Session I
Resiliency-Based Design: Progress and Developments

Technical and Policy Recommendations and Conclusions

Co-Chairs: Mitsuru Kawamura (Japan); Kit Miyamoto (U.S.)
Recorder: Curt Haselton

Session I: Recommendations and Conclusions

- Components of building resiliency that need to be considered include:
  - Non-safety issues. These are important and are not usually taken into account.
  - Building closure and business interruption. These are key to resiliency.
  - Is current safety level good enough (i.e., 10% probability of collapse at Maximum Considered Earthquake ground motion)? Efforts to better understand levels of safety and corresponding consequences need to be further investigated.
- Recommended next step on building resiliency: Develop a strategy, led by ATC, to determine how to progress on developing more resilient infrastructure (e.g., what 2-3 reports/methods are needed to bring together all the other resources/methods currently available?).

Session I: Recommendations and Conclusions

- Building ratings:
  - Everyone was in unanimous favor of it. The thought is that something is better than nothing.
  - Transparency to the public is very important in making sure that the rating system is effective. This can be done in the form of posted placards.
  - System needs to avoid conflict of interest.
- Recommended next step on building ratings: Start a Japan-US effort to discuss joint rating needs and what may work for both countries.

Session II
Performance-Based Design and Response Evaluation of Structures

Technical and Policy Recommendations and Conclusions

Co-Chairs: Jon Heintz (U.S.), Shinya Nishimoto (Japan)
Recorder: Jon Heintz

Session II: Recommendations and Conclusions

- Performance-based design was intended for enhanced performance
- Currently, performance-based design is being used to optimize design to meet minimum standards
- In recent disasters, newer, optimized designs are not performing as well as older, more robust designs

Session II: Recommendations and Conclusions

- Japan – proper design in conformance with the code should provide protection from liability.
- U.S. – recent legal developments have shown that simply meeting minimum standards is not enough to automatically provide protection from liability

Session II: Recommendations and Conclusions

- We must recognize uncertainty in designing for natural hazards
- We cannot adequately consider hazards or events that we have not experienced in the past
- Designing for minimum criteria may not be the best path toward resilience
- We should consider response modification technologies and improve consideration of damping to improve resilient design
- We need to involve the client or user in deciding on the maximum standard that should be employed in design

Session III
Risk Identification and Reduction: Methods and Validation

Technical and Policy Recommendations and Conclusions

Co-Chairs: Takayuki Teramoto (Japan), Curt Haselton (U.S.)
Recorder: Abbie Liel

Session III: Recommendations and Conclusions

- The U.S. Resiliency Council (USRC) Rating System should make every effort to minimize conflicts of interest throughout, including the rating development, the rating process (e.g., engineers should not be able to rate buildings they designed), and in the management of the organization.
- The USRC should continue to increase its independence as an organization, including transitioning to a leadership team that does not have conflicts of interest in the context of their current employer. In the meantime it is critical to maintain transparency with the broader community.

Session III: Recommendations and Conclusions

- USRC should make sure to have ratings done by multiple engineers (at least three) to ensure agreement on the rating.
- There were some concerns expressed about the legal protection for engineers who rate buildings. Could more be done to protect them?
- Lessons learned from Japanese experience and rating system should be taken into account.
- A more general recommendation was made about preserving and documenting design calculations. We would like to encourage cities and other jurisdictions to maintain this information for future use (e.g., ratings, evaluations).

Session IV
Multi-Hazard Design, Analysis and Research: Buildings & Critical Infrastructure

Technical and Policy Recommendations and Conclusions

Co-Chairs: Abbie Liel (U.S.), Hajime Okano (Japan)
Recorder: Franklin T. Lombardo

Session IV: Recommendations and Conclusions

Key Themes/Questions:

- What do we do about “rare” events or a “worst-case” scenario? How do we deal with probability vs. possibility? When thinking of these issues, we need to consider infrastructure type and their corresponding importance.
- How do we handle uncertainty?
- Do current designs that are “optimized” for a single hazard have the capacity to withstand other hazards?
- We need to better understand the:
  - Physical, spatial and temporal processes of multiple hazards
  - Limitations of probabilistic hazard assessment (statistical models)

Session IV: Recommendations and Conclusions

Broad Recommendations:

- Examine designs optimized for a single hazard loading (e.g., base isolation) for capacity to withstand loadings from multiple hazards.
- As hazard design loadings are associated with a low probability of hazard occurrence (i.e., “rare”) it is imperative to improve understanding of the physical processes of hazards and the limitations and uncertainties of the models for which the design loads are based.
- Improving understanding of multiple hazards should be performed concurrently with determining the sufficiency of these design loads for a given infrastructure type (e.g., critical infrastructure).

