

# **Research Funding and How to Get It**

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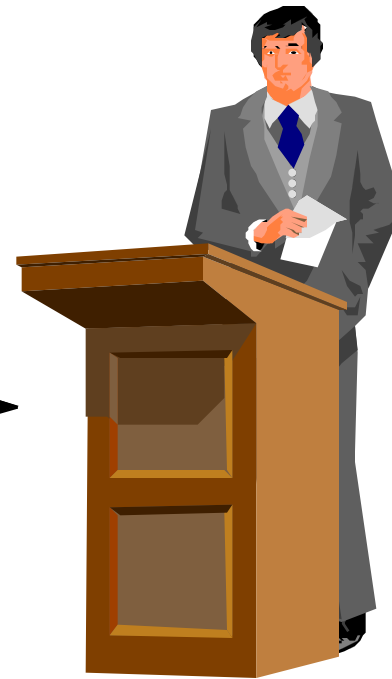
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# Agenda

- **Introduction**
- Funding Sources
- Writing a Proposal

# So Now You're a Professor! (at a research university)



*What happens next?*

# Why Research Funding?



Summer Salary

Research Students

Research Equipment

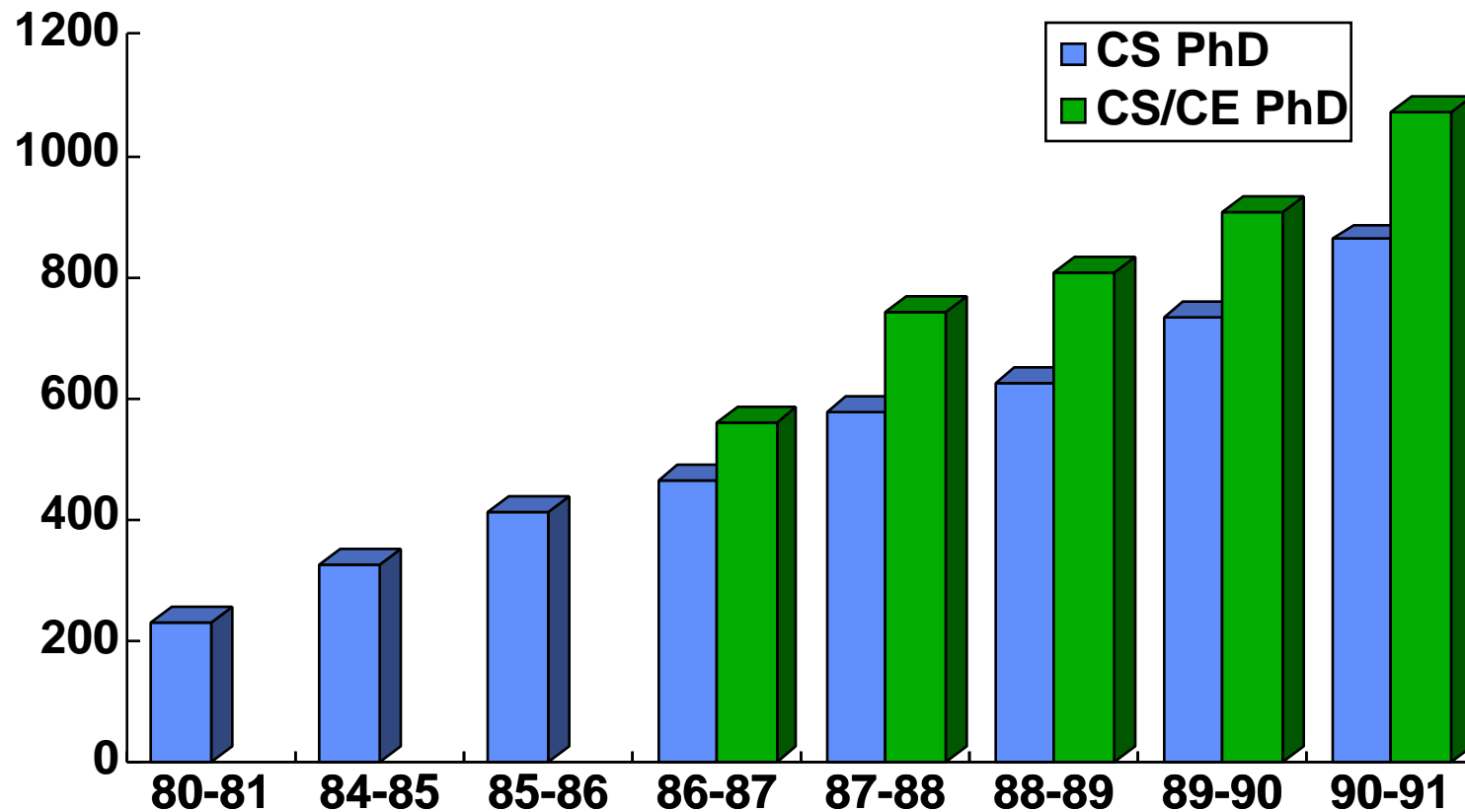
Secretarial Support

Travel

Research Career  
Success

*Some private universities  
require that part of your  
time is charged to research  
grants -- "Every ship on its  
own bottom."*

