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The concept of university research parks continues to draw attention as communities search to find new tools for promoting economic development. Unfortunately, in many instances expectations have not been met. In part, this has been due to the fact that expectations were unrealistic to begin with, concentrating too much on the possibility of attracting major corporate facilities from outside the area. Not enough care has been given to assisting existing local firms to grow and prosper. To be successful, research parks must be guided by sound real estate principles. But they must go beyond simply offering land near a university. The real economic benefit of research parks lies in the value that universities can add to private companies. Universities must be committed to working with park tenants, making the full resources of the institution available. The article reviews the experience of university research parks and offers some suggestions to ensure that development objectives are indeed achieved.

University Research Parks

Fulfilling the Promise

Universities today are grappling with new and often conflicting demands. Increasingly touted as the engines of economic growth, universities are being forced to go beyond their traditional responsibilities of education and research and to play a more direct role in promoting economic development. It is against this background that many have become involved in the establishment of research parks.

While research parks vary considerably, they share certain common elements that can be summarized in the following definition: A university research park is a real estate venture that involves:

- land originally owned by a university, not-for-profit corporation, or local government agency;
- restrictions on allowable land uses, limiting activities to research and development, light manufacturing, and/or business services;
- a comprehensive plan governing the physical layout of the park, design guidelines, and conditions of tenancy;
- an ongoing legal, financial, and/or operational relationship with a university.

Although the concept of research parks dates back almost four decades to the establishment of Stanford Research Park in California and Research Triangle Park in North Carolina in the 1950s, recent years have witnessed an explosion in the number of research parks in the United States and abroad. According to the Association of University-related Research Parks and the International Association of Science Parks, there are now some three hundred research parks worldwide with some affiliation to a university. Growth is expected to continue—almost fifty additional parks are on the drawing boards. The

fascination with the concept stems from its great promise. Research parks hold out the possibility of marrying the intellectual resources of universities with the industrial vigor of private enterprise.

For the most part, however, the potential has yet to be realized. If the true promise of research parks is to be fulfilled, universities must be aggressive in fostering substantive relationships between tenants in the park and all members of the university community. At the same time, the parks must be professionally managed based on traditional real estate principles.

Selling the Wrong Dream

Research parks have often been sold to legislatures, funding agencies, and the public as vehicles for attracting large corporate research centers from other parts of the country. Offering visions of glass and chrome buildings dotting rolling green fields, backers have peddled the concept as a way to create the next Silicon Valley by bringing new companies into the community. That is the message that many people want to hear: organizations involved in economic development continue to be more oriented to industrial recruitment than they are to the growth of existing local firms. It has always been easier to gain support for efforts that may culminate in a ribbon-cutting ceremony at a new plant than for programs that make existing companies stronger, more profitable, and more likely to retain or hire employees.

It is true that there have been some success stories where research parks have landed major corporate facilities from outside the area. For example, the University Research Park in North Carolina has been able to draw almost all of its tenants from outside of Charlotte. Led by IBM, major companies such as Verbatim, AT&T, and EDS have all located operations in the park. However, this is the exception rather than the rule.

Consider Central Florida Research Park (CFRP) in Orlando. Most of the corporations and government organizations in the park were already located in the Orlando area to begin with. The Navy's National Training and Simulation Center—the largest tenant in the park—consolidated operations into its new facility in CFRP from what used to be in twenty-eight separate buildings scattered throughout the city. The presence of the Navy Center subsequently attracted numerous subcontractors interested in maintaining their business with the organization. Many of these companies were also previously located in Orlando. Even the North Carolina Research Triangle Park is finding it difficult to lure companies from the outside: while there have been numerous expansions, few if any new firms have moved into the park since 1984.

Indeed, more and more research parks in the United States are competing for the limited number of companies that are considering a major relocation or establishment of a branch facility. In a series of interviews conducted a few years ago with directors of more than thirty research parks in the United States and Canada, almost all admitted very little success in attracting companies from outside the area. The executive director of the Central Florida Research Park reported, "There just aren't

very many companies looking for new locations, especially for research centers. We haven't seen any Fortune 500 companies that are looking for space."

The focus on industrial recruitment has caused some people to ignore the more fundamental role that research parks play in economic development. Research parks primarily serve a local market. More than 80 percent of all tenants in most research parks were located in nearby premises before relocating to the park. It is with these local firms that the real promise of research parks lies.

