PLANNING YOUR RESEARCH CAREER

Tracy Camp
Computing Research Association
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CONGRATULATIONS!!
Tracy Camp  
Emeritus Professor (Led CS@MINES)  
Colorado School of Mines  

Wireless Networks, Mobile Networks  

Research Successes  
1. 30+ external grants (= $20+ million)  
2. 15,000+ citations and 37 h-index (Google Scholar)  
3. software used by 4,000+ researchers in 88 countries  
4. ACM Fellow; IEEE Fellow  

Research Failures  
1. … 2. … 3. …
Sandhya Dwarkadas  
Professor and Chair  
University of VIRGINIA

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)

Ph.D. Rice ‘93; ACM and IEEE fellow  
‘96–’22: University of Rochester; Albert Arendt Hopeman Professor of Engineering,  
(former) Chair, Computer Science  
‘22–present: University of Virginia; Walter N. Munster Professor and Chair
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
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](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/](https://taoxie.cs.illinois.edu/advice/)
- Funding Tips (see QR code)