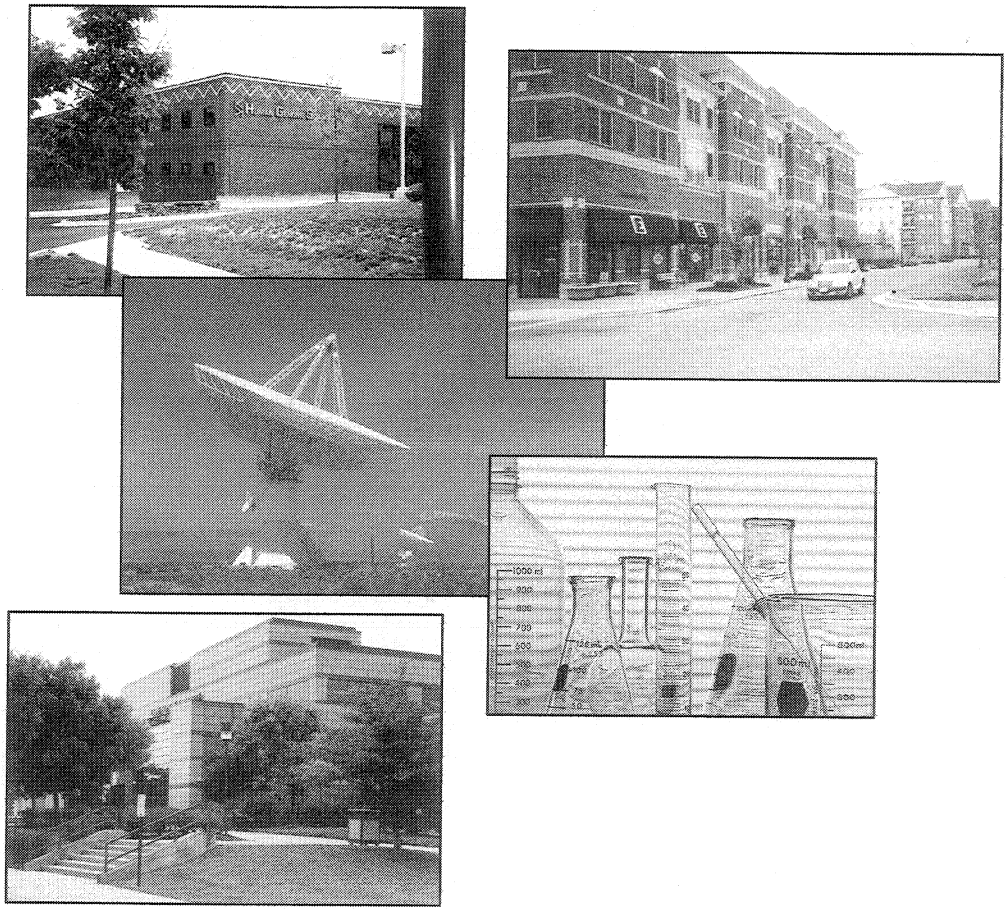
Characteristics of the 21st Century Workplace: Land Use Implications For Montgomery County, Maryland



Prepared for:

The Maryland-National Capital Park and Planning Commission

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TABLE OF CONTENTS

CHARACTERISTICS OF THE 21ST CENTURY WORKPLACE: LAND USE IMPLICATIONS FOR MONTGOMERY COUNTY, MARYLAND

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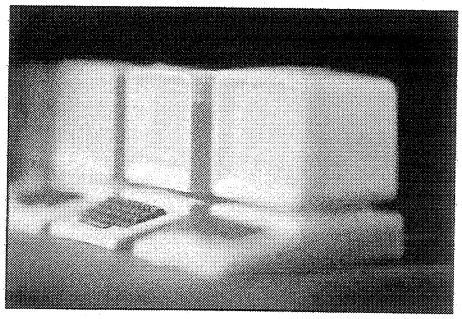
I. INTRODUCTION

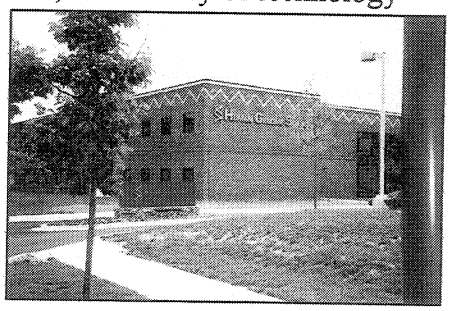
Over the past 20 years, a "New Economy" has emerged, representing an historic shift from manufacturing-based to knowledge-based firms. The New Economy is technology driven and global. It has already begun to



restructure metropolitan and urban economies. The firms driving the New Economy have markedly different locational preferences from those that ran the economy two decades ago. The workplace of the 21st Century that is emerging from this shift promises to be markedly different as well. These forces will have a dramatic impact on land use and development preferences and trends throughout the country.

This report, part of a zoning code rewrite project initiated by the Montgomery County Council and the Montgomery County Department of Park & Planning of the Maryland-National Capital Park & Planning Commission, focuses on the land use implications of the 21st Century workplace. First, it presents an overview of some of the characteristics of the New Economy such as global commerce, flexible employment systems, and volatile markets. A grasp of these characteristics helps to understand the forces at play that affect development at the local level.

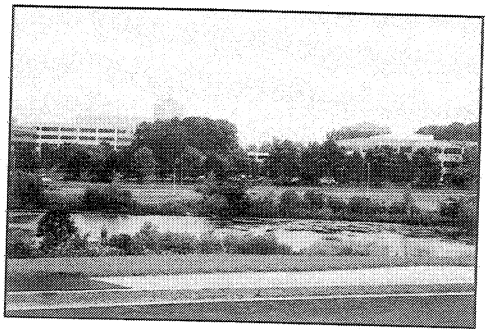
Next, the report discusses the regional locational preferences of growth firms in the technology sector—biotechnology enterprises, software/internet development firms, and high-technology manufacturers.[1] In the past, factors such as cost of labor, tax rates, and similar forces were prime considerations for businesses considering expansion or relocation. Today, issues such as quality of life, availability of technology



[1] Biotechnology is the application of scientific knowledge to transfer beneficial genetic traits from one species to another to enhance or protect an organism. Biotechnology firms include non-profit and for-profit institutions and companies that conduct research, testing, and clinical treatment. They produce medical devices and chemicals. Some for-profit firms are manufacturing pharmaceutical products or treatments (e.g., artificial insulin). Biotech firms/institutions in Montgomery County include Gene Logic, Human Genome Sciences, Inc., United Therapeutics Corp., Medimmune, BioReliance, Diagnon, Genetic Therapy, Inc., and IGEN. Software/internet firms vary tremendously in their products and services. Some produce software for commercial use; others provide internet support services to other businesses. Examples in Montgomery County include GE Information Systems, ecentives.com, bid4assets.com, and CityNet Telecommunications. High-tech manufacturing companies are typically marked by large research and development budgets and production of high-value products such as optical equipment or specialty medical products. Examples in Montgomery County include Acterna (telecommunications), ACE Communications, and Capital Electro Circuits.

infrastructure, and expeditious permit reviews are far more important to firms in growth sectors. Local governments must be aware of and respond to these new preferences if they are to be competitive.