Session V
Systems & Processes to Improve Emergency Response, Reconstruction & Recovery

Technical and Policy Recommendations and Conclusions

Co-Chairs: Seitaro Tajiri (Japan), Sabine Kast (U.S.)
Recorder: Mehmet Çelebi

Session V: Recommendations and Conclusions

- Programs to expedite the post-earthquake building tagging process and avoid unnecessary building closures are very valuable.
- Such programs include the City of Glendale's B2B Program and San Francisco's Building Occupancy Resumption Program (BORP).
- Seismic monitoring systems using strategically deployed accelerometers can also help make informed decisions about occupancy and resiliency by assessing the damage condition of structural systems based on near real-time displacements and drift ratios. These monitoring systems can be feasible and implementable.

Session V: Recommendations and Conclusions

- Software programs to facilitate post-earthquake safety and damage assessments are also very valuable.
- Such software programs include: the Earthquake Damage Assessment Management (EDAM) software, which was developed in Italy and University of California, Berkeley, and FEMA's Rapid Observation of Vulnerability and Estimation of Risk (ROVER), Version 2.
- Several Conceptual Recovery Processes have been proposed in Japan. For example, a Tsunami Evacuation Building in Iwaki City, Fukushima Prefecture is being built. Other proposed processes are still in the conceptual phase.

Session V: Recommendations and Conclusions

- Neural network methods are a promising tool to improve resiliency of individual buildings, groups of buildings and other infrastructure.
- In Japan, there is a new effort to increase instrumentation and monitoring of tall buildings, which will inform future decisions that affect resiliency.
- In the U.S., the USGS, in response to a request by the Veteran Affairs (VA) Administration and the Seismic Advisory Committee for VA Administration, is implementing a structural health monitoring program for the VA Hospital System.

Session VI
Humanitarian Engineering: The Role of Engineering and Technology in Less-Developed Communities

Technical and Policy Recommendations and Conclusions

Co-Chairs: Peter Yanev (U.S.), Mineo Takayama (Japan)

