

# *NSF CISE CAREER WORKSHOP 2017*

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# My Background

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## □ Education

- Undergraduate studies in mathematics at University of Zagreb, Croatia
- Masters degree in computer science, obtained at Max-Planck Institute (University of Saarland), Germany
- PhD in computer science, EPFL, Switzerland, 2011

## □ Interests

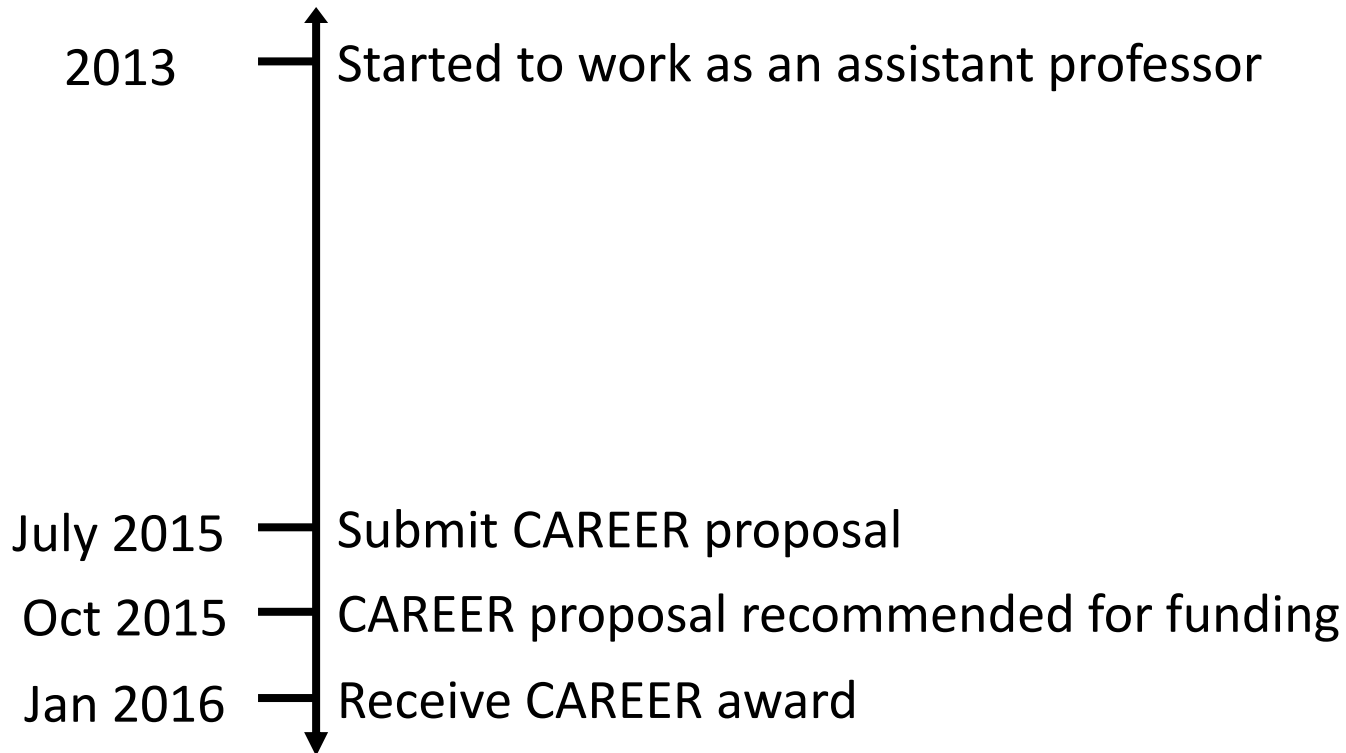
- Programming languages, software verification, system correctness, and code synthesis

## □ Some recent projects

- Synthesis for Functional Reactive Programming: extending the FRP paradigm with synthesis constructs
- Firewall Repair: using a high-level formal encoding and the programming-by-example paradigm to repair errors in firewalls

