Technology Alliance

DRIVERS FOR A SUCCESSFUL INNOVATION ECONOMY:

BENCHMARKING WASHINGTON'S PERFORMANCE

A TECHNOLOGY ALLIANCE REPORT
MAY 2013

How competitive is Washington in building and sustaining a vibrant, technology-based innovation economy that benefits all of our state's citizens?

In 2003, the Technology Alliance set out to answer this question with our first benchmarking study. Our approach was to analyze Washington's performance compared to that of other states in the essential drivers of a thriving technology sector and long-term economic success:

Strong RESEARCH CAPACITY
A robust ENTREPRENEURIAL CLIMATE
Excellent PRE-K – 12 & HIGHER EDUCATION SYSTEMS

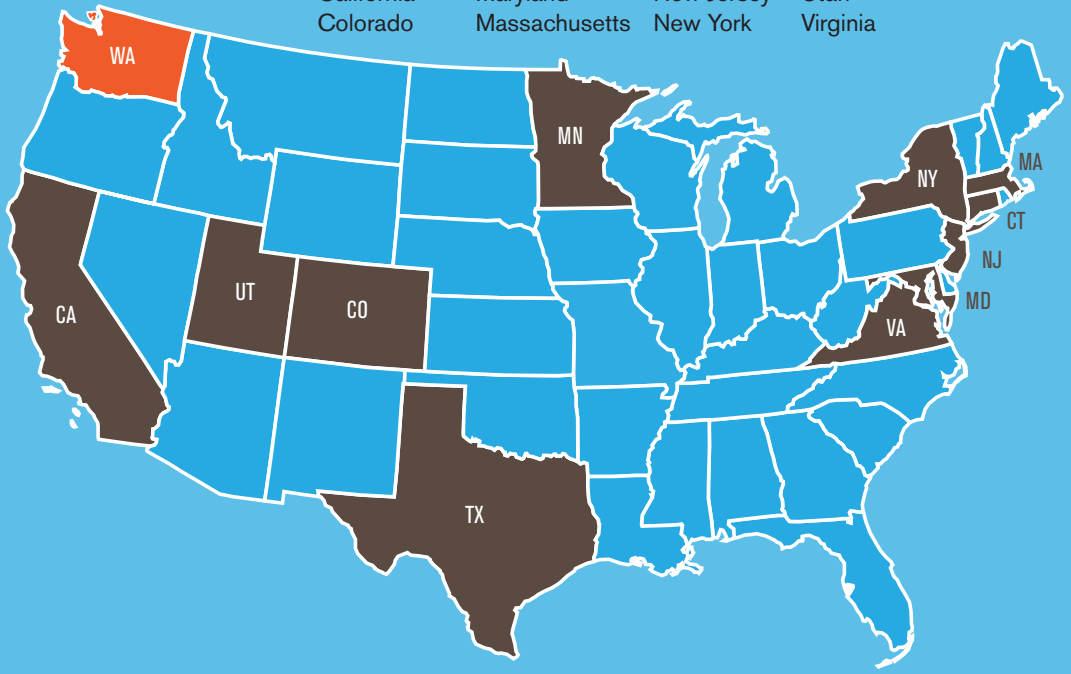
On the 10th anniversary of that groundbreaking report assessing Washington's competitiveness in the drivers of technology-based growth, we revisit the data to measure our progress and gauge how well our state and its citizens are positioned to realize the economic benefits of innovation in the future.

The Technology Alliance compares Washington to the rest of the nation, but also focuses on a select group of states that we consider peers and competitors for the talent, investment, and infrastructure that support a thriving innovation economy.

We selected our peers based on an analysis that identified states having a similar technology industry profile to our own, along with a significant concentration of research and development activity. In 2003, we chose eight states for comparison with Washington. As the economy has changed over the past decade, so have the states that we consider to be our peers. For our 2013 study, we selected 11 states with technology-intensive economies. Of those, five states (Connecticut, Minnesota, New Jersey, New York, and Utah) were not considered peers in 2003. Two states from the original peer group (Michigan and Georgia) were omitted from the current list.

