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Building on Innovation: The Significance of Anchor Institutions in a New Era of City Building

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The Significance of Anchor Institutions
in a New Era of City Building

Tom Murphy

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Tom Murphy

Senior Resident Fellow

ULI/Klingbeil Family Chair for Urban Development

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The mission of the Urban Land Institute is to provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide. ULI is committed to

- Bringing together leaders from across the fields of real estate and land use policy to exchange best practices and serve community needs;
- Fostering collaboration within and beyond ULI's membership through mentoring, dialogue, and problem solving;
- Exploring issues of urbanization, conservation, regeneration, land use, capital formation, and sustainable development;
- Advancing land use policies and design practices that respect the uniqueness of both built and natural environments;
- Sharing knowledge through education, applied research, publishing, and electronic media; and
- Sustaining a diverse global network of local practice and advisory efforts that address current and future challenges.

Established in 1936, the Institute today has nearly 30,000 members worldwide, representing the entire spectrum of the land use and development disciplines. ULI relies heavily on the experience of its members. It is through member involvement and information resources that ULI has been able to set standards of excellence in development practice. The Institute has long been recognized as one of the world's most respected and widely quoted sources of objective information on urban planning, growth, and development.

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Contents

2 Building on Innovation

- 4 Understanding the Past, Dissecting the Future
- 6 Getting the Basics Right
- 8 Sustained Economic Growth
- 11 The World's Preeminent Research Institutions
- 12 Creating Successful Public/Private Partnerships

13 Finding the Money

- 17 Metropolitan Impacts
- 19 Looking Ahead
- 20 Building a 21st-Century City

22 A Moment in Time

22 The Bottom Line

Building on Innovation

The innovation economy is sweeping away the old rules of city building in the United States and “anchor institutions”—research hospitals and universities—have become one of the primary drivers of this community-based change. At one time, companies could operate independently of community development factors, make industry-based acquisitions or mergers, forgo partnerships with the public sector, and forge their independent path to thriving business and enterprise value. Today, the technology and information economy has created a tempo of quick-speed change and public/private community interdependencies that have grown so great they have generated a new paradigm of local economic development and city building.

In just 20 years, metropolitan Boston has lost more than 100,000 manufacturing jobs while adding nearly 200,000 jobs in education, professional services, and health care-related sectors. Baltimore, Denver, and San Francisco now have double or even triple the jobs in educational, professional, and health services as in manufacturing. The capacity of communities to achieve economic resiliency amid these tectonic shifts will determine the difference between prosperous and failed local economies.

Land use decisions lie at the center of this capacity to succeed. A community’s ability to reuse its former manufacturing sites, to synergistically locate technology companies near research labs and each other, to encourage the growth of anchor institutions, and to build vibrant, engaging, and modern places to live and play is central to its competitiveness.

At the heart of these local economic development challenges lie the often overlooked anchor institutions of hospitals and universities that are the heavy-weights of local employment and globally competitive innovation.

The United States leads the world in higher education, health care delivery, basic research, and venture capital investment. Other economies seek to catch up. For individual communities in the United States to retain their quality of life, relationships between the public, private, and nonprofit sectors need to adapt to the new reality of the global innovation economy. Local leaders need a greater understanding of the desirability for business, institutions, and governments to mutually support each other rather than to be at loggerheads in the effort to nurture an agile workforce.

These relationships play out at several levels, but radical change is necessary at the local and metropolitan levels. Across this country, millions of manufacturing jobs have moved off shore as the information and technology economy has evolved. The pace of change continues to accelerate, and leaders at all levels need to act with common purpose to generate new wealth for communities. Metropolitan regions are increasingly being acknowledged as the laboratory for competition, learning, innovation, and change. The cumulative impact of local land use strategies and real estate investments is playing a decisive role in positioning communities for tangible growth and long-term prosperity.

The global marketplace for private sector investment is more mobile than ever. Investors and entrepreneurs want to see a community and its leadership moving to the future before allocating their time and capital. A city hoping to have a thriving and sustainable economy needs to be a place that demonstrates a track record of effective partnerships for this type of ongoing innovation to occur.

The ability of the United States to compete depends on countless decisions by thousands of local leaders in virtually every community.

Unlike other countries, where education, land use, and industrial policies are centrally planned, in the United States, many strategic policies and decisions are shaped and implemented at the local level. With more than 74,019 local governments and 13,506 school districts in the United States, local leaders must deliberately choose to invest in the future, be entrepreneurial, and build the critical public/private partnerships necessary to harness the strengths of the community and the region.

The success of institutions in becoming drivers of innovation and community development lies in their ability to link local networks of intellectual and business infrastructure.

Locally elected school boards determine the cost and quality of education, and it is overwhelmingly paid by local taxes. Local real estate interests and public leaders control and determine the quality and type of land use. To unleash these transformative economic drivers requires strong regional and local strategies and cross-sector collaborations.

This paper builds on the following three assumptions before offering some strategies for success:

1. Cities and their metropolitan regions will succeed only if they are managed well and adequately provide basic services.
 - Cities need to be clean and safe.
 - Cities need to be educating their workforce for the jobs of the future.
 - Cities need to offer a reasonable cost of living.
2. Cities will succeed if they commit to economic innovation and embrace cross-sector collaboration and partnerships.
 - Some cities already have the raw materials in existing research activities being undertaken at universities and medical institutions intent on commercializing their research.
 - Some cities have fostered public/private/university partnerships to drive their economic transformation and to help foster an entrepreneurial climate in their community.
 - Some cities recognize the need to attract various forms of venture capital available to invest in local business creation.
3. Cities will succeed if they provide vibrant places to live, plan regionally to maximize quality of life, and provide diverse housing choices and sustainable infrastructure.

Understanding the Past, Dissecting the Future

For the purpose of this paper, ten cities were selected to highlight the potential for change and to showcase the opportunities for growth when the raw materials of the innovation economy are met with public leadership and engagement. The ten metropolitan areas are a cross section of communities around the country that either have been created as a result of innovation strategies, such as the Research Triangle, North Carolina, or have re-created themselves like Baltimore and Pittsburgh. A third category includes communities that have definitively positioned themselves on the global stage as drivers of innovation, including San Francisco/San Jose and Boston. Each of these places tells a somewhat different story, but over the past 20 years, all of these metropolitan areas have dramatically changed and are in the midst of advancing their own transformations into thriving new-economy communities.

In every case, these changes happened over years—and most often over several decades. Often the community’s response, in the midst of declining and changing employment, looks better after the crisis than it did in the middle of it. In other words, no one game plan applies. These communities were often reacting to incredibly challenging situations, and they responded with creativity and resiliency, bringing together a great cross section of individuals, groups, and visions. For thousands of years, cities have been reinventing themselves, and American cities have thrived through constant reinvention. What is now new is the global nature of the competition, the rapidity of change, and the need for communities to form partnerships across traditional boundaries.

