

Beyond the Thesis: Developing a Research Vision and Navigating the PhD Journey

10 tips of a successful PhD in the AI era

ICDAR2026 Doctoral Consortium

Acknowledgement

Part of this presentation is derived from this source:

Dan Lopresti. “Advice for a Successful PhD Experience”

http://www.iapr-tc11.org/mediawiki/images/Advice_for_a_Successful_PhD_Experience.pdf



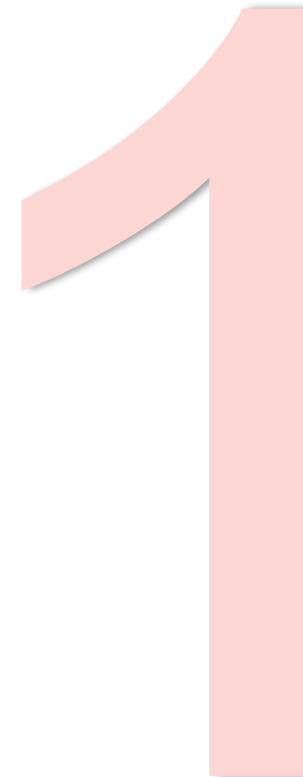
Advice for a Successful PhD Experience

ICDAR Doctoral Consortium
September 18, 2011



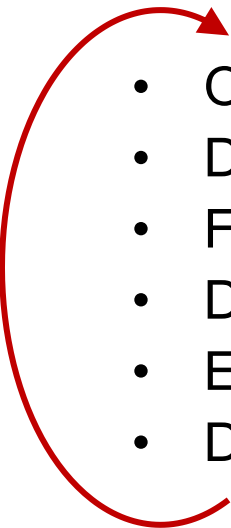
Professor Daniel Lopresti
Computer Science and Engineering
Lehigh University
Bethlehem, PA , USA

What is a PhD



What is research

- **creative work** undertaken on a systematic basis in order to increase the stock of **knowledge**, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise **new applications**.
- The scientific method:

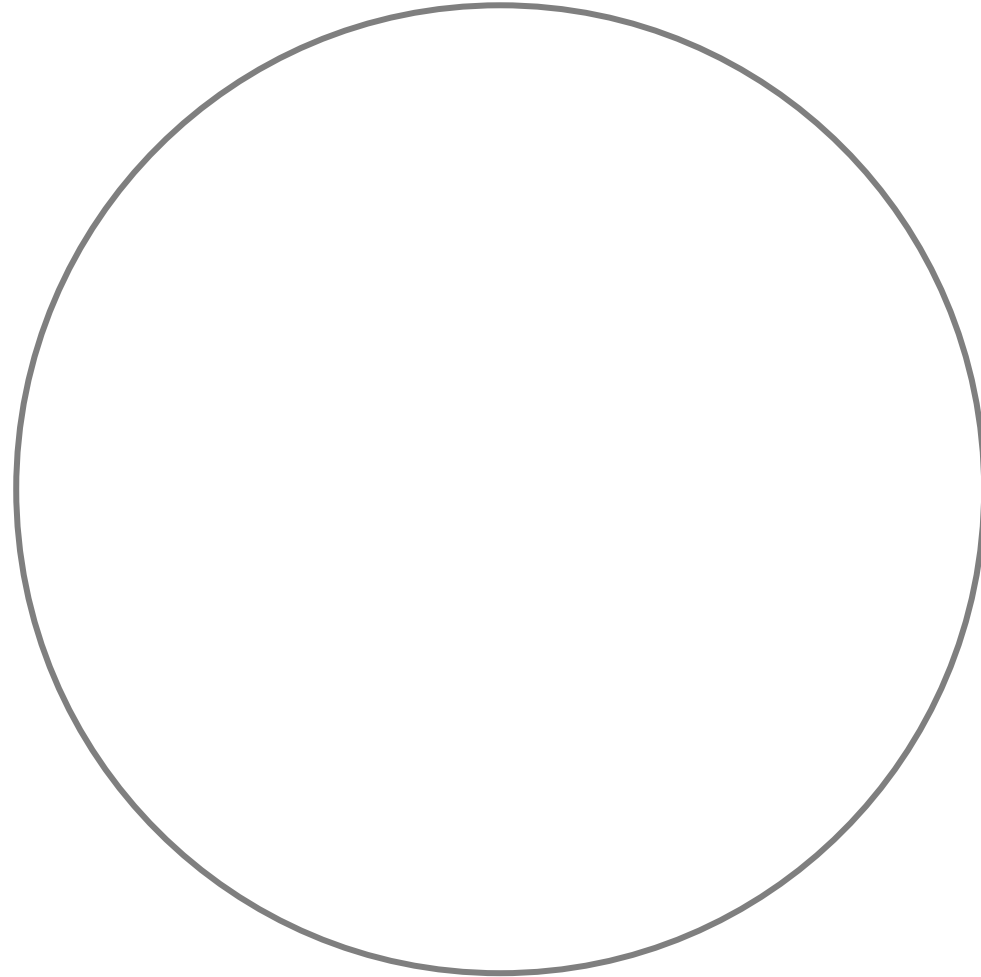
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- Observe what is happening
 - Define problems to solve
 - Formulate hypotheses
 - Develop solutions
 - Experiment
 - Draw conclusions

What is a PhD?

