

NSF CISE CAREER Workshop

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 - **CAREER: Verified Compilers for a Multi-Language World**
 - submitted 2014; already had 2 grants, had served on panels

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 - integration of education with research
 - it's about the rest of your career: decide what you want to do, connect to what you've done, tell that story
- My mentor's advice: **Think big. Think long-term.**
- Caveat: 500K for 5 years isn't enough to fund something extremely ambitious; I'll discuss strategies to deal with that

Two key questions...

- Why this research?
- Why you?

Think about these in tandem as you “develop your story”

Getting started

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- Start thinking early (at least 1 year before you submit)
 - decide on problem
 - develop/refine an idea for solving it
 - do preliminary work
 - decide on concrete things you'll propose to do
 - assess/adjust scope of project
 - read related work (and collect bibliographic references)
 - PITCH your idea to mentors

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 - *Lather, rinse, repeat*

Pitching your proposal

- Verbally pitch your proposal to senior people whose judgment you trust (mentors, former advisors)
 - their reactions, questions, suggestions will help you understand the strengths/weaknesses
 - ask them what they think of scope
 - ask what they think of your assumptions: reasonable? or might they be viewed as obstacle to practicality/scalability?
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 - knowing what senior people think reduces doubt which makes writing easier

Importance of preliminary work

- For proposals based on truly novel (untested) ideas:
 - it helps to have a publication that serves as initial evidence
 - unpublished preliminary work is valuable as it helps when writing technical sections — gives reviewers sense that you know (more than them!) what problems will arise and have reasonable solutions

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 - unpublished preliminary work is valuable as it helps when writing technical sections — gives reviewers sense that you know (more than them!) what problems will arise and have reasonable solutions
- Important to be several steps ahead of your reviewers
 - bit of “overthinking” is quite useful when writing grants!

Verified Compilers for a Multi-Language World

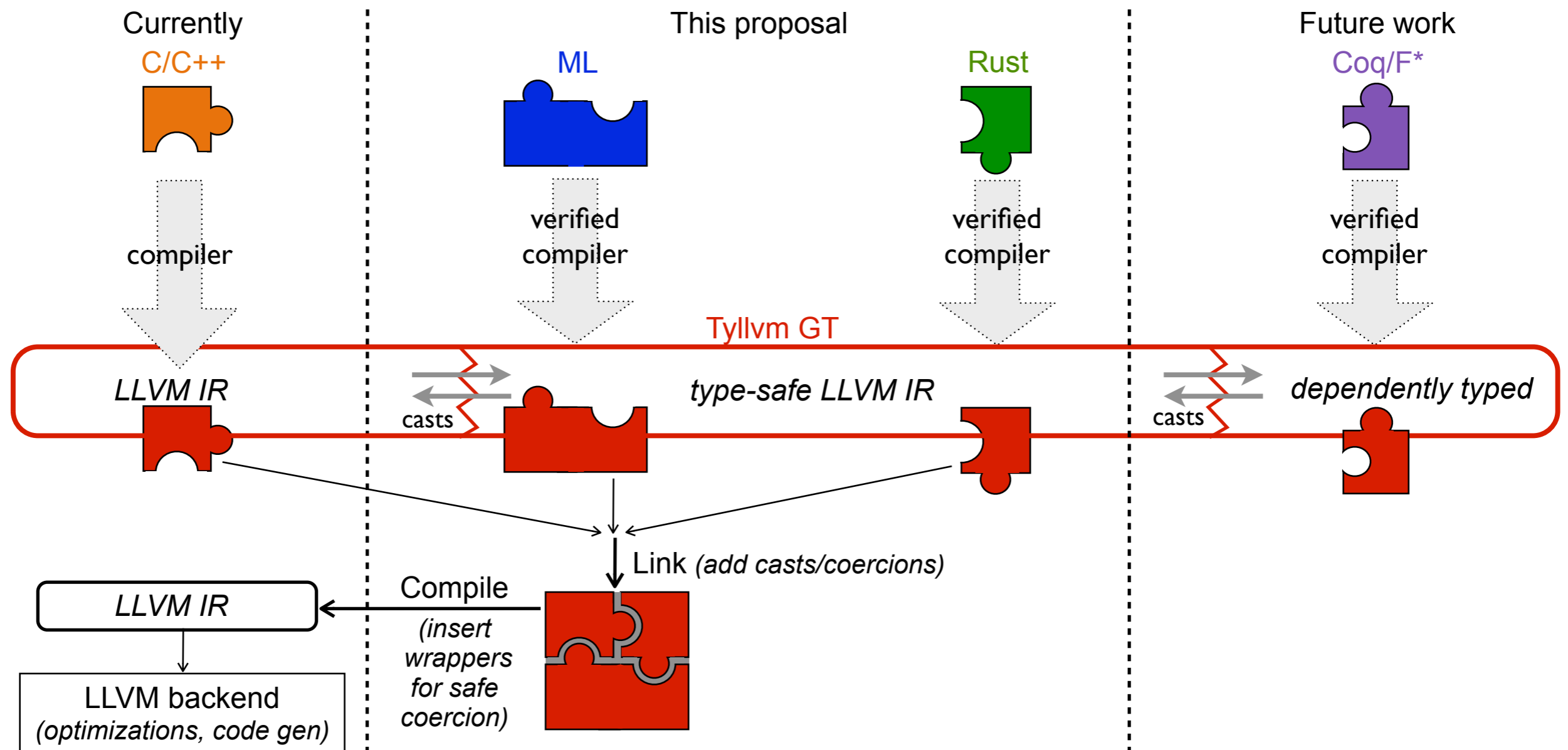


Figure 1: Research planned as part of this proposal and potential future work

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 - can you complement NSF funds with industry funding?
 - **acknowledge that proposal is ambitious!**

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- Two examples

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We present a timeline for our proposed work in Table 1. The PI realizes that the proposed work is substantial and the schedule overly ambitious for a single PI and student, but plans to augment the NSF funding with gifts from industry and work in collaboration with colleagues at Northeastern and Mozilla Research.

