How to be a productive PhD student?

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Why to become a PhD student?

- You want to do research.
- You want to be at the knowledge frontier of a research domain.
- In today's world, a PhD is a requirement to pursue a career in a research lab or in academia.
- Or you do a start-up based on your thesis research.

Overcoming Problems in PhD Studies

“Studying for a PhD can be a real roller coaster ride. A doctorate takes at least three years to complete and lots can go wrong during a student's doctoral study.”

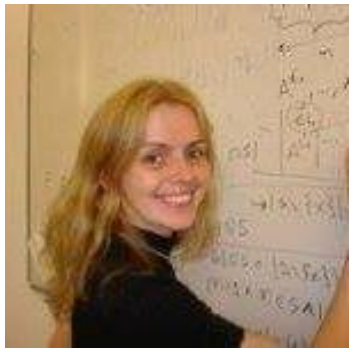
Alistair McCulloch

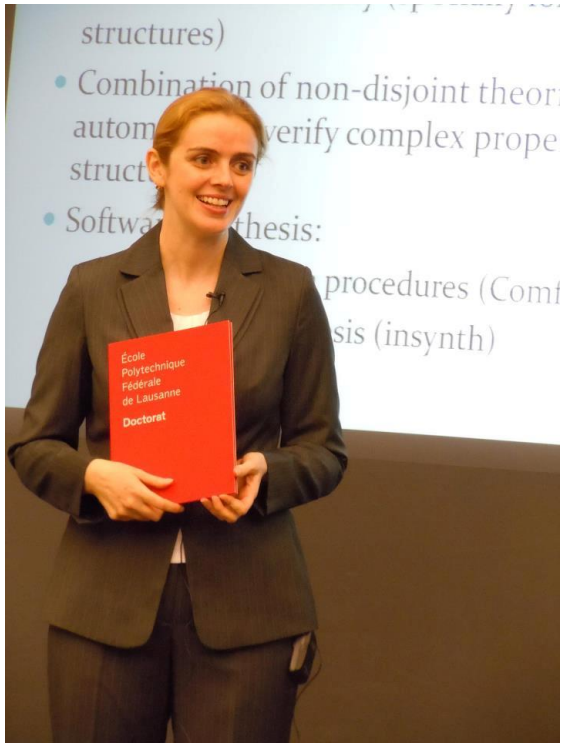
Problems in PhD Studies

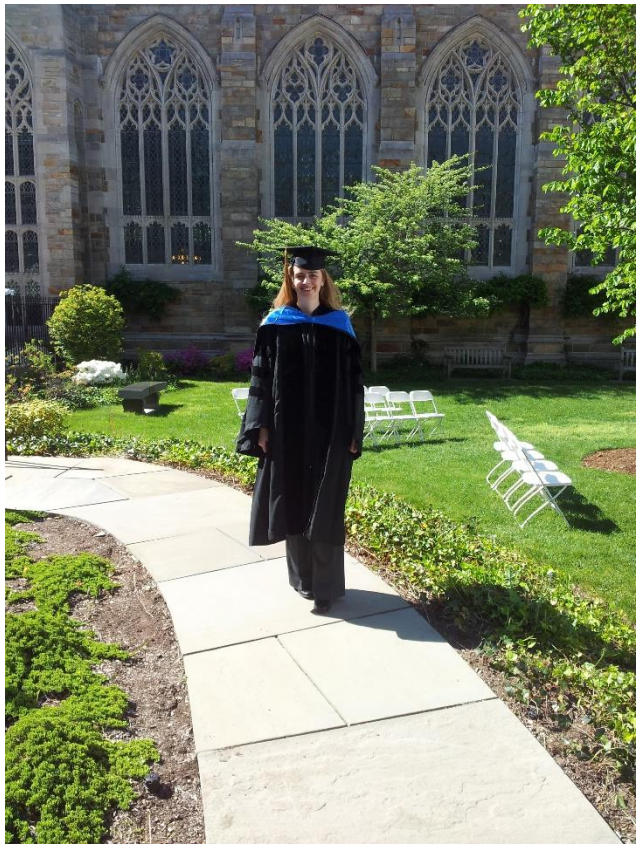
- Problems with identifying a good research topic
- Problems with data collection
- Isolation
- Running out of money
- Problems with a supervisor
- What if someone publishes students' original idea before they do?

ABD = "all but dissertation" stage

- Several studies have shown that the attrition rate in doctoral programs could be as high as 50 percent [Smallwood, 2004]
- Reasons:
  - personal nature (financial difficulties, family obligations)
  - academic nature (difficulty in coming up with adequate research topics or writer's block)







Enough about you, let’s talk about me!