Table 1 shows the significant losses—and increases—in employment in the ten selected cities compared to the nation as a whole. Critical to each community are

TABLE 1: Employment Changes in Select U.S. Metropolitan Areas, 1990–2009

Metro Area	Manufacturing			Professional and Business Services			Education and Health Services		
	1990 (thousands)	2010 (thousands)	% Change	1990 (thousands)	2010 (thousands)	% Change	1990 (thousands)	2010 (thousands)	% Change
Research Triangle	76.9	62.1	-19	62.4	121.4	95	51.6	118.5	130
San Diego	123.4	90.7		124.1	198.8		84.1	147.4	
Philadelphia	246.9	130.1	-47	213.6	286	34	278.3	434.5	56
Boston	205.8	92		226.1	296.1		267.2	378.5	
Seattle	222.2	169.1		138.8	224.7		114.8	213.7	
Houston	201.5	221.8		208.3	349.3		161.3	309.5	
Denver	84.8	59	-30	129.5	202.6	56	72	143.9	100
Baltimore	128.5	59.5		123.1	191.4		145.8	244.6	
San Francisco	170.5	113.4	-33	275.7	339.8	23	173.7	235.5	36
Pittsburgh	130.6	85.5		126.6	155.6		160.2	239.8	
U.S. Total	17,695	11,743	-34	10,848	16,991	57	10,984	19,838	81

Source: U.S. Bureau of Labor Statistics.

Note: The highlighted rows indicate a metropolitan area studied for this paper.

the offsetting increases in job production in the education, and health and professional services sectors of the local economy.

Dedicated partnerships are necessary to advance educational aspirations, investments in research, and coordination to transfer research knowledge into commercial applications and products. Recently at an Urban Land Institute (ULI) conference, a panelist repeated an oft-used phrase—“governments just need to get out of the way”—in referring to efforts to improve the economy. Although a popular sentiment, in fact, in many ways the opposite is true if communities are to align their resources in the context of globally competitive economic development. Communities with strong private and public leadership are more likely to succeed.

Today, cities and metropolitan regions are in a far more competitive environment than ever before. American states used to be dominated by one or two large cities. Of course, regional competition for jobs, corporate expansion, and quality of

Leadership in Working Together: The Research Triangle

For the Research Triangle in North Carolina, the story goes back to 1959; six business leaders in Raleigh had been rained out of their golf game and were sitting in the clubhouse. They were lamenting the fact that they were sending their sons and daughters to college only to have them move elsewhere because employment choices in the Raleigh area were largely limited to tobacco, lumber, and furniture. These visionaries proceeded to organize the Research Triangle—buying 4,600 acres (1,850 ha) of land, creating a plan for a new local economy, forming university partnerships, and exercising public leadership. The rest is history. Research Triangle is now the largest high-tech research park in North America, boasting 20 million square feet (1,858,061 m²) of developed space and home to 157 companies, employing 39,000 people. It is a center of innovation.



Research Triangle Foundation

life was ongoing, but the game has recently changed forever. Today, competition is fierce—among metropolitan areas, regions, countries, and continents.

Whereas until now diverse employment opportunities and quality-of-life issues have been the two imperatives for cities to succeed, today the ability to create and reinvent economic engines, marketplace synergies, and corporate enterprise offshoots is required. For many years, the emphasis was on job creation—often at the expense of the quality of life. The rules have changed. The forces of global trade, new requirements for energy and infrastructure, climate change impacts, technological innovation, and demographics are redefining the critical elements cities need to compete and succeed.

Getting the Basics Right

Certain threshold requirements exist for cities to succeed in the new economy:

- **Cleanliness and safety:** Efficient delivery of basic services, including security, cleanliness, and basic competency in good government, is essential. Without safety and cleanliness, no city can excel at providing new benchmarks of economic competitiveness. The improvement in urban management techniques over the past decade has enhanced police performance significantly. As an example, the CompStat program created in New York City tracks crime, and on a daily basis, it diverts and deploys resources as needed using a modern GPS system. This aggressive management and use of technology is credited with cutting the murder rate in New York City from over 2,000 in 1990 to under 500 by 2009. This leadership and use of technology has resulted in New York consistently having one of the lowest overall crime rates per capita in the nation.
- **An educated workforce:** Besides providing for safety, the single most important service that governments can offer in partnership with other institutions is education. Table 2 illustrates the percentage of the local workforce with various levels of educational attainment. Communities such as Seattle and Boston had a relatively well-educated workforce in 1990 so the changes were not as dramatic; in cities such as Pittsburgh and Baltimore, the changes have been impressive. Houston and San Diego continue to have a less well-educated workforce, with a lower percentage of college graduates, in part because these cities have experienced a significant increase in foreign immigrants.

In particular, an increasing percentage of college-educated individuals reflects an accelerating change in a community as its economy shifts. If the educational basis of a community is not rising, the lack of a qualified workforce will impede the community's ability to capture technology based jobs. Of particular importance is the increase in graduate degrees in Boston, San Francisco, and the Research Triangle. Graduate and doctorate degrees bring the research dollars. In many ways, cutting-edge researchers are now like free agents in major-league sports, requiring high salaries, first-rate research facilities, and strong support staff. They then are expected to deliver the "wins," the breakthrough technology results.

TABLE 2: Educational Attainment in Select U.S. Metropolitan Areas, 1990–2009

Metro Area	High School Graduates (%)		Bachelor’s Degree (%)		Graduate Degree (%)	
	1990	2009	1990	2009	1990	2009
Research Triangle	82	88	20	26	12	18
San Diego	82	85	16	22	9	13
Philadelphia	76	87	14	19	8	13
Boston	81	91	17	24	11	18
Seattle	88	91	21	24	9	13
Houston	75	80	17	18	8	10
Denver	86	89	20	25	9	13
Baltimore	75	88	14	20	9	15
San Francisco	82	87	22	27	13	17
Pittsburgh	77	91	12	17	7	11
U.S. Total	75	85	13	18	7	10

Source: American Community Survey, U.S. Census Bureau.

o **Cost of living and quality of life:** In addition to the availability and skill set of the local workforce, the underlying cost of living plays a role in encouraging new business and innovation. In many parts of the country, the high cost of housing drove people to the outer-edge developments. Few jobs existed in those areas. As the recession hit and some jobs were lost, the cost of gas and transportation increased, leaving households more strapped for cash; many lost their homes. The nexus of jobs with housing is an ongoing challenge, particularly as local governments cut back transit service to less-populated suburban districts. The cost of housing and transportation are the two largest segments in determining a community’s cost-of-living score.

Increasingly, playgrounds, bike trails, ballfields, and parks are a major defining element of a community’s “livability.” Examples of significant investments in parks include Millennium Park in Chicago, City Gardens in St. Louis, and Discovery Green in Houston. These parks are seen as investments in a number of ways, increasing real estate values on adjacent property and providing new places for civic activity.

The quality and responsiveness of local government encourages—or deters—growth and creativity. Local leaders and governments can embrace major institutions and civic leaders, or they can assume that they are to be fought at every opportunity.

