In addition to the creation of the RRW program, NNSA's vision as outlined in its 2030 document calls for "significantly increasing dismantlement of retired warheads; consolidating special nuclear materials used in nuclear weapons to fewer sites in the complex and fewer locations within the sites; construction of a consolidated plutonium center . . . in lieu of construction of a modern pit facility," and introducing better management practices to be more efficient.

Several years ago NNSA proposed the construction of a new facility to manufacture the plutonium pits that are the primary fission trigger in a nuclear bomb. The old pit facility at Rocky Flats in Colorado was shut down in 1989 after an FBI raid for environmental crimes in the handling of radioactive material (see PHYSICS TODAY, September 2006, page 34). Congress wouldn't fund a new facility until NNSA officials showed that they needed new pits. NNSA officials have long argued that the pits in "legacy" nuclear bombs in the current cold war stockpile would degrade after about 40 years and that a new pit manufacturing facility was needed. Aging of the existing pits was also a key justification for producing RRWs.

Pits long lived

But many scientists, including those on an American Physical Society panel that looked into the issue in 2004, said there was not a scientific basis for claiming a 40-year lifetime for pits and called for a study into pit lifetimes before a new facility was considered (see PHYSICS TODAY, June 2004, page 34). A November 2006 JASON report using data from the weapons labs concluded that the existing pits have "credible minimum lifetimes in excess of 100 years."

That conclusion undercut much of NNSA's argument for the RRW program and the new weapons complex, said Robert Nelson, senior scientist with the Union of Concerned Scientists. "Now they are talking about the safety and security of RRWs and about terrorist attacks," he said. "They've changed their language."

Indeed, when the JASON report was released, then-NNSA director Brooks conceded that "degradation of plutonium in our nuclear weapons will not affect warhead reliability for decades." But, he added, "other factors control the overall life expectancy" of the weapons.

Raymond Jeanloz, a geophysicist at the University of California, Berkeley, and a member of the JASON group that wrote the pit report, noticed the shift in emphasis. "Plutonium aging was one of [NNSA's] driving concerns for a lot of things, including the modern pit facility, the RRW, and the 2030 Complex infrastructure modernization," Jeanloz said in an interview in early January.

Concerns about plutonium aging "weren't unreasonable 5 or 10 years ago," Jeanloz said, "but there has been a huge amount of work on aging and it shows the problem isn't as urgent as was feared. So the next question is, Are the other arguments for transforming the nuclear complex realistic?"

Those arguments have to do with both the age of the existing facilities and the need to maintain expertise by giving the bomb designers and others at the weapons labs something to work on, Tarter, Jeanloz, and other weapons experts say. The weapons complex dates back to the early days of the cold war, with some facilities dating back to World War II.

"I think all who look at it agree that a large part of the nuclear complex hasn't been upgraded in years," said Jeanloz, who is also a member of the AAAS panel.

High costs

Underlying the entire discussion about the future of US nuclear weapons is the enormous expense. The US currently spends about $6.7 billion a year to maintain the existing stockpile and the weapons complex. D'Agostino said in his testimony that as the RRW program is put in place, the weapons stockpile can be reduced to "meet the president's vision for the lowest number of warheads consistent with the nation's security." In 2002 President Bush signed a treaty with Russia agreeing to reduce the number of deployed US warheads to 2200 by 2012.

Daryl Kimball, the executive director of the Washington, DC-based Arms Control Association, said that despite NNSA claims that RRWs will be easier to manufacture and fewer in number, "it won't be cheaper. The RRW would be phased in over 20 or 30 years, and during that time the Department of Energy will have to continue with LEP. So for a period of time, it would not be RRW instead of the existing warheads, it would be RRW also. It is not going to be less costly."

Kimball also said that "Congress needs to ask 'do we need all of these things and at what cost.' You might get a marginally safer warhead but at a cost of hundreds of millions or billions of dollars."

One weapons expert said that in all of the studies he's looked at, "I haven't seen a 10-year budget scenario involving RRWs. It's troubling that RRW, as a program, hasn't been able to put together a plausible budget scenario. Many in Congress pushed RRW with the idea of capping expenditures. If that continues to be the view in Congress, then money is a serious issue."

Tarter said the AAAS panel is trying to assess the risks in various approaches to the weapons program. The difficulty is "trying to articulate a path that is a little of both [old weapons and RRWs] that takes us through the next 25 years, or 12 Congresses and three or four administrations. And we're trying to do this when our national consensus on the role of nuclear weapons in the future isn't completely clear." **Jim Dawson**

Bell Labs parent merges into communications giant

With fundamental research in industrial settings long on the decline, researchers inside and outside of Bell Labs wonder how it will fare as part of a new, bigger company.

Bell Labs is a mere shadow of its former fabled glory. But it is still home to excellent research, so what does the 1 December acquisition of Lucent Technologies, its parent company, by Alcatel augur for Bell? Will there be layoffs? An increased emphasis on directed research? A boost for basic research? "People have been through a lot in the last few years," says Art Ramirez, a materials physicist and director of device physics research at Bell. "I think there's a wait-and-see attitude."

