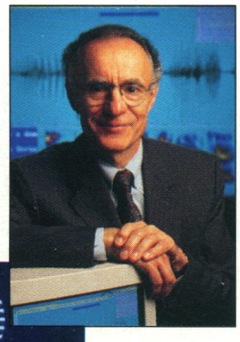
Relaunching Bell Labs

AT&T's fabled research shop has a new parent called Lucent Technologies, a new boss, and promises of no more job cuts. Yet some staff members are still sending out résumés

Ever since Ma Bell was broken up by court order 12 years ago, many researchers have been bemoaning the demise of a national treasure: AT&T Bell Laboratories. The labs, whose researchers count the development of the transistor, laser, and solar cell among a remarkable stream of breakthroughs that have garnered seven Nobel Prizes during the last 70 years, were moving away from basic science. Nobel Prize–winner Arno Penzias, research director since 1981, was pushing them to bring far-flung research projects in line with the company's telecommunications business, to help parent AT&T survive in a competitive marketplace. Researchers felt that "products not prizes" became the company mantra.

"A year ago we knew Arno Penzias was under a lot of pressure to reduce fundamental science," says Cherry Murray, who heads semiconductor physics research at Bell Labs. The physical sciences division, where the labs built their cherished reputation, was being cut back, and many researchers were looking for work elsewhere. But now the situation, says Murray, has "completely changed."

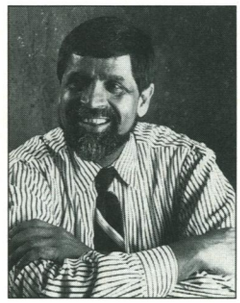
Much at Bell Labs, in fact, has changed. AT&T is splitting into three companies, and the labs—75% of them, at any rate—are going with one of the offspring: Lucent Technologies, a high-tech company that will develop and manufacture telecommunications technology and equipment for AT&T and other communications companies. Lucent launched its first stock offering to the public just last month. (The remaining 25% of the staff, made up of computer scientists, mathematicians, and other information scientists, will form the new AT&T Laboratories, supporting the giant telecom's businesses in long-distance and other services.) Earlier this year, about 70 out of 590 physical scientists lost their jobs as part of the split. But Bell Labs' new director, Arun Netravali, a 24-year veteran who replaced Penzias last October, says this latest round of job cuts in physical sciences is the last one planned.



Not the same as the old boss. Bell Labs is "more applied and less academic than it used to be. I make no apology for that," says former research director Arno Penzias.

What seems just as important to many labs scientists, however, is a change in corporate culture. Netravali has replaced the former corporate culture of "products not prizes" with one that's more inclusive. "I'm saying we ought to do both," says Netravali. Publications, prizes, and other types of recognition, he adds, not only help researchers advance their scientific careers, but also ensures "that there is some value that comes out of everything we do." Moreover, Bell Labs researchers believe they will have a higher profile at smaller Lucent than they ever had with behemoth AT&T; their name, "Bell Labs Innovations," is incorporated into the company logo. "We are on the radar screen, and we want to be," says physicist Bertram Batlogg. "Overall there is a good feeling that the company does count on us."

Lucent Technologies
Bell Labs Innovations



B. FORD

Meet the new boss. "There are no more cuts [planned] in the physical sciences," says new Bell research director Arun Netravali.

But that feeling isn't universal. In interviews with 30 present and past Bell Labs staffers, many of whom would only speak anonymously, a number voiced worries that the current support for physical sciences research and scientific freedom are familiar refrains that have been abandoned before. "The management says they are committed to research," says one physical scientist at the labs. But the job cuts to date, he adds, "speak louder than their words."

Outside observers such as Bob Lucky, a longtime Bell Labs engineer who is now vice president for applied research at Bellcore—the research arm of the Baby Bells, which split from AT&T in 1984—in Morristown, New Jersey, notes that an intensely competitive marketplace has led to "the businessification of research." Lucent really can't protect researchers from more downsizing if the going gets rough, says Lucky. And it may get rough: Lucent posted a $103 million loss for its first quarter.

