PhD in Chemical Engineering –
How to be successful during and after your degree?

Akshat Tanksale
Outline

- About me
- Career Paths
- Recent trends and numbers
- What do you need to do achieve your career objective?
About me

- 2001 – BEng at National Institute of Technology, Raipur, India
- 2004 – MEng at University of Queensland (UQ)
- 2008 – PGDip in Technology and Innovation Management at UQ
- 2008 – PhD at UQ
- 2011 – Lecturer at Monash University
- 2015 – Senior Lecture at Monash University
  - Teaching – CHE2162, CHE2163, CHE3165
  - Research – 3 PhD completions, 1 under examination and 7 current PhD students
  - Admin – Director of Graduate Research
Why did you choose to do PhD?

YOUR LIFE AMBITION - What Happened??

- World, here I come!
- Win Nobel Prize
- Revolutionize your field
- Get a job at a top University
- Attend that Conference in PoDunk, MN
- Get a job
- Hope they have Pepperoni Pizza

1st Year 2nd Year 3rd Year 4th Year 5th Year
Why did you choose to do PhD?

- Passion for research - want to be at the cutting edge of science / engineering
- Want to become a Professor
- Want to change the world!
- Available opportunity / was offered a scholarship, so why not!

Results from live survey
Honey, maybe it would help your job search if you thought about your life goals.

I mean, what sort of career did you have in mind when you went to grad school?

What did you envision doing with your Ph.D.?

What do you want to be when you grow up?

Retired.
What do you want to do with your PhD?

- Academic Research
- Corporate Research and Development
- Anything but research
- Too early to think / not decided

Results from live survey
Career Paths: What’s the right choice?
Career Options: Sectors

Academic
- University
- Government
- Research Institute

Corporate
- R&D Company
- CRO
- Technology-based Company
- Professional services

Commercialisation
Start-up company
Career Options: Application of PhD

**Technical**
- Research Scientist (CSO, Team leader, PI, Product development)
- Field Applications
- QC / Regulatory
- R&D manager
- Patent attorney
- Tech transfer
- Venture capitalist
- Publishing

**Non-technical**
- Exec / board
- Business Development
- Consulting
- Sales
Case Study: H

- PhD at Indian Institute of Science – Material Science
- Postdoctoral Fellow in Japan – 3 yrs
- Industrial R&D in Japan – 2 yrs
- Senior Scientist in various industries – 9 yr
- Corporate R&D Manager – 3 yr
- Chief Scientist of a multinational corporate R&D centre
Case Study: C

- BEng at UMel – Chem Eng
- Process Engineer at various companies – 8 yrs
- PhD at UMel – Chem Eng
- Research Fellow – 2 yrs
- Lecturer in Australia – 6 yrs
- Consultant at a management consulting firm in the UK
Case Study: G

- PhD at University of Cambridge – Chem Eng
- Engineering Consultant – 2 yrs
- Senior Lecturer – 5 yrs
- Corporate manager in sustainability – 5 yr
- Simultaneously Board Member at IChemE – 5 yr
- Concurrently part-time Associate Professor and part-time lead engineer and part-time consultant
Case Study: R

- PhD at UQ – Biochemistry
- Research Scientist at QIMR – 1 yrs
- Research Fellow at Brookhaven National Lab (US) – 3 yrs
- Senior Scientist at a Biotech R&D company – 3 yr
- Group leader – 2 yrs
- Manager / associate director – a techno-commercial role spread across Strategy, Business Development & Structural Biology departments – 4 yrs
- Global Head of strategy and business development at a medium size biotech R&D company.
Preparing for the Path: Why should you care?

- HDR numbers at Monash Chem Eng –

Source: Callista Q3 enrolments
Preparing for the Path: Why should you care?

- HDR Destinations – Availability for Full-time employment

* Not seeking full-time work = In part-time employment, not seeking FT work + Not working, only seeking PT work + not available for FT study or FT work

Reference: Postgraduate Destinations Report, Graduate Careers Australia
Preparing for the Path: Why should you care?

- HDR Destinations – Seeking Full-time employment
  - The charts below show the distribution of persons as a fraction of persons “Available for full-time work”

Reference: Postgraduate Destinations Report, Graduate Careers Australia
Preparing for the Path: Why should you care?

