PREPARING YOUR THESIS PROPOSAL

Julia Hirschberg, Columbia University
Lori Pollock, University of Delaware

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About this session…

- The slides will be online.

- Please ask questions or share ideas throughout!

Julia Hirschberg in One Slide

Technical Career

- PhD in History, UofM
- Asst Prof at Smith
- Saw the light: PhD in CS, UPenn
- Bell Labs/AT&T Labs: MTS and Dept Head
- Moved to Columbia CS 2002
- CS Chair with 7 PhD students (6 are female)

Family and Fun

- Married to Dan Hirschberg
- Cats: Oliver and Dahlia
- Hobbies: opera, plays and musicals, cooking, travel, Duolingo

Columbia Speech Lab

Lori Pollock in one Slide

Lori Pollock, Alumni Distinguished Professor, University of Delaware

- PhD University of Pittsburgh 1986
- Rice University 1986-1989
- University of Delaware 1990-present
- Sabbatical consulting: ABB Inc & Army Research

- **Research** in Software Engineering,
- Optimizing Compilers, CS Education

- **Service**
- CRA-W
- CS10K Partner4CS in Delaware
- WeC4Communities
- Comp Thinking in University Gen Ed
- **For Fun**
- Outdoor activities, handcrafts, traveling

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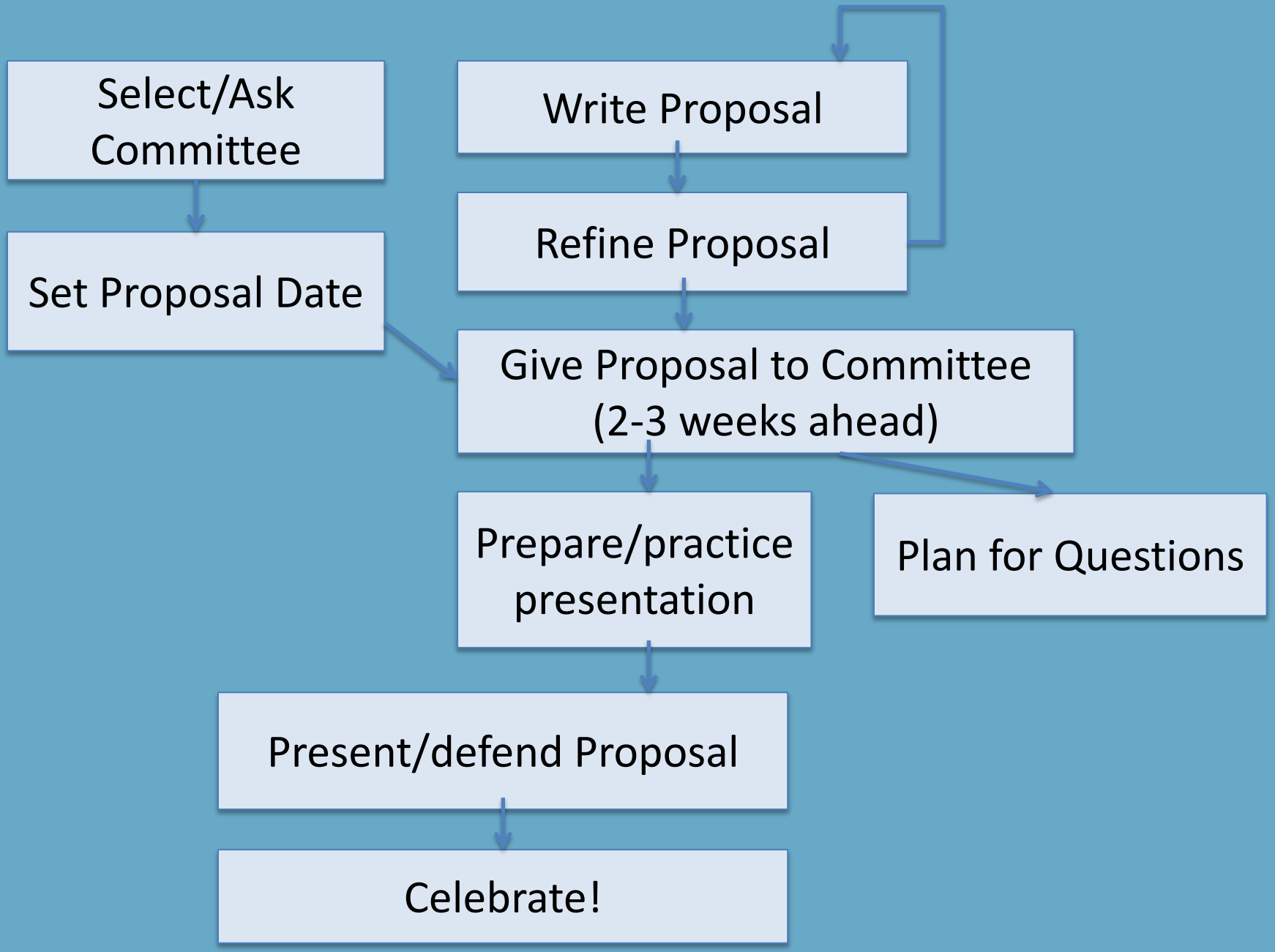
What is a PhD Proposal really?

- A brainstorming and planning process
- A succinct writeup of your proposed research goals, strategies, justification, & foreseen contributions
- A good time to get feedback & direction from experts
- Sometimes a stressful period of graduate school

When should I write/present a PhD Proposal?

When you have

- completed the rest of your PhD requirements
- a clearly defined problem
- some preliminary work to demonstrate promise of your approach
- some notion of the major subproblems
- an advisor who recommends you are ready


Select/Ask Committee
Set Proposal Date
Write Proposal
Refine Proposal
Give Proposal to Committee (2-3 weeks ahead)
Prepare/practice presentation
Plan for Questions
Present/defend Proposal
Celebrate!

