Donahue Institute

TECHNOLOGY ENTERPRISE IN BERKSHIRE COUNTY: ECONOMIC ANALYSIS

MARCH 2002

UNIVERSITY OF MASSACHUSETTS DONAHUE INSTITUTE

ECONOMIC RESEARCH AND ANALYSIS & RESEARCH AND EVALUATION UNITS

Funding and other support for this study were provided by the Massachusetts Technology Collaborative

For the Massachusetts Technology Collaborative

March 4, 2002

University of Massachusetts Donahue Institute

Rebecca Loveland, MRP
Economic and Research Analysis Unit

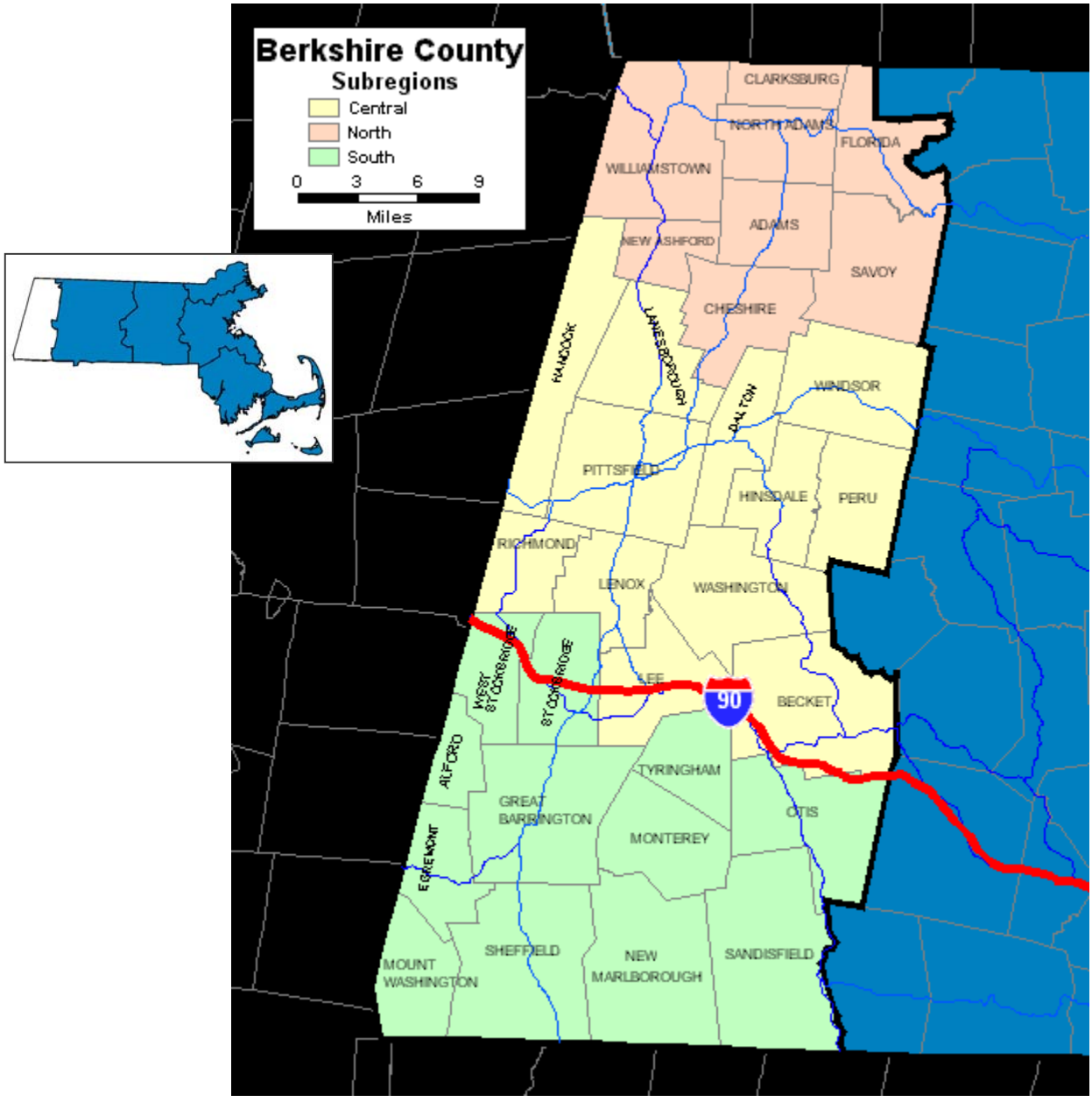
Steven Ellis, MPA
Research and Evaluation Unit

We extend our sincere thanks to Patrick Larkin, of the Massachusetts Technology Collaborative; William Ennen, of the University of Massachusetts Donahue Institute; Sharon Ferry, of Berkshire Connect; and the bTech Leadership Group, including: Al Bauman, Lisa Chamberlain, Karen Christensen, John Kemp, Tom Lewis, David Long, Michael Mah, Caroline Peabody, and Jay Walsh. All of these individuals provided valuable, ongoing support and guidance to the research process.

Thanks are also extended to our colleagues at the University of Massachusetts Donahue Institute; Andrew Hall, Ruth Malkin, and Paul Fattaruso who provided outstanding research assistance; and Michael Goodman and James Palma who gave critical feedback in the development of this report.

Table of Contents

Map of Berkshire County



Executive Summary

At the initiative of the Massachusetts Technology Collaborative (MTC), the University of Massachusetts Donahue Institute conducted research to help clarify, understand, and support Technology Enterprise business, an emerging cluster of economic activity within Berkshire County. The project was undertaken in support of bTech, an experimental initiative of the Massachusetts Technology Collaborative. bTech is a regionally based association of business people, focused upon promoting Technology Enterprise and economic growth in Berkshire County.

The Technology Enterprise cluster has a significant presence in Berkshire County. These businesses offer high-value products and services in information technology, communications, and design-related fields both within and outside the county. Unlike clusters in the dominant high tech regions of the state, the Berkshire County cluster can be characterized primarily as technology services rather than technology manufacturing. While working in distinct business niches, companies in this cluster rely on similar types of technical, creative and intellectual expertise. In fact, the importance of creative and design specialties along with technical skills is a distinguishing feature of this cluster in the Berkshires.

Key Findings

- **Technology Enterprise in the Berkshires is composed of four major types of activity.**
  These include Software and Systems Design; Design and Art; Content and Publishing; and Information Technology (IT) Business Consulting.

- **The economic impact of companies in this cluster is substantial.**
  Berkshire County is home to 154 employer firms in the Technology Enterprise cluster; responsible for 1,177 jobs and a total payroll in excess of $77 million in the last quarter of 2000. There are an additional 1,500 sole proprietorships (nonemployers) in the county whose total revenues exceeded $41 million in 1998, the latest year for which data are available. Technology Enterprise employers pay

their employees very well. Real average wages in the cluster are more than twice as high as average wages in the region as a whole. bTech Survey results suggest that businesses in the region provide their products and services to customers throughout the United States and the world with total sales to customers outside of Berkshire County estimated to be in excess of $74 million per year.

- **Technology Enterprise firms have experienced significant growth since 1993.** Since 1993, Technology Enterprise businesses have grown more quickly than the Berkshire economy as a whole. Since 1993, the cluster has grown at a higher rate than every major division of the Berkshire economy in terms of firm growth, employment growth, and real annual payroll growth. Notably, real annual payroll in Technology Enterprise companies grew 190 percent while total payroll in the region grew only 13.5 percent.

- **The growth of firms in the Technology Enterprise cluster is highly dependent on the attraction and retention of a well-educated and professional workforce.**
  Companies in this emerging cluster rely on similar types of technical, creative and intellectual expertise. Over 90% of workers surveyed reported having college degrees and many apply a combination of management, technical, and creative skills on the job. Overall, eighty-five percent of bTech Survey respondents reported that they perform both technical and creative/design work.

- **Technology Enterprise firms play an important role in recruiting younger professionals to the region and giving them a reason to stay.**
  Sixty-nine percent of those surveyed were between the ages of 25 and 45, an age group generally in decline in Berkshire County. Twenty-two percent are native to Berkshire County. Forty-eight percent moved to Berkshire County within the past ten years, a period in which the region as a whole experienced population and labor force declines. Thirty-nine percent were drawn to the region by a job opportunity. Many of these professionals previously worked in a metropolitan area, such as New York, Boston, or San Francisco, among others.

- **Technology Enterprise businesses are small relative to other firms in the region.**

  Employers in this cluster average 8 employees per firm, in contrast to 39 per firm in the average manufacturing business and 15 per firm in the average services business in Berkshire County. Other data sources suggest that Technology Enterprise firms are even smaller (with a large majority having fewer than five employees) and indicate that a large proportion of businesses in the cluster are nonemployer firms (mainly sole proprietorships).

- **While dense in some key locations, Technology Enterprise firms are dispersed throughout the region**.

  Some larger Technology Enterprise firms have clustered in business or industrial parks, but firms are dispersed throughout Berkshire County. A substantial number of firms occupy redeveloped industrial and commercial space and renovated downtown space in the region. In this respect, businesses in the cluster may well be significant forces for revitalization and redevelopment of regional infrastructure.

- **Companies associated with bTech have a positive business outlook and most say they are very likely to remain in Berkshire County.**

  Employment levels of surveyed companies remained stable in the past year, and over half of the companies reported an increase in revenues. Three quarters of respondents report that their company expects increased revenues over the next three years. Of the companies surveyed, 96 percent indicated that they are likely to remain in the Berkshires.

- **Quality of life in Berkshire County is a major positive factor influencing the recruitment and retention of Technology Enterprise professionals.**

  Three-quarters of bTech survey respondents reported that they chose to live in the Berkshires for the high quality of life and virtually all respondents believe it is somewhat or very likely that they will remain in the Berkshires for at least the next five years.

Introduction and Project Approach

A recent development in the Berkshire County economy has been the emergence of businesses offering high-value technology services related to information technology, communications, and design. The purpose of this study is to describe and quantify the economic impact of this cluster of business activity in Berkshire County. The findings of this study confirm a solid business presence and impressive rates of growth within Berkshire County.

Project Description

At the initiative of the Massachusetts Technology Collaborative (MTC), the University of Massachusetts Donahue Institute conducted research to help clarify, understand, and support Technology Enterprise business, an emerging cluster of economic activity within Berkshire County. The project was undertaken in support of bTech, an experimental initiative of the Massachusetts Technology Collaborative. bTech is a regionally based association of business people, focused upon promoting Technology Enterprise and economic growth in Berkshire County.

In addition to financial support, MTC has provided professional consultant services to bTech members in order to better understand the ways the public sector can support technology enterprise in more remote regions of the Commonwealth. The MTC model of support is to challenge local technology entrepreneurs and individuals to identify local constraints on growth in the technology sector and to work toward solutions to overcome these barriers.

A round of key informant interviews was conducted at the onset of this research project. These informants included members of the bTech leadership group, as well as representatives of selected business and economic development organizations. Through these initial interviews, a base of knowledge was developed, which enabled:

1. the development and administration of a survey of individuals and companies associated with bTech, and;
2. broader economic research focused on this regional cluster of economic activity.

The first phase of the research culminated in the report, "A Detailed Review of bTech Survey Findings",[1] which presented the results of a survey of individuals and organizations identified as being aligned with bTech. The survey collected a range of personal and business profile data, assessed the recent performance and the business potential of the cluster, and solicited feedback regarding bTech's future programmatic and organizational development. In addition to providing formative organizational input for bTech, the findings of this survey informed the second phase of the research.

