

Doing Business with DARPA

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Outline

DARPA Today

Personal Areas of Interest

- High Assurance Cyber Military Systems
 - Program synthesis
 - Domain-specific languages



A little about myself...

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Background:

Starting in graduate school, I have done basic research in a wide variety of programming language topics, with most of my career spent at AT&T Labs.



Disclaimer

This talk offers general guidance. Any statement in a BAA or other official document overrides anything I say here.



DARPA by Analogy

- A reasonable approximation of DARPA:
The management of DoD's corporate research laboratory
 - Annual budget of \$3B
 - Focused on DoD relevant technology
 - Think of the DoD as the largest enterprise in the USA
 - If an IT problem exists, the DoD probably suffers from it
 - Actual research gets outsourced to you!



Doing Business with DARPA

- **DARPA funds mission-focused research to**
 - Solve a DoD problem
 - Enable a new DoD capability
- **DARPA wants the best ideas from the best people fully devoted to the project**
- **Fund diverse collection of performers**
 - For profit
 - Non-profit
 - Foreign institutions (relatively rare)
- **Give us a realistic budget**



Funding Opportunities

- **Most DARPA work solicited via a Broad Agency Announcement (BAA)**
 - - Program-specific BAA
 - - Open Office BAA
- **Also Research Announcements (RAs)**
- **There are bureaucratic differences in RAs, BAAs and RFPs, but they all solicit proposals**
- **See <http://www.darpa.mil/cmo> for more details**



Program-Specific BAA

- DARPA management has identified an area in which DARPA would like to run a research program
- The BAA is the primary mechanism DARPA uses to solicit research proposals
- Typical: 45 day response period, but varies by BAA
- There's usually an optional, but highly recommended, Proposers' Day meeting, either before or after the BAA comes out.



Open Office BAA

- **DARPA has a funding mechanism available all the time**
- **Primarily for new study efforts**
 - You have a great idea that you want to explore
 - Relatively small (< \$1M), short (1 year)
 - Should have the potential to turn into a program if successful
- **You are encouraged to coordinate with DARPA before writing the proposal. You can talk to a PM or office director!**





Proposal Preparation

- **Format specified in the BAA, and varies by BAA**
 - You must follow it, or risk your proposal being deemed non-responsive and not technically evaluated
- **DARPA does not fund research for the sake of funding research**
 - Please do not try to do a lightweight “re-spin” of a failed proposal to another funding agency



Proposal Preparation

- **Emphasis on clarity of presentation:**
 - Reviewers will have a thick stack of proposals to rank
 - Have some people not involved in the writing give feedback on the proposal before it goes out
- **If you're teaming, the prime contractor will usually lead the proposal effort**





Proposed Options

- **Your proposal can include options (sometimes subsequent phases will technically be options)**
- **An option is just that: something the government can fund or not at its choice**
- **Options are good for both sides**
 - If a project is going well, DARPA might want to give it a plus up
 - Increases the contractual ceiling in general, so there may be room for other work under this funding vehicle
 - Much faster to modify an existing contract than generate a new one



Talking to DARPA



- **Early and often!**
 - We get excited when someone brings us a great idea
- **More freedom before the BAA is published**
 - After BAA publication, all Q/A or discussion is done as a public FAQ



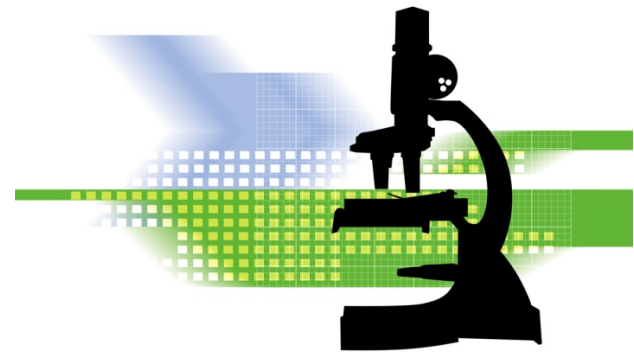


Typical Funding Types

6.1 – Basic Research

6.2 – Applied Research

6.3 – Advanced Development





Publication Restrictions



- **Sometimes DARPA requires publication pre-approval**
- **If that doesn't work for you, the key words to look for in the BAA are**
 - Contracted Fundamental Research
 - 6.1 money is usually Contracted Fundamental Research
- **Contracted Fundamental Research does not have any publication restrictions**
- **Universities get somewhat more liberal definition of CFR than research labs/industry**