A new tune for Bell

Today the labs, headquartered in Murray Hill, New Jersey, employ a total of about 25,000 people in eight states in the United States and abroad. The vast majority do development work, taking basic and applied research and turning it into new products for the business units. But the labs still spend about $350 million a year on research itself, supporting a staff of about 1300 physicists, chemists, computer scientists, mathematicians, and even a few biologists.

The seeds of the labs' current ups and downs were sown even before the 1984 divestiture of the Baby Bells. Until the late 1970s, physical scientists predominated at the labs—as befits an institution that made its name in solid-state physics—accounting for as much as 75% of the total researchers. But as the communications revolution took off in the 1980s and '90s, AT&T earned more and more of its business selling services such as long-distance calls and credit cards instead of hardware. That, in turn, expanded the need for computer scientists, software programmers, and mathematicians, and reduced demand for physicists, chemists, and materials scientists.

So during Penzias's tenure, when physical science researchers retired or took jobs outside the company, those slots, by and large, went to information scientists. By last fall, when AT&T executives decided to spin Lucent and Bell Labs off into their own company, the earlier division between disciplines was nearly reversed, with information-sciences researchers accounting for nearly two-thirds of the total (see graph on next page). Physical scientists, who numbered about 825 researchers among their ranks in 1984, were down to less than 600 last year.

Penzias also took on the Bell Labs tradition of unfettered research. The old model was to bring in topflight researchers, turn them loose, and hope something wonderful would happen. But Penzias—and the AT&T bosses—thought this "academic" model didn't make the most efficient use of the labs' time and money. For instance, the labs

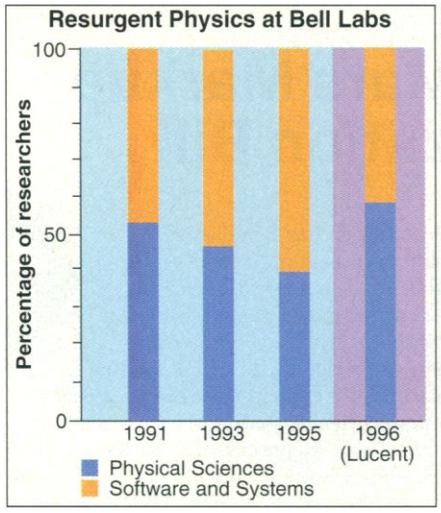
supported research in radioastronomy, for which Penzias shared a Nobel Prize with Robert Wilson in 1978 for discovering cosmic microwave background radiation. But AT&T was not in the radioastronomy business. "I single-handedly stopped the radioastronomy effort at Bell Labs," says Penzias, who now scouts out new business and research ventures for the labs in his current role as chief scientist. As head of research, he says he couldn't justify asking other researchers to rein in their academic projects without doing the same himself. And he did ask. The result, he says, is that research at the labs is now "more applied and less academic than it used to be. I make no apology for that. We want to stay focused on what we do best." Those academic projects, he says, have dwindled from nearly 25% of the labs' portfolio to next to nothing today.

For many researchers this focus has been welcome. "I like working on real problems," says computer scientist and mathematician Margaret Wright, an 8-year labs veteran, who says she tied her research to real problems even before the shift. Bell Labs, she adds, "is still the most exciting place scientifically. The air crackles with scientific excitement."

Holding the line

Yet in recent months, the air has been crackling with something else: job anxiety. The past few months have been a "tremendously emotionally wrenching period," says Ravi Sethi, who heads computer and mathematics research at Bell Labs. In January, research managers were told to make cuts as part of the overall AT&T effort to cut 40,000 jobs. That left research managers with the task of deciding how to split the labs and which researchers would be allowed to take voluntary retirement or asked to leave. With approximately 300 systems and software jobs being relocated to the new AT&T Laboratories, lab managers decided to make most of the job cuts in the physical sciences at Bell. And earlier this year, as the cuts were being finalized, morale was "pretty awful," according to one researcher. "It's not fun to be in an organization that's continually downsizing," says Bill Brinkman, who heads the labs' physical sciences division. "But I think the picture is getting brighter."

