



OREGON STATE
UNIVERSITY



NSF Network for Earthquake Engineering Simulation Grand Challenge

Solomon Yim

8 AUG 2003

Integrated Tsunami Scenario Simulations Workshop

Oregon State University

Excerpt from

The NEESR Solicitation --- a look at this new program in Civil and Mechanical Systems at NSF

First Annual NEES Consortium Meeting

Park City, Utah

21-22 May 2003

(with approval from)

Steven L. McCabe Ph.D., P.E.

NSF Program Director

Structural Systems and Hazards Mitigation

Division of Civil and Mechanical Systems

Directorate for Engineering

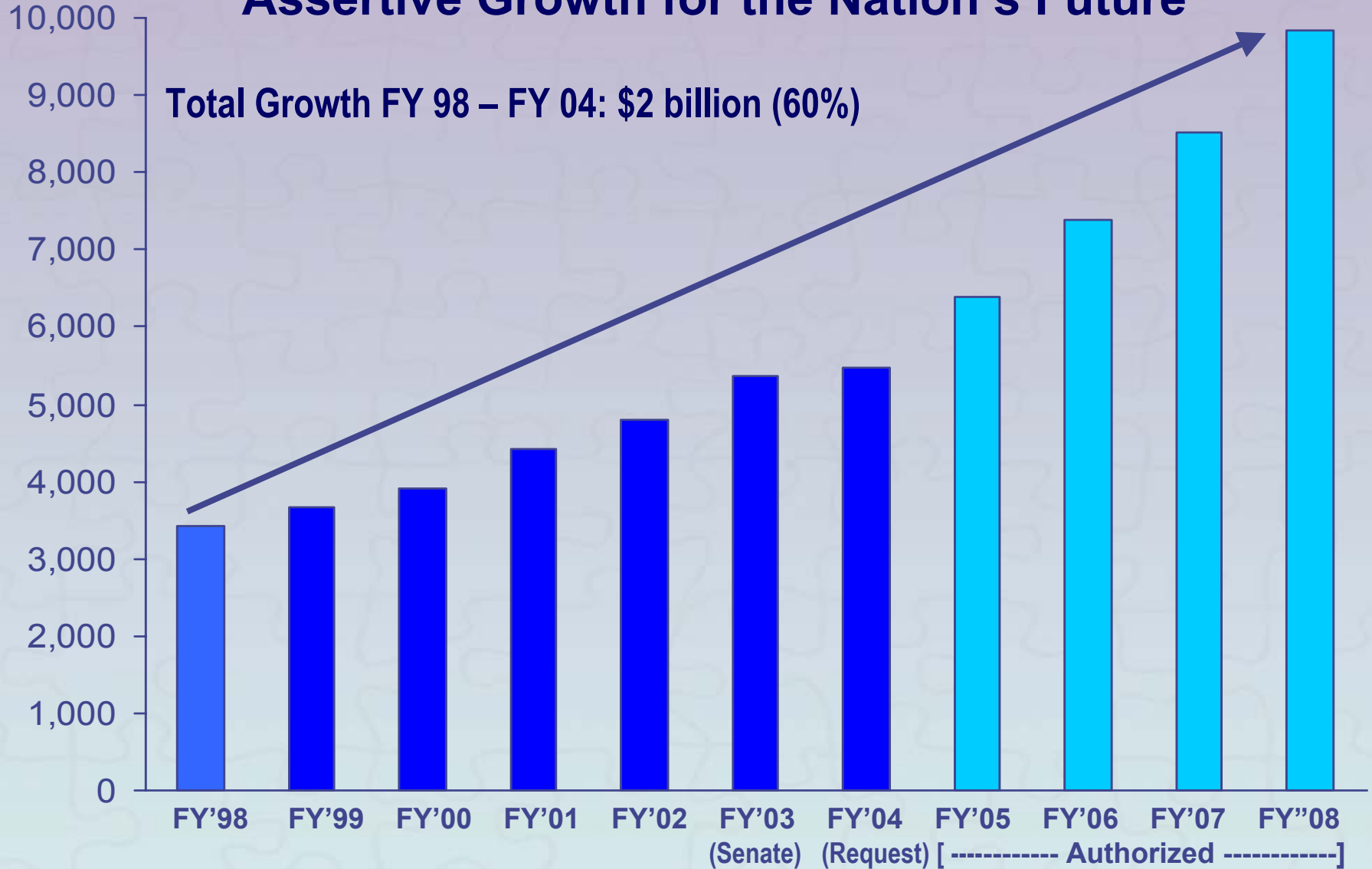
Appropriations for the National Science Foundation