Third, the report looks at what these firms and their employees are demanding in terms of site development and workplace configuration. The isolated suburban office park featuring headquarter buildings in a sprawling

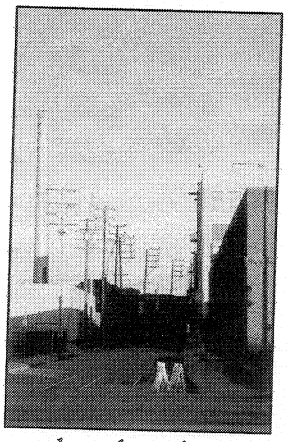


campus setting—typical of the 1960s and 1970s--is giving way to a different sort of business park and work environment in the 21st Century that reflects the needs of the New Economy. Firms and their workers are demanding new amenities, a variety of housing choices, and better transportation access. Again, the land use implications for local governments promise to be significant and suggest some important changes that must be made in local land use and zoning regulations and processes.

The report concludes with a list of potential responses Montgomery County should consider in revamping its land development codes that will help it to better address the changing locational and workplace preferences of firms in the technology sector. In doing so, the report draws on experience in other comparable metropolitan areas such as Seattle, Portland, San Diego, Fort Collins, Colorado, and Cary, North Carolina (Research Triangle area).

II. A SNAPSHOT OF THE FORCES SHAPING THE NEW ECONOMY[2]

Much has been written about the so-called "New Economy," often accompanied by a large dose of hype. But clearly the national economy is not what it used to be. The global economy and rise of information technology have dramatically reshaped the economic landscape. In the past, large Fortune 500 corporations often shaped our economic future. But net job growth of the



Fortune 500 in the last decade has been zero! Today, 80% of the labor force is working for firms employing fewer than 200 people. The number of self-employed, part-time, and temporary workers has skyrocketed. These smaller economic units have different locational and workplace needs than firms that gravitated to massive, big-box office buildings and sprawling campus complexes.

A recent study prepared for the James Irvine Foundation, "Linking the New Economy to the Livable Community," compared the industrial era leading up to the 1990s with today's knowledge era. The study summarized some of the most significant shifts in where we work and how:

[2] This report draws on a variety of sources, including major research reports and other publications referenced throughout and in Section VI.

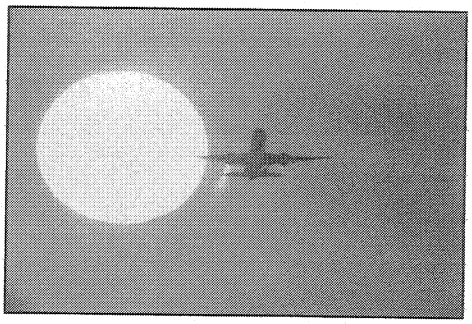
COMPARING ECONOMIC ERAS				
	Basis of Competitive Advantage	**Where We Work**	**How We Work**	**Place**
Knowledge Era (1990s-Future)	**Flexible Specialization** • Knowledge • Quality • Speed • Flexibility • Networks	**Variety** • Large, decentralized companies • Fast-growth, nimble smaller companies • Home-based businesses • Independent contractors	**Variety, Integration** • Knowledge workers changing jobs • Reintegration of work and home	**Integrated Region** • Economic regions • Distinctive quality of life • Vital centers • Choice for living and working • Speed and adaptability • Natural environment
Industrial Era (1940s-1980s)	**Mass Production** • Low cost • Quantity • Stability • Capital equipment • Control	**Factory Model** • Large organizations, vertically integrated	**Certainty, Separation** • Hierarchy • Distinct workplaces • Separation of work and home • Single career path • Lifetime employment	**Dispersion and Isolation** • Subdivisions • Technology parks • Office parks • Greenfield plants • Edge cities • Shopping centers

Source: Henton and Walsh, "Linking the New Economy to the Livable Community," The James Irvine Foundation, April 1998.

As the authors of the Irvine Foundation report observe, the New Economy is just not about making computers or microchips. "The New Economy is about speed, quality, flexibility, knowledge, and networks. It is about applying knowledge and new ways of doing business to a wide range of products and services...." While the term New Economy means different things to different people, there is general agreement it has some important characteristics that distinguish it from previous times. As will be discussed in later sections, these characteristics help influence where firms want to locate and how the sites they develop and workplaces they build must function.

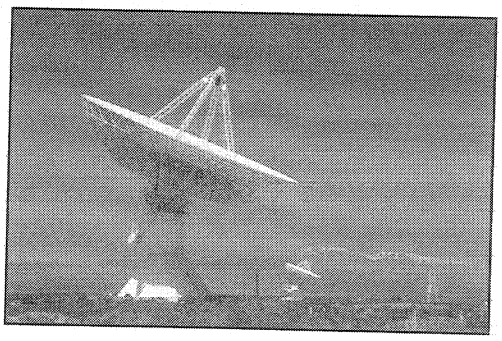
Globalization and Deregulation:

Global commerce forced many American companies to come out of isolation and compete with overseas firms. Free trade barriers were removed, and goods, services, and human capital began flowing freely around the world. One of the unintended consequences was the shake up of many large U.S. corporations previously protected from global competition. At home, deregulation of many industries such as the airlines, telecommunications, and banking has created new competition in many markets. The 2000s will witness increasing micro-segmentation of markets by more highly specialized businesses.



Technology and Automation:

Technology and automation transformed the way many businesses operated. Personal computers, cell phones, e-mail, and fax machines all rapidly emerged to transform business practices. They have



made alternative work arrangements more feasible and even desirable. A growing number of companies do not focus on work-at- home policies, preferring to think about "work anywhere, anytime programs."

Volatile Markets:

As the technology sector has become more dominant in the economy, the economy is increasingly more vulnerable to the inherent volatility of that sector. Today's high-flyer products are tomorrow's obsolete gadgets. Businesses must gear up quickly to translate ideas into new products or risk missing the market window. "Time to market" is the governing imperative. Transactional costs (the cost of obtaining resources and meeting deadlines) tend to be more important than input costs (the cost of labor and materials), and firms will pay more in terms of wages and land costs to operate in such an environment.

Flexible Employment Systems:

In the new economic order, businesses have learned how to react quickly to market shifts, shedding or building capacity, shrinking or expanding space, and downsizing or gearing up workforces. Firms hire more people when orders and revenues increase, and downsize when business drops off. Many U.S. companies utilize a flexible employment system that consists of many temporaries, contractors, and consultants. As a consequence, loyalty to firms has eroded.

Free-Agent Employees:

Accompanying flexible employment systems are free-agent employees who make frequent career changes and have little loyalty to a particular firm. On average, people change careers every 10 years. A recent Harris poll found that only 39% of workers intend to hold the same job in five years. However, businesses are investing more in training and other employee perquisites and amenities; the result is that job tenure actually increased in the 1990s.

