

NEES/E-Defense Collaborative Research: Task Group Meeting on Steel Buildings

Meeting Overview



Hyogo Earthquake Engineering
Research Center (E-Defense)



George E. Brown, Jr. Network for
Earthquake Engineering Simulation (NEES)

- ❖ Meeting Logistics
- ❖ Overall Program Objectives
- ❖ Review Agenda
- ❖ Discuss NEESR Solicitation description
- ❖ Questions & Suggestions

Meeting Logistics



- ❖ Redwood and Sequoia Rooms
- ❖ Meals: Continental Breakfast, Buffet Lunch, Afternoon Coffee
- ❖ Business Center
- ❖ Dinner tonight: No host, how many are interested?

NEES/E-Defense Research

- ❖ Accelerate solution of critical, high priority problems of mutual research interest to the US and Japan
- ❖ Make use of the unique NEES and E-Defense resources (physical and IT resources)
- ❖ Carry out work collaboratively that could not be done domestically in either country alone (intellectual resources)
- ❖ Synthesize and build upon current knowledge.
- ❖ Strategically seek payload investigations and alliances with other research programs in the US, Japan and other countries.
- ❖ Strategically engage participation from industry, profession, regulatory groups, etc.

Overall Objectives of NEES/E-Defense Research

1. Understand the 3-D dynamic response and failure mechanism of complete building systems, including nonstructural elements and contents,
2. Develop and validate models for numerical simulation of the entire range of behavior range expected of complete building systems.
3. Develop and validate new technologies, systems and methods to achieve targeted seismic performance,
4. Develop and validate procedures to assess the seismic performance of existing steel buildings and to retrofit or repair deficient structures.
5. Conduct educational and outreach activities to enhance the utilization of the findings of this effort.

After Toru Hayama

Agenda - Today

- ❖ *Introductory Remarks*
- ❖ *Overview of Japan Side Interests*
- ❖ *Overview of US side Interests*
- ❖ *Plenary Discussion of specific opportunities for using E-Defense and NEES Resources*
- ❖ *Plenary Discussion of Enabling Technologies*
 - ✓ *Theme structure*
 - ✓ *Simulation/visualization*
 - ✓ *Test beds*
 - ✓ *Experimental Methods*
 - ✓ *Data Bases*
 - ✓ *Instrumentation*
 - ✓ *Collaboration Tools*
 - ✓ *Cyberinfrastructure Tools*
- ❖ *Breakout Sessions*

8:00 AM - OK?

Agenda - Friday, February 11

- ❖ *Report on Breakout Sessions*
- ❖ *Opportunities for Education, Outreach and Training*
- ❖ *Strategic Partnerships*
- ❖ *Management and Administrative Issues*
- ❖ *Collaboration mechanisms and policies*
- ❖ *Packaging of US Proposal(s)*
- ❖ *Follow up activities - short and intermediate terms*

End about 11AM, but with continuing discussion on US side.

mini-Workshop on NEESit/OpenSees

Starting at about 11AM,
Lunch available after meeting

- ❖ *Introduction to NEESit and OpenSees*
- ❖ *OpenSees Features and Resources*
- ❖ *Model Building Commands*
- ❖ *Analysis Commands*
- ❖ *Examples*
- ❖ *Applications: OpenSees Navigator - Matlab graphical environment for running Opensees and hybrid simulations*
- ❖ *Applications: Modeling of elements under high loads and inelastic flexural deformations; how to run 100,000s of analyses a day without sweat to develop fragility and similar relations.*
- ❖ *Questions and Answers*

