Academia vs Industry: Choose Your Own Adventure

Deb Agarwal, Lawrence Berkeley National Laboratory
Sujata Banerjee, VMware Research
Mary Lou Soffa, University of Virginia
A vs B: So Simple, Right?

Industry/Government/Laboratory could be:
- Engineer
- Research scientist
- Engg./Research Manager
- Leadership
- Consulting
- Start-up

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

Minimizing Effort vs. Being Challenged?

Living Near Relatives?

Having a Family?

Physical Fitness?

Having Nice Things?

Excelling in Your Career?

Control of Technical Agenda?

Supporting Others?

Must-haves vs. Change?

Schedule Flexibility?

Visibility?

Control of Technical Agenda?

Minimizing Effort vs. Being Challenged?

Living Near Relatives?

Having a Family?

Physical Fitness?

Having Nice Things?

Excelling in Your Career?

Supporting Others?
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
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
About me: Sujata Banerjee

Currently at VMware Research
   Senior Staff Researcher
   Research co-Director, External Research

Previous Career
   ● Hewlett-Packard Labs
      Distinguished Technologist and Director, Networking Systems Research Grp
   ● University of Pittsburgh
      Associate Professor with tenure, Telecommunications Program

Research
   Networking: Software Defined Networking (SDN), Network Functions
   Virtualization (NFV), Energy Efficient Networking, Measurement

Education
   Ph.D., Electrical Engineering-Systems, University of Southern California (USC)
   B.Tech. and M.Tech.: Indian Institute of Technology (IIT), Bombay
# 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>Engg/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</td>
<td>Low</td>
</tr>
</tbody>
</table>

Same role can vary a lot from group to group
The Engineering Ladder
Titles may vary across companies

9. Fellow
8. Principal Engineer
7. Senior Staff Engineer
6. Staff Engineer
5. Senior Engineer
Engineer 4
Engineer 3

New PhD Grad
New BS Grad

Up or Out within 3 Years
# 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 not be totally unfettered</td>
<td>- An important 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>
</tbody>
</table>

<table>
<thead>
<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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Research Funding</th>
<th>Teaching/Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Internal project approval</td>
<td>- Interns and student mentorship</td>
</tr>
<tr>
<td>- External funding for joint University-Industry initiatives</td>
<td>- University collaborations</td>
</tr>
<tr>
<td></td>
<td>- Teaching opportunities at local Universities</td>
</tr>
<tr>
<td></td>
<td>- Ph.D./Masters student advising</td>
</tr>
</tbody>
</table>
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 “sell” your research ideas

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
About me – Mary Lou Soffa

Currently
Owen R. Cheatham Professor
Department of Computer Science
University of Virginia

Previous Career
Professor, University of Pittsburgh
Dean of Graduate Studies, University of Pittsburgh
Chair of the Computer Science Department, UVA

Research
Software Engineering, Programming Languages,
Software Systems, Architecture, Cloud Computing
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 ?