The Federal Research Enterprise

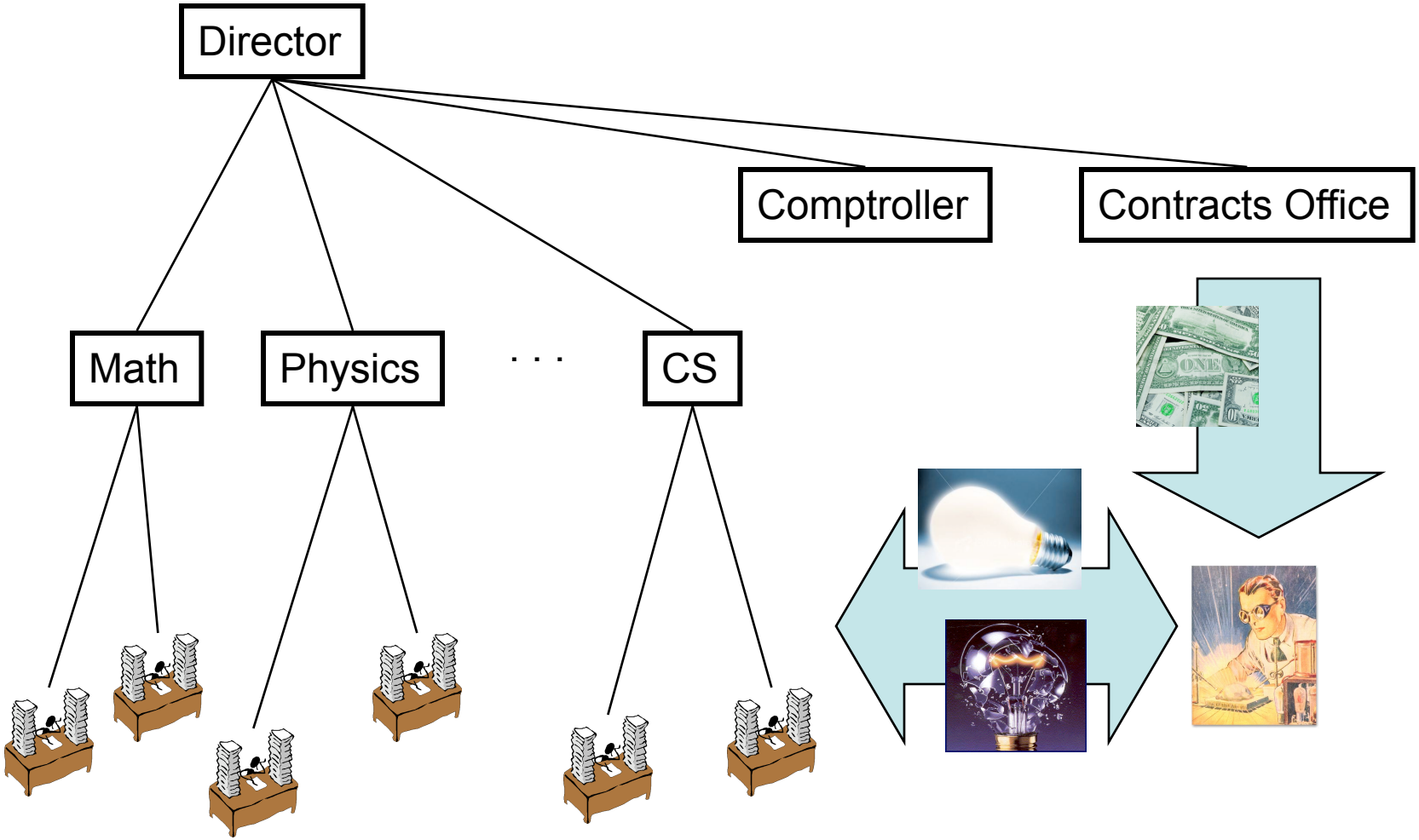
Goals

- 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 aintain 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

