Kicking Ass with your Research

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**About Me**

- 24 years of post-PhD research experience
- IEEE Fellow, Harlan Mills IEEE CS award
- Canada Research Chair, ERC Advanced grant
- ICSE PC co-chair in 2014
- EiC of Empirical Software Engineering (Springer) for 13 years
- Graduated 27 PhD students
- Worked with >30 industry partners (aerospace, automotive, health care, finance …)
- H-index = 73, around 24K citations (for those interested in the “number game”)
- **Had lots of papers rejected**
Disclaimer

- I have made many mistakes
- I have not always followed my intuition, yielding to real or imaginary pressures
- I have not always complied with what I am advising in these slides
Why Research?

- We love the opportunity for intellectual exploration and freedom
- We love sharing our passion of research with (graduate) students, nurturing it in them
- We want to have impact, do something that truly matters
But …

- Such freedom and privilege comes with responsibility
- One has to be allowed by the system to lead an academic career
- One has to achieve recognition from one’s peers, within and outside one’s institution
About being Judged

- Academic careers are mostly about reputation and perception.
- We would like to believe this is all about science, but the fact of the matter is that we face a great deal of subjectivity.
- No point trying to please everybody though – it is doomed to fail.
Politics?

- As in any human community, groups of influence try to win over other groups

- There are different schools of thought – with very different perceptions of the nature of SE research – who naturally want to prevail

- It is only natural that one may be tempted to engage into “academic politics”, to gain attention, favors, recognition etc.
Be True to Yourself

- Don’t waste your energy and time
- Respect yourself
- Listen, learn, make up your mind
- Do not fear to express – in a balanced way – your opinions
- Be ready to change your mind when facing a better argument
- Good work and professionalism (eventually) prevail
What is Success?

- Be known by a few hundred scientists (at best)?
- Get invited to lectures?
- Be proud of your work, happy with your research
- Keep the flame alive
- Feel useful, impactful
What is Impact?

- Results used by other researchers to run further research projects
- Public-domain, applicable and scalable solution in industrial context, under clearly specified working assumptions
- Adoption in industry (even partial)
- The latter depends on many factors that researchers don’t control and may take time
Why are some Academics Losing their Drive?

- Personal reasons
- Choose a management career
- Poor, demotivating, or conflictual working environment
- Losing sight of why we are doing this and how privileged we are
How to Become and Remain Successful?

• Be passionate about what you do – pursue your passions

• Don’t yield to opportunism and shortcuts

• Don’t engage into meaningless activities, seek impact

• Remain focused on the essentials

• Build and nurture strong ties with the colleagues you admire and enjoy interacting with – we are social animals
Collaboration

• Finding renewed energy through enjoyable interactions

• Enjoying the exchange of ideas and viewpoints

• Finding synergies among people of different backgrounds and expertise

• Particularly in SE, a very multidisciplinary field, collaboration is highly beneficial
Domain-Specific Research

• Research in SE is often disconnected because it is oblivious to the domains of application

• Problems, working assumptions, scalability and applicability factors vary across domains

• Example: Cyber-physical systems, Advanced Driving Assistance Systems

• To have impact, focus on domains in your research
Advanced Driver Assistance Systems (ADAS)

Automated Emergency Braking (AEB)

Pedestrian Protection (PP)

Lane Departure Warning (LDW)

Traffic Sign Recognition (TSR)
Advanced Driver Assistance Systems (ADAS)

Decisions are made over time based on sensor data
CPS Development Process

Model-in-the-Loop Stage

Functional modeling:
- Controllers
- Plant
- Decision

Continuous and discrete Simulink models

Model simulation and testing

Software-in-the-Loop Stage

Architecture modeling
- Structure
- Behavior
- Traceability

System engineering modeling (SysML)

Analysis:
- Model execution and testing
- Model-based testing
- Traceability and change impact analysis
- ...

(partial) Code generation

Hardware-in-the-Loop Stage

Deployed executables on target platform

Hardware (Sensors ...)
Analog simulators

Testing (expensive)
Collaborative Research Model

- Research take place in a concrete innovation and development context
- Publishable research results and focused practical solutions that serve an existing market.

Schneiderman, 2013
Mode of Collaboration

- Research driven by industry needs
- Realistic evaluations
- Combining research with innovation and technology transfer
- Tight, long-term industrial collaborations
Publishing

- Journals versus conferences
  - A great deal of confusion in SE
  - Journal-first initiative
  - Differences tend to decrease (size, review time, …)
  - Main difference: Revision process
  - Priority depends on the academic system you are in
Publication Tiers

- Tiers don’t necessarily correlate with how interesting publications are
- CORE ranking, Impact factors
- In SE: General vs. specialized conferences
- Prestige versus quality and depth of reviews
- Acceptable level of risk
- Strategy depends partly on requirements in your academic system
- Community building (mostly) happens at specialized conferences
Summary

• You will kick ass with your research if
  • You are passionate about what you do and keep the flame burning
  • You don’t take shortcuts and focus on important problems
  • You focus on building solid foundations for the long term
  • You collaborate with people you like interacting with and learning from
  • You don’t spend too much time and energy worrying about academic baloney
  • You make the effort to be an active member of the research community
Have a great research journey!
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