Separation of Business Functions:

Firms are increasingly separating their operations in different locations and cities. Corporate headquarters tend to be found in cities with good airline connections, abundant professional support services, and a high quality of life. The same is true of research and development functions, that must also have access to highly educated workers and educational institutions. Back offices locate in places with good communications infrastructure. Modern high-tech manufacturing firms are looking for good transportation networks and a well-educated workforce that is flexible in their work attitudes. Contemporary telecommunication equipment lets companies link all of these functions much more easily than in the past. A result of the ability to split functions is less corporate loyalty to any one community.

Home/Work Fusion:

An increasing number of workers have a desire for more flexible work schedules. A growing number of firms are responding by offering flextime and telecommuting. In 1997, 27% of the civilian labor force worked flexible schedules, an increase of 83% since 1991. In a recent survey of human resource executives, 43% said that an increasingly mobile, telecommuting work force would be the biggest workplace trend of the 21st Century.[3] Increased telecommuting can save firms money in terms of office space and improve productivity as well as benefiting employees. However, in some high-tech firms, there is a need for team problem solving and face-to-face contact, thus making telecommuting undesirable. According to a report from the Massachusetts Institute of Technology, "complex knowledge still needs to be transmitted face-to-face.

Technology does not yet have the 'bandwidth' to replace face-to-face communication."

Age of Talent:

Knowledge in the form of people has become a source of competitive advantage. Knowledge, skills, and experience have greater value than capital equipment or capital itself. However, knowledge and skills become obsolete quicker than ever. The half-life of an engineer's knowledge today is only five years. Eighty-five percent of the information in National Institutes of Health computers is upgraded in five years. Continuing job training and education is becoming increasingly essential. However, not all high-tech jobs demand post-doctoral or advanced degrees. Many high-tech jobs will require special skills, but only technical training or associate degrees.

Diversity:

Changes in laws and legislation have opened the doors to segments of the American population that were previously shut out or hamstrung in job opportunities by gender, race, age, or ethnicity. The New Economy workplace is far more diverse than 20 years ago, and its workers have greatly varying needs and desires in terms of services, amenities, or work schedule. Another aspect of diversity is diversity of career and life paths. Not only will employees change jobs more frequently, but they may hop back and forth between the public and private sector, large firms and small, full-time and part-time work.

Generation X and The Workplace:

As thirty and twenty-somethings move into the workplace in large numbers, they are forcing companies to respond to their lifestyles and desires. Research shows that they value quality of life very highly and seek more balance between their work and private lives. They tend to be more entrepreneurial and more likely to start their own firms or join small companies than their parents. They tend to have less loyalty to a particular firm and often hop to new jobs that offer more money or better working conditions.

Retirement Age Disappearing:

While many in the media have focused on Generation X employees and the New

[3] John Challenger, "24 Trends Reshaping the Workplace," The Futurist, Sept., 2000, p.4.

Economy, baby boomers are increasingly foregoing retirement in favor of starting new careers or making ends meet. Additionally, companies are working to retain older workers in the face of labor shortages and the transient nature of younger workers. They are placing increasing value on know-how, corporate memory, and wisdom as well as youth and energy. Labor force participation rates for those between 54 and 64 are predicted to increase sharply. True retirement, a permanent end to work, will be delayed until very late in life. Adapting to the needs of older

employees in the workplace will be a new challenge.

Two-Income Couples Are Becoming Even More The Norm:

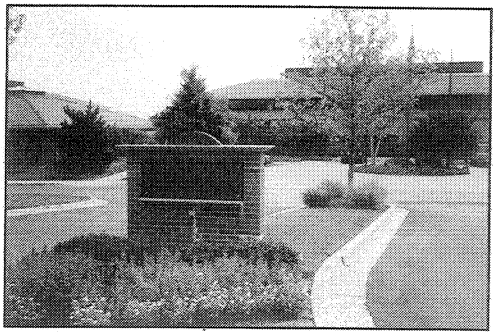
By 2005, in 75% of households both partners will work full time, up from 63% in 1992. Between 1996 and 2006, the number of women employed in the U.S. will grow from about 60 million to 70 million, a 14% increase. Demand for on-the-job childcare or eldercare, extended parental leave, flexible work schedules, and other family-oriented benefits will grow. Two-income families can also afford to eat out more, take more frequent vacations, and buy goods. They can also be more entrepreneurial, as one family member's salary can carry them over while the other starts a new business.

III. HIGH-TECHNOLOGY FIRMS AND THE NEW ECONOMY

High-technology firms are often seen as the drivers of the New Economy, and in some important ways that is true. They tend to pay high wages and attract well-educated, affluent workers. For example, in Maryland high-tech wages surpassed the private sector in the rate of growth in all but two years in the 1990s. Biotechnology had the highest weekly average wage--$1,350—compared to the average private sector wage of $683 in 2000. Nationally, high-tech industry output grew four times faster in the 1990s than the economy as a whole. High-tech jobs pay an average of almost 80% more than the median wage. And information technology industries now represent 8.2 % of NDP, up from 4.9 % in 1985. Predictions are that these industries will account for over 15% of GDP by 2020. Not surprisingly, many communities focus their economic development efforts on high-technology firms.

But it is important to understand that the high-technology sector is not monolithic in terms of the people they employ or the factors that influence where they locate. For example, biotechnology is still an infant industry and very dependent on associations with universities and their research facilities. Biotechnology laboratories have very specialized building requirements. On the other hand, high-technology manufacturers employ a much more blue-collar workforce, many of whom do not need college degrees. These firms want low-cost space and room to expand, which are more traditional locational/siting preferences.

A recent study of a planned high-technology business park near Boston



predicted that 30% of the 7,500 expected jobs would pay $34,000 or less and about 33% would pay $64,000 or more.[4] However, because 75% would likely live in two-income households, only 17% would be in households with income of less than $60,000.

Given this wide variation in locational preferences, employee profiles, and other attributes, it is clear that no one rigid set of local government land use and other policies (e.g., target housing and community amenity efforts mainly at higher-income, Generation X workers) will succeed in satisfying the needs of the high-tech sector. As discussed below, these policies will have to be multi-faceted and as nimble as the businesses themselves.

Communities must also keep in mind that other sectors of the economy will also continue to be extremely important. Not all growth and jobs will be in high-tech industries. Because improved productivity and wealth will give people more time and money to play with, experts predict that leisure-oriented business will dominate the world economy by 2015, accounting for roughly half the U.S. GNP. Moreover, they predict that as many as 70% of the well-paying jobs over the next 10-15 years may not require a four-year college degree. These service, craft, and technical functions will require an associate degree or technical training.

IV. LOCATIONAL PREFERENCES: WHAT HIGH-TECH FIRMS ARE LOOKING FOR

Overview.

Despite the recent hiccup in the national and world economy, all prognosticators predict that the high-tech sectors will continue to grow. In addition, thousands of new firms will spring up over the next decade. And because they are not typically tied by markets or raw materials to a particular location, high-tech firms are relatively footloose -- these firms can choose from a wide variety of locations within which to settle or expand. Knowledge workers, the raw material of the industry, also have many options as to where they can live and work. This means that local governments need to understand what high-tech firms are looking for when they search for a new location or room to expand.