TWELVE TOP CONTENDERS IN THE INNOVATION ECONOMY

Washington	Connecticut	Minnesota	Texas
California	Maryland	New Jersey	Utah
Colorado	Massachusetts	New York	Virginia



The Technology Alliance worked with William B. Beyers, Professor Emeritus in Geography at the University of Washington, on data collection and analysis. The tables in this brochure are arranged by rank within the peer group and also provide rankings for Washington and our peers out of 50 states. Some indicators contain historical comparisons with our performance in prior years.

Research Capacity & Entrepreneurial Climate

Strong research and development is the foundation for a thriving technology-based economy. It is the source of new knowledge, leading edge innovations, and entrepreneurial companies. A climate in which the companies that translate R&D into new products, services, and jobs are able to grow and thrive is also essential to fully realizing the promise of this innovation activity. Sustained investment and access to educated talent are required for our state to be successful in both. The data indicate that we have strengthened our position relative to our peers and to the rest of the nation – with a couple of caveats.

RESEARCH & DEVELOPMENT

Washington ranks high among peers and the nation in research capacity, measured as expenditures on R&D activities by various performers. Washington companies and institutions performed a total of more than $16.4 billion in R&D in 2010, the most recent year for which data are available.

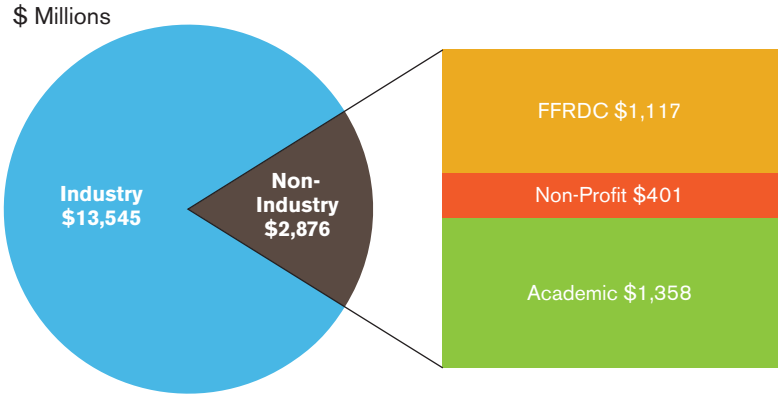
Our state excels in R&D conducted by private industry, which accounted for 82% of our total activity. On a per capita basis, Washington ranked 2nd among our peers and 3rd in the nation, an improvement over 5th place nationally in 2003. Washington also outperforms most states in R&D conducted by non-profit institutions and federally funded research and development centers (FFRDCs), a category that includes federal laboratories. In the latter, we topped the peer group in 2010, fueled by activity at the Pacific Northwest National Laboratory.

Washington's overall performance, largely driven by the volume of industry activity, masks a relative weakness in academic R&D. Our competitive position in this category is limited by the relatively small size of our academic research enterprise, for which we primarily depend upon two public institutions: the University of Washington and Washington State University. States that rank highly in this metric, such as Maryland and Massachusetts, benefit from the presence of large, private research universities.

Our position in this category is cause for concern, because academic R&D is heavy on the "R" – research – while industry R&D tends to emphasize the "D" – development. Basic research at our academic institutions is the foundation of innovation further downstream.

WASHINGTON R&D ACTIVITY BY PERFORMER

$ Millions



TOTAL: $16.4 Billion

National Science Foundation

How robust is Washington's climate for research and innovative company growth?

R&D ACTIVITY BY PERFORMER
Expenditures Per Capita

INDUSTRY	2010 $	2010 RANK	2003 RANK
MA	$2,136	2	1
WA	**$2,009**	**3**	**5**
CT	$1,817	4	2
NJ	$1,809	5	7
CA	$1,739	6	6
MN	$1,176	10	10
CO	$772	13	12
MD	$757	15	13
UT	$744	16	27
VA	$580	24	19
TX	$570	25	23
NY	$565	26	26

FFRDC	2010 $	2010 RANK	2003 RANK
WA	**$166**	**4**	**4**
MA	$120	5	6
MD	$120	6	9
CA	$115	7	5
CO	$108	8	7
VA	$83	9	10
NY	$28	11	12
NJ	$10	15	16
TX	$1	17	18
CT	$0	18	19
MN	$0	18	19
UT	$0	18	19

