Academia vs Industry:
Choose Your Own Adventure

A.J. Brush, Microsoft
Lisa Wu Wills, Duke University *(not able to make it)*
Susan H. Rodger, 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
Susan Rodger

• Education:
  • Purdue University, MS '86, PhD '89
  • North Carolina State Univ, BS '83

• Career:
  • Assistant Prof, Rensselaer Poly. Inst.
    • Tenure track, 1989-1994
  • Professor of the Practice, Duke University
    • Assist., Assoc. And Prof, since 1994
  • Research Interests
    • Computer Science Education, Visual and Interactive Tools, Algorithms, Data Structures

• Family and Fun
  • Husband and two boys Erich (25), Markus (22)
  • Hobbies: Baking, Running, Reading, Writing Wikipedia pages of Notable Women in Computing
A vs. B: So Simple, Right?

Academia could be:
- Professor at a research-oriented school
- Professor at a teaching-oriented school
- Research associate
- Academic administration

Industry/Government/Lab could be:
- Engineer
- Research Scientist
- Research Manager
- 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?
- Control of Technical Agenda?
- Supporting/Mentoring Others?
- Being Challenged?
- Location?
- Having a Family?
- 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
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 or PoP at R1
• 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