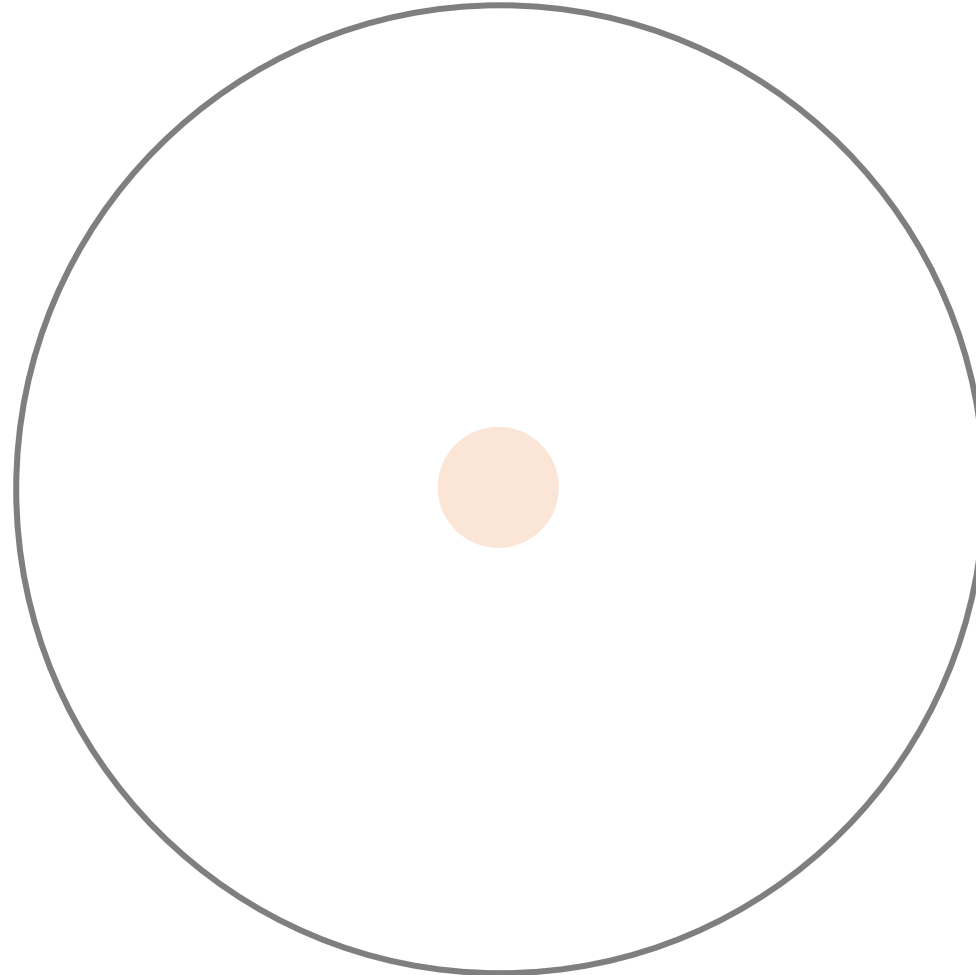
- A **substantial** body of **original**, ground-breaking work (can be in one field or interdisciplinary).
- Proposes a **hypothesis** and provides arguments to substantiate or refute that hypothesis.
- Evidence **you** can do research that matters (work that makes a difference in the field, that people care about).
- Should contain 2-3 key ideas you can articulate at the drop of a hat (think “**elevator speech**”).
- A significant piece of independent writing that you want to be proud of for years – or even decades – to come.

**What is your
Contribution
to the Human
Knowledge?**

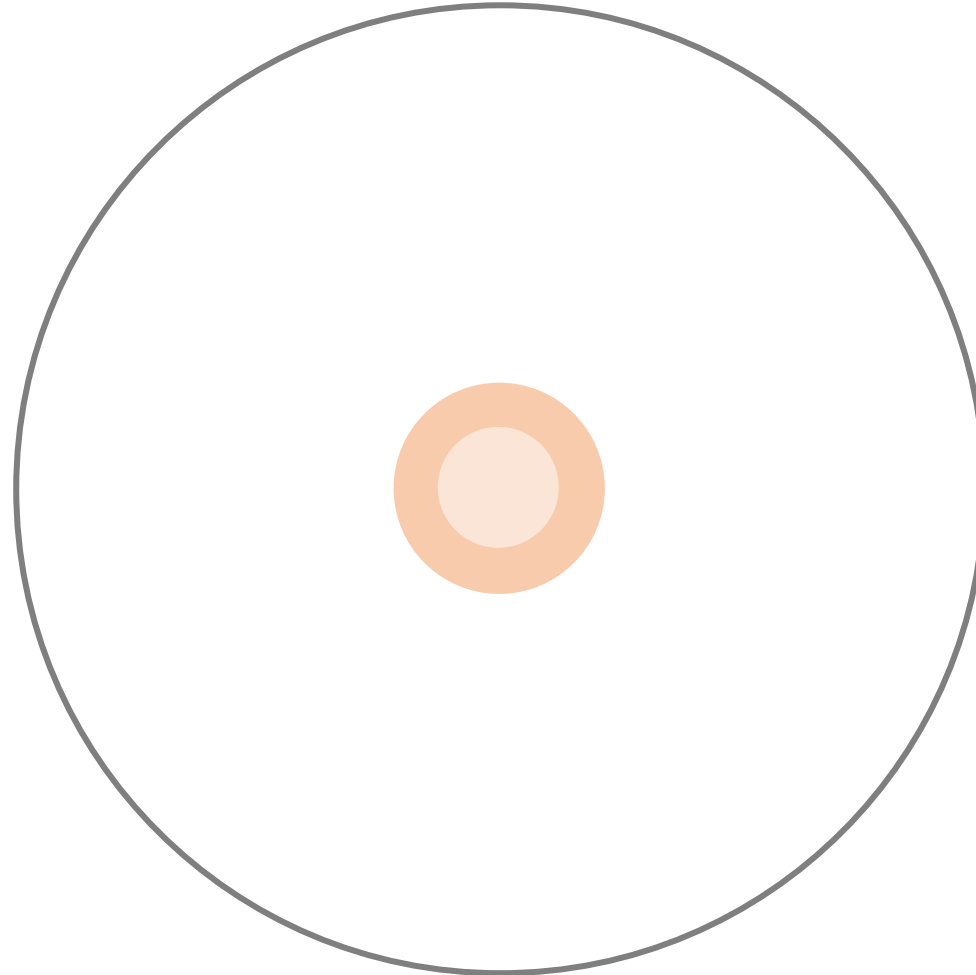
This circle contains all of human knowledge