# Competition for Funding (New PhD Production)

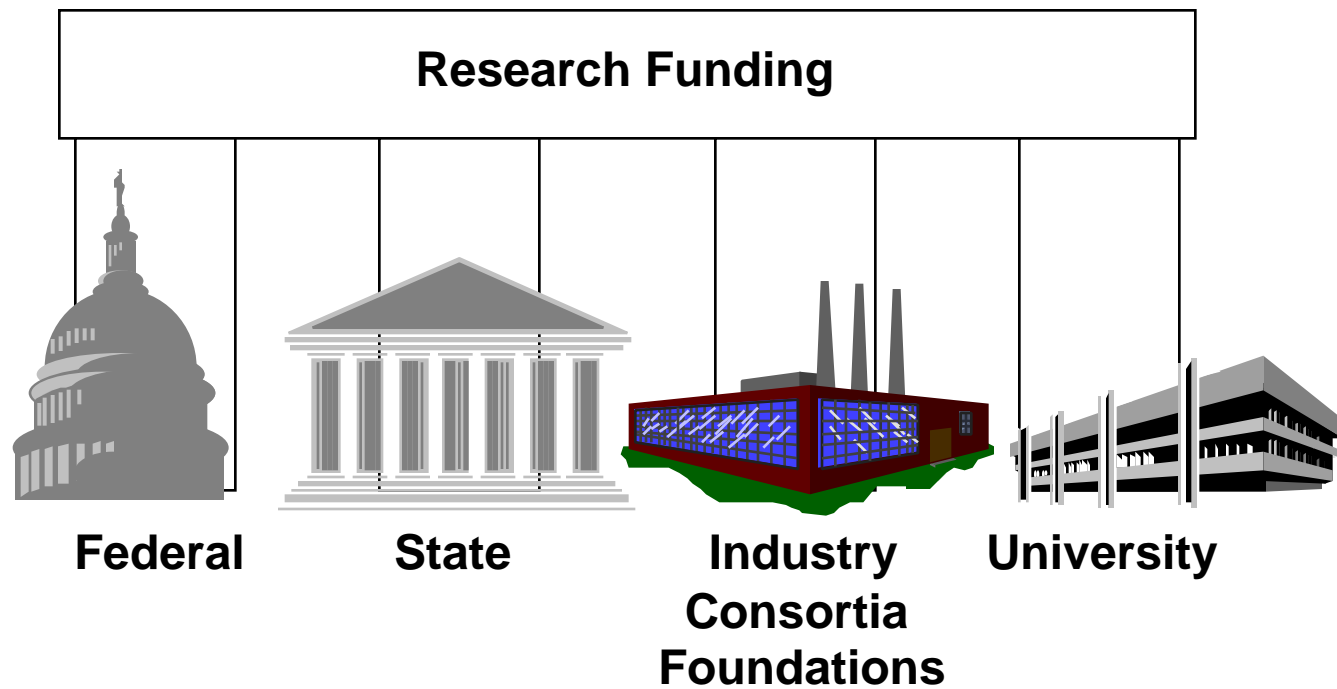


*Plus 2725 professors of computer science*

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# Four Pillars of Funding

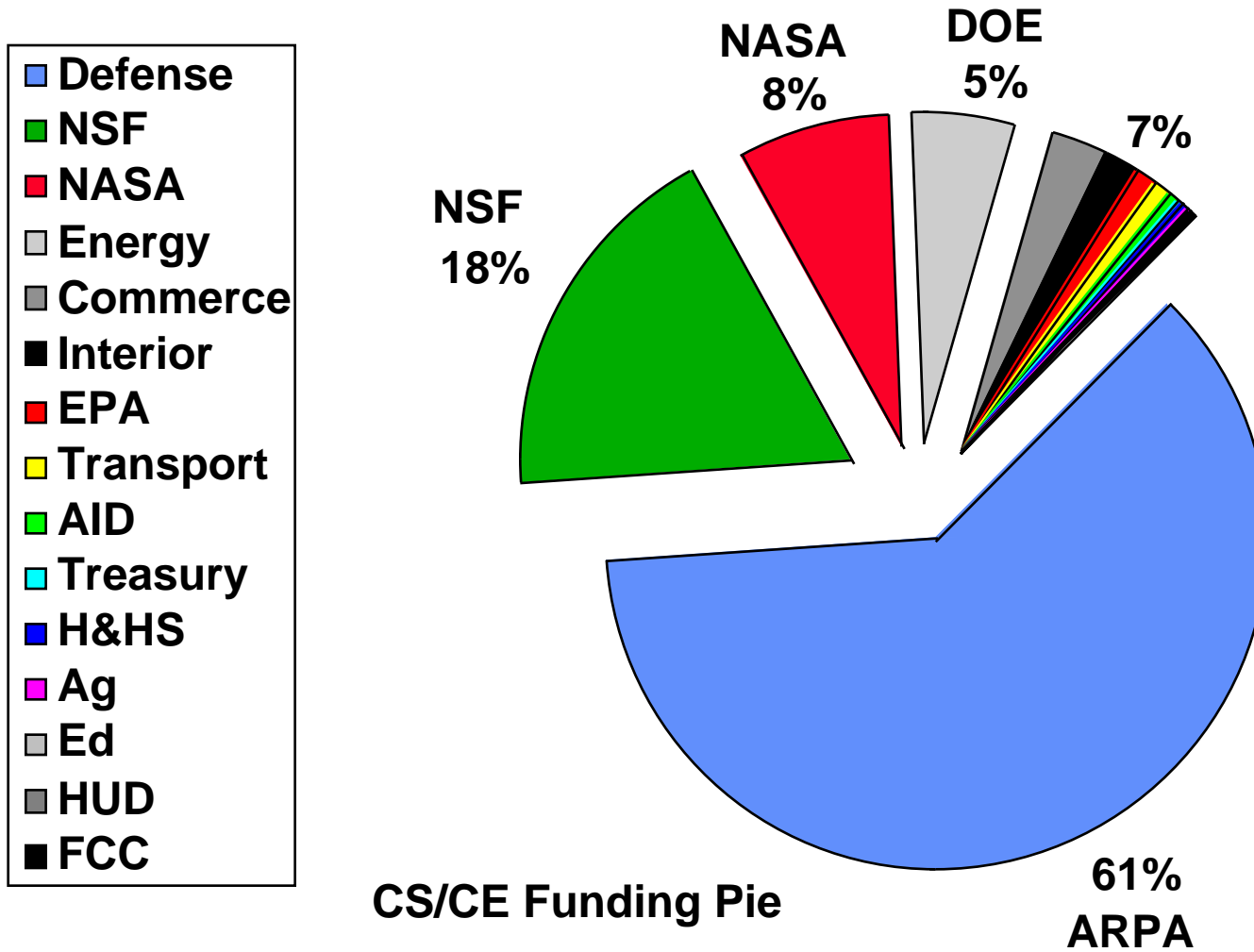