NON-PROFIT	2010 $	2010 RANK	2003 RANK
MA	$274	1	1
WA	**$60**	**4**	**5**
MD	$54	5	4
CO	$51	6	16
MN	$48	7	6
CA	$33	8	9
NY	$23	10	12
VA	$17	13	14
TX	$8	24	29
CT	$7	27	25
NJ	$3	39	40
UT	$1	47	34

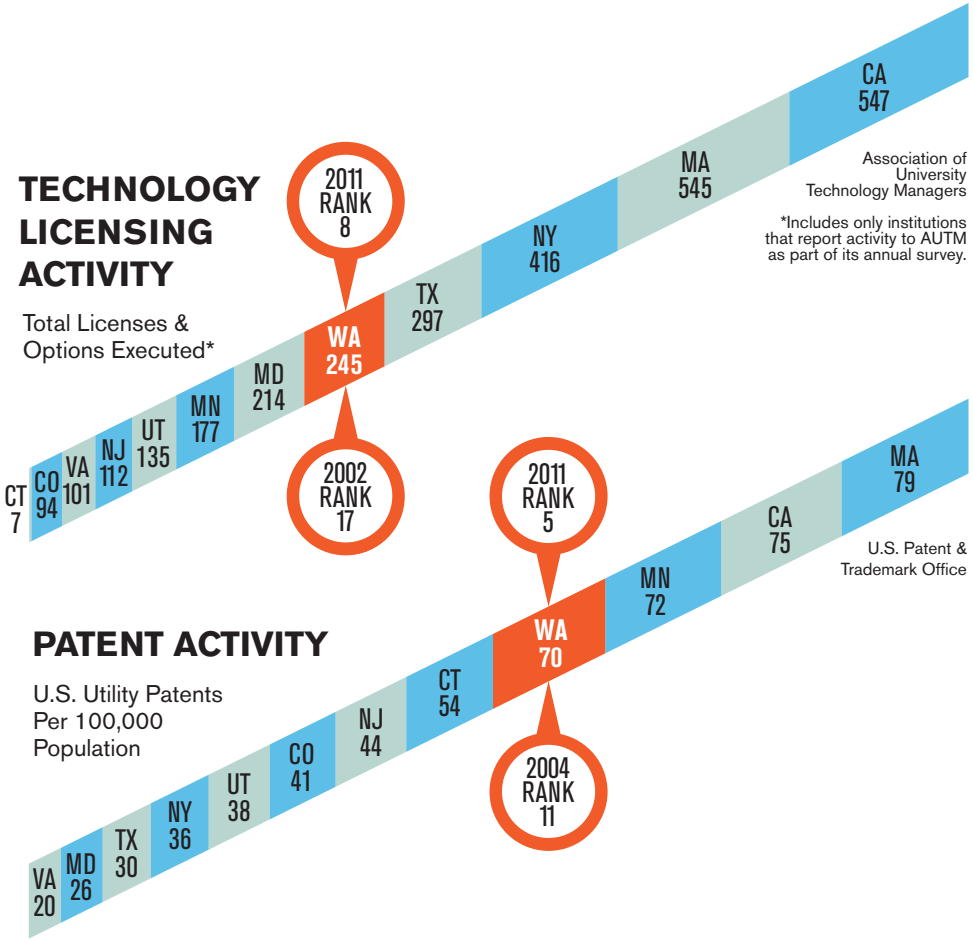
ACADEMIC	2010 $	2010 RANK	2003 RANK
MD	$542	1	2
MA	$419	2	1
NY	$255	6	16
CT	$249	8	9
CO	$234	12	18
CA	$210	16	19
UT	$203	20	12
WA	**$201**	**22**	**21**
TX	$175	29	27
MN	$157	35	40
VA	$149	37	38
NJ	$122	42	42

NSF/U.S. Census Bureau

LICENSING & PATENT ACTIVITY

While it is difficult to neatly capture the impact of research in terms of the generation of new knowledge, the creation of new products and services, enhanced quality of life for our citizens, and long-term contributions to our economy, two metrics – university licensing and patent activity – can serve as indicators of research sector outputs. Washington is competitive relative to our peers and the rest of the nation in both measures, and we have improved our position over time.