The ROSE Group

General Goal:

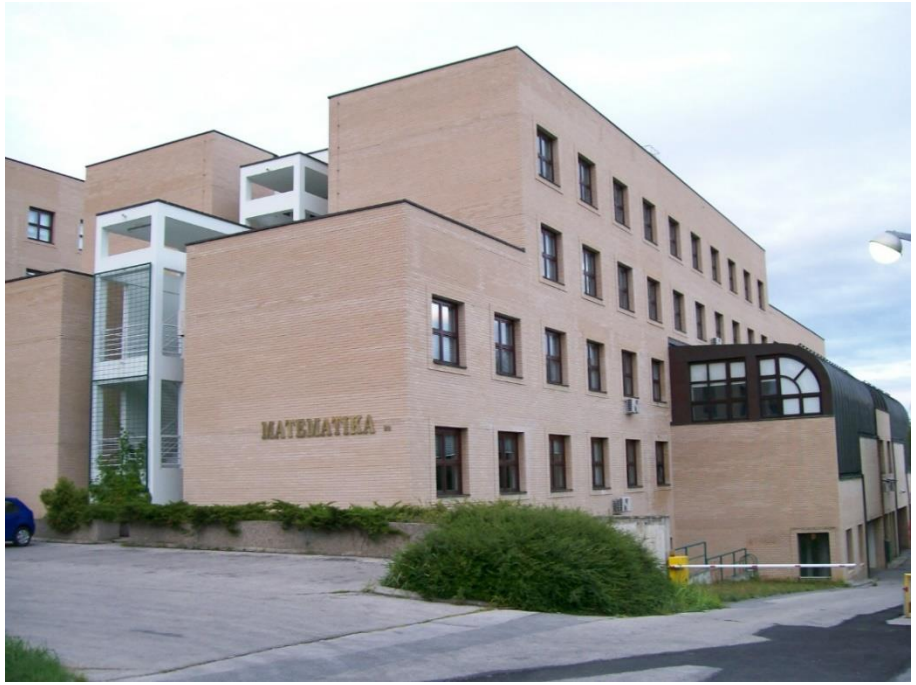
Improving software quality and reliability using formal methods

Some specific topics:

- Synthesis for FRP
- Verification of configuration files
- Symbolic execution engine for lazy languages
- Automated repair of firewalls
- Live programming environment
- Synthesis of digital signal processing programs

Bachelor Degree in Mathematics

- Born in Croatia
- Studied mathematics at the University of Zagreb
- In addition to regular student duties also worked as a student research assistant



Summer Internship at CERN

- International experience
- Working in a team
- Responsibility
- Learn the concept of “deadlines”
- International internship is a great way to network and make friends and contacts
- Published my very first paper (in a physics journal)

Master Studies: Germany

Computer Science

- But which area?

Programming Logics

- Describe programs using mathematical formalisms
- Prove properties of programs

Went to my first conference and met my PhD advisor

Research Associate in Austria

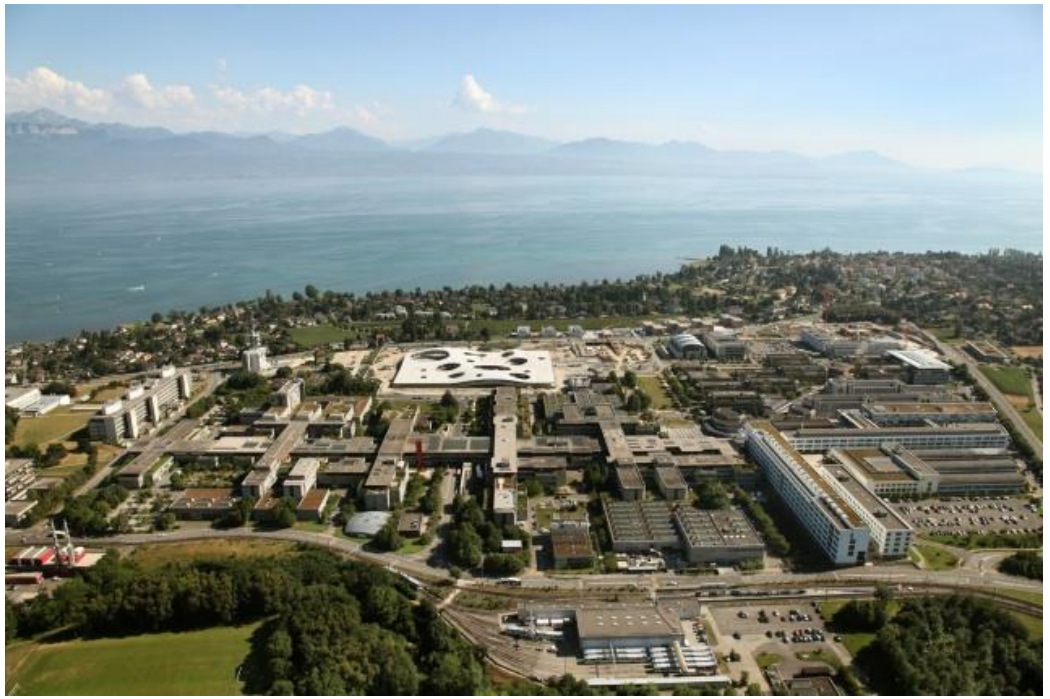
Project-funded institute

- Writing proposals
- Writing deliverables
- Programming
- Travelling
- Giving presentations