Again, it is important to keep in mind that the industry is not monolithic. That is, the locational preferences of high-tech firms can vary depending on whether, for example, which business function needs to be served. Does the firm have a commercial product to produce/distribute or does it need to focus on research? Locational preferences also vary significantly depending on the category of high-tech firm. High-tech manufacturing firms typically look for much different locations (suburban business parks) than software development companies (suitable for more urban environments).

[4] Center For Urban & Regional Policy, Northeastern University, "Telecom City Housing Impact Study," July 2001.

Nevertheless, one fact is very clear: The traditional factors that dominated locational decisions by growth companies in the 1950s-1980s have changed dramatically. Firms choosing a location in that era would typically have scrutinized labor costs and labor climate, proximity to markets or raw materials, and living preferences of the chief executive officer. While a few of these traditional factors are still important -- for example, CEO preference is still a significant factor driving many high-tech firms in locational decisions -- considerations that once ranked relatively low have become more important, and new factors have emerged. These include quality of life, technology infrastructure, and availability of skilled, educated workers, among others. Some of the critical factors are discussed in greater detail below.

While local governments can have only marginal influence over some of these factors (e.g., availability of venture capital) others such as maintaining a high quality of life are very much the bailiwick of cities and counties.

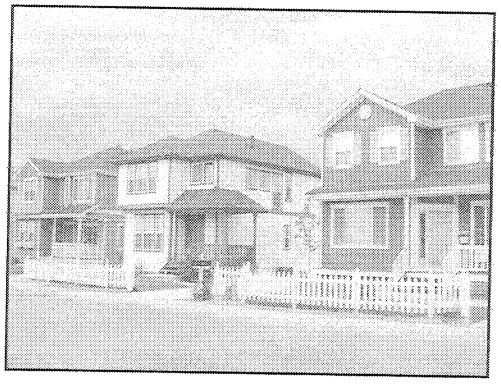
The table below, from a working paper published by the Brookings Institution, contains a useful summary of modern locational considerations by business function.

BUSINESS GEOGRAPHY BY FUNCTION

Function	Location Priorities	Sensitivity to Cost	Examples of Preferred Locations
Headquarters	• Accessible international air service • High-end hotels, restaurants, entertainment, cultural events; major league sports team/stadium with skyboxes to facilitate heavy inter-company face-to-face interaction • Professional support services, good choice of office space or availability of land to build-to-suit • Diverse professional employee base • Attractive housing for executives, affordable housing for managers and support staff within reasonable commute • Strong educational system for employees' children and continuing adult education	Cost sensitivity (within a normal range) is less important than availability of key requirements.	Central cities or strong first tier suburbs (e.g., Washington D.C.'s suburbs: Prince William, Fairfax and Loudon counties); northern suburban Atlanta, Charlotte, Dallas, Raleigh-Durham
Research and Development	• Proximity to concentration of universities • Clusters of highly educated workers, or alternatively, lifestyle amenities that are attractive to this pool of talent • Control over physical environment – to buffer company from nosy neighbors, sharing of secrets by employees	Cost sensitivity is less important than the availability of talent and other requirements (although R&D may be more sensitive to cost than Headquarters)	Near universities, in large metropolitan areas; campus locations favored; Route 1 near Princeton, New Jersey, home of several pharmaceutical companies

Back Office	• State-of-the-art telecommunications capacity • Affordable housing costs • Quality labor force with technical skills • Good schools for employee recruitment and their children • On-going available adult education and training	Sensitivity to cost: real estate, telecommunications, housing, taxes	Medium and small sized cities: Tampa, FL, Tucson, AZ; former military installations; in large metropolitan areas, prefer suburbs
Manufacturing and Distribution	• Good transportation system; near major interstates • Strong utility systems; electric, water, wastewater, gas • Well-educated workforce; strong, specialized training programs	Sensitivity to housing costs; taxes, utility rates	On interstate, near large markets; access to suppliers (Chicago-Aurora, Cincinnati south suburbs and northern Kentucky, Jacksonville, Florida and Kansas City, Missouri western suburbs
Source: Natalie Cohen, "Business Location Decision-Making And The Cities," Brookings Institution (April 2000)			

Another survey that focused on location differences among high-tech firms and all firms was also revealing. Environmental quality, cost of housing, and easy commute all ranked high for high-tech firms and much lower for firms as a whole. On the other hand, schools and safety were the top-ranked considerations for all firms.



ENVIRONMENTAL QUALITY AND HIGH TECHNOLOGY LOCATION

High Technology Firms			All Firms	
Amenity	Average Rank		Amenity	Average Rank
Environmental Quality	3.00		Good Schools	2.11
Cost of Housing	3.24		Public Safety	3.89
Cost of Living	3.38		Environmental Quality	4.22
Good Schools	3.50		Cultural Amenities	4.56
Easy Commute	3.50		Proximity of Housing	4.89
Recreational Amenities	3.63		Easy Commute	4.89
Climate	3.75		Cost of Housing	5.00
Cultural Amenities	4.13		Recreational Amenities	5.22
Government Services	4.50		Climate	5.89
CEO Preference	4.50		Government Services	6.22
Public Safety	5.25		Cost of Living	6.67
Proximity of Housing	5.25		CEO Preference	6.78

Source: Paul Gottlieb, "Amenities As An Economic Development Tool: Is There Enough Evidence?," *Economic Development Quarterly*, August 1994, p. 276

General Locational Factors.

A more detailed discussion of certain locational factors helps to better illuminate the steps that Montgomery County might take to strengthen its competitive position by making informed changes in its land use and

development regulations and procedures. These factors have been identified as significant or growing in importance by a number of commentators and recent studies.

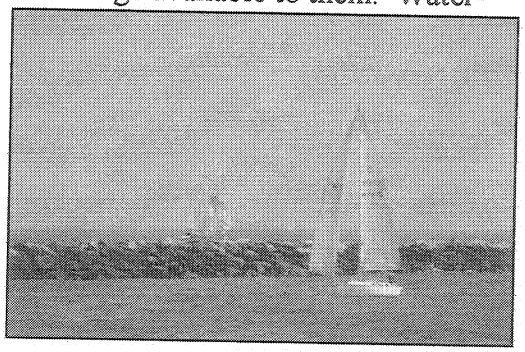
Technology Infrastructure:

Excellent infrastructure is critical to the operations of most high-tech firms in a variety of ways. Non-interruptible power that is free from voltage spikes is critical to biotechnology labs and Internet-based companies. Water quality is very important to advanced technology manufacturers and biotech companies. Telecommunications capacity may or may not involve a direct public role, but access to public right of way is always required. And as noted in a recent Brookings Institution report, "in places not already served by multiple providers of broadband communications capacity, public sector organizations may have a role to play. Cities can be important launch customers to entice a private provider into areas that they do not currently serve. Information from cities about infrastructure availability (e.g., fiber optic network layouts) is also invaluable in making siting decisions. Additionally, good transportation access is important not only for shipping products (such as software and instruments), but also for employees who commute to work.

