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)

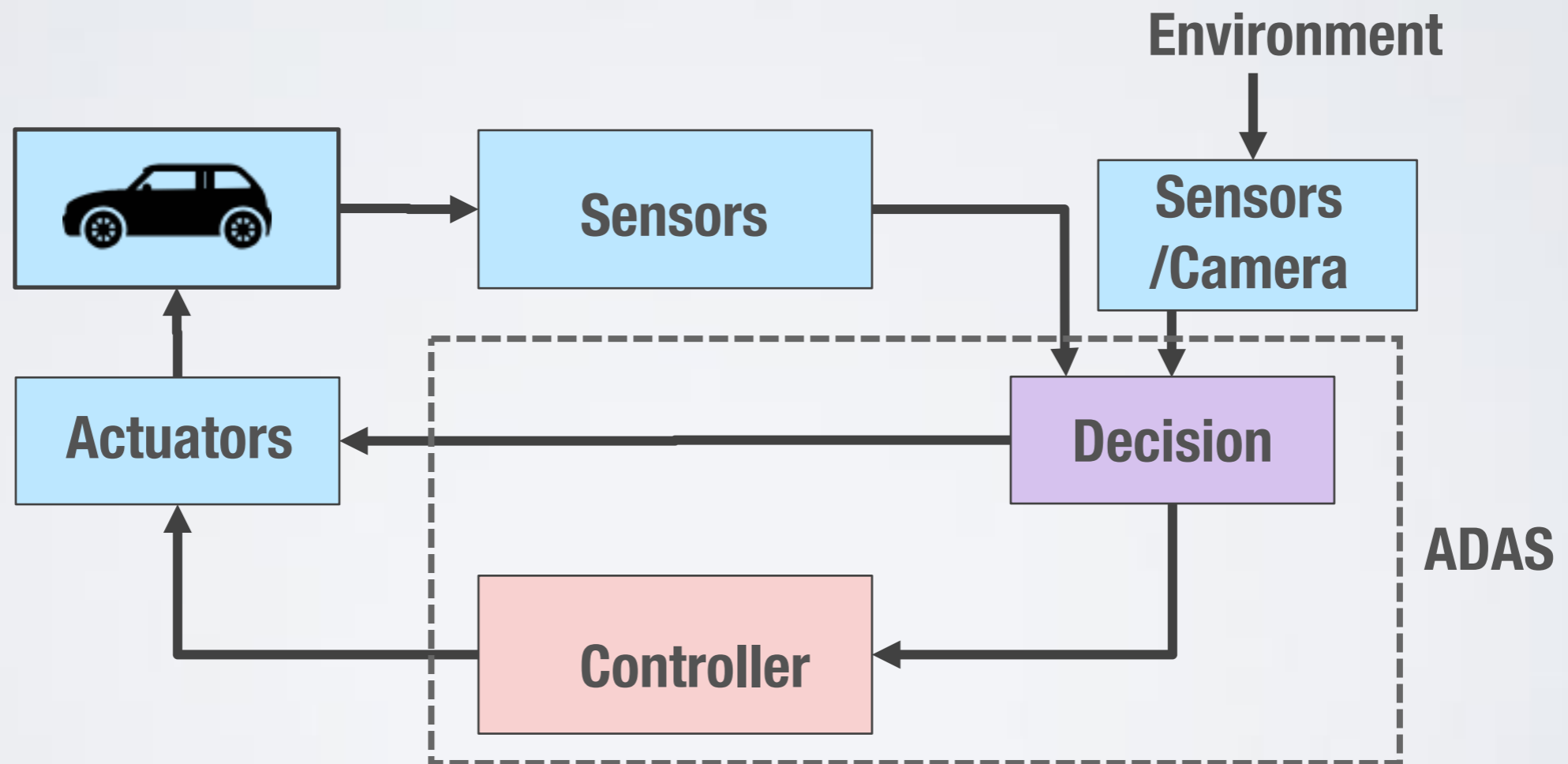**Automated Emergency