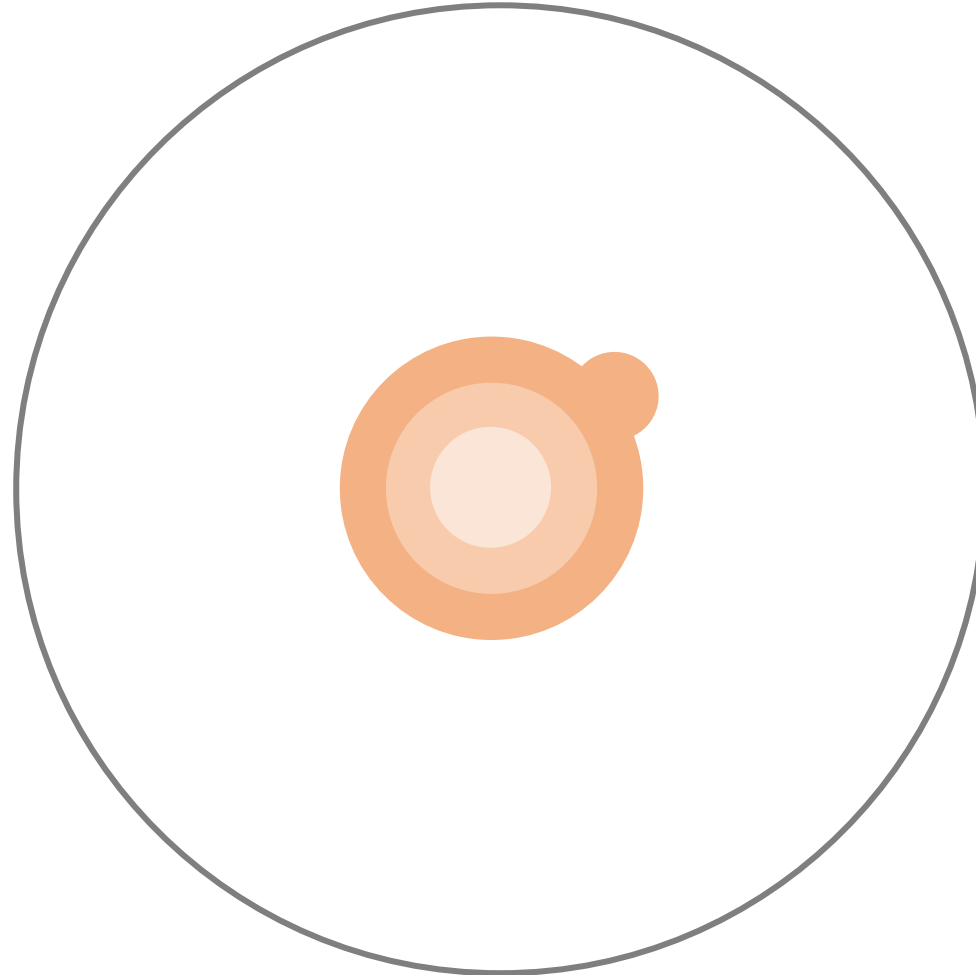
When you finish elementary school



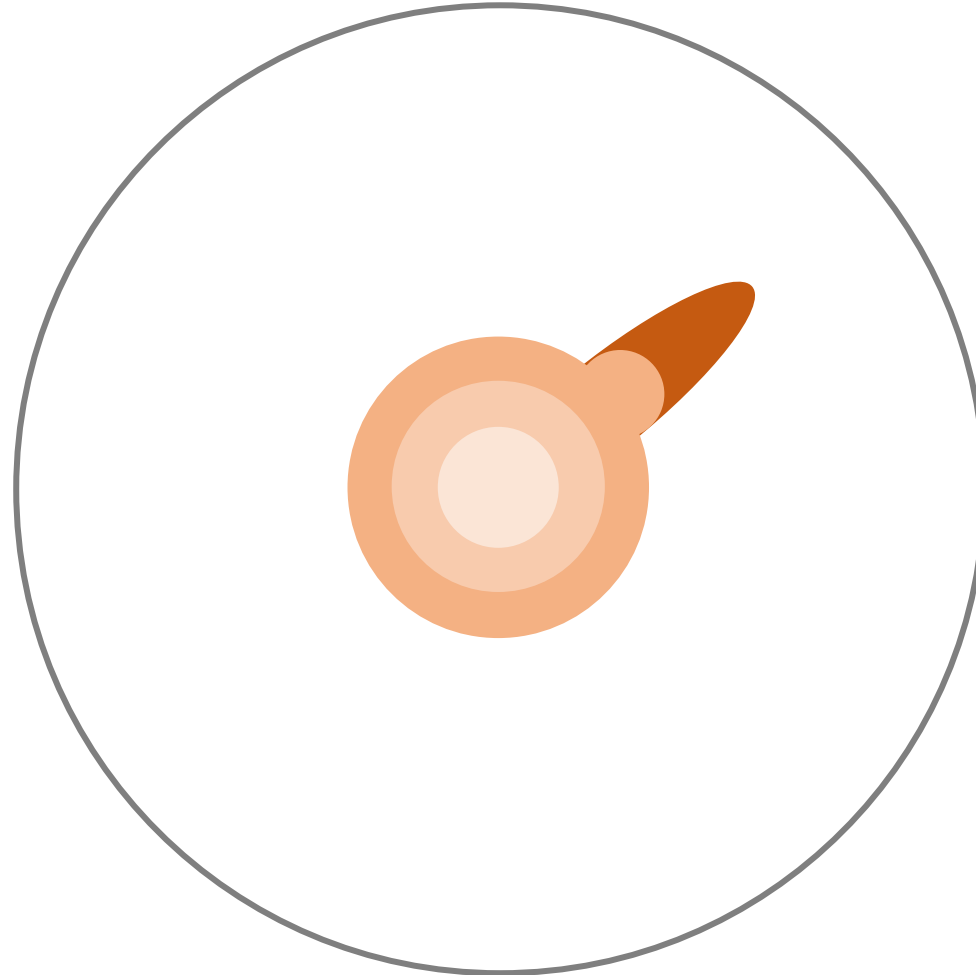
