WRITING AN EFFECTIVE SURF PROPOSAL

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Common goals of a research proposal

- Introduce proposed research
- Provide background and explain rationale for study
- Describe methodology and explain its rationale
- Propose a timeline
- Propose a budget*
- Provide preliminary results*
- Anticipate possible outcomes and impact*

* These are not goals for a typical SURF proposal
Why do scientists write proposals?

1. **Intellectual reason**: The process of writing the proposal is a process of **idea creation and development**

2. **Rhetorical reason**: To **convince readers** that the project is worth the time, money, and energy it will demand from everyone involved
Persuading readers

• Most science and engineering research is expensive

• The majority of STEM research done at U.S. universities depends upon funding from external grants

• Most external grants are highly competitive
Caltech received $92,680,000 from National Science Foundation Awards last year.
A recent article in the Proceedings of the National Academy of Sciences finds: “A number of distressing trends, including a decline in the share of key research grants going to younger scientists, as well as a steady rise in the age at which investigators receive their first funding, are now a decades-long feature of the US biomedical research workforce.”
Rhetorical goals of the SURF proposal

1. Clearly explain *what you plan to do* in your research
2. Make the case that this work is *necessary/useful*
3. Show that you have a *realistic plan* for carrying out the work
4. Demonstrate that you are *well-prepared* and capable of carrying out the plan
Proposal Parts

• Introduction/background
• Objectives
• Approach
• Work Plan
• References
Introduction/background

• What is the problem you are trying to solve? How did the problem arise?

• Why is solving this problem interesting or important?

• What previous work has been done to define and address the problem?

• How does your work fit into the larger ongoing work of your mentor? How will your work contribute to that larger project?

• Show familiarity with the existing literature through content and citation
Introduction/background: Possible pitfalls

- Too broad
- Too narrow
- Failure to articulate a problem clearly
- Failure to situate the problem in a narrative of previous research
Objectives

• What do you aim to accomplish? (Be specific.)

• What new things will we know once your research has been successfully completed?

• What assumptions or conditions will guide and/or limit your work?

• What are your criteria for success?
Objectives: Possible pitfalls

• Writing a personal statement
• Disjunction between introduction and objectives
• Lack of specificity
• Unrealistic objectives
Approach

• How will you accomplish your objectives? (Be specific.)

• What are the key steps or milestones for your work? How long will each take?

• What challenges do you anticipate, and how will you respond to them?

• What equipment or other resources will you need?
How does an approach differ from methods?

Approach
- Gives a reader an introduction to how you plan to carry out an experiment (for grant proposals)

Methods
- Tells a reader in considerable detail how an experiment was conducted, so that he/she can evaluate the data accordingly (for research articles)

Procedures
- Tells a reader in exhaustive detail how an experiment is to be conducted, so that it could be precisely carried out and replicated (maintained within a lab to ensure a successful experiment)
Approach: Possible pitfalls

• Should be developed in consultation with your mentor
Work Plan

• Offer your reader a schedule of your principle activities and milestones
Work Plan: Possible pitfalls

• Unrealistic

• Insufficient detail
References

• List all research articles, review articles, and other writing you have consulted to prepare your proposal and use in-text citations as appropriate
  • Take careful notes to avoid plagiarism

• If you have incorporated writing or language from prospective mentors or peers, attribute those sources

• Use a consistent citation system, as recommended by your prospective mentor
Audience

• Prospective mentor (has high level of specialized knowledge)
• Outside evaluators (have area knowledge, but not detailed knowledge of the lab’s ongoing projects)
• Reviewers will consider
  • Is the proposal well thought out?
  • Has the student given a clear statement of what s/he will do?
  • Does the student have the skills/knowledge/engagement to be successful?
  • Is the student likely to achieve the goals?
  • Is the project plan realistic?
  • Does the research have the potential for publication in a refereed journal or presentation at an academic conference?
Style

- Write in academic English with the goals of clarity, concision, and accuracy

- If writing scientific prose is new to you:
  - Talk to mentors
  - Talk to tutors
  - Study models
  - Consult guidebooks

http://libguides.caltech.edu/writing
What makes a SURF proposal challenging?

• Proposals are usually written by experts in a field, rather than novices
• Writing about technical matters in a clear manner takes practice and revision
Process

- Meet with mentors and/or co-mentors
  - Ask questions
  - Get references
  - Read papers
- Write a proposal draft
- Solicit feedback on your draft
  - From mentors
  - From peers or Hixon Writing Center tutors
- Revise
- Applications due February 22\textsuperscript{nd}, 2015

Writing is not a linear process—it is a cycle of research, thinking, talking, writing, responding to feedback, and revision.
Support

• Small group workshops in the Hixon Writing Center
  • Session A: Tuesday 2/17, 12-12:55pm
  • Session B: Wednesday 2/18, 4-4:55pm

• Details regarding sign-up at writing.caltech.edu
Student experiences

• Katie Ching
• Lori Dajose
Questions, comments?

• Hixon Writing Center
  • Professional and peer tutors available for one-to-one conversations Sunday-Friday
  • [http://writing.caltech.edu](http://writing.caltech.edu)

• SURF office
  • [http://sfp.caltech.edu/students](http://sfp.caltech.edu/students)
  • This presentation will be posted on the SURF website