In science and engineering, proposals are responsible for moving the money

Unsolicited proposal in which

Solicited proposal in which

Solicited proposal in which

This workshop focuses on the approach, structure, and winning strategies of research proposals

Approach

Plan

Structure

Winning strategies
A research proposal is a plan for filling a hole in our understanding about a subject

A proposal begins with a good idea

Perhaps the single most important decision that you make on a proposal is whether to go for it

<table>
<thead>
<tr>
<th>Your Career on Proposal Acceptances</th>
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<tbody>
<tr>
<td>Too Much Risk</td>
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<td></td>
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<td>0%</td>
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Too much risk =
Not enough risk =
In developing your schedule, work backwards

The organization of a research proposal is based on a need and a plan to address that need

In the 1980s, more than thirty-five states wrote proposals to be home to the Superconducting Supercollider
An effective site must not exceed several criteria

- Annual rainfall > 48 inches
- More than 120 freezing days
- High relief and mountains
- Coastal sedimentation
- High seismic hazard
- Limits of glaciation

Audiences are more likely to believe your argument if they know and comprehend your assertions

- Our site should be selected
- Our site is the only site that does not exceed the criteria
- A site must not exceed several criteria

The section explaining the need for the research makes the audience aware of the problem

- Need for Research
Audiences are more likely to believe your argument if they know and comprehend:

New methods are needed to detect plastic explosives in airline baggage.

Some research projects are easier to justify than others:

- Preventing Cardiac Arrests
- Validating and Verifying Software

The organization of a research proposal is based on a need and a plan to address that need:
The proposal identifies both the research hypotheses and the assumptions that shape those hypotheses.

Methods not considered:

- x-ray backscatter system
- nitrogen sniffer system
- thermal neutron system

Criteria for evaluation:
1. Cost (initial, maintenance)
2. Ease of use
3. Accuracy of detection
4. Speed

The proposal shows how the hypotheses will be met

<table>
<thead>
<tr>
<th>Criteria for Comparison</th>
<th>Methods for Comparison</th>
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<tbody>
<tr>
<td>Cost</td>
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<tr>
<td>Initial cost</td>
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<tr>
<td>Maintenance cost</td>
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<tr>
<td>Ease of Operation</td>
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<tr>
<td>Accuracy</td>
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<td>Explosive types detected</td>
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<tr>
<td>Percentage detected</td>
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<td>False alarm rate</td>
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<td>Speed</td>
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</tbody>
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Implicitly and explicitly, the proposal shows why you should do the work

Resources

Qualifications
Four key strategies can strengthen your proposals

- Sticking the beginning
- Emphasizing your assertions
- Showing your research plan
- Making appropriate appeals

To stick the beginning, your message should contain certain qualities

Stories and examples can provide a memorable beginning
As Toulmin states, people are more likely to believe your argument, if they know your assertions

Motivation

As Toulmin states, people are more likely to believe your argument, if they know your assertions. According to Toulmin, the audience should appreciate assertions. In 2004, Marthinsen states, you should make the audience appreciate your assertions.

Our objective is to determine whether the dunlins of Iceland and the Baltic Sea are different subspecies. As Toulmin also states, you should make the audience appreciate your assertions.

Assertion

Warrant

[Marthinsen, 2004]

The debacle of Oslo Sporveier reveals how important it is to estimate the effort needed for developing software.

In 1997, Oslo initiated a project to develop an electronic ticket system for buses, trains and trams in Oslo. In the late 1990s, after spending $318 million, the project was canceled. In 2002, the decision to develop the electronic ticket system was made again, and the estimated launch was to be at the beginning of 2006. The amount initially invested was 200 million NOK. During 2005, 180 ticket machines were placed at different train stations ready to be tested. However, the target date of starting up the system at the beginning of 2006 was not met, because Oslo Sporveier discovered several problems during the system testing. Today, in 2008, the system is still not up and running. The delay is now more than two years, and the amount invested since 2002 is 235 million NOK [1]. Still there are problems with functionality and system development that need to be solved. For example, no internet-based program for buying tickets online has been developed, and a problem exists with the connection between the ticket machines and the banking system. More than 20 years after the initial idea of an electronic ticket system, Oslo still does not have one.
A third winning strategy for proposals is to show the audience your ideas visually

When presenting an argument, you can appeal to logic, emotion, and your own credibility

Deductive reasoning is the most powerful form of logical evidence
Ethos is an appeal to the credibility of the author

How do you establish credibility?

- Associate yourself with an institution
- Methodically give details, including assumptions
- Name your reference sources

John Chambers

Pathos is an emotional appeal to the audience

In summary, although proposals are challenging to write, the rewards can be well worth the pain and effort

Need
Plan

Need