

# **Facts About Our State's Computer Science Professional Shortage**

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**Presented to the Washington State House of Representatives**

**Higher Education Committee**

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# Topics

- My personal background
- Why it matters: The scale and impact of Washington's ICT (Information and Communication Technology) sector
- Where are the workforce gaps in our state – the gaps between degrees granted and jobs available?
- What is the makeup of the workforce at Washington's ICT companies?
- What is the educational background of these employees?
- How does the national picture compare to Washington's?
- What about student demand? If we had additional capacity, would we have the student interest?
- UW Computer Science & Engineering's nature and role

# My personal background

- I have an industry background
  - 10 Years at Digital Equipment Corporation in the late 1970s/early 1980s
  - Member of the National Academy of Engineering
  - I do not have a Ph.D.
- I joined the UW faculty in 1983
- I have co-founded two companies from UW Computer Science & Engineering technologies
  - Performant: acquired in 2003
  - Skytap: employs more than 100 and has raised \$64M in venture funding
- I have been UW CSE department chair for 9 years

# Washington's ICT (Information and Communication Technology) industry is a powerhouse that is driving our economy

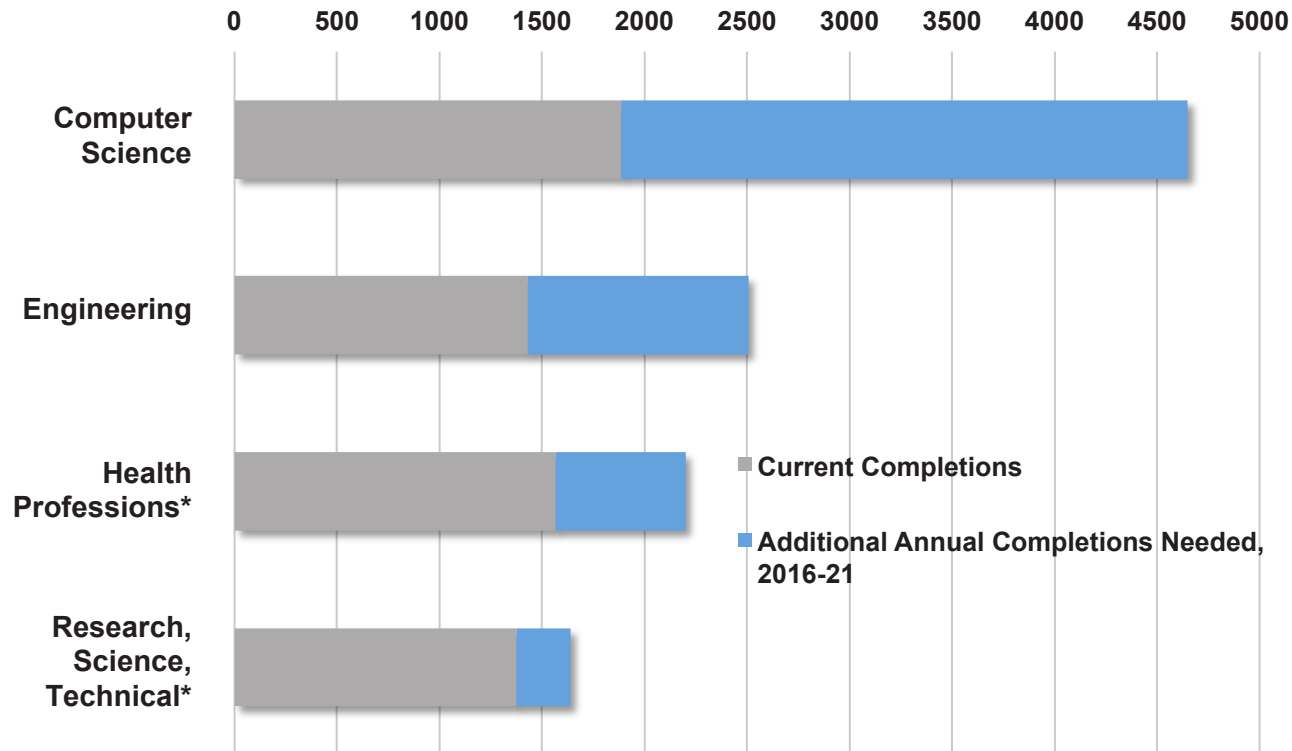
- 8,610 ICT employment establishments
- \$36.9 billion annually in Washington business revenue; \$16.4 billion annually in exports; hundreds of billions annually in total revenue (Amazon and Microsoft alone total more than \$150 billion)
- 176,600 workers in ICT companies (such as Amazon, Microsoft, RealNetworks, Zillow); 62,300 additional workers in Tech Units (blocks of ICT talent in non-ICT companies such as Boeing, Nordstrom, REI, Starbucks)
- We are *the software capital of America*: The US Bureau of Labor Statistics reports more software developers in Seattle-Everett-Bellevue than in Silicon Valley!