Washington ranked 5th among our peers and 8th in the nation in total licenses executed by our institutions in 2011– a marked improvement over our position in 2002, when we ranked 17th. We have also bolstered our patent activity, ranking 4th among peers and 5th out of 50 states in patents generated per capita, up from 11th in 2004. Washington's patent activity has notably picked up in recent years: we rank 19th in cumulative patents per capita between 1963 and 2011, but we rank 8th in patents issued between 1998 and 2011, and 5th in patents issued since 2006. While these two metrics do not tell the whole story, they do indicate that our robust research inputs are generating results compared to other technology-intensive states.



STATE & LOCAL GOVERNMENT SUPPORT FOR RESEARCH

Funding Per Capita

	2010 $	2010 RANK
TX	$24.68	3
NY	$16.70	11
VA	$14.46	15
MN	$13.18	19
WA	**$12.16**	**21**
NJ	$11.70	23
MD	$10.89	25
UT	$10.81	26
CA	$10.13	31
CO	$9.11	33
CT	$5.59	42
MA	$3.66	47

NSF/U.S. Census Bureau

Washington ranks 5th among our peers and 21st in the nation in state and local government support for academic research. Because we rely on our public universities to generate academic R&D activity, our lackluster support for these institutions is a potentially limiting factor on our future innovation capacity. Recent state budgets have no doubt exacerbated the problem by diverting public dollars intended for the Life Sciences Discovery Fund to other purposes.

VENTURE CAPITAL INVESTMENT

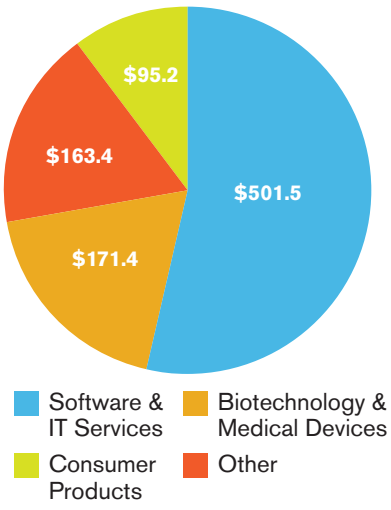
The deployment of venture capital dollars in the U.S. has historically been a story of imbalance among states, and this imbalance appears to be growing: California alone captured more than half of total venture capital investment in 2012, compared to 41% in 2000. California and 2nd ranked Massachusetts repeatedly have dominated this metric for reasons that can be considered structural. Their combination of strong public and private research institutions, a high concentration of venture capital firms, and the early development of large, successful technology companies enabled them to mature as centers of entrepreneurial activity ahead of other states.

Although Washington's share of total venture capital pales in comparison, we ranked 4th among our peers and in the nation with $932 million, equivalent to 3.5% of the total invested in 2012. Software and information technology services captured more than half of Washington's venture capital, with 18% directed to biotechnology and medical devices. Within the peer group, Washington ranked 4th in software/IT investment and 5th in life sciences investment. We nearly doubled our share of total U.S. investment in software/IT services compared to 2002, from 2.6% to 4.9%. While we saw a slight increase in life sciences investment, our share of the national total declined from 3% to 2.6%.

The top four states in the peer group, including Washington, increased their respective share of total venture investment compared to a decade earlier, while all other states in the group, with the exception of Utah, declined. When investment is indexed to gross state product, Washington moves up to 3rd behind Massachusetts (1st) and California (2nd), with Utah coming in 4th.

WASHINGTON VENTURE CAPITAL

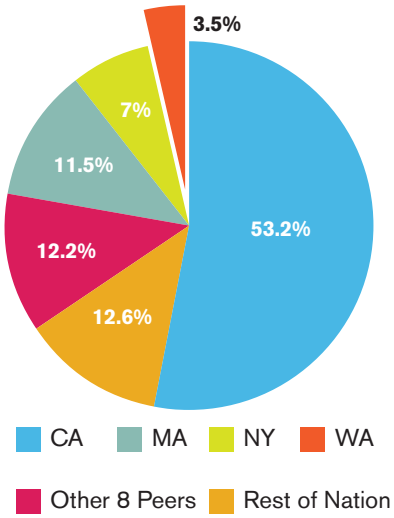
By Major Sector
$ Millions



PricewaterhouseCoopers/National Venture Capital Association MoneyTree Report

VENTURE CAPITAL INVESTMENT BY STATE

% of Total $ Invested



$ Millions

	2012 INVESTMENT	2012 RANK	2012 DEALS
CA	$14,090	1	1,521
MA	$3,034	2	410
NY	$1,853	3	331
WA	**$932**	**4**	**117**
TX	$924	5	153
CO	$560	6	99
NJ	$429	9	54
VA	$375	10	81
UT	$304	11	43
MD	$276	13	54
MN	$226	16	27
CT	$158	20	52