Sustained Economic Growth

Every community with a hospital or a university believes it can create a “new” economy. State and local governments have partnered with research institutions and private investors to nurture homegrown startup technology companies and to encourage major research institutions to relocate and engage local business communities.

Local innovation initiatives can be found across the country:

- The state of Florida and The Scripps Research Institute (TSRI) formed a partnership in 2006 to expand TSRI from La Jolla, California, to open a biomedical research facility in Jupiter, Florida. The Florida legislature appropriated \$310 million to fund the investment. The local governments made available 170 acres for the development of the campus and research facilities. More than 100 acres (40 ha) of land was committed for future technology development accommodating as much as 8 million square feet (743,224 m²) of new space. Since 2006 the facility has grown to 367 staff members. It has been the catalyst for the attraction of two additional research facilities: the Max Planck Institute and the Torrey Pines Institute. Additionally, Florida Atlantic University has located a postdoctoral and medical school at the campus. The Florida legislature approved investment of \$350 million of pension funds in venture capital firms to support startup companies resulting from the research. This coordinated state and local leadership and funding is one example of forward planning and implementation to change local economic conditions.
- Louisiana and the federal government are building a \$2 billion medical complex in New Orleans composed of a new Louisiana State University medical center (\$1.2 billion) funded by the state and a new Veterans Administration complex (\$800 million) replacing those facilities lost during Hurricane Katrina. These new facilities not only will serve patients and clientele but also are intended to stimulate related health care technology industry.
- In Las Vegas, an effort to broaden the employment base led the city to partner with the Cleveland Clinic and private contributors to build the \$100 million Cleveland Clinic and the Lou Ruvo Brain Center for research and cutting-edge neurological treatment. The building was designed by Frank Gehry and is part of a larger development plan known as Symphony Park, which includes the \$470 million Smith Center for the Performing Arts with additional plans for offices and housing. Newland Communities master planned the 61-acre (25-ha) site and is overseeing its development in partnership with the city, which owned most of the land. When completed, the development will represent a \$2.8 billion investment. Dan Van Epp, chief financial officer of Newland Communities, commented that “the development is a good model of a public/private partnership at a number of levels, between the Cleveland Clinic and the Ruvo Family; between the cultural, medical, retail, commercial, and housing developments; and, of course, between Newland Communities and the city in our role as master planner and developer. It has been a good experience.” Already, Cleveland Clinic is negotiating to expand its facilities in Symphony Park.

Ben Franklin Technology Partners, Pennsylvania

Launched with high hopes in 1983, the award-winning Ben Franklin Technology Partners (BFTP) is one of the nation's longest-running technology-based economic development programs. These programs were created in Pennsylvania as a partnership between business, government, and universities at a time when many of the traditional industries were in serious decline. These programs have maintained strong bipartisan support from both Republican and Democratic governors over 27 years. The mission has been to accelerate the commercialization of technology by providing very early stage financing to aspiring entrepreneurs. The program has been consistently funded with at least \$20 million annually over its history. The funds are invested through four Innovation Centers located in Pennsylvania.

BFTP has provided both early-stage and established companies with funding, business and technical expertise, and access to a network of innovative, expert resources. The program has been replicated in Connecticut, Indiana, Kansas, Minnesota, New York, and Ohio. BFTP has a 3.5-to-1 return on investment for every state dollar invested. It is credited with boosting the state's economy by more than \$17 billion. Investments have generated 45,667 additional job-years in client firms and 80,160 job-years beyond those in client firms—for a total of 125,827 additional job-years.

These investments are just examples of what has happened in many areas of the country. Other examples that also provide early-stage financing for promising technologies are Georgia, Michigan, and Ohio. The employment changes in communities across the country are pointing to a major shift toward research, medical, and health care. Local economies will continue to have dominant industries, such as gambling in Las Vegas, tourism in Orlando, banking in Charlotte, and energy in Houston. A move toward economic diversification and innovation becomes an integral part of every successful community's economic development program. Private and public investments in research represent a huge industry in itself. Where these dollars go, the ability of a community to leverage them and to nurture startup companies or to attract others interested in the technology is remaking regional economies.

The United States continues to lead other countries in the critical investment of research from public, private, and philanthropic sources (see figure 1). The federal government is the single largest source of research investment, representing \$147 billion of almost \$400 billion invested in 2010 (see figure 2). Recent discussions in Congress about deficit reduction efforts include significant proposed reductions in federal research investments that could seriously undercut the country's historic position as a leader in innovation.

FIGURE 1: Annual Research and Development Spending by Country, 2010

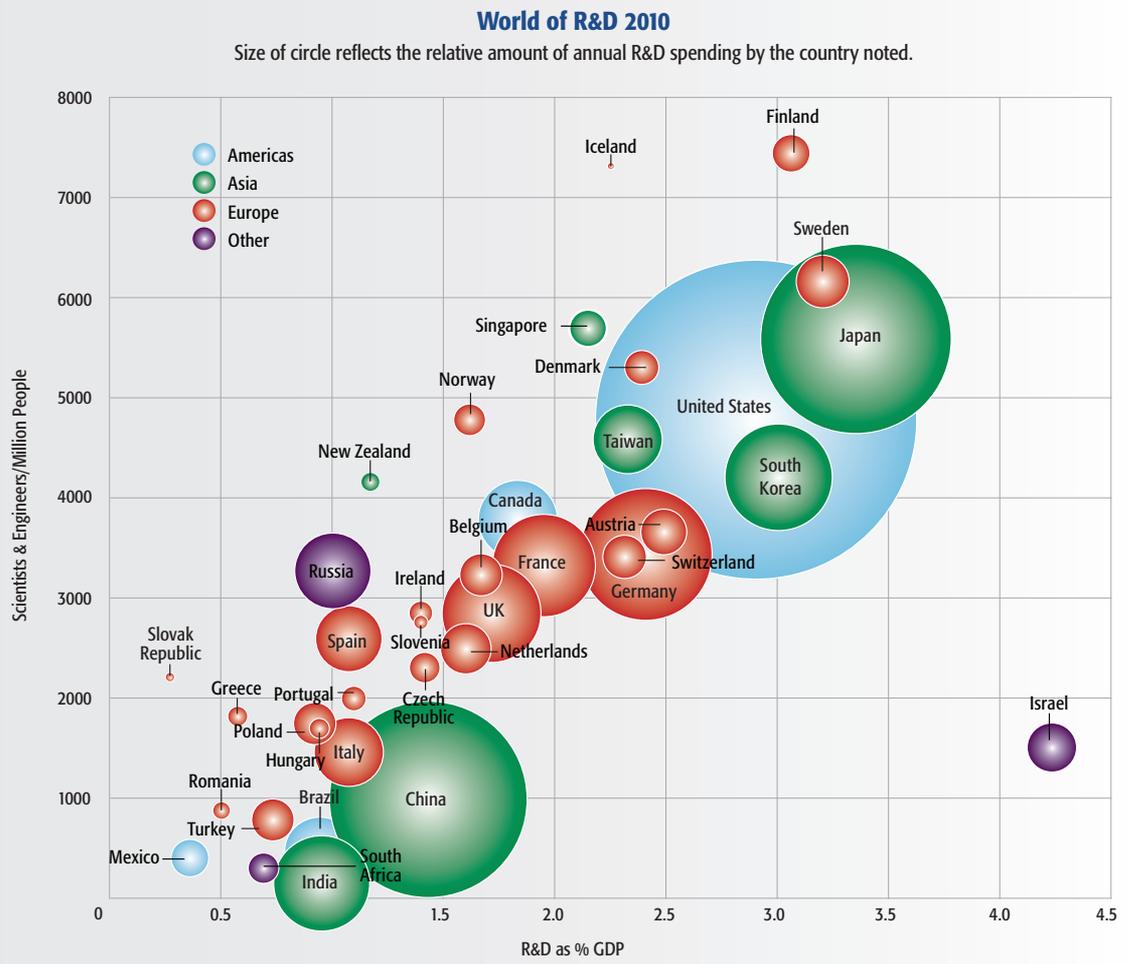
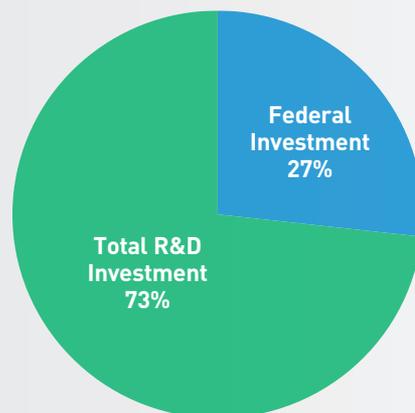


