NSF CISE CAREER WORKSHOP 2017

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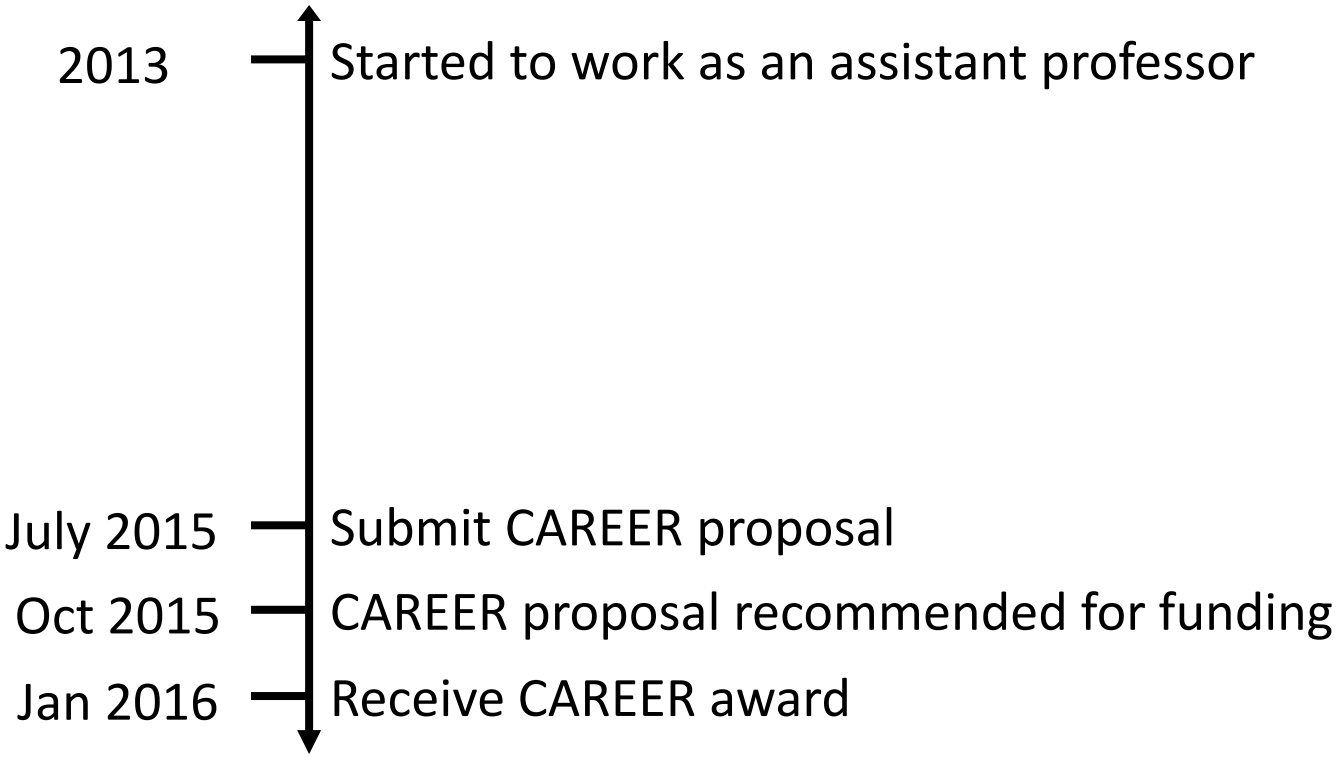
My Background

- 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



The “CAREER” process

2013 — Started to work as an assistant professor

What will your CAREER be about?

I am not sure yet. I will extend some my PhD work…

July 2015 — Submit CAREER proposal

Oct 2015 — CAREER proposal recommended for funding

Jan 2016 — Receive CAREER award

The “CAREER” process

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…

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The “CAREER” process

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)

2015 — Started to work with undergraduate students and some first year PhD students, obtained first results

I think you should really submit your CAREER proposal

Yes, I will, I know what this proposal will be about!

Oct [illegible] proposa [illegible]

