

NSF Directorate for Computer and Information Science and Engineering (CISE)

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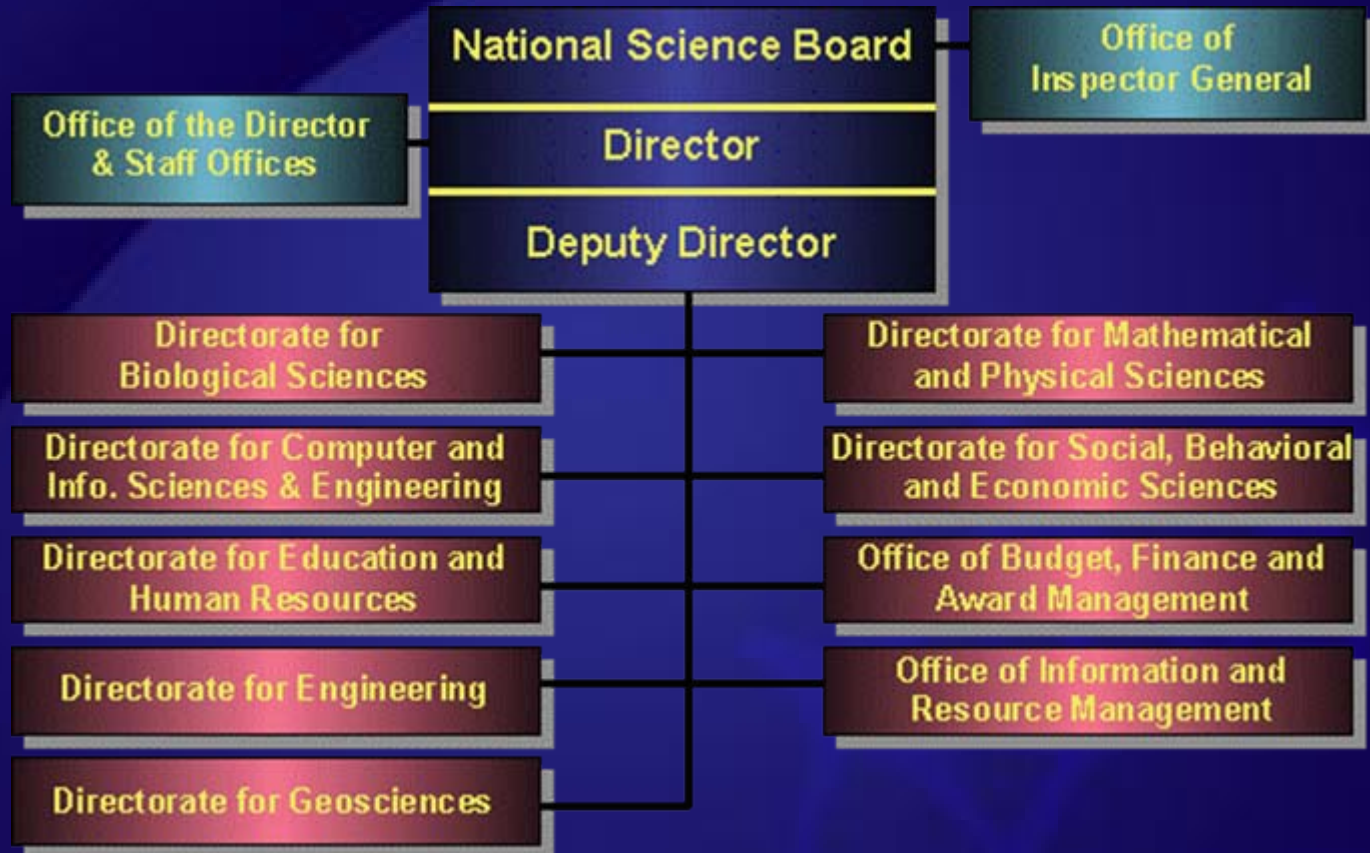