PhD Studies – EPFL, Switzerland

Amazing times:

- Research
- TA-ing
- Conferences
- Internships
- Excellent advisor, great mentors



The most important person: your PhD advisor

- You and your supervisor should have similar interests
- Usually two projects: one is offered to you by your advisor, the other one you find yourself
- You and your advisor should also connect on a human level
- The easiest way to your supervisor's heart:
  - Work hard!
  - Do more than the advisor asked you!
  - Offer to review papers for your advisor!

Importance of doing an internship

- I did an internship at Microsoft Research Redmond in summer 2008
- I met my internship mentor during a conference
- The result of an internship: we published a paper and a TR

- By doing internships you increase the size of your network
- You gain one more person who can write you a recommendation letter
- More importantly: you broaden your horizons

Really important: make sure that your supervisor approves you going for an internship!

Research during PhD studies

- Work in the area which you find important and that you are passionate about
- Hopefully you should already have some experience in your research area
- Try to figure out early what kind of a career would you like to pursue after your PhD, and structure your research agenda *loosely* around that idea
- Chose internships accordingly

Attending conferences

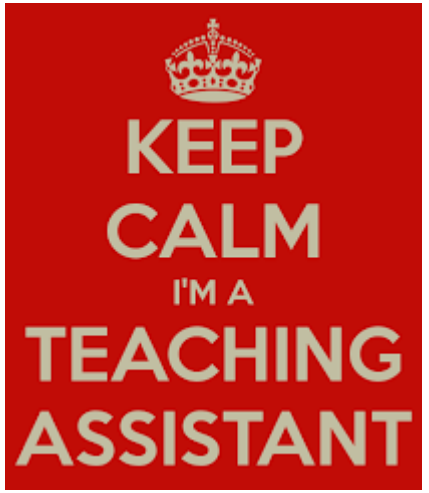
- Try to visit as many conferences as you possibly can
- However, don't do just a conference tourism: at every conference that you visit, make sure that you have something interesting to present to people when they ask you "What are you working on?"
  - Even if you don't have a paper at this particular conference, you must have something exciting that you are working on
- Apply for conference grant, even if your supervisor has enough of money – you might not get the grant but people will know that you exist and that you would like to attend
- Again: do not apply for the purpose of the conference tourism

Find the right mentor!

- There are mentorships programs and website that offer them http://mentornet.org/
- The best ones are the ones that happen spontaneously
- Your peers can also be your mentors
- Talk to more senior students and find out what is a secret of their success

Being a TA

- Being a teaching assistant (TA) is not a duty that you should just do and get over with it
- You learn how to speak in front of an audience
- You learn how to form arguments and answer the questions
- You will finally fully understand material
- Teaching experience is a very important part of a faculty application (*"teaching statement"*)
- Be open for discussion and inspire young undergraduate students to work in your field



What does “Nature” say about being a successful PhD student?

- An article published in Nature 441, 252 (10 May 2006) by Georgia Chenevix-Trench

Summary:

To be successful you must be at least four of the following: smart, motivated, creative, hard-working, skilful and lucky. You can't depend on luck, so you had better focus on the others!

Practical advice (from the same article)

- Choose a supervisor whose work you admire and who is well supported by grants and departmental infrastructure.
- Take responsibility for your project.
- Work hard — long days all week and part of most weekends. If research is your passion this should be easy, and if it isn't, you are probably in the wrong field.
- Take some weekends off, and decent holidays, so you don't burn out.
- Read the literature in your immediate area, both current and past, and around it. You can't possibly make an original contribution to the literature unless you know what is already there.
- Be creative. Think about what you are doing and why, and look for better ways to go. Don't see your PhD as just a road map laid out by your supervisor.
- Develop good writing skills: they will make your scientific career immeasurably easier.

So, how to be a productive PhD student?

- **In summary: work hard, play hard!**
- You need to find your own way to unlock your full potential
- You are not alone: your advisor is there to advise and guide you

- Doing a PhD is not a standard 9-5 job, so standard rules do not apply here
- There will be good days (thrills after submission) and there will be bad days ("We regret to inform you…")
- A life - work balance is important

- Organize your time: don't waste your rare free time seating in front of your screen and freaking out about what will happen
- Everything will be fine – trust me, I am a doctor

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