At a minimum, research parks can provide the physical infrastructure needed to support the growth of local companies. An adequate supply of land and buildings at reasonable prices is critical to continued economic growth in every community. In the absence of such a supply, established companies may be forced to seek alternative locations for their operations; new companies may find it prohibitively expensive to operate in the face of escalating land and building prices.

Research parks often involve rezoning land to industrial uses, frequently redressing shortages of industrial land in a community, and providing a new source of tax revenue. For example, Rensselaer Polytechnic Institute (RPI) won approval to rezone 450 acres of agricultural land that the university owned in nearby Greenbush for industrial purposes. The creation of the Rensselaer Technology Park greatly expanded the supply of land available for research and development, light manufacturing, and service activities in the community. In 1985, the town supervisor estimated that after three years of operation the park had added \$5 million to the assessed value of town property. Since that time, the value of the property in the research park has appreciated another three- to four-fold.

Some research parks have included factory and/or office buildings built on a speculative basis. RPI is one of a handful of universities that has decided to build and manage small multi-tenant buildings within the research park. Each offers a total of 20,000 square feet which can accommodate a broad range of activities. The design of the building allows companies to lease units of 2,000 square feet or more at reasonable rates. This type of accommodation was virtually nonexistent in the area prior to its development in the research park. The facilities have been well received by small local firms interested in leasing space that can be readily reconfigured for different uses.

The Science Park in New Haven illustrates yet another approach to meeting the facility needs of technology-based start-ups and small existing firms. In the late 1970s, Olin Corporation decided to close its operations on an eighty-acre site near Yale University. It donated the land and existing buildings to a not-for-profit corporation with the explicit aim of developing a research park and promoting local economic development. The Science Park Development Corporation has been renovating buildings on the site for offices, laboratories, and light manufacturing. More than 250,000 square feet have been made available at relatively low cost to house more than one hundred companies and organizations. All told, more than twelve hundred people are employed within the park.

Putting the Emphasis on Technology Transfer

University research parks can also provide companies with access to a unique labor pool. The use of part-time employees, whether students working as interns or faculty working as consultants, allows companies to expand operations without taking on the added cost of full-time employees until market conditions warrant it. This is very valuable to smaller firms, particularly start-ups. In the early stages of development, companies are invariably faced with cash flow problems, making it difficult to hire full-time employees. Moreover, it is quite common for students who have worked for a company on a part-time basis during the semester or as part of formal internship programs to go to work for the firm upon graduation. For students, such programs are a good way to gain practical experience and learn about the workings of the firm. For companies, they can dramatically lower recruitment costs and reduce the risk that future employees will not work out.

But universities can provide more than a ready source of labor for companies located in nearby research parks. Indeed, research parks can provide a critical intersection between industry and universities, bringing the two together with the explicit aim of transferring technology developed within the institutions to the market. Done correctly, this process can contribute to economic growth by helping to provide the know-how needed to improve quality, lower costs, and improve responsiveness—all watchwords in today's competitive environment. Technology transfer programs need to emphasize direct personal communication among members of the university community and users of technology on the factory floor, in design rooms, and in the offices of senior management.

Research carried out in universities is designed to expand a field of knowledge, providing new insights into fundamental scientific and social phenomena. Traditionally, universities have relied on publications to disseminate to society at large newfound knowledge within a given discipline. Unfortunately, some knowledge is difficult to convey in written form. In any field, there is always a body of information that is not formally put to paper—and thus not conveyed in any organized forum. Moreover, technology transfer involves more than simply relating experimental data. New information alone does not necessarily help to define a market opportunity nor provide the know-how necessary to exploit it. The best chance for successfully transferring technology is through direct and sustained personal interactions among members of the university community and representatives of private industry.

Research parks can also provide a vehicle for providing companies with continual access to research results. Because of the proximity of research parks to the university, faculty, students, and company employees can meet on a regular basis. The results of research in progress can be

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discussed in an informal setting, allowing both parties to benefit from a free interchange of ideas. In this way, representatives of tenant companies learn about research projects, their objectives, and ongoing results as they unfold. They are brought along gradually, developing a common understanding of the work as it progresses. By the time the research is completed, company representatives are knowledgeable participants in the research project and are in a better position to apply findings relating to their own particular situation.

Ongoing dialogue between the private sector and academia can lead to new research of commercial interest.