Outline

- Context
 - Mission, organization & strategic objectives
 - CISE 2004 & 2005 Reorganization
 - Divisions, Clusters, Programs
 - FY 2005 activities; FY 2006 plans
- Highlighted Emphasis Areas/Program
 - CAREER
 - Cybertrust
 - Science of Design
 - Broadening Participation
- GENI Initiative
- Awareness
- Pointers on proposal writing



National Science Foundation



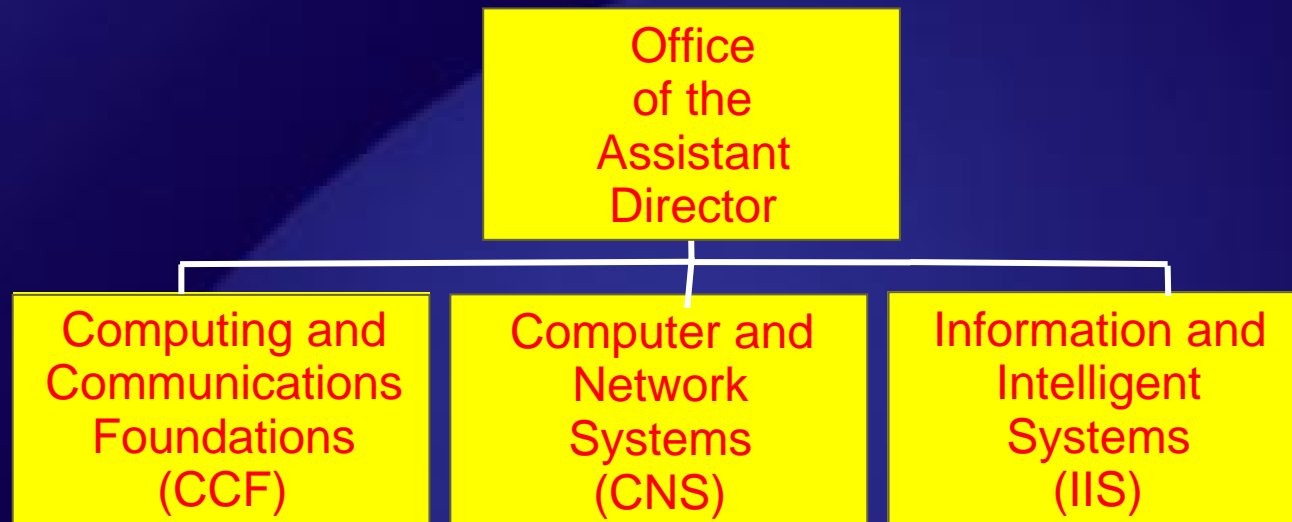


CISE Mission

- Uphold a position of world leadership in computing, communications and information science and engineering
- Promote the understanding of the principles and advance uses of computing, communications and information systems in service to society
- To contribute to universal, transparent and affordable participation in an information-based society



Current CISE Organization



Crosscutting Emphasis Areas



CISE Supported Areas

- Research
- Infrastructure
- Education in Computer Science
- Computer Engineering
- Information Science
- Networking
- Computation Science Disciplines



CISE Strategic Objectives

- Enhance research portfolio
 - Strengthen the core
- Broaden participation
- Improve organizational effectiveness



CISE 2004 and 2005

Reorganization: Drivers

- Scientific: changes to the field
 - The same organization from 1985 to 2003
- Administrative: proposal pressure
 - Up 125% from 1997 to 2003
 - vs. 16% for NSF as a whole
 - Up even more in FY 2004 and FY 2005
- Previously Cyberinfrastructure part of CISE
- Financial: end of ITR
 - How to invest those funds



CISE Reorganization: Goals

- Align divisions to reflect the field
- Group similar programs into *clusters*
 - Sharpen focus
 - Increase flexibility
 - Eventually increase grant size & duration
- Develop and support cross-cutting *emphasis areas*
- Integrate education and research
- Build on success of ITR



Key Concept: Clusters

- Comprehensive activity in a coherent area of research and education
- Team of Program Officers and staff working closely with the community
- Initially: group of existing programs
- One program solicitation per cluster



CISE Organization

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.



