CHAPTER 4

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Summary

The success or failure of State and university initiatives for high-technology development (HTD) is often affected by the complementary efforts of local governments. These local high-technology initiatives are often based on strategies to develop the characteristics of such models as California's Silicon Valley or Boston's Route 128. Based on how much they vary from these models and the resulting initiatives they undertake, OTA identified five types of communities:

- high-technology *centers,* which already have a strong base of high-technology firms, research universities, and venture capital;
- *diluted high-technology centers,* whose large high-technology base is diluted in a larger and more mature local economy;
- *spillover communities,* located near high-technology centers, whose proximity allows them to exploit the centers' resources, amenities, and high-technology base;
- *technology installation centers,* where the presence of a major research facility attracts specialized suppliers and creates a local base of researchers and skilled workers that can be exploited for economic development; and
- *bootstrap communities,* which lack most of the characteristics of high-technology centers but offer low operating costs and high quality of life that make them attractive for branch plants of expanding high-technology companies.

Local strategies usually address perceived weaknesses by exploiting local resources in order to build on the existing technology base. Some of the most common initiatives are:

- *land-use planning and zoning,* including the creation of science or research parks;
- university *improvements;*
- *vocational and technical training;*
- *incubator buildings;*
- *marketing programs;*
- *high-technology task forces,* involving government, university, and private sector representatives; and
- other initiatives, including networking, venture capital mechanisms, cultural amenities, and partnerships with local universities or business groups.

Local officials report that information for high-technology program design comes from a variety of sources, including journals and newspapers, government reports, and the experience of other communities, as well as the community's past experience with other types of industry. State and Federal government officials participate directly in many local initiatives, and others make use of funds or development tools made available by the Federal Government.

The success of these local programs is affected by a number of factors, including:

- *sustained effort,* often over a period of decades;
- *identifying local needs and resources;*
- *adapting to external constraints,* including climate, distance from existing high-technology centers, and other factors over which the community has no control;
- *linkage to other, broader development efforts;* and
- *local initiative and partnership* in the initiation, implementation, and operation of the program.

Private sector participation plays an important role in these efforts, but local governments have at their disposal a wide range of policy tools that provide incentives or remove barriers to private initiative. These policy tools include the following:

- *provision of public services and facilities;*
- *tax policies,* such as relief or incentives for inner-city location, as well as lower overall tax rates;
- *regulatory policies,* including zoning changes;
- *administrative reforms,* such as one-stop per-

mitting or streamlined licensing and inspection systems; and
- *public advocacy,* including public recognition for private initiatives and support for business interests in State legislatures.

Introduction

Chapters 2 and 3 identify a wide range of programs implemented by State governments and universities to encourage HTD, but many initiatives also have been launched by local governments and other community organizations.[1] These local programs usually arise from the specific needs and goals of particular communities, whereas State programs may not always be appropriate or useful for individual cities or regions. University programs, on the other hand, usually focus on improving linkages with the local business community. Consequently, the success of State and university programs often is affected by the presence or absence of these local initiatives.

OTA identified and analyzed a representative cross section of local HTD initiatives in order to determine what types of programs have been attempted, how well they have worked, and the factors that affect their effectiveness and their transferability to other communities. The material in this chapter is based on interviews with community representatives and detailed investigation of 54 separate high-technology initiatives in the following 22 communities:

Huntsville, Ala.	Binghamton, N.Y.
Phoenix, Ariz.	Cincinnati, Ohio
San Diego, Calif.	Portland, Oreg.
Colorado Springs, Colo.	Philadelphia, Pa.
Brevard County, Fla.	Oak Ridge, Term.
Orlando, Fla.	Austin, Tex.
Chicago, Ill.	San Antonio, Tex.
Lowell, Mass.	Salt Lake City, Utah
Montgomery County, Md.	Burlington, Vt.
Minneapolis-St. Paul, Minn.	Seattle, Wash.
Albuquerque, N. Mex.	Milwaukee, Wis.

Concise descriptions of the local high-technology initiatives in these communities are presented in appendix A.

[1] 'Material in this chapter is based on the contractor report, *Local High-Technology Initiatives Study,* prepared for OTA by the Fantus Co., Charles Ford Harding, principal investigator, April 1983.