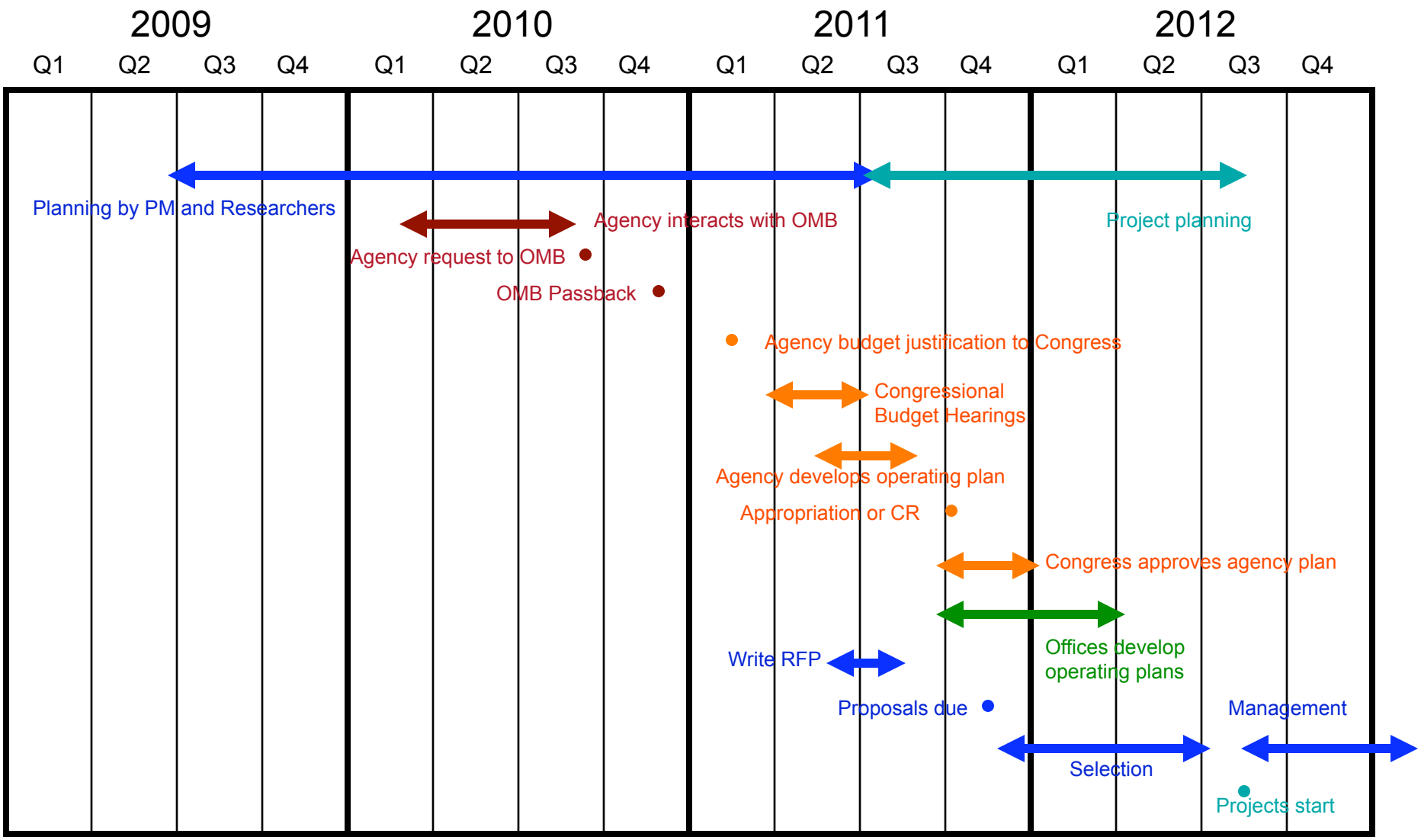
Typical Agency Structure



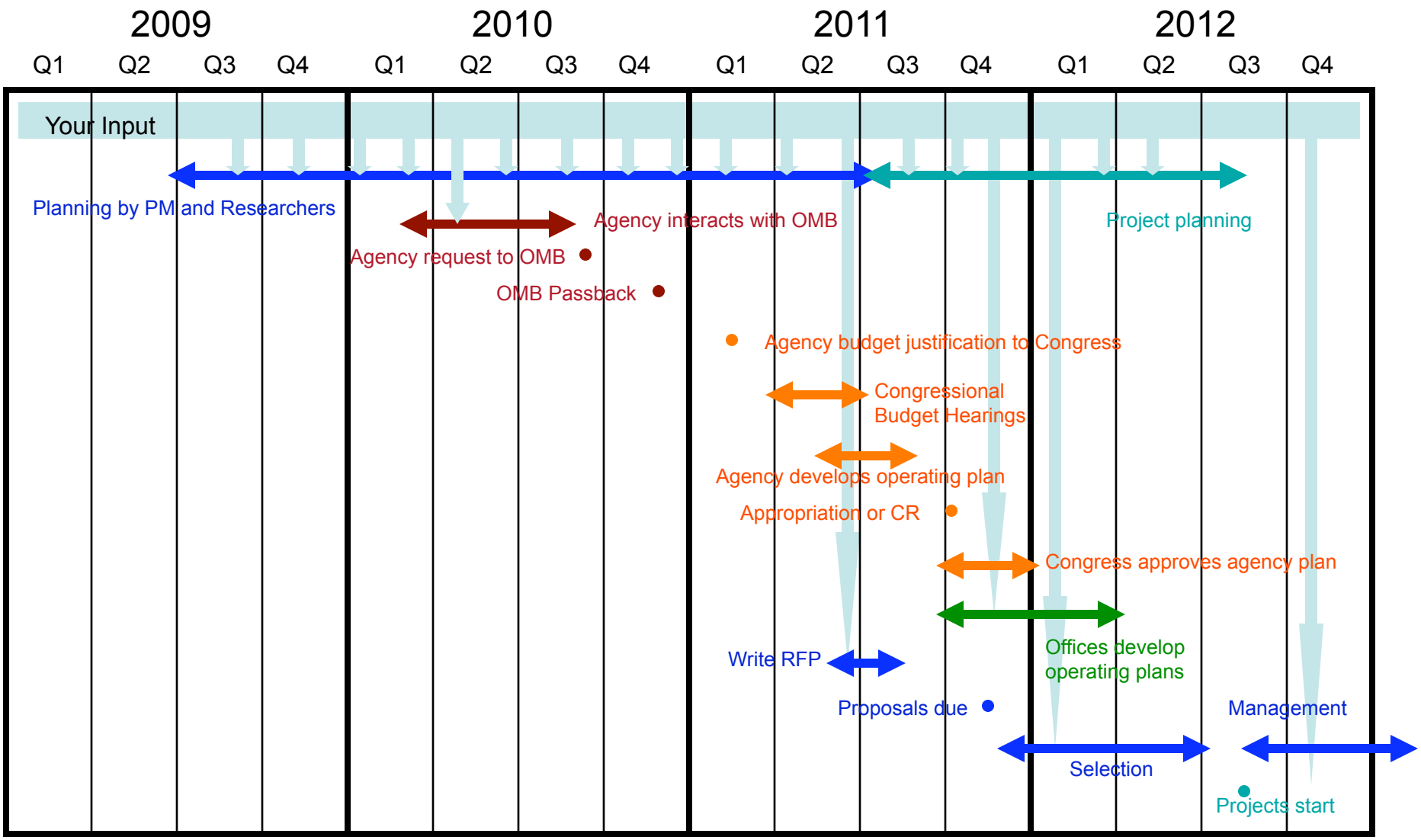
Considerations Beyond the Agency

- 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



Funding Timeline



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/

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...