Organization of this Report

In this report, the current range of Technology Enterprise business activity in the county is described and quantified. Salient bTech Survey findings are highlighted to provide additional perspective on the cluster analysis.

The layout of this report concerning Technology Enterprise in Berkshire County is as follows:

1. **An Overview:** comprising a description of the primary areas of Technology Enterprise business in Berkshire County.
2. **Economic Analysis:** a description of technology business activity within Berkshire County using the number of businesses, employment, payroll, revenues, firm size and geographic location.
3. **Critical Issues for Economic Development Planners**: a discussion of critical issues affecting technology enterprise business in the Berkshires.

The Appendices to this report provide numerous supporting documents including a section comparing the level and nature of Technology Enterprise activity within Berkshire County to activity in the Commonwealth as a whole and to selected Massachusetts regions. Details on methodology including SIC and NAICS definitions of the cluster are available in Appendices B and C to this report.

[1] "A Detailed Review of bTech Survey Findings", University of Massachusetts Donahue Institute, January 2001.

Overview

In recent years a significant number of technology services businesses have emerged within Berkshire County. These firms offer high-value products and services in information technology, communications, and design-related fields. Unlike clusters in the dominant high technology regions of the state, the Berkshire County cluster can be characterized primarily as technology services rather than technology manufacturing. As an organization, bTech emphasizes a commonality among firms, referring to them as " 'Technology Enterprise,' businesses."[2] For the purpose of this study, this term is used as the name of the cluster.[3]

The technical definition of the Technology Enterprise cluster used in this study was developed in consultation with the bTech leadership group through:

1. web research and a literature review on technology clusters nationwide;
2. an analysis of the companies affiliated with bTech;
3. business activity detail from the Fall 2001 bTech survey; and
4. interviews with members of the leadership group and other professionals in the region.

Major Business Sectors

Firms in the Berkshire Technology Enterprise cluster are concentrated in four primary types of business activity: Software and Systems Design; Design and Art; Content and Publishing; and IT Business Services.

Computer Education and IT Manufacturing activities also take place in the county but on a much smaller scale. Also of note is the fact that forty percent of bTech survey respondents report conducting more than one type of business activity.[4]

---

[2] Berkshire Regional Planning Commission "Comprehensive Economic Development Strategy for Berkshire County, Massachusetts, 2001." p.53 .

[3] Similar clusters of activity have been characterized in the literature and by industry groups in a variety of ways including: "information and communications technology" (Battelle 2001, pp. xii); "software, internet and interactive companies" (Mass High Tech: The Journal of New England Technology, website); "new media" (New York New Media Association, website); "digital new media" ((San Diego Sourcebook 2001, website); "high tech services" (DeVol, p. 34) and, "'soft' tech" (Kotkin and DeVol, p.13)."

[4] "bTech Survey Findings", p. 14.

Selected Technology Sectors, Businesses and Employment, '01 Q3, Berkshire County		
Businesses	**Sector**	**Employees**
67	IT Business Services	584
64	Software and System Design	281
56	Content and Publishing	500
51	Design and Art	123
7	IT Manufacturing	125
1	Computer Education	36
Source: iMarket		

The following section gives detail on primary business sectors in the Berkshire County Technology Enterprise cluster[5] and reviews survey findings on business activities taking place in Berkshire County firms.

IT Business Services: 67 firms and 584 employees in this sector are located in Berkshire county, according to iMarket.[6] These firms conduct a range of activities related to IT Business Services and Consulting including: computer-related consulting services; advertising consulting; online services technology consulting; economic, technical and business research; management consulting; communications consulting and telecommunications consulting.

Activities of Surveyed Companies: IT business consulting is a central business activity of 26 percent of the businesses surveyed. Within this group 64 percent are on-line marketing or advertising specialists and 46 percent are management consultants.

Software and Systems Design: According to market research data, 64 firms and a total of 281 employees in this sector are located in Berkshire county. Firms in this sector conduct a range of activities related to computer software and systems design including: computer programming services; computer software systems analysis and design;

[5] A detailed comparison of the Berkshires cluster with technology business activity in Massachusetts as a whole and in selected Massachusetts regions is given in Appendix F.
[6] From iMarket's MarketPlace database, third quarter, 2001.

software development and applications and integrated systems design. Businesses providing computer maintenance, computer equipment maintenance and repair services are also included in this sector.

Activities of Surveyed Companies: Forty-five percent of survey respondents indicate that software and systems design is a central business activity of their business. Within this group, 79 percent are engaged in software development, 37 in computer integrated systems design, 21 percent in computer programming services and 16 percent in computer maintenance and repair.

Content and Publishing: 56 firms and 500 employees in this sector are located in Berkshire county. These firms conduct a range of activities in areas related to content development and publishing including: content development and web content development; publishing (including books, periodicals, magazines and trade journals); editing; commercial writing; technical writing; and publishing consulting.

Activities of Surveyed Companies: Content and publishing is a central business activity of 33 percent of the businesses surveyed. Of these companies, 100 percent do content development, (some of this includes web content development); 57 percent do publishing, 29 percent do freelance writing, and 21 percent do freelance editing.

Design and Art: 51 businesses and a total of 123 employees in this sector are located in Berkshire county. These firms conduct a range of activities in design and art-related fields including: website design and production; digital art; graphic art and related design; commercial art and illustration; motion picture and video production and special effects production.

Activities of Surveyed Companies: Design and art is a central business activity of 36 percent of the businesses surveyed. Within this group, 79 percent do website design, 64 percent do graphic design, 21 percent do digital art, and 21 percent engage in special effects production.

Computer Education: The market research database reports only one firm in the county dedicated primarily to activities in this sector, in 2001. However, survey results indicate that this is an underestimate of actual business activity in the region. Businesses in this sector conduct a range of activities related to computer training and education including: computer-related training; data processing training; telecommunications training; and new media training.

Activities of Surveyed Companies: Among companies responding to the survey, 14 percent report education services as a critical business activity. One half of the respondents conduct computer and new media training and the other half conduct online education.

Activities of Surveyed bTech Companies

Software and Systems Design	45%		
Design and Art	36%	Education Services	14%
Content and Publishing	33%	Finance	10%
IT Business Services	26%		

Source: bTech Survey, Fall 2001

Workforce

Skills

While working in distinct business niches, companies in the emerging Technology Enterprise cluster rely on similar types of technical, creative and intellectual expertise. Survey results show that workers are generally well-educated: 95 percent of survey respondents have a college degree. In addition to technical work, the importance of creative and design specialties is a distinguishing feature of the cluster in the Berkshires. Workers in this field report that frequently they apply a combination of management, technical, and creative skills. Overall, 85 percent of survey respondents reported that they perform both technical and creative/design work.[7]

[7] "bTech Survey Findings", Section II.

Recruitment

Technology Enterprise firms play an important role in recruiting younger professionals to the region and giving them a reason to stay. Sixty-nine percent of those surveyed were between the ages of 25 and 45, twenty-two percent are native to Berkshire County and thirty-nine percent reported that they were drawn to the region by a job opportunity. It is notable that forty-eight percent responding to the survey reported that they had moved to Berkshire County within the past ten years, a period in which the region experienced a significant population decline.[8]

An interesting finding is that the Technology Enterprise cluster in the Berkshires, while still young, is similar to more developed New Media clusters in New York, San Francisco and Boston. Survey data show that, in fact, many workers in the region have previously worked in a metropolitan area: Forty-two percent in metropolitan New York; twenty-eight percent in Boston and fourteen percent in San Francisco. Twenty-three percent have worked in other metropolitan areas, both within the United States and abroad.

Business Outlook

According to survey data, companies associated with bTech have a positive business outlook and most are very likely to remain in Berkshire County. Employment levels of surveyed companies remained stable in the past year, while over half of the companies experienced an increase in revenues. Three fourths are expected to experience increased revenues over the next three years. Nearly all of the companies surveyed expect to remain in the Berkshires for the next five years.[9]

[8] "bTech Survey Findings", Section II.
[9] "bTech Survey Findings", Section III.

Economic Analysis

Our economic analysis confirms that the economic impact of companies in the Technology Enterprise industry cluster is substantial. Since 1993, Technology Enterprise businesses based in Berkshire County have grown more quickly and have outperformed the Berkshire economy as a whole. Specifically, since 1993, the cluster has outperformed every major division of the Berkshire economy in terms of firm growth, employment growth, and real annual payroll growth. Jobs in Technology Enterprise firms also tend to pay very well. Real average wages in this industry cluster are more than twice as high as average wages in the region as a whole.

The economic analysis of the cluster relied upon three different data sources. These sources included the ES-202 series (covered employment and wages data) released by the Massachusetts Division of Employment and Training; nonemployer statistics from the U.S. Census Bureau; and market research data from the iMarket database. On the whole, there was consistency among the data sources but each yielded different firm and employment totals. These differences are attributable to variations in the types of firms measured by each data set (for example: employers, non-employers, or both types combined), the system of industry classification used (SIC versus NAICS), and varying levels of data suppression.

Firms and Employment

According to Massachusetts Division of Employment and Training (DET) ES-202 data, in the fourth quarter of 2000 there were 154 employer firms in SIC codes corresponding to the Technology Enterprise cluster in Berkshire County.[10] These firms were responsible for 1,177 jobs in the region paying $77 million in real annual payroll to employees in the cluster.[11]

[10] These codes are found in Appendix B.
[11] Payroll and wage data are based on fourth quarter ES-202 data and, therefore, include annual bonuses and other extra payments.

Through its nonemployer statistics series, the U.S. Census Bureau reports close to 1,500 nonemployer firms engaged in Technology Enterprise business areas in the Berkshires. Nonemployers are businesses with no paid employees (typically self-employed individuals) with over $1,000 in annual receipts. Nonemployers are not reflected in any other core business statistics or detailed sector-specific data. According to the data, in 1998 these businesses brought in more than $41 million in annual receipts.[12]

The table that follows shows that employment and firm totals are significant; but caution must be used in interpreting these two data series together. Individual non-employers may work for an employer as well as for themselves under more than one business name. Therefore, nonemployer totals likely overlap with employment counts in the covered employment (ES-202) series. Consequently, employment totals from the two series combined can be seen as job counts as opposed to employee counts.

Technology Enterprise, Berkshire County Data Summary

	Firms	Employment	Payroll	Sales / Receipts
			Annual (in $1,000)	
MA Unemployment Insurance paying employers, by SIC, 2000	154	1,177	77,757	n/a
Non-employers by NAICS, 1998	1,491	1,491	n/a	41.7

Source Massachusetts Division of Employment and Training and U.S. Bureau of the Census

A third set of data, market-research data from iMarket,[13] provide additional insight into firm and employment totals in Berkshire County. Because iMarket measures the same businesses as the public data, totals from this database are interpreted separately to avoid double counting. Since the iMarket data includes employers as well as independent consultants it indicates higher firm and employment totals in the Berkshires than does ES-202 data alone: it reports 246 firms employing 1,649 people in Berkshire County. According to this source, businesses in the Technology Enterprise cluster bring in approximately $106 million in revenues per year.

[12] At this time 1998 data is the latest detailed nonemployer data available for the County.
[13] Market research data in this report are from the iMarket's MarketPlace 2001 database.

