2004 INDEX OF INNOVATION AND TECHNOLOGY

TRI-CITIES, WASHINGTON

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Pacific Northwest National Laboratory
Richland, Washington 98352

Dear Reader:

The known story of the Washington State technology industry has centered for the last 10-15 years around a number of the highly-successful software firms in the central Puget Sound area (the most famous of which is Microsoft) and a number of health-related businesses centered on the Fred Hutchinson Cancer Research Center and the University of Washington Medical School. Looking back a little further, the story was aerospace, centered on the Boeing companies. One rarely hears about technology businesses elsewhere in the state. The story is of increasing interest statewide and is beginning to appear in reports such as the *2004 Washington Index of Innovation and Technology, published by the Washington Technology Center (http://www.watechcenter.org/techindex/index.html). This report supplements the Washington Technology Center study by providing additional information on the Tri-Cities (Richland-Kennewick-Pasco) area of the state, its technology businesses, and important advantages that the Tri-Cities have as places to live and do business.*

In 2001, the Economic Development Office of Pacific Northwest National Laboratory provided a report telling the story of what the business community of the Tri-Cities had been doing to grow technology companies. That earlier report also compared the Tri-Cities area to other technology areas in the Pacific Northwest and nation along critical dimensions known to be important to technology firms. This report updates the material in the earlier report. The report shows a Tri-Cities area that

- *Has been successful in founding and sustaining technology companies based on physics, chemical engineering, materials science, measurement equipment, information technology, and services*
- *Has considerable technical and entrepreneurial talent, leading to the founding of over 70 technology startups in the last five years*
- *Has not yet experienced many of the downsides of growth such as traffic congestion and high cost of living*
- *Has two factors impeding its technology-based economic development:a shortage of local equity capital and a need for greater local high-bandwidth connectivity (the "last mile" problem).*

This report may be read on the Internet at http://www.pnl.gov/edo/documents/innovationtechindex2004.pdf. The US Department of Energy funded the research that went into this report.

We hope that you find the story of the Tri-Cities as a home for technology companies appealing and informative.

Table of Contents

Introduction

Innovation and technology are considered by many observers to be key drivers in local economic growth and development for today and for the future. However, to be successful at establishing a local technology industry base, it is important for a community such as the Tri-Cities area (Richland-Kennewick-Pasco metropolitan statistical area, encompassing Benton and Franklin counties of Washington) to understand the relationship between the needs of technology companies and the attributes of the community. It is also important for the community to understand how it stacks up against the competition. This report updates a similar report published in 2001 by the Pacific Northwest National Laboratory's Economic Development Office. It provides and discusses a set of indicators that compare the needs of technology firms to key Tri-Cities features. Not every comparison that a reader might wish to make appears in this report. For the most part, the report compares Benton County to other counties and regions, but sometimes includes Franklin County or specific cities when this is more appropriate, or where county data are not available. Some economic data and other indicators that technology companies find important are not always available or up-to-date at the local level, and this is especially true in smaller metropolitan areas. Thus, the story is necessarily less complete than at the state or national level, or even when comparing larger metropolitan areas. Where possible, we have directly updated the earlier study and have included a few additional economic and social indicators. Where this has not proved possible because some data used in the earlier study are no longer available or not appropriate, we have tried to substitute other indicators. Many indicators remain available, and these provide a picture of a community with considerable strengths as well as some admitted weaknesses.

Summary Findings

The Tri-Cities rank highly for innovation and entrepreneurial activity and talent, especially compared in per capita terms to much more famous innovation centers. While the vast majority of Washington State's technology employment is found in the Puget Sound area and has grown faster than elsewhere in the state, the Tri-Cities area is actually more technology-oriented in certain key respects and offers several important quality-of-life advantages.

Indicators

The report provides information on five key indicator areas: innovation, competitiveness, growth, financial capacity, and quality of life. A sixth area that is sometimes reported at the state level, human potential, is more difficult to track at the local level, but some data that indicate the potential of the area have been included under innovation and quality of life.

Innovation

The Tri-Cities area is very innovative, especially for an area of its population size. While not as many new ideas flow out of science and technology in the Tri-Cities in absolute terms as in the much-larger Puget Sound area, the Tri-Cities area has a high percentage of high-technology output and employment, an even higher percentage of technology occupations than the Seattle area, very repectable new-patent statistics, and high growth rates in its high-technology sector.

Research and development is clearly alive and well in the Tri-Cities. Reflecting the historical makeup of the local high-technology sector, most patented innovations are in applications of physics, chemical engineering, and materials sciences rather than computer software and hardware, the mainstay of many other high-technology centers. The area is also very successful in attracting federal research and development spending.

Competitiveness

The Tri-Cities are competitive in developing, attracting, and keeping new technology industry, but the area has had to address some disadvantages in order to do so. Internet infrastructure, for example, has adequate "backbone" capacity, but local high-bandwidth connections remain an issue. The business climate is very pro-business, with a long list of business-assistance organizations and significant business incubator capacity. The tax burden is slightly higher and labor costs are lower than in key competitor areas.

Growth

While the Tri-Cities have not shown the spectacular growth in high-technology employment and income that the Puget Sound area experienced in the late 1990s, the growth rate since 2000 has been very solid, especially for small startup firms. Although partly a reflection of the small size of many of the startups, the percentage of firms showing 15% per year or more growth ("gazelle" firms) is actually higher in the Tri-Cities than in the Puget Sound area, and is well ahead of the national average. The Tri-Cities also seem to be emerging from the historical boom-bust cyclic behavior that once depended almost exclusively on employment at the Department of Energy's Hanford Site.

Financial Capacity

As is true to a lesser degree for Washington State as a whole, local financial capacity to bankroll new and innovative businesses is a significant weakness for the Tri-Cities. The area compensates for this weakness by being very assertive with the regional "angel" and venture capital communities and in substituting federal R&D dollars for private investment dollars.

Quality of Life

Because it is not a large metropolitan area and has not become overcrowded, the Tri-Cities area has several distinct quality-of-life advantages that it can market in competing with other areas of the country. Among these advantages are a mild, sunny climate and very good air and water quality, very short commute times and comparatively uncrowded roadways, overall low cost of living and very reasonable housing costs, low crime rates, strong public school systems, and easily accessible outdoor recreation opportunities.

Fig. 1. Technology Ranks for Pacific Northwest Cities

Metropolitan Area, State	Location Quotient Score	Location Quotient Rank	Creative Class Index Share	Creative Class Index Rank	High-Tech Index Rank	Innovation Index Rank
Richland-Kennewick-Pasco, WA	1.10	41	34.2%	19	58	75
Boise City, ID	1.40	28	34.1%	20	23	1
Portland-Vancouver, OR-WA	1.98	12	31.7%	45	11	32
Seattle-Bellevue-Everett, WA	2.05	8	34.8%	15	3	34
Spokane, WA	1.01	50	30.4%	66	81	163
Nation	1.00	--	30.0%	--	--	--

2002 High Tech GDP Location Quotient: Combined Metropolitan area high tech location quotient during 2002. Location Quotient (LQ) is a measure of high tech concentration (U.S. = 1.0). A metro with an LQ higher than 1.0 is said to be more concentrated than the United States and vice versa. Rank is relative to 296 metropolitan areas studied by the Milken Institute..

Creative Class Index: The creative class share of the workforce as defined by selected NAICS occupational categories, 1999. Rank is out of 276 metro areas studied by the Richard Florida Creativity Group.

High-Tech Index: Milken Institute's Tech Pole Index, which is a ranking of metropolitan areas based on a combination of 1) high-tech industrial output as a percentage of total U.S. high-tech industrial output and 2) the percentage of the region's own total economic output that comes from high-tech industries compared to the nationwide percentage.

Innovation Index: A ranking of annual average patent growth from 1990 to 1999.

Rank for last three columns is relative to 268 regions where data are available

Source: Milken Institute; Richard Florida Creativity Group

INNOVATION

Innovation Capacity

Innovation is the most important difference between a technology-based economy and a traditional resource-based economy. A technology economy thrives on its ability to produce new products and services that are based on new ideas. A high rate and dependence on innovation is the primary factor that distinguishes technology companies from more traditional firms. While there is no single indicator of local innovation capacity, one can begin to make an aggregate assessment based on a number of indicators that are published for local areas.

