PLANNING YOUR RESEARCH CAREER

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CONGRATULATIONS!!
TRACY CAMP
PROFESSOR (LED CS@MINES)
COLORADO SCHOOL OF MINES

Wireless Networks, Mobile Networks

Research Successes
1. 30+ external grants (= $20+ million)
2. 14,000+ citations and 36 h-index (Google Scholar)
3. software used by 4,000+ researchers in 88 countries
4. ACM Fellow; IEEE Fellow

Research Failures
1. ... 2. .... 3. ....
Parallel Systems, Computer Architecture

Research Highlights

1. Shared memory implementations in hardware and software
   - influenced Intel’s Cluster OpenMP, big data analytics at scale
2. Hardware and software energy- and resource-aware configurability
   - patents licensed, collaborations with IBM, Intel, Google, Facebook
3. Collaborations on widely used parallel applications
   - Mr. Bayes, Fastlink (used to identify the gene responsible for Parkinson’s)

ACM and IEEE fellow
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Albert Arendt Hopeman Professor of Engineering
(Former) Chair, Computer Science
Interim Associate Vice President for Research
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ACADEMICS 101

• Path
  – [Postdoc] → aP → AP → Tenured AP → Full
  • At some schools AP and Tenure come at the same time
  – Along the way and beyond
    • Opportunities for administrative and service positions in academia and government; sabbaticals and leaves (academia, govt., companies, start ups)

• Evaluation Criteria:
  – Research, Education, Service
FIND OUT WHAT MATTERS AT YOUR SCHOOL/DEPARTMENT

(hopefully) Impact is what matters
– Quality, not quantity, but ... *there are limits*
– Ideas and people (students) are your legacy, not papers, but ... *great papers get you there*

Need to balance research community norms with your department’s criteria
– i.e., seek and consider advice from senior colleagues but don’t take it blindly
WHAT IS YOUR BIGGEST CONCERN REGARDING JUMPSTARTING YOUR RESEARCH CAREER?
TYPICAL CHALLENGES HEARD IN PAST

- How to determine a good research problem and its potential for impact?
- How to develop a coherent research agenda with limited time to do so (while juggling all your responsibilities)?
- How to discover the joys of an academic career (working with students) while “staying afloat”?
- How to preserve time for family and friends?
  - They keep you sane and cannot be replaced
  - People work more effectively when they are happier
MANAGING YOUR RESEARCH
WHAT IS YOUR MOST IMPORTANT RESOURCE? (QUESTION 1)
WHAT IS YOUR MOST IMPORTANT RESOURCE? (ANSWER 1)

• Your Graduate Students and Research Collaborators!
  – Hire graduate students As Soon As you can
  – Consider including undergraduate REUs
    • Create byte-sized project
    • Be mindful of your time
  – Choose your collaborators carefully
WHAT IS YOUR MOST IMPORTANT RESOURCE? (QUESTION 2)
WHAT IS YOUR MOST IMPORTANT RESOURCE? (ANSWER 2)

• Your Time!
  – Struggling students will take more of your time.
  – Even good students need time getting started. Hire deliberately and carefully!
  – Consider hiring postdocs and working with senior students (co-advising)
  – Learn to say No! (to lots of things)
QUANTIFY YOUR AVAILABLE HUMAN CAPITAL

- How will you spend your time?
  - Doing actual research
  - Managing / interacting with participants
  - Academic year vs. summer
- How much time and effort will your collaborators give?
  - Other faculty may have limited time
  - Industry researchers give and demand lots of effort
  - Students may require training
DETERMINE YOUR RESEARCH SCOPE

• What can you realistically accomplish?
  • How expansive can your project be?
  • How much prior knowledge will be needed to accomplish this research?
  • How many projects can you have going on at once?