# **Federal Funding Agencies HPCC Funding Levels (FY95)**

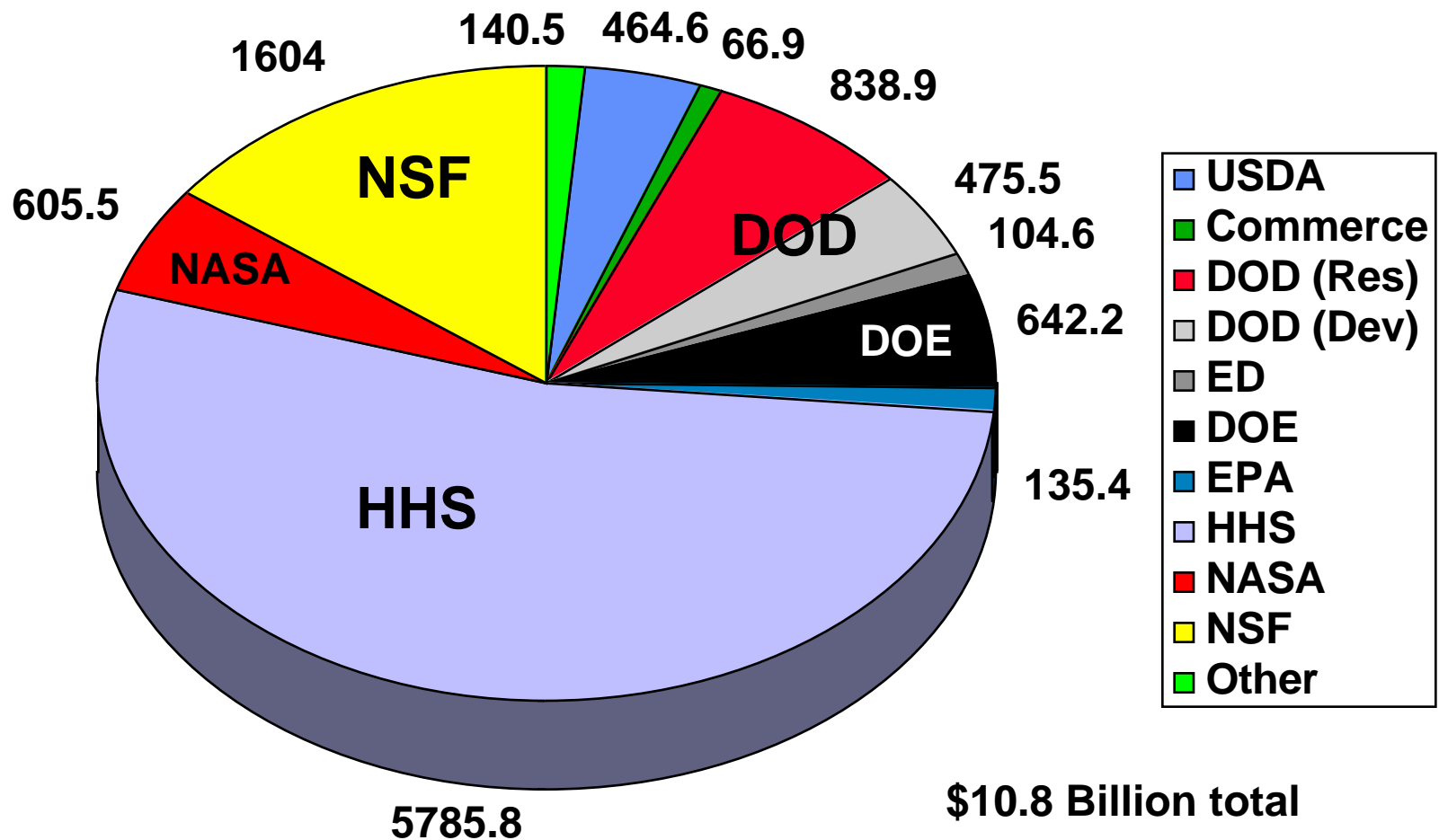
- **Department of Defense (\$357 Million)**
  - ARPA
  - ONR, ARO, AFSRO + numerous DoD labs
- **National Science Foundation (\$329 Million)**
  - Unsolicited proposals (Fall submission a good idea)
  - CDAs/PFFs
  - S&T and Engineering Research Centers
  - Institutional Infrastructure Grants
- **NASA (\$125 Million), DOE (\$125 Million)**
  - National Labs: LLNL, LBL, Los Alamos, Oak Ridge, ...
  - Ames, Langley, Greenbelt, ...
  - Most research performed “in-house”