Clusters



Computer Systems Cluster

- Program Directors
 - Dr. Frederica Darema – High-Performance Software
 - Dr. Brett D. Fleisch – Distributed Systems & OS
 - Dr. D. Helen Gill - Embedded and Hybrid Systems
 - Dr. Carl Landwehr - Trusted Computing
- My Current Activities
 - Distributed Systems and Operating Systems Proposals
 - Preparation of Solicitation for Cluster
 - Community Outreach Activities
 - Continuing Grant Oversight
 - Workshop and Conference Outreach
 - Career Proposal Management



Computing and Communication Foundations (CCF)

- Theoretical Foundations
 - Computer science theory; numerical computing; computational algebra and geometry; signal processing and communications
- Foundations of Computing Processes and Artifacts
 - Software engineering; software tools for HPC; programming languages; compilers; computer architecture; graphics and visualization
- Emerging Models for Technology and Computation
 - Computational biology; quantum computing; nano-scale computing; biologically inspired computing



CCF Competitions

- FY 2004
 - Responsible for about 2030 proposals
 - Heavy mortgages and commitments
 - Success rates: CAREER 15%, cluster programs 5%
- FY 2005 and FY 2006
 - CAREER competition both years
 - Formal and Mathematical Foundations and Emerging Models for Technology and Computation: November 2004 but no announced competition in FY 2006
 - Foundations of Computing Processes and Artifacts: May 2005 with funds from FY 2006 budget
- FY 2007: Fall deadlines for all three clusters



Computer and Network Systems (CNS)

- Computer Systems
 - Distributed systems; embedded and hybrid systems; Next Generation system
- Network Systems
 - General networking; wireless systems; sensor networks
- Computing Research Infrastructure
 - Research infrastructure; minority institutional infrastructure; research resources
- Education and Workforce
 - Curriculum development/educational innovation; IT workforce; special projects; cross-directorate activities (e.g., REU sites)



CNS Competitions

- FY 2004
 - Responsible for about 2035 proposals
 - Success rates: CAREER & Infrastructure 16%, others 10-15%
- FY 2006 — One solicitation per cluster
 - CAREER: July deadline as usual
 - Computer systems: November 2004
 - Network systems: January 2005
 - Computing Research Infrastructure: late August deadline
 - Education and Workforce: January 2005
 - Broadening Participation: April 2006



CSR Cluster Competition

Program Directors

- Dr. Frederica Darema
 - High-Performance Software
- Dr. Brett D. Fleisch –
 - Distributed Systems & Operating Systems
- Dr. D. Helen Gill
 - Embedded and Hybrid Systems
- Dr. Carl Landwehr -
 - Trusted Computing



FY 2005 CSR Program Results

Panel Recommendation Results

Category	Results	%
Highly Competitive	68	16%
Competitive	191	45%
Not Competitive	167	39%
Total Reviewed	426	100%

Total Requests

Category	Millions	%
Highly Competitive	51	21%
Competitive	86	36%
Not Competitive	100.8	42%
Total Reviewed	237.65	100%



Information and Intelligent Systems (IIS)

- Systems in Context
 - Human computer interaction; educational technology; robotics; computer-supported cooperative work; digital government
- Understanding, Inference, and Data
 - Databases; artificial intelligence; text, image, speech, and video analysis; information retrieval; knowledge systems
- Science & Engineering Informatics/Information Integration
 - Bioinformatics; geoinformatics; cognitive neuroscience;
...