When you finish high school



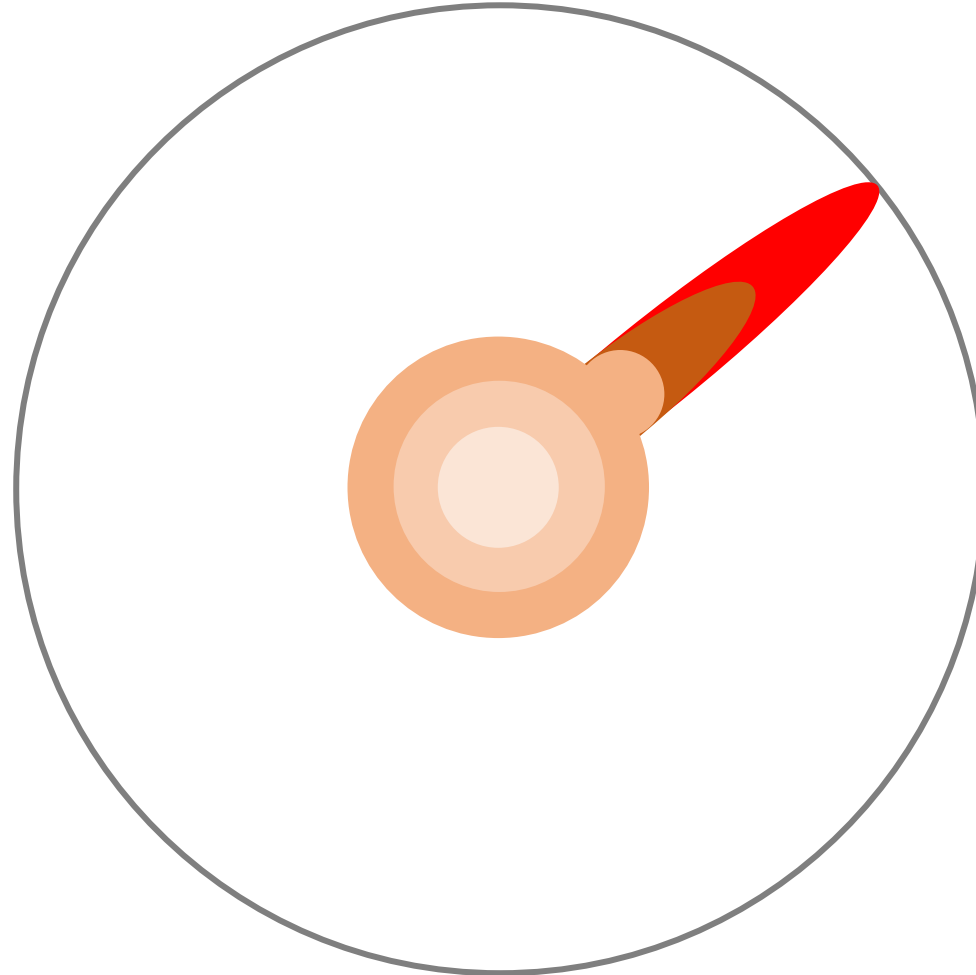
When you finish undergrad



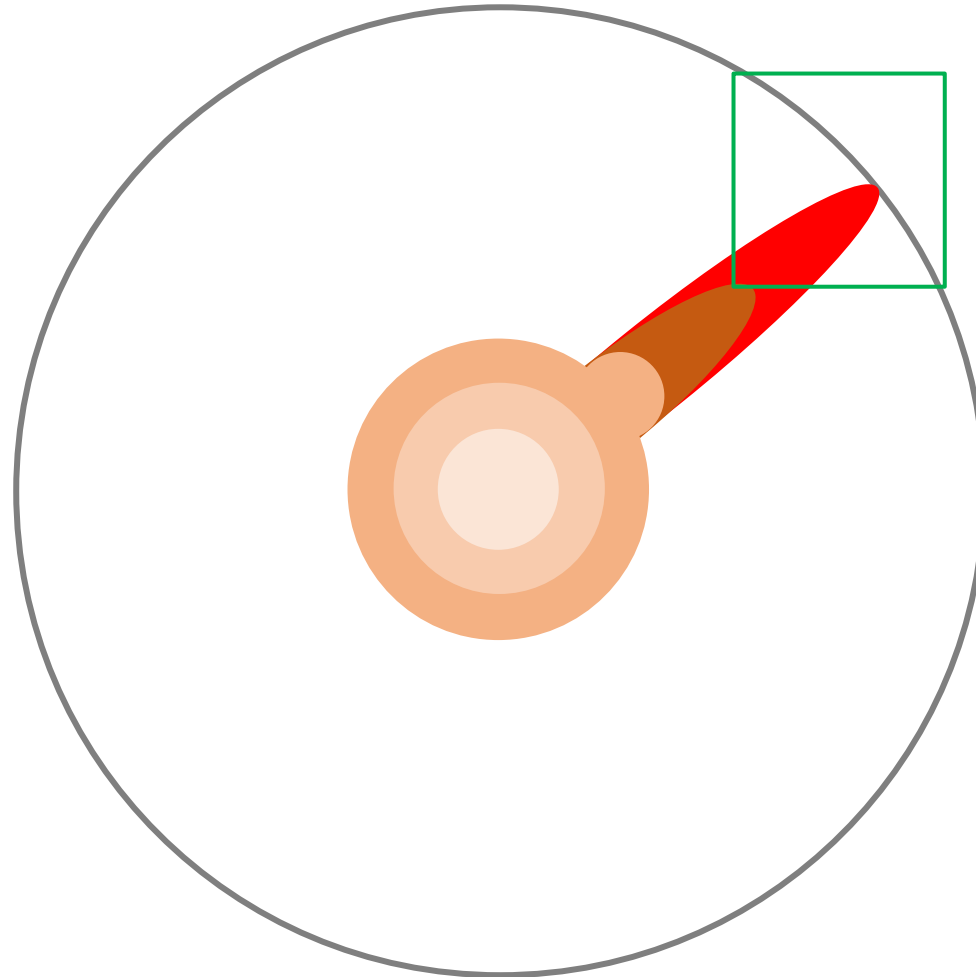