Quality of Life:

A number of major recent studies and surveys on locational preferences of high-tech firms all found that quality of life ranked at or near the top.[5] In this context, quality of life means natural, recreational, and lifestyle amenities and overall environmental quality. Knowledge workers balance economic opportunity and quality of life when selecting a place to work and live. A 1998 survey of more than 1,200 high-tech workers found that a community's quality of life was the second most important factor -- just below salary -- and more important than benefits, stock options, or company stability in the attractiveness of a job.[6]

Knowledge workers want their amenities and recreational activities on a "just-in-time" basis, that is, they want them to be easy to get to and available quickly. They want these amenities to blend seamlessly with work, and they want a wide range available to them. Water-based amenities and recreation are particularly important.



Leading technology regions such as Seattle and Austin have aggressively pursued strategies to bolster environmental quality, natural amenities, and recreational opportunities. Both have placed a high priority on trails, parks, and access to water-based recreation. Both have adopted zoning regulations that preserve views and sensitive environmental areas and well as promote as lively urban spaces.

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[5] Richard Florida, "Competing in the Age of Talent: Quality of Place and the New Economy," R.K. Mellon Foundation (Pittsburgh January 2000); Natalie Cohen, "Business Location Decision-Making and the Cities: Bringing Back Companies," The Brookings Institution (April 2000); Doug Henton and Kim Walesh, "Linking the New Economy to Livable Community," The James Irvine Foundation (California April 1998); Paul Gottlieb, "Amenities as an Economic Development Tool," Economic Development Study, August 1994, p. 276.

[6] KPMG/CATA Alliance, *High Technology Labor Survey: Attracting & Retaining High Technology Workers*, KPMG, June 5, 1998.

While high-tech companies often thrive on change, they want certainty that quality of life will be protected. Intel and other technology companies have been strong supporters of Portland, Oregon's, regional plan that includes ambitious elements covering transit corridors, mixed-use developments, urban greenspace, and growth boundaries.

Some site location experts maintain that since most employers no longer offer or guarantee long-term jobs, the best benefit will be quality of life in the community in which the worker lives. "Ironically, this will mean that the role of government will change to an attractor of people rather than an attractor of firms."

Efficient, Expedited Project Permitting:

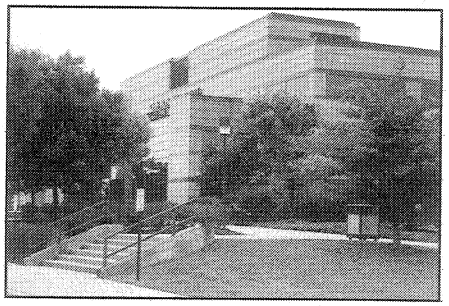
How quickly a facility can be built or expanded is often critical to a high-tech firm that must respond quickly to a market opening or to commercialize a product. Thus local governments that can offer an efficient, expedited process are at a significant competitive advantage. In Seattle, for example, a reportedly streamlined permitting process allows project reviews and approvals within 5 months for laboratory and similar facilities.[7] In Boulder, Colorado, the county allows high-tech firms to provide self-inspection for building permits when office or manufacturing space needs to be reconfigured. This self-inspection process, conducted by company employees who have certified knowledge of building codes, has reportedly shaved weeks off the construction/building permit process.

Clustering of Similar Companies:

For a variety of reasons, high-tech firms often seek to locate near similar companies. Software firms, for example, do not like to work in isolation. They and their employees hunt out opportunities for interaction with other similar firms and employees to augment and transfer knowledge. While they are fiercely competitive, they also often collaborate on products or projects. Research indicates that one of Silicon Valley's important advantages over other technology regions in the country is its ability to foster collaboration. Additionally, high-tech firms like to cluster because they can take advantage of specialty support services and proximity to educational facilities. Clustering is also attractive to knowledge employees, because they typically like to live in places with "thick" labor markets that offer a wide variety of employment opportunities.

Proximity to Major Educational & Government Institutions:

The presence of major research universities, educational facilities, and government institution offices are a powerful attractant to many high-tech firms. This is particularly true of the



[7] Paul Sommers and Daniel Carlson, "Ten Steps to a High-Tech Future: The New Economy in Metropolitan Seattle," The Brookings Institution (December 2000).

biotech sector, where a number of companies are spin-offs from research universities. These firms are likely to stay close to facilitate regular contact with the university and to have access to students and nearby clinical trials.

Skilled, Educated Workers:

High-tech firms need a deep pool of highly educated workers as well as those who may have lesser educational credentials but who are highly skilled. As one observers has noted, corporate real estate executives used to chant, "location, location, location." Now the mantra is "education, education, education." On one end, access to knowledge workers with advanced degrees is essential for bio tech, software development, and internet firms. On the other hand, high-tech manufacturing jobs often do not require a college degree, but employees must still have the skills to handle precise instruments and be highly motivated.

Several studies of high-tech firm locational decisions conclude that having a readily available and qualified workforce is one of the best investments that state and local governments can make.[8] For example, Motorola-Siemans was considering locating a product development facility next to a manufacturing plant in Richmond, Virginia. However, there was no engineering school in the region, a major negative. In response, the city worked with Virginia Tech to raise money and find land for a new engineering facility that help clinch the deal. Continued workforce education and training are also critical as is having such training readily available to workers at convenient places and times.

[8] Natalie Cohen, "Business Location Decision-Making and the Cities: Bringing Back Companies," The Brookings Institution (April 2000).

Housing Costs/Diversity:

Because the high-tech sector is not a monolithic block of young, highly paid workers, it is essential to most companies that a locale have a variety of housing choices available in various price ranges. Silicon Valley is a poster child for the problems created when a region lacks a range of housing choices. In the 1980s and 1990s, it began losing firms and jobs to other regions and states largely due to unaffordable housing. Businesses were forced to pay a premium to attract and retain workers.

Moreover, intense housing market pressures can contribute to urban sprawl -- loss of open space, longer commute times, grid-locked freeways, and more air pollution. All of these spin-off problems makes a region less attractive to high-tech firms.

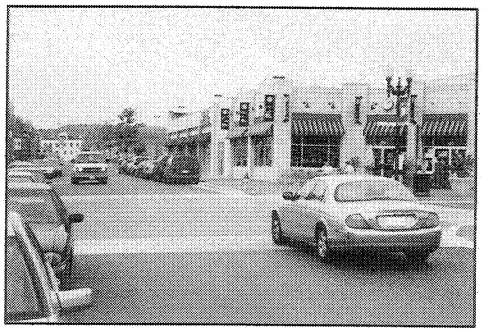
V. WORKPLACE/SITE PRERENCES OF HIGH-TECH FIRMS

Once a high-tech firm selects a region for relocation or expansion, a variety of site and workplace preferences come into play. Unlike some regional preferences that may be beyond the ability of local governments to influence, site and workplace factors can often be shaped by city and county land-use policies and regulations. This section discusses some of the key site and

workplace preferences of high-tech business.

Services/Amenities For Employees.

