PLANNING YOUR RESEARCH CAREER

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CONGRATULATIONS!!

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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. ….

SANDHYA DWARKADAS
PROFESSOR
UNIVERSITY OF ROCHESTER

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

Ph.D. Rice '93; '96-present: faculty at University of Rochester

Albert Arendt Hopeman Professor of Engineering

(Former) Chair, Computer Science

Interim Associate Vice President for Research

Moving to University of Virginia July '22

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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

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ACADEMICS 101 (CONT.)

- **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

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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

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MANAGING YOUR RESEARCH

WHAT IS YOUR MOST IMPORTANT RESOURCE? (QUESTION 1)

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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

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WHAT IS YOUR MOST IMPORTANT RESOURCE? (QUESTION 2)

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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)

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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

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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

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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

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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

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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!

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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

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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

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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)

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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!

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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

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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

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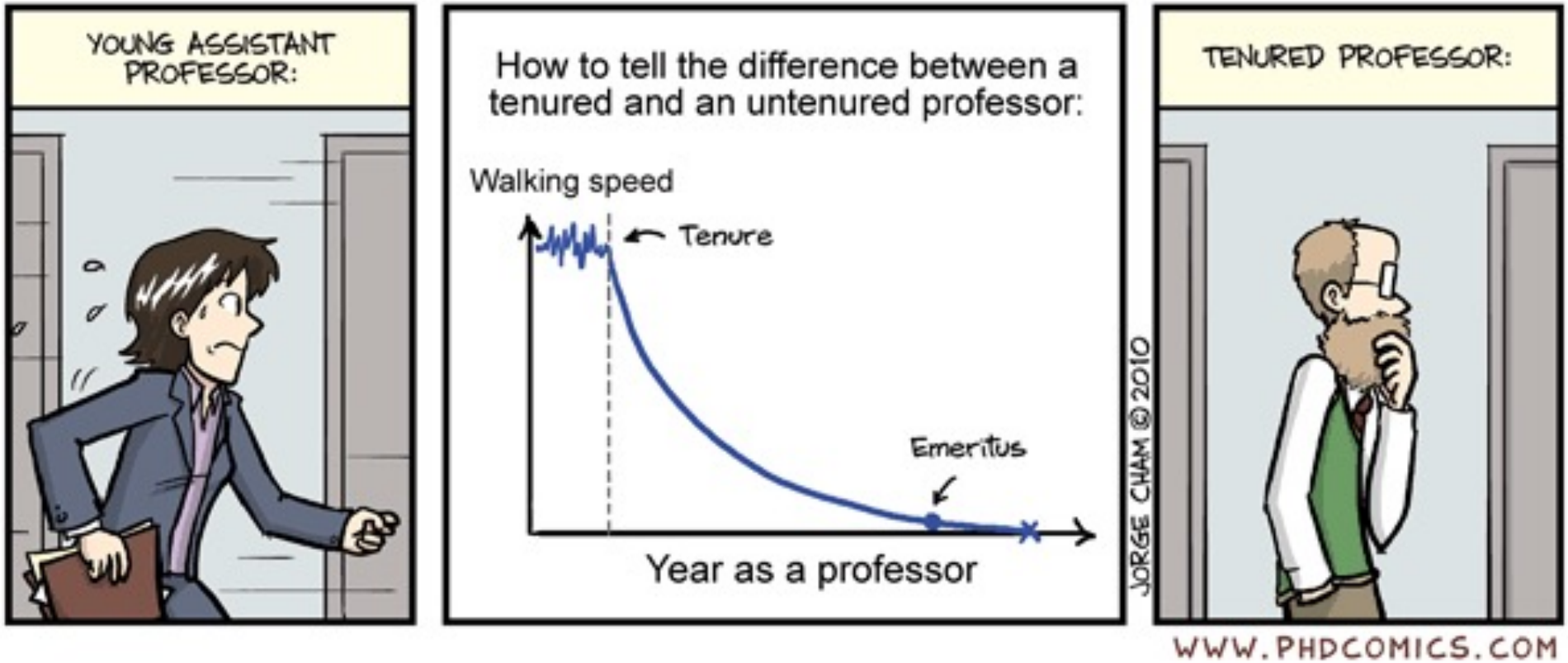

… AND HAVE SOME FUN ALONG THE WAY!

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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"
  - http://cacm.acm.org/blogs/blog-cacm/54177-twelve-tips-for-department-heads-from-an-nsf-perspective/fulltext
- Advice about everything from Tao Xie:
  - https://taoxie.cs.illinois.edu/advice/
- Funding Tips (see QR code)