Source: Washington Technology Industry Association, Washington State Department of Commerce, and Community Attributes, Inc.; *Washington State Information & Communication Technology Cluster Study*; soon to be released.

# Not surprisingly, then, Washington's largest workforce gap – by far – is in Computer Science

High Demand Fields in WA State, Baccalaureate Level & Above  
WSAC / SBCTC / WTECB, October 2013



\*Gap exists at the graduate and/or professional level only



**A Skilled and Educated Workforce  
2013 Update**

**A Joint Agency Report:**  
*Washington Student Achievement Council*  
 Daryl Monear, Ph.D., Associate Director, Academic Affairs and Policy  
 Randy Spaulding, Ph.D., Director of Academic Affairs and Policy  
 Mark Lundgren, Associate Director for Research  
 Mark Berreth, Assistant Director for Research  
*State Board for Community and Technical Colleges*  
 Tina Bloomer, Policy Research Associate  
 Kandra Hodgson, Policy Associate  
*Workforce Training and Education Coordinating Board*  
 Bryan Wilson, Ph.D., Deputy Director  
 David Pavelchek, Research Manager

October 2013

Source: Washington Student Achievement Council, State Board of Community and Technical Colleges, and Workforce Training and Education Board; *A Skilled and Education Workforce – 2013 Update*; October 2013

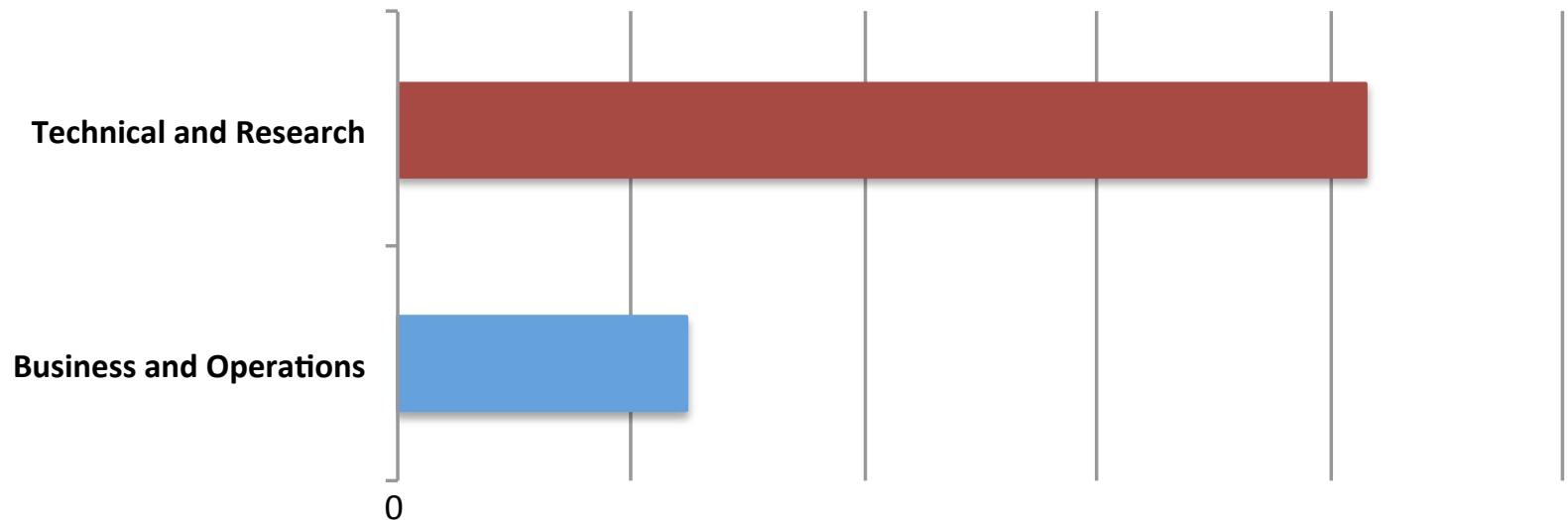
The ICT companies that call Washington State their home – the companies that are headquartered here – have relatively diverse workforces in terms of educational backgrounds