One reason is that downsizing is coming to an end, says Netravali. "There are no more cuts [planned] in the physical sciences," he states. After the gradual realignment of research under Penzias and the recent cuts, "we are roughly where we want to be." That comes as welcome news to physical scientists. "This hemorrhaging will stop," says Horst Stormer, Bell Labs' director of physics research. "That's very reassuring."



Back to basics. Under new owner Lucent, the slide of physical sciences at Bell Labs has been halted.

The new Bell Labs will retain approximately 520 physical scientists and about 400 information scientists—with plans to hire some more of the latter—according to Netravali, Brinkman, and other research leaders. The labs will also continue to focus their research on four main areas: silicon electronics; fiber optics and other light-based communications systems; wireless communications systems; and software for running a vast array of systems such as large networks. One area that is being dropped completely is research into flat panel screen displays, which had been undertaken to support AT&T division NCR, the computermaker, which will no longer be a part of Lucent.

In addition to stopping the hemorrhaging, Netravali is encouraging researchers to publish their results and excel in their own scientific disciplines—regardless of any financial benefit to the company. If research leads to publishable papers, not allowing researchers to get credit for their hard work "would just be wrong," says Netravali. "I think that's appropriate," says Penzias of the course change. Now that the organization is sized and balanced, he adds, encouraging researchers to be full participants in the scientific community "is exactly the right thing to do."

Among much of the Bell Labs staff, the change has been welcome news. "Now there's a euphoria among fundamental scientists," Murray says. Netravali's new emphasis has "taken the anxiety away from some of the fundamental people," agrees physicist Alice White. "It's important [for scientists] to be part of that research community," says Michael Gearey, a 26-year veteran who heads mathematical research. "If you're going to have the best people, that's what they're going to want to do."

Flying résumés

Not everybody shares the new euphoria, however. Cammy Abernathy, who left Bell Labs 2 years ago to become a professor of materials science at the University of Florida, Gainesville, says "I've seen a lot of résumés [from Bell Labs personnel] flying through search committees." And a researcher who decided to stay confirms this: "There's still some instability. I think a lot of people are still looking for jobs outside and considering other options."

Abernathy also thinks the labs have lost some of their luster. "In the old days it was hard to beat Bell Labs," she says, for the organization provided researchers with good budgets, strong interdisciplinary interactions, and the freedom to work on nearly any topic. "That situation doesn't exist anymore. So it makes other positions more attractive." And a physical scientist still at the labs adds that management's encouraging words are falling on somewhat cynical ears, because staff say they've heard support for publishing before, only to have it contradicted a year or so later. "There's no consistent policy," the researcher says, adding that quality work requires sustained support. "You can't just turn on the spigot and have Nobel Prizes overnight."

A number of people seem to be taking a wait-and-see approach, however. "For the moment we have a suspended sentence," says another Bell physicist. "It's not clear where things will go. Their intention is to start off this way. But the whole thing comes down to profitability of the new company and will it survive."

There are signs that it will. Despite Lucent's first-quarter loss, most financial analysts predict strong revenue growth for the company, as it should now have an easier time selling giant telephone switching systems and other equipment to AT&T's competitors, such as MCI and Bell Atlantic. That growth, should it occur, could also benefit research. Another factor that bodes well is the current research budget of roughly $250 million. That amounts to just over 1% of the $21.4 billion in 1995 revenues for the former AT&T divisions that make up Lucent. And that percentage, says Lucky, "is consistent with the industry average" for basic and applied research at high-tech companies.

Ultimately, the stability of companies in the telecommunications arena—and their research outfits—is anything but a sure proposition in this era of global competition. "We're sitting in a ruthlessly efficient marketplace. We didn't invent it," says Penzias, former steward of the shop that, at one time, seemed to be inventing almost everything else. "But we have to live with it."

–Robert F. Service