Community Typology

Sub-State and local efforts to stimulate HTD are driven by the increased jobs and tax base that would result for local economies. In deciding to focus on HTD as opposed to other possible avenues, the communities 'are generally influenced by the rapid growth of technology-based industry compared to other sectors of the economy and by the tremendous contributions that high-technology companies have made to the local economies of Silicon Valley and the Boston area. The use of these areas as models for development is made clear by efforts of communities to promote themselves as "Silicon Mountain," "Silicon Coast," or "Silicon Plain." Thus, one useful typology of communities is in the degree to which they vary from these model communities.

Indeed, OTA found that many local initiatives can be described as strategies used to develop the characteristics of the model communities. The type and importance of the resulting initiatives will depend, in part, on the principal shortcomings that community leaders believe are keeping their city from being a center of HTD like Santa Clara County or the Boston area. Using this criterion as the principle means of classifying cities, OTA has identified five types of communities:

- high-technology centers;
- diluted high-technology centers;
- spillover communities;
- technology installation centers; and
- bootstrap communities.

High-Technology Centers

Typified by Santa Clara County and the Boston area, these communities already have a high concentration of research-oriented companies and a major research-oriented university (Stanford and Massachusetts Institute of Technology). The large companies and universities, in turn, continually spin off other small companies, generally founded by researchers who have an idea for a product that they choose to develop on their own rather than within the environment of the larger firm. While some of these new companies fail, enough succeed and grow to increase the concentration of firms in the area.

Other important elements of the high-technology centers include a skilled work force, a university catering to the continuing education needs of local researchers, and the availability of venture capital. The skilled work force is trained by the large companies located in the area. The demands that these companies and their smaller counterparts make on the labor market encourage local workers to develop skills in technological areas; demand also makes it worthwhile for local vocational/technical schools to develop appropriate training programs. The depth of the local base of skilled workers, in turn, makes it possible for entrepreneurs to hire employees they might not otherwise have the resources to train.

Due to the rapid change of technology, engineers and technical workers at the technology-based companies must study constantly to keep abreast of their fields of interest. Others may take courses outside their fields of specialization. In both cases, many workers find it valuable to be able to continue their education in evening programs at nearby universities. Interestingly, in both Boston and Santa Clara County, this service is not provided by the major research university: the largest number of continuing education students in Boston attend Northeastern University, while in Silicon Valley they attend the University of Santa Clara.

Finally, the rapid growth of smaller companies with new products attracts the development of venture capital firms that specialize in identifying and providing capital and managerial advice to new and expanding technology-based companies. It is not surprising that, between 1970 and 1980, Massachusetts and California were the only States that consistentl$_y$ attracted a positive inflow of venture capital.

One problem for the high-technology centers, however, is that they tend to export many of the jobs that are generated through the innovations of local companies. The rapid growth of local firms tends to push up land and labor costs, and—at the point in a product's lifecycle when it no longer requires the highly skilled work force—the company will have a strong incentive to export its production to a lower cost area while concentratin$_g$ the energies of the skilled work force on the innovations that require their talents. A community that exports its technologies must continually develop new ones to keep its economy healthy.

Diluted High-Technology Centers

These cities also have a base of large technology-oriented companies, skilled work forces, research universities, and venture capital firms. But in these cases, the high-technolog$_y$ orientation of the area is diluted in larger, broader, and more mature economies. Metropolitan areas such as New York and Chicago typify this group of communities.

The Chicago area, for example, possesses most of the characteristics of a high-technology center, including: *major research institutions* (Universit$_y$ of Chicago, Northwestern University, Illinois Institute of Technology, University of Illinois at Chicago, Fermi National Labs, and Argonne National Labs); *major technology-basal companies* (Baxter-Travenol Labs, G. D. Searle, Abbott Labs, Motorola, Gould, Northrop, and others); *continuing education courses in science and engineering* (offered at the Illinois Institute of Technology); *vocational technical training* (offered at several 2-year community colleges in the area); and *venture capital* (provided by venture capital firms and the Continental and First National Banks). However, these high-technology characteristics are diluted in Chicago's much broader econ-

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omy, many parts of which are unrelated to high technology.

This dilution seems to reduce the innovative and entrepreneurial fervor of an area. In such an area, skilled workers are more likely to be lost to nontechnological endeavors, and universities are more likely to support a broader set of community needs. In addition, venture capital firms may be less likely to specialize in new businesses based on technological innovation. Consequently, a major focus of high-technology initiatives in such areas has been to increase the communication among the various participants in HTD in the area. Thus, the high-technology newsletter in Chicago and the University City Science Center in Philadelphia are seen by those who developed them as a means of bringing the high-technology players in the community together and making them aware of local resources that they might not otherwise find. It is reasonable to perceive these efforts as attempts to overcome the effects of dilution.