**REDFIN**<sup>TM</sup>



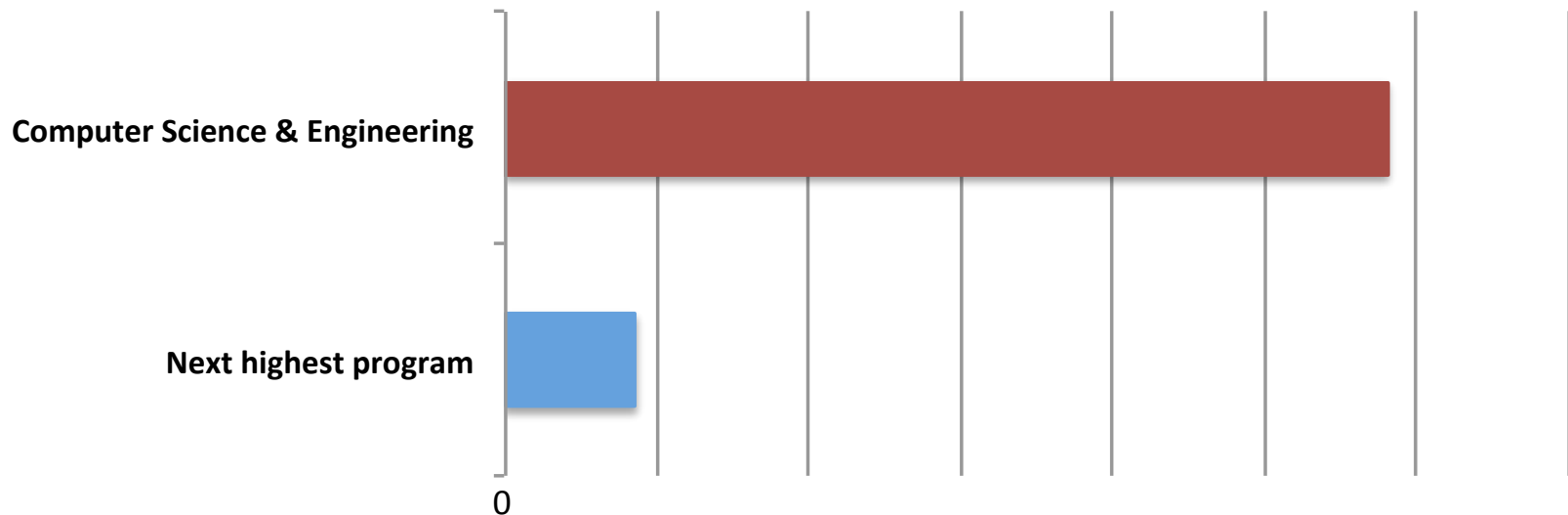
# But even these companies hire predominately technical employees

## All Microsoft Hires from UW, FY 13 and 14, Interns and Permanents



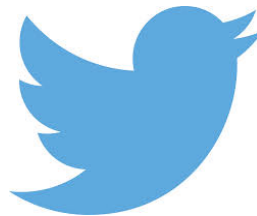
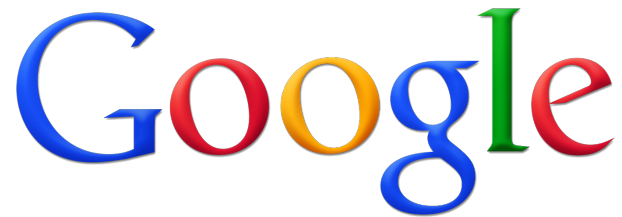
**And – at the companies that can afford to be selective –  
these technical employees predominately have degrees in  
Computer Science from top programs**

**Microsoft Technical and Research Hires from UW,  
FY 13 and 14, Interns and Permanents**





Major ICT companies headquartered elsewhere are opening offices in our region that do *software development only* – these are tilted *even more heavily* towards technical employees