Exports

Businesses in the Berkshires Technology Enterprise cluster report substantial revenues from outside of the County. Survey results suggest that businesses in the region provide their products and services to customers throughout the United States and the world, with 70 percent of total revenues coming from out of Berkshire County.[14] Using the proportions identified through the bTech Survey and iMarket revenue totals, this calculates to an excess of $74 million per year of revenues from outside the county.

Geographic Source of Revenues, Surveyed Companies

Region	Proportion
Berkshire County	23%
Massachusetts (excl. Berkshires)	8%
United States (excl. MA)	51%
International	11%
Unspecified	7%
Total	**100%**

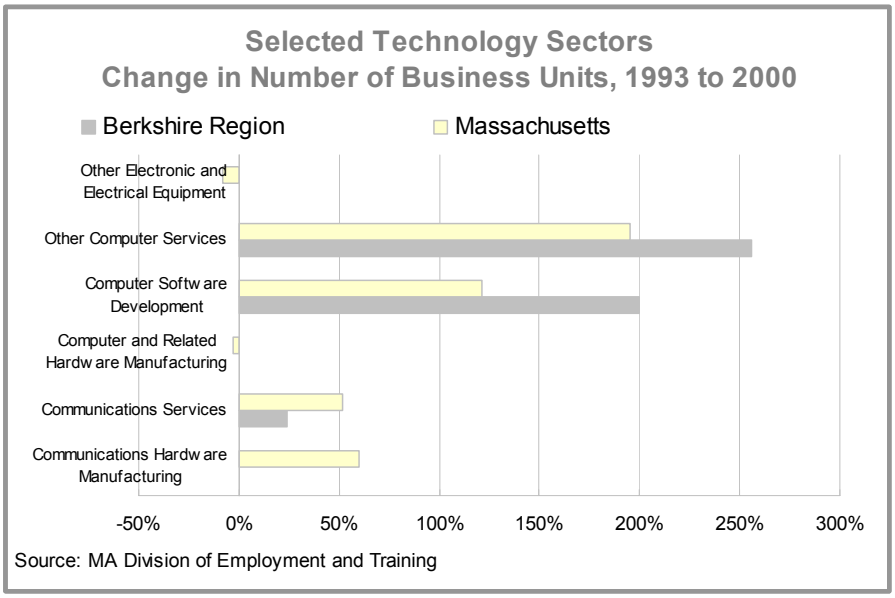
Sources: bTech Survey, Fall 2001

[14] "bTech Survey Findings", p. 17

Growth Since 1993

Companies and Employment

The chart illustrates, in the most general terms, the Technology Enterprise trends in Berkshire County. The region has seen dramatic rates of business growth in technology services, with no significant growth in information technology manufacturing sectors. Rates of business growth in two of three major technology services sectors far exceed state-level growth rates, and the third sector, while experiencing a lower rate of growth than the state as a whole, still experienced positive growth.



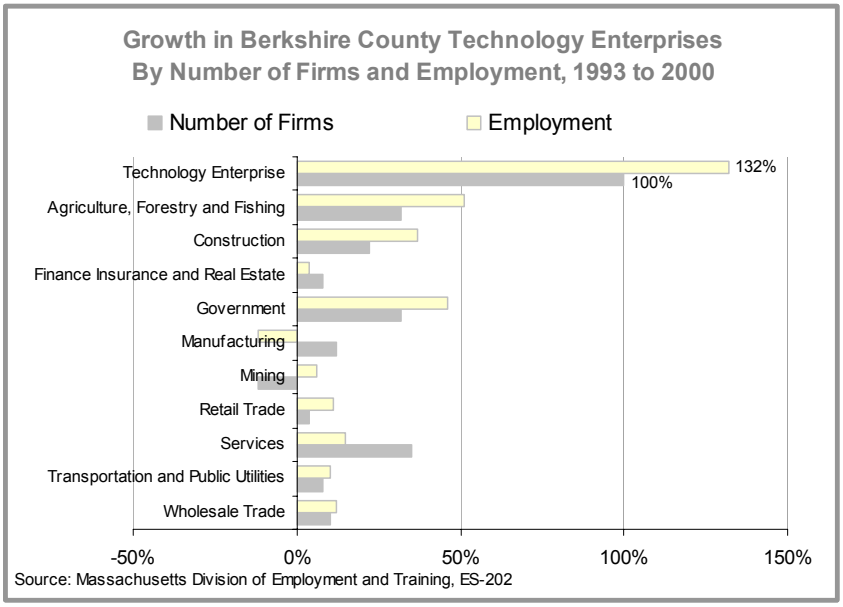
The Technology Enterprise cluster represents 3.4 percent of firms, 1.9 percent of employment and it has significantly higher pay than major divisions with the exception of Wholesale Trade.

Berkshire County Technology Enterprise versus Major Divisions, 2000, 4th Quarter

	Firms	Employment	Real Average Pay	Average Firm Size
Technology Enterprise	**154**	**1,177**	**66,064**	**8**
Agriculture, Forestry and Fishing	137	608	21,752	4
Construction	493	3,157	37,170	6
Finance Insurance and Real Estate	254	2,393	41,329	9
Government	121	2,379	32,512	20
Manufacturing	227	8,927	47,285	39
Mining	7	84	47,917	12
Retail Trade	1,111	13,646	19,495	12
Services	1,789	26,683	30,364	15
Transportation and Public Utilities	171	2,407	40,655	14
Wholesale Trade	183	1,542	71,637	8
Totals	**4,493**	**61,826**	**32,632**	**16**

Source: Massachusetts Division of Employment and Training, ES-202

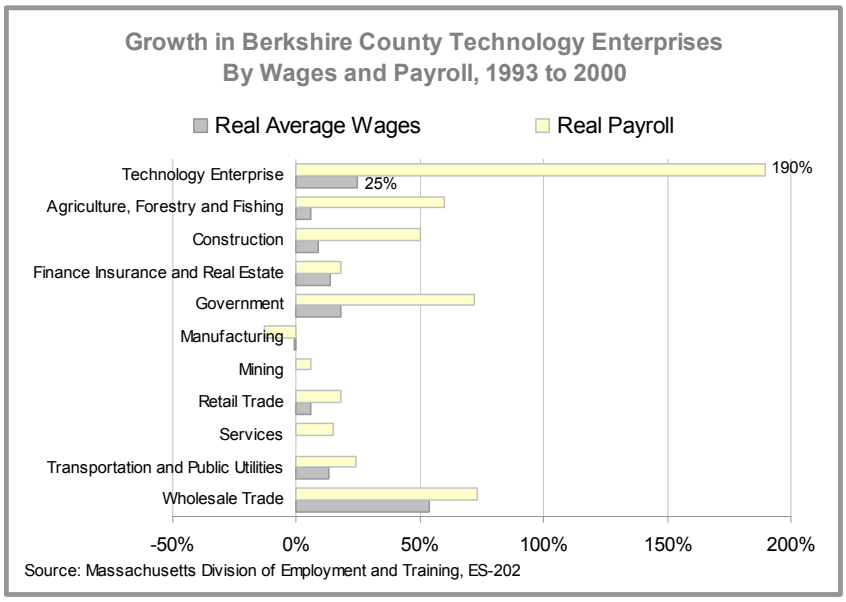
According to ES-202 data, since 1993 Technology Enterprise firms have grown faster than every major division of the Berkshire economy in firm growth, employment growth, and real annual payroll growth. Furthermore, real average wages in the cluster are more than twice as high as real average wages in the region as a whole.



The number of firms in this cluster doubled (from 77 to 154) between 1993 and 2000 while the corresponding growth rate in the region overall was only 19.5 percent. Over the same period, employment in the cluster grew 132 percent (from 507 to 1,177), compared to 11 percent in regional employment growth.

Wages

The average Technology Enterprise job in Berkshire County paid a real annual wage of $66,064, forty percent higher than the average manufacturing wage, and more than twice the average service sector wage. Real average wages in Technology Enterprise companies grew 25 percent between 1993 and 2000, while wages in manufacturing and services stagnated. Finally, real annual payroll in Technology Enterprise companies grew 190 percent while total payroll in the region grew only 13.5 percent.



Nonemployer Businesses

As is typical nationally, a large proportion of businesses in the region are non-employer firms; companies with no paid employees. While representing only 3.4 percent of employers at last measure Technology Enterprise nonemployers made up 17 percent of total nonemployer businesses in Berkshire County. In 1998, Berkshire County was home

to 1,491 non-employer firms engaged in technology-related activities[15], as compared to 167 employer firms in the same NAICS sectors. At that time, nonemployers represented about 90 percent of all Technology Enterprise firms in Berkshire County.

Employers and Non-employers
Selected Technology Sectors, Berkshire County 1998

Description	Employer Businesses	Individual Proprietor Businesses	Annual Receipts ($ thousands)
Information (NIACS 51)			
Publishing industries (511)	24	63	2,249
Motion picture and sound recording industries (512)	14	15	431
Broadcasting and telecommunications (513)	28	15	510
Information and data processing services (514)	14	23	943
Professional, Scientific and Technical Services (NAICS 54)			
Computer systems design & related services (5415)	17	92	2,855
Management, scientific, & technical consulting services (5416)	26	250	9,930
Advertising and related services (5418)	12	56	5,137
Other professional, scientific and technical services (5419)	23	508	12,533
Arts (NAICS 71)			
Independent artists, writers, & performers (7115)	9	448	6,848
Other Services (NAICS 81)			
Electronic & precision equipment repair & maintainence (8112)	4	21	340
Totals	167	1,491	41,776

Sources: U.S. Bureau of the Census, Non-Employer Statistics; County Business Patterns

Business activity by nonemployers in this cluster generated $41.7 million in average annual receipts in 1998. This represents 13 percent of total nonemployer receipts in the county for that year. Given business growth trends since that time, it is likely that current receipts are higher. However, year 2000 non-employer data will not be released until 2003.

Nonemployer data also suggest that, in certain sectors, entrepreneurial activity among technology professionals is higher in the Berkshires than in the state as a whole. The table below highlights sectors in Berkshire County and shows particularly high proportions of nonemployers as a percent of all firms as compared to the state as a whole

[15] The nonemployer series uses industries defined by the new NAICS system. As a result, firm and employment numbers vary from ES-202 data, which used SIC definitions. For more information on the NAICS definitions used see Appendix C.

and to Middlesex County. As seen in the table, nonemployers providing professional, scientific and technical services are especially active in Berkshire County.

Nonemployer Businesses as a Percentage of All Businesses
Selected Regions and Technology Sectors, 1998

	Berkshire County	Middlesex County	Mass-achusetts
Professional, Scientific and Technical Services (NAICS 54)			
Computer systems design & related services	84	68	72
Management, scientific, & technical consulting services	91	86	86
Advertising and related services	82	73	74
Other professional, scientific and technical services	96	96	96
Other Services (NAICS 81)			
Electronic & precision equipment repair & maintainence	84	61	70

Sources: U.S. Bureau of the Census

Firm Size

As suggested by the prominence of nonemployer business in the cluster, Technology Enterprise firms in the Berkshires tend to be very small. According to ES-202 data, employers in the cluster average around 8 employees per firm as compared to 16 employees per firm in the average company in the Berkshires. Other sources of data suggest that the majority of firms in the cluster are even smaller. Sixty-eight percent of the private companies responding to the Fall '01 bTech survey employ 24 or fewer full time employees and 46 percent employ fewer than 5 full time employees. According to iMarket data, more than 90 percent of technology services businesses in Berkshire County have fewer than 24 employees and more than 75 percent of technology services businesses employ between 1 and 4 employees.