Braking (AEB)**

Lane Departure Warning (LDW)
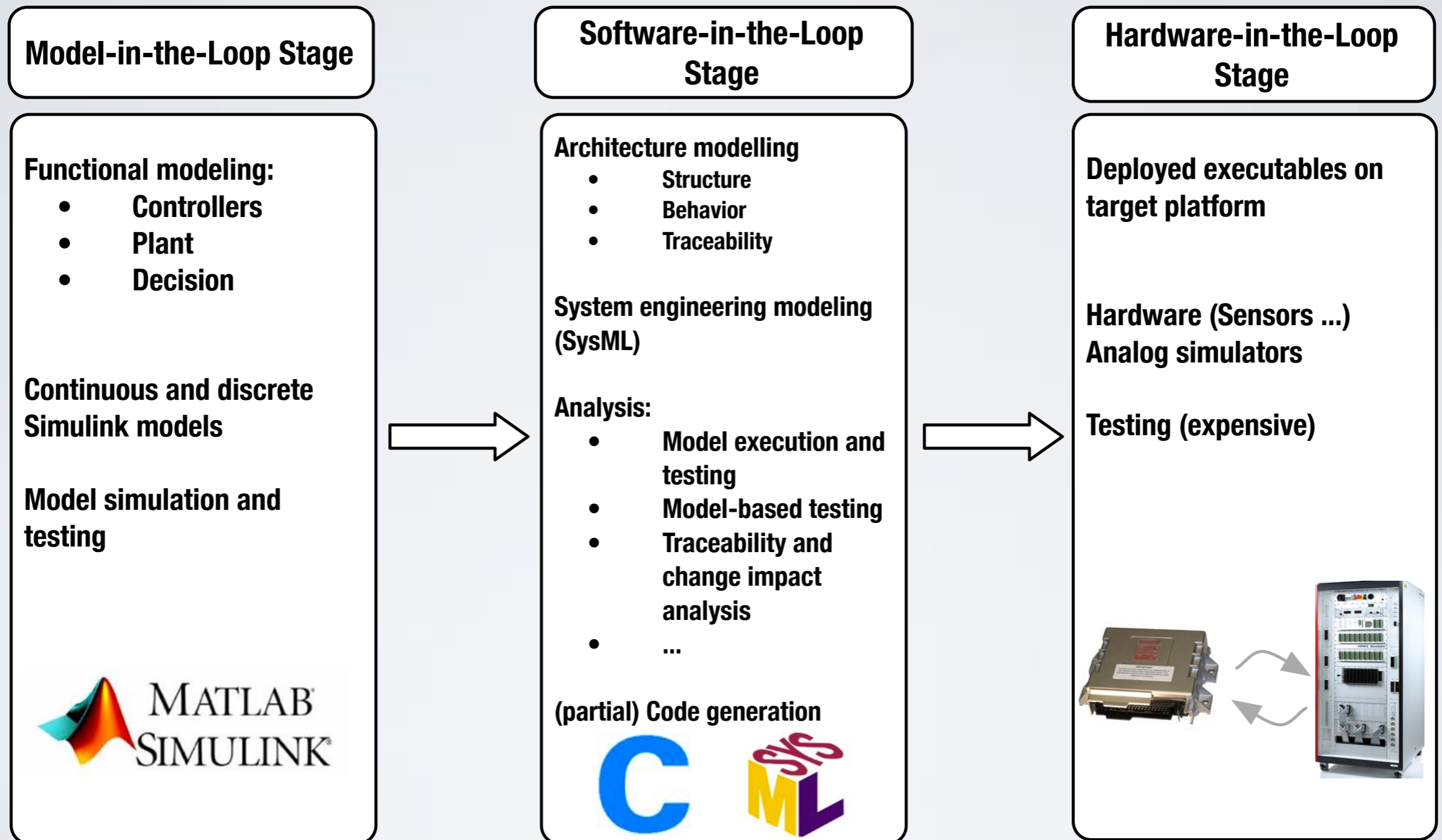

Pedestrian Protection (PP)

