

# Research Proposal in Computing

Introduction, Background and Problem Formation

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Assoc. Prof. Engineer Bainomugisha

Department of Computer Science

Makerere University

[baino@cis.mak.ac.ug](mailto:baino@cis.mak.ac.ug)

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# What is Research?

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“**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**”

(OECD, 2002)

# What is Research?

“The process of exploring the unknown, studying and learning new things, building new knowledge about things that no one has understood before - that is what we think of as performing research”

(Berndtsson et al, 2008)

# Key Messages

- Research:
  - Should be about some problem that encourages enthusiasm (for you) and interest (for others)
  - Is often generated from the thought “what we have got now/ from the past isn’t quite right/good enough – we can do better...”
  - Requires clear articulation of the research goal
  - Consists of work that leads to a meaningful contribution
  - Generates, in some way, a better solution to the problem

(Paul Wagner, 2003)

# What is **Not** Research?

- “Playing” with technology
- Book report (information gathering)
- A programming project
- Doing what others have already done or simply transporting facts
- However, each of the above can be part of research

(Paul Wagner, 2003)

# Who Does Research?

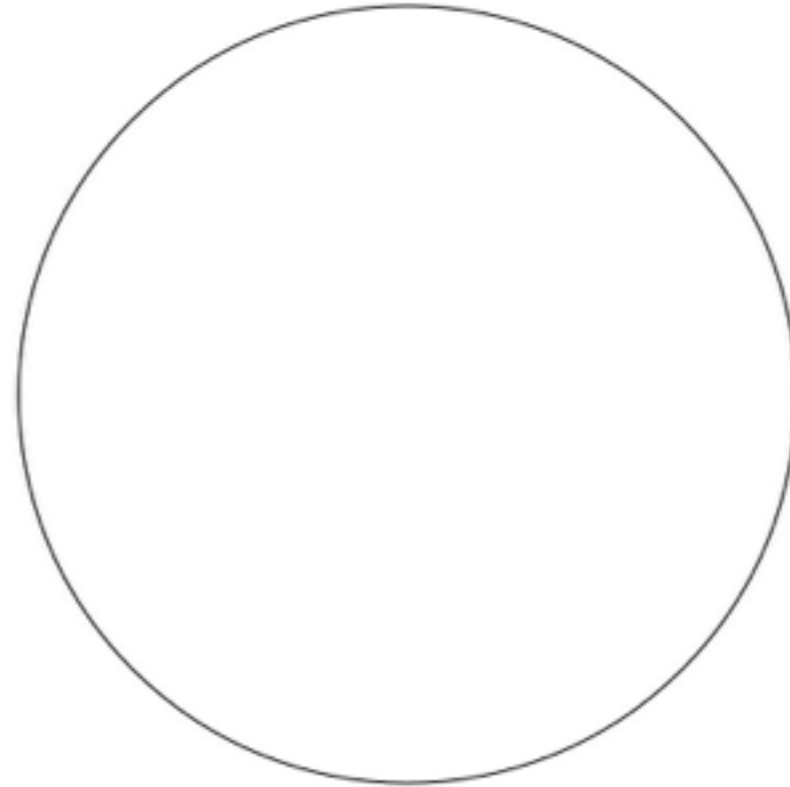
- Graduate students
  - PhD
  - Masters
  - Undergraduate
- Academic staff & Post-doc researchers
- Industry researchers