FIGURE 2: Federal Investment in U.S. Research and Development, 2010



Source: Battelle, *R&D Magazine*, 2011 Global R&D Funding Forecast, December 2010.

The World's Preeminent Research Institutions

The United States continues to hold a dominant lead internationally in top research universities, with 17 of the top 20 institutions sprinkled across the country (table 3). Of these institutions, eight of the 17 are in the metropolitan areas discussed in this paper. Significant dollars continue to be spent on research at these and many other institutions. For example, almost \$48 billion was invested in research in the United States in 2007 at institutions across the country.

TABLE 3: World Rank for University Research Performance, 2010

Rank	Institution	Region
1	Harvard University	Boston*
2	University of California, Berkeley	Berkeley*
3	Stanford University	San Jose*
4	Massachusetts Institute of Technology	Boston*
5	University of Cambridge	United Kingdom
6	California Institute of Technology	Los Angeles
7	Princeton University	New Jersey
8	Columbia University	New York
9	University of Chicago	Chicago
10	University of Oxford	United Kingdom
11	Yale University	New Haven
12	Cornell University	Ithaca, New York
13	University of California, Los Angeles	Los Angeles
14	University of California, San Diego	San Diego*
15	University of Pennsylvania	Philadelphia*
16	University of Washington	Seattle*
17	University of Wisconsin–Madison	Madison
18	The Johns Hopkins University	Baltimore/Washington*
18	University of California, San Francisco	San Francisco*
20	The University of Tokyo	Japan

Source: Academic Ranking of World Universities (ARWU), Center for World-Class Universities and the Institute of Higher Education of Shanghai Jiao Tong University, China.

* Indicates a metropolitan area studied for this paper.

Creating Successful Public/Private Partnerships

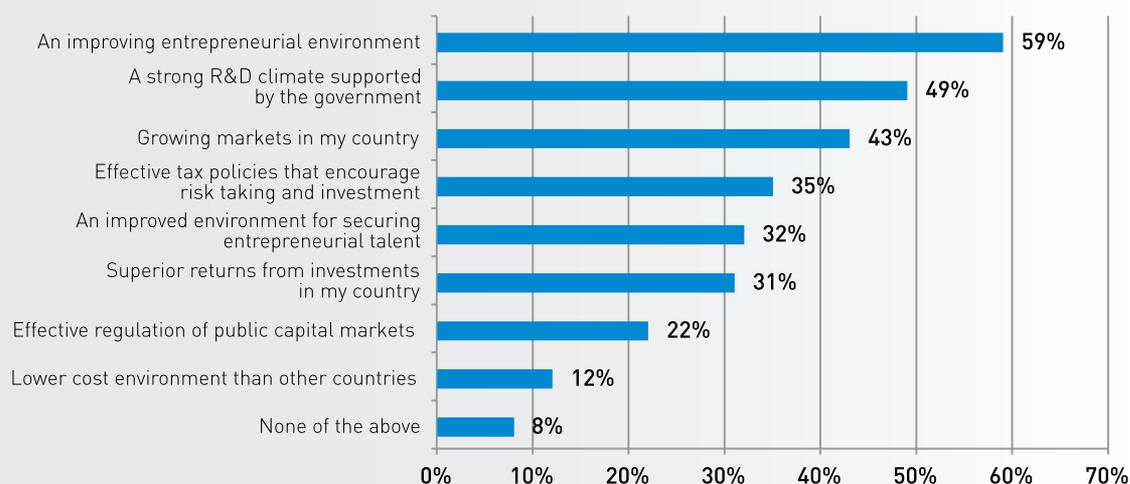
Although the investment of research dollars in institutions is an important ingredient in developing a new technology sector, it does not ensure that venture capital and startups will follow. The mix also includes such elements as the amount of early-stage capital available, the emphasis at the institutions on commercializing research, the degree of patent control, and the availability of the right type of real estate. Local governments can assist by providing surplus land, small business lending programs, and fast-track approvals.

A recent survey of global venture capital investors illustrates the importance of both the local business climate and the availability of research dollars as the two most important ingredients to encourage investment and growth of a technology sector.

To paraphrase, “it takes a whole village to grow a company”! The ability of local government to move beyond a stance of not impeding and into a position of creating a framework of support for investments in research activities—the raw material—is a decisive factor leading to success. The support of an entrepreneurial business climate by facilitating such elements as appropriate tax policies, land use approvals, and other regulations highlights the public/private partnership nature of each of the success stories throughout the United States.

The survey response from venture capital investors in figure 3 illustrates the importance of the milieu in which the startup company is operating. Most of these factors are out of the control of the local company and require favorable local governmental policies. By definition, a startup company does not yet have facilities staff, intergovernmental staff, or the other specialized personnel of a larger company. For every hour a small company spends on obtaining permits, locating appro-

FIGURE 3: Factors for Favorable Attraction of Venture Capital Investment Globally



Source: 2010 Global Venture Capital Survey, National Venture Capital Association, Deloitte Development LLC.

appropriate facilities, obtaining required licensing, and doing paperwork, time is lost that could be spent on developing new products and transferring innovation into the marketplace. To resolve these issues, many economic development departments in larger cities have been effective in creating “one-stop shops” to speed companies through these processes. This pro-business, expediting process is critical to a small company’s chances for success.

