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Jeong Kim

Applied Science

With Its Future Now Uncertain, Bell Labs Turns to Commerce

Storied Font of Basic Research Gets More Practical Focus Amid Worry Over a Merger

Mr. Kim's 'Totally Crazy' Idea

By SARA SILVER

August 21, 2006; Page A1

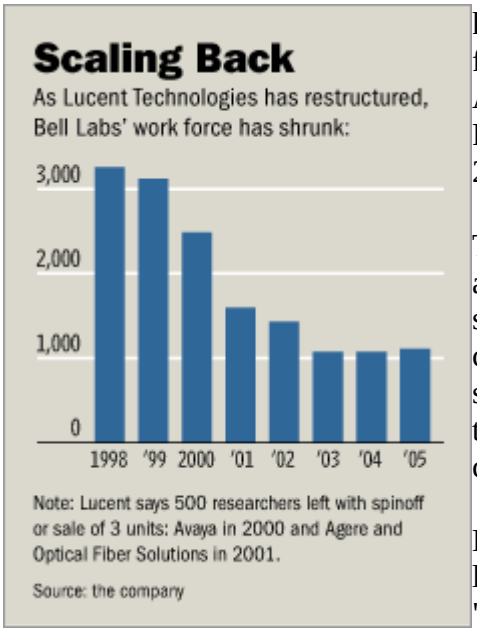
Lucent Technologies Inc.'s Bell Labs, the birthplace of the transistor and the laser, has been through a decade of turmoil during which it was reduced to a third of its size. Now, some of its scientists are warily embracing a former submarine officer and entrepreneur as perhaps the laboratory's best hope of maintaining its relevance.

Jeong Kim took over last year with a direct plan for saving the storied laboratory: Make it profitable. Among his first moves, he set more of its scientific stars to work on breakthrough technologies that could turn quickly into businesses -- the opposite of the pure research many live for.

Each of these projects is expected to make back six times what it spends on research. Those with the biggest financial potential get the most funding. Researchers often condense their work into eight-minute PowerPoint presentations. Mr. Kim also seeks more government research grants and is aiming to speed the transformation of technology into products by seeking corporate partners and venture capital.

In earlier days, Bell Labs' scientists might have rejected Mr. Kim's commercial approach to science. Not now.

Industrial labs have been losing clout for years as corporate parents looked askance at spending money on research that offered little immediate return. And in addition, Lucent is planning to merge with **Alcatel** SA of France, a company that doesn't do the



kind of fundamental research that made Bell Labs famous. "Bell Labs does research with a big "R"; Alcatel does research with a little "r," says Niel Ransom, Alcatel's chief technology officer until 2005.

The deal has stirred anxiety among scientists about what will happen if Alcatel, whose shareholders will own 60% of the combined company, asserts control. Some Bell Labs scientists, worrying that their jobs could be among the 9,000 expected to be cut after the deal is completed, are scouting for new work.

Lucent Chief Executive Patricia Russo, slated to lead the combined company, says that it has "absolutely no intention of separating Bell Labs from the company" and won't undermine the labs' research. "Bell Labs will be an integral part of the combined company and is critical to its future success," she says. "Our goal is to leverage its critical capabilities so that research can seamlessly flow from our labs into commercial applications in support of our customers."

Executives of Alcatel decline to say where Bell Labs will fit into the combined company, though Alcatel's chief technology officer, Olivier Baujard, says Alcatel believes "research is a balanced mix of advanced and applied research."

As Sept. 7 shareholder votes on the deal near, some investors have been selling Lucent stock, suggesting they aren't sure the deal will go through. Since word of it became public in late March, the stocks of both companies are off nearly 20%, though both regained some ground last week. Some analysts in Europe suggest Bell Labs' classified research could be a sticking point for U.S. regulators, but Lucent says it plans to create a U.S. subsidiary to handle such work, as other firms have done.

Over eight decades, Bell Labs produced a series of seminal inventions, including the solar cell, the electronic microphone and the digital computer. Scientists were free to pursue projects that sparked their interests, even ones their supervisors discouraged. As a result, 11 Bell Labs scientists have shared in six Nobel prizes, including one for proving the Big Bang theory.

But while the labs won glory, other companies marketed and profited from its inventions. In part, this was because its research was funded with public money -- a special tax on phone bills -- and inventions were available to anyone for a small fee. In any case, Bell Labs managers had little financial incentive to pursue commercialization of new technologies. AT&T had a lock on the phone business and was swimming in cash.