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- Picture on page 3 that visually presents key ideas and plans

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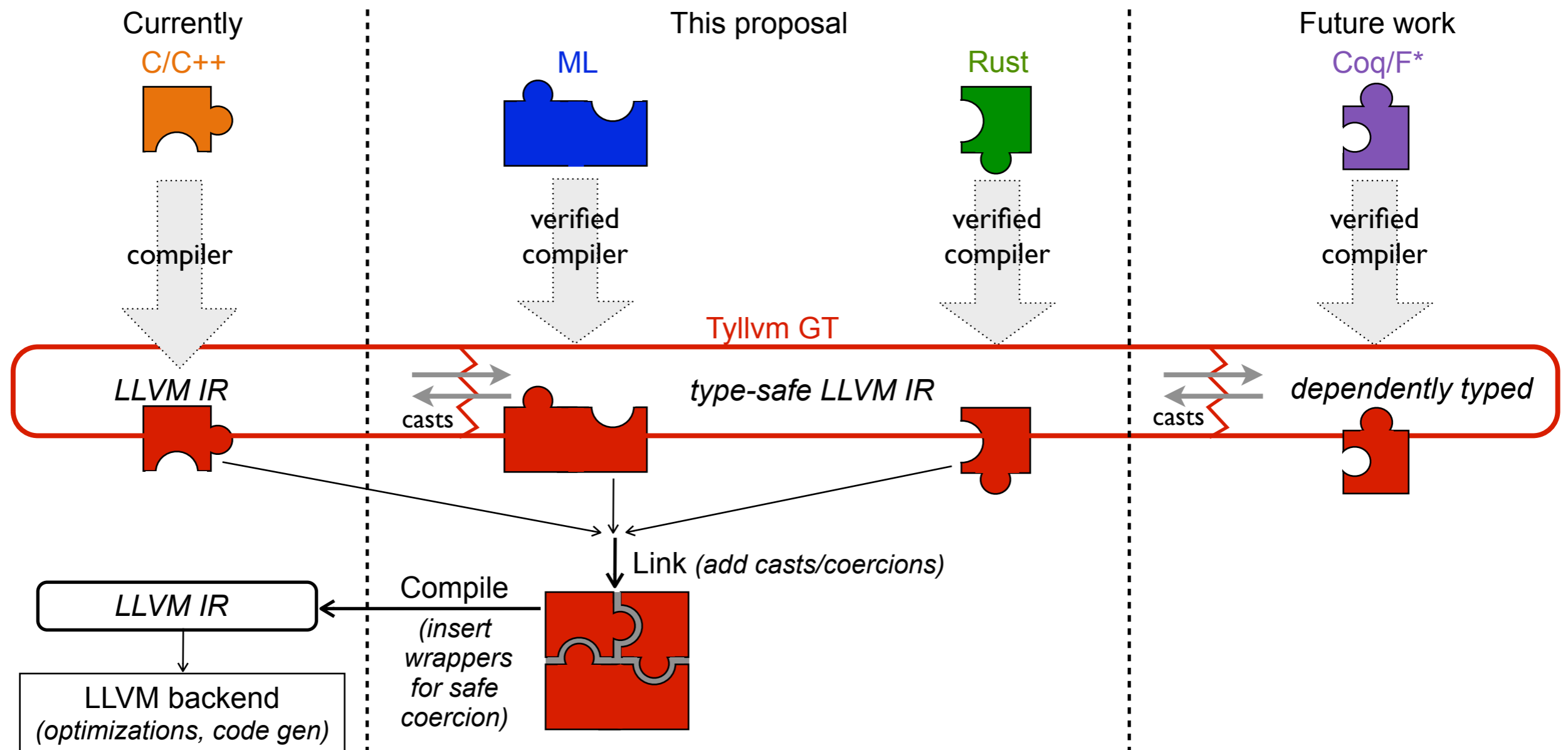


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 - explained problem, idea for solution, and why I'm proposing these particular pieces of work; gave institutional context, and summarized education and outreach plans
- Rest:
 - technical sections (7.5 pages)
 - education plan (2 pages)
 - schedule of proposed work (< 0.5 page)
 - previous work and accomplishments (< 0.5 page)
 - results from prior NSF support (0.5 page)
 - summary of broader impacts (< 0.5 page)

Education plan

- Why this education plan?
- Why you?

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Education plan

- Propose something you already have a track record in
 - otherwise start early, make connections, lay the groundwork
- Proposing new course: does your institution need it?
- Choose something you care about and want to do anyway
- Be specific about plans and how you'll measure outcomes

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- My education/outreach plan built on:
 - teaching at well-known PL summer school 3 years in a row
 - integrating 3 first-year undergrads into research
 - requests for book on proof method for program equivalence
 - need for grad course on “principles of compiler verification”

Timeline

- Lots of thinking, refining, pitching: mid-2012 to April 2014
 - developed picture
- 6 weeks before: write project summary
- 5 weeks before: picture for page 3, table with milestones
- 4 weeks before: get letters of collaboration
- Spent a lot of time on first section, later sections were quicker to write

Best advice I received...

- Why this research / education plan? Why you?
- Picture on page 3
- Think big. Think long-term.
 - CAREER can be an opportunity to step back and decide what you want to do in your career (beyond just the next few papers). Use the opportunity to bring the strands of your research together into something bigger, more coherent.