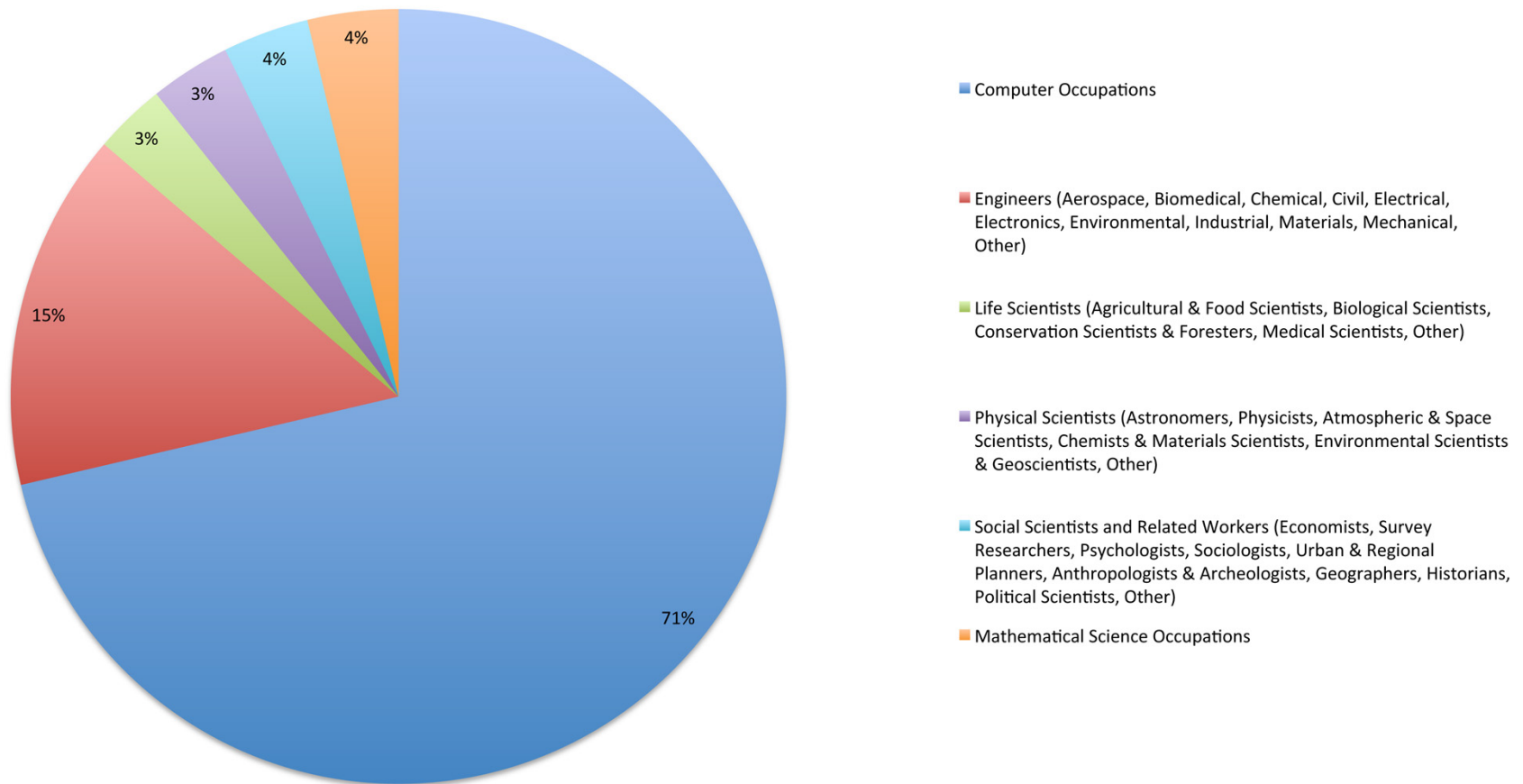


## To summarize my remarks thus far ...

- The 8,610 companies in Washington's ICT (Information and Communication Technology) sector employ a broad range of people with a broad range of educational backgrounds
- The Tech Units in Washington's non-ICT companies exhibit even a broader range
- All of these companies, and jobs, and people are important!
- But *what distinguishes our state from others, and what truly powers our economy*, are not the 14,050 "Computer Programmers" or the 4,230 "Web Developers" or the 1,430 "Database Administrators" or the 5,210 "Network and Computer Systems Administrators" or the 8,420 "Computer User Support Specialists" (these are BLS classifications and numbers)
- It's the 48,440 "Software Developers, Applications" and the 7,560 "Software Developers, Systems Software" – more, in total, than Silicon Valley
- And we know who these people are! Predominately, men and women with Computer Science degrees from America's top programs, including UW