In many ways, the ability of a community to nurture a diverse economy and continually create and foster new business has become the most compelling challenge. Although real estate development and economic activity continue to be largely initiated by private entrepreneurs, increasingly an expectation exists that public officials will be more proactive in seeking real estate development and promoting economic activity. Communities will succeed where the civic and public leadership come together to share a common vision in the creation of a competitive, diverse economy and a vibrant community.

Today, the United States continues to be the place for innovation and patent registration. The United States not only encourages innovation and entrepreneurship, but it also has a well-recognized system of patent registration, laws governing intellectual capital, and legal enforcement of patent infringement. The United States continues to lead in the number of patents being issued, but China and other Asian economies have clearly increased their research efforts. The continued high-level investment in basic research by the U.S. federal government is essential to the long-term mastery of commercializing research.

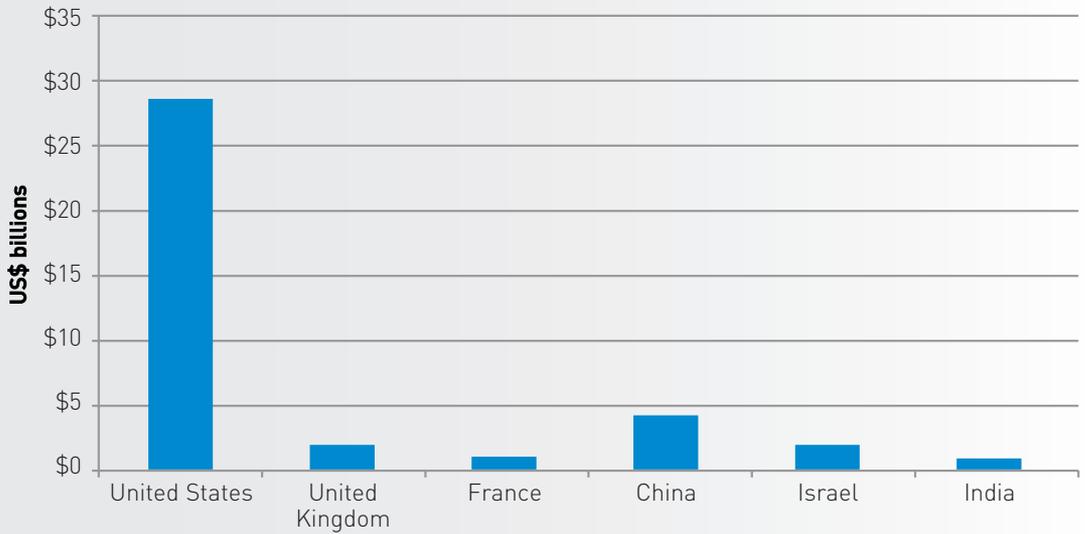
Finding the Money

In terms of venture capital investments by country, the United States continues to be the overwhelming global leader (figure 4). Despite other serious challenges associated with U.S. competitiveness in foreign markets, this leadership position in venture capital investment translates into a dominant position in the creation of new companies and the business of nurturing startup companies.

Early venture money is not distributed evenly across the country but largely concentrated in just two regions in the United States: Silicon Valley and New England (figure 5). These two areas dominate the market, capturing over 50 percent of the venture funds. Silicon Valley was originally driven by university research and the stories of well-known and dramatic technology upstarts. Over the last 30 years, much of the dominance of the San Francisco/San Jose region has been a result of private sector technology company creation and expansion. Indeed, the Silicon Valley story has itself become a local economic development strategy that has been exported and emulated by cities and regions around the world.

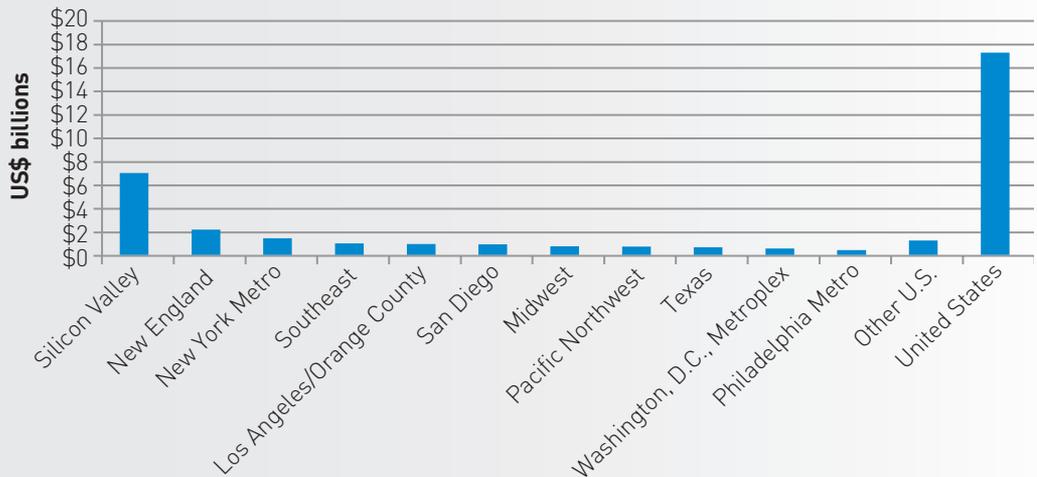
The ability of a community to attract venture capital becomes a critical piece of growing a technology community. If domestic venture capital is not readily available, startup companies will often “follow the money” and move their operations to the locations where financing is available. Often, venture capitalists prefer that. The relationship between receptivity of the local business community, availability of

FIGURE 4: Venture Capital Investments by Country, 2008



Source: Dow Jones VentureSource, 2008.

FIGURE 5: Venture Capital Investments by U.S. Region, 2009



Source: PriceWaterhouseCoopers, National Venture Capital Association.

skilled workers, and responsiveness and creativity of local government are all factors well known to venture capitalists and will often influence where they suggest new companies locate.

Table 4 illustrates the growth trends among cities in the number of newly created venture-backed companies, total dollars invested over time, and university research expenditures. In 1980, almost 90 percent of the venture capital invested in the United States was placed in only two states: Massachusetts and California. These markets have been attracting venture companies for years, particularly in Boston and San Jose, respectively. In many ways, growth in these larger new-economy cities was organic and attributable to the sheer amount of research undertaken at local universities and the ready availability of venture capital and land or real estate.

Of strategic interest are the “up and comers”—the communities that have made major gains in attracting both research dollars and venture capital companies over the past decade. Cities such as Austin, Pittsburgh, and Seattle are becoming much more aggressive about encouraging venture investments and creating the business environments to allow thriving companies to grow. Conversely, when looking at university research expenditures, some communities with extensive university research funding have notably little venture activity. Baltimore, Chicago, and Houston, for example, all appear to have lost ground or missed opportunities in this area over the past decade. The up and comers like Pittsburgh and the Research Triangle are communities where the civic and public leaders made a clear decision to intervene in the market with the goal of diversifying the economy.