Indicators:

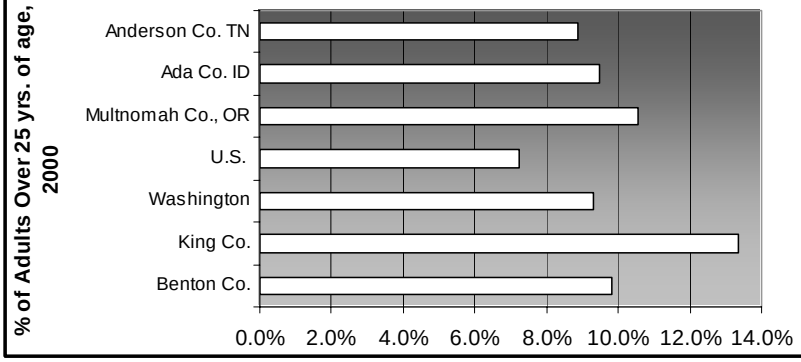
- relative shares of high-tech jobs and members of the "creative" professions in the workplace
- education of the workforce
- technical workers in the workforce
- patent generation
- research and development expenditures

Several organizations publish data and analyses that attempt to rate states and localities on how "technically-oriented" they are, as well as comparing some of the key enabling features such as education of the labor force and number of measurements of idea "output" (patented ideas generated) or "input" (research and development expenditures).

How well do the Tri-Cities perform?

The Tri-Cities area is in the top 20% of metropolitan areas of the country in terms of technology orientation. The area has a high concentration in technology–oriented industries and ranks in the top third for technology-oriented share of output. Furthermore, its share of employment in creative technology occupations is 19th in the country.

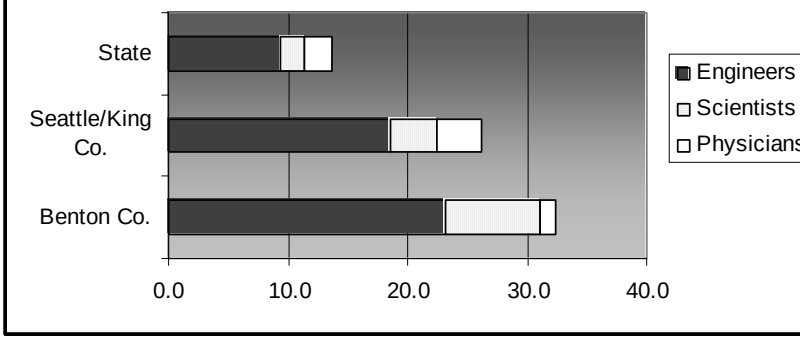
Fig. 2. Percentage Advanced Degrees



Education of the Workforce

Experts advise that areas successful in the technology-based economy are those that are able to attract smart people. These people generate the ideas on which a high-technology economy runs. In a technology-based economy, in which metropolitan areas increasingly specialize in high-skilled, knowledge-based production, the future prosperity of local areas stems from how educated and skilled their workforces are.

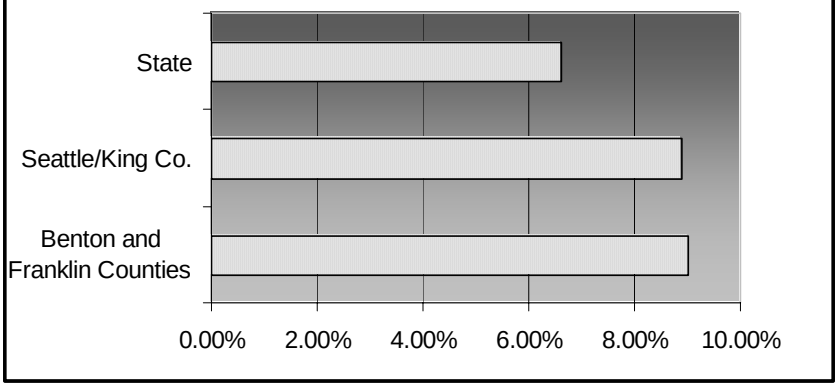
Fig. 3. Scientists and Engineers Per 1000 Population



How well do the Tri-Cities perform?

The Tri-Cities area is slightly ahead of the rest of the state in post-secondary educational attainment, except for King County, and is comparable to other competitor areas such as Multnomah Co., Oregon (Portland), Ada County, ID. (Boise) or Anderson Co., TN (Oak Ridge). The Tri-Cities area places well ahead of the Nation in general educational attainment. In addition, the Tri-Cities area has far more active scientists and engineers per capita (almost all of them work in Benton County) than the state. If physicians who are engaged in medical research are added to other scientists, King County comes closer, but Benton County still leads.

Fig. 4. Technology Occupations as % of Total Employment



Technology Orientation

A workforce oriented toward technology makes it easier for high-technology companies to start up and develop. A large grouping of such firms makes it easier for high-tech companies to find the services and allies they need to grow and prosper.

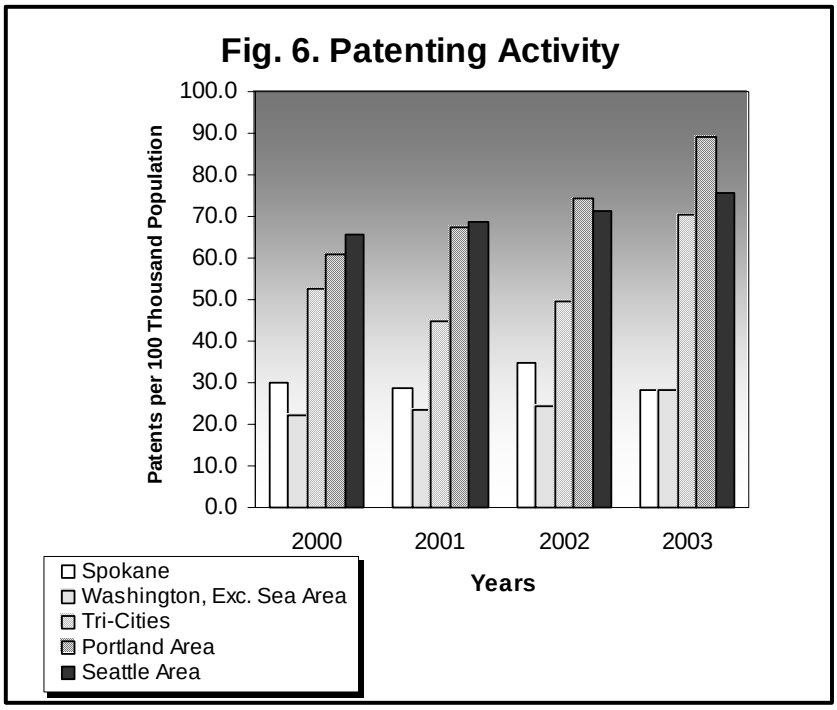
How well do the Tri-Cities perform?

The Tri-Cities area has a greater percentage of its workforce in "technology occupations" (defined in Appendix B) than the state of Washington or the even the technology-oriented Seattle/King county area. Unlike the state of Washington as a whole, the Tri-Cities area is not a significant player in the software and internet industries. The Tri-Cities technical strengths are in physics, chemical engineering, materials, and instrumentation-related businesses, research and development and engineering services, and in advanced agricultural services.

When seen from the perspective of technology employers, the Tri-Cities have over 360 technology units (establishments) with over 9,900 employees. This is a similar percentage of units and employment in high-technology industries as are found in the technology-dominated state of Washington as a whole. An advantage to prospective employers is the fact that although wage and employment growth in these Tri-Cities firms has been strong in comparison with the state's high tech industry, wage rates in the area are still not as high in absolute terms as in the Puget Sound area, or as high in relation to other industries in the area. Thus, even though Puget Sound high-tech wages have come down somewhat since the end of the 1990s, local labor in the Tri-Cities is still comparatively a bargain.

Fig. 5. High-Tech Units, Employment and Wages in the Tri-Cities and Washington State, 1999-2001

	Tri-Cities	Washington State
2001 Units	366	16,700
Employment	9,877	344,878
Wages (million)	$628	$26,353
Average Wage	$63,555	$76,414
High-tech as a % of Total		
2001 Units	5.2%	7.4%
Employment	11.5%	12.8%
Wages (million)	21.9%	26.2%
Average Wage	190.5%	204.0%
1999-2001 Growth		
High Tech Units	0.8%	6.6%
High-Tech Employment	10.9%	3.0%
High Tech Wages	27.9%	-3.2%
High Tech Average Wage	15.4%	-6.1%



Patent Generation

The number of patents generated by a region's companies, universities, and laboratories is a good general indication of how active the new idea creation process is. These new ideas are the basis for future products and companies. Without a sufficient number of these ideas, technology businesses will not grow as quickly and new businesses will not be founded.

In considering these data for small localities, it is important to remember that patent production is also affected by the strategies of individual companies in deciding whether to patent innovations. Some companies, for example, prefer to patent many related ideas to defend their "turf," while others patent only selectively.