As several recent studies reveal, it's not business as usual when it comes to building business parks for high-tech firms. According to the author of a new Urban Land Institute handbook on business park development, "in the 1970s we saw the development of low-scale corporate campuses built by individual companies. Those parks...on



greenfield sites relied overwhelmingly on the automobile and lack a strong sense of place. Companies today want something different." As the *Wall Street Journal* reported in an article on San Jose, "It's a lot more fun to be in a locale where you can go for a walk and have a nice dinner, or shop or take in a hockey game, than it is to be isolated in some sprawling suburban office park where a little truck comes by at lunch time and sells microwave burritos."

As discussed in greater detail below, new office users, particularly those with ranks of knowledge workers, are increasingly looking for services -- restaurants, banks, travel agencies, auto service stations -- within or very close by the business park. Day care facilities for children and, increasingly, elderly parents are pluses. Parks with gathering places and "town centers" are also seen as desirable as well as those with sidewalks and trails for walking.

Quality and convenience are watchwords. Some communities are tackling the lack of amenities in existing business parks with transit, shuttle, and other links to lively centers. For example, in Creve Coeur, Missouri, executives of the new Danforth Plant Science Center are strong supporters of a proposed greenline pedestrian connection between the center and downtown Creve Coeur.

A recent detailed study for the City of Vancouver, British Columbia, found the following type of non-industrial land uses often associated with high-tech business parks:[9]

--Common buildings with services: Most multi-tenant high-tech parks have a common building that offers executive services such as shared clerical staff, meeting management firms, and recreational facilities.
--Child care and schools: High-tech workers frequently have young families and need child-care services. In one case, an on-site elementary school is being developed to allow employees to have lunch with their children.
--Recreation facilities: Most high-tech parks provide both indoor and outdoor recreation facilities such as jogging trails, basketball courts, and play fields.
--Food and beverage: A range of food and beverage outlets on site, with flexible and extended hours, is important to serve employees.
--Retail and services: Access to basic services such as laundry, dry cleaners, and travel agents is needed, preferably with the park.

[9] "High-Tech Industry In The Urban Context: A Discussion Paper," City of Vancouver, B.C., Planning Department (September 1998).

--Bank: All high-tech parks survey indicated an on-site banking facility with at least an ATM is important.
--Bicycle and alternative transportation facilities. A large number of young high-tech employees cycle to work when possible. Full facilities such as showers, a towel service, cycle storage, etc. are often offered by firms.
--Residency hotels: A large percentage of high-tech employees are on contract for periods of time ranging from one week to several months. This, coupled with frequent and prolonged training, results in a need for intermediate-stay hotels. These are typically within walking distance of work.

This list suggests that local governments should ensure, at the very least, that their development codes encourage a wide mix of uses in business parks. Some, such as Ft. Collins, Colorado, have gone further and required a mix of uses in some business parks. These codes will also have to be flexible in allowing firms to address parking requirements that will change dramatically over time as uses change. Loudoun County, Virginia, for example, allows high-tech firms with few employees but large space demands to reserve land for parking in the future instead of requiring its construction initially.

Interestingly, public safety and security tend not to be high-priority locational factors for high-technology firms. (See Gottlieb survey results at p. 10 of this report.) Public safety ranks much higher for all firms in recent surveys. While some select high-tech firms, especially those producing products for the defense sector or with sensitive trade secrets, do attach a great deal of importance to security, other locational factors tend to be much more important, even in the wake of the September 2001 terrorist attacks.

Business Parks With Flexspace.

With volatile markets, rapid mergers and acquisitions, and smaller firm size, many high-tech businesses have very different space needs than larger companies that dominated the economy 20 years ago. These firms are often looking for space built by someone else with leases that are very flexible to allow expansion and contraction as needed. Successful high-tech business parks cater to these needs with more modest, lower-rise buildings with smaller floor plates than those found in 1970s sprawling campus-style complexes. Because many high-tech firms, especially those engaged in software/internet development activities, have more modest space needs, they fit more easily into town centers and older downtowns.

As discussed above, an adjunct to having business parks with flexible space is being able to respond to the need of high-tech firms to reconfigure or expand existing space quickly to exploit a market opening or to commercialize a product. Thus local governments that can offer an efficient, expedited development and construction review process are at a significant competitive advantage

Flexible Building Workspace.

Many high-tech firms are smaller and increasingly project-driven, reconfiguring and changing based on changing business opportunities. In the workplace, "privacy is being replaced with productivity, hierarchy with teamwork, and status with mobility." This focus on creativity and knowledge

requires the design of more varied, less prescribed work spaces that encourage creative thinking and informal interaction. It has also fueled the move toward team-based corporate office configurations.

According to the Architecture & Engineering Quarterly, to reduce costs, fixed work spaces are becoming smaller, and office tenants are devoting more of their real estate to open plan space.[10] In a recent Building Owners and Managers Association (BOMA) survey, the average office tenant devoted 49 percent of total space to an open plan.

According to one experienced firm that works with Internet start-up companies in Denver, adaptable design enables these companies, whose rate of growth is uncertain, to work in a productive and stimulating environment. "The companies that we are working with have no ability to project growth. As a result, everything we do for them has to serve multiple roles. There is no more hierarchy of space standards than we saw in the past -- that model is simply too rigid." Again, local governments that can offer an efficient, expedited development and construction review process are at a significant competitive advantage when it comes to attracting or retaining these firms.

Technology developments will continue to shape the 21st Century workplace. For example, wireless technology is emerging as a significant design consideration. The Cahners In-Stat Group estimates that the number of wireless data users will skyrocket from 784,000 in 1999 to nine million in 2003. This technology will enable easy configuration of space. Corporate intranets and extranets, along with videoconferencing and media distribution technologies, will also enable "virtual-teaming."

Although communications technologies have facilitated remote work on a part-time basis -- there were approximately 12 million part-time teleworkers in the U.S. in 1998 -- only a fraction of employees telecommute full-time, so the need for space for these employees does not disappear. Design and facility management must thus accommodate growing numbers of contingent, remote, and field workers.

All of the trends suggest that local governments should carefully re-examine development standards such as those for parking to ensure they reflect modern practice and demands.

Fighting Isolation/Fostering Collaboration.

Companies are realizing that e-mail, voice mail, and other forms of electronic communication are increasingly replacing face-to-face interaction on the job. While this isolation may provide the quiet time necessary to think, write, and create, it also hinders the teamwork and brainstorming time so critical to developing new ideas. To address this issue, firms have taken several approaches. One, discussed above, is to design work space to encourage interaction. For example, Alcoa Aluminum recently abandoned it's high-rise office headquarters in Pittsburgh with private 12' x 15' offices for a new low-rise complex on the Allegheny River that according to its CEO will have "escalators instead of elevators and plenty of meeting rooms...there will be a lot of places where people can gather."[11]

[10] Eileen March, "Integrated Parts," Architecture & Engineering Quarterly (May 2001).

[11] Joan Hamilton, "The New Workplace," Business Week (April 29, 1996).

At the same time, smart business park developers are addressing this need for interaction by creating outdoor spaces and places where people can gather and talk informally -- town centers with restaurants and coffee shops, parks and plazas, civic centers, recreation space, and the like. Some communities require such amenities in business parks through zoning regulations.

Access/Transportation.