IIS Competitions

- FY 2004
 - Responsible for about 2590 proposals
 - Success rates: CAREER 17%, regular 5%
- FY 2005
 - Raise acceptance rate of 2004 to 12-15%
 - CAREER in July as normal
 - Science & Engineering Informatics/Information Integration and Universal Access: December 2004
 - Data, Inference, and Understanding and Systems in Context: May 2005 with most funding from FY 2006
- FY 2006: Same deadlines as in FY 2005



CAREER Program

- Foundation-wide activity that offers the National Science Foundation's most prestigious awards for new faculty
- NSF supports the early career development activities of those faculty members who are most likely to become the academic leaders of the 21st century.
- CAREER awards have a 5-year duration
- In FY'05, the minimum CAREER award (including indirect costs) is \$400,000 for all NSF directorates

Cross Cutting Emphasis Areas





Cross-Cutting Emphasis Areas

- Characteristics
 - cuts across clusters and divisions
 - addresses scientific or national priority
 - has a program solicitation and funds
- FY05 Emphasis Areas: Cyber Trust, Science of Design, Information Integration, DDDAS: Dynamic Data Driven Application Systems
- FY 2006 Emphasis Areas
 - Cyber Trust: February 6 2006
 - Science of Design: Waiting for New Solicitation
 - Information Integration: December 2005
 - Broadening Participation: April 06

Cyber Trust





CyberTrust Theme

- Vision: A society in which
 - Computing systems operate securely and reliably
 - Computing systems protect sensitive information
 - Systems are developed and operated by a well-trained and diverse workforce
- Research on foundations, network security, systems software, and information systems
- Integrated education and workforce activities



Solicitation Information

- CyberTrust Solicitation
 - <http://www.cise.nsf.gov>

Science of Design





Science of Design

- Considers formal theories and computational methods for the representation, synthesis, and evaluation of designs and requirements;
- design processes supporting compositionality, maintainability, adaptability and evolution;
- the role of requirements and specifications in design;
- computer-aided design for software-intensive systems;
- studies of designs, designers and design methodologies;
- development of design education and the integration of knowledge about design methodologies into educational curriculum and training for computer scientists, software engineers and systems engineers.



Solicitation Information

- Information about the 2nd Science of Design solicitation will appear in September on the CISE web page

- This year's competition will be significantly different than last years:
 - It will encourage team projects to bring new thinking and people into the effort
 - It will lay a fundamental basis for the creation of software-intensive systems

- An informational meeting for potential PI's is being planned for late September/early October

Broadening Participation in Computing Program





BPC Program

- The Broadening Participation in Computing (BPC) program aims to significantly increase the number of students who are U.S. citizens and permanent residents receiving post secondary degrees in the computing disciplines.
 - Full Proposal: April 5, 2006
 - Check CISE web site concerning which proposals require a Letter of Intent and when it is due



BPC Program

- Initial Emphasis will be on students from communities with longstanding underrepresentation in computing:
 - Women, persons with disabilities, and
 - Minorities: African Americans, Hispanics, American Indians, Alaska Natives, Native Hawaiians, and Pacific Islanders.
- Develop and implement innovative methods to improve recruitment and retention of these students at the undergraduate and graduate levels
- Develop effective strategies for identifying and supporting members of the targeted groups who want to pursue academic careers in computing.
- While these efforts focus on underrepresented groups
 - it is expected that the resulting types of interventions will improve research and education opportunities for *all* students in computing



BPC Program Components

- Alliances
 - Comprehensive programs that address under-representation in the computing disciplines
 - Join academic institutions of higher learning with secondary schools, government, industry, professional societies, and other not-for-profit organizations
- Demonstration Projects
 - Demonstration Projects (DPs) are smaller in scope and narrower in focus than Alliance projects.
 - DPs will be pilots that could be incorporated into the activities of an Alliance
- Supplements

GENI Initiative





GENI Initiative

- New Initiative called Global Environment for Networking Investigations or GENI
 - Explore new networking capabilities that will advance science and stimulate innovation and economic growth.
 - Advance significantly the capabilities provided by networking and distributed system architectures.
 - Intended to catalyze a broad community effort that will engage other agencies, other countries, and corporate entities.
 - GENI comprises two components:
 - 1) the GENI Research Program and
 - 2) the experimental GENI Facility



GENI Initiative

- The GENI Initiative envisions the creation of new networking and distributed system architectures that, for example:
 - Build in security and robustness;
 - Enable the vision of pervasive computing and bridge the gap between the physical and virtual worlds by including mobile, wireless and sensor networks;
 - Enable control and management of other critical infrastructures;
 - Include ease of operation and usability; and
 - Enable new classes of societal-level services and applications.