Traffic Sign Recognition (TSR)

Advanced Driver Assistance Systems (ADAS)
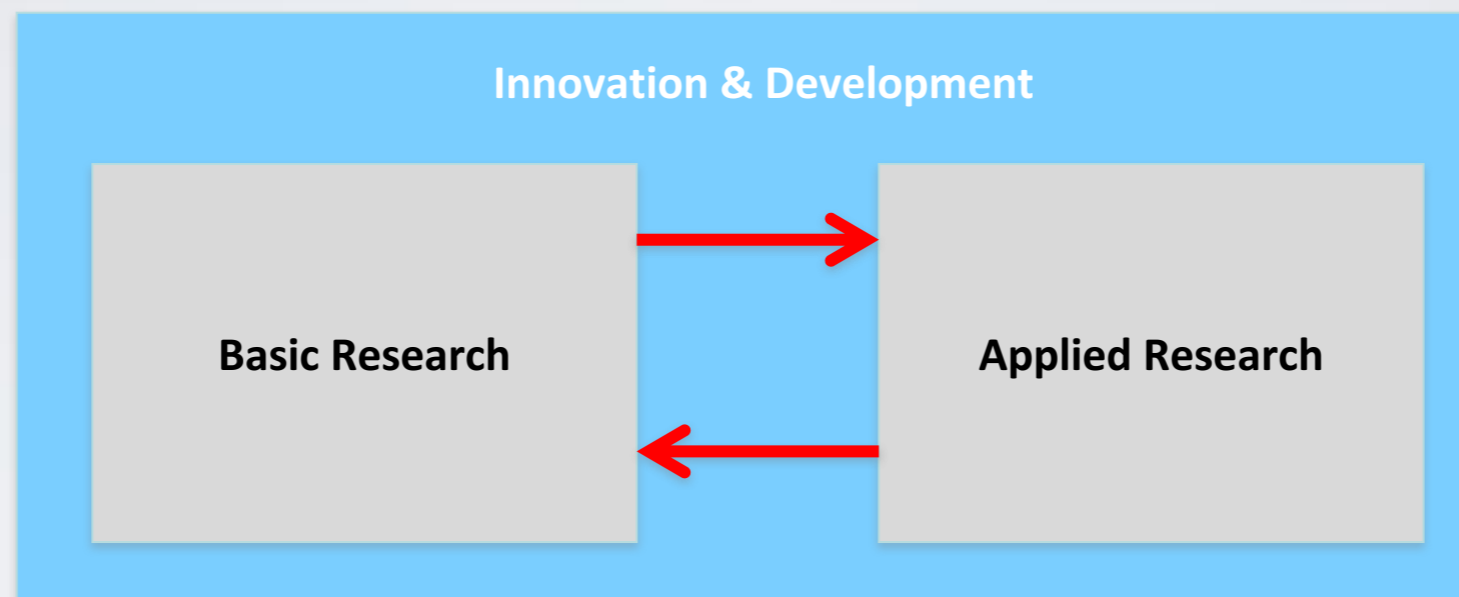
Decisions are made over time based on sensor data

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 modelling
- 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