When you finish a Master's degree



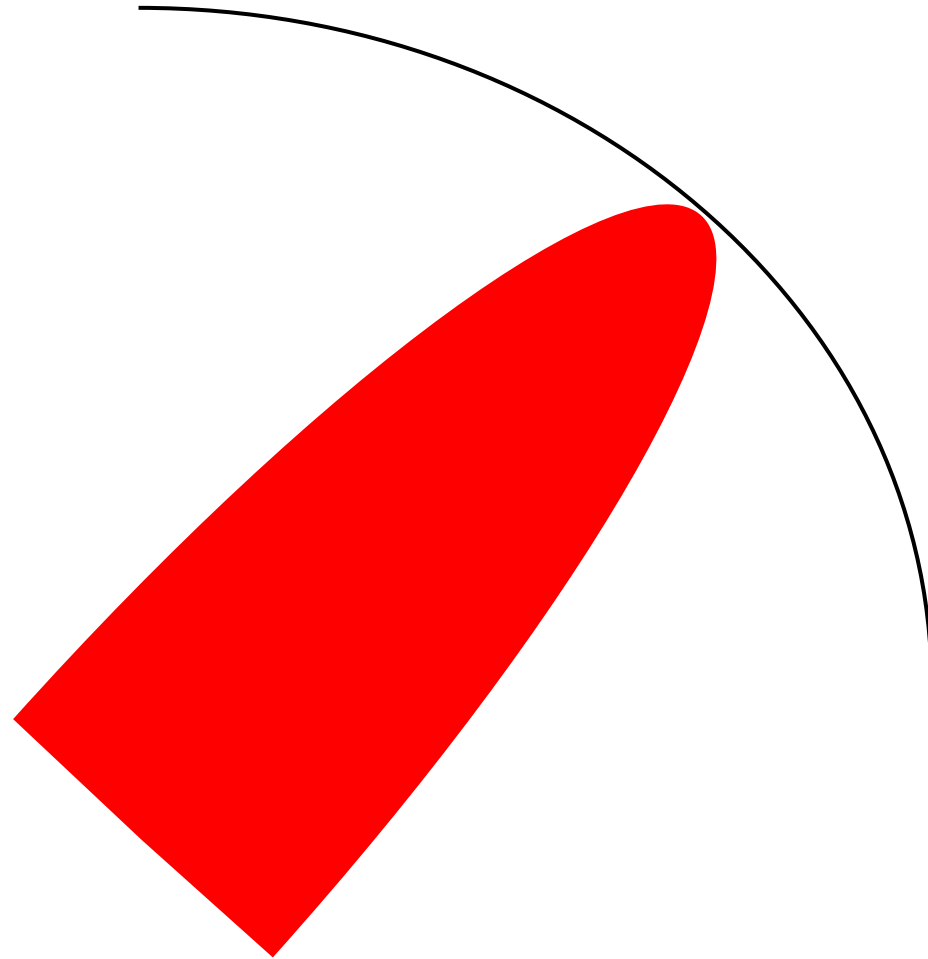
Reading research papers takes you to the edge