# Key Players

- Researcher
- Supervisor
- Evaluator/Examiner
- User



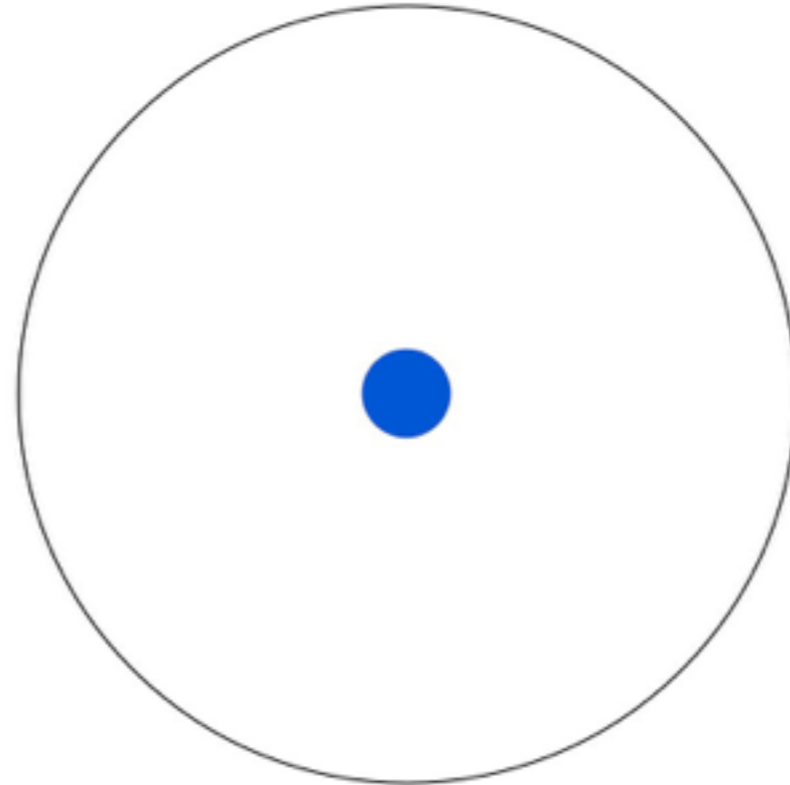
# The Illustrated Guide to Research



Imagine a circle that contains all of human knowledge

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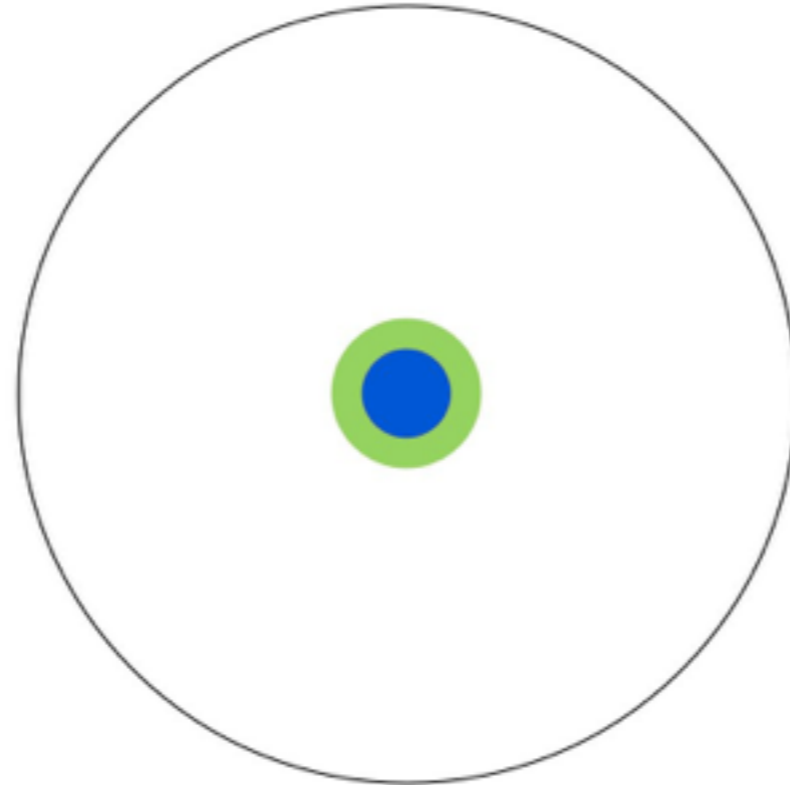
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By the time you finish secondary school, you know a little