In addition, these cities receive such accolades as mention on the “hot” lists of most livable cities. As an example, Pittsburgh—which 30 years ago was one of the most environmentally degraded cities in America—in 2011 has been ranked by the *Economist* and *Forbes* magazines as the most livable city in America. Other communities with world-class research and medical institutions such as Cleveland and Baltimore have not seen the same success. They have not gathered the leadership and entrepreneurship, in both the public and private sectors, to create a climate of innovation, shared vision, and progress.

Finding the money includes developing a whole array of potential investor vehicles. The largest single source of funds is the “angel” investor, providing over \$23 billion in 2005. Angels are generally individuals who provide capital to one or more startup companies. Venture capital firms are the second-largest source of capital, providing over \$22 billion in 2005. Whereas angel investors may come from anywhere and support a company located anywhere, venture capital firms concentrate in two major markets: San Francisco/San Jose and Boston.

Given this heavy geographic concentration, states have worked with major cities to develop investment strategies that equalize the playing field a bit. One example of such a program is in Pennsylvania. As a limited partner, the Pennsylvania State Employees’ Retirement System (SERS) is a public pension fund with \$34 billion in assets under management. Founded in 1923 and headquartered in Harrisburg,

TABLE 4: Metropolitan Leaders in Venture Capital-Backed Companies

	U.S. Region	Number of Venture-Funded Companies			Total Venture Investment (Millions)			University Research Expenditures* (Millions)
		1997	2007	Percentage Change	1997	2007	Percentage Change	2007
Long-Term Leaders	San Jose	497	669	35	\$3,514	\$7,581	116	N/A
	Boston	222	314	41	\$1,165	\$3,174	173	\$2,057
	San Francisco/Berkeley	194	303	56	\$1,135	\$2,521	122	\$2,390
	New York Metro	187	216	16	\$1,283	\$1,695	32	\$3,245
Emerging Leaders	San Diego Metro	83	129	55	\$496	\$1,990	301	\$2,450
	Washington Metroplex	105	180	71	\$558	\$1,282	130	\$2,868
	Seattle	65	132	103	\$403	\$1,253	211	\$967
	Los Angeles	72	124	72	\$450	\$1,150	155	\$1,797
	Austin	46	65	41	\$243	\$675	178	\$446
	Research Triangle, NC	48	53	10	\$208	\$509	145	\$1,776
Market Movers	Philadelphia	83	88	6	\$427	\$665	56	\$1,056
	Denver	63	70	11	\$351	\$537	53	\$521
	Dallas	51	42	-18	\$334	\$487	46	\$388
	Atlanta	61	52	-15	\$327	\$457	40	\$922
	Chicago	61	48	-21	\$333	\$426	28	\$1,193
	Minneapolis/St. Paul	54	39	-28	\$227	\$402	77	\$624
	Portland	28	28	0	\$125	\$251	101	\$477
	Houston	35	27	-23	\$247	\$243	-2	\$1,015
	Baltimore	N/A	32	N/A	N/A	\$225	N/A	\$2,442
Pittsburgh	12	44	267	\$32	\$198	513	\$889	

Sources: PriceWaterhouseCoopers, National Venture Capital Association.

* Major research universities: Seattle: University of Washington; Pittsburgh: University of Pittsburgh, Carnegie Mellon; Chicago: Northwestern, University of Illinois at Chicago; Baltimore: Johns Hopkins, University of Maryland at Baltimore.

Note: N/A=not available.

Pennsylvania, SERS engages in the following alternative investment strategies: buyouts and corporate finance; distressed debt and turnarounds; energy, oil and gas; international private equity; and limited partnership secondary, mezzanine, and venture capital. SERS commits from \$10 million to \$100 million per partnership and has a net internal rate of return target of 400 to 500 basis points above Standard and Poor's 500 Index. The fund allocates a maximum of 14 percent, or \$4.76 billion of its total assets, to alternative investments. One of the advantages

to states in encouraging local startups is the opportunity to keep the jobs and economic spin-offs of a new company in the state.

Metropolitan Impacts

Two years ago, Charlotte was becoming one of the largest banking centers in the United States. Mergers and the recession of the late 2000s have changed the plan. Thirty years ago, Pittsburgh was the steel production center of America, and Detroit was the auto center. Each of these cities is in the process of major transformation and re-creation. As has been the case for thousands of years, successful cities and societies are reinventing themselves continually. In contrast, the communities that have major research hospital and education anchor institutions have some certainty. The price of moving a major campus, hospital complex, or substantial government center is prohibitive. As the economy continues its movement to “brains, technology, and service,” these anchor institutions become critical.

Cities with a strong university and medical research presence—including the California cities—have generally done better in this recession. Regions such as Austin, Boston, Denver, Pittsburgh, Seattle, and the Research Triangle have tracked lower unemployment rates than the national average.

Generally, communities that have diversified their economies are experiencing lower unemployment rates. Education, medical, and university-based economies are growing and are “place based,” meaning that they have great difficulty moving. Collectively they act as a solid foundation for a community’s employment. The ability to grow from those anchors further improves and broadens the economic base. The reliance on a dominant industry as seen historically in Pittsburgh or Detroit, or more recently in Charlotte, Orlando, or Las Vegas, leaves a community open to wrenching changes because of recession, economic shifts, or technological innovations. Although the California cities’ unemployment rates may be higher than the national average, they are still lower than the California unemployment rate, which is 12.4 percent (table 5).

TABLE 5: Unemployment Rate in Select Cities, October 2010

City	Unemployment Rate (%)
Baltimore	7.4
Boston	7.0
Denver	8.2
Houston	8.2
Philadelphia	8.8
Pittsburgh	7.6
Research Triangle	7.1
San Diego (California is 12.4%)	10.2
San Francisco (California is 12.4%)	10.1
Seattle	8.8
United States	9.8

Source: U.S. Bureau of Labor Statistics.

Torrey Pines Mesa: San Diego

Twenty-five years ago, then mayor Pete Wilson of San Diego convened University of California, San Diego (UCSD), and local business leaders to explore how to stimulate the commercialization of science and technology discoveries from local research institutions. With land transferred from the city to the university, known as the Torrey Pines Mesa in La Jolla, UCSD created a research and technology park and dedicated funds to a new organization called CONNECT—a nonprofit business coordinator and catalyst—with the mission of commercializing research discoveries through education, mentoring, and access to capital.



UCSD Geisel Library, San Diego, California.

aeworldmap.com, http://aedesign.wordpress.com/2010/02/25/ucsd-geisel-library-san-diego-california-united-states/geisel_library_ucsd-use/

CONNECT has assisted in the formation and development of more than 2,000 companies since 1985 and is widely regarded as the world's most successful regional program linking investors and entrepreneurs with the resources they need for commercialization. Key to success has been the "culture of collaboration" among industry, capital sources, professional service providers, and research organizations. In 2007–2008, UCSD's total research expenditures were \$842 million, and the National Science Foundation ranked

San Diego sixth in the nation in terms of federal research expenditures.