Berkshire County Technology Enterprise Firms by Number of Employees						
Size Range	Software and Systems Design	Design and Art	Content and Publishing	IT Business Services	Total in Size Range	Percent in Size Range
1 to 4	48	46	40	49	183	76.9
5 to 9	7	2	5	5	19	8.0
10 to 24	7	3	7	8	25	10.5
25 to 49	1		4	3	8	3.4
50 to 99	1			1	2	0.8
100 or more				1	1	0.4
Unknown					0	-
Total	**64**	**51**	**56**	**67**	**238**	**100.0**
Source: iMarket						

Business Sectors

According iMarket data, which provide a level of sector detail unavailable from the ES-202 and the nonemployer data discussed above, the largest sectors of the cluster in Berkshire County are as follows: IT business services (67 firms in the county with 584 employees total), content and publishing (56 firms totaling 500 employees), software and systems design (64 firms with 281 employees total), and design and art firms (51 firms totaling 123 employees).[16]

Selected Technology Sectors, Businesses and Employment, Berkshire County						
Businesses			Sector	Employment		
'99 Q1	01 Q3	Percentage Change		'99 Q1	01 Q3	Percentage Change
41	67	63.4%	IT Business Services	401	584	45.6%
42	64	52.4%	Software and System Design	148	281	89.9%
48	56	16.7%	Content and Publishing	302	500	65.6%
43	51	18.6%	Design and Art	140	123	-12.1%
7	7	0.0%	IT Manufacturing	127	125	-1.6%
1	1	0.0%	Computer Education	66	36	-45.5%
Source: iMarket						

The data, found in the table above, show that recent business growth has been positive in the four largest Technology Enterprise sectors in the Berkshires. However, employment

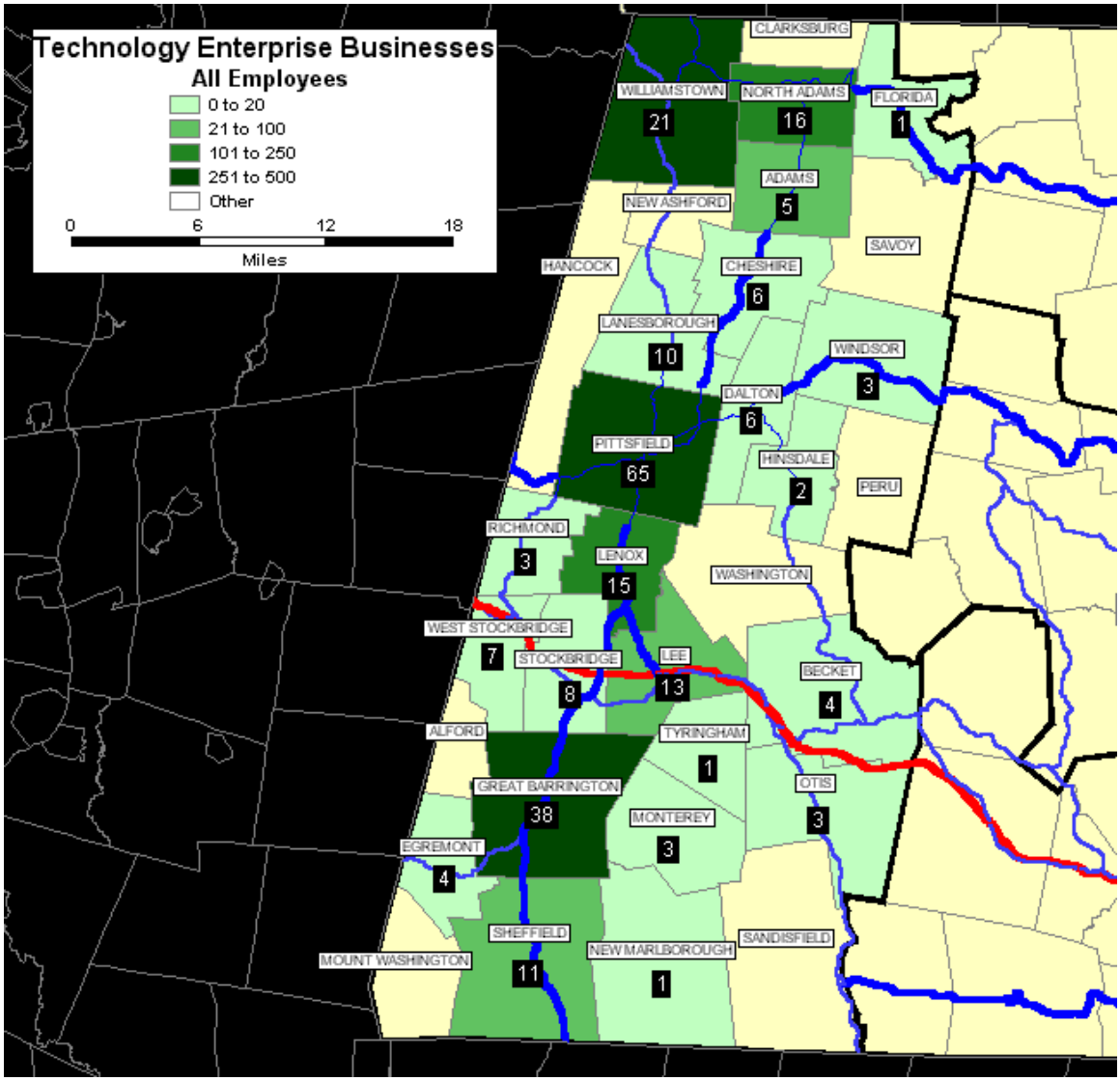
[16] For SIC code definitions and detail see Appendix B and Appendix C.

change in the four largest sectors varied from a growth rate of close to 90 percent in software and systems design to a loss of 12 percent in design and art businesses.

Firm Location

While some larger Technology Enterprise firms have clustered in business or industrial parks, it is worth noting that firms are dispersed throughout Berkshire County. During on-site visits to Technology Enterprise companies in the Berkshires, the researchers noted a large number of firms occupying redeveloped industrial and commercial space, and renovated downtown space in the region. In this respect, businesses in the cluster may well be significant forces for revitalization and redevelopment of regional infrastructure.

The map and table that follow display town by town and sub-regional detail of employment and firm location. As seen in the map, employment in the cluster is fairly well distributed throughout the region. Firm and employment totals represented in the map are outlined by sub-region in the table below the map.



Technology Enterprise Firms and Employment by Berkshires Sub-Region, 2001				
Berkshire Sub-Region	Firms	Employees	Percentage of Firms	Percentage of Employees
North	49	483	21	30
Central	121	720	51	45
South	76	446	28	25
Total	246	1,649	100	100
Source: iMarket				

As illustrated, businesses and employment are most densely clustered in Pittsfield (65 business, 474 employees), Great Barrington (38 firms, 293 employees), Williamstown

(21 firms, 257 employees), North Adams (16 firms, 181 employees), and Lenox (15 firms, 117 employees).

Geography of the Largest Business Sectors

The three sub-regions of Berkshire County are each characterized by a unique mix of Technology Enterprise business types. According to iMarket data, Central Berkshire county is the primary location of software and systems design and IT business services firms and employment. Thirty-eight and thirty-one percent of those firms, respectively, are located in Pittsfield. Content and publishing employment is dominant in North County with fifty-five percent of employment in that sector located in Williamstown and North Adams. The biggest cluster of design and art businesses and employment is in South County. Great Barrington and Sheffield are home to 33 percent of all design and art firms. While the size of these firms tends to be very small, Great Barrington, Tyringham and Lee are home to 58 employees or 47 percent of employment in that sector in the county. Maps and tables illustrating firm and employment densities, by location and sector appear in Appendix E.

Critical Issues for Economic Development Planners

The Technology Enterprise cluster in Berkshire County is a rare example of technology businesses taking root in a rural region. A review of technology clusters nationwide yielded few other examples, and these were located within commuting distance of a major metropolitan area or in close proximity to an established corporate high-technology cluster and major University resources. The fact remains that most successful technology clusters nationwide are located in metropolitan areas. Ironically, the critical issues for technology business, which are both challenges and opportunities, relate to the Berkshires' rural location.

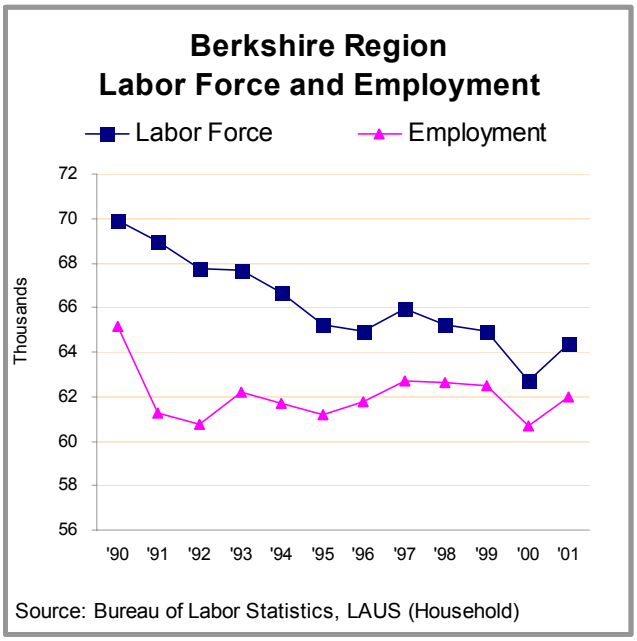
Quality of life helps recruitment

There is overwhelming evidence that the quality of life in Berkshire County is a major positive factor influencing the recruitment of Technology Enterprise professionals and businesses. Three-quarters of bTech survey respondents reported that they chose to live in the Berkshires for the high quality of life and virtually all respondents believe it is somewhat or very likely that they will remain in the Berkshires for at least the next five years. But quality of life does not pay the bills. The existence of Technology Enterprise business in the region makes it possible for professionals to relocate to the Berkshires. Thirty-nine percent of those surveyed said they were attracted to the region by a job opportunity.[17]

Primary labor force is small and declining

A major problem for technology business in the area is a serious shortage of technically skilled workers. The area lacks the dense labor pool typically found in metropolitan areas. Furthermore, economic and social constraints in the region have had a serious effect on overall labor force retention rates in the past ten years.

[17] "bTech Survey Findings", Section II



Berkshire County, along with the rest of Western Massachusetts, has experienced a decline in labor force disproportionately greater than the rest of the state. Especially troubling is the outflow from the region of workers of prime working age, 25 to 44. Unfortunately, this is the very age group relied upon to populate the professional ranks of the technology business boom of the past decade. The table that follows illustrates this point using newly released census numbers.

Berkshire Region Age Distribution

Percent of Population		Age Range	Number		Percentage Change In Number
1990	2000		1990	2000	
22.7%	22.4%	**Under 18**	31,689	30,187	(5)
10.9%	8.4%	**19-24**	15,193	11,395	(25)
29.8%	26.4%	**25 to 44**	41,459	35,573	(14)
19.7%	24.9%	**45 to 64**	27,482	33,575	22
16.9%	17.9%	**65 and over**	23,529	24,223	3
100.0%	100.0%	**Total**	139,352	134,953	(3)

Source: U.S. Bureau of the Census, Decennial Population Census

A "new economy" cluster in a "traditional economy" region

A number of issues serve to obscure the presence of this “new economy” cluster in Berkshire County. Technology Enterprise products, processes and workforce development needs are not easily recognizable to an economic development support system accustomed to working with large firms that produce durable goods. While technology-based and technical in nature, business activities and products in this cluster are typically classified as 'services' through the SIC system of classification. Aggregate service sector statistics easily subsume this high-value cluster within the large pool of lower-wage service sectors in the county. To make matters worse, no source of data exists which quantifies services exports, so Technology Enterprise exports cannot be compared against 'hard' product exports in the region.

