Workshop Goals & Outcomes

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GOALS & OUTCOMES

> GOALS

1. Provide attendees with better understanding of NHERI, the RAPID EF, DesignSafe, the cyber-infrastructure component of NHERI.
2. Identify key data gathering needs and opportunities to achieve Grand Challenges in Natural Hazard Engineering.
3. Develop a prioritized list of equipment to be acquired by the RAPID facility.
4. Identify challenges facing the reconnaissance community that hinder data collection and reuse.
5. Develop a prioritized list of reconnaissance support needs to be addressed by RAPID EF software and services.

> OUTCOMES

1. Synthesized notes from the workshop addressing the above goals.
2. Science Plan for the RAPID EF (summer 2017).

GOAL #1: Provide information about NHERI and the RAPID Facility

- Today
  - Joe Wartman's introduction of the RAPID EF team and our vision for the RAPID facility.
  - Joy Pauschke's presentation of NSF's vision for NHERI, the RAPID EF and how NHERI will enable us to advance NHE.
  - Ellen Rathje's introduction of DesignSafe, the resources DesignSafe brings to the NHE community and our shared vision for how the RAPID and DesignSafe will support the reconnaissance community and larger NHER community.
- Tomorrow
  - Mike Olsen's introduction of equipment and software tools the RAPID facility is *proposing* to support reconnaissance activities

GOAL #2: Identify data gathering needs to achieve Grand Challenges in Natural Hazard Engineering.

> Grand Challenges in Natural Hazard Engineering
(as developed from NRC 2011)

1. A ***community resilience framework*** that enables characterization and quantification as well as measurement and assessment of community-level resilience.
2. Computational tools and calibrated models to enable ***simulation-based decision making to improve community resilience.***
3. ***Renewal and retrofit strategies to mitigate the impact of natural hazard events*** on infrastructure and communities.
4. ***Improved design tools*** to achieve enhance performance, sustainability and resilience for new infrastructure as well as reduce uncertainty in performance prediction.

GOAL #2: Identify data gathering needs to achieve Grand Challenges in Natural Hazard Engineering.

> Grand Challenges in Natural Hazard Engineering
(as developed from NRC 2011)

1. A ***community resilience framework*** that enables characterization and quantification as well as measurement and assessment of community-level resilience.

> Currently, there are limited historical data characterizing the impact of natural hazard events on communities, so developing a framework is challenging.

> The questions to be addressed during the workshop are

- **What data characterize the impact of a natural disaster on a community?**
- **What data characterize community resilience?**
- **How should these data be archived/annotated/visualized…?**

to best support development of a community resilience framework?

GOAL #2: Identify data gathering needs to achieve Grand Challenges in Natural Hazard Engineering.

> Grand Challenges in Natural Hazard Engineering
(as developed from NRC 2011)

1. A ***community resilience framework*** that enables characterization and quantification as well as measurement and assessment of community-level resilience.
2. Computational tools and calibrated models to enable ***simulation-based decision making to improve community resilience.***

> These tools enable a variety of decisions makers to investigate the impact of mitigation strategies on community resilience.
> Data are required to advance the many component-specific models required for simulation of regional response to a natural disaster.
> Again, the questions to be addressed during the workshop are
  - **What data are required? What data should be prioritized?**
  - **How should they be archived/annotated/visualized…?**

  to best support development of simulation tools?

GOAL #2: Identify data gathering needs to achieve Grand Challenges in Natural Hazard Engineering.

> Grand Challenges in Natural Hazard Engineering

> The risk posed by natural disasters can be mitigated through renewal and retrofit.

> Post-event data can characterize the performance of existing and retrofit infrastructure and enable identification of vulnerable infrastructure elements.

> The questions to be addressed during the workshop are

- **What data are required? What data should be prioritized?**
- **How should they be archived/annotated/visualized…?**

to best support development of mitigation strategies?

3. ***Renewal and retrofit strategies to mitigate the impact of natural hazard events*** on infrastructure and communities.
4. ***Improved design tools*** to achieve enhance performance, sustainability and resilience for new infrastructure as well as reduce uncertainty in performance prediction.

GOAL #2: Identify data gathering needs to achieve Grand Challenges in Natural Hazard Engineering.

> Grand Challenges in Natural Hazard Engineering

- > Community resilience can be improved through improved design tools
  - – Improved design and construction methods that enhance to performance of existing structural systems,
  - – New structural systems that achieve enhanced performance,
  - – Improved performance-prediction tools that advance "simulation-based decision making"
- > The questions to be addressed during the workshop are
  - – **What post-event data are required to improve design tools?**
  - – **How should these data be archived/organized/annotated?**

4. ***Improved design tools*** to achieve enhance performance, sustainability and resilience for new infrastructure as well as reduce uncertainty in performance prediction.