Spillover Communities

Spillover communities are those located adjacent to a high-technology center or diluted centers. While these communities typically lack most or all of the ingredients that make up a high-technology center, they are close enough to such a city to take advantage of its resources. A high-technology company located in such a community can exploit the research capabilities at the nearby universities, visit venture capital firms easily, and hire engineers and scientists from the large technical work force around the high-technology center and within commuting distance. Employees seeking graduate courses in their field can commute to universities in the adjacent city. Typically, the objective of such communities is to capture the spillover of companies from the center looking for lower cost land and a less competitive labor market. Three examples of this type of community are Lowell, Mass.; Naperville, Ill.; and Montgomery County, Md.

Lowell provides a particularly instructive case. With the exception of a university, the community lacked most of the ingredients of a high-technology center, but it is located adjacent to the Boston area. Through careful land-use planning, the city was able to induce Wang Laboratories to locate a plant in the area. Later, when Wang was looking for a new headquarters site, the community successfully pursued and won it with aggressive initiatives. Wang has since contributed to the further growth of high-technology infrastructure and the creation of new firms in the area.

For communities located adjacent to a high-technology center, this type of strategy has obvious appeal. They often must overcome perceptions of distance and an older image that may not be compatible with a high-technology firm. Lowell's success at overcoming its "mill-town" reputation shows that this can be done. A principal means of doing this is by creating a physical environment attractive to technology-based companies.

Technology Installation Centers

These communities are the home of a major research or technology-based institution, but they lack most or all of the other ingredients of a high-technology center. The installation creates a local base of researchers and skilled workers, and in some cases, this has led to extensive spinoff activities in the local economy. In other cases, however, the technical base created by the research installation produces few new firms and often remains unavailable to new employers coming into the area. This is because payscales are usually quite high at such operations; additionally, the organization's rules regarding the rights to innovations have sometimes made it difficult for its research staff to start companies of their own.

As a result, local development initiatives often are begun after a downturn in the fortunes or finding of the major research installation. Thus, layoffs at Boeing in Seattle, program cutbacks at the Kennedy Space Center in Brevard County, Fla., and staff reductions at the Redstone Arsenal in Huntsville, Ala., all resulted in intensified development efforts, usually directed at technology-based companies that could take advantage of the skilled work force released by the installation.

These problems do not always apply, however, and the installations also attract a wide variety of suppliers that could be useful to other technology-based enterprises. For this reason, and because of the prestige associated with them, competition

for such installations is usually intense, as was the case before the Microelectronics & Computer Technology Corp. (MCC) chose to locate in Austin, Tex., after considering over 50 candidate communities. Several communities are seeking to attract or establish such installations in the hope that this will attract others from outside the area and, eventually, lead to the creation of new, indigenous technology-based firms.

Bootstrap Communities

A number of communities began their development efforts possessing none of the characteristics of the high-technology centers. They have depended instead on low operating costs and attractive living environments to attract the expansion plants of high-technology companies. These branch plants generally manufacture products which no longer have a high technological input; at this stage in their lifecycle, competitive operating costs are far more important than the research capabilities of a high-technology center. However, when several of these plants have located in an area, their combined work forces create a pool of skilled labor that a more sophisticated operation can build upon. Additionally, the combined engineering work forces at such plants create enough demand to merit the addition or improvement of engineering and science courses at local universities.

As these things occur, the community is able to attract increasingly sophisticated operations and, eventually, foster the creation of local spinoffs. Communities that fall into this pattern include Austin, Colorado Springs, Orlando, Phoenix, and San Antonio. These cities have enjoyed rapid job growth from new branch plants of technology-based companies. Interestingly, two of the most recent announcements of new facilities in Austin were the research laboratories of Lockheed Corp. and MCC. Although the growth of a local base of "indigenous" high-technology firms has been slower, it too has been impressive.

Initiatives in these communities generally focus on developing the technical infrastructure and institutional linkages that will permit progressive increases in the technological sophistication of new facilities in the area. Such initiatives include the development or improvement of engineering courses at local universities, the addition of vocational/technical courses to provide workers with needed skills, and the development of research parks to create the environment desired by technology-based firms.