Today the remnants of the physical sciences team that built Bell Labs's Nobel Prize–studded reputation number around 100 researchers, down from perhaps 400—and some estimates put the earlier high at twice that. The full Bell Labs, which includes research, technology development, and commercialization, has 650–700 employees. Alcatel's research and innovation counterpart is of comparable size, with a more applied emphasis. Although they are in close contact, the two research arms will remain separate, at least to begin with, says Bell Labs president Jeong Kim.

The combined Alcatel-Lucent communications giant has some 88 000 employees. The company has said that

over the next three years it will cut about 10% of its global workforce. In addition, because Alcatel-Lucent is French owned, a subsidiary, LGS, has been formed to do contract work for the US government. Of LGS's 500 or so employees, the number who do physical sciences research and development is "much bigger than dozens," says David Bishop, a longtime Bell physicist who now heads LGS operations and technology. "Scientific results and opportunities generated in Bell Laboratories can flow pretty much freely into LGS," he says, "but what can flow back is controlled." With LGS and Bell Labs collocated, he adds, "there are hundreds of ways people can interact." Some scientists are skeptical, however. "I at times did classified research in parallel with my unclassified activities, and most of my colleagues never knew or cared what was going on," says one Bell veteran. With the subsidiary split off from the parent company, he adds, "they won't be able to easily bring people in from research to do consulting and knowledge sharing."

The Bell brand

"What I enjoyed about the years I was [at Bell] was the electric atmosphere, the can-do attitude. I am reminded of it when I visit Google," says Anthony Tyson, an astrophysicist who 2 years ago moved to the University of California, Davis, after 37 years at Bell Labs. Bell Labs produced the science it did because it was owned by a monopoly, says Tyson. After the government broke up AT&T in 1984, he adds, Bell Labs has "been going downhill continuously with time."

Basic research in physical sciences at Bell Labs is now "small potatoes," says Louis Brus, a chemist at Columbia University who was previously at Bell. "It's not a significant factor in the success or failure of the company—it's irrelevant." But, he adds, "Bell Labs will not vanish. It will be a valuable trade name."

Indeed, says spokesman Peter Benedict, "We still value and promote the Bell Labs brand." The Bell Labs tag line was dropped from the company's new logo, he says, because having three company names—Alcatel, Lucent, and Bell Labs—"would have been confusing to the reader." Others, though, point to such changes as signs that the merged company values Bell Labs less: " 'Bell Labs Innovations' seems to have disappeared—from the logo, from the website, from the letterhead," says the Bell Labs scientist who did classified and unclassified research. "And when

PETER BENEDICT

Bell Labs is not highlighted on the banner of its main building in Murray Hill, New Jersey, the North American headquarters of Alcatel-Lucent.

the merger occurred [in December], there was not the ballyhoo about Bell Labs and the importance for the company that was made in the 1996 spinoff of Lucent [Technologies from AT&T]."

Perhaps not surprisingly, researchers who remain at Bell Labs paint a rosier picture. "It isn't the way it used to be," admits Rod Alferness, who came to Bell Labs in 1976 and now heads research. "But there continues to be vibrant and robust research activity in areas that are important in the communications industry and at the more fundamental levels in order to get there. I think there is a great deal of excitement with our researchers about the potential to have impact on industry and ultimately on society." Adds Bishop, "We certainly do a lot less semiconductor physics than we used to. But we are spending more time developing advanced mathematical algorithms. Research interests evolve and change because the company and customers evolve and change." Current research areas at Bell Labs include microelectromechanical systems, nanoscience, materials science, and high-speed electronics.

At least initially following the merger, "there is no real change" for physical sciences research, says Ramirez. He notes that a few years ago, when Lucent's stock was down—and he himself was at Los Alamos National Laboratory—the company was still letting researchers buy helium. "Even when [the company was] losing money, people were making two-dimensional electron gases, new materials, molecular electronics." The larger, merged company, Ramirez says, "makes components in addition to the things that

Lucent did—networking and optical communications. That gives us an additional outlet. Research scales with revenue. In that vein, it's better to be part of a bigger company."

A fine line

If the company is successful, it "will give us more flexibility, more money for fundamental research," says Kim. "I am passionate about trying to protect fundamental research. But at the same time, I want to make sure we do this by making a difference for the company. It's a fine line to walk."

"One of the important contributions of AT&T and the early Lucent, and IBM and others, was that research got published in the open literature," says the New Jersey Institute of Technology's Louis Lanzerotti, who used to work at and still consults for Bell Labs. "When you have fewer publications from industry, other physicists don't know what are deemed to be the important problems. That's not good for physics, for the country, or for the world." Stan Williams, director of quantum science research at Hewlett-Packard, agrees that the decline of basic research at Bell Labs and other companies is unfortunate: "I have been so disheartened by the whole thing. I view it as a great American tragedy."

