



# The Economic Impact of Technology-Based Industries in Washington State May 2005



# The Economic Impact of Technology-Based Industries in Washington State: An Introduction

Adapted from *The Economic  
Impact of Technology-Based  
Industries in Washington State*

A Technology Alliance Report  
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This report is the fourth in a series analyzing employment, business activity, and income stemming from a major segment of Washington's economy – our “technology-based industries” – commissioned by the Technology Alliance. This report documents the growth and development of technology-based industries in the Washington economy up to 2003 and their impact on our state's overall economy in the year 2003. Previous studies in this series were released in 1997, 1998 and 2001, benchmarked to 1995, 1997, and 2000 employment data. It is not easy to determine all of the industries that should be considered for inclusion in a study of this type. Terms such as “technology industry,” “high technology,” and “advanced technology” are frequently used by scholars, the media, political leaders, and others interested in this rapidly changing part of our economy. This study defines technology-based industries as those with at least 10% of their employment engaged in research and development (R&D) related occupational categories. This definition is consistent with State of Washington and U.S. Bureau of Labor Statistics definitions of “high-tech” industries. State of Washington Department of Employment Security data benchmarked against the year 2002 was used to identify the industries included in this study. While primarily in the private sector, some important segments of these technology-based industries are public employers. All segments generate a significant fraction of their business volume out-of-state, and thereby contribute to the economic base of our state. As a group these industries have been growing rapidly, expanding their contribution to Washington's economy over the past several decades.

Thank you to our study sponsors:

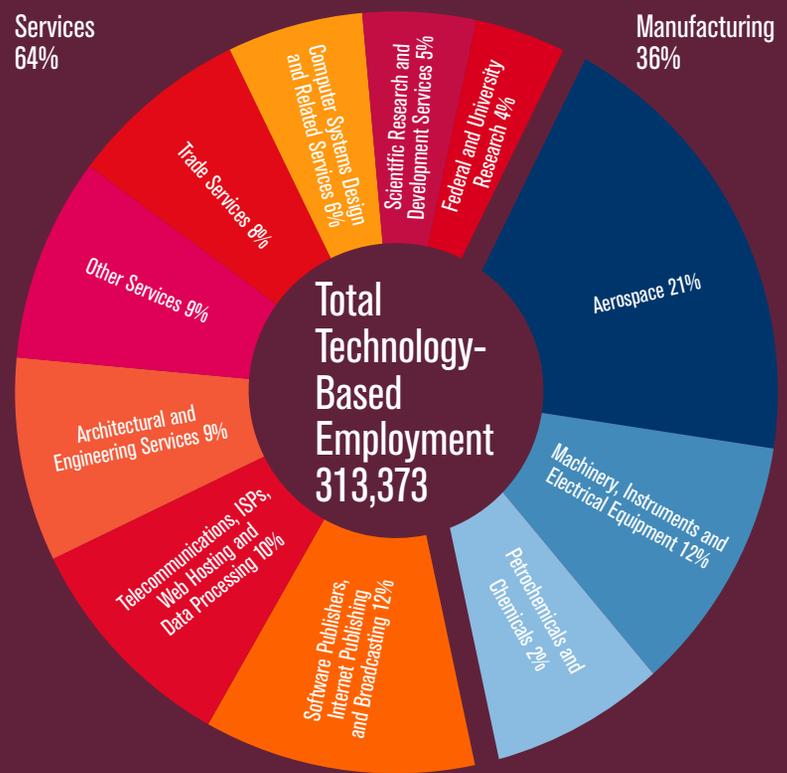
**Raven Foundation**



## Technology-based industries have a significant impact on Washington's economy:

Technology-based industries employed over 313,000 people in Washington State in the year 2003 (this figure also includes university and federal research employees; it excludes proprietors not covered by the Employment Security Department). Through multiplier effects, a total of 1.19 million jobs were created due to technology-based industries, representing 45% of total covered employment in the study period. Similar percentages of overall Washington State business activity (sales), labor income, and tax revenues are associated with the industries included in this study.

Economic impacts of the industries included in this study are relatively high due to the high wages paid in these industries. Technology-based industries support a total of 3.8 jobs for each direct job, compared to an average of 2.8 jobs in all industries. Labor income in technology-based industries averaged \$91,938 in 2003, compared to a state average of \$47,519, or 93% above the state average. Technology-based businesses contribute strongly to the export-base of Washington State, as 63% of their sales are out of state, compared to an economy-wide average of 41%.