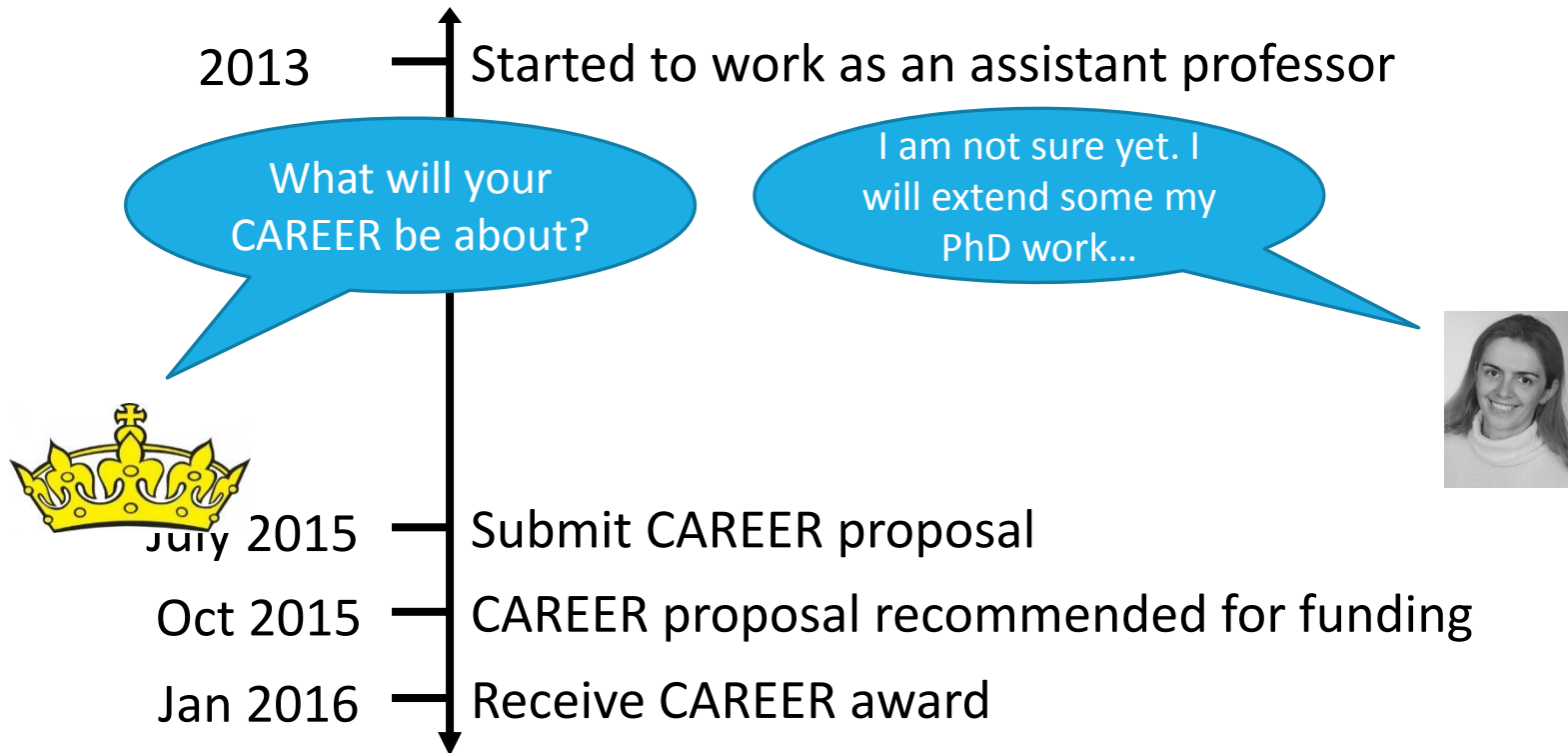
# The “CAREER” process

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# The “CAREER” process

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# The “CAREER” process

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2013 — Started to work as an assistant professor

2014 — Planned to submit a CAREER proposal, but had no clear idea about what (and neither did I have students)

What will your CAREER be about?