Toni Feder

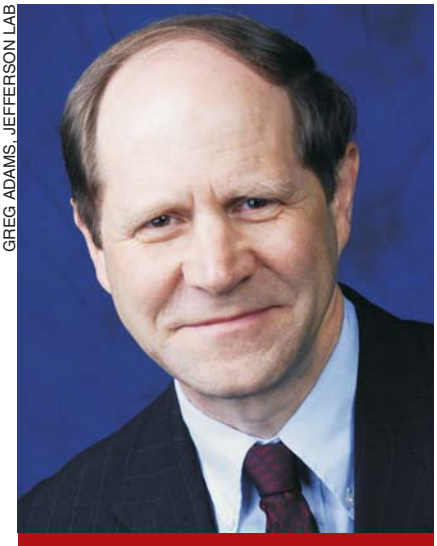
Dylla tapped to head AIP

H. Frederick Dylla will don the mantle as CEO and executive director of the American Institute of Physics on 1 April, after a one-month overlap with Marc Brodsky, who has steered the institute for more than 13 years (see PHYSICS TODAY, July 2006, page 22). A not-for-profit organization with 450 employees and an annual budget of about $75 million, AIP publishes scientific journals, conference proceedings, and magazines—including PHYSICS TODAY—and provides a range of services to its 10 member societies, individual scientists, students, the general public, and R&D leaders.

Dylla comes to AIP from Thomas Jefferson National Accelerator Facility (JLab) in Newport News, Virginia. Before moving there in 1990, he spent 15 years at the Princeton Plasma Physics Laboratory (PPPL).

"At Princeton, Dylla solved the wall problem for the tokamak—he learned how to clean the walls to stabilize them under ion bombardment from the plasma," says Xerox Corp's Charles Duke, who chaired the search committee that selected finalists, from which Dylla was chosen by the executive committee of AIP's Governing Board. "When Fred moved to JLab to build a free-electron laser, he was hijacked on a crisis basis and asked to take over the fabrication and manufacture of the cryomodules for the main accelerator's beamline. He led the cryomodule team to deliver on time and under budget. He has been indispensable in getting two national laboratories operational." Dylla's taking the top job at AIP, Duke adds, "is a match made in heaven. He has proven to be an accomplished manager, an outstanding physicist, and an inspiring leader."

GREG ADAMS, JEFFERSON LAB



H. Frederick Dylla

Dylla also has strong ties to AIP. He served on the Governing Board in the early 1990s and again beginning in 2004. He has been president of AVS: Science and Technology of Materials, Interfaces, and Processing, one of AIP's member societies; is a longtime member of the advisory committee for AIP's Corporate Associates Program; is a founding member of the Forum on Industrial and Applied Physics of the American Physical Society (APS), another AIP member society; and, until accepting his new job, was serving a stint as chair of PHYSICS TODAY's advisory body.

Despite his long career in national labs, Dylla calls himself an "industry junkie." As an experimentalist, he says, "you are constantly involved with small and large companies as you try to build frontier instruments." In addition, with a couple of his PPPL colleagues, he launched a consulting company and was its president for a decade. During his tenures at both PPPL and JLab, Dylla was involved in developing and implementing science education and outreach programs for elementary and secondary school students.

"The only thing you might think I'm weak on is the publishing business," says Dylla. "But through being on boards at AVS, AIP, and APS, I've been instilled with all the sensitivities and issues." And, Dylla adds, "difficult situations don't bother me. I enjoy challenges."

In considering the challenges facing AIP, Dylla points to the need to respond to rapid changes in publishing, including open access, electronic publishing, the growing East Asian market, and increasing competition from European journals. "I am optimistic that publications will remain the mainstay of AIP's business," he says. There will always be a market for publications that are high quality and nice looking, peer reviewed, and archival, he adds. "AIP can afford to do low-level experiments on open access and different distribution methods. You are not betting the farm."

Another challenge, he adds, is how AIP and its member societies can "be responsive to industrial members. There is no physics industry—unlike the American Chemical Society, which can point to a chemical industry. But physics still underlies the design and manufacture of semiconductors, which is the biggest business in the world. It still underlies energy technology and building cars. It's just that the scientists in the boardroom have been replaced with MBAs."

The job of heading AIP "is to first-order impossible," says Governing Board chair Mildred Dresselhaus, a physicist at MIT. "You have to be involved in everything. Publishing is a big factor, and all the resources we [at AIP] provide—education, statistical services, history of physics." Dylla, she continues, "is unusual in that he has experience that spans quite a number of fields of physics. That is an advantage in a job like this." AIP is doing well as a whole, she adds. "There is a good base to build on."

"In my first few months," says Dylla, "I will be extensively listening and asking questions. I am going to help various groups think about who their customers are, what are their deliverables, how they are using their resources. You will find me to be a manager who doesn't dictate things from the top, who helps the organization develop its own solutions,