Recorder: Kenny Buyco

Session VI: Introduction

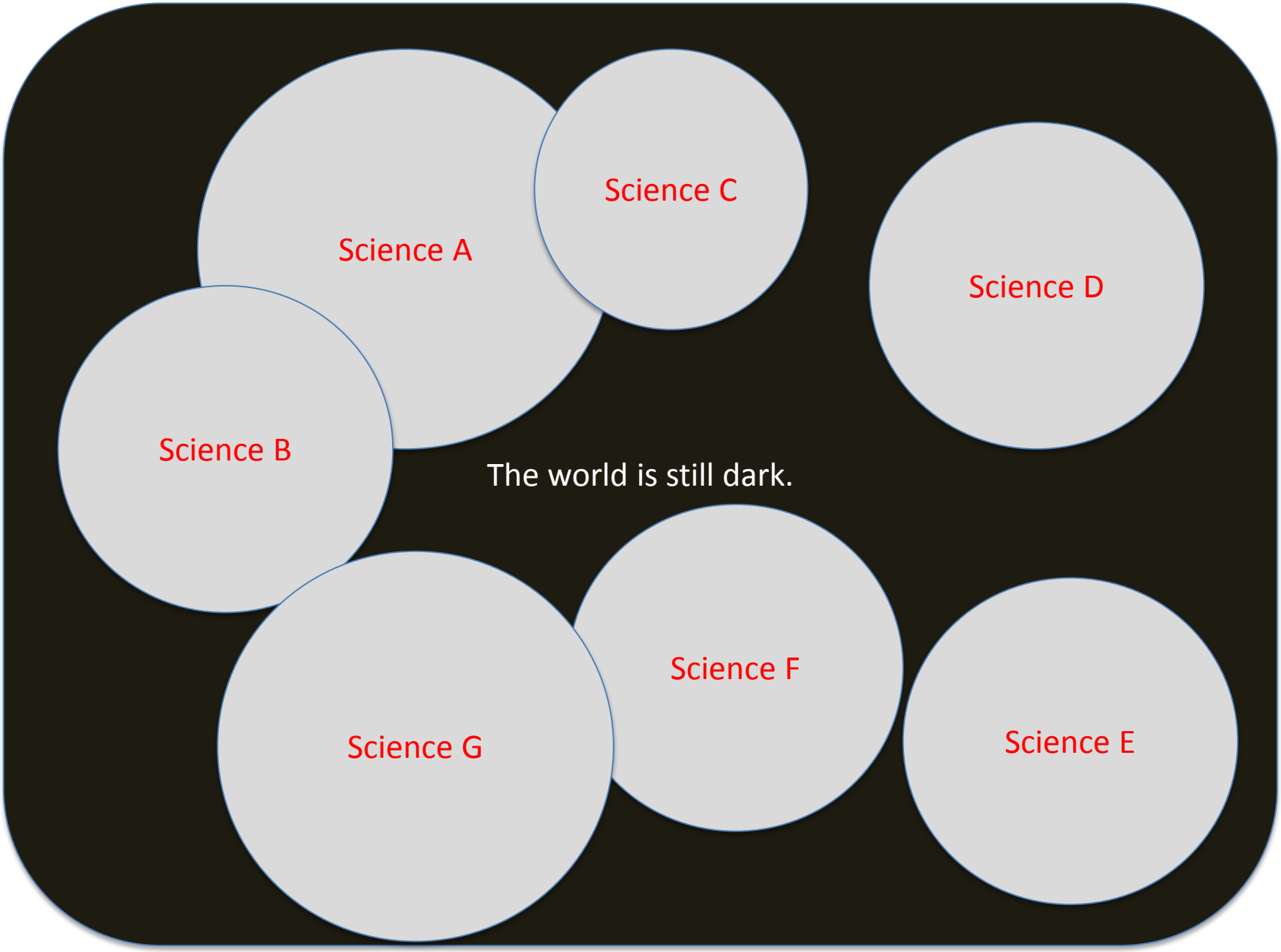
"Science knows no country,
because knowledge belongs to humanity, and
is the torch which illuminates the world"

Louis Pasteur

said more than 100 years ago

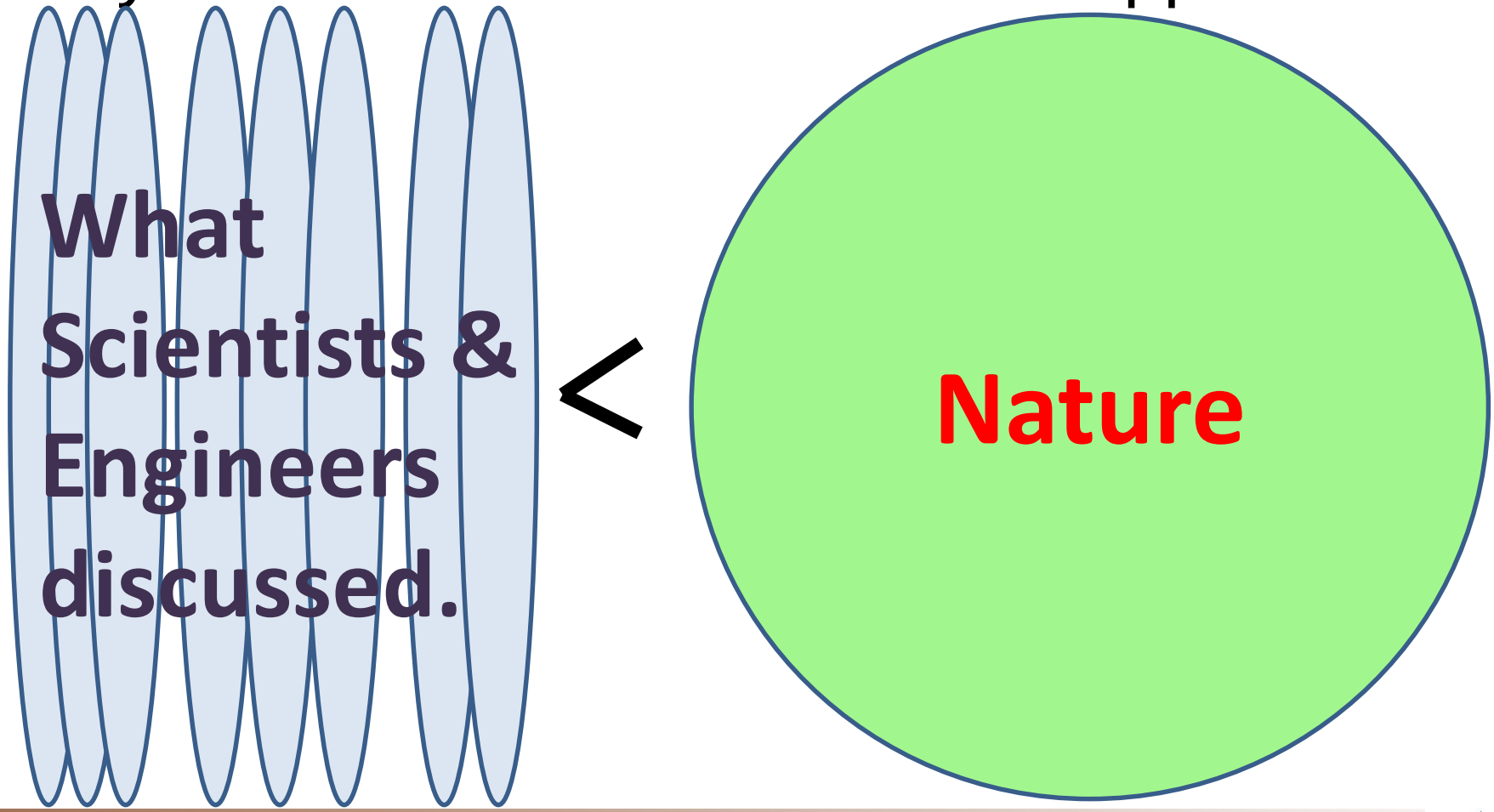
At the beginning….