Schneiderman, 2013

Innovation & Development

Basic Research

Applied Research
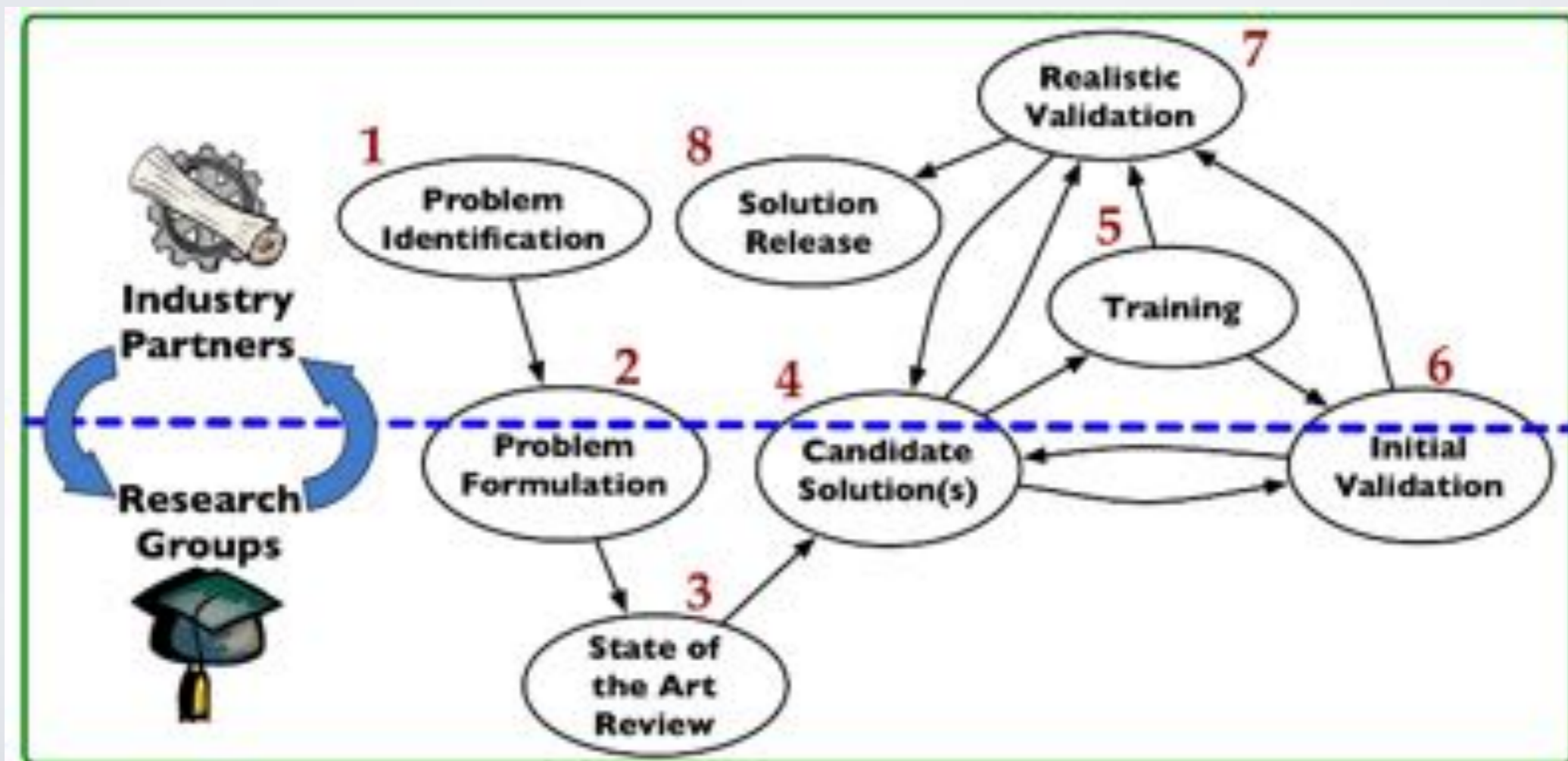
- **Research take place in a concrete innovation and development context**

- **Publishable research results and focused practical solutions that serve an existing market.**