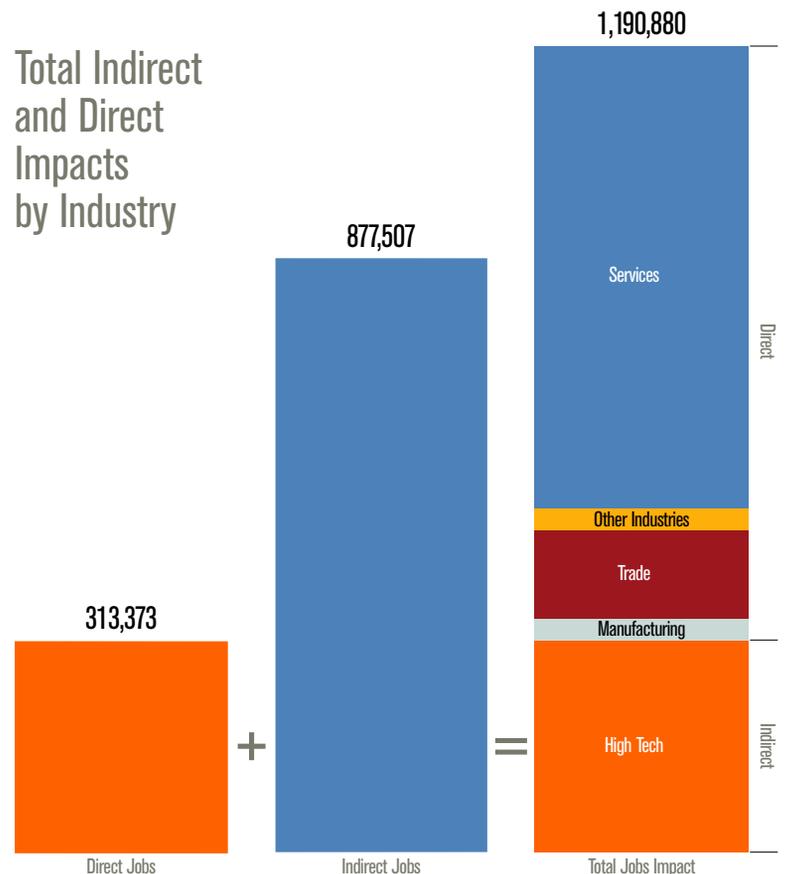
## Technology-based industries represent a growing share of total state employment:

There has been rapid growth in technology-based industries, compared to overall economic activity. Private sector technology-based employment has expanded from 96,000 jobs in 1974 to 300,772 jobs in 2003, an increase of 213%. This compares to a statewide increase in covered employment of 92% over the same time period. In 2003 there were 12,601 public sector university and federal research related jobs in Washington State, bringing total technology based employment to 313,373. Total technology-based employment has grown from 6.7% to 11.8% of total state employment over the 1974-2003 time period, which indicates that technology-based industries have made a growing contribution to the economic base of the state.

### A Note about NAICS

This is the fourth in a series of studies of the economic impact of technology-based industries produced by the Technology Alliance. Previous studies used industry data arranged according to the Standard Industrial Classification (SIC) system. SIC codes have since been replaced by the North American Industry Classification System (NAICS). For a detailed explanation, see the full report text available on the Technology Alliance web site at [www.technology-alliance.com](http://www.technology-alliance.com).

## Total Indirect and Direct Impacts by Industry



## Washington has a high level of research and development activity compared to the rest of the nation:

Research and development expenditures in Washington State, an important indicator of technology-based activity, outpaced the United States in recent years. R&D activity in Washington State as a share of Gross State Product in 2000 was 4.8%, compared with the national average of 2.7%. We have especially strong receipts and expenditures by industry and non-profits, while university and college research receipts are similar to the national average. Industry accounts for the largest share of R&D dollars in Washington State (89% in 2000), with very strong receipts in the information industry. Washington has a concentration of industry R&D that places us 8th in the U.S. in terms of dollars received, and 5th when the size of R&D expenditures in Washington State is indexed by our size relative to the U.S. Washington's concentration of industrial R&D ranks 3rd in the U.S., while we rank 2nd on federally funded research and development centers, and 6th in "other nonprofits." For comparison, Washington is the 15th most populous state in the United States.