Fig. 7. Tri-Cities Area Patents 2000-2003, by Category

Patent Category	Number
Class 427, Coating processes	13
Class 532-570 series, Organic compounds	8
Class 424, Drug, bio-affecting and body treating compositions	5
Class 073, Measuring and testing	4
Class 324, Electricity: measuring and testing	4
Class 376, Induced nuclear reactions: processes, systems, and elements	3
Class 052, Package making	2
Class 055, Gas separation	2
Class 060, Power plants	2
Class 095, Gas separation: processes	2
Class 096, Gas separation: apparatus	2
Class 209, Classifying, separating, and assorting solids	2
Class 219, Electric heating	2
Class 250, Radiant energy	2
Class 313, Electric lamp and discharge devices	2
Class 378, X-ray or gamma ray systems or devices	2
Class 422, Chemical apparatus and process disinfecting, deodorizing, preserving, or sterilizing	2
Class 423, Chemistry of inorganic compounds	2
Class 428, Stock material or miscellaneous articles	2
Class 518, Chemistry: fischer-tropsch processes	2
Class 588, Hazardous or toxic waste destruction or containment	2
Class 702, Data processing: measuring, calibrating, or testing	2
Subtotal	**69**
Total, 2000-2003	**210**
% of All in Top Categories	**33%**

How well do the Tri-Cities perform?

The number of patents granted to Washington inventors has consistently risen for the past five years. Measured as a share of total activity and in patents per 100,000 people in the population, the Tri-Cities are moving even faster. The two previous major patenting organizations in the Tri-Cities area, the Pacific Northwest National Laboratory (PNNL), operated by Battelle for the U.S. Department of Energy and Areva—formerly Siemens Power Corporation and Framatome ANP— have been joined by MesoSystems Technology, Inc., and Integrated Environmental Technologies, LLC. These four organizations generate technology ideas in much the same way as major research universities do in other localities and provide much of the intellectual "seed corn" for the growth of new firms. The top categories of innovation in the Tri-Cities have been in physics, chemical engineering, materials, energy, and measurement devices. Over 33% of all patents were in these top categories.

Fig. 8. Tri-Cities Patents by Organization					
	2000	**2001**	**2002**	**2003**	**Total**
Battelle Memorial Institute	35	33	37	56	161
MesoSystems Technology, Inc.	3	2	3	1	9
Integrated Environmental Technologies, LLC	3	0	1	3	7
Areva (Siemens Power Corporation)	5	1		1	7
Advanced Diagnostics, Inc.	0	0	2	1	3
Bind-N-Stix Twin Track, LLC		2	1		3
Subtotal	**46**	**38**	**44**	**62**	**190**
Total Tri-City Patents	**51**	**40**	**50**	**69**	**210**

Research and Development Expenditures and Assistance

The few companies that generate a large number of ideas provide a "spin-off" effect that has a positive result on the economy. In addition, large blocks of research expenditures provide opportunities for smaller technology companies to develop. Very little information is available at the local level for private R&D expenditures, but data on federal expenditures are available.

How well do the Tri-Cities perform?

PNNL is the second largest research organization in terms of federal research and development dollars in the state of Washington, close behind the University of Washington. This represents a huge potential for economic development of the Tri-Cities area, which is being rapidly fulfilled. PNNL provides technology and entrepreneurial assistance, access to user facilities and equipment, connections to sources of equity capital, and other expertise to help strengthen and diversify the local economy. Free technology assistance of up to one labor-week per year is available to qualifying small and local firms. PNNL has helped more than 440 firms this way in the last nine years, many more than once. Of these, at least 175 local companies received more than 13,000 hours of technology assistance by PNNL staff on 330 projects, at no cost to the businesses. PNNL helped start, expand, or recruit 72 Tri-City-area tech companies from 1996 through 2003, through technology and other forms of assistance. Seventy-four technology companies founded in the Tri-Cities area in the last 39 years have had their technology and/or management roots in PNNL.

Fig. 9. Federal R&D Grants plus Procurements Per Capita, Year 2002

	Federal Research Spending per Capita	Federal R&D Grants per Capita	Federal Procurements per Capita
Benton County	$15,298	$45	$15,253
King Co., WA (Seattle)	$1,394	$446	$948
Multnomah Co., OR (Portland)	$808	$258	$550
Santa Clara Co., CA (Palo Alto, San Jose)	$2,518	$274	$2,245
Cambridge, MA	$10,997	$6,677	$4,320
U.S.Average	$1,044	$103	$941

The Tri-Cities attract about $2.3 billion in non-defense spending by the federal government every year, most of it directed toward research, development, and science-based operations expenditures at the Hanford Site and PNNL. This represents a large pool of resources for smaller, specialized technology companies. The Tri-Cities area also compares favorably with other technology communities in per capita grants and procurements, especially when it is recognized that the Hanford contractors are generally not eligible to participate in the grants programs of the National Science Foundation (NSF). NSF provides a large portion of the federal grants for research and development elsewhere in the nation.

COMPETITIVENESS

Competitiveness measures how well the Tri-Cities area compares with other regions in attracting and keeping high-technology industry. Many of the so-called "output" indicators such as growth in technology employment in particular sectors are not available for localities as small as the Tri-Cities.

Indicators

- Technology infrastructure
- Services to technology firms
- Tax burden
- Labor costs

Technology infrastructure and services to technology firms enhance competitiveness in the regional, national, and global marketplace. Tax burden and labor costs are costs of doing business that need to be in line with principal competitor regions.

Why is competitiveness important?

States and regions that are competitive are able to attract the people, businesses, and capital that will help them grow. Continued economic growth depends on this ability to renew and expand the area's talent and resources.

Fig. 10. Some Features of Tri-Cities Internet Infrastructure

OC-48 Backbone (Northwest Open Access Network or NoaNet)

Some in-town access at OC-12

Several clusters of T-1 Servers; T-3 service readily available

Five companies investing in local optical fiber

Expanding Wi-fi wireless hotspots and networks

Overcoming "last mile" problem with "meet-me' centers (Three Rivers Local InterNetwork eXchange)

How well do the Tri-Cities perform?

The Tri-Cities' business and government communities have formed partnerships to assist startups and relocating businesses with technology infrastructure such as broadband capacity. The Tri-Cities meet many of the standards for high-speed internet communication, and now have sufficient bandwidth capacity at OC-48 and above, as necessary to permit easy exchange of large volumes of data. Plans are in place and are being executed to further increase local capacity and upgrade local delivery systems for wireless communications and expanded local high-speed data exchange and internet services (overcoming the so-called "last mile" problem).

Fig. 11. Alphabetical List of Tri-Cities Area Business Assistance Organizations

Applied Process Engineering Laboratory (APEL)
Benton-Franklin Council of Governments
City of Benton City
City of Kennewick
City of Pasco, Department of Community Development
City of Richland -Office of Business and Economic Development
City of West Richland
Columbia Basin College (CBC)
Economic Development Office, Pacific Northwest National Laboratory
Energy Northwest Industrial Site (formerly Supply System WNP-1/4 site)
Fluor Hanford Economic Diversification
Franklin County Public Utility District
Greater Pasco Area Chamber of Commerce
Hanford Area Economic Investment Fund Committee (HAEIFC)
Historically Underutilized Business (HUB) Development Program
Kennewick Irrigation District
Pasco Downtown Development Association (PDDA)
Port of Benton
Port of Kennewick
Port of Pasco
Procurement Technical Assistance Center (PTAC)
Prosser Economic Development Association (PEDA)
Public Utility District No. 1 of Benton County
Richland Chamber of Commerce
Service Corps of Retired Executives (SCORE)
Small Business Development Center Columbia Basin College
Tri-Cities Enterprise Center (TEC)
Tri-Cities Science & Technology Park
Tri-Cities Visitor and Convention Bureau
Tri-City Area Chamber of Commerce
Tri-City Industrial Development Council (TRIDEC)
Volpentest HAMMER Training and Education Center (HAMMER)
Washington Innovation Assessment Center (IAC)
Washington Manufacturing Services (WMS)
Washington State University Tri-Cities (WSU-TC)
Washington Technology Center (WTC)
WorkSource Columbia Basin
WSU Tri-Cities Business LINKS

Services to Technology Firms

Experts advise governments to "foster an innovative business climate." Governments are advised to recognize and celebrate public and private innovation and support the formation of high-tech business councils to encourage networking and learning. They are generally advised to reinvent and streamline land processes to have a smoothly functioning real estate market. Governments that succeed in the technology-based economy also encourage public and private partnerships. Successful governments in a technology-based economy form strategic visioning and managing partnerships across local government boundaries, with all the key players in a region (private sector, universities, labor, community organizations).

Some services critical to young technology companies are often found in business "incubators," which may provide building space, access to communications, financing, management expertise, and many other forms of assistance.

Fig. 12. Tri-Cities Business Incubators
Applied Process and Engineering Laboratory (APEL)
Technology Enterprise Center (TEC) Kennewick Business Center North Richland Business Incubator South Richland Business Incubator
Port of Benton
Port of Pasco
Port of Kennewick

How well do the Tri-Cities perform?