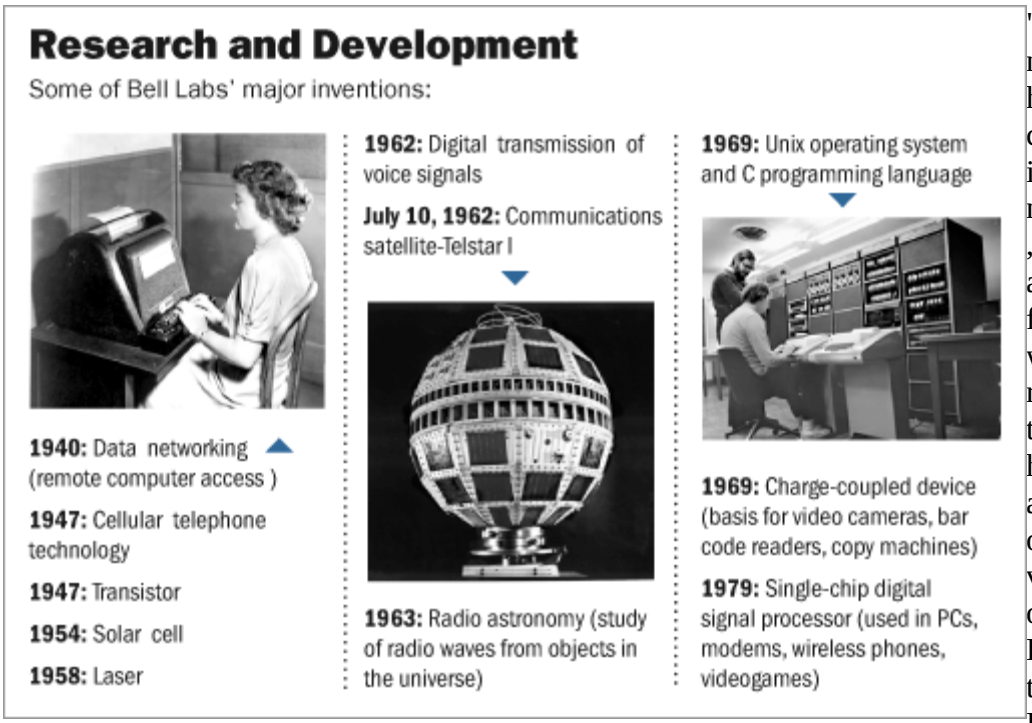
The 1984 breakup of AT&T, followed by the 1996 spinoff of Lucent, ushered in an era of uncertainty for the labs. Lucent slashed funding after the technology and telecommunications bubble burst and demand for Lucent's products shrank. To stave off bankruptcy, it cut tens of thousands of jobs through buyouts and layoffs and by spinning off or selling units such as Agere, Avaya and Optical Fiber Solutions. It eliminated entire departments at Bell Labs, such as those working on statistics, psychology and economics.

By 2003, Bell Labs' research budget had fallen to about $115 million, less than a third of its mid-1990s level of $350 million, current and former managers estimate. It has since stabilized. The number of researchers fell to just over 1,000 in 2003 from 3,000 in 1999, with 500 moving with divisions that were spun off or sold. Entire hallways on the Labs campus are dark.

Today, the worries about the Alcatel deal loom large for scientists, as most analysts consider the deal an acquisition by the French company. Despite the planned CEO role of Lucent's Ms. Russo, former Alcatel executives will fill a majority of posts on the executive committee and run operations in most parts of the world. The board will be tilted in Alcatel's favor by the presence of two independent European directors in addition to six named by each company.

Lucent says a balanced number of executives from each side are filling top slots, and the European directors must be mutually agreed upon. The new parent company is to be called Alcatel Lucent and based in Paris. Bell Labs' headquarters will remain alongside Lucent's current headquarters in Murray Hill, N.J.

The task of keeping Bell Labs going beyond the merger has fallen to Mr. Kim, its first leader who didn't rise through the ranks. He isn't promising a return to the glory days. To reshape the labs into a commercial machine -- and preserve its relevance to a multinational corporation -- he wants to unleash its scientists' entrepreneurial spirit.



"Within a highly competitive market, we are faced with a reality that we have to align our vision of Bell Labs to that of Lucent," he says. His mission is to create new revenue streams to make up for those eroded by competitors, especially Lucent's core business of selling telecom equipment. Without income from its overfunded pension plan, instead of a profit Lucent would have posted a loss so far this fiscal year, which ends Sept. 30.

Mr. Kim says he is confident he can make Bell Labs relevant under its new ownership, enabling "the combined company -- and its customers -- to help shape the future of communications."

Bell Labs has tried building start-up technology businesses before, and in 2002 it aborted one attempt. Lucent says it sold the bulk of its interest in 27 companies for less than $100 million and the remaining interest for an undisclosed sum later that year. Since then, several of those start-ups have sold for hundreds of millions of dollars.

