# Being A Successful Academic

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# Being A Successful Academic

A successful academic can be defined in many ways.

- Excellent research
- Inspiring teaching
- Important service
- Successful students
- Wide-Spread adoption of some contribution

No one definition serves everybody.

# Research and Teaching Themes

Pick research topics that will grow.

- Solving early problems in a new area may mean that your solutions will be used and recognized for many years.
- Consider problems in which you have natural, unexplainable interest – such problems will hold your interest until you can make progress
- Don't be afraid to pursue something if you believe you can make progress.

When possible, teach "right at" your research

- For instance, when teaching architecture, I give the undergraduate students a formal description of a microprocessor ISA.
- Even when your research is good you may find:
  - It's often a lot of work to move something from the "Ah ha" stage to being able to present it in a clear and effective manner
  - That if you can't explain what you are doing to a student, then it's not ready for general consumption nor publication

# Planning

Always have a five-year plan with your research and impact goals.

- Such planning sharpens your execution
- It keeps you prepared to write proposals
- It helps you stay focused
- Your plan should identify opportunities if you are successful
- Include what resources will be required for success

Update the plan every year.

- Planning is not an exact process
- Record what worked and what didn't

Don't be a prisoner to your plan – take time to explore new ideas and be sure to exploit breakthroughs

# Be Prepared to Run a Small Business

You always need to be able to articulate how your work adds value.

- Have a two-page business plan prepared and ready
- Know your costs, both for yourself and your team
- Learn how to make financial projections
- Learn the business system of your institution

It is important to be able to successfully multiplex between a number of different tasks every day.

- Serialists need not apply
- Make sure that you make progress on multiple fronts each week
- Don't get involved in university administration before you get tenure

# Mentors and Role Models

If possible, get a mentor – someone considerably senior to you, someone you can trust, and someone with whom you can really communicate.

- Communicate with colleagues regularly about your work
- Listen to your colleagues describe their work
- Change some of your colleagues in pursuit of stimulation and new challenges

Select role models – for me they are regular and continuing contributors.

- Randy Bryant – combined engineering/modeling skills
- Edsger Dijkstra – pruning and sharpening skills
- Richard Feynman – excellent communicator at all levels

I recommend you read Richard Hamming's "You and Your Research" lecture.

# Publish and Read

You may be the world's smartest person, but if you don't communicate your ideas, no one will benefit.

- Develop a trustworthy network of colleagues with whom you can share and discuss your ideas.
- Just write – don't worry about where an article may be published.
- Write for different communities

Read

- Regularly read published articles – try to identify what you think is good and bad.
- Read outside of your area
- Really study other folks' good work

Communicate your ideas to folks outside of your area

- This will sharpen your ability to articulate your ideas
- This will help you write accessible proposals

I recently explained to a kindergarten teacher what I do

- This teacher wanted to know how I identified who might be successful in my area
- After about an hour, this teacher was proud to have basic comprehension of the value of my research.

# Rewards and Costs

- Costs of being an academic
  - May think of problems at dinner with your partner
  - Thinking while hosting people
  - May often work late
  - May not think enough of your partner and family
- Limitations
  - Hopefully, you have (or will have) a partner that understands your need to think, study, and write
  - Not so much money
  - Hard to do anything really big
  - Having ideas/approaches out of step with the mainstream
- Rewards
  - Freedom to pursue long-term objectives
  - Freedom to throw out uninspired work
  - Flexibility to manage your time
  - Students with whom to work
  - Belonging to an institution that believes in education
  - The pleasure of creating something new and better
- Fulfilling
  - Teaching and service make obvious contributions to society
  - Respect from your community

# My Weaknesses and Strengths

- I have too many weaknesses to list, but I mention a few that might affect your ability to be a good academic.
  - Not inspired by publishing the next "little" twist.
  - For me, writing is hard work
  - Lack of interest in "fighting it out" at conferences
  - Unwillingness to insist that my work is better than others
  - Often have to learn "obvious" lessons on my own – this can be painful
  - I often have too many things going on at the same time
  - Sometimes, I'm too trusting of my colleagues
  - I'm not selfish enough
  - I believe my students should graduate!
- To be a good academic, you need to believe strongly in yourself.
  - I don't mind hard work – I like to work
  - Multi-faceted background – some math, some engineering, some computer science – I think this helps me find research opportunities in the "creases"
  - I believe I see trends and opportunities well
  - I really enjoy the work I'm doing

# My Vision

We would like computing systems to be specified by a *formula manual*, a complete precise set of formulas that exactly specifies computing systems (whether hardware, software, or both).

- A formula manual unambiguously describes the functionality being offered.
- A formula manual defines the abstract specification for its concrete implementation.
- A formula manual can be used as the concrete specification for something built on top of it.

We want mathematically specified, mechanically checked computing systems.

- This is a long-term and evolving goal. `E` is one such step.
  - Systems are increasing in complexity faster than our ability to manage them or control them.
  - If we are aggressive, maybe we can achieve this vision on small commercial designs, e.g, cell telephones, pagers, routers, etc.
- Our ability to field secure systems is based our our ability to specify and validate our computing, networking, and control systems.