Local government and industry partner to provide management, regulatory, and financial assistance to startups. The Tri-Cities particular technical strengths are in physics, chemical process, materials, and instrumentation-related businesses, research and development and engineering services, and in advanced agricultural services. The Tri-Cities area boasts nearly 40 organizations and government partnerships that assist in economic development. These organizations include the Economic Development Office at PNNL and Fluor Hanford's Office of Economic Diversification, the Tri-Cities Industrial Development Council (TRIDEC), and organizations of local city and county governments, port districts, etc. Several provide incubator facilities.

Fig. 13. State Government Tax Rankings 2003

	Washington	Oregon	Idaho	Nation
State Per Capita Total Tax Collections	$2,114 (12th highest)	$1,602 (39th highest)	$1,716 (33rd highest)	$1,884
State Per Capita Collections By Type of Tax:				
Property Taxes	$245	$7	$7	$34
Sales and Gross Receipts Taxes (Including B&O Tax)	$1,648	$210	$0	$937
Licenses	$110	$162	$162	$124
Individual Income Tax	$0	$1,130	$618	$627
Corporate Net Income Tax	$0	$63	$68	$98
Other Taxes	$112	$29	$13	$64
Tax Climate Index	7.37 (8th best)	7.2 (9th best)	5.43 (33rd best)	5.97 --
State Business Taxes :				
Business Share of All Taxes	54% (10th highest)	35% (48th highest)	40% (35th highest)	43% --
Business Taxes Per Employee	$5,355 (4th highest)	$2,618 (49th highest)	$3,001 (41st highest)	3,760 --
Business Taxes Percent of Private Economic Activity	6.30% (7th highest)	3.40% (50th highest)	4.60% (36th highest)	5.17%

Tax Burden

Although not the most important factor in business location for high-technology companies, high business taxes make it more difficult for businesses to operate and expand. Similarly, high personal tax rates make it difficult to recruit employees, especially experienced and therefore more highly compensated employees. Washington has a unique tax structure, featuring a Business and Occupations Tax (B&O Tax) on gross sales and no personal or corporate income tax. Due largely to the absence of certain taxes, the state's "tax climate" index is ranked 7th best in the country by the Tax Foundation. The portion of state and local taxes paid by business is the highest in the western states, while the tax on personal income is the lowest of those same states. According to U.S. Census Bureau, Washington State ranks 12th highest in nation on overall state tax burden per capita.

Washington State provides an annual credit of up to $2 million against the B&O tax for those high-technology businesses that perform a specific minimum level of research and development in Washington under specific high technology categories. State law also provides for a sales/use tax deferral for expenditures by certain high-technology firms on new research and development or pilot scale manufacturing operations, or

expenditures to expand or diversify a current operation by expanding, renovating or equipping an existing facility.

How well do the Tri-Cities perform?

The Tri-Cities have minimal control over Washington State's tax structure. However, the local property tax rate in the area is not among the higher ones in the region and is below the national average.

- Benton County = $13.62/$1000
- Seattle = $12.00/$1000
- King County = $10.99/$1000
- Portland = $17.00/$1000
- Boise = $17.00/$1000
- National average = $16.43/$1000)

Fig.14. Year 2004 Wage Rates from Survey Data, Selected Technical Occupations

	Median Annual Wage		
Occupation	**Richland-Kennewick-Pasco MSA (Benton & Franklin Counties)**	**Seattle-Bellevue-Everett MSA (King & Snohomish Counties)**	**Washington State**
Civil Engineers	$68,806	$69,202	$64,938
Computer and Information Systems Managers	$93,662	$98,571	$95,160
Computer Software Engineers, Applications	$63,918	$75,712	$73,466
Computer Support Specialists	$31,117	$46,717	$43,160
Computer Systems Analysts	$56,701	$67,954	$65,229
Electrical and Electronic Engineering Technicians	$46,634	$50,752	$47,944
Electrical Engineers	$78,582	$74,630	$72,446
Engineering Managers	$105,893	$100,818	$97,157
Env. Scientists and Specialists, Incl. Health	$65,978	$58,594	$53,872
Graphic Designers	$38,896	$47,986	$42,661
Life Scientists, All Other	$55,578	$51,667	$52,125
Life, Phys, and Social Science Techs, All Other	$37,066	$34,715	$36,088
Natural Sciences Managers	$69,826	$91,936	$75,400

Labor Costs

Labor costs are usually the largest component of cost for any industry, but particularly for young technology companies. Other things equal, a less-expensive and more productive labor force is attractive to many firms.

How well do the Tri-Cities perform?

The Tri-Cities area has some lower wage rates and some higher ones in the technical occupations. In general, however, employers must pay more in the King County area because of the relatively high cost of living.

Fig. 15. National Commission on Entrepreneurship Growth Company Index for Selected Labor Market Areas (LMAs)

LMA	Total Companies, Base Period (1991)	No. Growing Over 15% per Year or 100% in 5 Years (1992-1997)	Index (U.S. Average =100)
Seattle	79,123	3,797	102
Portland	39,656	2,349	150
Spokane	13,837	763	136
Boise	9,855	611	117
Kennewick (Tri-Cities)	5,611	316	137

Data reflect the number of firms, not size.

GROWTH

Growth is measured both as an increase in available jobs and in the kind of jobs provided. The growth and vitality of individual companies improves the general ambience of the area and provides a ready market for locally produced goods and services. Many areas are concerned not just with the number of jobs created but in the quality of those jobs, with a preference for the so-called "family wage" jobs.

Indicators

The following indicators are related to growth:

- Employment in technology sectors
- Employment in startup companies
- Employment in fast-growing "gazelle" companies
- Average wage for technology workers
- Sensitivity to economic downturn.

How well do the Tri-Cities perform?

It is difficult to track startups and fast-growing "gazelle" companies in areas as small as the Tri-Cities because of disclosure issues. However, many new technology-oriented companies have been started in or attracted to the Tri-Cities area since 1996, and a large proportion of them continue to grow and prosper.

The Tri-Cities area (Kennewick LMA) performed very well on the National Council on Entrepreneurship (NCOE) Growth Company Index (GCI) published in 2001 (the index has not been updated since). GCI is based on the Census Bureau's Business Information Tracking System (BITS) longitudinal database, which for the first time permits researchers to look at individual firms and track their employment growth over time. GCI shows the relative number of companies in each of 394 LMAs that grew 100% or more from 1992-1997. The GCI national average is 100.

Fig. 16. High-Tech Units, Employment and Wages in the Tri-Cities and Washington State, 1999-2001

	Tri-Cities		Washington State	
	High-tech	**Total**	**High-tech**	**Total**
2001				
Units	366	7,054	16,700	225,527
Employment	9,877	86,070	344,878	2,689,366
Wages (million)	$628	$2,872	$26,353	$100,735
Average Wage	$63,555	$33,370	$76,414	$37,457
1999-2001 % Change				
Employment	10.9%	5.2%	3.0%	1.7%
Wages	27.9%	16.6%	-3.2%	6.6%
Average Wage	15.4%	10.9%	-6.1%	21.8%

Employment in Technology Firms

Employment in technology firms has been a key indicator for the growth of Washington State's economy during the last 20 years and has offset cycles in airframe manufacture, agriculture, pulp and paper and wood products, primary metals and agriculture. Employment in these industries is an indicator of how large and healthy these industries are.

How well do the Tri-Cities perform?

Although many of the high-technology firms outside of the "big two" (PNNL and Areva) are still relatively small, a few have reached the 100–200 employee stage. In addition, the pace of adding local firms has accelerated in the last five years, and growth of many of them has been rapid, reflected in the growing employment and payrolls in Tri-Cities high-tech compared with the state. This is partly reflected in the area's strong GCI performance shown earlier.

Growth in Startups

Small companies have the potential to provide a majority of job growth. Rapid job growth in startup companies can significantly affect the overall increase in employment for the state. This measure also reflects the extent to which local entrepreneurs have an effect on the overall economy.

How well do the Tri-Cities perform?

Local technology startups are still a very small part of the local Tri-Cities economy, but are rapidly growing in importance. The various services provided to startups and technical assistance from the Department of Energy, PNNL, and Fluor Hanford have helped foster this growth.