Implications for Local Initiatives

As one would expect, not all cities fit neatly into this typology. Minneapolis-St. Paul, for example, fits somewhere between the true high-technology centers and the diluted centers. Cincinnati, on the other hand, has some of the characteristics of a diluted center, but its high-technology base is limited; its development efforts have focused on creating a research installation, developing a venture capital fund, and increasing the flow of technological information among local machine tool companies. The value of the typology is not that any one city fits it neatly, but rather that by determining which type a city most closely approximates, it can launch the initiative that will be most appropriate and effective in developing a more sophisticated technological base.

A word of caution however, is in order. Before deciding upon a high-technology program, a community should investigate other approaches to development that might result in a greater return on its investment. Not all communities can expect to enjoy rapid growth from high-technology operations. For example, OTA experienced difficulty in identifying small rural communities with effective initiatives; this suggests that relatively few such towns will receive direct benefits in jobs and taxes from high-technology plants.

Common Initiatives

Some of the most common types of initiatives used by sub-State and local organizations to attract high-technology industry include the following:

- land use, planning, and zoning;
- university improvements;
- vocational-technical training;
- incubator buildings;
- marketing programs;
- high-technology task forces; and
- venture capital funds.

Land Use, Planning, and Zoning

High-technology firms generally are quite concerned about the quality of the environment in which they are located. They want land use to be compatible with their own needs but not so restrictive that they will find it impossible to expand as their need for space grows. Many communities control land use through planning and zoning with a careful concern for high-technology firms' requirements. Such controls include limitations on types of uses permitted, to ensure that only clean and attractive operations are located on the site; coverage, set-backs, construction code, and maintenance restrictions, to ensure that properties are compatible in appearance; and park provisions. Streets and utilities often are developed by local government to a required standard, with access controlled to limit traffic. Lowell's attraction for Wang Laboratories was based, in part, on such initiatives. Many locally developed research parks (in which parcels are sold only to firms conducting research) can be viewed as a subclassification of this type of initiative.

Communities of each of the categories described above have engaged in these types of initiative. Such programs are not without risk. Carrying costs can be high if suitable users are not attracted, and the parks can monopolize valuable land that could be put to other productive use. Some communities ultimately have had to relax usage criteria to attract nontechnological users. Pressures for such relaxation is constant, but once undermined in this manner, the research parks may lose much of their appeal to technology-based companies.

University Improvements

A number of communities have worked hard to develop engineering programs at local universities. Such initiatives have been most important in the technology installation and bootstrap communities, where local demand for such programs previously had been modest. Such initiatives have been of crucial importance in San Antonio, San Diego, Phoenix, Colorado Springs, Huntsville, and Seattle, to name the most striking examples identified in this survey. Such initiatives include efforts to create an engineering department at a university that has not had one; add graduate programs; upgrade the overall quality of the program; and\or bring faculty to the university with specializations in areas of importance to local industry. Another university-related initiative is the establishment of a research center to conduct contract research for industry. (See ch. 3 for further information on university initiatives.)

Vocational/Technical Training

As a specific initiative for the purpose of attracting high-technology firms, this approach is most common in diluted centers, technology installation centers, and bootstrap communities. It can take the form of adding specific training programs required by local industry or the development of high-technology "magnet" high schools. Such initiatives often begin with an assessment of what skills are required by local industry; courses are then designed with input from those businesses most likely to hire graduates.

Incubator Buildings

These are most often built in areas where the quantity of high-quality speculative space for small users is limited. Such areas include inner-city portions of diluted centers and smaller communities without a large high-technology base. Such facilities require experienced real estate management, and (as with research parks) carrying costs can be high if they are not utilized. In addition, technology-based tenants often require technical and management as-

sistance. Similar initiatives have been undertaken by both universities and private industry (see chs. 3 and 5).

Marketing Programs

Virtually all communities conduct marketing programs to attract new industry. However, those localities with the most sophisticated programs directed at high-technology companies tend to be those that already have experienced the greatest success in attracting them. These include communities in all of the categories listed above, with the exception of the high-technology centers themselves, but the programs differ in their focus depending on the type of community involved. For example, the spillover communities are most likely to direct their efforts toward companies located in the city to which they are adjacent, while bootstrap communities primarily seek to attract labor-intensive, less technical branch operations of technology-based companies.

