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Public-sector strategy: North Carolina builds a high-tech center

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do certain things," he says. "One is to provide research opportunities; the other is to provide seed money."

Formed as a nonprofit corporation, the MCNC works closely with five North Carolina universities—North Carolina State, North Carolina A&T State, North Carolina at Chapel Hill, North Carolina at Charlotte, and Duke—as well as the Research Triangle Institute, a contract research organization.

MCNC president Don Beilman sees the center not only as the pivotal element of microelectronics development but of North Carolina's entire high-technology industrial development strategy. "Microelectronics is maybe the most pervasive of all areas in developing high-technology opportunities and industries," he says.

To staff the microelectronics center, about 60 industrial laboratory people will be hired, representing advanced areas of microelectronics from chemistry to computer science. Many of these people also will have joint appointments with the universities. "Part of our uniqueness is that the universities are an integral part of the overall microelectronics program of the state," says Beilman.

Role of Education

Indeed, educational institutions play an important role in the MCNC strategy, as well as in North Carolina's overall industrial development plan. People of the "tar-heel" state always have known the value of education. The state was founded in 1776 on the belief that democracy requires an educated citizenry.

But the wooing of high-technology companies didn't begin until the 1950s, when North Carolina set about to use its then greatly expanded education system to attract industry to the state. Even then it was not high-technology companies per se that the state was vying for—the term had not yet been coined—but a new industrial base to vitalize the state's sagging economy. At that time,

North Carolina was dependent on what were then three labor-intensive, low-wage industries—tobacco, textiles, and furniture manufacturing—and suffered with the lowest per capita income and average industrial wages in the United States. Moreover, 20 percent of its college graduates were leaving their home state each year for lack of career opportunities.

One of those who resolved to change all that was Luther Hodges, who was the governor of North Carolina from 1954 to 1961. He, along with others, supported the premise that what North Carolina needed in order to boost its economy and its labor force were new and higher-paying industries.

To foster such an industrial renaissance, Hodges envisioned a research park, one cooperatively run by the state's leading universities. The main attraction for new industry would be the universities themselves, with their nationally recognized and multidisciplinary strengths in science, mathematics, engineering, and medicine; the research support that the universities would provide, in the form of faculty and research consultants; and the graduates that the universities would produce, which would provide the scientific and engineering manpower necessary for industry to grow. Ultimately, it was predicted, companies that settled in the park would spawn manufacturing facilities elsewhere in the state.

Selected as the academic base for North Carolina's research park were three universities: the University of North Carolina at Chapel Hill, North Carolina State University at Raleigh, and the privately endowed Duke University, in Durham.

In 1958, the dream came true. Backed with \$1.5 million of privately raised funds, a research park was realized. Named the Research Triangle Park and modeled in part after the Stanford Research Institute, it is situated on 5,500 rolling, pine-forested acres in the center of the triangularly shaped area formed by the cities in which its three participating universities are located. The park is operated by the three universities through the Research Tri-

angle Foundation, a nonprofit organization.

At present, the park has about 50 tenants. Major companies with facilities in the area include IBM, Northrop Corporation, and Data General. But the park's tenant base, by design, is quite diversified. It includes, besides support services, Burroughs Wellcome (pharmaceuticals), the U.S. Environmental Protection Agency, the National Research Center for the Humanities, as well as educational and research facilities of the MCNC and other park programs. More than 20,000 people work in the park, and it is estimated that the high-tech companies surrounding the park employ three times that number.

One of the park's tenants, Northern Telecom (a Toronto-based company owned 51 percent by Bell of Canada) made two decisions to move to North Carolina. In 1974, it chose the town of Creedmoor as the site for a subplant for manufacturing its analog telephone switching equipment. "We were after the tech graduate at that time and looking primarily at North Carolina's technical schools and community colleges," says Tom Worthy, group vice president of Northern Telecom's digital switching systems division in the Research Triangle Park.

In 1977, when the company replaced its analog switching system with a digital system, the company began to press harder for college graduates and master's degrees. "One of the key reasons for staying here—in addition to the healthy business climate in North Carolina—was the Research Triangle and the colleges, such as NC State, that have terrific engineering schools," says Worthy. "That forced us to rethink our whole program."