Ongoing dialogue between the private sector and academia can also lead to new avenues of research of commercial interest. Clearly, the prerogative of defining specific research projects rests with faculty and students. However, this does not mean that research must be isolated from the demands of the market. Market issues can still frame basic research questions without subverting the process of independent, objective scientific inquiry. The issue is one of balance and establishing appropriate mechanisms to guard against overt conflicts of interest.

Finally, companies in research parks represent a potential market for any licenses offered by universities. Licensing technology from universities can offer significant benefits to private firms. It may be less costly and risky than internal research and development. It may also enable existing companies to enter new markets more quickly by shortcutting the development process. In addition, licensing and attendant relationships may allow research park tenants to obtain specialized knowledge and resources that they could not hope to develop on their own.

In order for this to work, however, companies must be able to recognize the value of the technology. Research and development within the university needs to be carried to a point where the technology is sufficiently defined to assess its advantages and calculate its potential worth. Furthermore, the technology needs to be adequately packaged and supported by the university. Companies must be assured that the faculty and students responsible for developing the technology will provide adequate technical assistance. These needed relationships are likely to be more easily maintained if the companies that license university technologies are actually located in nearby research parks.

Guidelines for the University

The promise of research parks is certainly compelling. As noted above, however, the success of the project is dependent on a number of factors. Many of these relate to the fact that research parks are, first and foremost, real estate projects. Economic growth cannot occur unless the park is viable—it must address a real market need, be managed effectively, and generate an adequate rate of return. Other factors relate directly to fundamental attitudes and policies within the university. The real economic value of research parks lies in the resources that universities can marshal in support of local companies. Universities involved in the

development and ongoing operations of nearby research parks should consider the following suggestions.

Define the Market Clearly, Focusing on the Needs of Local Firms

The bread and butter of most research parks will be local companies looking for an affordable site on which to relocate or expand operations. In general, these companies are likely to be relatively small with some sort of technological orientation. Depending on market conditions, the research park should permit a broad range of uses, including research and development, light manufacturing, and general office.

A survey of fifty-four research parks conducted in 1988 illustrates the mix of tenants typically housed within research parks:

Research and development	48 percent
Business services	29 percent
Manufacturing	8 percent
Corporate offices	7 percent
Finance, insurance, and real estate	4 percent
Professional associations	2 percent
Government	2 percent

Most successful research parks have recognized the diverse nature of the market and have targeted a wide range of different types of firms within the local area. It is unlikely that the market for research facilities alone is of sufficient size to justify and support the development of a park. Restricting the park to this sole use can have disastrous financial consequences: some research parks have experienced protracted periods during which land remained vacant as they waited for new companies to come along that met strict entrance criteria. Moreover, restrictive covenants may keep out tenants who have the potential for significant interaction with the university even though they are not engaged in substantial research activities. Indeed, one can argue that manufacturing operations stand to benefit more from a sustained involvement with universities than research centers, and that the economic impact of such relationships is likely to be more immediate.

Tailor Master Plans and Design Guidelines to Local Market Conditions

Master plans governing the layout of major subdivisions, individual lots, road, and utilities should also reflect market and financial considerations. There is no magic formula for deciding how large the park should be. Urban research parks have tended to be small due to the high cost and difficulty of assembling large parcels of land in major cities. Research parks in suburban and rural areas, where land is more plentiful and less expensive, tend to be much larger. While most research parks have been on the order of 150 to 400 acres, the size should be driven by an assessment of the market and the economics of the project.

Design features should be used to help differentiate the park from competing real estate projects in the area. Guidelines should address setbacks and lot coverage, building heights, exterior appearance, landscaping, signage, and maintenance. Many suburban and urban research parks share certain features: low density development, significant green areas, and extensive landscaping. However, the master plan and development guidelines need to be tailored to be consistent with the local market. For example, it makes no sense to divide the site into large ten-acre parcels if the demand is likely to be for smaller two-acre lots. Similarly, while low-density development and extensive landscaping may be aesthetically pleasing, it can also make the park too expensive for some companies to locate there.

Management Capabilities and Financial Expectations Should Dictate the Level of University Involvement

Universities can participate in the development of a research park in a variety of ways. For example, the university can elect to serve as a general partner, assuming complete responsibility for developing and managing the research park. As such, the university is able to maintain control over the project and stands to realize the greatest profits. At the same time, the university is exposed to greater risk. Some universities, such as Cornell in upstate New York, have assumed this role directly. They have built in-house real estate offices, put up university-held assets as equity, and taken on the day-to-day responsibility for managing the project. Others, such as Princeton University, have decided to enter into a fee-for-service contract with private developers who serve as "shadow" developers responsible for the day-to-day management of the research park.