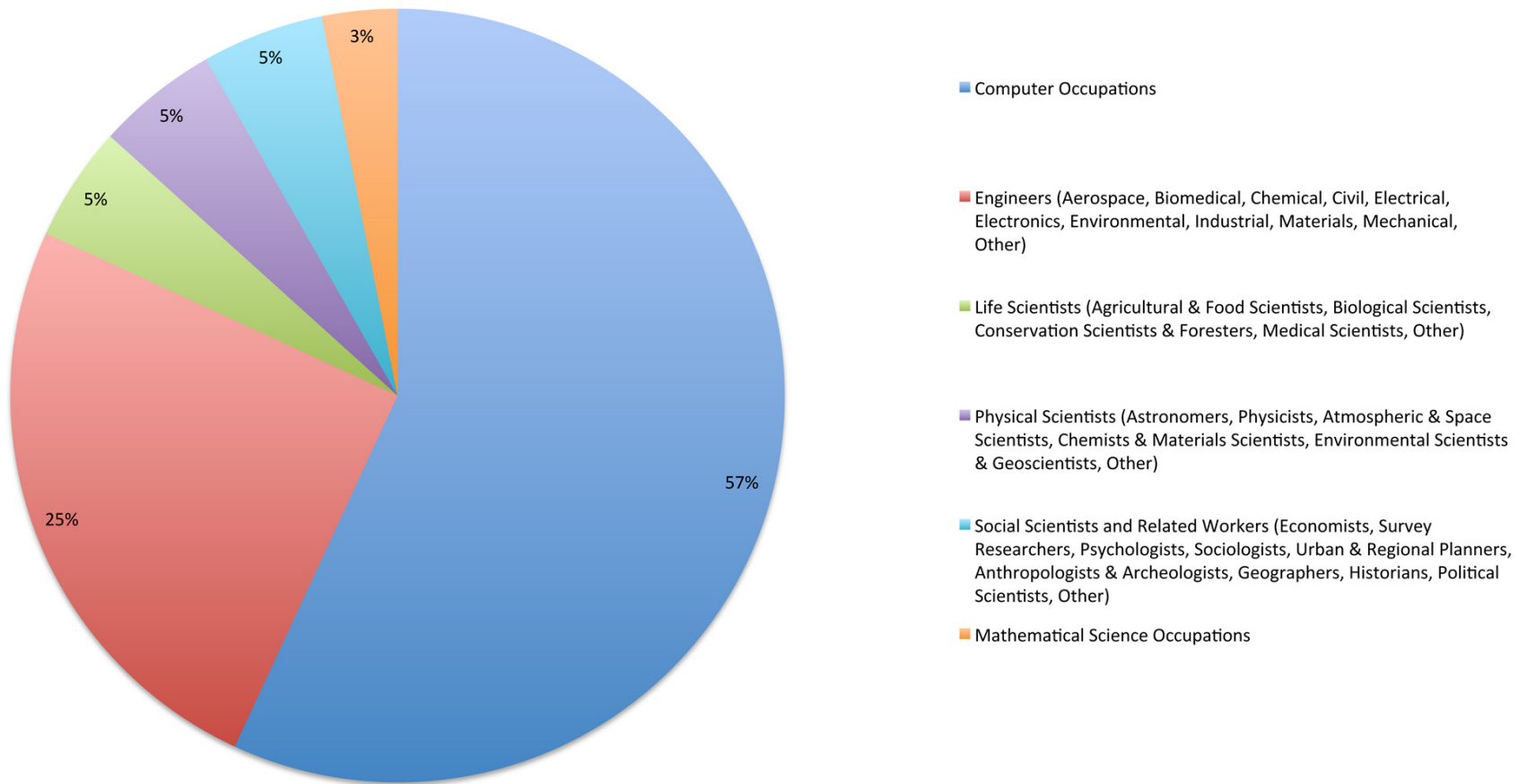
# Nationally, the story is similar: BLS projects Computer Occupations will be 71% of all newly-created STEM jobs in this decade ...

Job Growth, 2012-22 - U.S. Bureau of Labor Statistics  
Computer Occupations = 71% of all STEM