Teaming

- **Some programs have wide-ranging objectives beyond the capability of any individual performer**
- **DARPA values academic, small business, and large contractors**
- **Be strategic:**
 - Make synergy explicit
 - Don't duplicate
 - Look for a good impedance match
- **Make sure it's a team you want to work with if you win**





Overall Process

- BAA published (or response to Open Office BAA encouraged)
- Proposal sent to DARPA
- Source selection
- DARPA sends out notifications, and paperwork for selectees to contracting agent
- Government contracting agent negotiates contract with prime contractor
- Contract signed; research begins
- Only the government contracting agent can authorize you to spend money!



Work at DARPA

- DARPA rotates people through PM roles, so is usually hiring
- Either via Intergovernmental Personnel Act (IPA) Mobility Program or as a Government Employee
- If you or someone you know is interested in serving their country and research community, please point them at me



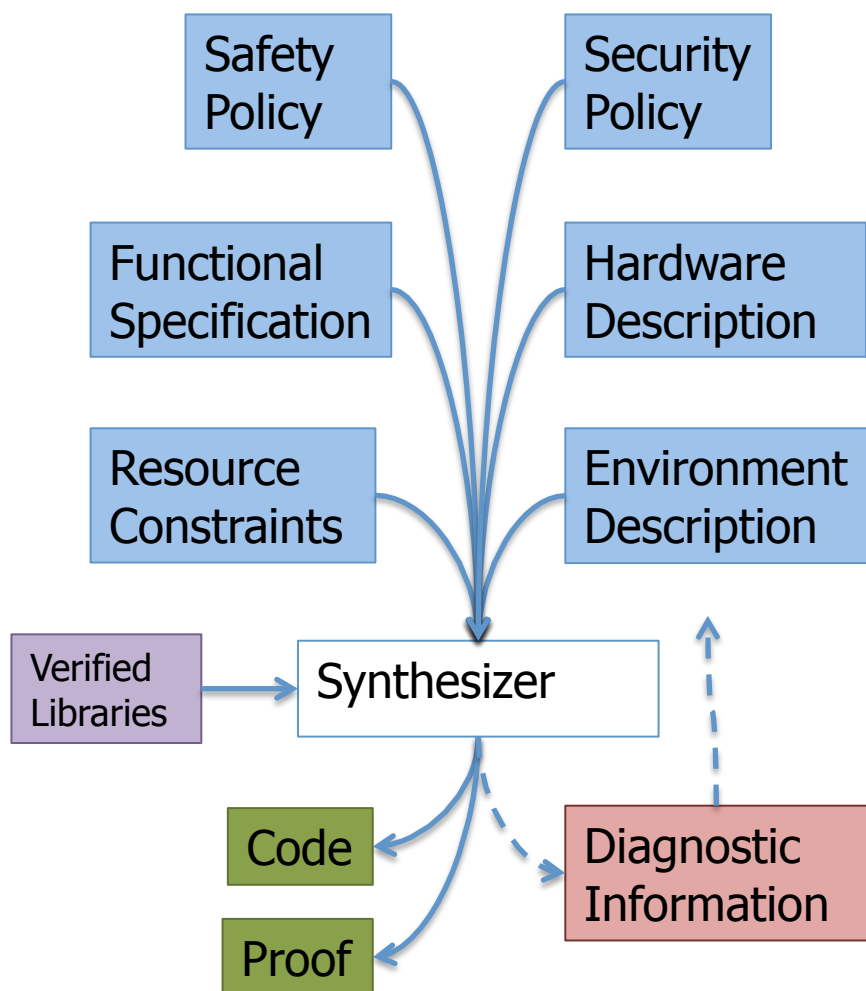
Personal Areas of Interest

Disclaimer: these are technical areas that I'm personally interested in.

Programs are announced only by the publication of the BAA.



Idea: Synthesize & Verify High-Assurance Systems



Proof: Generated executable

- implements functional specification,
 - satisfies safety and security policies, and
 - satisfies resource constraints
- when run
- on hardware satisfying the hardware description and
 - in an environment satisfying the environmental description.

"If software always worked as specified or intended by its makers, only a small subset would be vulnerable to attack, and defenses would be much easier to implement."