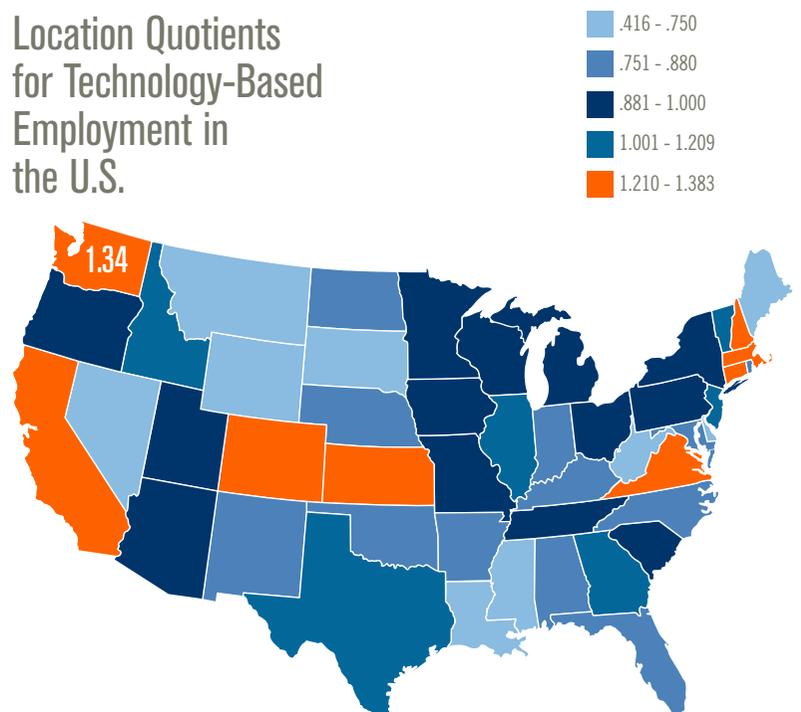
## Key Findings

- Technology-based industries directly employ over 313,000 people in Washington. Through direct and multiplier effects, these industries account for 45% of all jobs in the state.
- The average salary paid by technology-based industries is 93% higher than the state average.
- Technology-based industries' share of total state employment is growing: between 1974 and 2003, private sector employment in these industries expanded from 6.7% to 11.8%.
- Washington State is a center of technology-based employment and R&D activity, ranking 3rd in the nation in concentration of technology-based industries. Washington also ranks 3rd in concentration of technology-intensive industries, defined as those having more than 30% of employees engaged in R&D.
- Technology-based employment has spread to every county in the state, with one-third of Washington's 39 counties having at least 1,000 people employed in such industries. Significant concentrations of technology employment, exceeding 11,000 employees, are found in King, Snohomish, Pierce, Clark, Benton and Spokane counties.

## Washington has a high concentration of technology-based industries compared to the rest of the nation:

The concentration of technology-based industries in Washington State is well above the national average. In 2002, the latest year for which data are available to make national comparisons with the definitions of technology-based industry used in this study, Washington State had employment in these industries 34% above the national average. Our sizeable aerospace sector has been a primary contributor to this high index; if we exclude aerospace, the Washington economy has a concentration in these sectors that is only 13% above the national average. Our strong software and computer services sector had a concentration 98% above the national average, while scientific R&D labs and medical laboratories were 76% above the national average. Waste remediation activity in Washington State had a concentration nearly triple the national average, largely due to activities at Hanford. The overall concentration of technology-based industries in Washington has declined slightly since peak levels of aerospace employment (when we were about 42% above the national average).

Location Quotients for Technology-Based Employment in the U.S.



# Educate. Innovate. Prosper.

1	Excellent education systems
2	Strong research capacity
3	A robust entrepreneurial environment

## About the Technology Alliance

The Technology Alliance (TA) is a statewide consortium of leaders from our state's diverse high-tech businesses, research institutions, and the community dedicated to Washington's economic success. We believe this success is dependent upon three drivers:

Excellent Education Systems

Strong Research Capacity

A Robust Entrepreneurial Environment

Through programs, events, research studies, and policy activities the TA works to mobilize support for these drivers in order to grow and sustain a vibrant technology-based economy benefiting all of Washington's citizens.

## Technology Alliance Programs

### Alliance of Angels

The Alliance of Angels (AoA) is a group of accredited investors and representatives of investment corporations active in financing early stage technology companies in the Pacific Northwest. AoA also hosts investor-oriented educational forums on topics relating to emerging technologies and investment strategies.

### Science & Technology Roundtable

The Science & Technology Roundtable (STRT) produces a series of monthly breakfast meetings featuring presentations by regional and national experts on cutting-edge innovations in science and technology. STRT educates its members about the latest developments and showcases the contributions of our research institutions.

### Technology Alliance Research

The Technology Alliance is a leading voice in our state on issues and policies surrounding the technology sector. In addition to this series of reports detailing the impact of technology-based industries on the state economy, recent Technology Alliance reports include: *Is Washington's Higher Education Providing a Foundation for a Strong Economic Future? Assessing Washington's Performance*, comparing Washington higher education to that of eight peer states with technology-intensive economies and providing an overview of business leader perspectives on higher education in our state; and, *Drivers for a Successful Technology-Based Economy: Benchmarking Washington's Performance*, comparing Washington to its peer states in indicators of K-12 and higher education performance, research capacity, and entrepreneurial climate.



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