Technology Enterprise business culture is also different in many respects from the culture of traditional business in the region. Based on our observations, work environments and schedules in the cluster tend to be more informal and flexible. Work with colleagues and clients in other time zones is common, so work often takes place beyond normal business hours. Finally, the relative youth and informal culture of professionals in the cluster may effect their involvement in traditional economic development activities. Younger professionals may feel they lack the status or connections to participate effectively (or they may not be aware of who to connect to). Unfortunately, without the full participation of the cluster, the needs of technology businesses and professionals may remain undetectable to existing economic development entities in the region. This reinforces the importance of an industry association such as bTech.

Primary labor force desires urban amenities

> *"'Net people have different needs and a different culture than a heavy-industry culture ... We like the idea of being able to walk out of the building and being in a place to eat and mingle.' Physical location, it turns out, still matters in the wired world."*[18]

[18] Dallas Morning News. "Going to Town, Tech firms moving into uban centers to lure workers." Dallas, TX: *Dallas Morning News*. July 7, 2000.

There is growing evidence that location and amenities matter a great deal to technology workers. This is a highly sought after, highly mobile population, and these factors have become key in recruitment and retention. While many people have been drawn to the natural beauty of the Berkshires, technology professionals also desire cultural, artistic and intellectual resources and amenities typically found in more metropolitan centers. According to Joel Kotkin, author of the book, *The New Geography: How the Digital Revolution is Reshaping the American Landscape*, technology workers such as designers, programmers and writers tend to want the creative stimulation found most readily in an urban setting.[19] Fortunately Berkshire County does offer a range of artistic, cultural and intellectual resources, although in far less density than found in metropolitan areas. But still young technology professionals have few social and recreational outlets designed for their age group. In this respect, Berkshire County benefits from its relative proximity to major urban centers in the Northeast.

However, life in a rural area is still a challenge for young professionals. Rural regions lack breadth and depth of job opportunities for workers and their partners to advance in-place. This factor makes the region an especially difficult place in which to rebound after a layoff.

Professional networking

To date, bTech has provided networking opportunities for the Technology Enterprise community. 84 percent of professionals responding to the bTech survey consider bTech's networking events to be somewhat or very important. This approach makes sense as a business development strategy for a number of reasons. Based on interviews, it appears that technology professionals value face-to-face interaction with colleagues as this provides opportunities for professional networking, skill development and information sharing as well as for collaboration.

Professional networks also create opportunities for business innovation:

> *"Innovative activity has a high propensity to cluster in industries where tacit knowledge plays a critical role primarily because it is transferred through*

[19] IBID

> *informal networks, typically demanding direct and repeated contact and dialogue."*[20]

Technology clusters benefit from a highly interactive, networked business culture. Clusters, by definition, are groups of related businesses that have built a strong set of linkages, allowing them to specialize and innovate at rates far higher than geographically and operationally dispersed firms.[21] Interaction within a cluster increases knowledge and technology transfers between companies, thus increasing the rate of innovation, regional economic growth and the expansion of the cluster itself.[22]

Given the documented need for interaction at all levels within the cluster, bTech's networking focus can be seen for what it is: providing professional support and facilitating technology industry development in an otherwise dispersed region.

Urban areas offer more amenities

The amenities of metropolitan life have become essential complements to urban Technology Enterprise culture. Businesses are supported by resources readily available in the city: density of world-class design, art, content, media and computer technology professionals, highly developed technology infrastructure and services, well developed transportation networks; abundant, easily accessible business services like printers, express mail services, and conference facilities. Furthermore, urban areas have a 24-hour culture in which business services, restaurants and stores remain available to professionals working around the clock.[23] While business in the city can access these amenities with little effort, rural technology enterprise faces a more difficult challenge. But it is worth noting that limitations in the region also present opportunities for future business growth in the region to meet the needs of local Technology Enterprise business.

[20] Kotkin and DeVol, p. 14.
[21] Standard and Poor's DRI, p. 22.
[22] IBID.
[23] Kotkin and DeVol

Communications infrastructure

In most rural regions, communications infrastructure tends to be inferior and costly when compared to what is available in metropolitan areas. We noted no complaints about internet service during interviews with technology professionals. It is likely that Berkshire Connect has improved telecommunications access for many technology businesses in the region, but this topic was not explored fully during the key informant interviews. However, unreliable, or limited cell phone service remains a common complaint.

APPENDICES

Appendix A. Methodology for Identifying Major Business Sectors

A primary task of the economic analysis was to identify and describe the dominant types of business activity in the region and to quantify their economic impact.[24] In order to accomplish this task, the following methodology was used:

Literature review: A review of bTech public relations material, articles, and other written material about technology activity in the region helped to initially identify and clarify the types of Technology Enterprise activity taking place in Berkshire county.[25] A review of articles and economic research on the nature of Technology Enterprise businesses nationally helped to place the Berkshires Technology Enterprise cluster within a broader context.

Interviews: Field interviews were conducted to provide more in-depth information on Technology Enterprise activity in the region. The research team spoke to representatives of the bTech leadership group as well with other business leaders and economic development professionals active in the region. Through the interviews, it was possible to itemize a range of technology business sectors with a significant local presence.

Mailing list analysis: To obtain further detail on sectors of technology business activity, business activities of companies appearing in the bTech database were analyzed. Market research databases and available company websites allowed the identification of primary types of business activity conducted by these companies.

[24] The most detailed public data using SIC codes is ES-202 data at the four digit SIC level. But as is often the case in geographically dispersed locations like Berkshire County, economic data was suppressed in some sectors. This made the task of detailed analysis more challenging. Our solution to the suppression issue involved the use of iMarket data. These data allow industry analysis through eight digit SIC codes, allowing a more detailed analysis of business activity. U.S. Census Bureau data on nonemployers, classified through the NAICS system, allowed further measurement of business activity.

[25] For research purposes, codes affiliated with IT manufacturing activities were added to the analysis as this type of activity is known to be important in other regions of the state. For a detailed description of SIC's and NAICS codes used see Appendices B and C.

bTech Survey: A survey of businesses and professionals in the cluster was conducted in November, 2001. Among other things, the survey was designed to collect a range of personal and business profile data and explore the relative performance of this cluster. Survey results confirm a range of significant business activities and provide data on the level of activity taking place.

Appendix B. Technology Enterprise Definition: 4-digit SIC Codes

Information and Communications Technology Cluster 4 Digit SIC Codes and Names		
Sector	**SIC**	**What does this code help estimate?**
I. Technology Services		
Software and Systems Design		
Computer programming services	7371	
Prepackaged software	7372	
Computer integrated systems design	7373	
Computer maintenance and repair	7378	
Computer facilities management	7376	
Design and Art		
Commerical art and graphic design	7336	
Motion picture and video production	7812	
Services allied to motion picture production	7819	
Services allied to motion picture distribution	7829	
Services, nec	8999	*Art studios*
Content and Publishing		
Periodicals: publishing or printing	2721	
Books: publishing or printing	2731	
Miscellaneous publishing	2741	
Business consulting services, nec	8748	*Publishing consulting*
Secretarial and court reporting services	7338	*Freelance editing*

Information and Communications Technology Cluster
4 Digit SIC Codes and Names

Sector	SIC	What does this code help estimate?
I. Technology Services, cont…		
IT Business Services		
Advertising agencies	7311	
Radio, television & publishers' advertising services	7313	*Electronic media advertising representatives*
Computer related services, nec	7379	
Management consulting	8742	
Business consulting, nec	8748	*Communications consulting*
Commercial economic, sociological & educational research	8732	*Market research*
Computer information retrieval services	7375	
Data processing and preparation	7374	
Communications services, nec	4899	
Computer Education		
Data processing schools	8243	
II. IT Manufacturing		
Pressed and blown glass & glassware	3229	*Fiberoptic strands*
Drawing & insulating of nonferrous wire	3357	*Wire, fiber optic cable*
Computers	3571	*Computers*
Computer terminals	3575	*Computer terminals*
Computer peripherals	3577	*Computer peripherals*
Semiconductors and related devices	3674	*Microprocessors*
Magnetic media	3695	*Magnetic media*
Telephone equipment	3661	*Telephone equipment*
Communication equipment	3663	*Communication equipment*
Communications equipment, nec	3669	*Communications equipment, nec*
Telephone directories	2741	*Telephone directories*
Commercial, physical & biological research	8731	*Computer (hardware) development*

Appendix C. Technology Enterprise Definition: SIC and NAICS Code Detail

Technology Enterprise Cluster - SIC codes and NAICS codes			
I. Information and Communications Services			
Software and Systems Design			
Computer programming services	7371	541511	Custom computer programming services
Software development	*(7371 and 7373)*		
Software publishers	7372	511210	Software publishers
Computer integrated systems design	7373	541512	Computer systems integrators
Computer facilities management	7376	541513	Computer facilities management
Computer maintenance and repair	7378	811212	Computer mainenance and repair
Design and Art			
Graphic design			
Art design services	7336-0100	541430	Graphic design services
Chart and graph design	7336-0101		
Creative services to advertisers	7336-0102		
Graphic arts and related design	7336-0103		
Commercial art and graphic design, nec	7336-9900		
Commercial art and illustration	7336-9901		
Special effects			
Motion picture and videotape production	7812	512110	Motion picture and video production
Services allied to motion picture production	7819	512191	Teleproduction and other postproduction services
Services allied to motion picture distribution	7829	512199	Services allied to motion pictures
Art studios	8999-01; 8999-02	711510	Authors, composers, + other arts-related services
Content and Publishing			
Publishing			
Periodicals: publishing, or publishing + printing	2721	51120	Periodical publishers
Books: publishing, or publishing + printing	2731	51130	Book publishers
Miscellaneous publishing	2741	51140	Database and directory publishing
Freelance editing	7338-9901	561410	Document preparation services
Publishing consulting	8748-9908	no NAICS equiv.	
Freelance writing	8999-03	711510	Authors, composers, + other arts-related services

Technology Enterprise Cluster - SIC codes and NAICS codes, cont…			
SIC Sector	**4-digit SIC**	**6-digit NAICS**	**NAICS Sector**
I. Information and Communications Services, cont…			
IT Business Services			
Communications services, nec	4899	513	Broadcasting and telecommunications
Advertising agencies	7311	541810	Advertising agencies
Electronic media advertising representatives	7313-01	541840	Media representatives
Data processing services	7374	514210	Data processing services
Computer information retrieval services	7375	514191	On-line information retrieval services
Computer related services, nec	7379	334611; 541512;	Software reproducing; computer systems consulting (except systems integrators);
		541519	Other computer related services
Market research	8732-01	541910	Marketing research and public opinion polling
Management consulting	8742-9905	541611	Administrative mgt + general mgt. consulting services
Communications consulting	8748-03; 8748-04	541618	All other mgt. consulting services
Computer Education			
Data processing schools	8243	611420	Computer training
II. IT Manufacturing			
Fiberoptic strands	3229.0401	335921	Fiber optic cable manufacturing
Wire, fiber optic cable	3357.01		
Computers	3571	334111	Electronic computer mfg
Computer terminals	3575	334113	Computer terminal mfg
Computer peripherals	3577	334119	Other computer peripheral equipment
Microprocessors	3674.0207	334413	Semiconductors + related device mfg
Magnetic media	3695	334613	Magnetic + optical recording media mfg
Telephone equipment	3661	334210	Telephone apparatus mfg
Communication equipment	3663	334220	Broadcasting + wireless communications mfg
Communications equipment, nec	3669	334290	Other communications equipment mfg
Telephone directories	2741.03	511140	Database + directory publications
Computer (hardware) development	8731-0203	no NAICS equiv.	