GENI Initiative (1)

- The GENI Initiative will support research, design, and development of new networking and distributed systems capabilities by:
 - **Creating new core functionality:** Going beyond existing paradigms of datagram, packet and circuit switching; designing new naming, addressing, and overall identity architectures, and new paradigms of network management;
 - **Developing enhanced capabilities:** Building security into the architecture; designing for high availability; balancing privacy and accountability



GENI Initiative (2)

- **Deploying and validating new architectures:** Designing new architectures that incorporate emerging technologies (e.g., new wireless and optical technologies) and new computing paradigms enabled by pervasive devices;
- **Building higher-level service abstractions:** Using, for example, information objects, location-based services, and identity frameworks;
- **Building new services and applications:** Making large-scale distributed applications secure, robust and manageable; developing principles and patterns for distributed applications; and
- **Developing new network architecture theories:** Investigating network complexity, scalability, and economic incentives.



Outreach

- In planning for GENI CISE has supported numerous community workshops
- CISE is supporting on-going planning efforts, including needs assessment and requirements for the GENI Facility.
- CISE will hold town meetings and continue to support future workshops to broaden community participation.
- CISE will work with industry, other US agencies, and international groups to broaden participation in GENI beyond NSF and the US government.



Resources at your Disposal

- “Keeping Aware” Resources
- Proposal Preparation
- Grant Management



Resources at your Disposal Keeping Aware

- Funding Opportunities Calendar at NSF
- Guide to Programs/Browsing of Funding Opportunities at NSF Web site
- Funding Search Engine
- Upcoming Due dates



Proposal Preparation

- Grant Proposal Guide
- Frequently Ask Questions
- Regional Grants Conferences



Award Management

- Grant Policy Manual
- Grant General Questions
- Cooperative Agreements
Conditions
- Federal Demonstration Project
- NSF Policy Office Website

Observations on Proposal Preparation



NSF Merit Review Process





NSF Merit Review Criteria

Criteria include:

- **What is the intellectual merit and quality of the proposed activity?**
- **What are the broader impacts of the proposed activity?**



What is the intellectual merit of the proposed activity?

Potential Considerations:

- How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields?
- How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, reviewers will comment on the quality of prior work)
- How creative and original are the concepts?
- How well conceived and organized is the proposed activity?
- Is there sufficient access to resources?



What are the broader impacts of the proposed activity?

Potential Considerations:

- How well does the activity advance discovery and understanding while promoting teaching, training and learning?
- How well does the activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?
- To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks and partnerships?
- Will the results be disseminated broadly to enhance scientific and technological understanding?
- What may be the benefits of the proposed activity to society?



Seven Deadly Sins of Proposal Writing

1. Fail to focus on the problems and payoffs
2. No persuasive structure
3. No clear differentiation: competitive analysis
4. Fail to offer a compelling value proposition: potential impact
5. Key points are buried: no highlights, no impact
6. Difficult to read: full of jargon, too long, too technical
7. Credibility killers: misspellings, grammatical errors, wrong client name, and inconsistent formats



Ingredients for a Good Proposal

Educate the reviewers and the Program Director

- What problem(s) does your work address?
- Why is this problem important?
- What will you do to contribute to a solution?
- What unique ideas/approaches do you have? Put in context
- Why are you the best person to do this work?
- How will you evaluate your results?
 - How will we know if you were successful or if you failed?
- How will you assure that the work has an impact?



Thank You



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visit the NSF web site at:
www.nsf.gov