Key ingredients of these initiatives include the identification of specific firms to which the community would have the greatest appeal, the improvement of the community to make sure that required infrastructure or amenities are in place, and a concerted marketing effort through direct mail, telephone contacts, and personal visits to the prospect companies.

In some cases, marketing programs have been conducted without an adequate understanding of the requirements of high-technology firms or without a thorough evaluation of the community attributes that high-technology firms are likely to find of interest. This can result in missing the market or overselling the community. In such cases, the time, funds, and effort spent on marketing bring poor results.

High-Technology Task Forces

Engaged in by many communities and States (see ch. 2), this initiative serves to focus local attention and resources on high-technology economic development. Local task forces usually are appointed by mayors, although they are sometimes an adjunct of the chamber of commerce (see ch. 5). They generally include representatives from industry, education, and government. They are distinct from other initiatives in that they are not designed to overcome some limitation in a community's ability to attract or retain high-technology companies. Instead, they have a designing function and, in some cases, participate in implementation. They also have a pronounced networking effect and thus are used most commonly in diluted high-technology centers, such as Chicago and Minneapolis, where such efforts are the first step in overcoming the effects of dilution.

Venture Capital Funds

Most of the local representatives interviewed for this study recognized the importance of venture capital to HTD, but few expressed satisfaction with their initiatives to fill this need. Planned and existing efforts included seminars or conferences for venture capital firms and local entrepreneurs, the identification of local venture capital resources, and consulting assistance in procuring venture capital. (For similar university initiatives, see ch. 3.) Only one community of those surveyed, Cincinnati, was seriously considering the establishment of a venture capital fund. However, OTA has identified such efforts in a few other communities (see ch. 5).

Effective venture capital programs directed at high-technology companies presuppose a substantial number of high-technology innovations in a community each year. Without a major university or a large existing base of research-oriented firms, it is doubtful that an adequate number of innovations with commercial potential will be found in a community. The critical mass of innovations is most likely to be found in the true high-technology or diluted high-technology centers. These areas are also the ones most likely to have existing, private venture capital operations, which may explain some of the problems that other communities are having with this type of initiative.

Other Initiatives

Other, less common initiatives include efforts to attract a specific company. In some cases, the contributions of a single firm to an area were viewed as being so great and as having such an impact on the future HTD of the area, that a major initiative was devoted to the specific firm. The efforts to bring Wang Laboratories' headquarters to Lowell provide

the best example of such a focused marketing drive; Austin's successful campaign to attract MCC provides a more recent example.

Also, realizing that companies seeking to recruit large numbers of researchers are concerned about amenities and cultural opportunities for these workers, one community (Huntsville) developed a large civic center to house visiting orchestras and other cultural events. Several cities are considering the establishment of research institutes (private contract research organizations not directly affiliated with a university), with Cincinnati's Institute of Advanced Manufacturing Sciences being the most developed. In one diluted high-technology center, Chicago, a high-technology newsletter was felt to be an important tool for overcoming the effects of dilution.

Several initiatives are based on "partnerships" between local government and the various components of the community's educational and technological base. For example, there is usually a strong relationship between research parks (occupied by industrial research laboratories) and local universities; in many of the cases discussed in ch. 3, the development of research parks was a cooperative initiative in which the original stimulus was the university. Local vocational/technical programs, too, typically have strong ties to both State and local training programs, and many have received Federal finding. Additionally, the private sector (and especially the technology-based business already located in the community) has made major contributions of time and effort to local initiatives. This is particularly true of task forces but also of programs to improve university engineering and scientific programs. (See ch. 5 for a discussion of private sector initiatives.)

Program Design and Effectiveness

Sources of Information

The surveyed communities got their ideas for high-technology initiatives from a variety of sources. Most local officials followed discussions of high-technology and economic development in journals, magazines, and newspapers; many also had collected reports issued by State and local governments on the subject. Additionally, there was often direct contact among the communities on high-technology issues related to economic development. (This was also the case among State initiatives—see ch. 2.) For example, in several cases, public officials who were investigating the development of a research park visited successful parks in other communities. This was true in Binghamton, Chicago, Orlando, and Montgomery County, among others. The Puget Sound task force, which was seeking to improve scientific and engineering education in the Seattle area, invited the president of MIT to speak at a meeting. Information on other areas' initiatives also was collected through consulting studies, phone interviews, and letter requests.