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
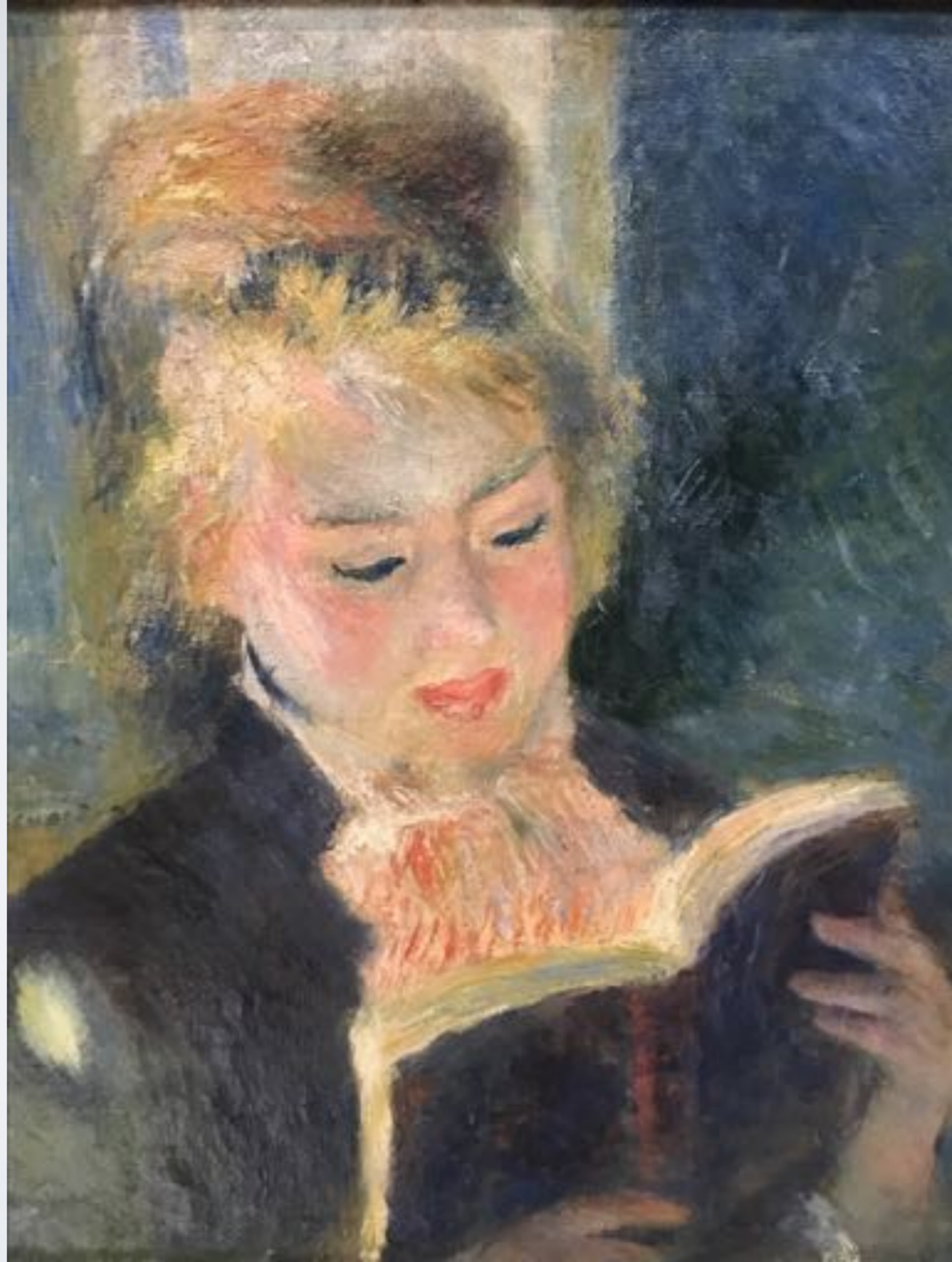
Summary