Today San Diego is home to 6,000 technology companies employing 140,000 people. Technology companies represent 6 percent of the region's employers but pay a full quarter of the region's wages. The city is now home to 75 research institutes; 1,900 information technology, wireless, communications, and software companies; 600 biomedical and life sciences companies; 250 clean-tech companies; 600 action and sport innovation companies; and more than 260 defense and transportation companies. Over 40 percent of the people employed in the San Diego biotechnology industry work in UCSD spin-offs. Qualcomm was founded in 1985 by UCSD professor Irwin Jacobs, and UCSD is a national leader in developing and fostering biotech/high-tech clusters, making San Diego one of the nation's leading biotech/high-tech hubs.

Thanks to the proximity of researchers and industry on the Torrey Pines Mesa, San Diego has developed economic clusters that leverage the region's strengths:

- Ten convergence research institutes;
- Fifty mobile health companies;
- Seventy-five genomics and bioinformatics companies;
- Seventy-five cyber security and autonomous robotics companies; and
- Two hundred forty biofuels, solar energy, and energy storage companies.

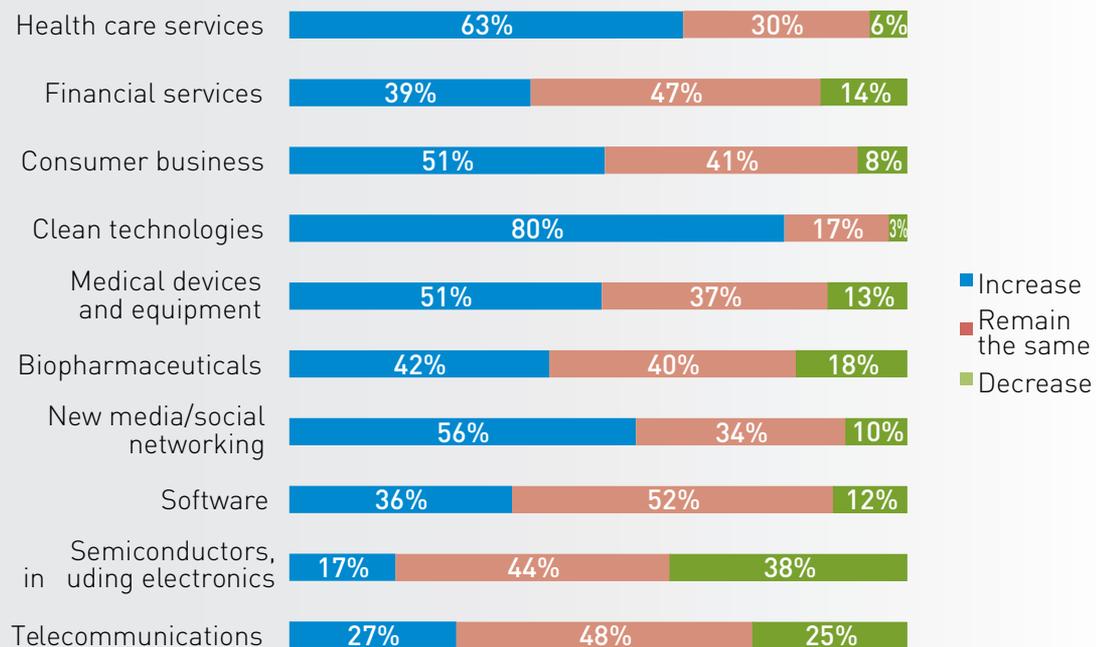
In 2007, CONNECT helped 54 companies start up, and 150 are currently in the formation pipeline. It is a "coach" for emerging companies and literally "connects" them to venture capital and enterprise development services.

Looking Ahead

The domestic economy will continue to trend away from manufacturing and into technology, information, and services. Figure 6 illustrates the likely new technology drivers and investments over the next five years. Health care and the new media will continue to have significant growth and effect. Who could have imagined the impact of Google, YouTube, Facebook, or Groupon even ten years ago?

The technologies of driving, of building, and of managing energy use in daily living and running businesses are now influencing decision making. With or without government climate change legislation, the genie is out of the bottle. It is not going to be put back in. The impetus toward clean technologies will have a dramatic effect on real estate. Two-thirds of carbon emissions in the United States are caused by the types of buildings we live and work in and by the means in which we move around. Of course, how we build buildings and where we put them are critical to any success in reducing carbon emissions.

FIGURE 6: Investment by Sector in the Next Five Years



Source: 2010 Global Venture Capital Survey, National Venture Capital Association, Deloitte Development LLC.

Building a 21st-Century City

Whether in Baltimore's Science + Technology Park at Johns Hopkins, Pittsburgh's Collaborative Innovation Center, Seattle's redefinition of its economic base, or Houston's efforts to grow its medical center, common lessons can be learned from these remarkable success stories of long-term public/private partnerships.

- **Leadership:** Change doesn't happen without a champion, nor will a community reinvent its economy overnight! Leadership can come from the public or private arena, from an individual or a group, but it requires someone to visualize the result, understand its place in the overall city development, create public enthusiasm, make it real, and begin to identify the resources necessary to move forward. Leadership needs to be sustained and committed to the long term. These developments will extend beyond the term of an elected official, often taking ten to 20 years to succeed. Whether in the Research Triangle, where the leadership came from business leaders, or in San Diego, where public leadership rallied the city, each success story has benefited from the presence of a champion. Although these success stories may seem obvious now, in the middle of competing interests creating an investment an investment that will have a long-term payoff—or not—is extraordinarily difficult. Quite simply, without leadership these deals are unlikely to happen. One of the major challenges to these success stories is determining a method of sustaining leadership—through different local elections, changing business, and institutional leaders. Without sustained and broadening leadership, these long-term developments and the promise of expanding synergies fall short.
- **Strategy:** One needs to know where one is going in order to get there! An individual development needs to be seen strategically, not as just another project. It should be understood as catalytic in its impact on both market and perception. A strategy and a plan need to be critically focused on a true competitive advantage, not an abstract idea of some undefined goal. Public, business, and institutional leadership need to come together to create an ongoing dialogue to create, sustain, and expand an environment that encourages economic growth. The required elements may include improving school performance, easing and expediting approval and permitting processes, and making land assembly easier. Any process needs to be reasonably transparent and inclusive while moving expeditiously toward the shared goals.
- **Institutional capacity:** To carry through on long-term commitments, public/private/university partnerships require sophisticated organization on all sides. The institutions have to have a professional stability that outlast terms of office and the professional capabilities in financing, design, and other areas to fairly negotiate with governmental and private entities. A critical ingredient in the success of these partnerships is the research institution's commitment to an efficient technology transfer process and an institutional commitment to encourage professors, students, and others to think entrepreneurially. On the public side, having the land, financing, and deal-making responsibilities and authority all in one place is most effective. The best example is the Research Triangle, which has had

almost 50 years to integrate these components. Special-purpose authorities have frequently been created to govern and encourage research park development, acquire land, and provide specialized financing.

