Academia vs Industry: Choose Your Own Adventure

A.J. Brush, Microsoft
Lisa Wu Wills, Duke University

Thanks to previous presenters of this topic!
A.J. Brush

Education:
• University of Washington, Ph.D. 2002
• Williams College, BA 1996

Career
• Microsoft: Microsoft Research for 12 years, 4 years on Cortana product
• Research areas: HCI, Ubicomp,

Family and Fun
• Kids: Colin (19), Ryan (16)
• Hobbies: Exercise, Reading, Travel
Lisa Wu Wills

Education
• Columbia University, Ph.D. 2014
• University of Michigan Ann Arbor, M.S.
• University of Illinois Urbana-Champaign, B.S.

Career (reverse chronologically)
• Assistant Professor at Duke University, Postdoctoral
  Researcher @ UC Berkeley, Researcher @Intel Labs, 
  back to school for Ph.D., Computer Architect @Intel 
  (Xeon Phi, Knights product line)
• Research areas: Computer Architecture, 
  Hardware Accelerators, Big Data Analytics, 
  Healthcare

Fun
• Travel, Art Museums, Performance Arts, Cooking, 
  Beach
A vs. B: So Simple, Right?

**Academia**
could be:

- Professor at a research-oriented school teaching-oriented school
- Research associate Academic administration

**Industry/Government/Lab**
could be:

- Engineer
- Research manager
- Research Scientist
- Technical or Managerial Leadership
- Consulting
- Start-up
All Choices are Valid!

• Do what you love
• If you don’t love what you’re doing, do something else
• A Ph.D. gives you that option
• Take ownership of what you do now and what you want to do next (your career is what you make of it)

Aspire to be happy - not ‘stereotypical’
What is Important to You?

Must-haves vs. Nice-to-haves?

- Stability vs. Change?
- Excelling in Your Career?
- Having Nice Things?
- Physical Fitness?
- Being Challenged?
- Location?
- Supporting/Mentoring Others?
- Having a Family?
- Control of Technical Agenda?
- Schedule Flexibility?
- Visibility?
Grab a piece of paper

**What** is your current plan?
Industry vs Government vs Academia vs Undecided?

**Why?**
How do you enjoy spending your time?
What are your goals in a job?
Government Research Labs
Government Research Centers

DOE, DoD, NASA, NSF, DHS, NSA, NIST, NRC, FAA, ...
Why Work at a Government Lab?

• Opportunity to work on problems of national and international importance
• Chance to make a difference
• Work on cross-disciplinary teams with other scientists
Scientist Track

- Postdoc
  - Named - small project internally funded
  - Regular - working as a primary on an already funded project
- Research Scientist
  - Significant leadership roles in projects
  - Smaller projects on own
- Scientist
  - Leadership of projects and proposals
- Senior Scientist
  - Recognized international leadership in area of research
  - Leadership of large-scale projects

Advancement metrics similar to a research university
Applied Research Track

- Software Engineer
  - Developer on a research project
  - Leadership on development activities

Advancement metrics related to deliverables on projects
What Can You Do Now to Prepare?

• Internships at government laboratories
• Gain experience working on team projects
• Learn how to lead teams
• Build communication skills
• Learn about the various labs
  • types of work
  • qualifications required
  • citizenship requirements
• funding models
Industry Research Careers
# Industry Careers

<table>
<thead>
<tr>
<th>Role</th>
<th>Visibility</th>
<th>Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Research scientist</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Engr/Research Manager</td>
<td>Medium (all internal)</td>
<td>Medium</td>
</tr>
<tr>
<td>Corporate leadership</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Consulting</td>
<td>Low</td>
<td>Varies/Low</td>
</tr>
<tr>
<td>Government</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Start-Up</td>
<td>Low (initially)</td>
<td>Low</td>
</tr>
</tbody>
</table>

The same role can vary significantly from company to company
Research/Engineer Ladder Examples