NEESR Solicitation

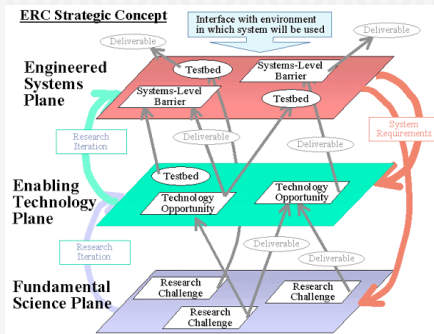
- ❖ *Projects use: NEES shared-use labs and IT & collaborative resources*
- ❖ *Projects must have extensive Education, Outreach & Training (EOT), data sharing and dissemination components*
- ❖ *Strategic systems-oriented vision and research plan*
- ❖ *Integration of numerical and experimental simulation*
- ❖ *Geographically distributed, multidisciplinary approach (geo-engineering, policy makers, industry, regulation writing entities, practitioners, multi-scale research focus, etc.)*
- ❖ *External Advisory Board (EAB)*
- ❖ *Opportunities for "Payload" Projects*

Systems Approach Required

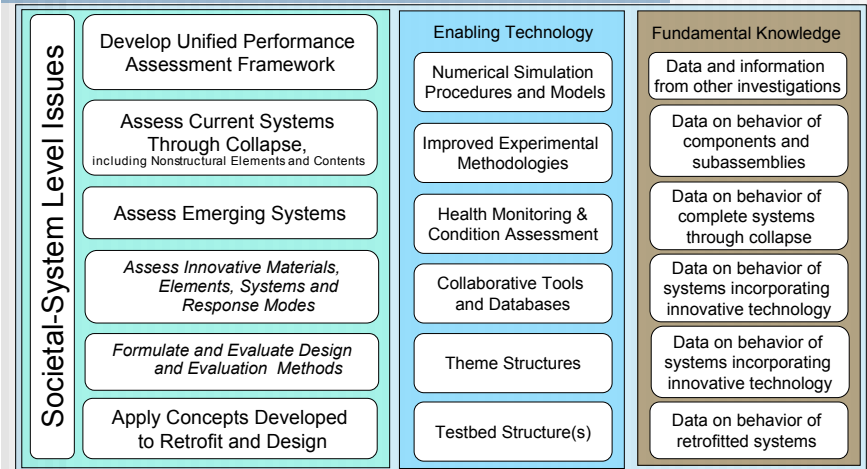
Societal Level System Concepts - PBEE, discovery, reduced costs, education to enhance and expand workforce, testbeds, etc.

Enabling Technology - Computer programs, experimental methods, design theories, etc.

Fundamental Engineering - Tests to develop or validate computer models or design concepts, etc.



Systems Approach taken to PBEE of Steel Building Systems



US side needs to emphasize systems aspects for proposal

- ❖ *Basically the same as conventionally done, but not the immediate focus on a list of tests and analyses.*
- ❖ *Need to identify specific tests, analyses and tools needed to solve a problem.*

NEES/E-Defense Budgets

- ❖ *Up to \$15 million has been allocated by NSF to the NEES/E-Defense Collaboration*
 - ✓ *Thus, about \$7.5 Million for Steel Structures*
- ❖ *Awards are made on a competitive basis.*
- ❖ *No guarantee that there will be a E-Defense Award*
- ❖ *E-Defense Management must endorse proposals to be considered from US side.*

NEES/E-Defense Budgets

- ❖ *However, maximum award for NEESR project is \$4 million, plus \$600,000 for a supplemental program on Cyberinfrastructure Tools (CI).*
- ❖ *This funding would be spread over 5 years.*
- ❖ *Thus, we need to package our research as:*
 - ✓ *Master framework that focuses on the systems level problem emphasizing one or two systems (but outlining entire project),*
 - ✓ *Additional group proposals that are linked, for submission this year or in future years.*
 - *Experimental methods* ■ *More detailed studies on specific problem*
 - *Increased emphasis on particular system*
 - *US support for large scale proof of concept test at E-Defense*

Additional 24 project-years (assuming little EOT, CI, etc.)

At best 24 project-years (e.g., if each project takes 2 years => 12 projects)

Next

- ❖ *Overview of Japanese Research Interests*
- ❖ *Overview of US Research Interests*
- ❖ *Use of NEES and E-Defense resources*

Lunch

- ❖ *Plenary Discussion of Specifics*
- ❖ *Breakout sessions for details*