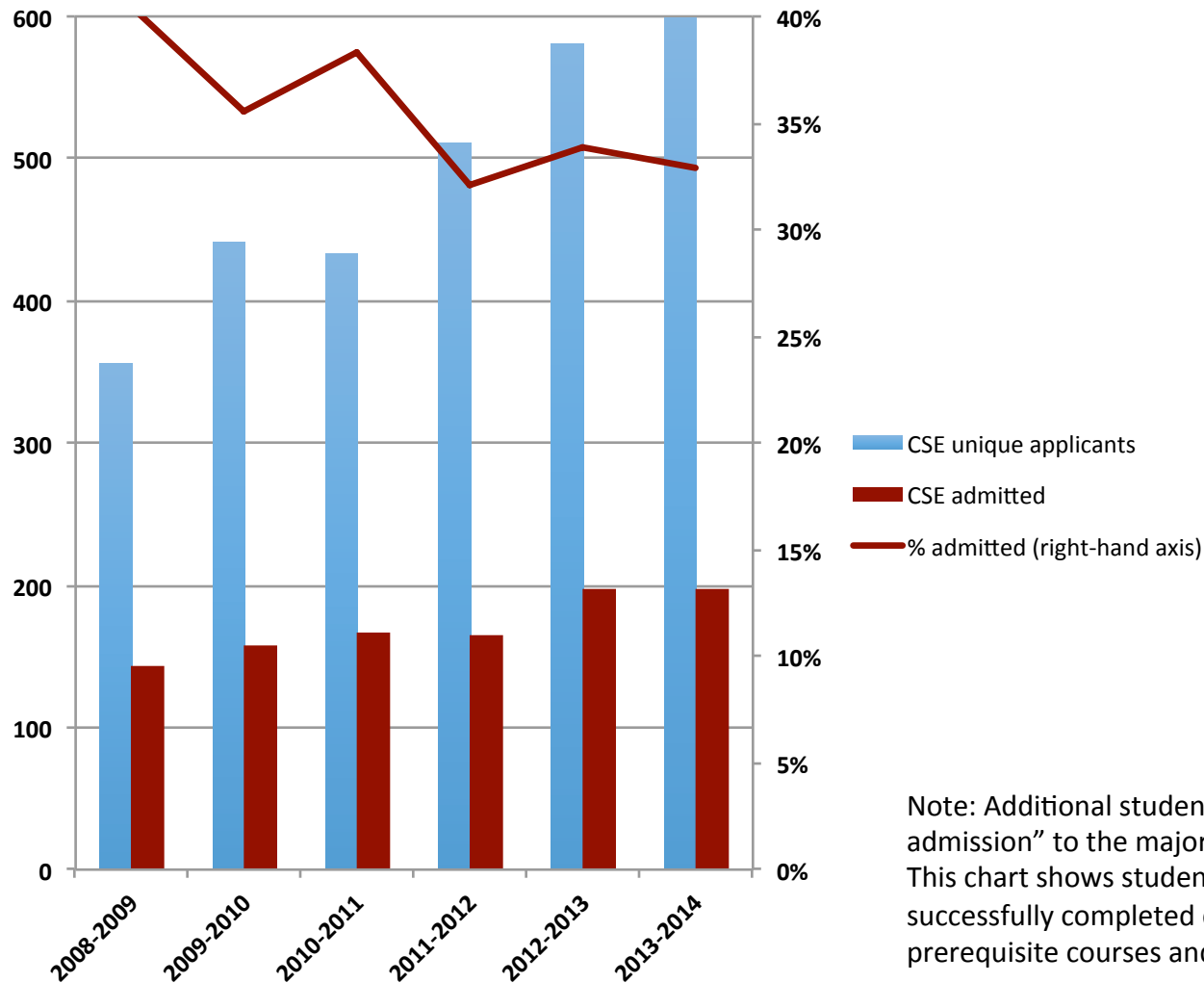


# And that Computer Occupations will be 57% of all available jobs, whether newly-created or available due to retirements

Job Openings (Growth And Replacement), 2012-22 - U.S. Bureau of Labor Statistics  
Computer Occupations = 57% of all STEM



