Academia vs Industry: Choose Your Own Adventure

Deb Agarwal, Lawrence Berkeley National Laboratory
Patty Lopez, Datacenter Group, Intel
A vs B: So Simple, Right?

**Academia** could be:
- Professor at research-oriented university
- Teaching-oriented position
- Academic administration
- Research associate

**Industry/Government/Laboratory** could be:
- Engineer
- Research Scientist
- Research Manager
- Technical or Managerial Leadership
- Consulting
- Start-up
Turn and Talk to Your Neighbor

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

Why?
How do you enjoy spending your time?
What are your goals in a job?
About me: Deb Agarwal

Education
- Purdue University - BSME
- University of California, Santa Barbara - PhD CE
  – Distributed systems

Career Path at Berkeley Lab
- Intern
- Scientist
- Group Lead
- Department Head & Senior Scientist

What I work on
- Management - Data Science Dept Head
- Research - Data Science - Data lifecycle topics
- Applied Research - Eco-informatics - Data systems supporting science
What is Important to You?

Must-haves vs. Nice-to-haves?

- Control of Technical Agenda?
- Supporting Others?
- Minimizing Effort vs. Being Challenged?
- Living Near Relatives?
- Having a Family?
- Visibility?
- Schedule Flexibility?
- Physical Fitness?
- Having Nice Things?
- Excelling in Your Career?
- Stability vs. Change?
Does What You’re Doing 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
Government Research Labs
GOVERNMENT RESEARCH CENTERS

- DOE, DoD, NASA, NSF, DHS, NSA, NIST, NRC, FAA, ...
- Mission-driven research and development
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
Dr. Patty Lopez

New Mexico State University
(BS, MS, Computer Science)

HCMS Computing Research Laboratory
Vision and Robotics Researcher
(PhD, Computer Science)

Hewlett Packard Co (1989-2008)
Product Software Development,
Color & Imaging Scientist

HP Tech Camp – on team that planned and delivered the first camp ~2006

Married with family
3 kids, 1 dog

General Co-Chair, 2013
Grace Hopper Celebration of Women in Computing Conference

Intel Corporation (2008-present)
Sr. Platform Applications Engineer,
Datacenter Group (aka "the Cloud")

Artificial Intelligence

In July about their work in teaching a computer
The highly controversial field of artificial intelligence is a blend of psychology, biology and computer science.
### 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>
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The same role can vary significantly from company to company
The Engineering Ladder
Titles may vary across companies

New PhD Grad
- 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

New MS Grad

New BS Grad

Senior Fellow – 20+ years
Fellow – 15+ years

CRA-W
Computing Research Association
Women
## Industrial Research Career

### Differences and similarities with academia

<table>
<thead>
<tr>
<th>Research Agenda</th>
<th>Tech Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>- May depend on company’s interests</td>
<td>- Critical goal for industrial researchers - Typically hard!</td>
</tr>
<tr>
<td>- May be more applied than pure</td>
<td>- Patents and open source contributions count</td>
</tr>
<tr>
<td>- May change as company changes</td>
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</tbody>
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<table>
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<tr>
<th>Publishing Papers</th>
<th>Participate in conferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Typically encouraged – extent varies</td>
<td>- Technical Program Committees</td>
</tr>
<tr>
<td>- Not always a requirement for success</td>
<td>- Organization committees</td>
</tr>
<tr>
<td></td>
<td>- Standards Committees</td>
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</tbody>
</table>

<table>
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<tr>
<th>Creating Patents</th>
<th>Teaching/Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Strongly encouraged</td>
<td>- Interns and student mentorship</td>
</tr>
<tr>
<td>- A requirement for success</td>
<td>- University collaborations</td>
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<table>
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<th>Research Funding</th>
<th></th>
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<tr>
<td>- Internal project approval</td>
<td>- Ph.D./Masters student advising</td>
</tr>
<tr>
<td>- External funding for joint University-Industry initiatives</td>
<td>- Teaching opportunities</td>
</tr>
</tbody>
</table>

- CRA-W  
  Computing Research Association  
  Women
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
Can vary significantly on course load
Some roles offer tenure equivalent

Postdoctoral/Research Associate
Usually on “soft money”
Traditional Professor/Instructor Roles

Research universities
- Ph.D. program - emphasize *research, funding*

Teaching-oriented colleges
- B.S. program – emphasize *teaching, service*

Public vs. Private
- 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
  - Professor-in-training programs, courses

- **Service**
  - Organizing student organizations/support groups – Women in CS
  - Working on department committees
  - Volunteering at conferences
Career Change
Moving Between Industry and Academia

From University to Industry/Government

- Must build real systems
- Establish visibility and knowledge in industry
- Need to pass 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)
All Choices are Valid!

- Do what you love
- If you don’t love what you’re doing, do something else
- A PhD gives you that option
- Take ownership of what you do now and what you want to do next

Aspire to be happy - not ‘stereotypical’
Questions ?