The world was dark.


Science A
Science C
Science D
Science B
The world is still dark.
Science F
Science G
Science E

Session VI: Introduction

- Why natural disaster cannot be stopped



Session VI:

Presentation of Joint Statement of 30 Disaster-Related Academic Societies of Japan

Global sharing of the findings from the Past Great Earthquake Disasters in Japan

Toward the 2015 United Nations World Conference on Disaster Risk Reduction

Toward the World Engineering Conference and Convention 2015

November 29, 2014

Academic Society Liaison Association Corresponding to the Great East Japan Earthquake

Session VI:

Listing of Disaster-Related Academic Societies of Japan

- Science Council of Japan, Executive Committee members:
  - Architectural Institute of Japan
  - Association for Children's Environment
  - Atomic Energy Society of Japan
  - Geographic Information Systems Association of Japan
  - Institute of Social Safety Science
  - Japan Association for Earthquake Engineering
  - Japan Association for Fire Science and Engineering
  - Japan Association for Planning and Public Management
  - Japan Concrete Institute
  - Japan Society for Disaster Information Studies
  - Japan Society for Natural Disaster Science
  - Japan Society of Civil Engineers
  - Japan Society of Engineering Geology
  - Japan Society of Erosion Control Engineering
  - Japan Society on Water Environment

Session VI:

Listing of Disaster-Related Academic Societies of Japan

- Science Council of Japan, Executive Committee members (continued):
  - Japanese Association for Disaster Medicine
  - Japanese Institute of Landscape Architecture
  - The City Planning Institute of Japan
  - The Japan Landslide Society
  - The Japan Society of Mechanical Engineers
  - The Japanese Geotechnical Society
  - The Japanese Society for Active Fault Studies
  - The Japanese Society of Irrigation, Drainage and Rural Engineering
  - The Seismological Society of Japan
  - The Society of Environmental Instrumentation Control and Automation
  - The Society of Heating, Air-Conditioning and Sanitary Engineers of Japan
  - The Society of Instrument and Control Engineers
  - The Japan Association for Regional Economic Studies
  - Japan Society of Material Cycles and Waste Management

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

- The 2011 off-the-Pacific-coast-of-Tohoku Earthquake (Great East Japan Earthquake) was huge and exceeded our expectations. Its induced damage was so serious that we are still recovering from it and still face many issues. Response activities undertaken against the accident of the Fukushima Dai-ichi Nuclear Power Station are very difficult and insufficient to alleviate its impact to both inland and marine environments.
- For many years, Japanese scientists and engineers have been trying to establish scientific knowledge and to develop technologies for disaster reduction, but they were divided into each specialty. Specialization has caused significant knowledge gaps and communication difficulties among specialties. Issues between specialties have not been tackled. There is a serious reflection that we blindly believed our scientific knowledge and technologies and we didn't have enough sense of the awe and humble feeling to nature.