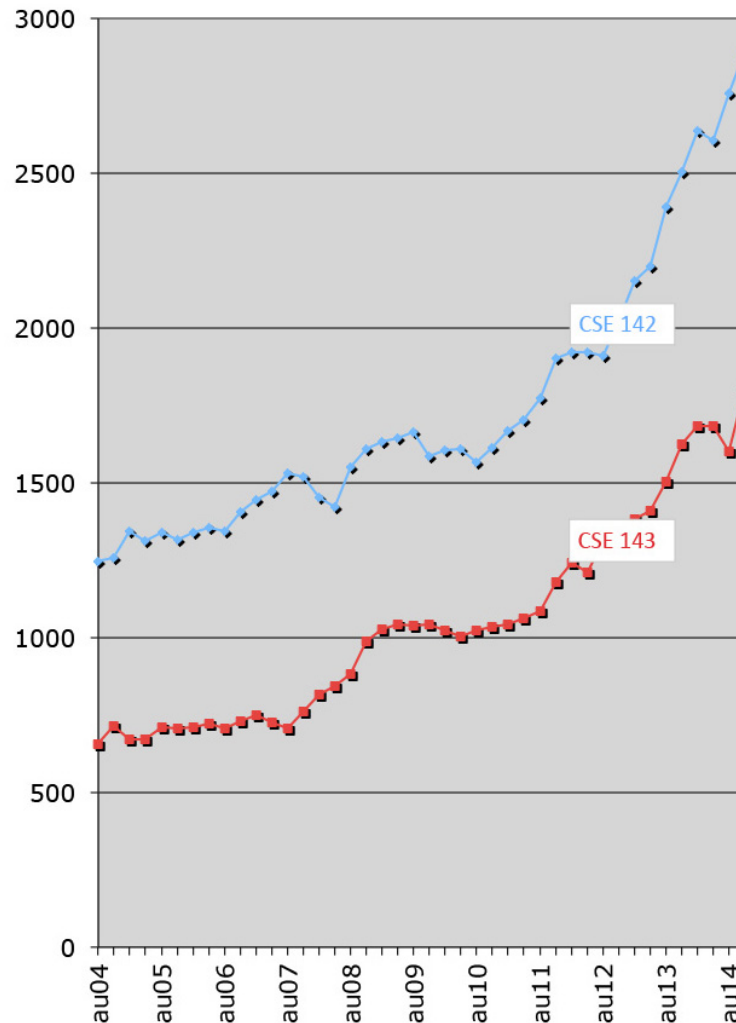
# The student demand is there! Despite recent expansion, UW CSE can accommodate only 1/3 of the students who successfully fulfill prerequisites and apply to the major



Note: Additional students receive “direct admission” to the major from high school. This chart shows students who have successfully completed college-level prerequisite courses and apply to the major.

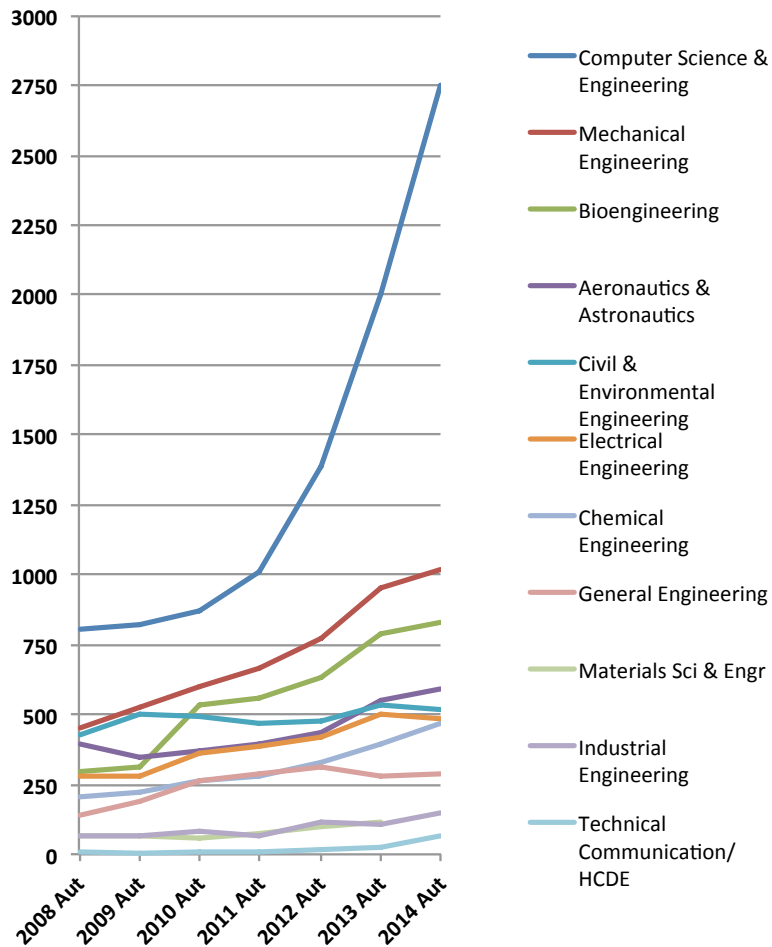
# Introductory course enrollment is booming – we expect to exceed 5,000 student enrollments this year!