Appendix D. Technology Enterprise Activity, Berkshire County, 2001

Q3 2001 Berkshire County SIC Detail				
Category	**SIC**		**Businesses**	**Employment**
Software & Systems Design	7371-0000	Custom computer programming services	6	29
	7371-0101	Computer software systems analysis and design, custom	11	46
	7371-0200	Computer software writing services	1	4
	7371-0202	Computer software writers, freelance	1	1
	7371-0300	Computer software development and applications	2	5
	7371-0301	Computer software development	7	30
	7371-0302	Software programming applications	1	2
	7372-0000	Prepackaged software	13	44
	7372-9903	Educational computer software	1	2
	7373-0000	Computer integrated systems design	8	55
	7378-0000	Computer maintenance and repair	10	38
	7378-9901	Computer and data processing equipment repair/maint.	2	22
	7378-9902	Computer peripheral equipment repair and maintenance	1	3
Subtotal			**64**	**281**
Design and Art	7336-0103	Graphic arts and related design	13	42
	8999-0101	Artist	8	10
	7336-9901	Commercial art and illustration	6	6
	7812-0000	Motion picture and video production	4	18
	8999-0200	Art related services	3	5
	7336-0101	Chart and graph design	2	2
	7812-0106	Motion picture production and distribution, television	2	22
	7812-0200	Video production	2	4
	7819-0000	Services allied to motion pictures	1	1
	7819-9901	Sound effects and music production, motion picture	1	1
	8999-0202	Greeting card painting by hand	1	1
	7812-9903	Commercials, television: tape or film	1	1
	7812-9901	Audio-visual program production	1	2
	7812-0202	Video tape production	1	1
	7812-0105	Motion picture production and distribution	1	1
	7812-0103	Educational motion picture production, television	1	1
	7812-0101	Cartoon motion picture production	1	1
	7812-0100	Motion picture production	1	3
	7336-0100	Art design services	1	1
Subtotal			**51**	**123**

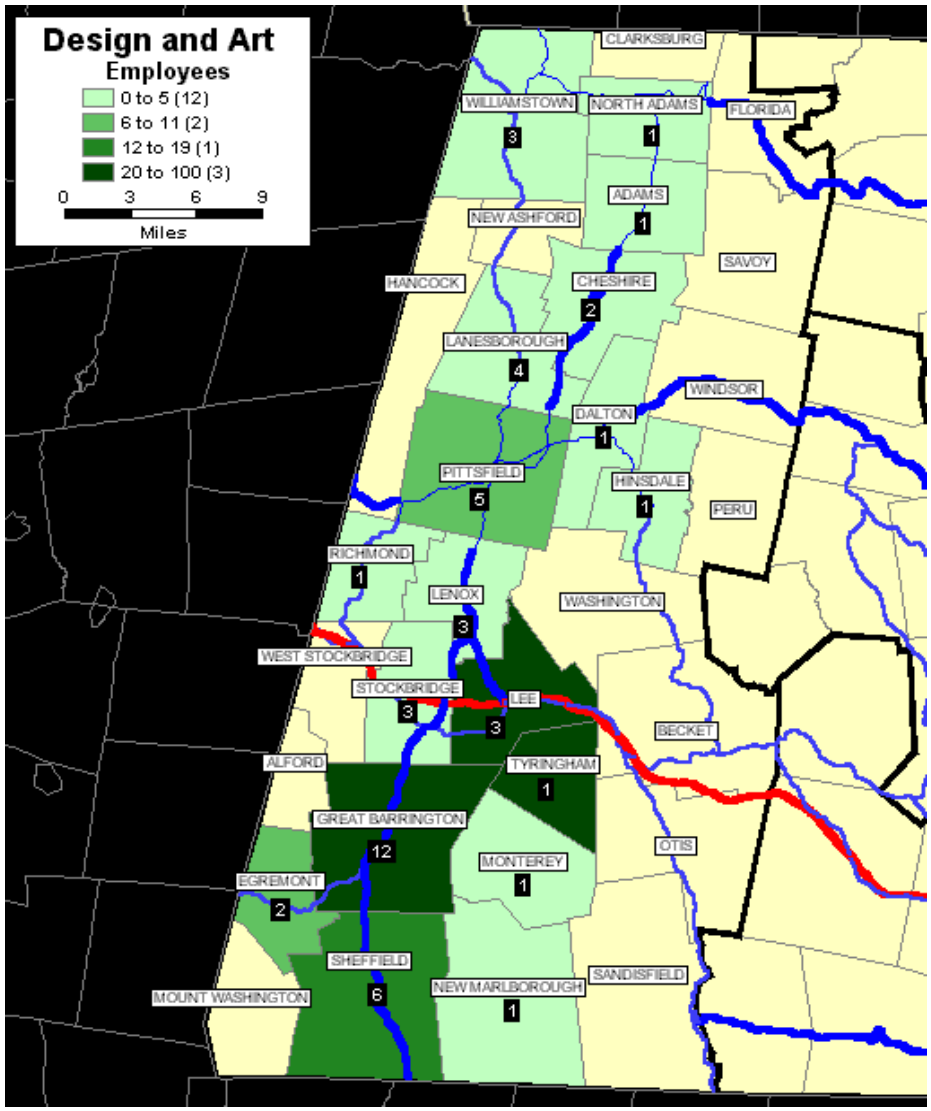
Q3 2001 Berkshire County SIC Detail, continued				
Category	**SIC**		**Businesses**	**Employment**
Content and Pub-lishing	2721-0000	Periodicals	5	13
	2721-0100	Periodicals, publishing only	1	65
	2721-0102	Magazines: publishing only, not printed on site	1	2
	2721-0105	Trade journals: publishing only, not printed on site	2	67
	2721-0205	Trade journals: publishing and printing	2	8
	2731-0000	Book publishing	10	94
	2731-0100	Books, publishing only	6	118
	2731-0200	Books, publishing and printing	1	1
	2741-0000	Miscellaneous publishing	1	1
	2741-0206	Guides: publishing only, not printed on site	2	15
	2741-0300	Telephone and other directory publishing	2	10
	2741-0401	Music, book: publishing and printing	1	13
	2741-0500	Newsletter publishing	3	35
	2741-0501	Business service newsletters: publishing and printing	1	1
	2741-0502	Shopping news: publishing and printing	1	4
	2741-0503	Shopping news: publishing only, not printed on site	1	10
	7338-9901	Editing service	1	1
	8748-9908	Publishing consultant	1	20
	8999-0300	Commercial and literary writings	3	3
	8999-0302	Author	4	11
	8999-0304	Newspaper column writing	1	1
	8999-0305	Writing for publication	5	6
	8999-0306	Technical writing	1	1
Subtotal			**56**	**500**

Q3 2001 Berkshire County SIC Detail, continued				
Category	**SIC**		**Businesses**	**Employment**
IT Business Services	4899-0000	Communication services, nec	1	1
	7311-0000	Advertising agencies	6	39
	7311-9901	Advertising consultant	4	11
	7313-0102	Television and radio time sales	2	6
	7374-0102	Computer graphics service	12	18
	7374-0104	Service bureau, computer	2	91
	7374-9901	Data entry service	1	1
	7374-9902	Data processing service	1	1
	7375-9902	On-line data base information retrieval	2	20
	7379-0000	Computer related services, nec	4	7
	7379-0100	Computer related maintenance services	1	160
	7379-0200	Computer related consulting services	17	45
	7379-0203	Online services technology consultants	2	15
	8732-0104	Economic research	1	24
	8732-0108	Research services, except laboratory	2	11
	8742-9905	Management information systems consultant	1	35
	8748-0300	Communications consulting	2	21
	8748-0302	Telecommunications consultant	1	1
	8748-0400	Systems analysis and engineering consulting services	1	2
	8748-0402	Systems engineering consultant, ex. computer or professional	1	36
	8732-0103	Business research service	3	39
Subtotal			**67**	**584**

Q3 2001 Berkshire County SIC Detail, continued				
Category	**SIC Sector**		**Businesses**	**Employment**
Computer Education	8243	Data processing schools	1	36
Subtotal			1	36
IT Manuf-acturing	2741-0300	Telephone and other directory publishing	2	10
	3357-0100	Communication wire	1	100
	3577-0000	Computer peripheral equipment, nec	2	9
	3661-9908	Fiber optics communications equipment	1	N/A
	8731-0203	Computer (hardware) development	1	6
Subtotal			**7**	**125**
Total			**246**	**1,649**
Source: iMarket				

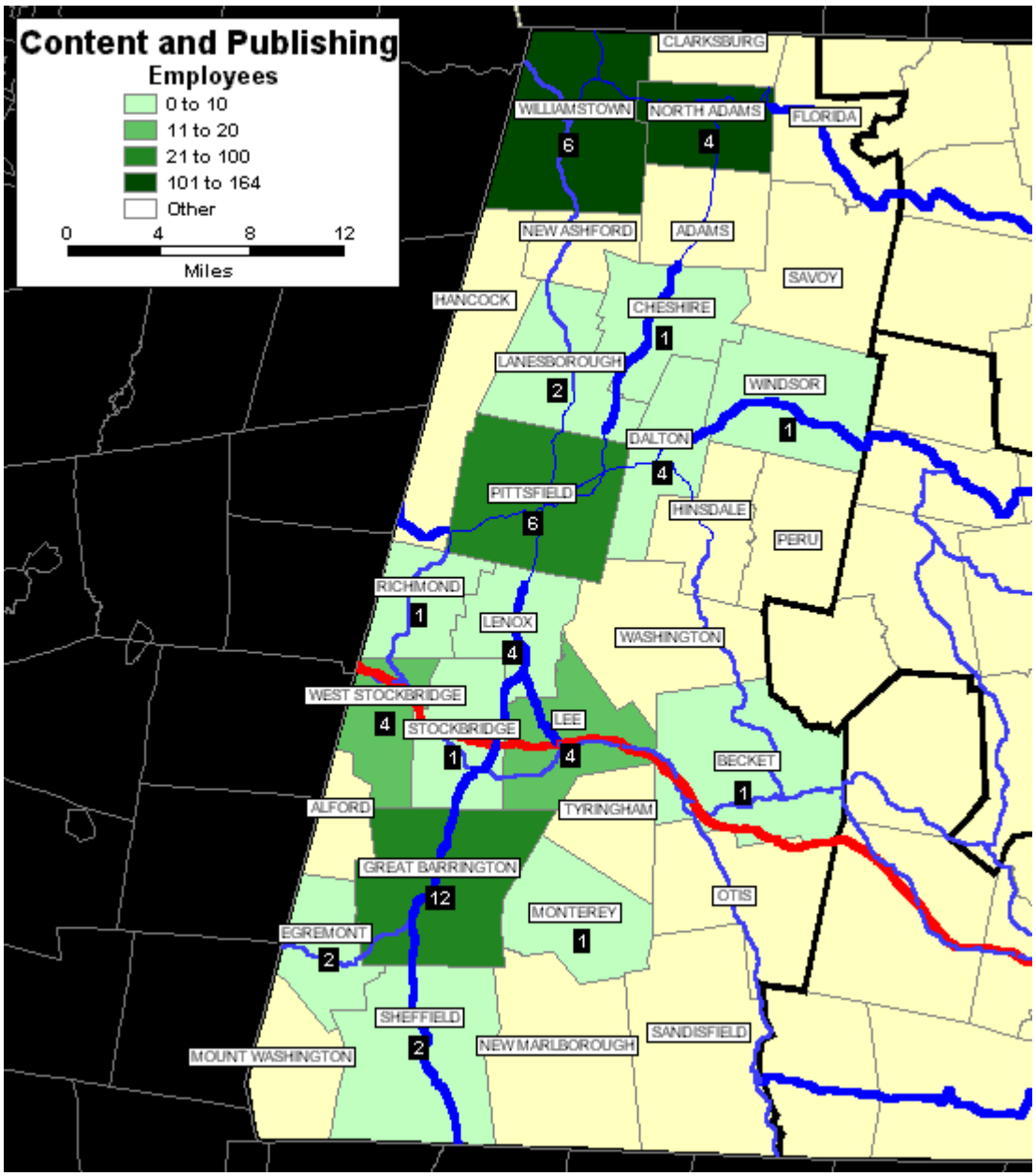
Appendix E. Business Locations of Major Sectors, Berkshire County, 2001

