Meeting Minutes of the Grand Challenge Task Force

Subcommittee on Disaster Reduction
16 May 2003, 9:00 a.m. to 12:00 p.m., Room 595, Stafford II, National Science Foundation

Attendees

NASA
Steve Ambrose, sambrose@nasa.gov

NOAA
John Simensky, NWS, john.simensky@noaa.gov

NSF
Clifford Astill, ENG, castill@nsf.gov
Deb Frisch, Social Science, dfrisch@nsf.gov
Dennis Wenger, Social Science and ENG, dwenger@nsf.gov
Doug James, hydrology, ldjames@nsf.gov
George Strawn, computer science, gstrawn@nsf.gov
Jim Lightbourne, Education, jhlightb@nsf.gov
Larry Weber, International, lweber@nsf.gov
Priscilla Nelson, ENG, pnelson@nsf.gov
Steve Nelson, atmospheric sciences, snelson@nsf.gov
Valerie Gregg, Digital Government, vgregg@nsf.gov

USGS
Kathleen Gohn, kgohn@usgs.gov
Tim Cohn, tacohn@usgs.gov

Agenda

9:00	Welcome and Introductions
9:15	Background on Grand Challenges
9:45	Mission and Charter
10:45	Ground Rules and Topics
10:40	Grand Challenge
11:50	Close

Handouts

Agenda
SDR Charter
Grand Challenge Task Force Charter (proposed)
Grand Challenge Ground Rules (proposed)

Call to Order

Task Force Co-Chair Priscilla Nelson called the meeting to order at 9:20 am.

Summary of Discussion

1. Background on Grand Challenges

George Strawn, the NSF representative to the Federal Networking and Information Technology Research and Development (NITRD), briefed the group on the Grand Challenge process employed by NITRD. He began with a history of the Interagency Working Group (IWG), the inter-agency committee coordinating the NITRD, explaining that the IWG began in the mid-1990's when federal agencies were asked what they needed now and in the future to succeed in their missions. The results were varied, but the need for a coordinating Interagency Working Group was clear. The IWG was formed, along with working entities in the form of the NITRD and sub-working groups. In 2002, the need to re-energize the process became clear and the NITRD invented the Grand Challenge process as an opportunity to explain the needs, justify the costs, and galvanize the research and development community.

Beginning in January of 2003, the group met every Friday for three months. The intent of the group was to create a series of Grand Challenges, each representing a ten-year vision. The scope of a Grand Challenge can be difficult to define, yet it seemed to make the most sense to designate Grand Challenge Areas as the broad concept areas, with Grand Challenges denoted within. In total, the NITRD Grand Challenge process invented eighteen Grand Challenges and mapped those to relevant social problems using a matrix. The team also identified the relevant research required for each and listed a total of thirty hard problem areas to be addressed.

The NITRD Grand Challenge process produced a PowerPoint presentation to be used in part or in whole with various audiences, to include the IWG, the Administration, the Congress, and individual federal agencies. Because cross-cut budget information on inter-agency high performance computing is requested by the Office of Management and Budget (OMB), the NITRD Grand Challenge results also will be included in the Blue Book to be submitted with the President's FY2005 budget.

> **Action**: George Strawn will share latest NITRD documents with Priscilla Nelson by 23 May 2003.

Question and Answers: Tim Cohn asked about methods to ensure effective engagement with OMB. Mr. Strawn identified the Office of Science and Technology Policy as the most effective path to OMB, though he added that there is already a great deal of interest in high performance computing and the efforts to revitalize high performance computing dovetail nicely with the current NITRD Grand Challenge process.

Priscilla Nelson asked if there were anything the NITRD team would do differently if they had it to do again. Mr. Strawn laughed and said he would have proposed a three-month timeframe for this activity rather than the one month originally anticipated.

Priscilla Nelson asked how the NITRD process handled the fact that required expertise may not be present on the working team. Mr. Strawn answered, noting that it is important to have representative membership on the working team but that it will never be complete. A final vetting of the proposed materials at the agency level is the best way to ensure Grand Challenge completeness.

Priscilla Nelson asked about opportunities for engagement between the NITRD and the Subcommittee on Disaster Reduction (SDR). Several additional meetings are possible, including a meeting in which the NITRD team presents their ideas to the SDR Grand Challenge Team, and a meeting in which the SDR Grand Challenge Team presents their findings to the NITRD team.

Mr. Strawn closed his presentation by reminding the group that the Grand Challenge process is a mixture of brainstorming and subgroup efforts and, ultimately, the process is a journey not a destination.

2. Mission and Charter

Priscilla Nelson led a discussion of the proposed Mission and Charter, adding that the documents must be strong enough to lead the process to the creation of final recommendations. Tim Cohn noted that it is also important to identify what is not a grand challenge. The group discussed the proposed Charter in great depth and identified several changes (see Appendix B).