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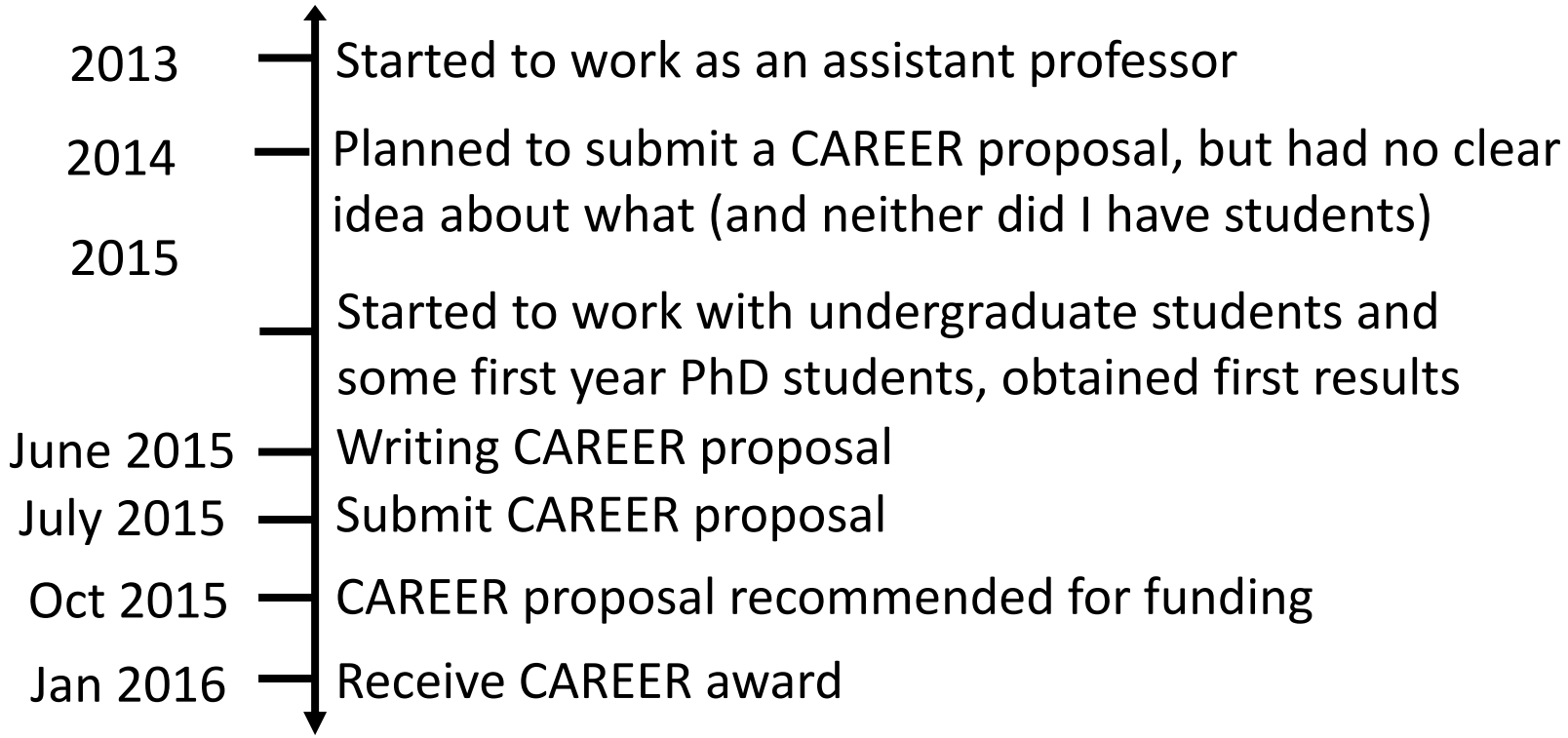
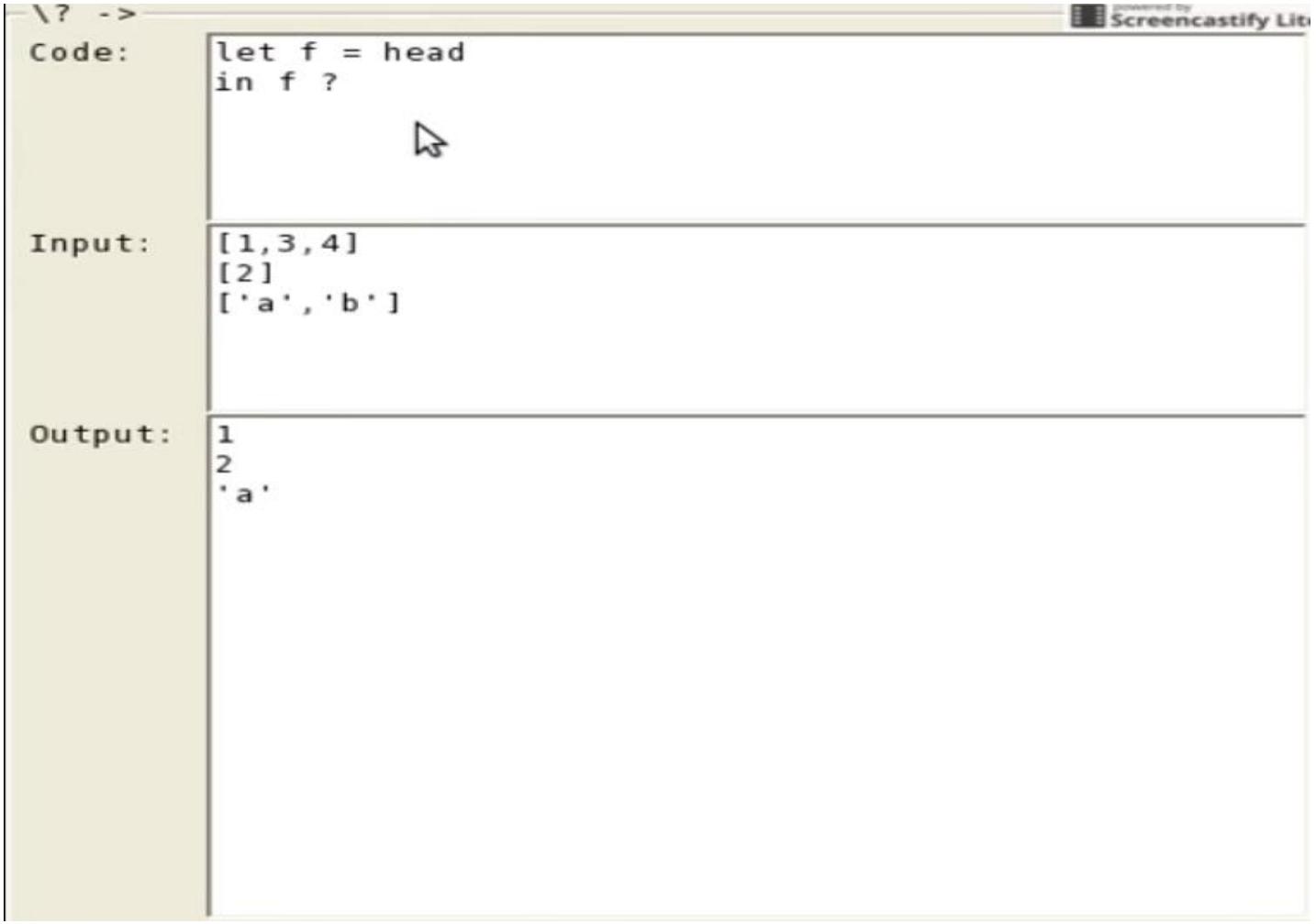
The “CAREER” process