FY 1998 - 2004

In millions of dollars

Assertive Growth for the Nation's Future

Total Growth FY 98 – FY 04: \$2 billion (60%)



George E. Brown, Jr. Network for Earthquake Engineering Simulation
NEES Oversight during Operational Period: FY 2005 - FY 2014

NSF Directorate for Engineering (ENG)
Assistant Director, ENG
Director, Division of Civil and Mechanical Systems (CMS)

NEES
Research
Programs

NEES Program Director

NEES Consortium Awardee

- Provide leadership for NEES
- Build inclusive environment and opportunities
- Coordinate, maintain, and operate NEES, with shared-use access to equipment sites
- Maintain, update, and operate the NEES system network, including curated data repository
- Coordinate outreach and training activities for NEES resources, including equipment sites
- Pursue development of new technology and applications, and national and international participation and partnerships

NEES U.S. Linkages

- Other equipment sites as part of NEES (university and federal/national labs)
- Distributed experimentation
- Data curation
- Simulation software

NEES Equipment Awardees

- Participate in NEES Consortium
- Operate equipment as shared-use equipment site
- Provide outreach and training activities
- Incorporate NEES into research and academic programs

NEES International Linkages

- Other equipment sites as part of NEES (university and federal/national labs)
- Distributed experimentation
- Data curation
- Simulation software



Goal of NEES: National Shared Use Resources

- ◆ Experimental Sites funded by NSF (ES)
- ◆ Experimental Data Repository
 - Grid facilitates replication of results remotely or locally
- ◆ Computational Simulation Results Repository
 - Digital content for use in R&D, practice, education, outreach
- ◆ Simulation Software Tools Archive
 - Browsable and searchable library of community codes
- ◆ Collaborative technologies
- ◆ Capabilities (e.g., HPC sites for numeric simulation)
 - Grid facilitates ubiquitous access to computing resources, including high-performance parallel supercomputers

Eligibility

- ◆ *Only* U.S. universities and colleges (**and nonprofit institutions**) may submit proposals as the lead institution.
- ◆ Integrated partnerships are encouraged (i.e., multi-organizational arrangements including other universities and colleges, minority-serving institutions, women's colleges, predominantly undergraduate institutions, national laboratories, private sector organizations, government agencies, and international collaborators).
- ◆ The number of participating organizations is not necessarily a measure of quality.

One Proposal Package

- ◆ Only one proposal may be submitted by a Principal Investigator,
 - must be a full-time faculty member of an engineering department or program at the lead academic institution.
- ◆ Proposals involving more than one organization must be submitted as a single administrative package from the lead academic institution;
- ◆ Collaborative proposals involving multiple administrative packages *will not be accepted.*

The Awards

◆ Grand Challenge Awards:

- Up to two per year; funding of up to \$1,400,000 per year per award for up to five years.

“Proposals submitted to this solicitation are required to utilize appropriate equipment resources at one or more of the NEES equipment sites.

Proposals that do not require significant NEES equipment resources will be returned without review.