Another option is for the university to take on private developers as partners in the project. The specific nature of agreements can vary widely, differing with respect to management responsibility, equity contributions, debt assumption, and distribution of returns. In exchange for relinquishing some control of the project, the university is able to retain professional assistance and lay off a certain amount of the risk inherent in the project.

Finally, universities with property can simply sell or lease land to private developers with the aim of establishing a research park. Sale or lease terms can specify restrictions on the use of lands to ensure the suitability of neighboring land uses and the overall objectives of the project.

There is no right or wrong way to divide responsibilities between universities, private developers, and other participating organizations. However, the decision to serve as a general partner represents a major undertaking that few universities are willing or in a position to assume. Most successful research parks involve shared development responsibilities. The particular arrangement needs to be commensurate with the objectives of the project and the capabilities of the various parties involved.

Facilitate Access to University Facilities, Faculty, and Students

Regardless of the precise responsibility of the university in the real estate project, it must play a significant role in ensuring substantive interactions between tenants and the university community. This must begin with the recognition that research parks can support the basic mission of institutions of higher education. For example, when George Low was appointed president of RPI in 1977, he brought with him a unique vision for a university, a vision grounded in his own experiences in industry, government, and academia. This was clearly articulated a year later in a report entitled *Rensselaer 2000*. The report outlined a basic philosophy and detailed specific objectives and strategies to enable the university to achieve its goal of being “one of a small number of first-rank, internationally renowned technological universities.” A few statements are particularly relevant:

- “To achieve these objectives, Rensselaer will develop significant opportunities for student involvement with business, industry and government.”
- “...RPI will also encourage a significant number of faculty to maintain extensive contact with industry.”
- “To further strengthen RPI and the surrounding community, Rensselaer will make a significant effort to attract high-technology industrial plants to the surrounding area and to encourage technological interaction among students, faculty and people from industry.”
- “These enterprises will provide a direct practical relationship for faculty and an additional educational experience for students.”

RPI’s subsequent decision to establish a research park on university-owned property was a direct reflection of the institution’s overall philosophy and stated objectives.

In general, universities participating in research parks need to fully accept the notion that the parks can further the basic mission of the institution. While universities need to maintain the primary allegiance of faculty, their teaching and research pursuits can be enriched through extensive ties to industry. Moreover, students can benefit greatly by supplementing classroom and laboratory work with direct experience in an industrial setting.

The relationship between research park tenants and the university can be facilitated by having an agreement that details what the available resources are and how they can best be secured. While recognizing that most relationships tend to be based on informal ties, a formal set of provisions can help foster closer links among tenants and members of the university community. First, the very process of preparing such an agreement will force universities to consider critical issues and spell out what they are actually prepared to deliver as part of their commitment to working with companies located in the park. Second, a formal agreement can be used in marketing efforts, differentiating the research park from competing real estate projects in the area. Finally, an agreement can make

it significantly easier for tenants to obtain resources once they establish operations in the park.

In drafting such an agreement, serious consideration should be given to providing:

- continuing education programs tailored to tenant needs;
- access to computer and laboratory facilities at marginal rates as long as companies do not disrupt ongoing work;
- possibilities for qualified employees to enroll in degree programs or serve as adjunct faculty;
- library services, including library loans and literature searches;
- curriculum vitae of faculty and students interested in consulting or part-time work and assistance in establishing intern programs;
- a regular schedule of symposia and workshops for research park tenants and members of the university community.

The list of resources available to tenants in the research park is just a starting point, however. Management of the research park should assume explicit responsibility for liaising between tenants and the university. Universities may be a fountain of knowledge, but someone has to know how to turn on the tap. Research park management can serve a valuable role as intermediary, fostering the kinds of personal contacts that underlie successful efforts at transferring technology.

The research park phenomenon reflects a growing awareness of the importance of science and technology to economic development. However, just assembling land near a university and putting up a sign announcing the grand opening of the latest research park is clearly insufficient. Research parks must begin with real estate development but continue on to forge close ties between tenants and participating universities. Unless universities are fully committed to working hand in glove with industry, the benefits of research parks will remain elusive. The real economic contribution of research parks will depend on the extent to which technology transfer becomes a major priority.

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