Mr. Kim first joined Lucent in 1998 after it bought his broadband start-up Yurie Systems Inc. for $1 billion. He pocketed $500 million and joined Lucent's executive team. He left in 2001 to join the engineering faculty at the University of Maryland, where he endowed an engineering building that bears his name. Ms. Russo hired him back in April 2005 to try to spread his entrepreneurial success throughout Bell Labs.

In addition to his rules on presentations and investment returns for breakthrough technologies, Mr. Kim eliminated a division of labor in which 40% of scientists focused on basic research and the rest tried to turn discoveries into technologies to sell or license. He cut costs by opening and expanding branches in Dublin, Beijing and Bangalore, India.

He also served up a fair dose of corporate-speak rarely heard before at the labs. Applying "matrix management" principles, he pulled together scientists from disparate departments to work together on special projects. At a "town hall" meeting two days after taking over as president, he announced: "We must innovate innovation." At another meeting, he told an audience of scientists that "the future is ours to take."

Mr. Kim, a 45-year-old who lived in South Korea until age 14, issued a "call for volunteers" to attend marathon evening sessions devoted to reshaping the labs. He asked scientists to put their ideas in one of two groups, like drug makers classifying pills. One group was "vitamins" -- which have no instant benefit and are low-priced because they're widely available. The other type was "painkillers," which can command a premium price because they address an immediate need. The result of the brainstorming session: 150 ideas for technologies, including videogames, cellphone payment methods and tiny batteries the size of an atom.

Mr. Kim passed the hottest ideas to a secretive group he formed to lead the quest for breakthroughs, called the Technology Commercialization, or "TC," unit. Anticipating resistance, he nicknamed it "Totally Crazy."

Physicist Sharad Ramanathan is currently trying to figure out how nearly blind spiders can weave roughly symmetrical webs. "It's important to have some people who are released from the constraints of immediate or even remote applicability of their research," he says. "It doesn't have to be everyone -- it just has to be some people, and that's what makes Bell Labs special."

Ronen Rapaport, attracted by Bell Labs' pioneering work in ultra-pure semiconductors, came on board five years ago to study the behavior of particles called "excitons" trapped in the material. He has since been pulled on to different projects, including examining how deep-sea creatures filter light. Now he devotes at least a fifth of his time to developing future products. It's all right with him. "We want to help the company as long as there's room for our research," he says.

Scientists accustomed to writing academic papers sometimes gripe that boiling their research into PowerPoint presentations leaves no time for crucial details. But Mr. Kim is using this format to spread the gospel about the labs' usefulness within Lucent.

Dave Bishop, a 28-year Bell Labs veteran who heads its government-funded-research arm, is banking on Mr. Kim's long-term plan to prove the labs' worth. "I've worried about this place since Day One," he says. "Jeong has provided a structure and a focus and has made our fight his fight to save this institution, and I say, 'God bless and God speed.' "

Some alumni are supportive, as well. Steven Chu, who won a Nobel in physics for his 1978-87 work at Bell Labs, says that "working on applied things doesn't destroy a kernel of genius -- it focuses the mind." Mr. Chu is now director of the Lawrence Berkeley National Laboratory in Berkeley, Calif.

Arthur Penn Ramirez

An example of the new approach involves metal detectors made of silicon the width of three human hairs -- technology for which Lucent long couldn't find a use. Under the new regime, Bell Labs is working with a small company to develop it into a device that could help the military detect snipers. Called a magnetometer, the device also could be used by doctors to measure blood flow through subtle changes in the heart's magnetic field.

Arthur Penn Ramirez, a physicist spearheading its development, recruited Bell Labs experts in delicately sculpting silicon to provide interlocking combs that can sense minute electrical charges. He summoned mechanical- and electronic-measurement experts to turn the information from the combs into electronic signals. And he brought in noise-theory experts to ensure that the sensor, which works best in the stillness of absolute zero, would be accurate enough to work at room temperature. This means the device could be cheap and thus could be installed in large quantities.

Six months later, a prototype came out and Mr. Kim began showing it off to potential partners. Bell Labs' Mr. Bishop sold the idea to a small company called mPhase Inc., which has also invested in initial development.

Mr. Ramirez says he doesn't miss the days when there was no pressure to turn science into dollars. Though the magnetometer has yet to find a customer, he is excited about it. "The project has given me an additional outlet to pursue science," he said.

But Mr. Ramirez has also experienced the flip side of Mr. Kim's regime. A different sensor-related project was a leading candidate for commercial development -- only to be rejected by Mr. Kim's selection committee this summer.

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