Challenges

- 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)!

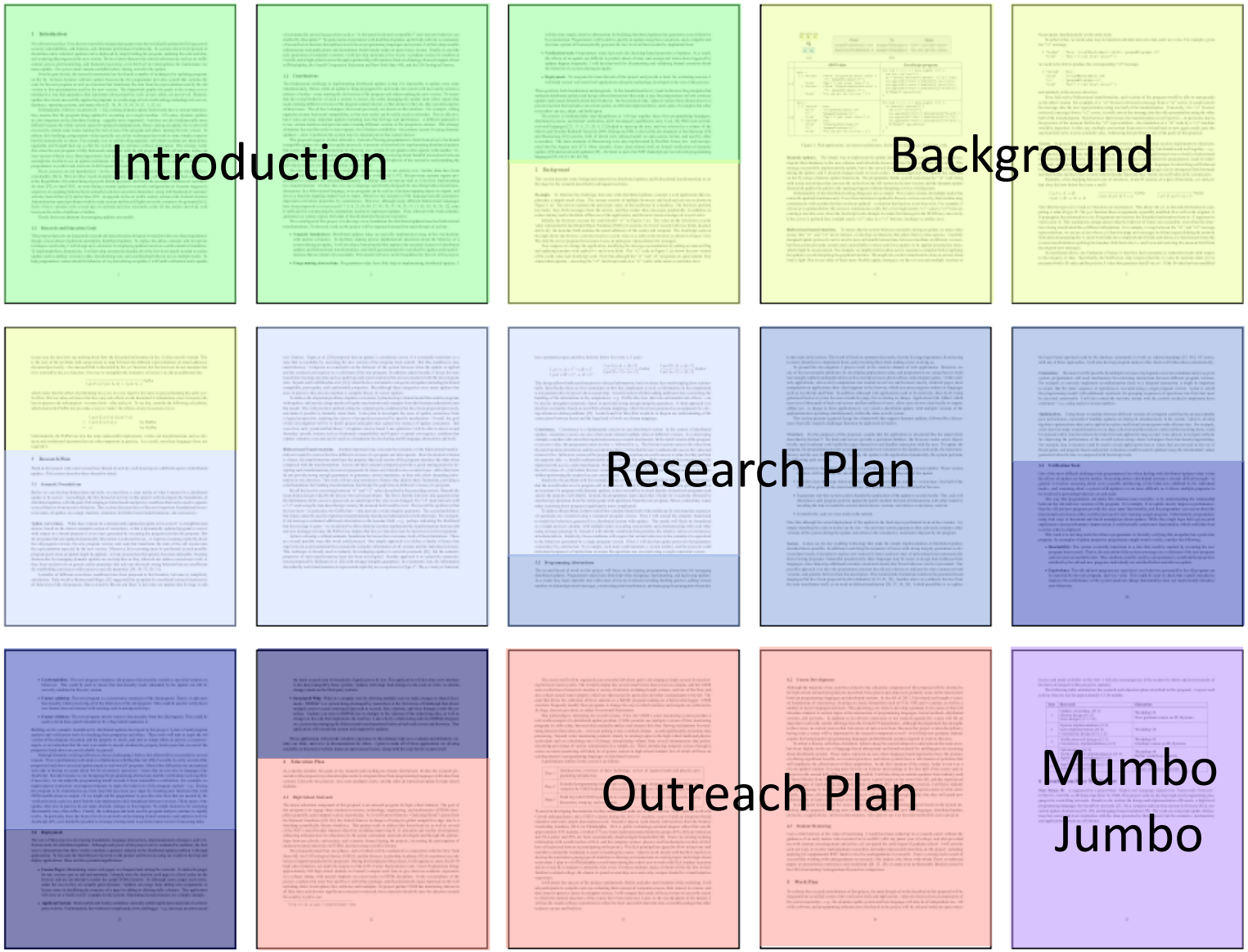
Proposal: “Synthesis in a Live Programming Environment”