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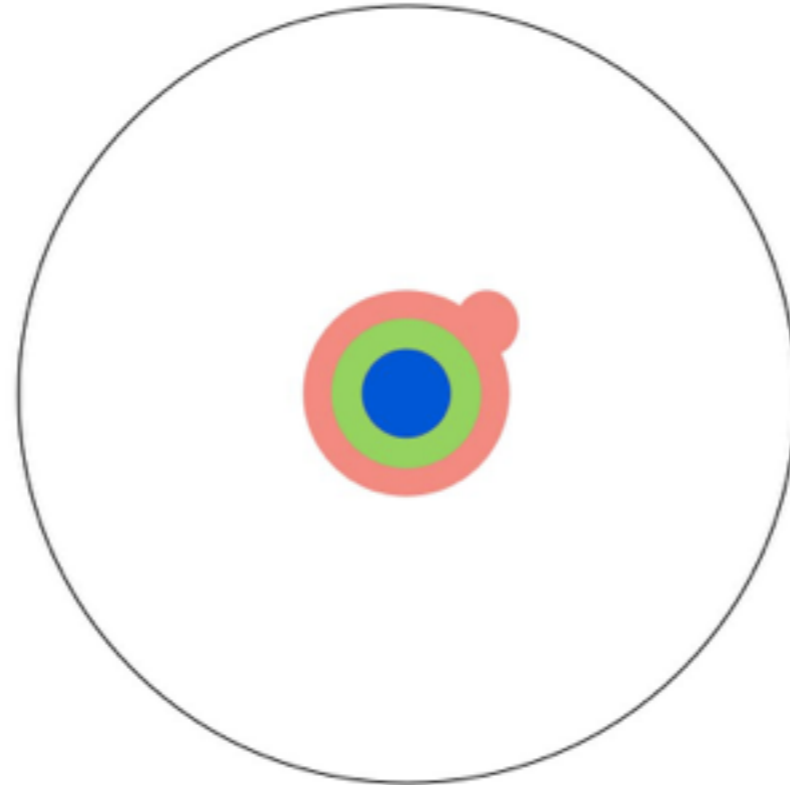
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By the time you finish high school, you know a bit more

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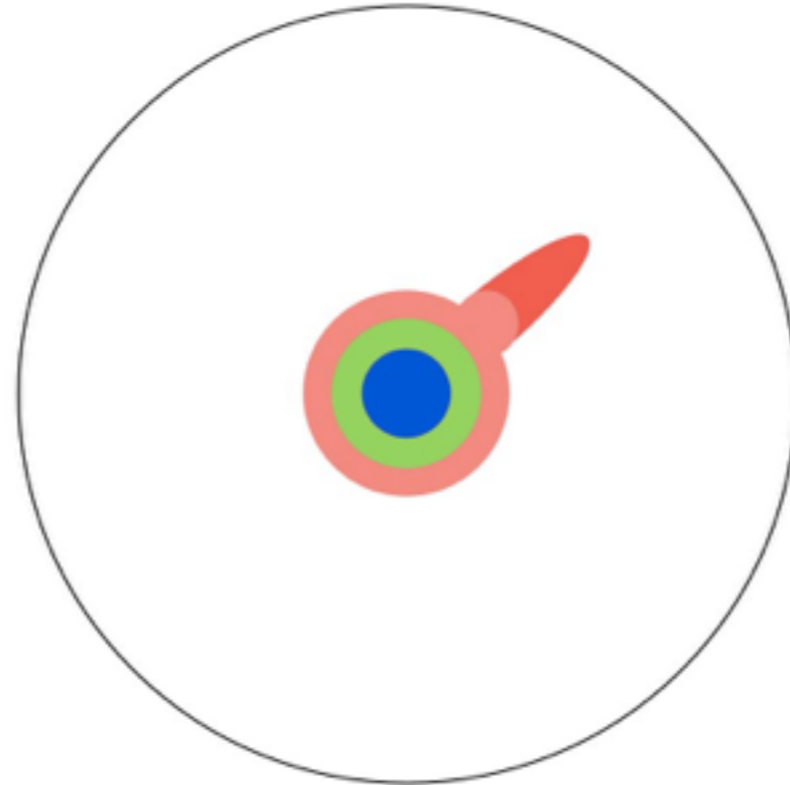
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With a bachelor's degree, you gain a specialty

