Agenda

PhD Goals and Skills
PhD Milestones and Template
Research Topic Formulation
PhD Goals

What are they?
Push the field forward.
Practical Goals of CS Ph.D.

Generate papers?
   Need N papers to graduate??

Create new technology that will change the way we do things
   Describe your technology in a paper
   Paper is not the goal. It is a vehicle for communication and dissemination.
Research Skills vs Technical Knowledge

Research skills are different from discipline-specific knowledge

Research skills are somewhat general
  Could even extend to other sciences

We can improve proficiency by practice
  Need iterations and pattern matching
Research Skills

What skills do we need to do research?

How to create knowledge?

(Practical) How to produce output such as: paper/presentations/software?
Deliberate Practice

Observe
Find good papers and presentations
Study the content and style

Identify Skills
Compare with your habits/skills/outputs
Details (not high level like “writing”)

Practice
Drills to challenge and improve
Iterate with feedback
PhD Milestones

What are they?
PhD Template

Work on a project or two, often assisting a senior student; write a little

Work on a major project; write one or two papers on that topic

Write a dissertation
Discussion on variations in the “PhD template”

Think about your post-PhD objectives
Recap...

• What do you need to know/learn?
• What do you already know/learn?
• What do you want to work on?

• Practice, observe, adapt, seek feedback, iterate
Finding a Topic

Different from working on a topic

Didn’t get a chance to practice this much until now
An Observation About Ideas...

Rarely do we see an idea with no relation to the existing body of knowledge.
How to Find a Topic?

Read, read, read, discuss, go to talks

Listen to your advisor: sometimes you may not have a choice, but you can still bring small ideas
Let's say you are convinced you found a topic. You are excited.

How to know if we should pursue the topic?

Why do (PhD) research?
Research Formulation

What are you trying to do? Articulate your objectives using absolutely no jargon.

How is it done today, and what are the limits of current practice?

What's new in your approach and why do you think it will be successful?

Who cares?

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Research Formulation

If you're successful, what difference will it make?

What are the risks and the payoffs?

How much will it cost?

How long will it take?

What are the midterm and final "exams" to check for success?

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