Another important source of information on initiatives is the industrial prospects themselves. For example, public officials in San Antonio began lobbying for engineering programs in the city's State college after a major electronics company announced that it would not build a plant in the area because of the lack of continuing education opportunities for its employees. Local industry and business groups frequently exerted similar pressure for the improvement of vocational/technical programs to train skilled workers (see ch. 5). In several cases, the State government or a statewide business organization encouraged initiatives by counties and universities to establish research parks. In Wisconsin, for example, both the State and the city of Milwaukee are participating in a joint marketing effort directed at the robotics industry. A final source of information for program design was the community's development efforts with other types of industry. Many high-technology marketing initiatives are adaptations of successful efforts used for many years by local economic development organizations. Similarly, task forces were a common mechanism used to address a wide

range of community concerns long before this technique was applied to HTD.

Implementation

Like information gathering, program implementation followed common patterns in most communities. The first step was usually to identify the need for something lacking in the community or the importance of a particular service to local high-technology firms or prospects. Once the need or opportunity was identified, many communities explored their resources and policy tools with consultants, local businessmen, and other knowledgeable informants. For example, in exploring potential participation of the local government or university in a research park, the community would need to know what protective covenants or tax changes would help as well as what types of firms would qualify for the park and how many jobs they would create. In launching and operating the program, communities must adapt the experiences of other communities to their own specific situation and avoid the weaknesses and pitfalls (if any) of their models.

Federal and State Participation

Agents of the Federal Government participated directly in the initiatives in several of the surveyed cities. For example, the High Technology Task Force in Chicago was chaired by the director of the Argonne National Laboratories. Significantly, the local organizations responsible for high-technology programs made frequent use of the funds and other development tools made available by the Federal Government. The most frequently mentioned Federal programs and development tools in relation to specific initiatives in 22 surveyed communities were:

Urban Development Action Grants	9
Industrial Development Bonds	5
Economic Development Administration grants	4
Community Development Block Grants	3
Comprehensive Education and Training Act programs	2
Free Trade Zone	2
Appalachian Regional Commission programs	2
Small Business Administration loan programs	1

Although none of these Federal programs were designed specifically to help with high-technology development, this finding shows that they have been successfully applied to such purposes.

Major Federal R&D installations frequently provided the base around which high-technology programs are built. In several cases, in fact, it was the reduction of Federal support for these installations that provided the impetus for developing a local economic development program directed at high-technology companies. This was true in both Brevard County and Huntsville. Also, military bases were often cited as good sources of skilled labor for high-technology companies located in an area. This is true in such cities as San Antonio, San Diego, and Colorado Springs. In such cases, the Federal Government has in effect subsidized technical training for workers who subsequently feed into the local private economy.

State governments also participated in local initiatives, frequently through their control of university and vocational/technical education resources. State marketing programs also complemented those of the local communities. (See ch. 2 for a discussion of State government initiatives.)

Innovation v. Attraction

Although most of the local representatives interviewed for this survey recognized the importance of stimulating new local companies built around innovative products, the greatest efforts were directed at attracting branch operations of large high-technology firms. This strategy pays more immediate dividends in terms of job creation, but another reason seems to be the relatively small number of communities in which a significant number of innovative new products are developed. In the true high-technology centers, there seems to be a "critical mass" for the creation of new companies, which in turn warrants the concentrated attention of venture capital firms and other development organizations. This critical mass is missing in cities with smaller technology-oriented industrial bases. At least initially, it may not be cost effective in such cities to devote local resources to initiatives aimed at entrepreneurial ventures. In time, however, the attraction of several branch plants may result in the necessary concentration of firms, technical workers, and potential entrepreneurs. Several cities reviewed for this study—including Minneapolis-St. Paul, Austin, and San Diego—are reaching the stage at which a significant number of new high-technology companies can be spawned, but they are the exception rather than the rule.

Factors Affecting Success

Not all of the communities investigated for this study have been equally successful in becoming high-technology centers. Given the differences in their goals and strategies, absolute criteria for success are difficult to determine and, as with State initiatives (see ch. 2), these programs have not been subjected to rigorous comparative analysis or evaluation. As a result, measures of success are somewhat impressionistic. Nevertheless, the collective experience of these 22 communities indicates that the following factors condition the effectiveness of local programs for HTD:

- *sustained effort,* often over a period of decades;
- *identifying local needs and resources;*
- *adapting to external constraints,* including climate, distance from existing high-technology centers, and other factors over which the community has no control;
- *linkage to other, broader development efforts;* and
- *local initiative and partnership* in the initiation, implementation, and operation of the program.

