

How to write a great research grant proposal

Simon Peyton Jones,
Microsoft Research, Cambridge

with Alan Bundy, Edinburgh University

Grants are important

- Research grants are the dominant way for academic researchers to get resources to focus on research
- **INVARIANT:** there is never enough money

The state of play

- Even a strong proposal is in a lottery, but a weak one is certainly dead
- Many research proposals are weak
- Most weak proposals could be improved quite easily

Audience

- **With luck**, your proposal will be read **carefully** by one or two **experts**. You must convince them.
- But it will **certainly** be read **superficially** by **non-experts**... and *they* will be the panel members. You absolutely must convince them too.
- Some influential readers will be non-experts, and will give you **one minute maximum**.

The vague proposal

1. I want to work on better type systems for functional programming languages
2. **Give me the money**

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You absolutely must identify the problem you are going to tackle

Identifying the problem

- What is the problem?
- Is it an **interesting** problem? That is, is it research at all?
- Is it an **important** problem? That is, would anyone care if you solved it? (jargon: “impact”)
- Having a "customer" helps: someone who wants you to solve the problem

The aspirational proposal

1. I want to solve the problem of avoiding all deadlocks and race conditions in all concurrent and distributed programs
- 2. Give me the money**

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- **It is easy to identify an impressive mountain**
- **But that is not enough! You must convince your reader that you stand some chance of climbing the mountain**

Climbing the mountain

Two sorts of evidence

1. You absolutely must say what is the **idea** that you are bringing to the proposal.
2. Explain modestly but firmly why **you** are ideally equipped to carry out this work. (NB: not enough without (1))

1. Your idea

- Give real technical “**meat**”, so an expert reader could (without reading your doubtless-excellent papers) have some idea of what the idea is
- Many, many grant proposals have impressive sounding words, but lack almost all technical content. Reject!

1. Your idea

Offer **objective evidence** that it's a **promising** idea:

- Results of preliminary work
- Prototypes
- Publications
- Applications

Strike a balance: you don't want the reader to think “they've already solved the problem”.

2. Blowing your own trumpet

- Grants fund **people**
- Most researchers are far too modest. “It has been shown that ...[4]”, when [4] is your own work!
- Use the first person: “I did this”, “We did that”.
- Do not rely only on the boring “track record” section

2. Blowing your own trumpet

Express value judgements using strong, but defensible, statements: pretend that you are a well-informed but unbiased expert

- “We were the first to ...”
- “Our 1998 POPL paper has proved very influential...”
- “We are recognised as world leaders in functional programming”

2. Blowing your own trumpet

Choose your area...

- “We are recognised as world leaders in
 - functional programming
 - Haskell
 - Haskell’s type system
 - functional dependencies in Haskell’s type system
 - sub-variant X of variant Y of functional dependencies in Haskell’s type system”

Your message

We are ideally placed to do this timely research because

- We have an idea
- Our preliminary work shows that it’s a promising idea
- We are the best in our field

The arrogant proposal

1. I am an Important and Famous Researcher. I have lots of PhD students. I have lots of papers.

2. Give me the money

- Proposals like this do sometimes get funded. But they shouldn't.
- Your proposal should, **all by itself**, justify your grant

The I'll-work-on-it proposal

1. Here is a (well-formulated, important) problem

2. Here is a promising idea (...evidence)

3. We're a great team (...evidence)

4. We'll work on it

5. Give us the money

The I' ll-work-on-it proposal

1. Here is a (well-formulated, important) problem
2. Here is a promising idea
3. We're a world-class team
4. We'll work on it
- 5. Give us the money**

The key question

How would a reviewer know if your research had succeeded?

Jargon: "aims, objectives"

Suspicious phrases

- "Gain insight into..."
- "Develop the theory of..."
- "Study..."

The trouble with all of these is that there is no way to distinguish abject failure from stunning success.

Good phrases

- “We will build an analyser that will analyse our 200k line C program in less than an hour”
- “We will build a prototype walkabout information-access system, and try it out with three consultants in hospital Y”

The most convincing success criteria involve those “customers” again

Related work

- **Goal 1:** demonstrate that you totally know the field. Appearing ignorant of relevant related work is certain death.
- **Goal 2:** a spring-board for describing your promising idea
- But that is all! Do not spend too many words on comparative discussion. The experts will know it; the non-experts won't care.

Methodology/plans

- “Methodology”, or describing your step-by-step plans, is usually over-stressed in my view.
- Concentrate on (a) your idea, and (b) your aims/objectives/success criteria. Then the “methodology” part writes itself.

The ideal proposal

1. Here is a well-defined problem
2. It's an important problem (evidence...)
3. We have a promising idea (evidence...)
4. We are a world-class team (evidence...)
5. Here is what we hope to achieve
6. Here is how we plan to build on our idea to achieve it
7. **Give us the money. Please.**

One page, please

- Start with a **one-page summary**, that tells the whole story (previous slide)
- Remember: most of your readers will only read this page
- **NO BOILERPLATE:** “The XYZ institute has a vigorous research programme in many important fields...”. This page is worth **10x** the other pages. Every word is precious.

Know your agency

- Read the call for proposals
- Try to understand what the motivation of the agency (or company) is
- Understand their criteria, and write your proposal to address them
- But do not prostitute your research. Write a proposal for good research that you are genuinely excited about.
- Do not exceed the page limit

Know your agency

- Find a reason to telephone (not email) the program manager. S/he is a Human Being, and is constantly on the lookout for original research.
- Build your relationship. Invite them to visit your institute. Offer to help as a reviewer. Ask what you can do that would help them. Do not begin by making demands (everyone else does)

Help each other

**Ask others to read your proposal critically
Revise, and ask someone else
Repeat**

- Cheap: what someone thinks after a 10-minute read is Really Really Important
- Informative: after reading 20 proposals by others, you'll write better ones yourself. Much better proposals.
- Effective: dramatic increases in quality. There is just no excuse for not doing this.

Attitude

- To every unfair, unjustified, and ill-informed criticism from your reader, respond *“That’s very interesting... here is what I intended to say... how could I rephrase it so that you would have understood that”*?
- Better get criticised by your friendly colleagues than by panel member at the meeting.
- Much easier do face to face than by email

Good news

The general standard of
research proposals is low

So it is not hard to shine

Although, sadly, that still does not guarantee a grant.

Good luck!

<http://research.microsoft.com/~simonpj/papers/Proposal.html>