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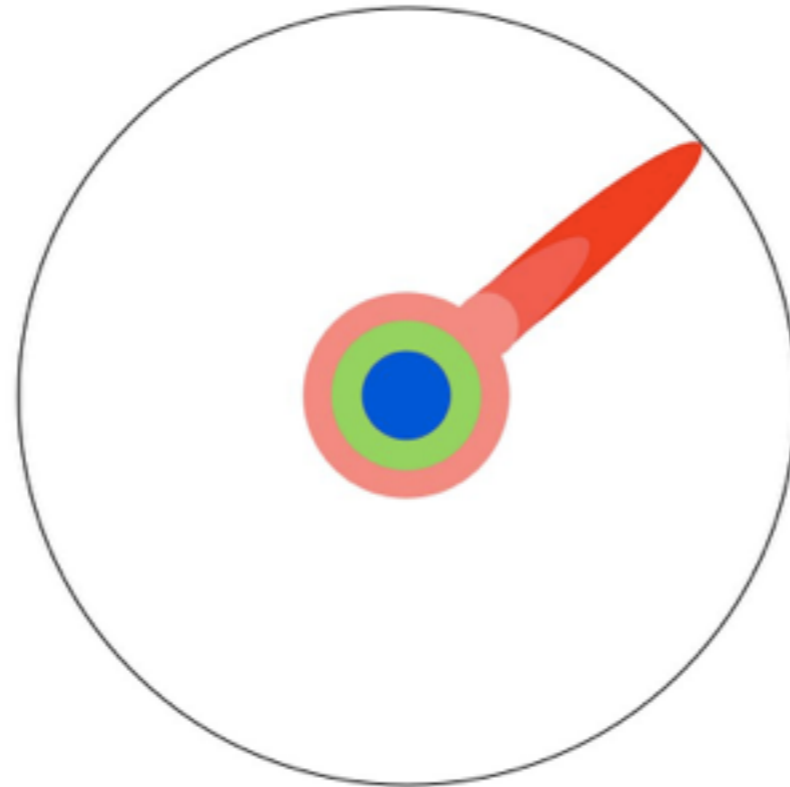
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A master's degree deepens that specialty

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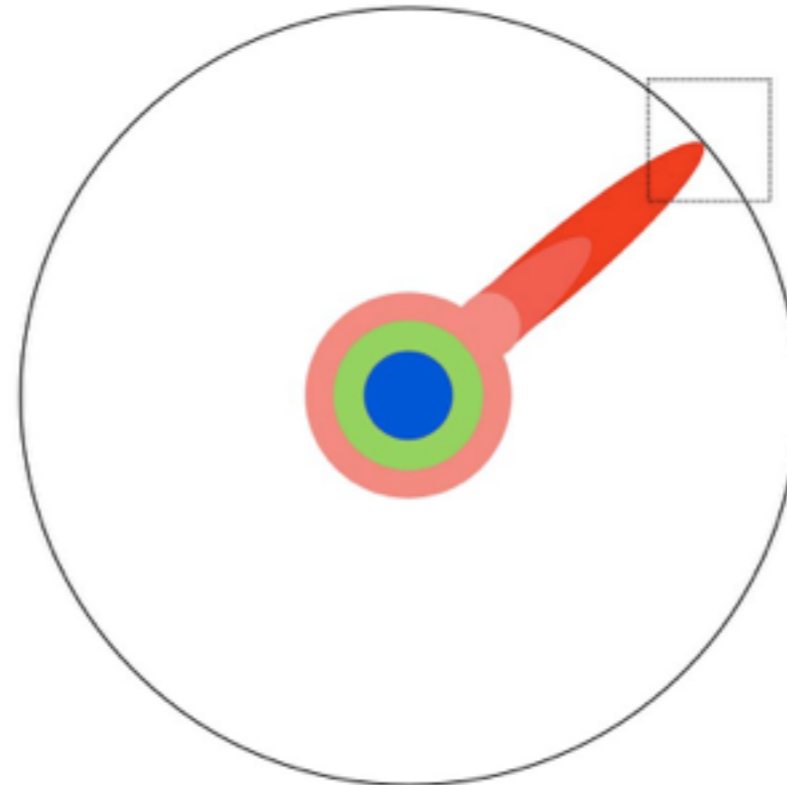
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Reading research papers takes you to the edge of human knowledge