Sustained Local Effort

Although some of the 22 communities were able to reap rapid results from their initiatives, few have developed large concentrations of high-technology establishments in a short time. A minimum of 20 years may be a realistic period for a community to develop to the stage where a significant number of local jobs can be credited to products created by local entrepreneurs or local research establishments of larger companies. This long timeframe should not be discouraging, however, since many of the "bootstrap" and "spillover" communities improved their economies quickly and significantly by attracting branch plans of technology-based companies. Huntsville, Phoenix, San Diego, Colorado Springs, Lowell, and Austin, had all been working successfully for many years to attract technology-based branch operations.

Identifying Needs and Resources

A second factor is clear recognition of the local attributes, both strengths and weaknesses, that influence a community's ability to attract high-technology industry. In the more successful cases, such analyses of the community were conducted by local representatives or by outside consultants. With clear objectives, the community was then able to develop appropriate development strategies.

Adapting to External Constraints

There are other factors over which a community has little control, such as climate, terrain, and proximity to existing high-technology centers. The successful communities recognized these external constraints and adjusted their objectives and strategies accordingly. Thus, both Colorado Springs and Austin initially focused their marketing efforts on branch plants rather than on research-or technology-intensive establishments. Over time, as these branch plants created a base of skilled labor and technical infrastructure, they have been able to attract more sophisticated operations and encourage local spinoffs.

Linkage to Other Efforts

The local initiatives that formed part of a broader development strategy often produced the most substantial results. Two examples of this pattern are worth reviewing. San Diego had conducted several analyses to determine the types of industry that would find the area most attractive and had targeted several specific high-technology operations like consumer electronics. The community also identified the large quantity of available land as a major asset, and most of its initiatives are based on exploiting this resource to achieve its HTD objective. In Huntsville, community leaders commissioned a detailed assessment at the time of the downturn in employment at the Redstone Arsenal, and the pool of skilled labor created by the Arsenal was recognized as a major attribute that could be marketed to technology-based firms. Other initiatives were also developed to make the community more attractive to such operations, including the creation of a research park and the construction of the community center. Huntsville conducts periodic reassessments to monitor changes in local conditions that would warrant shifts in this strategy.

Local Initiative and Partnership

Finally, it is worth noting that in the successful communities, most of the effort has been initiated and implemented locally. Some communities received substantial help from State governments in developing university resources and complementing the local marketing program. Others have used funding and a number of development tools made possible by the Federal Government. But in most cases, the objectives and strategies were developed locally, and local representatives had a major part in design and implementation of the programs. In addition, cooperation or "partnership" with local entrepreneurs and business groups plays an important role in successful programs, since the public and private sectors are far less distinct at the local level.

Local Policy Tools

Local governments have at their disposal a wide range of policy tools that have been used to provide incentives for the necessary private sector participation.[2] Some, like zoning bonuses or minority hiring quotas, encourage or require private initiative; others, like administrative reform, tax relief, or infrastructure improvements, remove barriers to private initiative. The effectiveness of some of these tools may be constrained by the policies and regulations of State or Federal Government; in such cases, public and private leaders at the local level often have joined forces to overcome these constraints (see ch. 3). Policy tools that are in the control of local government include the following:

- *provision of public services,* including improved public safety, education system reforms, and recreational or cultural programs;
- *provision of public facilities,* such as improvements to water, sewer, and road systems, improved mass transit, and public parks;
- *tax policies,* such as relief from property tax or incentives for inner-city location, as well as lower overall tax rates;
- *regulatory policies,* including changes in zoning or building codes that will encourage rehabilitation;
- *administrative reforms,* such as improved financial practices, one-stop permitting, or streamlined licensing and inspection systems; and
- *public advocacy,* including public recognition for private initiatives and support for business interests in State legislatures.

The role played by the private sector, and the initiatives it has launched, are discussed in greater detail in the following chapter.

[2] Tom Chmura, et al., *Redefining Partnership-Developing Public/Private Approaches to Community Problem Solving: A Guide for Local Officials* (Menlo Park, Calif.: SRI International, January 1982), p. 16; see also SRI International, "Developing Public/Private Approaches to Community Problem Solving," *Management Information Service Report*, International City Management Association, vol. 14, No. 7, July 1982, pp. 5-6, 17.