Sensitivity to Economic Downturn

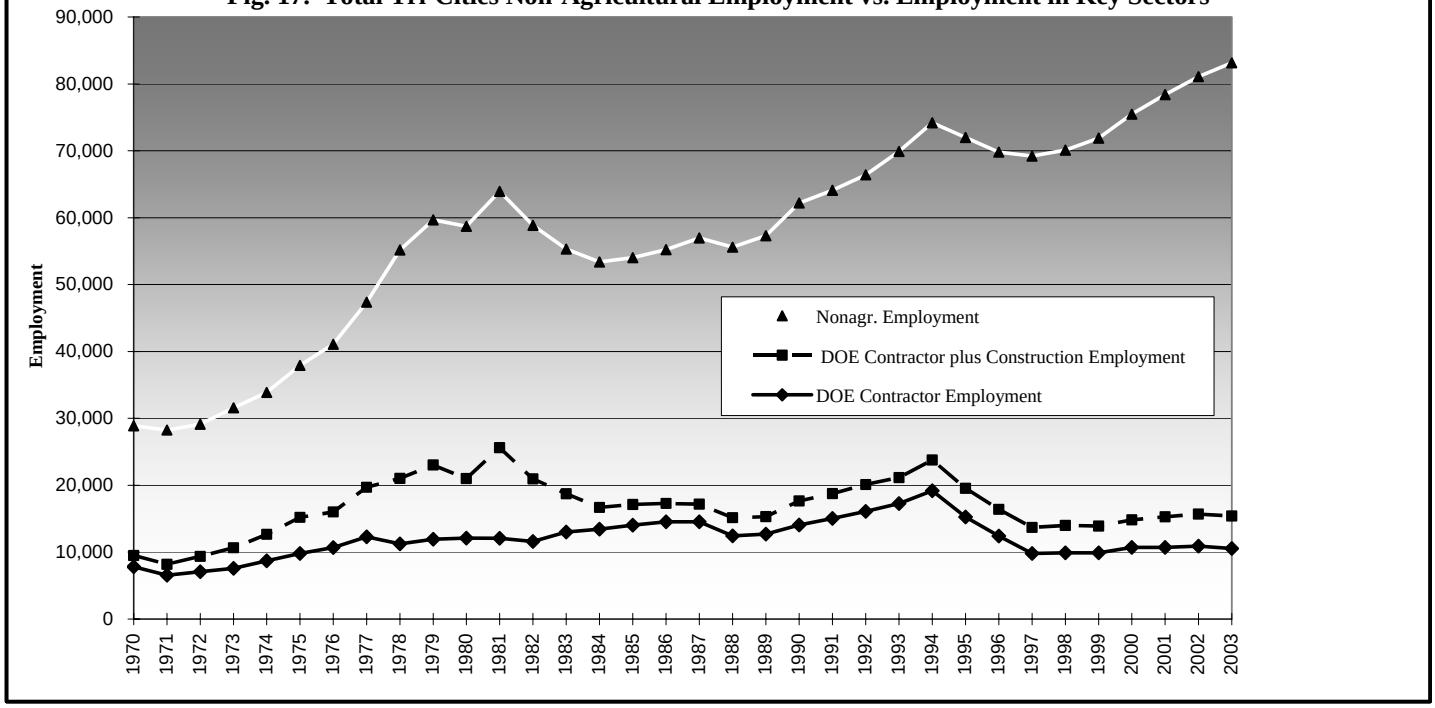
Washington State's major industries historically have been sensitive to business cycles. For example, the Boeing recession of the early 1970s severely affected the economy of the Seattle area and similar impacts were felt in both aircraft and

technology firms in the early 2000 period, while business cycles in construction and wood products in particular have adversely affected many of the state's smaller communities. The Tri-Cities area economy has been driven by budget cycles at the U.S. Department of Energy (DOE). Understanding the sensitivity of technology firms to business cycles provides some forewarning about future economic difficulties.

How well do the Tri-Cities perform?

Although grouped around energy production and defense activities funded with federal dollars, the Tri-Cities economy has also shown a marked cyclical sensitivity. Diversification of the local economy is one way to mitigate such cycles. Growth in the local Tri-Cities economy was fairly steady throughout the 1990s, even with loss of Hanford employment since 1995. This is a sign of increased maturity and depth of the local economy. It is not yet clear how dependent local technology firms may be on continued DOE budgets.

Fig. 17. Total Tri-Cities Non-Agricultural Employment vs. Employment in Key Sectors



FINANCIAL CAPACITY

Financial capacity is the ability of local firms to grow by attracting local capital investment.

Indicators

Both private (equity capital) and public (state and federal) sources of technology capital are important to measure financial capacity. Some indicators that are usually used include:

- Regional venture investment
- Growth in venture investment
- Distribution of venture investment
- Small Business Innovation Research (SBIR) program awards.

Most of these indicators are not available for the Tri-Cities, but SBIR awards are, and the situation with respect to equity capital is well understood.

Why is financial capacity important?

It can be argued that ready access to capital is one of the most important success factors for technology companies, since they often make relatively large front-end investments. Especially in the technology sectors, strong capital backing is needed to ensure that new ideas can be translated into new products. Many partially developed ideas fail in the so-called “valley of death” between invention and manufacture, for lack of ability to attract early investors.

There is frequently a strong geographic tie between capital investment and management guidance, and between a company and its investors. Thus, when a local company can attract local capital, it has a much higher chance of remaining in the locality.

How well do the Tri-Cities perform?

Lack of local private capital sources is a fundamental problem in the Tri-Cities. As the overall Washington State capital markets grow, this will become less of a constraint on growth, but for now entrepreneurs have to show considerable

ingenuity and persistence to attract capital investment. The Tri-Cities aggressively pursues the funding that is available in the Pacific Northwest. Several local agencies assist entrepreneurs with business plans and developing appropriate contacts within the financial community.

Fig. 18. Financial Support Available to Tri-Cities Technology Businesses

Business and Industry Loan Guarantee Program
Cascadia Revolving Fund
Columbia Regional Economic Development Trust (CREDIT)
Columbia Trust Angels
Community Development Block Grants
Community Economic Revitalization Board (CERB)
Delta Angel Group (Spokane)
Electrical Infrastructure
Facility Rent Programs (Port Districts)
Hanford Area Economic Investment Fund
Regional Revolving Loan Fund
Rural Development Investment Fund
Rural Business Enterprise Grants
Rural Business Opportunity Grants
Rural Economic Development Loans
Rural Economic Devleopment Grants
Southeastern Washington Development Association (SWDA)
Tax Exempt Economic Development Bonds
Tri-City Enterprise Association (TEA)
TRIDEC Incentive Fund
TRI Angels
US SBA 504 Loans
US SBA 7(a) Loans
Washington Economic Development Finance Authority
WA Department of Community, Trade & Economic Development (CTED) Programs

Regional Venture Investment

While the growth of local private investment in the Pacific Northwest has been impressive, growth is not keeping pace with other technology regions of the country. PricewaterhouseCooper's "Money Tree" reports rank the Pacific Northwest, with $580 million in total private venture investment (less than one-tenth the amount in Silicon Valley), as 11th out of 19 technology-growth regions and 9th (of 19) in number of venture investment deals in 2003. The average increase in venture investment for the 19 regions between 1996 and 2003 was 142%—more than ten times Washington's growth rate of 14%. The Tri-Cities have a very small (unreported) share of the venture investment dollars in the Northwest.

Washington's companies have been active in the Small Business Innovation Research (SBIR) program, ranking the state 11th of all states in total awards for the period 1999-2002, and 13th in per capita amounts at $20.46. For the latest period reported (1999-2002) the Tri-Cities area ranked well above average in this successful state on a per capita basis ($59.57).

How well do the Tri-Cities perform?

Because of the lack of local venture funding resources, Tri-Cities economic developers regularly attend meetings of the Northwest Entrepreneur Network, Alliance of Angels, Delta Angel Group, Early Stage Investment Forum, and WSA (formerly, Washington Software Association) Investment Forums to form relationships with out-of-area funding sources. Statewide data from Northwest Venture Associates show that 80% of venture capital in the state goes into only three areas: computer related, medical and health care, and communications, none of which are considered Tri-Cities strengths.

Fig. 19. SBIR Awards 1999-2002

	No. of Awards	Total Dollars (1,000)	Dollars Per Capita
Benton County	36	$8,487	$59.57
King Co. (Seattle, WA)	405	$93,192	$53.65
State of Washington	506	$120,578	$20.46
Multnomah Co. (Portland, OR)	79	$13,001	$19.68
State of Oregon	282	$61,445	$17.96
State of Idaho	46	$8,530	$6.59
Nation	21,274	$4,810,994	$16.87

SBIR Program Awards

The ability of small businesses to attract competitive research money is an indicator of the research competence and relevance of these firms to the federal sector. One indicator is the awards of the Small Business Innovative Research (SBIR) Program from the various federal agencies.

How well do the Tri-Cities perform?

Small Tri-Cities area firms have very been successful in attracting SBIR money, outperforming both the Pacific Northwest and the nation. The consolidated reporting on this program lags considerably behind the recent success stories of small Tri-Cities firms; nevertheless, some local firms were successful, even in the period though 2002, and have become more so since then. The Tri-Cities area receives SBIR awards at a rate three times that of the state of Washington and 3.5 times that of the nation as a whole. Even California, the most successful state overall in obtaining SBIR grants, receives only $28.94 per capita.

