Proposal Writing: Why this, why now, why me?

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The Heilmeier Catechism

• What are we trying to do? (George Heilmeier DARPA Director 1975)
• How is it done today? Who does it?
• What are the limitations of the present approaches?
• What is new about our approach? Why do we think we can be successful at this time?
• If we succeed, what difference do we think it will make?
• How long do we think it will take? What are our success benchmarks?
Attributes of a Successful Proposal

• Clear, concise project objectives
• Strong motivation (need for research)
• Thorough analysis of the state-of-the-art (background)
• Clear research progression with definable milestones
• Adequate resources (laboratory, team expertise)

Introduction and Overview

• Provide reviewers with an outline of your proposed project which you will fill in later
• After the first 2 - 3 pages
  – Reviewer should be intrigued and excited
  – Should have a basic understanding of your project and why it’s significant
  – Should be convinced that this research is a great idea
  – Will just be looking for details to confirm you can do what you say you’ll do
Project Objectives

- Single most important part
- Focus reviewers’ interest
- A clear concise statement of intended contribution to field
- Significance of contribution

Mousetraps

- What are we trying to do?
- What is special about our approach?
- Why?
- How?
- Who?
Common mistakes

• Many reviewers will subconsciously make recommendation within the first few pages of proposal
• Objectives not clearly stated - force the reviewers to infer objectives
• Objectives are buried within the text of the proposal - the importance and relevance may be missed

Suggestions

• Boldface or italicize important aspects (use judiciously)
• Use bullets to stress main themes and/or objectives
Motivation

- Clearly state: Why is there a need for this research? What is the existing problem? Why is the topic timely?
- Must convince the reviewers that this is a worthy research project - reviewers will not recommend funding for problems that are merely “interesting” - there must be a need and application
- Cause and effect - what is causing the problem? And what is the effect on the industry?

The Background Section

- What is the current state of knowledge and how does this relate to your project?
- What are the holes in knowledge and how will your research fill them?
- Cite important work but don’t provide a comprehensive literature review covering the entire history of the subject
- Keep relating discussion to your project
- Typical length: 3 – 4 pages
Background

• Not just a “literature survey”
• Describe (tactfully) the merits of existing methods
  – advantages
  – disadvantages
• What does the proposed method offer that is lacking in other approaches?
• Describe any previous work that supports the proposed project, including:
  – promising results
  – preliminary development of proposed research directions

Project Description

• Flexible Structure
• Typical Outline
  – Introduction, overview, objectives
  – Background
  – Preliminary Results
  – Experimental Plan
  – Broader Impacts
  – Timeline
Do I Need Preliminary Data?

- Expectations vary by discipline
- How risky is your research idea?
  - Do you need preliminary data to demonstrate feasibility?
- How strong is your track record?
  - Do you need to demonstrate your mastery of the methodology?
- Are there potential showstoppers that could be explored with some preliminary experiments/calculations?

Preliminary Data

- Sometimes folded in with Background, but be careful!
- Summarize up front the significance of your data as it relates to your project. Beware getting bogged down in too many details
- Be clear who did the work – beware passive voice and the royal “we”
Research Plan

• How will you accomplish your goals, step by step?
• Need enough details to convince reviewers you have a well-developed plan that is likely to succeed
• But don’t drown reviewers in non-essential details
• More details needed for the first 2 or 3 years
• Discuss how you will deal with any potential showstoppers

Research Plan

Give a concise overview before launching into details.
– What are the objectives?
– What are the required tasks?
– What will be your overall approach?
– What are the roles of your collaborators?
Project Objectives

Research Progression

Year 3

Year 2

Year 1

Tasks

Activity

• Sketch a flow chart of your research plan including all major tasks and subtasks
• Indicate critical or high-risk tasks
• Show special resources or collaborators if applicable
Resources

- Describe any unique experiences the investigators have
- Useful laboratories and equipment
- Industrial partnerships
- Access to data

RESOURCES

Other suggestions

- Talk to the program manager in advance of submission
- Obtain (if possible) copies of successful proposals to the same initiative
- Have others read and give comments
  - editorial
  - technical
- Fill out forms in advance
- Resubmit and learn from reviewers’ comments
Persevere Intelligently

• Plan on rejection
  – Funding rates typically 20% or lower
  – Even the best researchers are declined more than they are funded
  – Agencies expect you to revise and resubmit
• Learn from declined proposals
• Pursuing grants is like honing in on a target

Analyzing the Reviews

• Did the reviewers have particular concerns that you can address?
• Were the reviewers confused or unclear about your project?
• Were the reviewers unimpressed by the significance or novelty of your research idea?
• Were the reviewers generally favorable, with no clear issues brought up?
• Did the project topic not fit the program?
• Be careful about chasing one comment by one reviewer – look at the Panel Summary