Ferris wheel at Old Orchard Beach. Doesn’t summer seem like a long time ago?
Research Proposal: Foundation & Moves

- Understand the role of the proposal in innovation
  - Effective writing strategies
- Building a foundation with sources
  - Drafting the evidence table
- Rhetorical and linguistic moves
Take a first pass at defining your topic. As we will see later, focusing the key questions is a process.
What makes research complicated?

When a user takes a photo, the app should check whether they're in a national park...

Sure, easy GIS lookup, gimme a few hours.

...and check whether the photo is of a bird.

I'll need a research team and five years.

In CS, it can be hard to explain the difference between the easy and the virtually impossible.

What parts of your introduction were easy/difficult to explain Why?
The introduction example gives an opportunity to emphasize the rhetorical triangle, especially the role of audience in making decisions. You didn’t add stories from your childhood (not the purpose of the communication), or the fact that you’re a student at MIT (the context implies that), or definitions of terms your audience would understand.
Ask students: how do AUDIENCE, CONTEXT, PURPOSE determine the choices made here? Which moves to make and how to make them? Highlight: different words/discourse/tone, same move.
THE PROPOSAL GENRE
What questions do you have? Be sure to email me with anything that confuses you or that you’d like to see better explained.
The SuperUROP typically intervenes at the “Challenges” level
Hand out guidelines and pause for questions. The text examples later in the lecture will show how we recognize these moves and clarify them for the audience.
These moves are also:
- real world problem
- gap in knowledge
- technological solution/outcomes
Common issues in proposals: working at all levels

Real world problem / area of inquiry

Technical solution to real-world problem

SuperUROP

At each level, include:
- The "gap"
- Problem linked to solution
- Justification

The main focus of your proposal is your **SuperUROP**: give it ample space in your text.

The generic idea
Application to Fernando’s project
Look for repeated technical terms. How does the context change as the paragraph develops?
Are there statements that say, in effect, “Here is the problem,” or “Here is the gap in knowledge”? What language alerts you to the rhetorical move being made.
This is a long discussion activity. Each team should have one copy of the excerpt. They should read and then decide which sentence is which move. Then report back to the class. You can: Ask them how they identified each move (signal phrases); see if there are any disagreements and ask students to explain their reasoning—usually they are both sort of right; etc. Give students the chance to ask questions or report confusion.

[Handout: intro / problem statement]
Highlight the signal phrases which cue readers to key functions (rhetorical moves)
Text by Uttara Chakraborty

We can look at a problem statement in a few ways:

Disciplinary vocabulary (terms with precise meaning)
Signal phrases that correspond to rhetorical moves
Development of important concepts within the paragraph
Single photon sources play a critical role in quantum information processing technologies, such as quantum key distribution, quantum computation, and quantum optical communication. Among currently studied candidates, epitaxially-grown semiconductor quantum dots are perhaps the most promising solid state single photon emitters suited to quantum engineering applications. However, incorporating single photon emitters into complex, engineered photonic environments presents significant challenges, owing to low collection efficiencies and low spontaneous emission rates. This project will develop a method of functionalising optical fibres with quantum dots for use as on-demand single photon sources. Quantum dots in circular micro-cavity gratings will be detached with a tungsten micro-probe from the fabrication substrate and aligned to the tips of optical fibres. The proposed fibre-integrated architecture seeks to be compatible with a wide range of quantum engineering experiments, improving photon extraction from the quantum dots and cutting down on losses that could arise from free-space optics.
Track the progression of core concepts throughout the text. I don’t love these colors and they’re not good for red/green colorblind people so let’s adjust.
Let's practice: your problem statement

- What are the important disciplinary terms?
- What is the current state of the art? Where is the gap?
- What ideas will you need to develop/connections will you need to make?
RELATED WORKS
How do sources inform your research and your proposal?

- Help you avoid reinventing the wheel!
- Motivate your choice of problem
- Justify your methodology
  - Why is your approach likely to work?
  - How do you know it's novel?
- Explain complex technical material
Again in groups. Students can “find the gap” in the text. What is justifying what?

**Justifying methodology**

Current existing upstream assays for predicting antibody nonspecificity include self-interaction chromatography (SIC) and cross-interaction chromatography (CIC) [1], but neither of these methods enable high-throughput characterization that is necessary for screening large synthetic antibody libraries. This project bridges the gap in technology with the development of a yeast display compatible high-throughput platform for predicting antibody nonspecificity...
Again in groups. Students can “find the gap” in the text. What is justifying what?
Motivating the choice of problem

Single photon sources that can produce photons with controllable quantum correlations are crucial to the success of scalable quantum information-processing technologies. Quantum cryptography, for example, requires the use of single photons travelling over a channel because multiple photons increase the likelihood of eavesdropping by potential interceptors. Ideal, “on-demand” single photon sources would emit exactly one photon into a given spatio-temporal mode at any time in response to a trigger pulse. However, in real-life experiments, there are deviations from the ideal situation and the probability of multi-photon emission is non-zero [2].
Motivating the choice of problem

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Evidence tables illustrate connections and how one article can be cited multiple times but in different contexts.
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You’ll get a sense of how your sources agree, disagree, and complement each other. These relationships will help you develop a nuanced statement on the problem, background, and need.
Evidence tables illustrate connections and how one article can be cited multiple times but in different contexts.
Next steps

- 2 sample proposals on stellar!
- Evidence table due 9/21 (at least 5 sources)
- Draft due Oct 5
- Lecture next week

Contact me with any concerns, questions, or to set up a meeting:

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Questions?