Design and Art Sector:



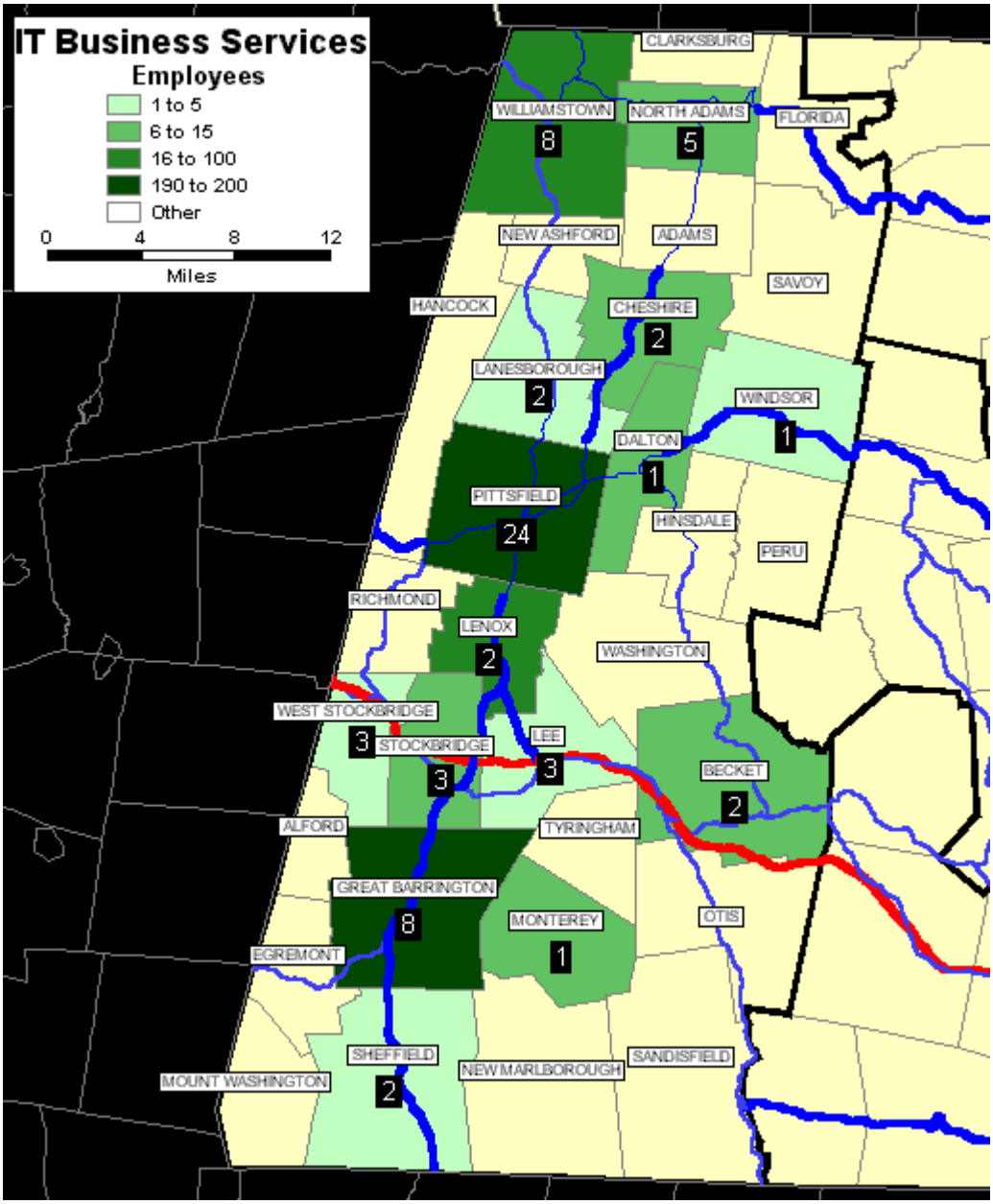
Design and Art			
Subregion	Businesses	Employees	Sales ($M.)
North	18	43	3.9
Central	7	9	0.7
South	26	71	9.2
Grand Total	51	123	13.8
Source: iMarket			

Content and Publishing Sector:



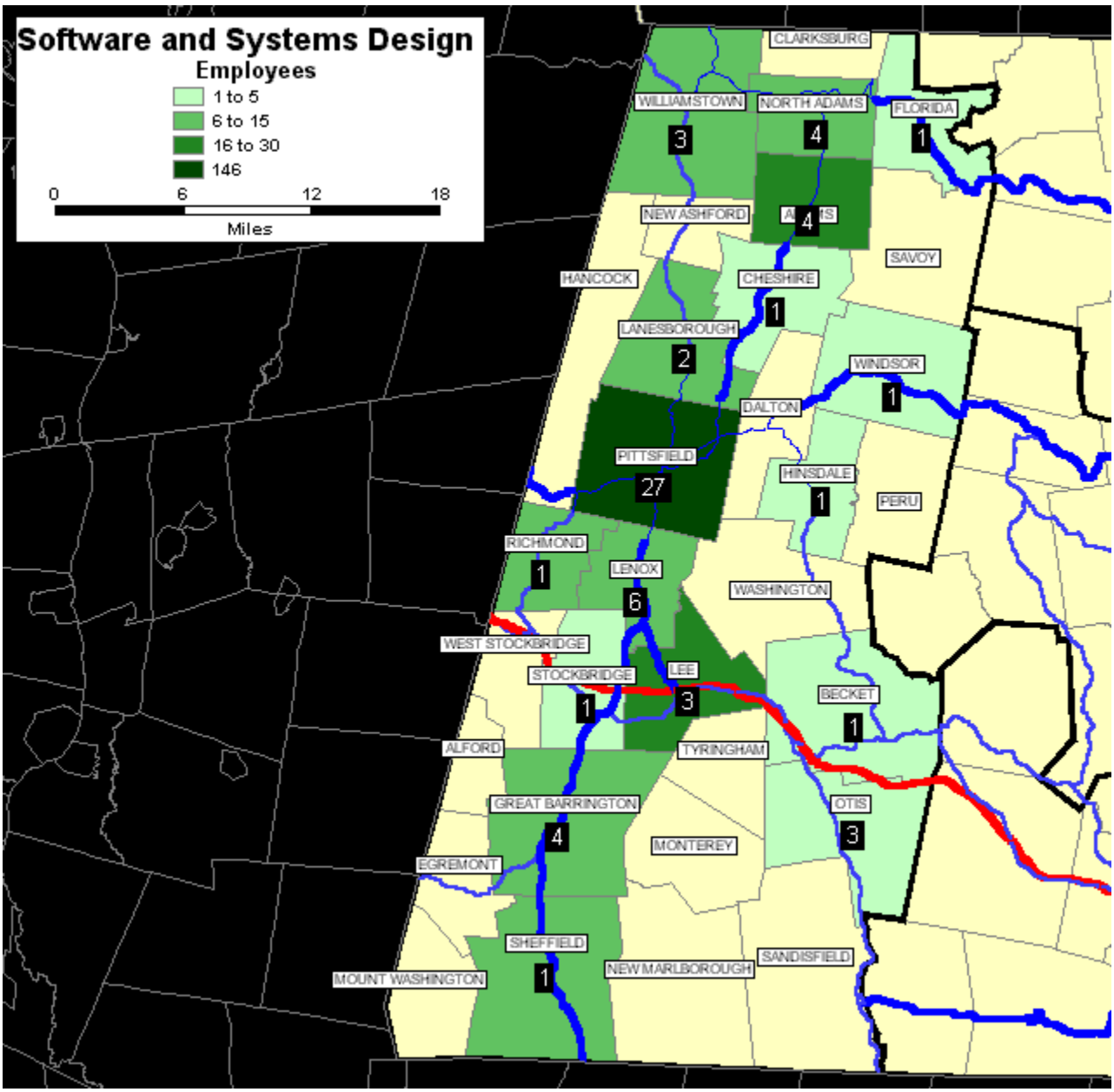
Content and Publishing			
Subregion	Businesses	Employees	Sales ($M.)
North	11	276	10.4
Central	23	111	16.6
South	22	113	8.4
Grand Total	56	500	35.4
Source: iMarket			

IT Business Services Sector:



IT Business Services			
Subregion	Businesses	Employees	Sales ($M.)
North	15	47	3.3
Central	35	319	22
South	17	218	5.3
Grand Total	67	584	30.6
Source: iMarket			

Software and Systems Design Sector:



Software and Systems Design			
Subregion	Businesses	Employees	Sales ($M.)
North	13	49	8.4
Central	42	200	9
South	9	32	2.6
Grand Total	64	281	20
Source: iMarket			

Appendix F. Technology Enterprise Companies in Massachusetts and Massachusetts Regions

For over thirty years, Eastern Massachusetts has been home to a dense cluster of computer technology businesses in manufacturing and, more recently, services. Initially, this activity was concentrated along Route 128 and subsequently expanded along Route 495. Recent data from the MA Division of Employment and Training illustrate that, both in absolute numbers and in percent of total regional employment, technology enterprise activity remains disproportionately dense along route 495 and in the Northeast and Boston Metro regions of the state. In fact, while only 1.9 percent of all Massachusetts employment is in IT manufacturing, these regions have IT employment from 5.7 percent to 8.7 percent of their regional totals.