The Committee

What is the role of the Committee?

- **Throughout the process …**
  - Guidance and understanding of what to expect
  - Feedback
  - Eventually, reference letters

- **At the proposal, they…**
  - Make sure you know what you're talking about
  - Make sure you know the state of the art

Selecting the PhD Committee

- Know your department rules
- Ideally
  - PhD advisor
  - Faculty in the topic area to provide useful direction
  - Faculty outside topic to provide high level feedback
  - External member – someone in research area who could write a reference letter

Activity

Individually

1. Using your department's website, write the list of required members' qualifications.
   e.g., Major advisor, Dept faculty in same area, Dept faculty outside area, External, …
2. Write a list of potential committee members and how each contributes to your PhD problem.
3. How did you choose the external member?

When you return, discuss with advisor.

The Written Proposal

Activity

With a partner, develop a list of questions your proposal should answer.

Hint: There are at least 7 major questions to answer.

You have 10 Minutes

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Hint: There are at least 7 major questions to answer.

SHARE OUT

In Summary…

The proposal should clearly answer:

1. What is the problem you are studying?
2. Why is it important?
3. What results have you achieved so far and why do they matter?
4. How is this substantially different from prior work?
5. How will you systematically evaluate your work?
6. What do you need to do to complete your work?
7. What is your timeline?

To answer these questions, how do you organize a proposal?

- Introduction
  - Problem statement and importance
- Background and State of the Art
- Preliminary Work
- Proposed Research
  - Subsections on each research contribution
- Evaluation Plans
- Research Plan
- Summary of your Contributions and Timeline

Think about the Audience

- **Your Committee**
  - Not necessarily all in your general topic area
  - Not familiar with your specific problem
  - Not aware of your prior work
  - Not aware of your skills, infrastructure
- **Implications**
  - Background: terminology, problem,…
  - State of the art related to your problem
  - Convincing motivation for importance
  - Demonstration of feasibility/promise of success

How long should a proposal be? Your presentation?

- Check your department rules/Ask for examples.
- Examples:

Columbia

- Proposal: 30pp
- Presentation: 45min

University of Delaware

- Proposal: 15-25 pp (single spaced, single column)
- Presentation: 40-45 min

What would help BEFORE I start writing?

- Think about what YOU want to accomplish
- Write a succinct thesis statement/hypothesis
- Discuss your ideas with others
- Present parts of the research at seminars, workshops, PhD workshops, conferences
- Think about 3-4 major contributions/papers
- Formulate these contributions in writing

Challenges, Frustrations, Misconceptions

- “The proposal is just a hurdle. I can just propose ideas off the top of my head now and then figure out what I really want to do later.” – **the lazy path**
- “How can I propose something when I don’t know the details yet?” **– the unknown path**
- “I don’t know how to organize the different parts of the research on the page.” – **writer’s block**
- “I’m not ready yet. I might as well solve the problems and then present them.” **– postpone, postpone, postpone….**

How do I GET STARTED writing?

- Examples in your department, with same advisor, in your area
- Break it down into manageable chunks?
  - Subprojects
  - Writing style: problem statement, hypothesis
  - Organization
    - Overall outline and flow
    - Within each proposed project section

The Proposal Defense

Proposal Defense Format

Presentation + Questioning

Presentation mirrors Writing Highlights

Proposal Presentation Tips

- Attend others' proposal defenses in your area
- Thank committee, introduce yourself and background
- Practice presentation many times
- Be polite during interruptions with questions
- Have someone take notes of questions
- Be open to suggestions
- Prepare for questions
- Don't be afraid to say 'I don't know' but ask for direction/help on those questions
- Be confident. Don't look to advisor for answers.

Activity

With a partner, develop a list of typical questions you should be prepared to answer at a proposal defense.

You have 5 Minutes

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With a partner, develop a list of typical questions you should be prepared to answer at a proposal defense.

You have 5 Minutes

SHARE OUT

Some Sample Questions

- Topic too large? too small? doable in the timeframe? Focused? What problems haven't you foreseen? What happens if your planned experiments fail (backup plans)?
- Evaluation (plan, statistics, validity)
- Related work missing?
- Practicality/scalability
- Vision of where this can go…

Last Tips on Defense

- Make sure you know the tough issues and have some answers
- Make sure your plan is reasonable, especially the timeline
- Certain people have go-to questions
  - Watch your committee members on other proposal defenses
  - Especially if your thesis touches on work they have done or know a lot about
  - Ask your advisor

So now you know why….

THANKS! AND QUESTIONS?

MORE DETAILS ON PROPOSAL SECTIONS

The Introduction

- General, high level problem for people outside area to appreciate
- Quick overview of what state of the art ***does not*** address
- Thesis statement – specific open problem and proposed strategy
- Brief overview of key insights and why your approach is promising
- List of your likely contributions

Proposed Research

- Overview of project – maybe a figure
- Specific project in steps
- For each –
  - Problem
  - Strategy
  - Details known now
  - Plans for remaining challenges
  - Evaluation plan

Evaluation: Experimental Design

- Questions you will ask to judge success of your approach
- Independent variables – what is being varied/compared
  - Eg, your technique versus other techniques
- Dependent variables and measures – what is being measured
  - Effectiveness – precision and recall, f measure
  - Cost – efficiency

Evaluation Methodology continued

- What actions are you going to perform to conduct the experiment?
- Human subjects?

Research Plan

- What steps do you plan to take next?
- What will you save for post-thesis work? Why?

Conclusion

- Summary of contributions to the state of the art – intellectual merit
- Repetition of broader impact on society