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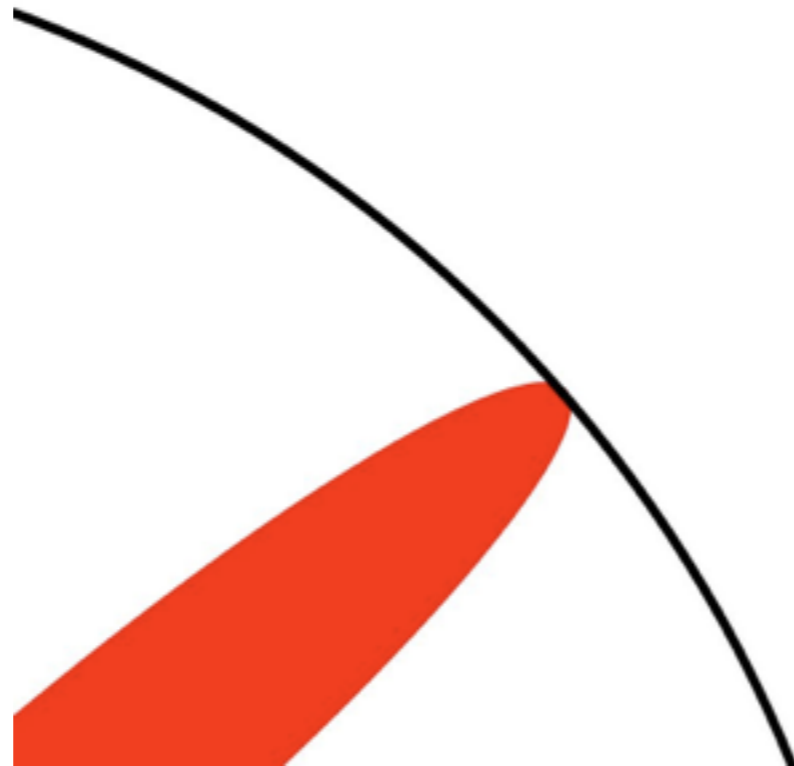
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Once you're at the boundary, you focus

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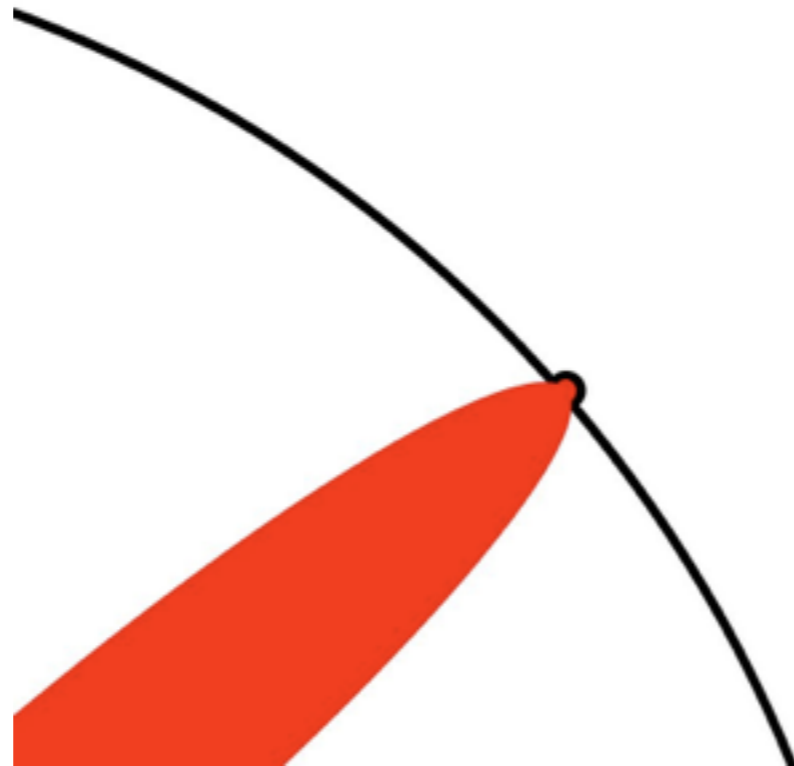