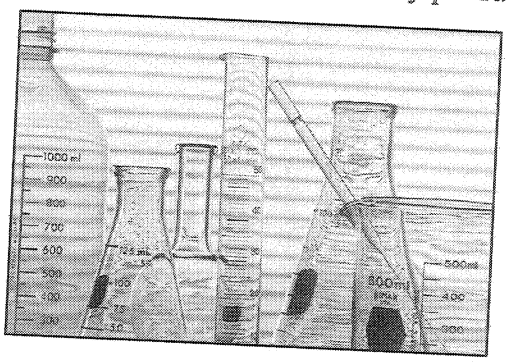
Although the flow of information electronically drives the New Economy, good surface access to a site remains paramount for a number of reasons. For firms that ship products, many have customers that rely on just-in-time delivery. Congestion that slows truck and overnight deliveries can be a serious impediment and business cost. And congestion that adds to commute times is one of the most significant frustrations to employees and is often seen as a major indicator of erosion in an area's quality of life. A number of studies also demonstrate that high-tech firms value transportation mobility options that permit employees to have easy access to restaurants and services during the work day. An increasing number of local governments have responded by requiring sidewalks, trails, interconnected street systems, bicycle racks and other such facilities in business parks as well as encouraging mixed-use developments that can help reduce traffic.

Locational Factors and Site Preferences For Specific High-Tech Industries.

The general locational factors and preferences discussed above provide some important guidance in shaping local land use and development policies to accommodate high-tech industries. It is also useful to take this inquiry to the next level and highlight some of the specific locational preferences of the biotech, software/ internet, and manufacturing sectors, which differ somewhat given the varying needs of firms in each.

Biotechnology Firms.[12]

Most biotech firms are young and very dependent on close associations with educational institutions and their researches. Most locate near an urban research university or government research institutions and are often linked by shuttles. Only a few actually produce

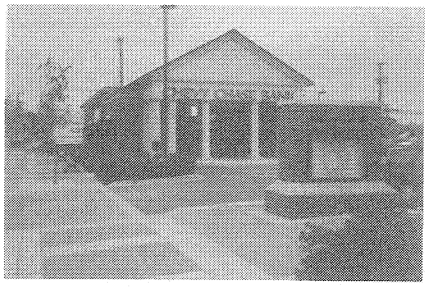


products at this point, although commercialization is beginning. Montgomery County is already one of the leading biotech centers in the nation. Its biotech firms are maturing and moving beyond research and into the production phase.

- Facility needs vary greatly depending on whether a firm has a commercial product. The industry uses office, flex, and industrial space. Flex buildings may be more suitable for labs while biotech firms that use computers more than test tubes are at home in more traditional office buildings.

[12] The Maryland-National Capital Park and Planning Commission has produced an extensive report on the biotech industry in the county, "The Biotechnology Industry in Montgomery County: Factors Related to the Development of the Industry Including Land Use Issues" (August 2000).

- Biotech labs are costly and require special containment and disposal capabilities. The work environment typically requires high standards in terms of security, ventilation, floor loads, power supply, and water. The lack of appropriate flex space that could be adapted for labs was the most common problem cited by industry representatives in a recent study for Montgomery County.
- Clustering is definitely a factor for biotech firms. Montgomery County has identified seven biotech clusters in the county including industrial parks, mixed-use areas, and the Bethesda/Silver Spring central business districts. Except for the Shady Grove Life Sciences Center, biotech firms are intermingled with many other industries.
- Employees typically place a high value on urban amenities

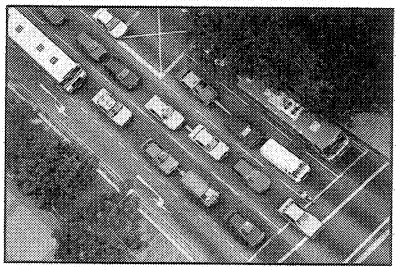


(restaurants, banks, personal services) and easy access to their homes.

Software/Internet-Based Companies. The major asset of these firms is their people and knowledge. Workers are typically well-paid and receive stock options. Until the recent dot.bomb shake out in the industry, workers often jumped jobs looking for higher salaries and better working/living conditions.

Attracting and retaining key employees is priority concern.

- Workers prefer an active urban environment with many eating, drinking, recreation, and entertainment options.
- Firms in this sector are found more often in urban and downtown locations than other high-tech companies. They often prefer unusual space that will spur creativity and imagination. Thus renovated, historic structures can be more appealing than high-rise office buildings.
- Ease of access between work and home is important. Traffic congestion is a major negative factor.



Advanced Technology Manufacturers. Advanced technology manufacturers produce a wide variety of products ranging from aviation equipment to optical instruments. The locational needs of high-tech manufacturers are similar to that of traditional industrial firms. They look for affordable space and access to affordable housing for their largely blue-collar work force. Facilities must have adequate square

footage, room for expansion, and good truck access for shipping products and receiving raw materials and parts. These priorities lead many to locate in suburban business and industrial parks that offer affordability for the company and provide workers a pleasant environment. Additionally, they desire locations that provide access to training opportunities for employees.

Conclusions and Recommendations:

The locational and site preferences of high-tech companies discussed in this report suggest a number of steps that local governments can take to improve their attractiveness to these firms. This section presents some recommendations for an overarching strategy with respect to revamping and refining development review processes and regulations as well as some specific development code changes that should be considered.

There are several important context points that should be kept in mind while considering code revisions. First, local governments simply are not in a position to influence or respond to some important business locational preferences. Recall that one of the dominant factors for all firms continues to be where the CEO wants to live. That variable is hard to regulate or address. Availability of venture capital is another criterion that is difficult for local governments to control.

Second, high-tech firms vary dramatically in terms of needs, products, employees, and many other factors. Even within one sector, such as biotechnology, locational and siting issues will differ depending on the function of the company, for example, research vs. production. This variety makes it challenging to develop a strategy that will be effective for a wide range of firms.

Finally, while a number of steps to improve land use review procedures and standards are presented here, Montgomery County and the Washington, D.C., region are obviously doing something right in terms of attracting and retaining high-tech companies. A recent report for the R.K. Mellon Foundation by Richard Florida found that the Washington, D.C., area scored very highly in terms of overall amenities and environmental quality, both factors that tend to correlate with high-technology development.[13] The region already has one of the highest concentrations of high-tech firms in the nation.

Overarching Strategy

Because of the tremendous variety in high-tech firms, it makes sense to **craft a locational strategy that focuses on attracting and retaining people, not specific types of firms.** For example, if a strategy focuses heavily on younger, higher income Generation X knowledge workers, it may overlook the needs of the blue-collar high-tech manufacturing employees, which differ substantially in a number of ways. A more successful approach will be to recalibrate land-use policies to address issues like maintaining a high quality of life, easy access to work, and provision of amenities. These are issues that cut across and appeal to a wide swath of high-tech firms and workers. As one observer has noted, "local governments will be entrepreneurial in devising

[13] Richard Florida, "Competing in the Age of Talent: Quality of Place and the New Economy," R.K. Mellon Foundation (January 2000).

products and services that can sustain social capital within the community." Second, **land use plans and policies should accommodate the increasingly diverse work and living patterns of high-tech employees. People need to have real choices when it comes to where and how they live.**

Seattle is using choice as an organizing principle in its economic development strategy that includes land use aspects: "We are building a city of choices," explains Mayor Paul Schell, "No single solution is for everybody."[14] Seattle recognizes that workers need choices in housing, training, recreation, and transportation. Some of today's Generation X workers who value lively urban environments will soon be looking for suburban houses with yards to raise children, buying them from empty-nester Baby Boomer high-tech employees tired of mowing the lawn and who want a more lively urban setting.