SCIENCE & ENGINEERING TALENT

Washington boasts one of the highest intensities of science and engineering workforce of any state: we ranked 5th in overall intensity of technical talent in 2010, among our peer group and nationally. This is the same, strong position we enjoyed in 2003, and illustrates our state's continuing ability to attract educated, innovative talent. All of the peers, with the exception of Utah and Connecticut, increased their intensity of scientists and engineers compared to 2003.

When broken down by occupational group, Washington leads the peers in intensity of engineers and ranks 2nd in the nation behind only Michigan. It is worth noting that we jumped seven places in this metric since 2003. We outperform most of our peers in intensity of life and physical scientists, ranking 3rd in the group and 8th out of 50 states; although we increased our intensity from 2003 to 2010, we fell three places compared to the rest of the nation. Washington ranked 5th among peers and the nation in intensity of computer specialists in our workforce, the same position we occupied in 2003.

SCIENTISTS & ENGINEERS
Per 100,000 Workers

	2010 NUMBER	2010 RANK	2003 RANK
VA	6,565	1	1
MA	6,511	2	2
MD	6,044	3	3
CO	5,851	4	4
WA	**5,833**	**5**	**5**
CA	4,768	7	9
MN	4,555	9	8
NJ	4,547	10	13
CT	4,350	11	6
TX	4,051	15	18
UT	4,027	16	10
NY	3,304	33	30

NSF

Pre-K-12 & Higher Education

In many ways, this report presents a tale of two Washington States: the one that is generating new knowledge, products, and high-impact jobs; and the one that is failing to prepare its own citizens to directly benefit from the opportunities that the other is creating. While we celebrate the strength of our R&D sector and entrepreneurial activity, our state is not heeding the economic imperative to educate our citizens to fully participate in the innovation economy.

EARLY INDICATORS OF STUDENT SUCCESS

Early learning plays a critical role in preparing students for academic success. While pre-school enrollment does not provide a measure of quality, it indicates how many children have access to programs that equip them for entry into the K-12 system. Only 42% of Washington's pre-school aged children are enrolled, placing us 11th among our peers and 37th in the nation. When the data are broken down by age, our participation rate among 4-year olds rises to 53%, but that pales in comparison to that of the top-ranked state, New Jersey, with nearly 78%.

A student's ability to read by the end of 3rd grade is considered a predictor of future achievement. The National Assessment of Educational Progress enables us to gauge how many students are proficient in reading after exiting the 3rd grade. Only 34% of Washington's 4th graders demonstrated proficiency in 2011, placing us 9th among our peers and 20th in the nation. Washington performed slightly better in math, but with only 45% proficient, we rank in the bottom half of peers and 17th in the nation.

PRE-SCHOOL ENROLLMENT
% of 3-4 Year Olds, Averaged

	2007-09 %	2007-09 RANK
NJ	66.0%	1
CT	62.4%	2
MA	61.1%	3
NY	58.1%	4
MD	50.6%	13
CA	50.0%	17
VA	49.4%	19
CO	48.1%	22
MN	46.3%	26
TX	42.6%	35
WA	**42.1%**	**37**
UT	40.3%	39

National Center for Education Statistics

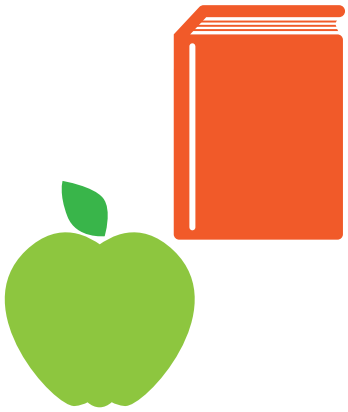
4th GRADE READING
% Proficient

	2011 %	2011 RANK
MA	50%	1
NJ	44%	2
MD	43%	4
CT	42%	5
VA	39%	8
CO	39%	9
MN	35%	16
NY	35%	19
WA	**34%**	**20**
UT	33%	26
TX	28%	39
CA	25%	47