Felix Lindner, Reurity Labs, *CACM*, June 2006

High Assurance: Correctness, Safety, Security



High-Assurance Vehicle of the Future: Built from Synthesized Components

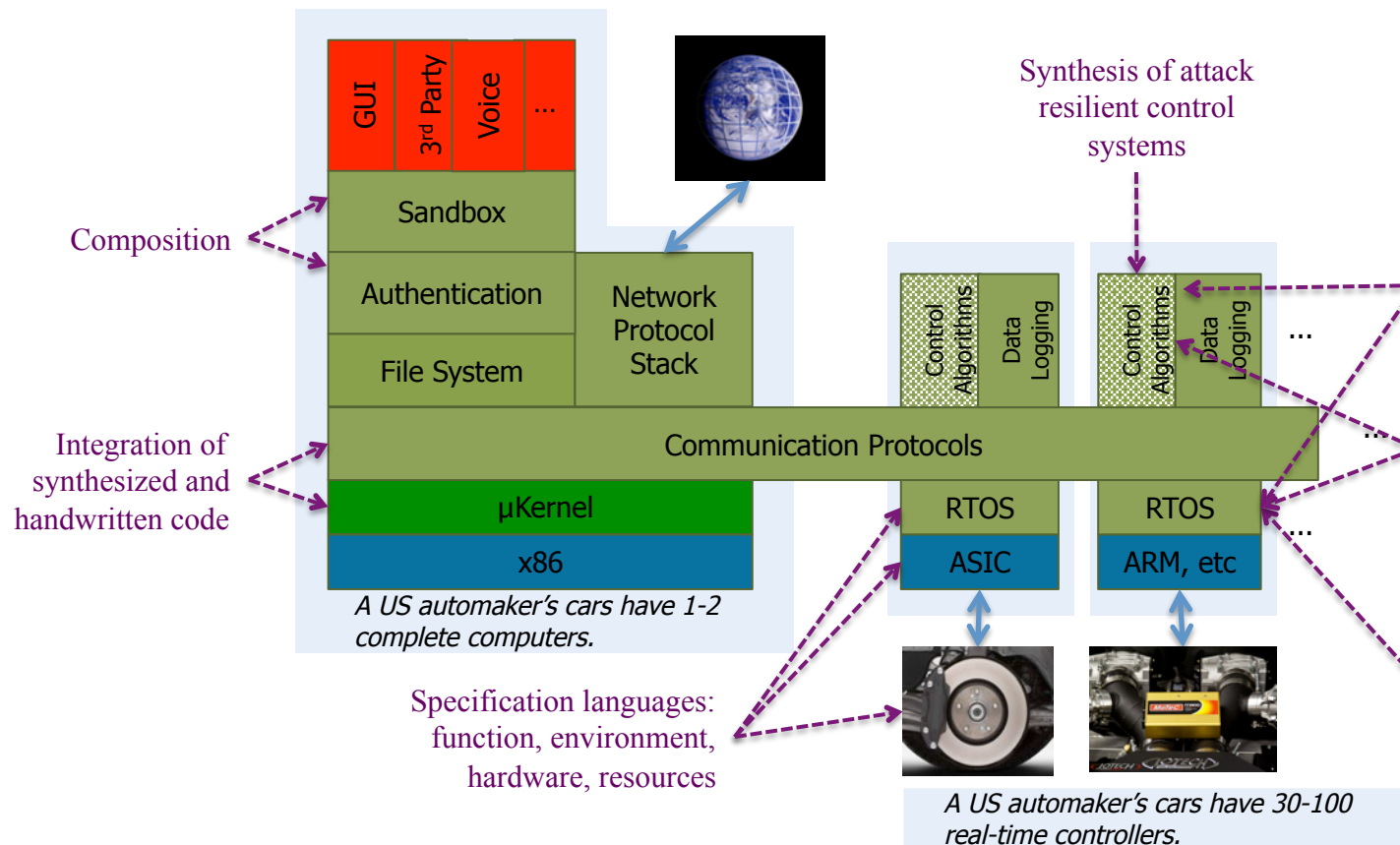
Research Challenges

Scaling
Proof engineering
Attack/fault response
V&V of complete system

Integration of
control systems and
operating systems

Managing time:
synchrony, asynchrony,
concurrency

Synthesis of
operating systems code
Specialization of reusable
components



Key:

Unassured modules
New assured modules
Existing assured modules
Hardware

Focus on vehicles, but techniques will apply to other domains.



Questions?



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