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

- After the 2011 Great East Japan Earthquake, we, 30 Japanese academic societies related to disaster management, started to deepen mutual understanding and made efforts to integrate different specialties. We also studied lessons for better recovery and preparedness from the 1995 Kobe Earthquake and other disasters.
- Experience and knowledge learnt from natural disasters should be widely applied to reduce all disasters worldwide. Prior to the United Nations World Conference on Disaster Risk Reduction (March, 2015 Sendai, Japan) and the World Engineering Conference and Convention 2015 (November, 2015 Kyoto, Japan), representatives from these 30 academic societies relevant to disaster management, have started to discuss ways of exchanging very rare and important experience and knowledge on such disasters.

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

For global sharing, the representatives of 30 societies declare to promote the following actions:

1. Serious soul-searching on blind belief in our science and technologies

We, Japanese scientists and engineers, have been trying to establish scientific knowledge and to develop technologies for disaster reduction and we could reduce damage by natural hazards to lower levels than before. But based on the experiences after the 2011 Great East Japan Earthquake, we seriously recognized that there was blind belief in our scientific knowledge and technologies and that they were not enough. We should always question our knowledge and never forget the sense of awe and humble feeling to nature for implementation of a disaster safe society.

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

For global sharing, the representatives of 30 societies declare to promote the following actions (continued):

2. Sharing of our experiences with international community

We will contribute to disaster reduction around the world by sharing the lessons learnt from the past earthquake disasters, such as the 2011 Great East Japan Earthquake and the 1995 Kobe Earthquake disasters. We will emphasize the importance of pre-event countermeasures including damage mitigation, preparedness, disaster prediction and early warning, and warning for the possibility of unexpected huge hazards with extremely low probability.

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

For global sharing, the representatives of 30 societies declare to promote the following actions (continued):

3. Collaboration of academic societies

We will collaborate across academies to promote multidisciplinary research for disaster reduction and sustainable development. The researchers in both natural and social science fields, such as physical science, engineering, medicine, sociology, and economics etc. will work together to create practical measures that have been examined from various perspectives.

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

For global sharing, the representatives of 30 societies declare to promote the following actions (continued):

4. Application to local communities

We will integrate different specialties and establish comprehensive and effective risk reduction countermeasures for local communities around the world as well as in Japan, considering each local environment and condition.

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

For global sharing, the representatives of 30 societies declare to promote the following actions (continued):

5. Enhancing earth observation and strengthening international human network

We will enhance the global earth observation and monitoring system, and carry out broad and integrated studies across the earth sciences, focusing on evolution and dynamics of the earth. We will pursue the cause of natural disasters and strengthen the international network of researchers and practitioners for disaster reduction.

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

For global sharing, the representatives of 30 societies declare to promote the following actions (continued):

6. Resiliency for huge hazards that exceed conventional expectations

We will consider the preparedness against huge hazards, which lie beyond conventional expectations. Even if it seems to be technically impossible, we will do our best to find a way to reduce the impact due to the hazard considering environmental issues and needs for uninterrupted business and social activities during and after severe disasters.

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

For global sharing, the representatives of 30 societies declare to promote the following actions (continued):

7. Human resource development

We will promote the capacity building of scientists and engineers worldwide by sharing knowledge and experiences learnt from the past earthquake disasters around the world. We will develop Japanese experts in comprehensive disaster management who can work nationally and internationally. We will also train local experts who can contribute to local disaster risk control and management.

Session VI:

Joint Statement of Disaster-Related Academic Societies of Japan

For global sharing, the representatives of 30 societies declare to promote the following actions (continued):

8. Public awareness

We will improve public awareness, which is one of the most important measures for disaster reduction. Pre-disaster countermeasures are effective in both human security and economic growth. We will present the knowledge based on the experiences from the past earthquake disasters in an easy-to-understand format to the public. We will promote understanding of the self-help effort, mutual assistance and public support, and will appeal their importance for disaster reduction to the public.

Session VI:
Recommendations and Conclusions

Participants in the 15th U.S.-Japan Workshop on the Improvement of Structural Engineering and Resiliency endorsed the findings and declarations in the Joint Statement of 30 Disaster-Related Academic Societies of Japan, as described in the previous slides.