National Assessment of Educational Progress

4th GRADE MATH
% Proficient

	2011 %	2011 RANK
MA	58%	1
MN	53%	3
NJ	51%	4
MD	48%	8
CO	47%	10
VA	46%	12
CT	45%	13
WA	**45%**	**17**
UT	43%	22
TX	39%	29
NY	36%	39
CA	34%	42



READY FOR HIGH SCHOOL AND THE INNOVATION ECONOMY?

The 8th grade NAEP measures how many students are prepared in essential subjects as they approach high school. Massachusetts leads the nation in reading with 46% proficient, up from 36% in 1998. Washington is roughly where Massachusetts was more than a decade ago, with 37% proficient. While we improved from 32% in 1998, our national rank dropped from 11th to 13th. Because our economy is increasingly driven by innovation, math and science literacy are also essential to our students' successful completion of high school, entrance to higher education, and access to high-impact career opportunities. However, only 40% of our students were proficient in math in the 8th grade, and only 35% demonstrated proficiency in science. Based on the data, the lack of reading, math, and science achievement among middle school students must be addressed by Washington and, indeed, our entire nation.

8th GRADE READING
% Proficient

	2011 %	2011 RANK
MA	46%	1
NJ	45%	2
CT	45%	3
CO	40%	6
MD	40%	7
MN	39%	9
WA	**37%**	**13**
VA	36%	16
UT	35%	18
NY	35%	21
TX	27%	42
CA	24%	47

8th GRADE MATH
% Proficient

	2011 %	2011 RANK
MA	51%	1
MN	48%	2
NJ	47%	3
CO	44%	7
WA	**40%**	**12**
MD	40%	13
TX	40%	14
VA	40%	15
CT	38%	19
UT	35%	24
NY	30%	37
CA	25%	44

8th GRADE SCIENCE
% Proficient

	2011 %	2011 RANK
MA	44%	3
UT	43%	5
CO	42%	6
MN	42%	7
VA	40%	10
WA	**35%**	**19**
CT	35%	22
NJ	34%	24
MD	32%	29
TX	32%	30
NY	29%	34
CA	22%	45

NAEP

WASHINGTON'S STUDENT PIPELINE

100 students enter 9th grade in Washington…

77 graduate on time (-23)

37 of them enroll directly in college (-40)

= 63 students delayed/diverted between high school entry and college entry.

AVERAGED FRESHMAN HIGH SCHOOL GRADUATION RATE*

	2009-10 RATE	2010 RANK	1999-00 RATE	2000 RANK
MN	88.2%	4	84.9%	3
NJ	87.2%	6	83.6%	4
MA	82.6%	14	78.0%	13
MD	82.2%	15	77.6%	14
VA	81.2%	20	76.9%	17
CO	79.8%	24	74.1%	28
TX	78.9%	25	71.0%	33
UT	78.6%	26	82.5%	7
CA	78.2%	29	71.7%	32
WA	**77.2%**	**31**	**73.7%**	**29**
NY	76.0%	35	61.8%	45
CT	75.1%	40	81.9%	8

National Center for Education Statistics

COLLEGE CONTINUATION RATE OF RECENT HIGH SCHOOL GRADUATES

	2010 RATE	2010 RANK	2000 RATE	2000 RANK
CT	78.7%	2	62.2%	14
MA	73.2%	3	69.0%	2
MN	70.9%	6	63.9%	10
NY	68.9%	8	63.9%	9
NJ	68.6%	9	63.6%	11
MD	64.0%	20	54.7%	31
VA	63.8%	22	53.1%	35
CA	61.7%	29	47.7%	44
CO	61.2%	32	52.8%	37
TX	56.2%	42	52.5%	38
UT	53.3%	44	38.1%	50
WA	**48.3%**	**46**	**44.6%**	**47**

NCES, Postsecondary Education Opportunity

READY FOR COLLEGE?

57% of recent high school graduates who enroll in our community and technical colleges are required to take at least one pre-college course.