Investigators who wish to conduct research into earthquake engineering issues without using NEES equipment should submit proposals to one of the existing earthquake engineering programs within NSF/CMS”

Annual Deadline

◆ Proposal Deadline Date(s) (due by 5 p.m. proposer's local time):

- ~~October 7, 2003~~ **December 8, 2003**
 - and each ~~October 7~~ **December 8** thereafter
 - **CMS deadline for “normal” unsolicited proposals has been moved to December 1 (also annual; see web site)**
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Key features of GC projects

- ◆ Strategic vision for a system-level problem requiring extensive use of NEES experimental resources;
- ◆ Seminal, rather than incremental, research that will advance the state-of-the-art
- ◆ Strategic research plan to realize the vision;
- ◆ Research program encompassing a full spectrum of experimental and analytical investigations;

Key features of GC projects

- ◆ Education and outreach program
- ◆ Cross disciplinary and multi-institutional project team with broad geographic participation and including active participants from research institutions with NEES equipment awards, research institutions without NEES equipment awards and from primarily undergraduate institutions;
- ◆ Project team and leadership diverse in gender, race, and ethnicity;
- ◆ Aggressive and innovative dissemination and transfer of findings to the entire earthquake engineering community

Proposal Preparation

- ◆ Multi-organizational collaborative proposals may only be submitted if a single award is requested by the lead organization (with subawards administered by the lead organization).
- ◆ Collaborative proposals that are the simultaneous submission of proposals from different organizations, with each organization requesting a separate award, will be returned without review.
- ◆ Literature review that justifies the “gap” in earthquake engineering knowledge that the project proposes to address;
- ◆ Well-defined anticipated broader impacts of the proposed research activities, including expected research outcomes and impact on the current and future earthquake engineering workforce.

Data

- ◆ All experimental and analytical data required to be submitted to the NEES data repository
 - including full documentation of the associated metadata and the complete E-Notebook,
 - in accordance with the data, metadata, and E-Notebook established policies set by NEES Consortium, Inc.

NSF expects:

- ◆ significant findings from research and educational activities to be *promptly submitted for publication* with authorship that accurately reflects the contributions of those involved.
- ◆ NSF expects PIs to share with other researchers, at no more than incremental cost and *within a reasonable time*, the data, samples, physical collections and other supporting materials created or gathered in the course of the work.
- ◆ It also encourages grantees to share software....

International Collaboration

- ◆ Strongly Encouraged –
 - ◆ if it makes sense
- ◆ Separate funding streams for US and non-US participants on a common project
 - ◆ NSF cannot fund foreign institutions or colleagues

UNJR and E-Defense can play a key role

- ◆ Promote NEES and E-Defense cooperation in research
- ◆ Promote a common vision of research priorities to be jointly studied – develop the agenda for ***NEES + E-Defense***
- ◆ Promote leveraging of experimental resources in the US and Japan to help one another
- ◆ Large experimental systems
- ◆ Complement one another
- ◆ NEES has a variety of experimental facilities that can test small to near full scale specimens
- ◆ E-Defense completes this experimental system by permitting full scale tests to be conducted.

Examples of NEES Research Possibilities...

- ◆ Performance-based earthquake engineering models and design criteria
- ◆ Multi-span structures: effects of spatial variation of ground motion on extended lifeline structures
- ◆ Nonstructural component response
- ◆ Large-scale/full-scale subassemblage testing
- ◆ Linear and nonlinear response mechanisms and models
- ◆ Soil-foundation-structure interaction and design
- ◆ Improved prediction of soil liquefaction, subsidence, lateral spreading, slope stability, and site amplification
- ◆ Feasibility and constructability studies for new systems
- ◆ Post-earthquake safety, repair, and loss estimation
- ◆ Coastal structures: tsunami-wave/structure interactions

Establishing the NEES/Earthquake Engineering Research Agenda

- ◆ Developing a Long-Term Research Agenda for the Network for Earthquake Engineering Simulation
 - Richard Little, PI, National Academy of Sciences, rlittle@nas.edu
 - <https://www.fastlane.nsf.gov/servlet/showaward?award=0135915>
 - <http://www4.nationalacademies.org/webcr.nsf/5c50571a75df494485256a95007a091e/8dabe190beac9ad585256b41007d766b?OpenDocument>
- ◆ The Earthquake Research Plan: Research Needs and Opportunities for Earthquake Engineering
 - Susan K. Tubbesing, PI, Earthquake Engineering Research Institute, skt@eeri.org
 - <https://www.fastlane.nsf.gov/servlet/showaward?award=0130009>

NEESR Research Initiative

Ready for launch in a few weeks

(...in final “clearance” and will be out in the next couple of weeks or so...)