# Research Funding for CS/CE by Federal Agency (1992)



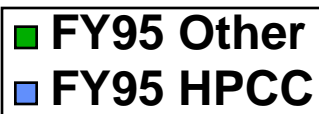
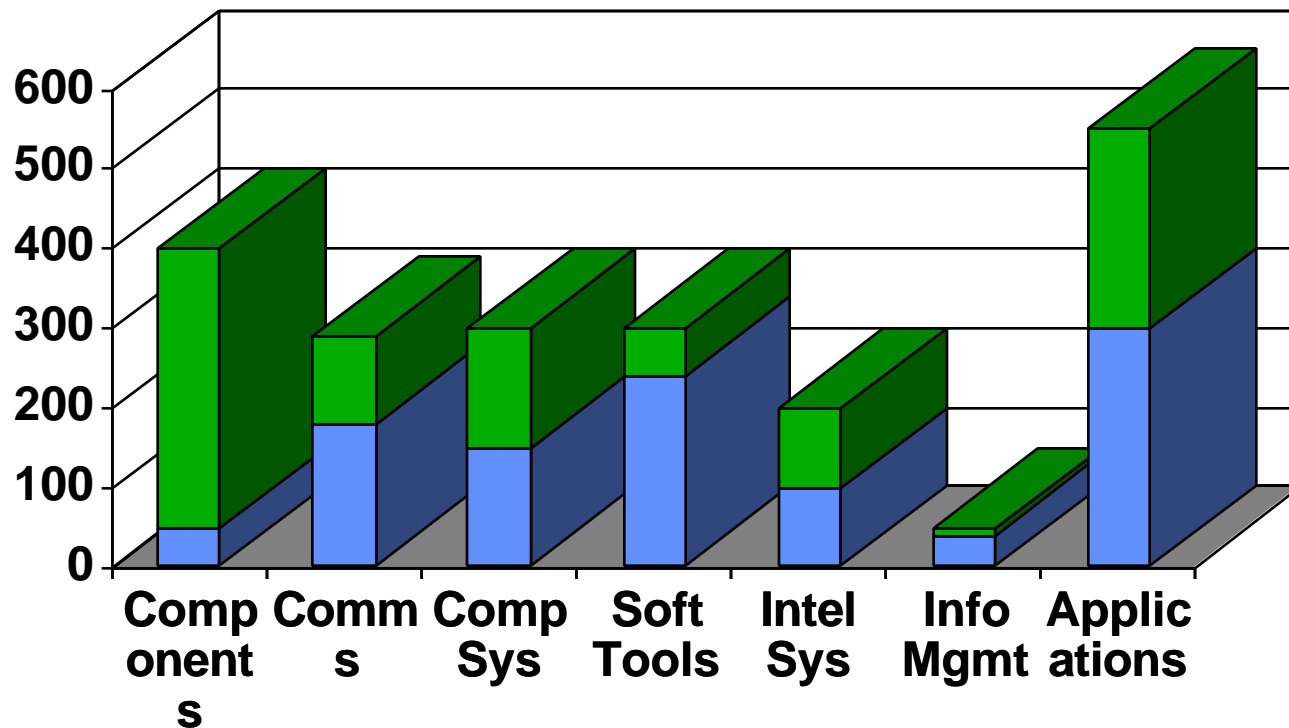
# Federal Funding to Universities by Agency (1992)