• What will be valued by your university?
  • Individual vs. collaborative work
  • Student research
  • Primary vs. interdisciplinary vs. pedagogical research
CREATE A MIX OF PROJECTS

• Keep one solo project
• Create a collaboration with a researcher in your field
• Create an interdisciplinary project with someone at your university or someone locally
COLLABORATION
WAYS TO INITIATE COLLABORATION

• Finding Collaborators
  – At seminars, workshops, conferences
  – Introductions from colleagues
  – Cold calls

• Collaboration Vehicles
  – Artificially or externally driven collaboration to compete for large $$
  – Via students, class projects or interns
  – Via shared research interests
UPSIDES OF COLLABORATION

• Successful collaboration is a multiplier
  – Enables you to achieve more than you can on your own,
    is fun, and brings new friends and colleagues
• Synergy
  – New ideas!
  – The whole is greater than the sum of the parts – visibility,
    impact
  – Quality control – a (presumably) friendly critic
  – Successful collaboration is a multiplier
    • you achieve more than you can on your own
    • Introduces you to new colleagues who may be future
      collaborators
  – Is fun!
DOWNSIDES OF COLLABORATION

- Overhead
  - Long start-up time and face-to-face meetings
- Interdisciplinary issues
- Intellectual property ownership (industrial collaborations)
- Perceptions of the community
  - Who gets the credit externally and for what
- Unsuccessful collaboration can be a negative multiplier
  - Wastes time
  - Stressful
  - Creates hard feelings
  - Avoid upfront if possible… but if not, leave gently
FUNDING
FUNDING DO’S

• Visit funding agency sites regularly
  – Talk to appropriate program manager(s)
  – Volunteer to serve on review panels especially for types of proposals you plan to submit
  – Expand your funding sources (e.g., industry)

• Seek advice/examples from colleagues
  – Ask successful colleagues to review your proposal and LISTEN to their feedback
  – Borrow sample proposals from successful colleagues

• Understand the program you are submitting to
  – Read the program announcement carefully
  – Read funded summaries/proposals of projects from that program
FUNDING DO’S

• Fund your research through a variety of sources
• If at first you don’t succeed, try, try again
  – Read reviews carefully
  – Don’t take it personally
  – Talk to program manager
  – Be persistent
• Write a few GOOD proposals
  – Immature ideas/plans rarely get funded
  – Borrow sample proposals from successful colleagues
  – Seven criteria for a GOOD proposal (handout)
Other Advice
Rule #1: Make everything possible help your research

• Service at your university:
  – Ask for things like graduate recruiting or arranging distinguished lectures

• Service to your research community:
  – Serve on the “best” program committees that you can

• Teaching:
  – Talk about your research in your undergraduate classes
    ➔ recruit students
  – Teach courses that will help you find and evaluate students
    ➔ projects
  – Get students to do research presentations (when possible)
  – Don’t neglect research groups reading papers!
Rule #2: Build your mentors and network

• You need mentors now more than ever
  – Consider separate mentors for research, teaching, and service.
  – If your department/university has mentoring available, use it!
  – Ideally have someone outside your department (or at least research group) to talk to.
  – Consider external resources like the Center for Faculty Development and Diversity

• Be strategic at conferences: seek out people who can help you (e.g., write tenure letters), follow up, and keep track
Rule #3: Always think about “impact”

- Set aside blocks of research thinking time in your schedule
- Spend money to save yourself time (it’s an investment in you)
- Keep your CV up-to-date on your website
- Toot your own horn (and often)
- ……
- Make time for yourself, your family, your friends
... AND HAVE SOME FUN ALONG THE WAY!
RESOURCES

• Presentations at previous CRA-WP/CRA workshops
• Dave Patterson’s Non-Technical Talks
  – https://people.eecs.berkeley.edu/~pattrsn/talks/nontech.html
• Jeannette Wing’s “Twelve Tips for Department Heads from an NSF Perspective”
• Advice about everything from Tao Xie:
  – https://taoxie.cs.illinois.edu/advice/
• Funding Tips (see QR code)