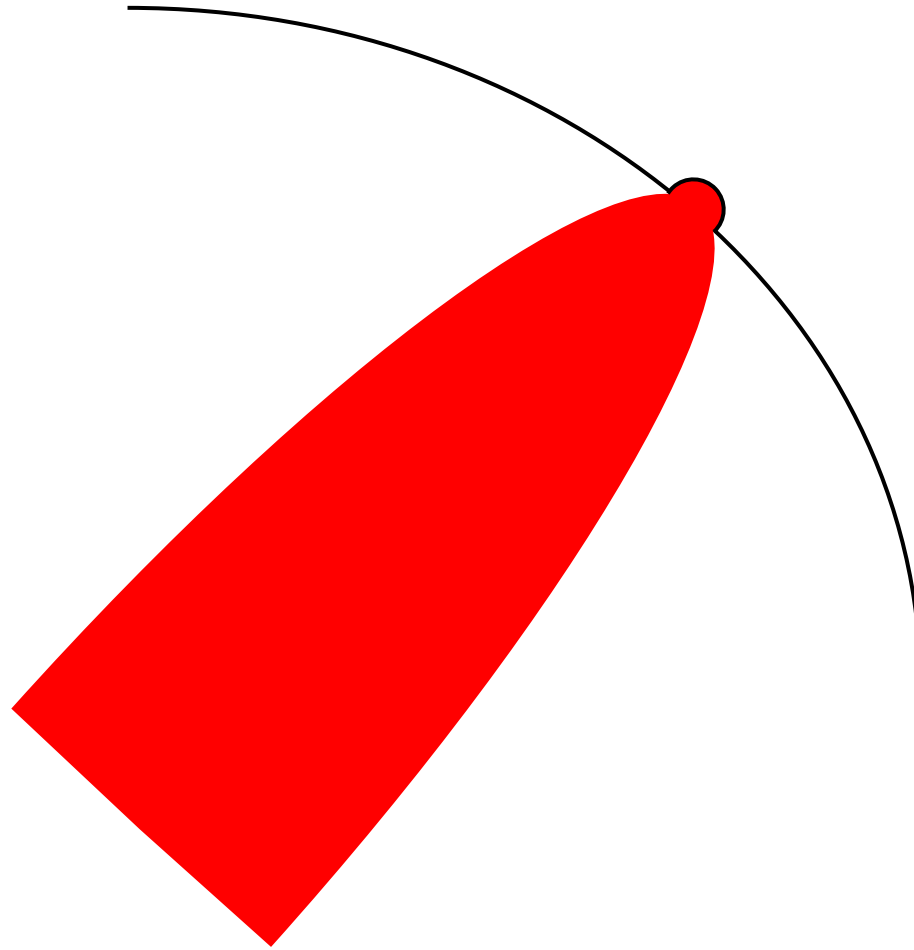
At the boundary, you focus



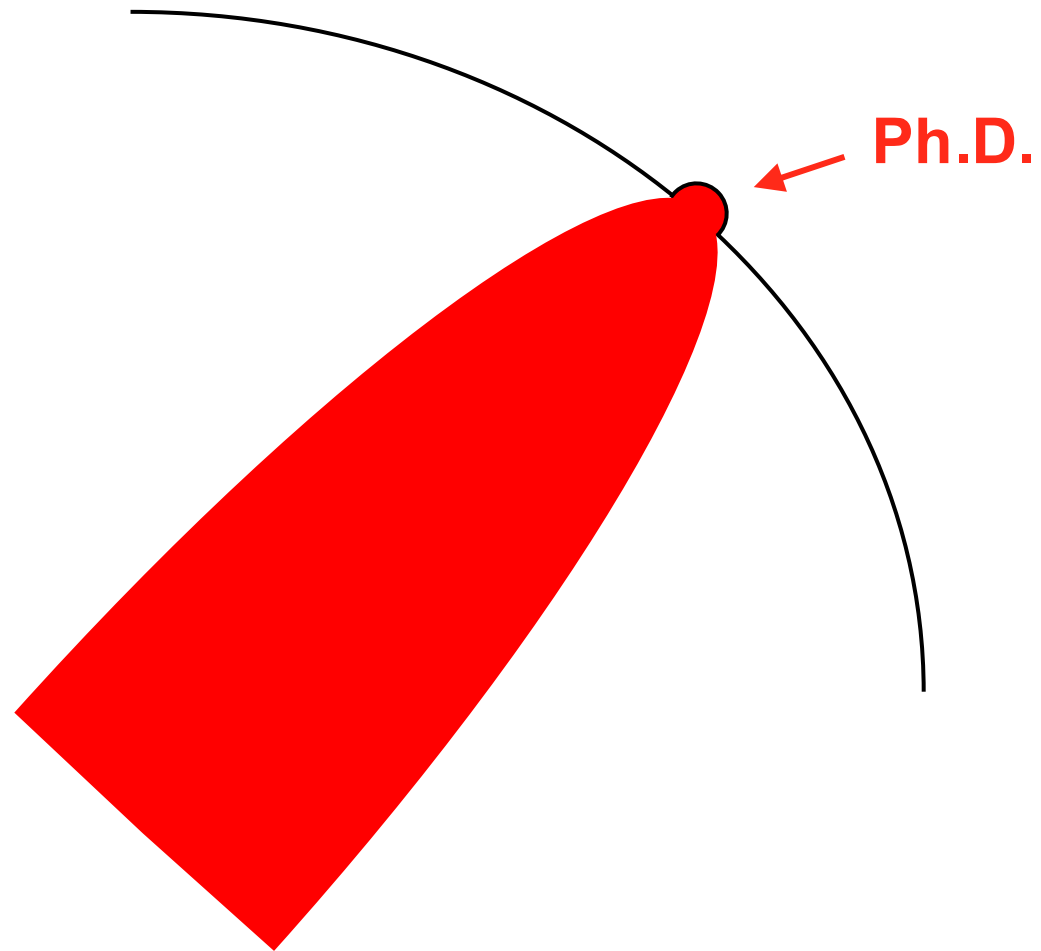
You push at the boundary for several years...



One day, the boundary gives way



That dent is your PhD



What topic to choose

Trends come and go.
Important problems stay

2

Trends come and go. Important problems stay

- Your thesis topic is **not carved in stone**.
- Many students **change their topics** as they work. Research is a discovery path. The research plan is a roadmap, but it is updated every year.
- **Research is unpredictable**: a smart researcher needs to be flexible and adaptable.
- Choose an important problem, **not a trendy topic**. Trends can change and you will work in your doctorate during 3-4 years.
- Work on **problems that will still matter when you graduate**.
- **Do not solve datasets**, solve problems.
- **Example**: years ago, researchers competed to gain an extra 0.5% on ImageNet. The benchmark eventually saturated. Problems remain: How can vision systems generalize to the real world? Trustworthiness. Explainability ...