You push at the boundary for a few years

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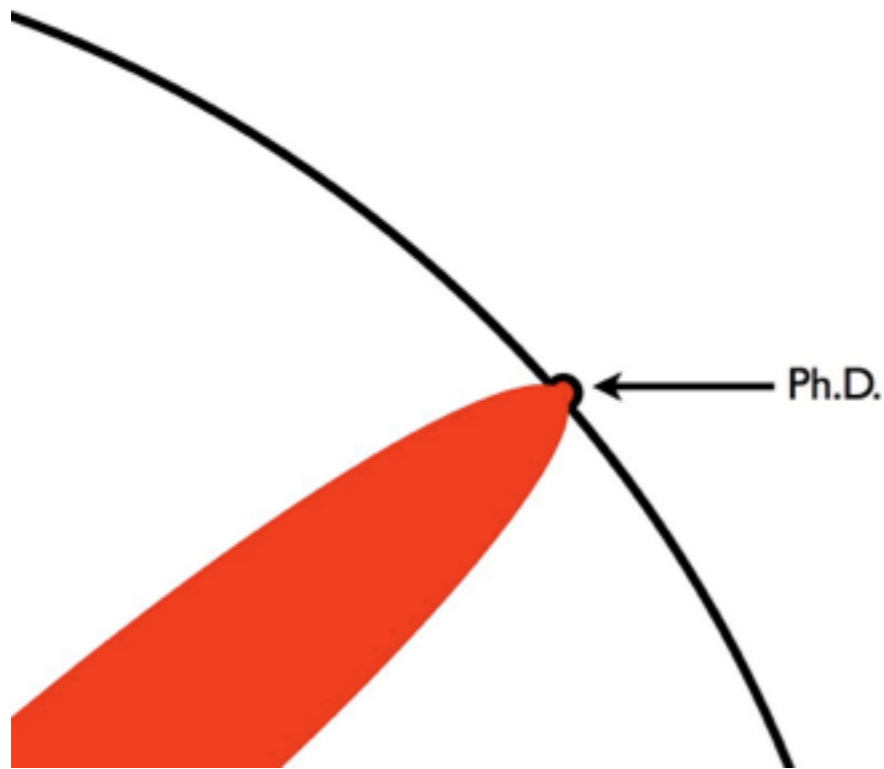
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Until one day, the boundary gives way

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# The Illustrated Guide to Research



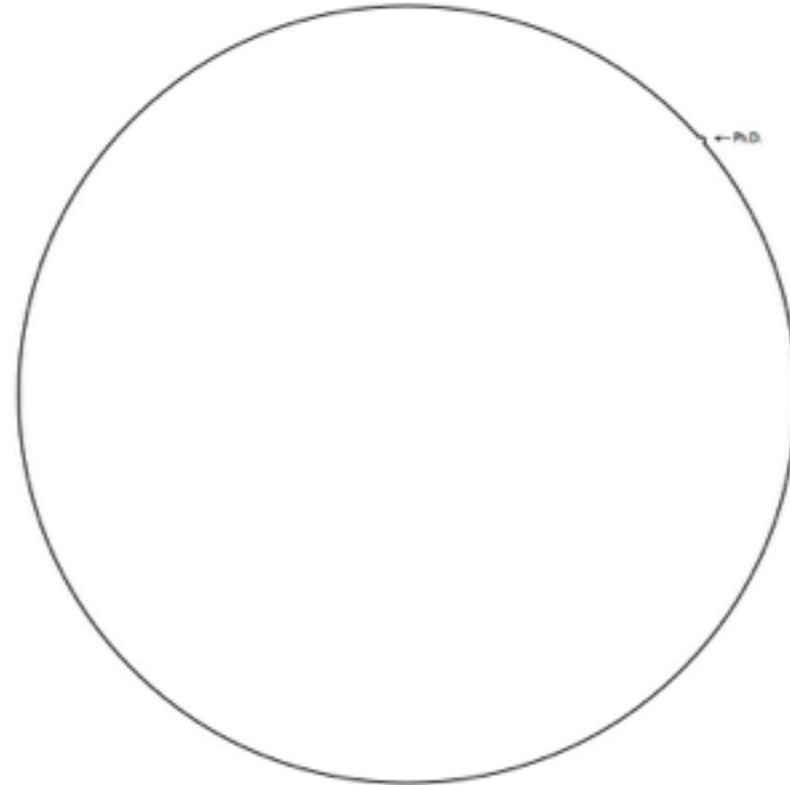
And, that dent you've made is called a Ph.D.



