The Computing Fields: National, Regional, UW

Ed Lazowska
Bill & Melinda Gates Chair in Computer Science & Engineering
University of Washington

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REPORT TO THE PRESIDENT AND CONGRESS
DESIGNING A DIGITAL FUTURE: FEDERALLY FUNDED RESEARCH AND DEVELOPMENT IN NETWORKING AND INFORMATION TECHNOLOGY

Executive Office of the President
President’s Council of Advisors on Science and Technology

DECEMBER 2010
The Impact

“From smartphones to eBook readers to game consoles to personal computers; from corporate datacenters to cloud services to scientific supercomputers; from digital photography and photo editing, to MP3 music players, to streaming media, to GPS navigation; from robot vacuum cleaners in the home, to adaptive cruise control in cars and the real-time control systems in hybrid vehicles, to robot vehicles on and above the battlefield; from the Internet and the World Wide Web to email, search engines, eCommerce, and social networks; from medical imaging, to computer-assisted surgery, to the large-scale data analysis that is enabling evidence-based healthcare and the new biology; from spreadsheets and word processing to revolutions in inventory control, supply chain, and logistics; from the automatic bar-coding of hand-addressed first class mail, to remarkably effective natural language translation, to rapidly improving speech recognition – our world today relies to an astonishing degree on systems, tools, and services that belong to a vast and still growing domain known as Networking and Information Technology (NIT).”
“As a field of inquiry, NIT has a rich intellectual agenda – as rich as that of any other field of science or engineering.”

“In addition, NIT is arguably unique among all fields of science and engineering in the breadth of its impact.”

“The development and application of NIT-related systems, services, tools and methodologies have boosted U.S. labor productivity more than any other set of forces in recent decades. Advances in NIT, deployed pervasively throughout the U.S. economy, have helped U.S. workers become the world’s most productive and have enabled the U.S. to remain one of the world’s most competitive economies.”
The Future Role

“Recent technological and societal trends place the further advancement and application of NIT squarely at the center of our Nation’s ability to achieve essentially all of our priorities and to address essentially all of our challenges:

• **Advances in NIT are a key driver of economic competitiveness.** They create new markets and increase productivity.

• **Advances in NIT are crucial to achieving our major national and global priorities in energy and transportation, education and life-long learning, healthcare, and national and homeland security.** NIT will be an indispensable element in buildings that manage their own energy usage; attention-gripping, personalized methods that reinforce classroom lessons; continuous unobtrusive assistance for people with physical and mental disabilities; and strong resilience to cyber warfare.
• Advances in NIT accelerate the pace of discovery in nearly all other fields. The latest NIT tools are helping scientists and engineers to illuminate the progression of Alzheimer’s disease, elucidate the nature of combustion, and predict the size of the ozone hole, to cite just a few examples.

• Advances in NIT are essential to achieving the goals of open government. Those advances will allow better access to government records, better and more accessible government services, and the ability both to learn from and communicate with the American public more effectively.”
“All indicators – all historical data, and all projections – argue that NIT is the dominant factor in America’s science and technology employment.”

Science and Technology Job Growth, 2008-2018
(Bureau of Labor Statistics)
“The gap between the demand for NIT talent and the supply of that talent is and will remain large.”
In Washington State

• Washington’s **single biggest competitive advantage** – for recovery, for growth, for prosperity – is its leadership position in Information Technology.

• This leadership position in Information Technology is also a **critically important asset** in establishing and expanding competitive positions in biotech, in energy, in health care, in education, in a host of other fields.

• **We should make investment decisions as if we understood this.**
Our region has innovators in most major information technology industry sectors.

- Software: Microsoft
- Cloud: Amazon
- Online media: Expedia
- Online real estate: Zillow
- Networking infrastructure: F5
- Games: Amaze Entertainment
- Bioinformatics: Geospiza
- RFID: Impinj
- High-performance computing: Isilon Systems
- Clustered storage: Cray
- Focused e-tailing: Drugstore.com
Many spawned by UW, Aldus, McCaw, Boeing, Amazon.com, and Microsoft
Innovative industries support 42% of all jobs in Washington State.

Source: Technology Alliance: *The Economic Impact of Technology-based Industries in Washington State*, 2010
Washington is among the top states in the nation for innovative workforce (a lot of it imported).

Sources: ITIF/Kaufman Foundation: *The 2010 State New Economy Index*; National Science Foundation: *Science & Engineering Indicators 2010*
Dice America’s Tech Talent Crunch (2011)

Top 10 “Shortage States”

1. California
2. New Jersey
3. Texas
4. New York
5. Massachusetts
6. Illinois
7. Washington
8. Connecticut
9. Virginia
10. Washington D.C.

Source: Dice.com
Regional press

April 2010

The Seattle Times Company | Business / Technology

Brier Dudley's Blog
Brier Dudley offers a critical look at technology and business issues affecting the Northwest.

