of the antiterrorism technology involves sophisticated chemical, biological, and radiological sensors and related screening and detection devices. How much of that is off-the-shelf technology and how are you approaching the development of new equipment?

McQUEARY We are looking for things where sufficient work has been done to bring a device to a prototype stage so we have confidence we could put it in the field and do the next stage of testing with the anticipation that we could go forward into full-scale development. We're in a very embryonic stage of that right now. In fact, a lot of energy, including a lot of my own time, is being spent on making sure that we have a reasonable understanding of what's available, not only within the labs, but also from private industry as well as universities. So I've not been in a mode of "Lets rush to start fielding something that we find" until we get at least a little better understanding of what kind of capabilities exist there. It was my view that taking a small number of months, certainly no more than six, to determine exactly what kind of capability we have could serve us well as we prepare to decide actually what we're going to be putting in the field.

PT Which research areas are strongest, and which need more work?