# Federal Funding Agencies

- **Mission-Oriented Agencies**
  - DOD, NASA, DOE
  - Requests for Proposals (RFP)/Broad Agency Announcements published in Commerce Business Daily
  - Targeted programs, e.g., HPCC
  - Internal review by government employees (contracts)
- **Unsolicited Proposals**
  - NSF
  - Peer review, extremely competitive (grants)
- **Special Programs**
  - Career Development Awards replace RIGs and NYIs
  - Presidential Faculty Fellows: 1-2 per campus
  - TRP/Defense Conversion

# Where the Money Is: FY95 Fed Funding Investment



# Strategic Focus Areas in Information and Communications

- High Confidence Systems
- High Performance Scalable Systems
- Global-Scale Information Infrastructures
- Virtual Environments
- User-Centered Interfaces and Tools
- Human Resources and Education

*approx. \$1.25 billion in HPCC funding, \$1.25 billion in other funds for FY 95*

# Federal Funding Agencies

- **Support for Interdisciplinary Research and Infrastructure**
  - Multi-investigator equipment grants
  - NSF Institutional Infrastructure Grants (e.g., Titan)
    - » 5 year funding for equipment and staff
  - Science and Technology Centers (often multi-campus)
    - » Data Storage Center at CMU
    - » Parallel Computation Center at Rice
    - » 5 year funding, industrial participation
  - Engineering Research Centers
    - » Utah, UNC, Cornell, Brown, ... Visualization Center
    - » Berkeley proposed “Center for Networked Multimedia”
    - » 10 years, industrial participation

# State

- **California MICRO Program (\$4 Million)**
  - Restricted to U. C. Faculty
  - State matches funding from industry
  - All funds are free of overhead (enormous leverage!)
  - Socialist program: everyone gets something
  - Also funds graduate fellowships
- **Other states have similar programs**
  - New York, Massachusetts, ...
- **State agencies like CalTrans, DWR, etc.**
- **Also programs for University/Laboratory collaboration, inter-campus collaborations**

# Industry, Consortia, Foundations

- **Industrial Research Support**
  - e.g., IBM research collaborations
  - Equipment support more likely than cash
  - Requires personal relationships with sponsors
  - Start developing these as soon as possible
- **Industrial Consortia**
  - SRC, Sematech, MCC
  - Channel industrial research funds to universities
  - RFP, Centers of Excellence
- **Foundations**
  - Sloan Foundation
  - MacArthur Foundation (Genius Awards)



# University

- **Start-up funds as part of your hiring package**
  - Summer support
  - Research student support
  - Equipment funds
  - A new assistant prof in chemistry might get \$500K!
- **Competative awards for summer support**
  - Tend to be reserved for new faculty
  - E.g., Wisconsin Alumni Research Fund (WARF)
- **Modest programs for travel and research equipment**

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# Writing a Proposal



**First, you need an idea!**

**Continuation of dissertation research?  
Completely new direction?  
New opportunities for collaboration?**

**Plan on writing proposal by end of first year**

**Scan CBD  
Visit Program Managers in DC  
Seek advice of colleagues  
Talk to Departmental Research Director**

## **Writing a Proposal (Heilmeier's Five Questions)**

- **What is the problem you are tackling?**
- **What is the current state-of-the-art?**
- **What is your key “make a difference” concept or technology?**
- **What have you already accomplished?**
- **What is your plan for success?**

***A 20 to 30 page document is the result  
(50 pages + for ARPA, but lots of boilerplate)***

# What Does a Program Manager Look For (My Ordering)?

- **Innovative ideas**
  - Intriguing ideas, well presented
  - Identifying a good problem is not enough
  - Feasible approach is critical, even if it doesn't pan out
- **Credibility/track record**
  - If you did it before, you can do it again
- **Responsiveness to mission goals (for ARPA)**
  - Must fit the BAA call for research
- **Technology transfer plan (for ARPA)**
  - Industrial involvement very important
  - Customer involvement is too