- HDR Destinations – Seeking Full-time employment
  - The long-term trend of persons still seeking full-time work as a fraction of persons “Available for full-time work”

Reference: Postgraduate Destinations Report, Graduate Careers Australia
Preparing for the Path: Why should you care?

- HDR Destinations – Engineering HDR graduates in full-time work
  - Percentage of persons in full-time work as a fraction of persons “Available for full-time work

For the last three years Chem Eng HDR graduates are doing worse than the average HDR graduates.

* Data for Aeronautical and Mining Engineering omitted due to small sample size

Reference: Postgraduate Destinations Report, Graduate Careers Australia
Preparing for the Path: Why should you care?

- HDR Destinations – Median Salaries of HDR graduates
  - The charts below show the median salaries according to the broad employment sectors

Reference: Postgraduate Destinations Report, Graduate Careers Australia
Conclusion from the recent trends –

No, seriously, I think our HDR students need to develop an X-factor – add value to your HDR degree.
What should you do throughout your career?

- Talk with people who have taken the direction of your interest
- **Ask about their typical day** – consider how you would like to spend your day and what you enjoy
- Identify your key scientific and **non-scientific** skills
- Find a champion / mentor to point you in the right direction
- Think outside the box – it is not always about following others
- Think about what your key drivers are (be aware of when they change throughout your career)
What should you do during your PhD?

- Learn new skills / broaden your horizon – PhD is not just about research in your narrow topic
  - Formal courses (technical, software, management, commercialisation, etc.)
  - Seminars
  - Grant writing?
  - Travel abroad on research visits where possible

- Time Management
  - Being efficient at unimportant things is useless!
  - Being effective an finishing important things makes a difference.
  - Pareto’s 80/20 Principle: Focus your efforts on the 20% of the tasks that bring 80% of the benefits (data analysis, writing papers). Remove 80% of the tasks that contribute to only 20% improvement (e.g. constantly revising Gantt charts)
What should you do during your PhD?

- Recognise Self-sabotaging and Self-handicapping Behaviour
  - Overcommitting – taking too many responsibilities and using them to ‘justify’ that you are too busy to finish research on time.
  - Busyness – avoiding high priority or difficult tasks by filling your day with easier less important tasks.
  - Choosing distracting environment in which to work (split screen with youtube and a paper draft)
  - Procrastination – actually all of the above are forms of procrastination!

- Defeating self-sabotaging
  - Recognizing bad habits is the first step
  - Exhibiting some of the above characteristics does not necessarily mean that you are self-sabotaging. However, if you are constantly missing deadlines then there is a problem.
What should you do during your PhD?

- Stay Motivated
What should you do during your PhD?

- **Stay Motivated**
  - Develop a rich network of contacts: your supervisors, fellow students, other academics, and of course family and friends.
  - Believe in yourself (you are the expert in your field of research, not your supervisor)
  - Stay organised and in control – set short-term achievable goals and tick them off to boost your confidence / motivation.
  - Deal with ‘failures’ quickly – negative results / failed experiments are part of every PhD
  - Ironically, the biggest reason for not finishing PhD is quitting it.

- **Actively work on your portfolio**
  - Deliver results/paper drafts fast, often and get feedback – aim for “good enough” and deliver soon rather than “excellent results / perfect draft in a few weeks time”
  - Keep track of all your courses, trainings, seminars, presentations – pimp your online profile
  - Self assess your progress against high achievers.
What should you do during your PhD?

- **Befriend WReN**
  - The most important skills in PhD are **Writing**, **Reading** and **Networking**
  - “Graduate school is a kindergarten of scientists. You learn to write, read and interact with others”
  - **Writing** – get to the point in comprehensive, concise and precise sentences.
  - **Reading** – you should be able to skim a paper in 30 s to decide whether to invest next 30 min reading in depth.
  - **Networking** – you may think that most famous scientists probably worked in silos, locked away from the rest of the community, but networking can bring you job offers, collaborators, co-authorship on others papers, ideas, equipment access, etc.

- **Enjoy the ride!**
  - Remember you are still a student (with a sizable income!)
  - You only have one project during your PhD, it will only get a lot worse in future!
After listening to this talk, I would...

- Make significant changes to my ‘typical work day’
- Make minor changes to my ‘typical work day’
- Keep doing what I was doing – I got all the bases covered
- Too early to decide