TechAlliance

SUMMARY OF TECH'S IMPACT ON WASHINGTON'S ECONOMY

Technology is driving innovation across the state and throughout our top industries. The Tech Alliance wanted to better understand how this shift was affecting Washington's workforce, companies, and communities. In partnership with the economic impact firm, Community Attributes, we dug into the data and stories that underlie Washington's tech-driven economy. The digital report at technology-alliance.com is the result.

What we found was a diversified economy dependent on the development of new technologies, the adaptation and application of those technologies, and the required shifts in the workforce (new degrees, retraining, etc.). The strength of this economy depends on our collective commitment to supporting those elements that make this growth possible - education, the entrepreneurial and research climate, and distribution of and access to opportunities. This is where the Tech Alliance is focused.

Key Findings

1. **STEM is everywhere.** STEM-driven jobs are in every industry and every community, with minimal variance by region. Software developers, nurses and engineers dominate the STEM occupations in every region of the state, and are working in all industries, not just the ICT sector.
2. **Our institutions of higher education cannot keep pace with the demand**. We have huge gaps in our supply of STEM-trained workers - both in the current workforce and in the pipeline of STEM graduates.
3. **The forecast points to even greater STEM job growth and penetration.** Looking at the state's projections by occupation, we see a much faster rate of growth for STEM jobs over any other; this is dominated primarily by computing-based occupations.

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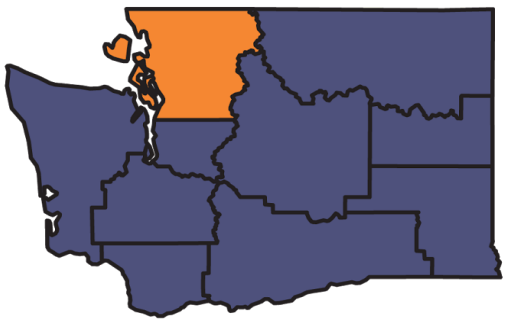
STEM IN NORTHWEST WA



	NORTHWEST WA	WASHINGTON
STEM Employment *2016*	60,121	503,139
Total Employment *2016*	441,834	3,122,749
Percent of STEM Jobs *2016*	14%	16%
STEM Graduates *2005-2015 cumulative completions*	15,923	132,799

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TOP STEM OCCUPATIONS	# STEM Jobs
Registered Nurses	6,655
Aerospace Engineers	5,564
Industrial Engineers	2,610
Software Developers, Applications	1,915

WA UNIVERSITIES ARE NOT GRADUATING ENOUGH STEM GRADS TO MEET JOB DEMAND

Though higher ed institutions are offering more STEM courses/degrees, there is not enough local supply to meet job demand. For example, Whatcom Community College has seen an increase in CSIS degrees granted -from 12 students in 2002 to ***218 enrolled in 2015****. And even UW's Seattle campus, which had the largest number of STEM graduates in the state -****more than 4,300 grads in 2016*** *(31% of their graduates), is not meeting WA's STEM job demand.*

NORTHWEST WA STORIES THAT ILLUSTRATE THE DATA

AEROSPACE

Physical labor in all of its forms is hard work and can lead to injuries, which is why **Boeing** is utilizing robots to make workplace improvements. In preparation for its 777x, Boeing is focused on increasing efficiency while also improving safety, reducing injuries and ergonomic stress. "Providing a safe working environment is the right thing to do for our employees and our business," said Perry Moore, 777X Wings leader. "People perform better and managers can better manage their workload. Everyone wins." One example is to use **devices to support power hand tools** so employees no longer have to use their own power to hoist and hold the tools. Jordan Northrup, a 777x mid-bodies structures mechanic lead, feels the difference in his shoulder. He now **operates and maintains robots** that do much of the repetitive drilling and driving work he used to do manually. "It's 100 percent different," Northrup said. "I'm still worn out at the end of my shift, but I don't wake up in pain in the morning after countersinking 300 holes." While employees have had to learn how to perform their work differently, it's a welcome transition that ultimately improves productivity: more efficiency AND greater safety.

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ADVANCED MANUFACTURING & MIXED REALITY

Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR). All versions of tech-driven altered reality. VR displays objects that are not there; AR is the ability to see real world objects (digitally enhanced) in your physical environment, yet it is a digitally enhanced version of that reality. **MR (mixed reality)** is essentially a combination of both. You can see and remain in the "real world," yet you are also seeing virtual objects. **Microsoft's HoloLens** allows its users to collaborate together in a shared physical space, while also viewing the same VR hologram. **PACCAR's** engineering and sales teams are using HoloLens for that reason. By using HoloLens' MR technology during the design process for new engines, engineers save time and resources – allowing for faster, real-time collaboration and innovation. At the same time, PACCAR's sales teams are using the technology to elevate the sales experience for their customers - making the process both more fun and interactive. To ensure seamless integration of HoloLens into PACCAR's workflow, Microsoft has a PACCAR-dedicated HoloLens team supporting the implementation and operation of this new, **homegrown technology**.

POWER

School rivalry is alive and well - but in the case with **Western Washington University (WWU)** and the **University of Washington (UW)**, competition is set aside and **solar innovation** is created. In summer 2017, New Mexico-based UbiQD reached an agreement with WWU and UW to exclusively license luminescent solar concentrator (LSC) technology that was developed at WWU's Advanced Materials Science and Engineering Center with UW's CoMotion via funding from the National Science Foundation. The technology was created by these two Washington universities, and will be commercialized by UbiQD. While this particular technology is now licensed, the universities are still researching new approaches for converting sunlight into hydrocarbon fuels. This **homegrown tech** is just one result of collaboration and partnership between Washington's universities - and demonstrates the job opportunities that come with innovation.

CYBERSECURITY

Do you receive a lot of SPAM emails? And how about those virus emails that actually make it to your inbox? Cyber crime is not going away; and Washington stands out in cybersecurity growth -from investing to start-ups to higher education. In Q2 2017, Boeing's HorizonX Ventures and Microsoft Ventures invested in cybersecurity start-ups, and WA-based Polyverse Corporation received new funding. The state also has five federally recognized centers for cyberdefense education. In Pasco, a three-year-old cybersecurity program at **Columbia Basin College** has seen a 60% increase in enrollment in the past three years, with ~100 students currently enrolled. And, **Whatcom Community College's** CIS program enrollment has increased an average of 18% over the past four years, with 218 students enrolled in CIS program courses in 2015. Additionally, over the summer of 2017, **Boeing** gifted 50 computer servers to **Western Washington University** for use in its new CyberRange at **Olympic College Poulsbo**, a virtual environment where students in Western's CISS program practice cyberwarfare training and cyber technology development. The CyberRange supports all of WA's cybersecurity programs that offer cyberdefense education.