51% of graduates enroll in pre-college math.

Washington State Board for Community & Technical Colleges

The commitment to cultivating a highly educated and innovative workforce is not evident in Washington's student pipeline. For every 100 students who enter 9th grade in our public schools, an estimated 37 both graduate high school on time and enroll directly in college after high school; 63 students are delayed or diverted along the way. Our 77.2% on-time graduation rate in 2010 placed us 10th among our peers and 31st in the nation – two places below our position in 2000. We ranked last among our peers and 46th in the nation in the percentage of recent high school graduates who enrolled directly in college anywhere in the nation, improving just one place compared to a decade earlier.

Postsecondary Education Opportunity has tracked "Chance for College by Age 19" for all states since 1986. This calculation paints a similarly grim picture for our state: in 2010, PEO estimated Washington students' chance for college at 35%, placing us last among our peers and 47th in the nation. In 1986, Washington's chance for college was 31% and we ranked 8th. Despite some improvement on an absolute basis, we have fallen behind most other states in helping our students along the path to higher education.

MONEY ISN'T EVERYTHING, BUT…

It is not only the quantity of investment that matters in K-12 education, but how effectively that money is deployed to support student learning. However, Washington's level of investment, measured in per-pupil expenditures, falls short of most other states.

	2010 RANK	2010 $ PER PUPIL	1999 RANK	1999 $ PER PUPIL
NY	1	$18,167	2	$12,309
NJ	2	$17,379	1	$13,364
CT	5	$15,698	3	$12,274
MA	8	$14,699	6	$10,880
MD	9	$14,007	12	$9,650
MN	21	$10,665	16	$8,976
VA	22	$10,594	22	$8,364
WA	**30**	**$9,497**	**25**	**$8,048**
CA	33	$9,300	32	$7,642
CO	39	$8,926	30	$7,801
TX	42	$8,788	34	$7,489
UT	50	$6,452	50	$5,545

NCES; figures are reported on a fiscal year basis and inflation-adjusted to 2010 $

*The averaged freshman graduation rate provides an estimate of the percentage of students who receive a high school diploma within four years of entering 9th grade, calculated to account for the high rate of grade retention in the freshman year.

HIGHER EDUCATION DEGREE PRODUCTION

Washington ranks in the bottom half of our peers in measures of total degree production and science and engineering degree production at both the undergraduate and graduate level, indexed to the appropriate age group within the population. Our relative position in bachelor's degree production has worsened over time: we ranked 37th in total bachelor's and 32nd in natural sciences and engineering bachelor's production in 2009, compared to 32nd and 31st, respectively, in 1998.

Our performance declines at the graduate level. Washington ranked last among our peers in both total master's degree production and science and engineering master's degree production in 2011. Our PhD production in science and engineering fields placed us 11th out of 12 peers and 35th in the nation – one place lower compared to a decade earlier.

There is a deep disconnect between our competitiveness in measures of educated, innovative workforce and the capacity to produce such talent in our own higher education system. Limited capacity at all levels has negative implications for our students, as they are denied access to higher education and high-impact career opportunities while companies are required to look outside Washington for talent. It also curtails our ability to recruit and retain the faculty who attract research funding to our state: our lack of graduate degree capacity contributes to our relatively poor performance in academic research.

How well are we preparing Washington's citizens to participate in the opportunities presented by a thriving innovation economy?

BACHELOR'S DEGREES TOTAL

Per 1,000 Individuals 18-24 Years Old

	2009 NUMBER	2009 RANK	1998 RATE	1998 RANK
MA	75.0	4	80.6	3
NY	63.5	12	58.4	10
UT	62.9	14	57.4	11
CO	59.7	16	56.6	13
MN	59.4	17	52.5	20
CT	56.3	22	53.6	18
VA	52.1	27	47.2	25
MD	51.0	29	50.2	21
WA	**46.7**	**37**	**43.4**	**32**
NJ	45.8	40	37.4	41
CA	43.0	43	35.3	44
TX	40.5	45	35.2	45