QUALITY OF LIFE

Indicators:

To gauge the quality of life in the Tri-Cities, we quantify some of the non-economic factors that make life enjoyable for residents and attract others to the area. Some indicators include:

- Weather
- Air and Water Quality
- Local Transportation and Traffic Congestion
- Transportation Access
- Cost of Living
- Crime
- School Quality
- Leisure Activities.

Why is quality of life important?

A pleasant physical and social environment is important to technology workers. These factors are important both in attracting and retaining qualified individuals. Technology economy authorities advise metropolitan areas to "create a great quality of life." To make a region more attractive to knowledge workers, metropolitan areas need to take steps to boost forward-looking amenities like outdoor recreation facilities, improved public transportation, and reduced road congestion by (among other things) expanding road capacity and deploying new intelligent transportation systems.

How well do the Tri-Cities perform?

The Tri-Cities area provides its citizens with a pleasant physical environment with excellent weather and air and water quality. The area features many of the amenities of larger metropolitan areas with few of the drawbacks such as severe traffic congestion, high housing prices, or crime.

Weather

Workers tend to prefer warm climates with low precipitation and with considerable sun.

Fig. 20. Weather and Air Quality

	Tri-Cities (Hanford Weather Station)	Boise	Portland	Seattle	Spokane	Nation
Annual number of days with measurable precipitation (over .01 inch).	68	91	152	148	113	109
Sunny days	202	214	137	136	176	213
Air Quality : 90th Percentile, EPA Air Quality Index (lower is better)	51	61	56	82	64	65
Annual Days, Min Temp < 32	105	124	44	32	141	83
Annual Days Max >90	52	43	10	3	21	34
Rainfall (in.)	7	11.9	37.5	34	17	34.6

How well do the Tri-Cities perform?

The Tri-Cities area has a sunny, dry climate with warm-to-hot summers and mild winters. The area does not experience the high summer humidity or cold winters that characterize most of the eastern U.S. It also avoids much of the heavy cloud cover that characterizes many Pacific Northwest locations. Cloud cover in the Tri-Cities is largely confined to the period from mid-November to early February, with May-October mostly clear.

Air and Water Quality

Superior air and water quality is an important feature that attracts technology workers into an area.

How well do the Tri-Cities perform?

The Tri-Cities' air and water quality compares favorably with better-known principal competitor areas in the Pacific Northwest, which are in turn noted for their superiority to most of the country.

Fig. 21. Local Transportation

	Tri-Cities	Portland	Seattle	San Jose	Los Angeles	Nation
Average travel time to work, 2000 Census (minutes, one way)	21.4	24.4	27.7	29.3	29.1	25.5
Yearly travel delay per person, hours, 2001	3	48	60	64	101	26
Daily peak travel time in congestion (% of 6-8 peak travel hours when speed is reduced due to congestion	25	78	79	73	88	67
Mass transit availability Index (Higher is better. National average is 8.0)	33.2	21.9	39.4	16.3	18.9	8.0

Local Transportation and Traffic Congestion

As is true in most small metropolitan areas, traveling to work, shopping, entertainment and other activities is primarily by car. However, the Tri-Cities area does have a bus-based public transportation system with reasonably frequent service, as well as vanpool and transportation assistance such as Dial-a-Ride.

How well do the Tri-Cities perform?

As reflected in average commuting delays, traffic congestion is practically non-existent in the Tri-Cities. As compared with Seattle or Portland metropolitan areas, the typical driver spends far less time on the road to accomplish the same work commute. The average commuting time in the Tri-Cities area is about 21 minutes (perhaps 25 minutes for Hanford workers) and involves less than 12 minutes delay (round trip) for peak hour Hanford workers due to traffic. The annual delay averaged over the population is less than five hours per year, whereas other metropolitan areas typically have much higher figures for traffic delay.

Transportation Access

Access to the major metropolitan areas in the country and the world is important to the senior management and sales staff of high-technology companies. Major metropolitan areas have this ready access, whereas air service in smaller metropolitan areas is often less frequent and sometimes less convenient.

How well do the Tri-Cities perform?

One major carrier and two regional airlines serve the Tri-Cities Airport. Elapsed trip times to Chicago, Boston, New York, Atlanta, and San Francisco from the Tri-Cities and other metropolitan areas at most times of day are similar for the Tri-Cities and other Pacific Northwest cities; however, direct jet service from many of the competitors offers some faster connection times from Seattle, Portland, Spokane, and Boise. The Tri-Cities area is located on an interstate highway, with freeway access to Seattle, Portland, Boise, and Spokane. The Tri-Cities area is served by two major railroads and has five port facilities on the Columbia-Snake River barge system.

Cost of Living

High costs of living mean that workers must work longer hours and employers must pay higher wages to support an equivalent lifestyle. Larger metropolitan areas typically have higher costs of living (especially housing). Smaller metropolitan areas frequently do not show costs that are as high.

Fig. 22. Cost of Living

	Tri-Cities (Richland)	Boise	Portland	Seattle	Spokane	Nation
Cost of Living Index	109.4	102.4	119.2	136.3	97.3	100.0
Median home price	$145,390	$128,140	$163,480	$223,320	$100,810	$146,102
Property taxes (per $1,000 of home value)	$13.60	$17	$17.0	$12.0	$13.0	$16.43
Home utility cost index	72.6	85	81	67.2	66.4	100.0
Health cost index	126.8	107.9	124.9	130.3	123.2	100.0

How well do the Tri-Cities perform?

The Tri-Cities area shows median housing prices slightly below the national average, compared with much higher prices in many metropolitan areas. Thanks to low electricity and gas prices and relatively mild weather, utility bills are also low. The overall cost of living is slightly above the national average, and much lower than in many metropolitan areas.

Crime

Violent crime and property crime are both serious issues in many parts of the United States. To attract and retain workers, they must believe that they are safe in their homes and at work and that their children are safe in their school and after-school lives.

Fig. 23. Crimes per 100 Thousand Population

	Tri-Cities (Richland)	Boise	Portland	Seattle	Spokane	Nation
Violent crime	156	307	1,237	767	737	446
Property Crime	2,868	4,452	6,897	8,397	7,305	4,162

How well do the Tri-Cities perform?

Tri-Cities crime rates are very low for a metropolitan area, and there is very little violent crime. This makes the area an exceptionally safe environment in which to live and work.

Fig. 24. Average National Percentile Rank on the ITBS/ITED* Selected School Districts and State, 2002-2003

	Grade 3 ITBS		Grade 6 ITBS		Grade 9 ITED	
	Math	Reading/ Math Composite	Math	Core Total	Quantitative Thinking	Core Total
Benton County						
Richland	66	64	57	59	67	61
Kennewick	63	62	53	52	57	54
King County						
Seattle	71	66	57	57	60	59
Bellevue	77	72	69	70	75	74
Lake Washington	78	74	74	75	74	73
Northshore	81	75	76	73	77	75
Washington State	67	63	58	56	59	57

* Iowa Tests of Basic Skills (ITBS); Iowa Tests of Educational Development (ITED)

Fig. 25. Percent of Students Meeting Washington State Assessment of Student Learning Standards, Selected School Districts and State, 2002-2003

	4th Grade		7th Grade		10th Grade	
	Math	Overall (4 subjects)	Math	Overall (4 subjects)	Math	Overall (4 subjects)
Benton County						
Richland	59.3	38.6	40.9	31.8	50.7	44.5
Kennewick	58.8	40.7	29.8	22.8	48.0	42.4
King County						
Seattle	53.1	36.1	33.9	26.7	34.9	29.2
Bellevue	70.2	48.9	55.4	44.6	64.9	58.7
Lake Washington	72.2	51.8	55.2	44.1	63.5	58.2
Northshore	71.2	51.9	58.7	45.0	62.6	55.7
Washington State	55.2	34.4	36.8	27.2	39.4	33.6

Fig. 26. High School Graduation and Dropout Rates, Selected Districts and State, 2001-2002

	On-time Graduates as % of Class of 2002	Dropouts as % of Total October Enrollment, Grades 9-12
Benton County		
Richland	85.9%	4.5%
Kennewick	90.8%	6.7%
King County		
Seattle	70.5%	8.9%
Bellevue	89.2%	2.5%
Lake Washington	89.0%	2.0%
Northshore	92.1%	1.4%
Washington State	79.0%	10.6%

Quality of Schools

Experts advise that a strong K-12 system in an area is important not only because it produces better workers, but also because it is a key amenity in drawing knowledge workers. It is impossible for a city or region to be a successful in the technology-based economy over the long run if its schools are failing or even mediocre.

How well do the Tri-Cities perform?

The Tri-Cities schools do a good job of educating the area's children. Richland in particular has strong outcomes in comparison with either the state or the nation. Washington State itself is above the national average on the Iowa Skills tests (ITBS and ITED), and the local schools do better yet.