Recent statistics show that Montgomery County's workforce is even more diverse than most:

- The typical technology worker is between the ages of 22 and 40 years of age, single or married, highly educated and culturally diverse.
- The baby boomer age group (35-54 years old) represents over half of the total work force.
- There is little evidence of early retirement in the county, with 75% of the people between 55 and 64 still working.
- Nearly 31% of the county's population lives alone.
- Non-family households represent 30% of the total households, and single-parent households headed by females represent 10.5%.

Thus, in Montgomery County even more than many other areas, strategies that call on land use policies to deliver choices are more likely to be more successful.

Moreover, companies will also benefit if the county can easily present choices available, for example, by providing information about infrastructure availability quickly through a GIS system.

Specific Land Use Policies. Montgomery County should address the following issues in revamping its development codes and processes:

Encourage or require mixed-use developments. Some of the county's zone districts (e.g., commercial) do not allow the type of lively mixed-use developments favored by many high-tech workers and firms. (See p. 14 of this report for a list of desired uses.) Many communities such as Austin, Fort Collins, Colorado, and Cary, North Carolina are not only encouraging but requiring new developments to contain a mix of housing, hotels, educational, and commercial uses. Others provide incentives in the form of density bonuses or "free" residential density on a site in addition to any permitted commercial uses. The county's new RMX district is reportedly working well to encourage mixed-use developments. It can serve as a template for changes in other district.

Other aspect of successful mixed-use development is density. An increasing number of communities are requiring minimum densities and a variety of uses

[14] Quoted in Henton and Walesh, Linking the New Economy to the Livable Community. The James Irvine Foundation (April 1998) at p. 19.

at selected locations such as future transit stops to ensure that new developments support mass transit and provide the critical mass for a lively mixed-use development. In contrast, while Montgomery County has been taking steps to encourage residential development around transit stops, there has been little or no high-density residential development at most.

Encourage or require more amenities in high-tech developments and business parks. Many high-tech firms and workers are making clear that they prefer to work in locations that are near or have easy access to vital centers with lively amenities and opportunities for interaction. They also value access to open space and recreational opportunities near the work place. Everything from sidewalks and trails to playing fields are assets.

Promote environmental protection and conservation of natural areas. High-tech employees value the natural environment both at work and at play. They often oppose sprawl and developments that gobble up open space. Currently, while the county has some regulations on the books to address natural resource protection, including stream buffer and forest conservation standards, it lacks provisions adopted by many other jurisdictions to protect sensitive natural features on a site or open space such as landscaping provisions and wildlife habitat protection standards. Moreover, many developments are not subject to site plan review, which means staff has no authority to review important elements such as connectivity between parcels or landscaping. While staff often attempts to negotiate to accomplish these goals, objective standards would ensure they are achieved while providing more certainty to the development community. The staff is currently working on landscaping provisions, an important initiative that should be completed.

Focus on specific uses, not buildings. In regulating development, most jurisdictions focus on the size of a building in regulating items such as parking. There is little flexibility to respond to uses that may have large space needs but relatively few employees (e.g., biotech labs). High-tech firms in the county have complained that they are sometimes required to build expensive parking that never gets used. The county needs to tailor parking and other standards more to specific uses, and then allow flexibility to meet future needs (e.g., set aside land for parking, but don't require paving at the outset).

Scrutinize home occupation regulations. Because an increasing number of New Economy workers will telecommute or start-up new businesses at home, the county should carefully examine its home occupation regulations to ensure they do not unnecessarily stifle this important trend. Of course, surrounding residences need to be protected from potential adverse side effects. Additionally, the county should consider creating flexibility for live-work spaces in commercial and other non-residential districts.

Improve the development review process. One of the most important needs of high-tech firms is the ability to respond quickly to new market opportunities and demands. This means that local governments that can provide efficient and responsive development review and construction inspection processes will have a leg up.

Currently, both staff and developers in Montgomery County agree that there is

much room for improvement. For example, while the county has a specifically designed zoning district for development around transit stations, it is little used because it is cumbersome and time-consuming. According to developers, there is little resemblance between the review process in practice and what is set forth in the zoning ordinance. They also point out that because the ordinance has so few standards, there is a great deal of uncertainty in the process over what staff will require—it may vary from case-to-case.

In making changes to development review procedures, the county should not overlook the importance of construction and building code review processes. It will do little good to make the development review process more efficient and predictable, only to have it followed by a slow and tedious process of getting a building built or expanded space built out. Some jurisdictions such as Boulder County, Colorado, are allowing for self-inspection by companies to speed this end of the development process.

By making these substantive and procedural changes in its development codes and processes, Montgomery County can help ensure it will be a desirable community and attractive location for high-tech firms and their workers.

VI. SELECTED REFERENCES:

Clarion has drawn on a variety of publications and studies in the preparation of this report. The following were particularly valuable and insightful:

Richard Florida, "Competing in the Age of Talent: Quality of Place and the New Economy," R.K. Mellon Foundation (January 2000).

Doug Henton and Kim Walesh, "Linking the New Economy to Livable Community," The James Irvine Foundation (April 1998).

"High-Tech Industry In the Urban Context, A Discussion Paper," City of Vancouver, B.C., Planning Department (September 1998).

Edward Cornish, The Cyber Future: 93 Ways Our Lives Will Change By The Year 2025, World Future Society (Bethesda, Maryland 1999).

Paul Sommers and Daniel Carlson, "Ten Steps to a High-Tech Future: The New Economy in Metropolitan Seattle," The Brookings Institution (December 2000).

Natalie Cohen, "Business Location Decision-Making and the Cities: Bringing Back Companies," The Brookings Institution (April 2000).

"The Biotechnology Industry In Montgomery County: Factors Related to the Development of the Industry Including Land Use Issues," The Maryland-National Capital Park and Planning Commission (July 2000).

John Challenger, "24 Trends Reshaping the Workplace," The Futurist (October 1, 2000), p. 35.

Anne Frej, "Business Park and Industrial Development Handbook," Urban Land Institute (Washington, D.C. July 2001).

Jill Mazullo, "Not Business As Usual," Planning (September 2001), p.4.

Center For Urban & Regional Policy, Northeastern University, "Telecom City Housing Impact Study," (July 2001).

Paul Gottlieb, "Amenities as an Economic Development Tool," Economic Development Study, (August 1994), p. 276.

KPMG/CATA Alliance, *High Technology Labor Survey: Attracting & Retaining High Technology Workers*, KPMG, (June 5, 1998).

Eileen March, "Integrated Parts," Architecture & Engineering Quarterly, (May 2001).

Joan Hamilton, "The New Workplace," Business Week, (April 29, 1996).