Participation: Members observed that only NASA, NOAA, NSF, and USGS were represented in the assembled group and determined that this effort can only proceed if interested individuals are tapped from the missing agencies (e.g., FEMA, State Department, NIST, and others).

> **Action:** Task Force co-chairs agreed to invite specific individuals to participate based on their experience and agency affiliation. These individuals may be asked to participate in the broader group or to co-chair specific task groups.

Process: Valerie Gregg suggested the group arrange a two to three day retreat to begin the discussion. Kathleen Gohn suggested this process link to one of the panels planned for the Hazards Research and Applications Workshop in Boulder, Colorado. Other suggestions for coordination included sponsoring a roundtable with the National Academy of Sciences Disasters Forum and arranging a special meeting of the Subcommittee on Disaster Reduction.

3. Next Meeting

The group proposed that the SDR Grand Challenge Task Force continue. Members agreed to make this proposal to the SDR membership in the June 5, 2003 meeting of the SDR and, if the members ratify the proposal, to meet again on June 10, from 1 p.m. to 5 p.m. at the National Science Foundation.

> **Action:** SDR Secretariat will facilitate the creation of a Grand Challenge web page to include web forum discussion tools, if appropriate.

4. Contact Information

> **SDR Leadership**
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>
> **Grand Challenge Task Force**
> Priscilla Nelson, Co-Chair, 703-292-7018, pnelson@nsf.gov
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>
> **SDR Secretariat**
> Dori Akerman, 703-560-7448, dori@grs-solutions.com

Close

The meeting concluded at 12:00 p.m.

Appendix A: Representative NITRD Grand Challenge Information

National Priorities Used by IT

Leadership in Science and Technology
National and Homeland Security
A "Healthy" Environment
A Healthy Citizenry
Economic Prosperity
A Well-Educated Populace
A Vibrant Civil Society

Illustrative Grand Challenge Areas

Dependable and secure infrastructure
An intelligent and reliable transportation system
High confidence infrastructure control systems
Real-time threat detection (natural or man-made), assessment, and response
Improve capacity, safety, and security of the transportation system
Environmental research
Climate modeling and weather forecasting
Regional impacts of climate change
Knowledge environments for science and engineering

Sample Grand Challenge Area: High Confidence Infrastructure Control Systems

- Description
  - Develop technologies to ensure the continuous, safe availability of the Nation's infrastructure systems that are critically dependent on information technologies for command, supervisory control, and communications
  - Protect against malicious attacks as well as physical failures and complex, cascading failure modes
  - Spur transformation from legacy systems to capable, resilient, IT-enabled infrastructures
- Focus
  - Supervisory Control & Data Acquisition (SCADA) systems (Power grid, water supply, automated transportation systems (rail, subway))
  - Command and control (Air traffic control, transportation scheduling)
  - Communications (Telecommunications networks)
- IT Hard Problems
  - Integrating security (authentication, access control, intrusion detection) into networked embedded systems environment
  - New paradigm: operating at acceptable levels through attacks (shutting down to thwart attack is not an option)
  - Complex systems: interaction of real-time, fault tolerance, and security mechanisms; emergent behavior
- Relationship to National Priority Areas
  - Homeland Security: Critical Infrastructure Protection

    - National Security: Information Warfare, Command & Control
    - Economic Prosperity: Trustworthy Infrastructure
    - Maintaining a Civil Society
- Metrics
    - Availability (fraction of time system is operational)
    - Mean time to reduce system availability to unacceptable levels
    - Work required to have a specified impact on availability
    - Safety and impact metrics (what happens if system goes down?)

Appendix B: Proposed SDR Grand Challenge Task Force Charter

NATIONAL SCIENCE AND TECHNOLOGY COUNCIL
COMMITTEE ON ENVIRONMENT AND NATURAL RESOURCES
SUBCOMMITTEE ON DISASTER REDUCTION
GRAND CHALLENGE TASK FORCE
CHARTER

The Subcommittee on Disaster Reduction's (SDR) Grand Challenge Task Force is charged with defining representative Grand Challenges for Disaster Reduction. The Grand Challenge Task Force will develop topics, definitions, frameworks, and examples of Grand Challenges for Disaster Reduction through meetings, inquiry, and the establishment of topical Task Groups. Task Groups will achieve the following:

- Create a list of National Priorities relevant to the SDR;
- Create a list of Grand Challenge areas;
- Identify Grand Challenges within each area;
- Relate those Grand Challenges to National Priorities;
- Identify hard problems for each Grand Challenge; and
- Identify metric statements for each Grand Challenge.

By September 2003, the Grand Challenge Task Force will deliver a report for consideration by the members of the Subcommittee on Disaster Reduction, to include:

- List of National Priorities;
- List of Grand Challenges illustrating each National Priority; and
- List of hard problems and metric statements within each Grand Challenge.