Research Funding
and
How to Get It

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Agenda

- Introduction
- Funding Sources
- Writing a Proposal
So Now You’re a Professor! (at a research university)

What happens next?
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
Agenda

- Introduction
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Four Pillars of Funding

- Federal
- State
- Industry Consortia
- Foundations
- University
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)

- Defense: 61%
- NSF: 18%
- NASA: 8%
- Energy: 5%
- Commerce: 7%
- Interior: 6%
- EPA: 5%
- Transport: 4%
- AID: 4%
- Treasury: 4%
- H&HS: 4%
- Ag: 4%
- Ed: 4%
- HUD: 4%
- FCC: 4%

CS/CE Funding Pie

- ARPA: 61%
- NASA: 8%
- DOE: 5%
- NSF: 18%
- Other agencies: 7%
Federal Funding to Universities by Agency (1992)

- NSF: 5785.8
- DOD: 1604
- NASA: 140.5
- DOE: 464.6
- HHS: 66.9
- USDA: 838.9
- Commerce: 475.5
- DOD (Res): 104.6
- DOD (Dev): 642.2
- ED: 135.4
- EPA: 140.5
- Other: 605.5

$10.8 Billion total
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!
- **Competitive 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

- PI writes it: 1 - 3 months
- AA prepares budget: 2 weeks
- ERL director approves: 1 day
- Agency renegotiates budget: 2 weeks
- Agency evaluates: 6 - 9 months
- SPO checks & approves: 2 weeks

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?