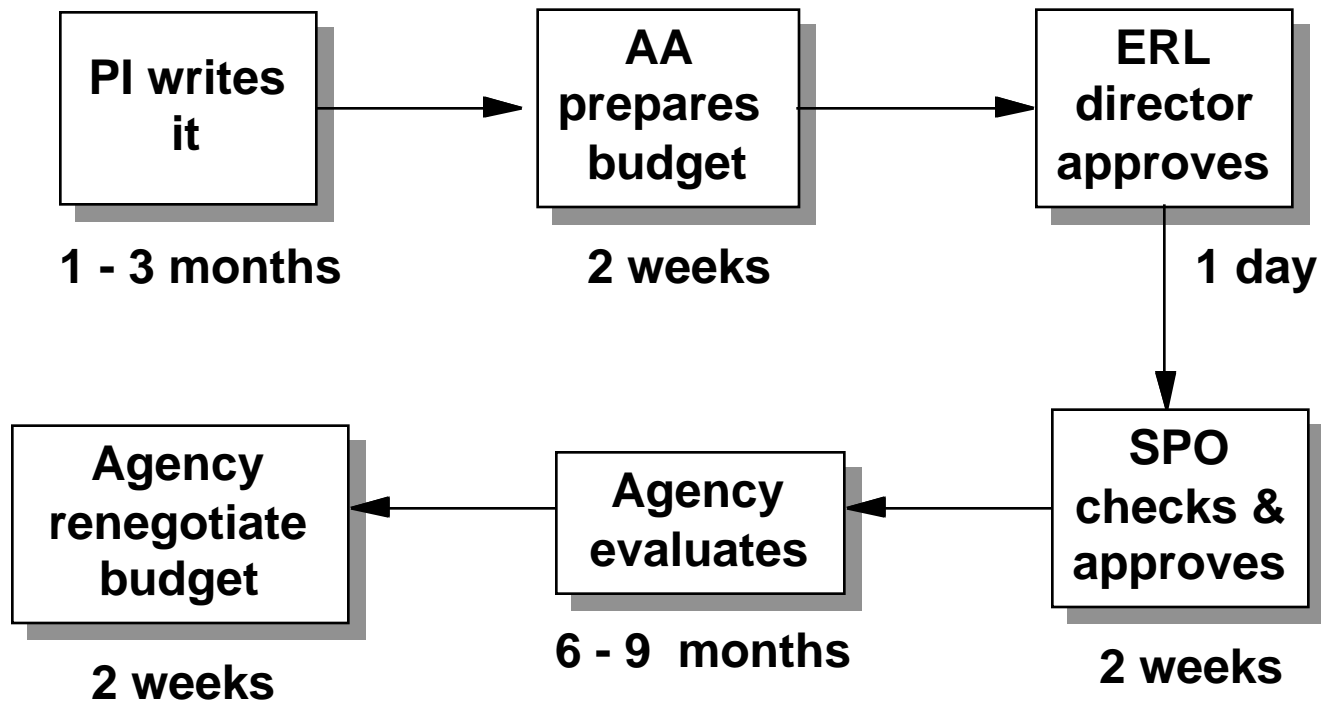
# Target the Agency

- You are where you are
- Find out the desired proposal format
- Technology transfer plans are important (ARPA)
- Don't be shy about your achievements
- But be kind to your references (NSF)
- Don't get discouraged ("try try again")
- Investigate NSF Career Development grants

# Budget

- **Direct charges vs. indirect charges**
- **Overhead rate at CAL: 49.5%**
- **Overhead items**
  - Salaries, travel, supplies & expenses
  - Summer salaries include benefits (2 vs. 3 months)
  - One student costs \$50-60K, one tech staff \$120K
- **Non-overhead items**
  - Permanent equipment
  - Student fee waiver, tuition waiver, health insurance
- **Program mgrs will cut your budget, but padding pisses them off!**

# Typical Proposal Timeline



*Start early: it really takes almost a year  
Increasing use of White Paper process*



# Funding Opportunities

- **HPCC (\$1.2 Billion in 95)**
  - Teraop goals in dispute
  - Information infrastructure is (was?) the rage
  - Next generation internetworking
  - Digital libraries and electronic commerce
- **What happens next?**
  - What follows HPCC as a federal initiative?
  - University's poor reputation in DC?
  - Applied research/industrial co-sponsorship on the way out?
  - More funding for NSF, reduced funding for ARPA?
  - DOE labs in competition with universities?