IT Manufacturing Employment

Technology Enterprise: Technology Manufacturing Employment, Massachusetts and Regions, 1993 - 2000

Region	Employment '00 Q4	Real Average Annual Wages '00 Q4	Percentage Change from '93 Q4 Employment	Percent of Regional Employment
Massachusetts	60,404	92,261	12	1.9
Greater Boston	31,190	103,375	-8	1.9
Northeast	17,579	83,901	80	7.3
495 West	11,329	105,605	-39	5.7
495 North	17,268	83,787	11	8.7
Central	8,521	83,563	7	2.8
Pioneer Valley	796	42,302	-28	0.3
Southeast	2,055	53,365	71	0.6
Cape & Islands	128	59,067	88	0.1
Berkshire	34	40,426	70	0.1

Source: MA Division of Employment and Training, ES-202

Outside of the IT manufacturing hotspots, the state appears to have relatively little IT manufacturing activity. IT manufacturing activities do exist in the Central region (2.8 percent of regional employment) but are low when compared to the density of firms and employment in the east. IT manufacturing hardly exists in the most outlying regions, namely the Berkshires, the Pioneer Valley, the Cape and Islands and the Southeast.

Technology Services Employment

IT services firms and employment follow the same pattern of higher density in the 495 and Northeast regions. Employment in IT services represents 5.6 percent of all jobs in the Commonwealth. However, in Greater Boston, the Northeast region, 495 North and 495 West, the proportion of employment ranges between 8.2 to 9.4 percent of all jobs.

Technology Enterprise: Technology Services Employment, Massachusetts and Regions, 1993 - 2000

Region Name	Employment '00 Q4	Real Average Annual Wages '00 Q4	Percentage Change from '93 Q4 Employment	Percent of Regional Employment
Massachusetts	177,154	94,728	112	5.6
Greater Boston	138,681	98,156	114	8.5
Northeast	22,278	96,186	109	9.2
495 West	18,498	93,126	172	9.4
495 North	16,216	104,738	123	8.2
Central	6,166	74,177	165	2.0
Pioneer Valley	3,575	56,021	77	1.3
Southeast	3,275	50,908	72	1.0
Cape & Islands	1,860	62,847	78	2.0
Berkshire	1,143	66,826	135	1.9

Source: MA Division of Employment and Training, ES-202

While the importance of IT manufacturing varies significantly by region, technology services employment appears to have some degree of importance in every region. Employment growth in this sector between 1993 and 2000 was notable in all regions. Average annual wages in the technology services are relatively high across all regions of the state. Nevertheless, as with IT manufacturing, the major employment areas with the highest wages are the eastern and northeastern-most regions of Massachusetts.

Firms and Firm Size

Data show that firm size is higher in regions closer to Greater Boston. IT manufacturing firms in the state average 65 employees. Average firm size at the regional level is highest in the Northeast region and in 495 North region. IT manufacturing firm size is lowest in the Berkshire and the Cape and Islands regions. Overall, IT services firms in Massachusetts average 14 employees per firm and are smaller than manufacturing firms in all regions of the state. Regionally, average firm sizes range from 19 employees per firm in the 495 North region to 5 per firm in the Southeast and Cape and Islands regions.

Technology Enterprise Firms, Massachusetts and Regions, 1993 - 2000

Region Name	Category	Number of Firms '00Q4	Percentage Change 93-00 (Q4-Q4)	Average Firm Size '00 Q4
Massachusetts	Manufacturing	927	36	65
	Services	13,103	106	14
Greater Boston	Manufacturing	584	32	53
	Services	8,873	100	16
Northeast	Manufacturing	158	35	111
	Services	1,657	122	13
495 West	Manufacturing	119	37	95
	Services	1,435	133	13
Central	Manufacturing	106	80	80
	Services	888	117	7
495 North	Manufacturing	123	31	140
	Services	870	140	19
Southeast	Manufacturing	31	19	66
	Services	602	177	5
Pioneer Valley	Manufacturing	20	5	40
	Services	537	79	7
Cape & Islands	Manufacturing	18	29	7
	Services	368	130	5
Berkshire	Manufacturing	4	-	9
	Services	150	105	8

Source: MA Division of Employment and Training, ES-202

The character of the Berkshire technology economy is different from that of the state as a whole and, especially, from eastern Massachusetts regions where technology manufacturing is dominant. Given the regional variation in business activity it is important to analyze the

Berkshires in the context of the western half of the state. According to ES-202 data, the Berkshire County cluster performs well when compared with business performance in the Pioneer Valley (Hampden, Hampshire and Franklin counties).

Technology Enterprise Employment, Western MA, 1993 - 2000

Region Name	Category	Employment '00 Q4	Real Average Annual Wages '00 Q4 in Dollars	Percentage Change from '93 Q4 Employment	Percent of Regional Employment
Massachusetts	Manufacturing	60,404	92,261	12	1.91
	Services	177,154	94,728	112	5.60
Berkshire	Manufacturing	34	40,426	70	0.06
	Services	1,143	66,826	135	1.88
Pioneer Valley	Manufacturing	796	42,302	(28)	0.29
	Services	3,575	56,021	77	1.31

Source: Massachusetts Division of Employment and Training, ES-202

The table above features employment data for Western Massachusetts regions. Berkshire County, with 150 firms and 1,143 employees has the highest proportion of IT services employment in Western Mass. The rate of growth in the Berkshires between 1993 and 2000 is almost double the rate of growth in the Pioneer Valley although absolute employment growth was smaller (656 in the Berkshires versus 1,554 in the Pioneer Valley region). Technology services firms in Berkshire County and in the Pioneer Valley are generally about the same size (8 and 7 employees per firm respectively).

The table below features wages and payroll data for Western Massachusetts regions. In both manufacturing and services areas, growth in payroll and wages between 1993 and 2000 was highest in Berkshire County. Real annual payroll in Berkshire County technology services grew 191 percent compared to 100 percent in the Pioneer Valley. Average annual wages in technology services in the Berkshires rose 24 percent between 1993 and 2000, compared to 36 percent in the state as a whole, while growth rates were lower in the Pioneer Valley. Average wage statistics show that Berkshire County IT services wages exceed Pioneer Valley wages by over $10,000 per year. In 2000, average real wages in Berkshire County firms were $66,826 compared to $56,021

in the entire Pioneer Valley (Hampden, Hampshire and Franklin counties), and $31,009 in Franklin County.

Technology Enterprise Payroll and Wages, Western MA, 1993 - 2000

		Payroll		Wages	
Region Name	Category	Real Annual Payroll '00 Q4 ($M)	Percentage Change from '93 Q4	Average Annual Wage '00 Q4 in Dollars	Percentage Change from '93 Q4
Massachusetts	Manufacturing	5,572,951	55	92,261	39
	Services	16,781,379	188	94,728	36
Berkshire	Manufacturing	1,374	127	40,426	34
	Services	76,383	191	66,826	24
Pioneer Valley	Manufacturing	33,672	-32	42,302	(6)
	Services	200,275	100	56,021	13

Source: Massachusetts Division of Employment and Training, ES-202

Appendix G. References

Battelle Memorial Institute. "Western Massachusetts Regional Technology Audit and Network Identification Assessment: Building Technology Networks for Regional Economic Competitiveness." Cleveland, Ohio: Technology Partnership Practice, Battelle Memorial Institute. January, 2001 and January, 2002.

Berkshire Regional Planning Commission. "Comprehensive Economic Development Strategy for Berkshire County, Massachusetts 2001." Pittsfield, MA: Berkshire Regional Planning Commission, March 2000.

Berkshire Trade and Commerce Monthly. "Beyond the Boom…With tumult in the tech sector and deflated dot-coms, have prospects faded for Berkshires' new economy?" Pittsfield, MA: *Berkshire Trade and Commerce Monthly,* Volume 5, No. 2, June 2001.

Carey, Bill. "New Economy types are bonding in Berkshire County." Pittsfield, MA: *The Berkshire Eagle*, December 13, 2000.

Carey, Bill. "High tech, high productivity manufacturing sector remains a foundation of Berkshire economy." Pittsfield, MA: *The Berkshire Eagle*, Connections 2001, January 11, 2002.

Coopers & Lybrand Consulting. "New York New Media Industry Survey: Opportunities & Challenges of New York's Emerging Cyber-Industry." New York City: New York New Media Association. 1996. http://www.nynma.org/industry_intelligence.

Dallas Morning News. "Going to Town, Tech firms moving into urban centers to lure workers." Dallas, TX: *Dallas Morning News*. July 7, 2000.

DeVol, Ross. *America's High-Tech Economy: Growth, Development, and Risks for Metropolitan Areas.* Santa Monica, California: The Milken Institute. July 13, 1999.

Empire State Development. "The Communications and Media Services Industry Cluster in New York State." Albany, NY: Empire State Development Division of Policy and Research. April 2001. www.empire.state.ny.us.

Hawaii Department of Business, Economic Development and Tourism. "Hawaii's Emerging Technology Industry." *Hawaii's Economy, a quarterly report.* January, 2000. http://www.hawaii.gov/dbedt/he1-00/.

Kotkin, Joel. "Hudson Valley: How's Them Apples?" *REIS Reports.* 2001. http://www.reis.com/learning/insights_crossroads_art

Kotkin, Joel and Ross DeVol. *Knowledge-Value Cities in the Digital Age.* Santa Monica, California: The Milken Institute. February 13, 2001.

Kuhn, Sarah. "Interstate 495 West: the challenge of change in an information technology corridor." *Massachusetts Benchmarks*, Fall 2001, volume 3, issue 4.

Markusen, Ann and Karen Chapple, Greg Schrock Daisaku Yamamoto and Pingkang Yu. "High-Tech and I-Tech: How Metros Rank and Specialize." Minneapolis, MN: The Hubert H. Humphrey Institute of Public Affairs. August, 2001.

Massachusetts Technology Collaborative. "Index of the Massachusetts Innovation Economy, 2001." Westborough, Massachusetts: Massachusetts Technology Collaborative, 2001.

Moore, Craig. "Information Technology: The New Foundation." Amherst: The University of Massachusetts Donahue Institute. 1999.

National Institute for Working Life. "New media industry development: regions, networks, and hierarchies." Working Life Research and Development News. http://www.niwl.se/wl2000/workshops/workshop 63/article_en.asp

PricewaterhouseCoopers. "New York New Media Industry Survey Climate Study." New York City: New York New Media Association. 2000 and 2001. http://www.nynma.org/industry_intelligence/nynma_ir/2001

San Diego Source. "Digital New Media: Assessing San Diego's New Digital Media." San Diego, CA: San Diego Sourcebook, 2001. October 29, 2001. http://sourcebook.sddt.com/Spotlights/digital.cfm

Starger, Steve. "Regional Technology Alliance Cluster: Connecting a network of technology companies and educational facilities." *Western Mass. Business Magazine.* September 2001.

Stover, Thomas. "A River Runs Through It: High Tech-on-Hudson." New York, NY: *AlleyCat News: The Magazine of New York's New Economy.* March 2001.

Standard and Poor's DRI. "U.S. Metro Economies: Leading America's New Economy." Lexington, MA: Standard and Poor's DRI for the United States Conference of Mayors and the National Association of Counties. June 2000.

Techvalley.org. TechValley website. http://www.techvalley.org

University of Massachusetts Donahue Institute. "A Detailed Review of bTech Survey Findings." Amherst, MA: Donahue Institute. January 2001.

U.S. Department of Commerce. "Information Technology Industries" *The Emerging Digital Economy II.* http://www.ecommerce.gov/ede/chapter2.html June 1999.

Zuckerman, Amy. "Hidden Tech: on the trail of the Pioneer Valley's low-profile high-technology community." Boston, MA, *The Boston Globe*, February 10, 2002.