CSE 14x annual enrollment  
(1-year moving total)

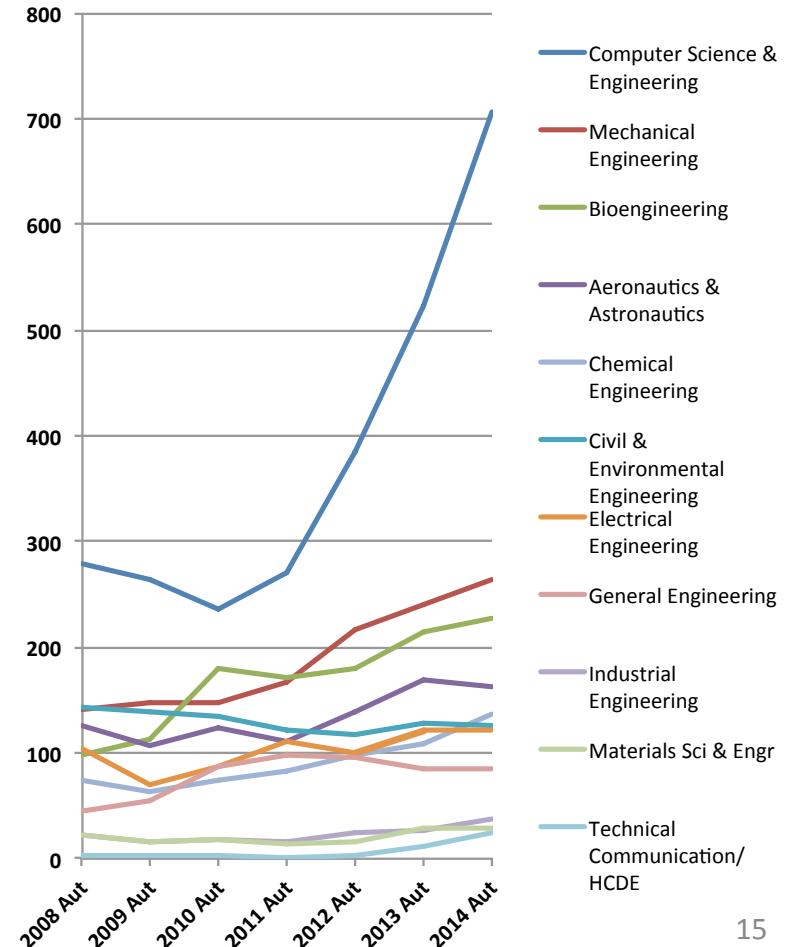


**Freshman interest is booming too – and this data understates the interest, because 30% of UW students are transfers, and 40% of CSE majors (and 60% of our female majors) planned on a different major but took our introductory course and loved it**

**Applied to UW as Freshmen**

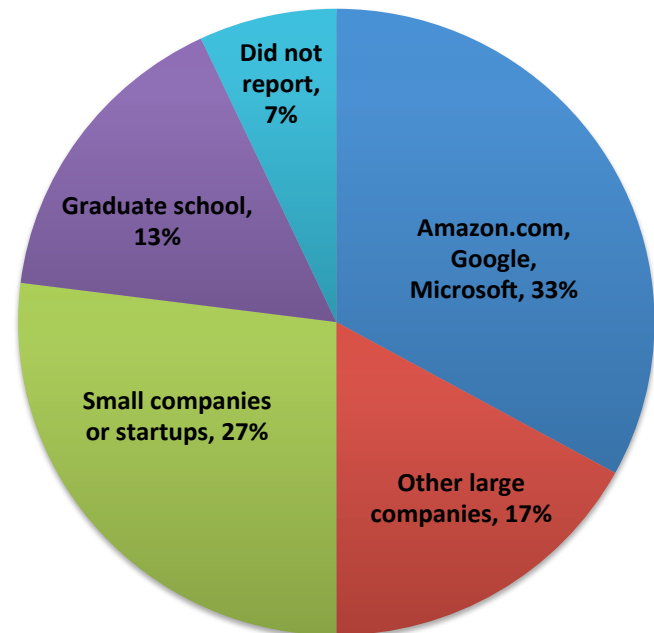


**UW Confirmed, Incoming Freshmen**



# UW Computer Science & Engineering is one of the nation's premier programs

- Our only competitors for faculty and students are Stanford, MIT, Berkeley, and Carnegie Mellon
- We awarded 300 degrees in the most recent year; we are funded to grow to 375; we would like to reach 600
- We are a top supplier of students to Amazon, Microsoft, and Google Seattle
- We are the predominate supplier to the leading smaller companies and startups in the region
- We prepare *Washington's top students for Washington's top jobs*: more than three-quarters of our students are from here, and more than three-quarters of our graduates remain in the state





# Washington's ICT companies, the academic programs that staff these companies, the students who aspire to work at these companies, and Washington's economy *need* and *deserve* your support

- Washington will always be a net importer of talent
  - Otherwise, smart kids who grow up in Kansas won't have any place to go!
- But Washington students who have the ability and the desire to prepare for these leading-edge jobs ought to have the opportunity to do so!