NSF

NATURAL SCIENCES & ENGINEERING

Per 1,000 Individuals 18-24 Years Old

	2009 NUMBER	2009 RANK	1998 RATE	1998 RANK
MA	12.3	3	14.2	3
CO	11.4	6	12.4	7
UT	11.0	9	9.8	13
MD	10.4	11	10.1	12
MN	10.2	13	8.9	18
NY	8.9	21	8.6	24
VA	8.7	23	8.9	22
WA	**7.7**	**32**	**7.3**	**31**
CA	7.6	33	6.9	38
CT	7.5	34	7.7	27
NJ	7.1	35	7.2	32
TX	6.0	45	5.7	44

NSF

MASTER'S DEGREES TOTAL

Per 10,000 Individuals 25-34 Years Old

	2011 NUMBER	2011 RANK
MA	398.0	2
MN	304.3	4
NY	264.0	7
MD	222.4	13
CT	216.6	14
CO	194.7	18
VA	189.9	20
UT	156.7	25
NJ	132.2	33
CA	126.3	36
TX	116.5	41
WA	**104.3**	**44**

NCES, U.S. Census Bureau

SCIENCE & ENGINEERING

Per 10,000 Individuals 25-34 Years Old

	2011 NUMBER	2011 RANK
MA	44.0	1
MD	41.9	2
CT	32.5	3
NY	31.7	4
CO	26.6	8
NJ	23.9	11
VA	22.2	13
CA	19.8	19
TX	18.4	22
MN	18.2	23
UT	17.4	27
WA	**9.5**	**45**

NCES, U.S. Census Bureau

PHDs IN SCIENCE & ENGINEERING

Per 100,000 Individuals 25-34 Years Old

	2010 NUMBER	2011 RANK	2001 RANK
MA	297.2	1	1
MD	155.0	7	5
CT	153.5	9	6
MN	152.7	10	9
NY	150.9	11	16
VA	123.8	18	18
UT	111.4	21	22
CA	109.4	23	24
CO	105.1	25	26
NJ	94.6	34	32
WA	**91.7**	**35**	**34**
TX	88.5	36	38

NSF

HIGHER EDUCATION FUNDING

INSTITUTION REVENUES PER FTE

All Higher Education*

	2012 $	2012 RANK
CT	$14,016	7
MD	$13,924	8
NJ	$13,322	11
TX	$12,678	16
MN	$12,196	18
VA	$11,975	19
NY	$11,852	21
MA	$10,786	27
UT	$9,165	43
CA	$8,842	46
CO	$8,722	48
WA	**$8,215**	**49**

State Higher Education Executive Officers Association

Washington ranks last among our peers and 49th out of 50 states in total revenues (state appropriations and tuition) per full-time equivalent student at our 2 and 4-year public colleges and universities. Since 2008, state funding for Washington higher education has declined 22.4% – the second largest drop among our peers. The steep reduction in state support puts further pressure on our institutions and increases the burden on students and families.

*Revenue figures adjusted by SHEEO to account for differences in cost of living and enrollment mix between states.

How can we sustain Washington's competitiveness in the future and ensure our citizens prosper from a thriving innovation economy?

Equipping our citizens to fully participate in the innovation economy is an economic imperative for our state. The data clearly point to the need to improve K-12 student achievement and increase access to higher education opportunities in Washington. In addition, we disregard the vital importance of academic research at our peril, as it generates the new knowledge, technologies, and companies that in turn fuel economic growth and prosperity.

In order to build on our existing strengths, address our competitive shortcomings, and grow our innovation economy for the long-term benefit of our entire state, Washington must commit to the following priorities:

- Expand access to **early learning opportunities** for our pre-school aged children.
- Promote **STEM literacy** for all of our K-12 students through a combination of high-quality instruction, rigorous curriculum, and college and career-ready graduation requirements.
- Cultivate a **college-going culture** in our public K-12 education system and among our citizenry.
- Substantially increase **capacity and enrollment in high-demand, high-impact fields** at our public higher education institutions, at both the undergraduate and graduate levels.
- Make the **attraction and retention of preeminent faculty** a core strategy in our capacity-building at Washington's public research universities in order to strengthen our competitiveness in academic research and increase graduate degree production in fields that fuel our innovation economy.
- Protect the state's commitment to the **Life Sciences Discovery Fund** to advance promising academic and non-profit research.
- Nurture the **growth of innovative young companies and high-impact jobs** by continuously striving to make it easy to start and expand new businesses in Washington State.

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