Be aware of the SotA

3

Today's Research Knowledge Extends Far Beyond Papers

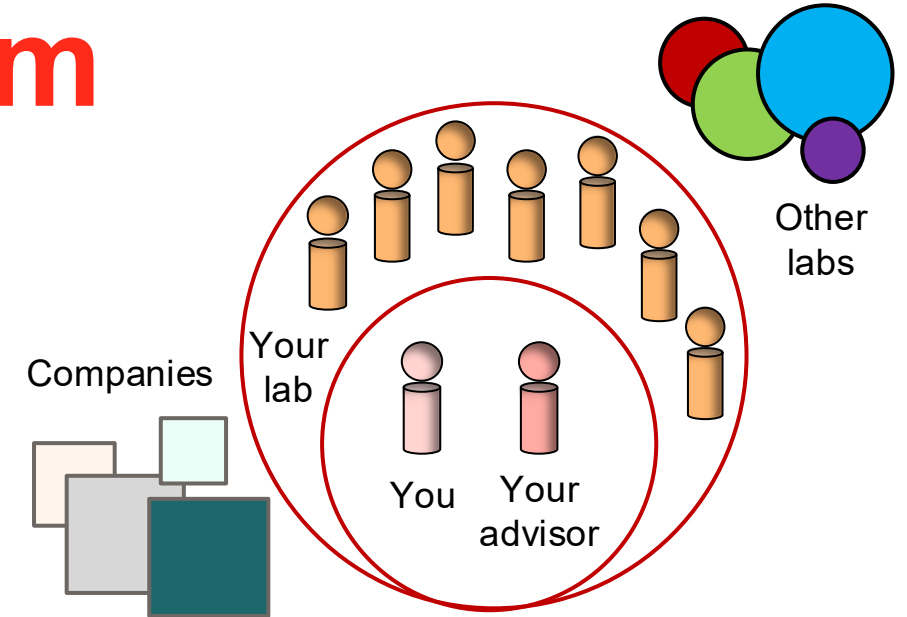
- Diversity and easy access to papers, code and model repositories, tutorials, blogs, talks, and AI assistants can all accelerate learning. The challenge is learning to **evaluate them critically**.
- Don't ask: "What does this paper/source say?"
- Ask: "Why was this paper worth publishing?"
 - What problem?
 - Why important?
 - What is novel?
 - Are the claims justified?
 - What are the limitations?
- AI can summarize content. Researchers must judge its value. A PhD student should become a **professional critic of research**.

Your Research Ecosystem

4

The Research Ecosystem

- Learn from your peers
- Discuss ideas frequently
- Visit other labs
- Explore topics beyond your immediate research area
- Attend summer schools and workshops
- Build relationships early
- People you meet during your PhD may become your **future collaborators**, project partners, reviewers, and friends.



What is the role of the advisor?

- A PhD is a journey toward **independence**.
Year 1: Learn from your advisor → Year 4: Your advisor learns from you.
- By the time you finish your project, **you will know more about your subject than your advisor** or your committee (Important in **your PhD defense**).
- The student/teacher relationship you have with your advisor will necessarily change as you take this big step toward becoming more of a **colleague /mentor**.
- The advisor **is not ChatGPT**. He/she is not there to provide instructions on demand.
- A PhD is not awarded because you worked hard. A PhD is awarded because you make a **significant contribution** to the field. The advisor can help in **judging significance, novelty, impact...**

**AI Will Not Do Your
PhD ... yet**

5

AI is a tool, not a researcher

- AI can help with
 - coding
 - debugging
 - literature exploration
 - summarizing papers
 - writing drafts
 - generating figures
- AI cannot replace
 - scientific judgment
 - creativity
 - defining hypotheses / Research questions
 - understanding significance
 - defending conclusions
- The danger is not that AI will replace PhD students. The danger is that mediocre PhD students will use AI to produce mediocre research faster.

But nobody knows how it will evolve and probably at some point we will see new knowledge generated by AI

GPUs Are Not Distributed Equally. Talent Is

- Modern AI research increasingly depends on **large datasets and HPC infrastructures**. Large companies can train models with resources that are far beyond the reach of most universities.
- A PhD is **not a competition** of computational resources. The most valuable resource in research is still: **creativity, critical thinking, scientific curiosity, originality**.
- Think Differently. Instead of asking: "*How can I train a bigger model?*", ask: "*How can I solve the problem in a **smarter way?***"
- Academic research often resembles **jugaad innovation**: finding clever ways to answer important questions despite limited resources.
- Others may have more GPUs than you. They do not have **more brains** than all PhD students combined.

Build a Research portfolio



The generated portfolio

- A successful PhD creates:
 - Publications
 - Software
 - Data
 - Visibility
 - Community
 - Dissertation
- Today's reputation depends on much more than papers.

What makes a great dissertation?

- A document that allows you to claim you ...
 - ... made your mark in your chosen field ...
 - ... fundamentally changed the way something is done ...
 - ... introduced a new concept others continue to “mine” ...
 - ... solved a problem that has plagued people for years ...
 - ... will continue to influence (and be cited by) others.

A truly great dissertation will be accessible to everyone in computer science/engineering, not just to specialists.

How to Write?

- The essence of a dissertation is **critical thinking, not experimental data**. Analysis and concepts are key.
- A dissertation concentrates on principles: it states the **lessons learned**, and not merely the facts behind them.
- Every statement must be **supported by a reference** to the scientific literature or by original work.
- **Plagiarism**: a dissertation does not repeat details found in published sources; it uses these results and refers the reader to the original work for further details.

The importance of the introduction

- The introduction is not where you explain everything you did. Its purpose is to convince the reader that:
 - The problem is important.
 - There is a gap in current knowledge or practice.
 - Your work addresses that gap.
 - You have a clear plan to investigate it.
- A common mistake is mixing motivation, objectives, methodology, contributions, and results. These elements should be clearly distinguished.
- General Rule:
 - **Objectives** = What you want to achieve
 - **Methodology** = How you will achieve it
 - **Contributions** = What new knowledge or artifact the thesis delivers

Draw only justified conclusions

- Even if the cause of some phenomenon seems obvious, do not draw conclusions without **solid evidence**.
- You must refrain from such judgments until you have conducted **carefully controlled experiments**.
 - For example, if classifier A has higher performance than classifier B in your particular dataset, you cannot conclude that the classifier A is better than the classifier B unless you have ruled out all differences in different datasets, parameters, pre-processing steps, memory usage, execution time / complexity, etc.
- Link your conclusions to your **initial hypothesis and objectives**.
 - For example “to achieve the objective X we proposed the implementation of the method Y and we validated with the protocol Z. We concluded that the objective was partially achieved because ...”.
- Your conclusions open **new research directions**.