Of course, the world looks different to you now

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# The Illustrated Guide to Research

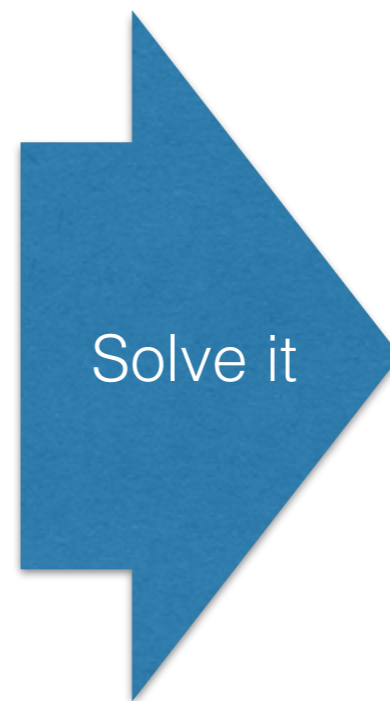
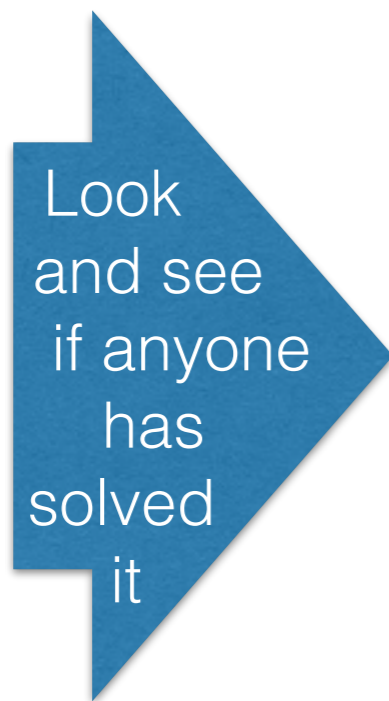


But, don't forget the bigger picture

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# Research Process

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# Research Proposal Development

# What is a Research Proposal?

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“... the meaning of proposal ... suggests looking forward, to what the researcher plans to do in the future. ... The proposal lays out the problem for research, describes exactly how the research will be conducted, and outlines in precise detail the resources – both factual and instrumental – the researcher will use to achieve the desired results”

(Leedy & Omrod, *Practical Research*. 8th ed)



# Research Proposal

- Finding a research topic
- Background and Introduction
- Research Problem

# Finding a Research Problem

- You wake up one day with a new insight/idea
- Critical thinking
- New approach to solve an important open problem (e.g., [https://en.wikipedia.org/wiki/Millennium\\_Prize\\_Problems](https://en.wikipedia.org/wiki/Millennium_Prize_Problems) )
- Your supervisor suggests a topic
- Be on the lookout of open problems (e.g., Topic emerges from your work/projects)
- You read some papers from other subfields in computing or related fields — there has to be a limit
- Disagreeing with some previous research

# Articulating Your Problem

- Ask questions
  - “Is something missing here?”
  - “Can this be done in a better way?”
  - “Is there a need for a new approach
- Given an idea, need to determine:
  - Has this work been done previously?
  - What similar work has been done leading up to this point?
  - How is any previous work distinguished from what I’m planning to do?
  - What group of people will be positively impacted by the research?
- Focus on precisely defining the problem
- Case study
- Scope your problem - you have limited time

(Paul Wagner, 2003)

**GOOD LUCK**  
for your  
**RESEARCH**  
**PROPOSAL**  
**SEMINAR**

*daracantika*

(Source: via Google)