Both the Richland and Kennewick districts out-perform the state average on the Washington Assessment of Student Learning. On-time high school graduation rates are also above the state average and are similar to those in northern King County. Dropout rates are well below the state average.

Leisure Activities

Technology workers are interested in an environment with a variety of leisure activities, especially those involving outdoor recreation.

Fig. 27. Selected Outdoor Recreation Opportunities

	Miles of Paved Bike Trails per 100 Thousand People	Park Acres per 1000 People	Boat Ramps, Launch Areas per 1000 People	Public Golf Holes per 100,000 People
Benton-Franklin Counties	15.5	27.0	15.0	65.4
King County	5.7	22.0	2.3	28.6
Multnomah Co. (Portland, OR)	20.7	54.6	2.5	27.9
Ada County (Boise ID)	11.7	10.8	0.9	66.4
Spokane County	8.6	8.1	4.9	50.1

How well do the Tri-Cities perform?

Thanks to its climate, the Tri-Cities area offers a variety of outdoor activities centered on golf, team sports, and river-based recreation, with more than 4 million visitor days per year to the area's parks, beaches, and marinas. The new Hanford Reach National Monument is expected to add a new dimension to outdoor recreation. Golf opportunities are particularly abundant, with year-round play possible in most years. In addition, the local area is home to minor-league hockey and baseball franchises and numerous local arts organizations, including a symphony orchestra, an opera company, and a light opera company.

Summary Comparisons: Tri-Cities, Washington, State and the U.S.

The following table summarizes some comparisons between the Tri-Cities and the state of Washington and/or the Seattle area as a location for high-technology activity. Some of the Washington State values are taken from the *Washington State 2004 Index of Innovation and Technology* by the Washington Technology Center.

	Nation	Washington State	Seattle Area (King County)	Tri-Cities (Benton County)
Innovation				
State Technology and Science Index (Milken Institute 2004)	51.5	69.7 (6th in Nation)	--	--
Location Quotient (high tech real output and concentration in tech industries) (Milken Institute 2003)	1.00	--	2.05 (8th out of 296 in nation (Seattle Area)	1.10 (41st out of 296 metro areas in nation)
Creative Class Index 2002	30.0	--	34.8 (15th out of 268 metro areas in nation–Seattle metro area)	34.2 (19th out of 268 metro areas in nation)
High Tech Index 2002	--	--	3rd out of 268 metro areas in nation (Seattle metro area)	58th out of 268 metro areas in nation
Innovation Index 1990-1999	--	--	34th out of 268 metro areas in nation (Seattle metro area)	75th out of 268 metro areas in nation
Patent Generation per 100,000 population, 2003	30.2	45.1 (Excluding King County: 28.1)	75.6	70.6
National R&D Expenditures, 2000 (National Science Foundation)	$264.6 billion ($940 per capita)	$10.5 billion (8th in Nation)	--	--
Federal R&D Expenditures per capita (grants plus contracts)	$1,044	$1,079	$1,394	$15,298
Technology Occupations as % of Total Employment (State Dept. of Employment Security) 1Q 2003	--	6.6 %	8.9%	9.0%
Education of the Workforce: Graduate Degrees (% of Workforce> 25 Years of age) (2000 Census)	7.2%	9.3%	13.3%	9.8%

Appendix A

	Nation	Washington State	Seattle Area (King County)	Tri-Cities (Benton County)
Competitiveness				
Tax Burden (Business Share of State Tax Collections) (Ernst and Young)	43%	54% (10th highest in nation)	--	--
Property Tax Rate, 2003 (combined) (Washington State Dept. of Revenue and Sperling's "Best Places")	$16.43/$1,000	$12.33/$1,000	$10.99/$1000	$13.62/$1000
Growth				
Rate of Growth in Startup Companies (Progressive Policy Institute)	--	1st in nation	--	--
Growth Company Index (No. of firms per capita growing at more than 15% per year, or 100% over 1992-97) (National Council on Entrepreneurship, 2001)	100.0	100.0	102	137
Growth in high-tech employment, 1999-2001 (Employment Security)	--	--	3.0%	10.9%
Average Wage in High-Tech Industries, 2001 (Employment Security)	--	--	$76,414	$63,555
Annual labor costs in 13 Technical Occupations (Employment Security)	--	--	Above state average for 11 out of 13 occupations.	Above state average for 6 out of 13 occupations.
Financial Capacity				
Small Business Innovative Research Investments, per capita, 1999-2002 (Small Business Administration)	$16.87	$20.46	$53.65	$59.57
Quality of Life				
Iowa Tests of Educational Development, 9th Grade, Percentile vs. Nation (Superintendent of Public Instruction)	Math: 50 Core Total: 50	Math: 59 Core Total: 57	Seattle: Math: 60 Core Total: 59	Richland: Math 67 Core Total 61 Kennewick: Math 57 Core Total 54
Annual Lost Hours in Commuting Time Due to Congestion 2001 (Texas Transportation Institute 2003)	(Median of 75 Metro Areas): 26	--	Seattle: 60	3

Appendix A

	Nation	Washington State	Seattle Area (King County)	Tri-Cities (Benton County)
Mass Transit Availability Index Sperling's "Best Places" Rankings	8	--	Seattle: 39.4	33.15
Annual Days, Mostly Sun (Clear or Partly Cloudy) (NOAA)	213	--	Seattle: 136	202
Air Quality Index (Higher is better) (EPA)	65	49	Seattle MSA: 82	51
Cost of Living Index (Lower is Better)	100	100	Seattle: 136.3	109.4
Median Housing Price (Sperling's "Best Places")	$146,102	$146,102	Seattle: $223,320	Tri-Cities: $145,390
Home Utility Cost Index (Lower is Better)	100	100	Seattle: 67.2	72.6
Crimes per Thousand Persons Money.com "Best Places" Rankings	Violent 416 Property 4,462	--	Seattle: Violent 767 Property 8,397	Richland: Violent 156 Property 2,868
Golf Holes Per 100 Thousand People	—	—	28.6	Benton and Franklin Counties: 65.4
Paved Bike Trails per Capita (Miles)	—	—	5.7	Benton and Franklin Counties: 15.5

Appendix B: Definitions of the Technology Occupations and Industries

Technology industries are industries that employ a high percentage of the technology occupations. As used in the 2004 Index of Innovation and Technology by the Washington Technology Center, a practical working definition is any Standard Industrial Classification (SIC) Code having at least 7% or more of its employment in "technology" occupations. The occupations and industries meeting those definitions in Washington State are listed below.

Technology Occupations	
Physicians	Chemists
Physicists & Astronomers	Meteorologists
Biological Scientists	Geologists, Geophysicists, Ocean
Medical Scientists	Physical Scientists, NEC
Life Scientists, NEC	Systems Analysts
Mathematical Scientist, NEC	Data Base Administrators
Operations Research Analysts	Computer Support Specialists
Engineer, Math, Natural Science Mgrs	Computer Programmers
Aeronautical & Astro Engineers	All Other Computer Scientists
Metallurgists & Rel Engineers	Statisticians
Mining Engineers, Incl Safety	Medical and Clinical Laboratory Technologists
Petroleum Engineers	Technical Writers
Chemical Engineers	Civil Engineering Technicians and Technologists
Nuclear Engineers	Electrical and Electronic Engineering Technicians and Technologists
Civil Engineers, including Traffic	Industrial Engineering Technicians and Technologists
Agricultural Engineers	Mechanical Engineering Technicians and Technologists
Electrical & Electronic Engineer	All Other Engineering and Related Technicians and Technologists
Computer Engineers	Biological, Agricultural, and Food Technicians and Technologists, Except Health
Industrial Engineers, Ex Safety	Chemical Technicians and Technologists, Except Health
Safety Engineers, Except Mining	Nuclear Technicians and Technologists
Mechanical Engineers	Petroleum Technicians and Technologists
Marine Engineers	All Other Physical and Life Science Technicians and Technologists
Engineers, NEC	Mathematical Technicians

APPENDIX B

Technology SIC Codes (Source: Index of Innovation and Technology Washington State 2003)	
281 Industrial inorganic chemicals	372 Aircraft and parts
282 Plastics, rubber and fibers	375 Motorcycles, Bicycles and Parts
283 Drug manufacturing	376 Guided missiles, space vehicles and parts
286 Organic chemicals	381 Search and navigation equipment
287 Agricultural chemicals	382 Measuring and controlling devices
289 Misc chemicals and chemical preparations	384 Medical equipment, instruments and supplies
291 Petroleum refining	385 Opthalmic Goods
351 Engines and turbines	386 Photographic equipment and supplies
353 Construction and related machinery	481 Telephone communications services
354 Industrial tools	482 Telegraph and other message communications
355 Special industrial machinery	484 Cable and other pay television services
357 Computers and office equipment	489 Misc communications services
361 Electrical distribution equipment	504 Wholesale office and computer equipment
362 Electrical industrial apparatus	506 Wholesale electrical equipment, parts and appliances
363 Household equipment	737 Computer and data processing services
364 Electric wiring and lighting	781 Motion picture production
365 Household audio visual equipment	807 Medical and dental laboratories
366 Communications equipment	871 Engineering and architectural services
367 Electronic components and accessories	873 Research and testing services
369 Misc electrical equipment and supplies	874 Management and public relations services
371 Motor vehicles and equipment	

Appendix C: References

Innovation

Figure 1: Technology Ranks for Pacific Northwest Cities. Milken Institute, *Best-Performing Cities: Where America's Jobs are Created.* 2003. http://www.milkeninstitute.org/pdf/best_cities_june2003.pdf, with indexes at http://www.milkeninstitute.org/research/research.taf?cat=indexes&function=detail&ID=24&type=BPC. See also Richard Florida, *The Rise of The Creative Class.* Basic Books, 2002.