I am getting some nice results with students – the ideas are forming...

July 2015 — Submit CAREER proposal

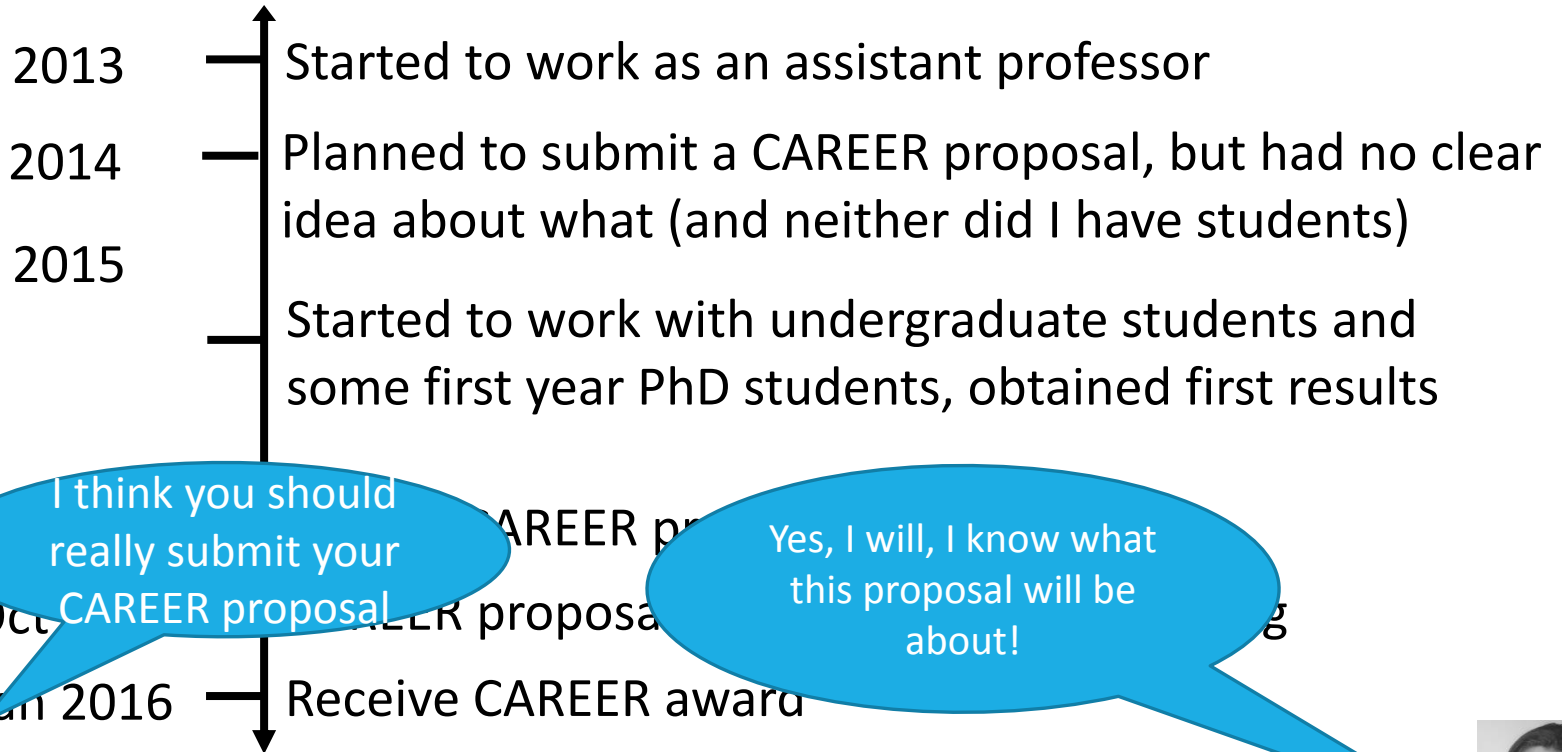
2015 — CAREER proposal recommended for funding