University-Industry Bridge

The concepts of the Research Triangle Park and the microelectronics center are unique, maintains MCNC President Don

Beilman. "Most other centers—at Stanford, MIT, or Rensselaer—are operated by a single university and are aimed at academic research," he explains. "Ours is a third-party nonprofit company and will be developed as an industrial research laboratory. Working with the universities and the Research Triangle Institute, we will develop the basic research, and the center itself will act as a bridge between those universities and industry." But the MCNC's mission is not just research, emphasizes Beilman. It also is to shorten the time it takes for research developments to get into industry.

From their participation in the MCNC, the universities have the opportunity to enhance their own microelectronics and semiconductor education programs. Special microelectronics teaching centers have been developed with the universities, and the MCNC provides grants for new laboratories and equipment. The central facilities of the MCNC—including equipment for semiconductor research and for the design, fabrication, and testing of complete microelectronics systems—also are shared by all participating schools.

To house its facilities, the MCNC has begun construction of a multimillion-dollar semiconductor research and development center in the Research Triangle Park. Scheduled for completion late this year, the 80,000-square-foot facility will contain laboratories for computer-assisted integrated circuit design and for semiconductor research and new-generation integrated circuits, as well as space for the MCNC's administrative staff.

North Carolina's commitment to the MCNC and to economic development is important to companies relocating to the state, center officials have learned. The coalescence of the research activities and the universities' faculties also is particularly attractive, as is the commitment to the state college system and the availability of a technical work force, which is a function of the com-

munity college system. The third largest in the United States, the community college system has 58 campuses within 30 miles of 90 percent of the population.

The commitment also extends to increasing the science and mathematics being taught in primary and secondary schools, which is seen as fundamental to developing a greater supply of scientists and engineers. One such effort has been the North Carolina School of Science and Mathematics in Durham—the only resident and tuition-free science and mathematics high school in the country.

Biotechnology

What is being viewed as the next candidate for technology development in the state is biotechnology, the primary effort toward which has been the North Carolina Biotechnology Center (NCBC). Established in November 1981, the center's purpose is to "facilitate and catalyze collaborative multidisciplinary activity between universities and industry," explains NCBC acting director Don Phillips. "People come to us often with ideas, but they have no capital. Others come to us with capital, saying they are looking for ideas. Part of our role is to match one group with the other. In some cases, it's between an entrepreneur and financier; in others, it's between industries and groups of people in universities."

Though the Research Triangle Park is only half occupied, its apparent success to this point is exemplified by its still-growing list of tenants and by the state's growing employment base in manufacturing, which rose by 50 percent in the 1970s. Such success also has apparently stemmed the outgoing tide of the state's college graduates. For example, more than three quarters of North Carolina State University's science

and engineering graduates used to be lost to other states. Now more than half of these potential high-tech workers are said to be remaining in North Carolina. Still another success gauge that North Carolinians like to point to is the number of Ph.D.s now residing in the Research Triangle Park area—more per capita than in any other urban area of the U.S.

Despite the initial success of the Research Triangle Park, not everyone in North Carolina feels that high-technology development in general will succeed in solving the state's economic and employment problems. Thomas Broughton, the director of the Business Assistance Division of the North Carolina Department of Commerce, says that his group is "pointing its sights at job creation—whether it's high tech or not. There's no way under the sun that high-technology industries can put all our people to work," he says. "Yes, we're in the technological age, and its going to get more so. At the same time, we've got to realize that 65 to 70 percent of a high-technology company's employees are production-line assemblers whose wage levels, generally speaking, are not appreciably higher than those of the production workers we've already got."

A National Center

In view of its uniqueness, Don Beilman expects that the MCNC eventually will evolve into a national center. North Carolina has taken a bold initiative and made a very substantial, unequaled commitment, he says. "It would seem appropriate for the federal government to reinforce state initiatives like this. They are a superb way to take advantage of the investments being made in universities and of the need for a closer coupling between universities and industry. We think that this major new state initiative can evolve into a national center to address the very aggressive international competition. We're moving into a new technological era in microelectronics where, unless there are technology-transfer bridges such as MCNC, it will be much more difficult for the nation to maintain international leadership." 