The Federal Research Enterprise
Goals

• Describe the Federal research enterprise
  – Program Managers
  – Agencies
  – Beyond Agencies

• Show how to spark or find relevant Federal research
  – Timeline for information gathering and inserting ideas

• Conversing with the program managers
  – Need to maintain some continuity in the reviewer base (most PIs complain that one year one panel says something and makes suggestions on improvements, but next year a completely different panel rejects the improvements and suggest an entirely different set of improvements);
  – Encourage junior faculty members, as well as PIs from "second tier" universities by conducting workshop etc.
The Agency

• Mission determines all else
  – Ensure health of US science and engineering
  – Be the source of technical surprise in defense
  – Ensure readiness of the future fleet
  – ....

• Scale, complexity and vista of projects
  – Range from 10K through multibillion
  – Range from 1 professor through several companies cooperating and competing
  – Range from 1 year through 50 years

• Project selection and management
  – Tight control by one person
  – Loose control in consultation
  – Selection and management by community

• Funding instruments
  – Grants: loose oversight, far future returns
  – Contracts: tight control, immediate to far future returns
  – Other instruments sometimes
Typical Agency Structure

- Director
- Comptroller
- Contracts Office
- Math
- Physics
- CS
- [Images and text indicating flow and roles within the agency structure]
Considerations Beyond the Agency

- **Department goals**
  - Deter war and protect the security of our country
  - Fast, safe, efficient, accessible and convenient transportation

- **Executive Branch goals**
  - American competitiveness
  - Security of the American people

- **Congressional goals**
  - Jobs, especially in district
  - Individual member issues
    - Safe bridges in Minnesota and across the nation
Funding Timeline

- **Projects start**
- **Selection**
- **Management**
- **Proposals due**
- **Office develops operating plan**
- **Appropriation or CR**
- **Agency develops operating plan**
- **Congressional Budget Hearings**
- **Agency budget justification to Congress**
- **OMB Passback**
- **Agency interacts with OMB**
- **Congression Passback**
- **Write RFP**
- **Planning by PM and Researchers**
Funding Timeline

<table>
<thead>
<tr>
<th>Year</th>
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<th>Q3</th>
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- **2009 Q1**: Projects start
- **2009 Q2**: Selection
- **2009 Q3**: Proposals due
- **2009 Q4**: Write RFP
- **2010 Q1**: Offices develop operating plans
- **2010 Q2**: Congressional Budget Hearings
- **2010 Q3**: Agency budget justification to Congress
- **2010 Q4**: OMB Passback
- **2011 Q1**: Agency develops operating plan
- **2011 Q2**: Appropriation or CR
- **2011 Q3**: Congressional Budget Hearings
- **2011 Q4**: Agency interacts with OMB
- **2012 Q1**: Selection
- **2012 Q2**: Projects start
Finding Relevant Research

• Emulate a researcher
  – Search science.gov, grants.gov
  – Read RFPs, BAAs, program announcements, etc.

• Search agency project reports
  – Nsf.gov: award search
  – DARPA: DarpaTech website
  – ....

• Talk to research program managers

• Participate in research planning at all phases
Example: National Science Foundation

- Mission: curate US science and engineering
- Organization: by scientific topic
- Researchers: Universities and SBIRs
- Project selection: by program director with advice from peer review
- Project types:
  - Typical: 100K/year grant for 3 years, basic research and education
  - Large: 1-3Million/year cooperative agreement, research with technology transfer and outreach
- For more information: nsf.gov
Example: Defense Advanced Research Projects Agency

- Mission: create and prevent technical surprise
- Organization: by defense need
- Researchers: Industry and universities
- Project selection: by program manager in consultation with agency director and FAR selection panels
- Project types: 6.1 and 6.2
  - Typical: 20M/year contracts to a collection of 5-10 research organizations, coordinated by program manager and agents
  - Seedling: 300K/year contract to a researcher
- For more information: darpa.mil (or fedbizops)
Classifying Defense R&D

• Basic research (6.1)
  – produces new knowledge in a scientific or technology area of interest to the military

• Applied research (6.2)
  – exploratory development of new technologies for specific military applications or further development of existing technology for new military applications

• Advanced technology development (6.3)
  – larger scale hardware development, integration, and experiments that can demonstrate capability in more operationally realistic settings

• Demonstration and validation (6.4)

• Engineering manufacturing development (6.5)

• Management support (6.6)

• Operational systems development (6.7)
Example: Air Force Research Laboratories

• Mission: warfighting technologies for aerospace
• Organization: By defense need
• Researchers: In house, industry and universities
• Project selection: by program directors in consultation with FAR selection panels
• Project types: 6.3, 6.2, some 6.1. Mostly contracts.
• http://www.wpafb.af.mil/AFRL/
Example: DOE Office of Science

- **Mission:** Discover solutions to energy and secure America’s future through research in the physical, environmental, and biological sciences
- **Organization:** by scientific topic
- **Project selection:** by program manager with advice from other Federal reviewers
- **Researchers:** National Laboratories, industry and universities
- **Project types:** Contracts, CRADAs and grants
- **For more information:** [http://www.er.doe.gov/](http://www.er.doe.gov/)
Researcher Role

• Think of research you need
  – Popular press, brainstorming

• Describe technology transfer opportunities
  – Find resources within your agency

• Find appropriate R&D agencies
  – Science.gov, grants.gov

• **Find and talk to the program managers**
  – Sell your tech transfer opportunities
  – Or become one

• Talk with other researchers, participate in workshops, consider all possible opportunities
Self-managing Software

• All these "camps"
  – (autonomic computing, organic computing, self-organizing systems, pervasive systems) all of which claim they're different from the others and they're not.
  – Danger: they don't talk enough to each other.
  – Additionally the problem is that a lot is ad hoc and one thing impinges on another. A lot of the stuff comes from the AI and systems view,…

• Not enough of a Software Engineering view and not enough formalism.
My Experience

See white papers and proposals...