Jan 2016 — Receive CAREER award



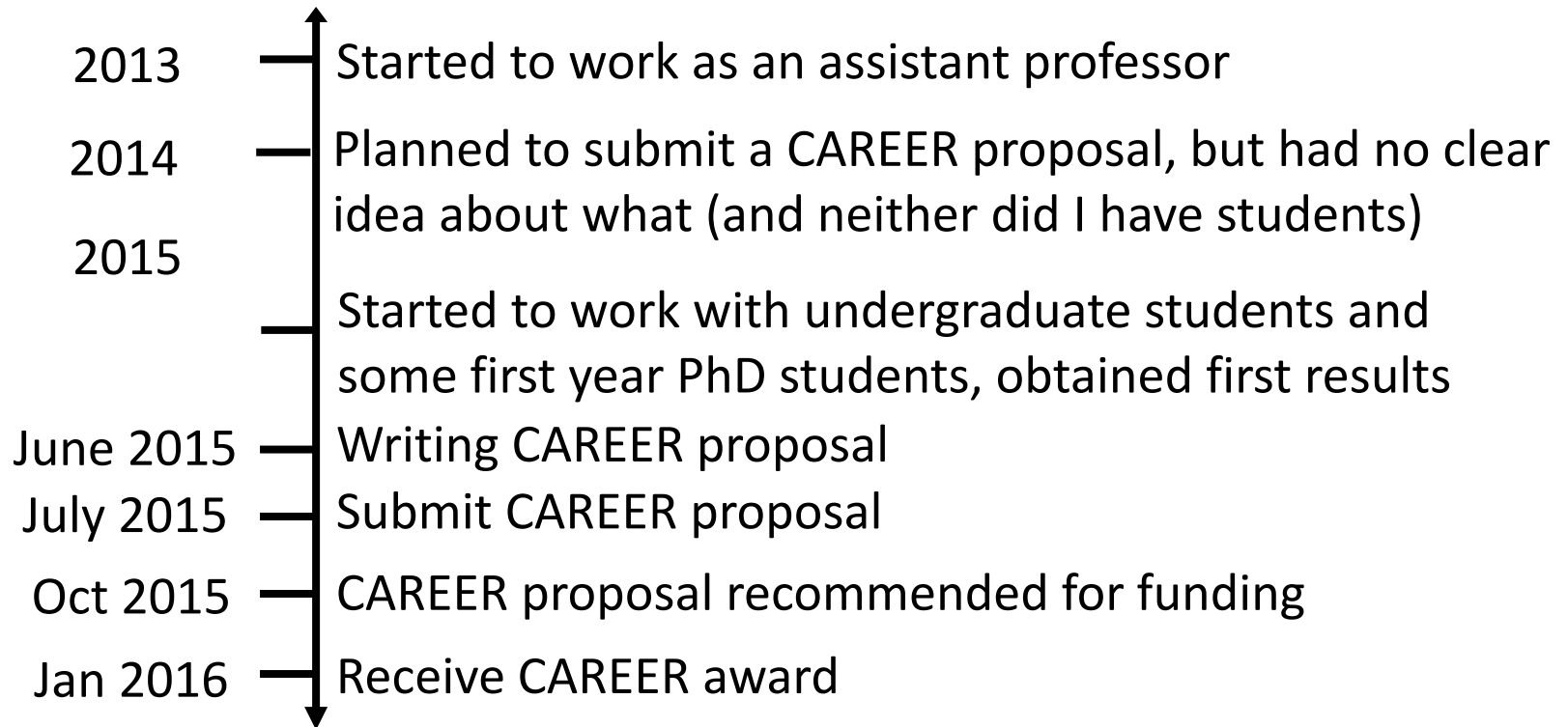
# The “CAREER” process

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# The “CAREER” process

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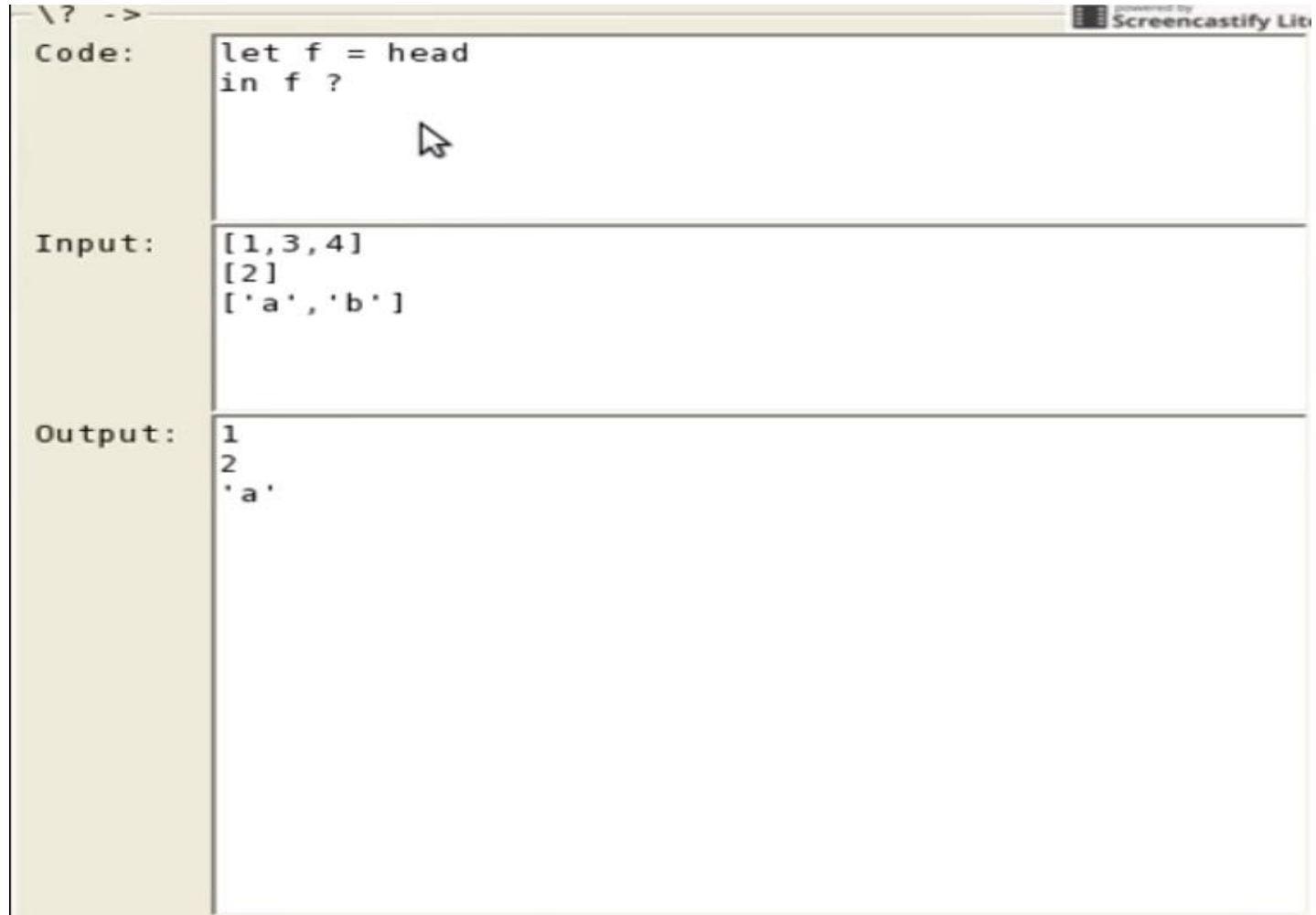
# Challenges

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- Finding a topic close to my areas of expertise...  
...but not too close!
- Finding an ambitious and exciting topic...  
...but one that is also feasible!
- Developing a educational outreach component...  
...but that fits nicely and naturally into your proposal  
(and it should also be something that you are  
passionate about)!