GOAL #2: Identify data gathering needs to achieve Grand Challenges in Natural Hazard Engineering.

> Tomorrow morning:

Facilitated discussion by all to determine **what data are required** to achieve …

Grand Challenges in Natural Hazard Engineering

1. A ***community resilience framework*** that enables characterization and quantification as well as measurement and assessment of community-level resilience.
2. Computational tools and calibrated models to enable ***simulation-based decision making to improve community resilience.***
3. ***Renewal and retrofit strategies to mitigate the impact of natural hazard events*** on infrastructure and communities.
4. ***Improved design tools*** to achieve enhance performance, sustainability and resilience for new infrastructure as well as reduce uncertainty in performance prediction.

GOAL #3: Prioritized list of equipment to be acquired by the RAPID facility.

- Equipment is required to collect the data required to achieve the previously discussed Grand Challenges.
- The RAPID EF will acquire this equipment and …
  - maintain it,
  - train people to use it,
  - support field use of it, and
  - facilitate archiving of data collected using it.
- The RAPID EF team has developed a proposed equipment list.
- Given that the equipment will be used by the community and that funding is limited ….
- Input is requested to develop a prioritized equipment list.

GOAL #3: Prioritized list of equipment to be acquired by the RAPID facility.

> Tomorrow afternoon:

Facilitated discussion by all to develop **prioritized list of equipment** to be acquired by the RAPID EF

GOAL #4: Identify challenges that hinder data collection and reuse

- A wide variety of factors make data collection and reuse challenging
  - Prior to field deployment
    - Building a team.
    - Determining what equipment are required and/or appropriate.
    - Are there export / shipping / import controls for the equipment?
    - Is review for human subjects required?
  - In the field
    - Communication with team, other teams and those not in the field.
    - Problems using equipment.
    - Documenting data collection process and creation of metadata
    - Local data backup and storage.
  - Upon return from the field
    - Data and metadata cleanup and archiving.
    - Publishing data so that they are easy for others to find, understand and use.
    - Data visualization (i.e. use and reuse).

GOAL #4: Identify challenges that hinder data collection and reuse

- The RAPID EF and DesignSafe will provide support and develop software tools to mitigate these challenges
  - Prior to field deployment
    - Building a team – **DesignSafe tools supporting research collaboration**
    - Determining what equipment are required and/or appropriate.
    - Are there export / shipping / import controls for the equipment?
    - Is review for human subjects required?

    } **RAPID EF documentation**
  - In the field
    - Communication with team, other teams and those not in the field.
    - Problems using equipment - **RAPID EF support for field activities.**
    - Documenting data collection process - **RAPID EF 'apps' to facilitate documentation of data collection and field activities.**
    - Local data backup and storage – **RAPID EF equipment and, as possible, support for upload to DesignSafe**
  - Upon return from the field
    - Data and metadata cleanup and archiving - **DesignSafe**
    - Publishing data so that they are easy to find and use - **DesignSafe**
    - Data visualization - **RAPID EF software and support; DesignSafe**

GOAL #4: Identify challenges that hinder data collection and reuse

> This afternoon:

1. Ellen Rathje: DesignSafe, including capabilities wrt data archiving and publication.
2. Joe Wartman and Kurt Gurley: presentation of challenges associated with data collection following the Christchurch earthquake and hurricanes Sandy and Mathew
3. Facilitated discussion by all to identify
   - Challenges that hinder data collection and reuse
   - Opportunities for RAPID EF to develop software / tools to overcome these challenges

GOAL #5: Develop prioritized list of support needs to be addressed by RAPID software and services

- Software and services are required to overcome challenges that currently hinder data collection and reuse.
- The RAPID EF will develop and/or acquire this software and provide these services.
- Given that the software and services will be used by the community and that funding is limited ….
- Input is requested to develop a prioritized list of support needs.

GOAL #5: Develop prioritized list of support needs to be addressed by RAPID software and services

> Tomorrow afternoon:

Facilitated discussion by all to develop **prioritized lists of equipment (GOAL #3) and support (GOAL #5) needs** to enable data collection and reuse to achieve NHE Grand Challenges

OUTCOMES

> In a ~month:

Synthesized notes from the workshop that provide community consensus

- Key data gathering needs and opportunities to achieve Grand Challenges in Natural Hazard Engineering.
- Challenges facing the reconnaissance community that hinder data collection and reuse.
- Prioritized lists of reconnaissance community needs wrt to equipment, software and support services

> This summer:

Science Plan for the RAPID EF

BREAK

2:15 – 2:45