Motivation and Justifications

- I have already done lots of work in program synthesis

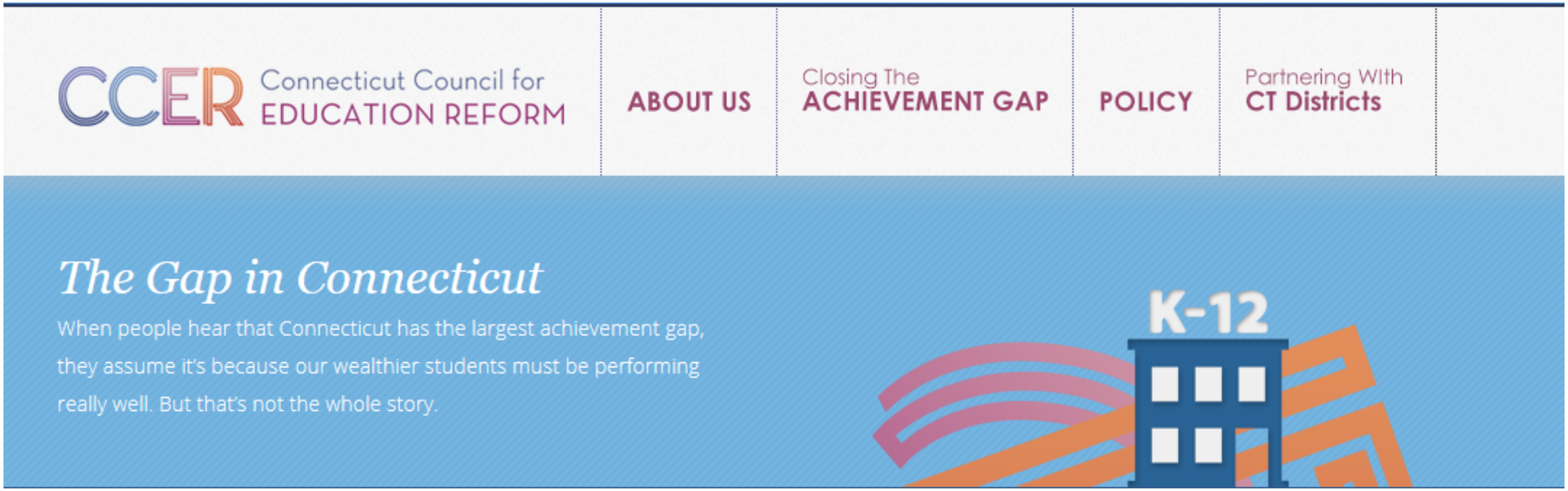
  … but nothing in programming-by-example
- With an undergraduate student, we obtained first results on program repair
- Another undergraduate student wrote a prototype tool for generating representative examples
- Previously I published a tool paper on script synthesis
- **Summary**: the ingredients (two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


Introduction
Background
Research Plan
Outreach Plan
Mumbo Jumbo

Writing Process

- 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



- 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

- 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…

- 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!

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?