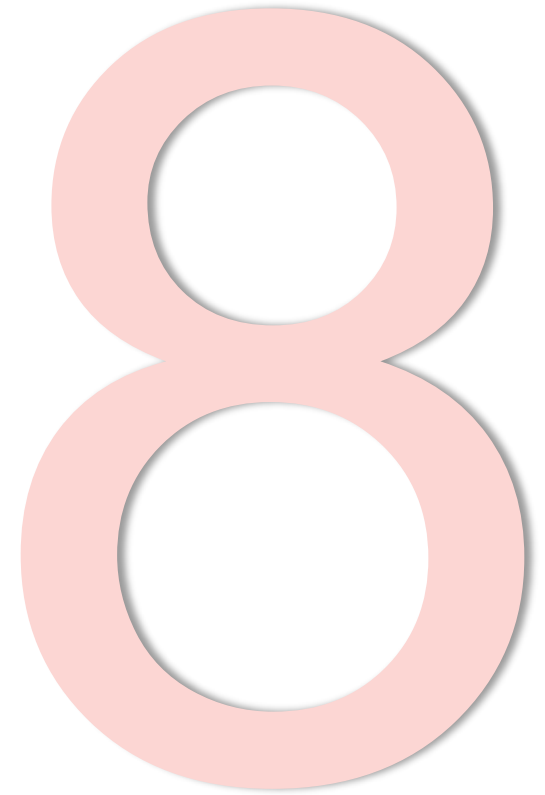
Reproducibility and Research Integrity



Reproducibility and Research Integrity

- Research must be **Trustworthy**
 - Design experiments that **others can reproduce**.
 - **Document** datasets, code, parameters, and evaluation protocols.
 - Embrace **open science** whenever possible.
 - Manage research data responsibly (**FAIR principles**: Findable, Accessible, Interoperable, and Reusable).
 - Understand the opportunities and risks of **AI-generated content**.
 - Respect authorship and avoid plagiarism.
- AI-Assisted Writing: Use Responsibly
 - (+) Grammar and text polishing
 - (+) Summarization and organization of content
 - (-) Hallucinated references
 - (-) Invented experiments or manipulated results
- Your **reputation** as a researcher is built on the trustworthiness of your work. A result that cannot be reproduced is not a scientific contribution.

**What is your
Impact?**



What is your Impact?

- The impact can be measured to the extent that the generated knowledge is valorized:
 - **Scientific**: citations (researchers make progress)
 - **Technological**: patents, software licensing (companies make profit)
 - **Social**: applications (benefits for the society)
 - **Open science**: open source, citizen science (outreach, public understanding)
- Half of academic papers are read only by their authors, reviewers, and Journal Editors → **ZERO impact**
- Many modern researchers are highly influential with relatively modest citation counts.

Mental Health and Anxieties

9

PhD Well-Being: It's a Marathon, Not a Sprint

- **A PhD has ups and downs.** Every PhD includes uncertainty, failures, and rejections. Difficult moments do not mean you are failing.
- **Avoid unhealthy comparisons.** Do not compare your progress with that of others. Every thesis follows a different path and timeline.
- **Be persistent but stay flexible.** Be ready to revise hypotheses and change direction when needed. Sometimes the most interesting discoveries emerge from unexpected results.
- **Take care of yourself.** A PhD is not a 24/7 job. Rest, hobbies, family, and friends are not distractions, they are part of a sustainable research career.
- Remember there is **no shame** in not completing a PhD. Deciding not to continue with a PhD does not mean that you have “quit” or that others who remain in the program are smarter, more driven, or more virtuous than you are.

Beyond the PhD

10

Beyond the PhD

- The purpose of a PhD is **not to become a professor**. The purpose of a PhD is to learn how to create knowledge and solve difficult problems.
- Choose **the path** that you find more attractive: academia, industry, entrepreneurship, public sector.
- Your PhD opens doors. Walk through **the one that excites you**, not necessarily the one you expected. This is the best time in your life to explore new directions and **take risks**.
- Your PhD is **not your destination**. The skills, people, and experiences you gain today may open opportunities you cannot yet imagine.

Conclusion

In summary ...

- Be curious.
- Choose important problems.
- Use AI, but do not depend on AI.
- Read critically.
- Publish responsibly.
- Build your network.
- Take care of yourself.
- Think long term.
- Help others succeed.
- Leave a dent in human knowledge.

As Document AI researcher ...

- Enjoy the collaborative atmosphere of this community, stay connected, and help it grow. The future of the field is in your hands.
You are the leaders of Tomorrow !

**Don't Tell Mom I'm Doing Document Analysis; She Believes I'm in the Computer
Vision Field**

Suzanne Collin, Karl Tombre, Pascal Vaxivière
CRIN/CNRS & INRIA Lorraine
Bâtiment LORIA, B.P. 239
54506 Vandœuvre-lès-Nancy CEDEX
France

ICDAR 1993

- Research fields evolve. What looks like a narrow application area may sit at the intersection of several disciplines and address unique scientific questions.

Best wishes for succes in you PhD studies !

Josep Lladós
josep@cvc.uab.cat

CVC^R
Computer
Vision Center

Edifici O, Campus UAB
08193 Bellaterra
(Cerdanyola)
Barcelona, Spain
www.cvc.uab.cat