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June 9, 2010 at 12:11 PM

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Facebook chooses Seattle site, by Pike Place Market

Posted by Brier Dudley
Regional press

April 2010

February 2011
Amazon.com on a hiring spree

Amazon.com has been expanding its office complex in South Lake Union and has about 1,900 openings in Seattle.

By Amy Martinez
Seattle Times business reporter
Regional press

April 2010
February 2011
March 2011
April 2011
9 Companies Hiring Now

Might one of these companies value your skills and potential?

By ALEXIS GRANT
Posted: May 31, 2011

To help you think outside your box, here are nine companies hiring right now:

1. Boeing. The company has more than 500 openings and plans to hire a total of 4,000 to 5,000 employees this year, says company spokesman Peter Pedraza. The bulk of those positions are located in the Puget Sound region in Washington, followed by Charleston, S. C., but the company's also hiring at headquarters in Chicago and other facilities throughout the country.

2. Google. The Internet giant is hiring more employees this year than any other, including its record of 6,000 hires in 2007. It now has about 26,000 employees who work in 60 offices in 30 countries. The majority of Google's open positions are in engineering and sales, but the company is also hiring for its communications, legal, and HR teams. While the bulk of those positions are located at Google's headquarters in Mountain View, Calif., other offices are also growing significantly, including those in Seattle and New York City.

3. Amazon. Amazon did not respond to inquiries for information, but the company is opening two facilities in Tennessee this fall, creating 1,200 jobs, WSMV-TV reports. It also has plans to open a facility in West Virginia, creating 200 jobs by 2014, Bloomberg writes. And a new distribution center in Seattle, where Amazon's headquartered, will also mean more available positions, The Seattle Times reports. On Amazon's website, the online marketplace lists positions open in product management, sales, and software development.

4. Facebook. The company declined to talk about employment opportunities, but it lists hundreds of openings on its website. Facebook is looking for recruiters, salespeople, data analysts, engineers, business associates, and more. Palo Alto, Calif., the company's headquarters, boasts most of the openings, but others are scattered throughout the country and the globe. Facebook is known for its perks, including three free meals a day for employees who work at headquarters.
May 2011

National press

Bay Area Technology Firms Put Down Roots in Seattle

By NICK WINGFIELD

Many engineers make the pilgrimage to Silicon Valley to work for hot Web companies. Increasingly, though, top tech workers in the Seattle area are seeing Bay Area Web companies come to them.
HEC Board Regional Needs Analysis Report (2011)

Figure 12
Comparison of Current Supply with Future Demand for Baccalaureate and Graduate Degrees

<table>
<thead>
<tr>
<th>Field</th>
<th>Current Supply</th>
<th>Future Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research, scientists, technical</td>
<td>1,655</td>
<td>280</td>
</tr>
<tr>
<td>Human/protective service professionals</td>
<td>1,850</td>
<td>498</td>
</tr>
<tr>
<td>Editors/writers/performers</td>
<td>1,359</td>
<td>607</td>
</tr>
<tr>
<td>Medical professionals</td>
<td>2,493</td>
<td>1,134</td>
</tr>
<tr>
<td>Computer science</td>
<td>2,052</td>
<td>2,973</td>
</tr>
<tr>
<td>Engineering/software engnr/architecture</td>
<td>1,292</td>
<td>1,148</td>
</tr>
<tr>
<td>Business and management</td>
<td>7,805</td>
<td>304</td>
</tr>
</tbody>
</table>

Source: Openings: Washington ESD June 2008 Long Term Employment Forecast
Supply: HECB Analysis of IPEDS data. Current supply is a 3 year annual average of degree awards, 2006-2008 adjusted for entry into the labor market.
UW Computer Science & Engineering

• Ranked among the top 10 programs in the nation

• Two undergraduate programs
  – Computer Science (College of Arts & Sciences)
  – Computer Engineering (College of Engineering)

• 160 Bachelors graduates per year (most recent expansion was in 1999)
• 80 Masters graduates per year
• 20 Ph.D. graduates per year
• Top-5 supplier of new graduates to Microsoft, Amazon.com, Google
  – Typically along with Stanford, Berkeley, MIT, Waterloo
UW CSE Annualized Introductory Course Enrollment

Graph showing annualized enrollment for two courses (CSE 142 and CSE 143) from 1996 to 2010.
UW CSE Bachelors Student Destinations
(most recent 2 years, ~90% response rate)

- Amazon.com, Google, Microsoft: 35%
- Other large company: 15%
- Small company or startup: 30%
- Graduate school (CS, Law, Medicine, Business, Biology, …): 15%
- Other: 5%

University of Washington
Computer Science & Engineering
Summary

• Computing is a field of huge intellectual opportunity and unmatched impact
• Computing is *the dominant factor* in America’s science and technology employment
• The same is true in Washington State
• Our economy is creating great jobs
• However, they are going to other people’s kids
• In addition to disadvantaging our kids, this disadvantages smaller companies, which must recruit locally
• Ultimately it will stifle the growth of our economy