# Proposal: “Synthesis in a Live Programming Environment”



The screenshot shows a live programming environment with three main sections: Code, Input, and Output. The Code section contains the code `let f = head` and `in f ?`. The Input section contains the lists `[1,3,4]`, `[2]`, and `['a','b']`. The Output section contains the results `1`, `2`, and `'a'`. The environment is titled `\? ->` and includes a `powered by Screencastify Lite` logo in the top right corner.

```
\? -> powered by  
Screencastify Lite
```

<b>Code:</b>	<code>let f = head in f ?</code>
<b>Input:</b>	<code>[1,3,4] [2] ['a','b']</code>
<b>Output:</b>	<code>1 2 'a'</code>

# Motivation and Justifications

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- I have already done lots of work in program synthesis  
... but nothing in programming-by-example
- With an undergraduate student, we obtained first results on program repair
- Another undergraduate student wrote a prototype tool for generating representative examples
- Previously I published a tool paper on script synthesis
- **Summary:** the ingredients (two published papers, three projects of undergraduate students) were there, indicating that this proposal might work

1 Introduction

1.1 Introduction

1.2 Background

1.3 Research Plan

1.4 Outreach Plan

# Introduction

# Background

1.5 Research Plan

1.6 Outreach Plan

1.7 Research Plan

1.8 Outreach Plan

1.9 Outreach Plan

# Research Plan

1.10 Outreach Plan

1.11 Outreach Plan

1.12 Outreach Plan

1.13 Outreach Plan

1.14 Outreach Plan

# Outreach Plan

# Mumbo Jumbo

# Writing Process

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- First step: collecting several successful proposals and analyzing their structure
- The proposal outline created in May, “borrowed” some text from the Introduction section from the papers I already wrote
- Preliminary feedback from Zhong Shao in June
- Big push after mid-July deadlines
- Last edits made just five hours before proposal due date

# Outreach Plan / Educational Plan



ABOUT US

Closing The  
ACHIEVEMENT GAP

POLICY

Partnering With  
CT Districts

## *The Gap in Connecticut*

When people hear that Connecticut has the largest achievement gap, they assume it's because our wealthier students must be performing really well. But that's not the whole story.



- ☐ I am passionate about education and mentoring
  - Collaborating with CTCSTA
  - Organizing several mentoring workshops at POPL and CAV (top conferences in my field)
  - Organizing summer schools

# Outreach Plan / Educational Plan

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- ❑ Broader impact and educational plan is very important: do not just add a few sentences stating “I will create a new course in my field of expertise”
- ❑ Work with undergraduate students - try to engage members of underrepresented groups
- ❑ Try to engage high school students to get interested in STEM
- ❑ The best is if you can combine your interests and education/mentoring beyond the classroom: you will do all these activities without noticing that you are doing them – but be sure to mention them in your proposal!

# If I had to do it again...

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- CAREER awards are important but it might help to not think of your project as your life's work
- Go serve on panels!
- Talk to your program officer
- Write proposals in a way that makes it totally easy to distinguish new work from old
- Include some form of evaluation for each component of the proposal
- Send a message "I know what I am doing, and I will do that independently of whether you give me money or not"

# Heilmeier's Catechism – Listen to George!

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A set of questions credited to [Heilmeier](#) that anyone proposing a research project or product development effort should be able to answer.

1. What are you trying to do? Articulate your objectives using absolutely no jargon.
2. How is it done today, and what are the limits of current practice?
3. What's new in your approach and why do you think it will be successful?
4. Who cares? If you're successful, what difference will it make? What are the risks and the payoffs?
5. How much will it cost? How long will it take? What are the midterm and final "exams" to check for success?