Figure 2: Percentage Advanced Degrees. Educational Attainment 2000. U.S. Census Bureau, *American Factfinder.* **factfinder.census.gov**

Figure 3: Scientists and Engineers Per 1000 Population. Washington State Department of Employment Security, WILMA System. Figures are for 1st Quarter, 2003.

Figure 4. Technology Occupations as % of Total Employment. Washington State Department of Employment Security

Figure 5. High-Tech Units, Employment and Wages in the Tri-Cities and Washington State, 1999-2001. Washington State Department of Employment Security.

Figure 6. Patenting Activity. Delphion Research, U.S. Patents Granted dataset www.delphion.com.

Figure 7. Tri-Cities Area Patents, 2000-2003, by Category. U..S. Patent Office and Trademark Office, USPTO Full Text and Image Database, http://patft.uspto.gov/netahtml/search-adv.htm.

Figure 8. Tri-Cities Patents by Organization. See Figure 6.

Figure 9. Federal R&D Grants plus Procurements Per Capita, Year 2002. Consolidated Federal Funds Report, 2002, Searchable Database. www.census.gov/govs/www/cffr.html.

Competitiveness

Figure 10. Some Features of Tri-Cities Internet Infrastructure. Compiled from *Tri-Cities Broadband Story: Briefing for Richland Chamber of Commerce TRIDEC IT Task Force Bandwidth Committee.* John McCoy, Chair. February 12, 2004. http://www.tridec.org/welcome/docs/Tri-Cities_Broadband.pdf.

Figure 11. Alphabetical List of Tri-Cities Area Business Assistance Organizations. PNNL Economic Development Office Website: http://www.pnl.gov/edo/.

Figure 12. Tri-Cities Business Incubators. PNNL Economic Development Office Website: http://www.pnl.gov/edo/.

Figure 13. State Government Tax Rankings, 2003. Total taxes and per capita amounts and rankings from U.S. Census Bureau, Federal, State, and Local Governments 2003 State Government Tax Collections. http://www.census.gov/govs/www/statetax03.html. Tax climate ranking from by Hodge, et al., *State Business Tax Climate,* Tax Foundation, Washington D.C., 2003: http://www.taxfoundation.org/bp41.pdf. Business Tax data from Cline et al., *Total State and Local Business Taxes: A 50-State Study of the Taxes Paid by Business in FY2003.* Ernst and Young, Inc. for The Council on State Taxation, 2004. The study can be found at the Association of Washington Business website: http://www.awb.org/media/specialreport/50-StateStudy-main.pdf. and the Ernst and Young website at http://www.ey.com/global/content.nsf/US/Tax_-_Publications_-_Total_State_and_Local_Business_Taxes.

Figure 14. Year 2004 Wage Rates from Survey Data, Selected Technical Occupations. Washington State Department of Employment Security, WILMA System.

Growth

Figure 15. National Commission on Entrepreneurship Growth Company Index for Selected Labor Market Areas (LMAs). National Commission on Entrepreneurship, *High-Growth Companies: Mapping America's Entrepreneurial Landscape.* http://www.publicforuminstitute.org/nde/reports/2001-high-growth.pdf. Kennewick LMA is Benton and Franklin Counties.

Figure 16. High-Tech Units, Employment, and Wages in the Tri-Cities and Washington State, 1999-2001. Special tabulation by the Washington State Department of Employment Security.

Figure 17. Total Tri-Cities Non-Agricultural Employment vs. Employment in Key Sectors. Derived from the Washington State Department of Employment Security, LMI System. http://www.workforceexplorer.com/.

Figure 18. Financial Support Available to Tri-Cities Technology Businesses. PNNL Economic Development Office Website: http://www.pnl.gov/edo/.

Financial Capacity

Figure 19. SBIR Awards 1999-2002. Small Business Administration, *SBIR Award Winners [Year].* SBA Tech-Net on-line database of individual award winners. http://tech-net.sba.gov/tech-net/search.html. The 2002 data were obtained from the websites of the individual agencies. Dollar amounts were not available for NASA grants for 2002. A list of agency SBIR links can be found at http://www.zyn.com/sbir/#agsites.

Quality of Life

Figure 20. Weather and Air Quality. Most data: From Sperling's Best Places to Live website, http://www.bestplaces.net/city/ccompare.aspx. Precipitation and sunshine data for the Tri-Cities: Pacific Northwest National Laboratory, PNNL-13117. 2000. *Hanford Site Climatological Data Summary 1999, With Historical Data*. D. J. Hoitink, K. W. Burk, and J. V. Ramsdell. Pacific Northwest National Laboratory, Richland, Washington, Table 6.1. Air quality is a summary of EPA Air Quality Index values. 90% of all days during 2003 were at or below the value shown in the figure. EPA air quality rankings: Good = 0-50, Moderate = 51-100, Unhealthy for Sensitive Groups = 101-150, Unhealthy = 151+. See: http://www.epa.gov/air/data/geosel.html.

Figure 21. Local Transportation. Most commuting data from Texas Transportation Institute, *2003 Urban Mobility Study*. http://mobility.tamu.edu/. Data for Tri-Cities estimated from data compiled in Perteet Engineering, Thomas/Lane and Associates, Inc., and SCM Consultants, Inc., *The Impact of the Tank Waste Remediation Project on the Hanford Communities*. August 2001(draft). Transit data from Money.Com website, Best Places to Live. http://money.cnn.com/best/bplive/bplive_allcities.html.

Figure 22. Cost of Living. From Sperling's Best Places to Live website, http://www.bestplaces.net/city/ccompare.aspx.

Figure 23. Crimes per 100 Thousand Population. From Sperling's Best Places to Live website, http://www.bestplaces.net/city/ccompare.aspx.

Figure 24. Average Percentile Scores on Iowa Standard Achievement Tests by 3rd, 6th, and 9th Graders, Selected School Districts vs. Nation and State, 2002-2003. Office of the Washington State Superintendent of Public Instruction http://reportcard.ospi.k12.wa.us/.

Figure 25. Percent of Students Meeting Washington Assessment of Student Learning Standards, Selected Districts and State, 2002-2003. Office of the Washington State Superintendent of Public Instruction http://reportcard.ospi.k12.wa.us/.

Figure 26. High School Graduation and Dropout Rates, Selected Districts and State, 2001-2002. State Superintendent of Public Instruction, Graduation and Dropout Statistics for Washington's Counties, Districts, and Schools School Year 2001-02.Available at http://www.k12.wa.us/DataAdmin/default.aspx.

APPENDIX C

Figure 27. Selected Outdoor Recreation Opportunities. Data on trails and acres were compiled from telephone interviews with local county officials. Some additional data came from the following websites. Trails: http://www.metrokc.gov/parks/trails/trails1.htm, http://www.weirscyclery.com/trails.htm. Golf courses: http://www.golfwashington.com/courses.html, http://www.idahogolfassn.org/affiliat.htm, http://www.oregongolf.com/. Boat ramps: Washington Interagency Commission on Outdoor Recreation website http://boat.iac.wa.gov/

Note: Millken's Science and Technology Index is defined as follows: "The State Technology and Science Index is composed of five major composites (Research & Development Inputs, Risk Capital and Infrastructure, Human Capital Investment, Technology and Science Workforce, and Technology Concentration and Dynamism) weighted equally. Each of the components is measured on a relative basis to a relevant indicator (population, Gross State Product, number of establishments, etc.) The data were collected from a number of governmental agencies, foundations, and private sources and compiled by the Milken Institute." See R. C. DeVol, R. Koepp and F. Fogelbach, State Technology and Science Index: Comparing and Contrasting California." Milken Institute, September 2002. http://www.milkeninstitute.org/pdf/nst.pdf