- 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
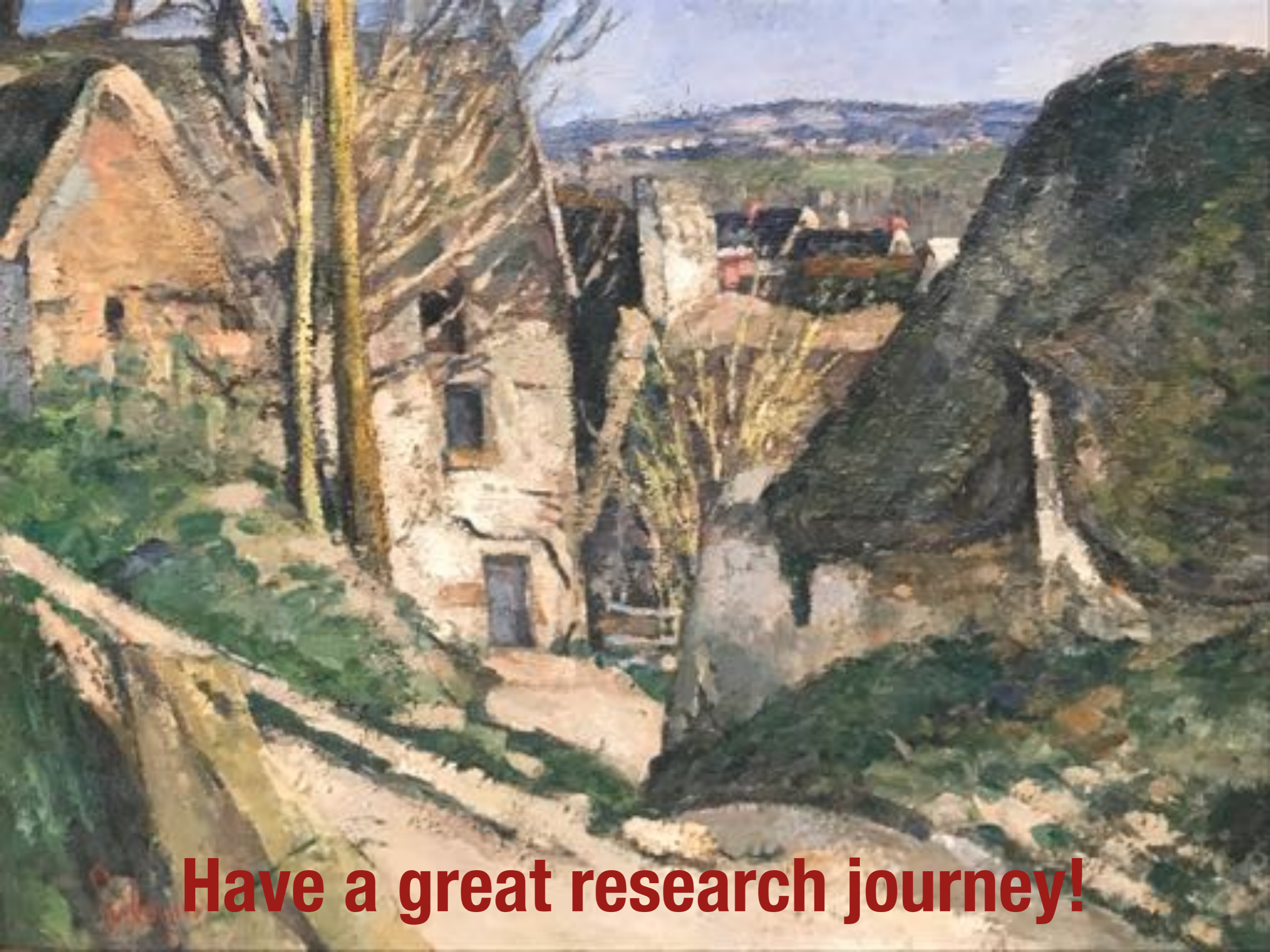
Have a great research journey!

Kicking Ass with your Research

Lionel Briand

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