- **Financing infrastructure:** Success depends on creating strong public/private/university or medical relationships. Partnerships often entail investments by both the public and private organizations that fund the development. Public investments are assuming some of the risks of the deal for two reasons: first, to alleviate the perception that the market will not support the cost of the development without subsidy, and second, to realize some clear public benefits from the investment as defined by the public agency, such as increased tax revenue, more jobs, blight removal, or additional public space. Thus, the public agency must have enough knowledge of the market to confirm (a) that the developer actually needs the subsidy, and (b) that the public benefits are clearly measurable and cost-effective. To be effective, the public agency needs to be a public entrepreneur with the flexibility to respond as nimbly as the private partner. It is helpful if the public agency develops a “financial menu” of programs that can be used to finance different components of a development. In Baltimore, a partnership between the city, private sector developers, community groups, and Johns Hopkins University helped create a 31-acre, new Science + Technology Park at Johns Hopkins, focusing on biomedical innovations.

Availability of both venture capital and early-stage investment cannot be stressed enough. Without these resources, deals may move elsewhere, and the success story will go with the move. The San Francisco metro area and Boston dominate the U.S. venture capital funding market—attracting close to 50 percent of the venture funding. As local budgets are cut, the availability of state or local financing, state pension funds, and investment, as well as the creation of new funds, will require creativity and shared vision. Whether in Baltimore or Las Vegas, efforts to move forward on projects that build upon the research capabilities of universities almost always depend on public/private investments. Leveraging private investments with public financing may require tools such as tax increment financing, small business loans, industrial revenue bonds, infrastructure funds, and public tax-exempt financing.

- **Education:** A knowledge economy is driven by educated people. Companies that locate or grow in these cities need an educated workforce. Universities need innovative thinkers to continue successful research activities. The educational attainment shifts over the last 20 years have shown that cities such as Boston and San Francisco have high preschool education enrollment, as well as a high percentage of citizens with college and other advanced degrees. Cities such as Baltimore and Pittsburgh have increased dramatically their educated workforce as their manufacturing industries decreased and their economies became more education and health services based. In contrast, Houston lags the other cities in educational attainment, but, interestingly, is the only city in this group that has had an increase in manufacturing in the last 20 years.

A Moment in Time

While attending a medical conference in San Francisco, Dr. Horatio Nelson Jackson went out to dinner with a group of other doctors. In a spirited conversation, Dr. Jackson and the other doctors discussed a new invention, the automobile, and its impact on society. All the other doctors thought its usefulness was limited, a fad really. Dr. Jackson believed otherwise and that evening bet the others \$50 that he could drive across the United States in 90 days. They all took the bet and laughed.

It was 1903; there were 8,000 cars, 150 miles of paved roads, and no highway departments in the entire country. The very next day Dr. Jackson bought his first car, a Winston, convinced the young mechanic, Sewall Crocker, to go with him, and brought a dog named Bud. Two days later they were on the road with no support team or an infrastructure to provide gas or repairs. Sixty-three days later they drove down Fifth Avenue in New York City, the first people to drive an automobile across the United States.

In 1923, only 20 years later, there were 8 million cars, hundreds of thousands of miles of paved roads, and a highway department in every state. Society had changed virtually overnight.

Is that moment of time here again? The forces of global trade, energy needs, climate change, technological innovation, infrastructure needs, and demographics are going to change society as we know it.

The Bottom Line

What if in 20 years oil is not the primary source of fuel for transportation (70 percent of the oil used in the United States is used for transportation)? Where will the innovations happen? Where will the new products be manufactured? Winchester, Virginia, now located squarely in the exurbs of the Washington, D.C., metropolitan region, just witnessed the closure of the last incandescent light-bulb manufacturing facility in the United States. New compact fluorescent, energy-efficient bulbs are all being manufactured in China. Those communities that respond effectively to these forces will be well positioned to succeed in the 21st century.

Land use is at the center of these forces. Without thoughtful, sustainable land use that both positions a city to compete for jobs and creates a high quality of life, growth will, in a new paradigm, become unsustainable, leading to further pollution, congestion, health issues, and a lower, less-competitive quality of life. Public/private partnerships that recognize the momentous changes happening and embrace a new framework for development will position their investments and communities to compete in a new world.

ULI has an important role to play in educating public officials, civic leaders, and industry stakeholders about the real estate and economic and community development potential associated with the new economy. The new economy requires these actors to lead their communities toward a more entrepreneurial perspective in their identification of local development opportunities and effective public/private partnerships. A shared vision at the local level must leverage the leadership of anchor universities, medical institutions, public sector officials, and private entrepreneurs to forge new local economies with which to sustain their communities. The willingness to innovate is America's competitive advantage.

About the Author



Tom Murphy is a senior resident fellow, ULI/Klingbeil Family Chair for urban development. A former mayor of Pittsburgh, Murphy joins six other ULI senior resident fellows who specialize in public policy, retail/urban entertainment, transportation/infrastructure, housing, real estate finance, and environmental issues. His extensive experience in urban revitalization—what drives investment, what ensures long-lasting commitment—is a key addition to the senior resident fellows’ areas of expertise.

Since January 2006, Murphy had served as ULI’s Gulf Coast liaison, helping coordinate with the leadership of New Orleans and the public to advance the implementation of rebuilding recommendations made by ULI’s Advisory Services panel last fall. In addition, he worked with the Louisiana state leadership as well as with leadership in hurricane-affected areas in Mississippi, Alabama, and Florida to identify areas appropriate for ULI involvement.

Before his service as the ULI Gulf Coast liaison, Murphy served three terms as the mayor of Pittsburgh, from January 1994 through December 2005. During that time, he initiated a public/private partnership strategy that leveraged more than \$4.5 billion in economic development in Pittsburgh. Murphy led efforts to secure and oversee \$1 billion in funding for the development of two professional sports facilities and a new convention center that is the largest certified green building in the United States. He developed strategic partnerships to transform more than 1,000 acres of blighted, abandoned industrial properties into new commercial, residential, retail, and public uses, and he oversaw the development of more than 25 miles of new riverfront trails and urban green space.

From 1979 through 1993, Murphy served eight terms in the Pennsylvania State General Assembly House of Representatives. He focused legislative activities on changing Western Pennsylvania’s economy from industrial to entrepreneurial and authored legislation requiring the Commonwealth of Pennsylvania pension fund to invest in venture capital. He authored legislation creating the Ben Franklin Technology Partnership, which is dedicated to advancing Pennsylvania’s focus on technology in the economy; he also authored legislation to encourage industrial land reuse and to transform abandoned rail rights-of-way into trails and green space.

Murphy served in the Peace Corps in Paraguay from 1970 through 1972. He is a 1993 graduate of the New Mayors Program offered by Harvard University’s Kennedy School of Government. He holds an MS in urban studies from Hunter College, New York, and a BS in biology and chemistry from John Carroll University, Ohio.

He is an honorary member of the American Society of Landscape Architects, a board member of the Pennsylvania League of Cities and Municipalities, and a board member of the National Rails to Trails Conservancy. He received the 2002 Outstanding Achievement of City Livability Award from the U.S. Conference of Mayors and was selected as the 2001 Pittsburgh Man of the Year Award by Vectors Pittsburgh.



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