On the Development of Research Practice

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The Typical EE/CS Grad Career

- Year 1 and 2: take some classes, take orals or subject exam (get MS degree)
- Year 2 and 3: begin to focus on a thesis topic
- Year 3 and 4: get some results in the area
- Year 5: advance to candidacy / qualifying exam
- Year 6 or more: complete thesis
Focus on a Topic

• Interesting: to you and those around you
• Opportunity: you can contribute something
• Term: not incredibly far away
Get Some Results

• Try for 1-2 papers published in the area
• First author is preferable
  – Who did what work can be an issue
  – Have it be “your thing”
• Better networking/systems conferences:
  – SIGCOMM, Infocom, NSDI, OSDI, SOSP, SIGMETRICS
Advancing

- Form your committee
  - Scheduling your experts can be hard!
  - You may benefit from people at a different institution

- Your qualifying exam
  - Be very well prepared for this
  - May be the committee’s only opportunity to stop you

- What “they” want
  - Is the topic reasonable (not too simple)?
  - Is the scope reasonable (not an over-extension)?
  - How will you know you are done?
  - Are you competent to undertake the work?
Finishing

• Many PhD students lost in the ABD phase
  – Try to avoid losing momentum
  – Keep in contact with others in the field
• Writing
  – Allocate a good chunk of months for this (min. 3-4)
  – Be relentless– don’t allow yourself to be interrupted
• The end game
  – Have some idea of where you want to go next
  – Know people in your field by name
  – Get your interviews in line
  – Many places will let you finish your writing after employment
  – Final copyediting may be a little painful– be ready for it
‘Professional Research’

• Some of the same skills from grad school
• Choosing a research topic
  – How applied versus how much ‘pure’ research
  – Who to work with?
  – Topic may be related to grant responses
  – How crowded is the area?
  – What about my institution?
  – Other time commitments?
Flavors of Professional Research

- **Industrial research**
  - Tends to be more applied (not always)
  - Intellectual property (you will meet lawyers!)
  - Somewhat resistant to cross-fertilization
  - Hard and soft money

- **Government research**
  - Could be applied or pure
  - Less focus on intellectual property
  - May be working closely with universities (depends)
  - Soft money

- **University research**
  - Pure research
  - Minimal focus on intellectual property
  - Often in search of money
  - Need to teach
  - More freedom
  - Working with smart students is typical best benefit
Horror Stories/Realizations

- You got scooped
- You were awarded a grant that was then cancelled
- You were awarded an unclassified program that went dark
- You didn’t make tenure
- Your big applied project burned up on entry
- You couldn’t get any grants (esp. university)
- You are a very bad teacher or advisor
- Your ‘pure’ research lab goes ‘applied’
My Current Research Area

• Delay-Tolerant Networking (DTN)
• Started from a trip to NASA/JPL
• ‘Extreme’ networks charter of Intel Lab
  – I really took the ‘extreme’ to heart