Titles vary across companies, also management track

New PhD Grad
- Sr. Engineer – 5+ years
- Engineer – 3-5 years
- Engineer – 1-3 years

New MS Grad
- Sr. Engineer – 5+ years
- Engineer – 3-5 years
- Engineer – 1-3 years

New BS Grad
- Sr. Engineer – 5+ years
- Engineer – 3-5 years
- Engineer – 1-3 years

Senior Fellow – 20+ years
Fellow – 15+ years
Sr. Principal Engineer – 15+ years
Principal Engineer – 10+ years
Tech Lead – 10+ years
Sr. Engineer – 5+ years
Engineer – 3-5 years
Engineer – 1-3 years

Technical Fellow
Partner Researcher
Principal Researcher
Senior Researcher
Researcher
Industrial Research Career
Differences and similarities with academia

Research Agenda
• May depend on company’s interests
• May be more applied than pure
• May change as company changes

Publishing Papers
• Typically encouraged – extent varies
• Not always a requirement for success

Creating Patents
• Strongly encouraged
• A requirement for success

Research Funding
• Internal project approval
• External funding for joint University-Industry initiatives

Tech Transfer
• Critical goal for industrial researchers - Typically hard!
• Patents and open source contributions count

Participate in conferences
• Technical Program Committees
• Organization committees
• Standards Committees

Teaching/Students
• Interns and student mentorship
• University collaborations
• Ph.D./Masters student advising
• Teaching opportunities
How to prepare for an Industrial Research Career?

Similar to what you would do for an academic career
• Learn about the research process: identify important research problems, problem formulation, build solution artifacts, publish
• Go to conferences: learn to network
• Learn to “pitch” your research ideas, know your audience

Internships in industrial research and product organizations, start-ups
• Learn about the company you work for: leadership, products, services, growth areas, customers, market segments, competitors
• Interactions between business units and research

Evaluate what you really enjoy doing
• Tangible vs open ended problems
• Seeing your research realized into products and used by customers
• Publishing and Teaching/Mentoring
Academic Careers
Academic Career Ladder

Professorial Ranks
- Assistant: Tenure-track, 5-7 years
- Associate: Usually with tenure
- Full (no set time limit to achieve)
- Chaired Professor – endowed

Administrative Ranks
- Department Chair/Head, Dean, Provost, President

Teaching Faculty/Professor of the Practice
- Teaching load varies based on institutions
- Some institutions offer tenure-track for PoPs

Research Associate
Traditional Professor/Instructor Roles

Research universities (e.g., R1 institutions)
- Ph.D. program - emphasize research, funding (also need to show reasonable teaching and service)
- Managing a research team – Manage funding sources, manage students' projects, manage publications

Teaching-oriented colleges
- B.S. program – emphasize *teaching, service*
- Develop/Update curriculum

Public vs. Private
- Impacts funding structure
- Class sizes, student interactions, research group sizes

U.S. vs. Canada vs. Europe
- Impacts funding structure
What can I do now to prepare for an academic job?

Research
- Apprenticeship: learn from advisor, write papers, collaborate
- Grant writing: Help out on proposals, read successful proposals
- Corporate connections (for funding, student job placement)

Teaching
- Guest lectures, teaching assistantships
- Education minor, teach a summer course on your own

Service
- Organizing student organizations/support groups – Women in CS
- Working on department committees as student liaison
- Volunteering at conferences
- Join PC shadowing program when you are a senior grad student
Career Change
Moving Between Industry and Academia

From University to Industry/Government

• Must build real systems
• Establish visibility and knowledge in industry
• Look into sabbatical programs
• May be a technical interview

From Industry/Government to University

• Must continue publishing
• Establish visibility and reputation in research community
• Need to pass an academic interview (presentation, strong publication record)

This will be easier/harder at different times in your career.
Does What You’re Thinking Align With What’s Important to You?

• What you value most could change over time
• Absolutely no one is in your exact situation
• A PhD gives you options
• Be true to yourself and your values
• Don’t be afraid to course correct at any point in your career
Questions