

NHERI RAPID Experimental Facility



RAPID EF Team



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Jennifer Irish, co-PI, (VT), Scientific and User Needs Comm.

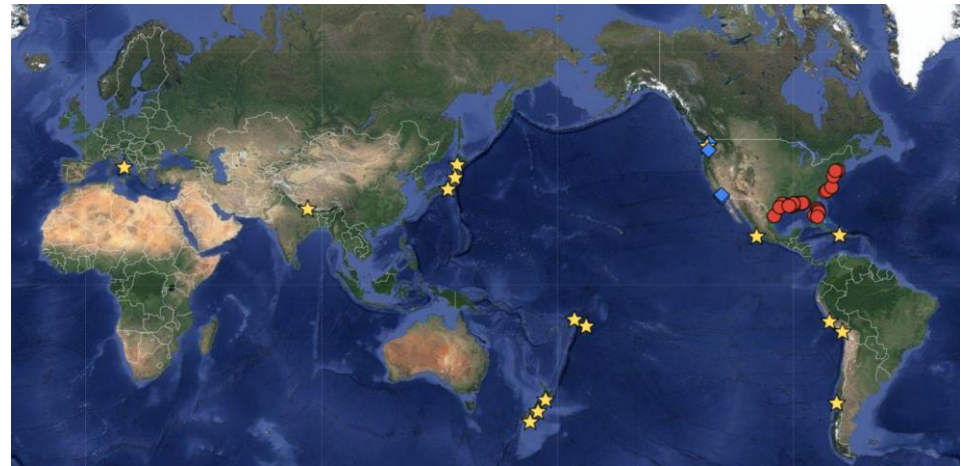
Scott Miles, co-PI, (UW), Scientific and User Needs Comm.

Kurtis Gurley, Sr. Per, (UF), Scientific and User Needs Comm.

Ann Bostrom, Sr. Per., (UW), Scientific and User Needs Comm.

Laura Lowes, Sr. per., (UW), Scientific and User Needs Comm.

TBD: Site Operations Specialist, IT Specialist



RAPID EF: *Intellectual Merit*

The RAPID EF will provide *infrastructure* and *services* to enable the next generation of reconnaissance-based natural hazards research

- Portfolio of state-of-the-art field data collection tools
- Software tools
 - *mobile field data collection app*
 - *citizen science app*
 - *desktop interface (with Designsafe-ci)*
- Visualization facility
- Advisory and field services to support reconnaissance
- Training workshops and activities



RAPID EF: *Broader Impacts*

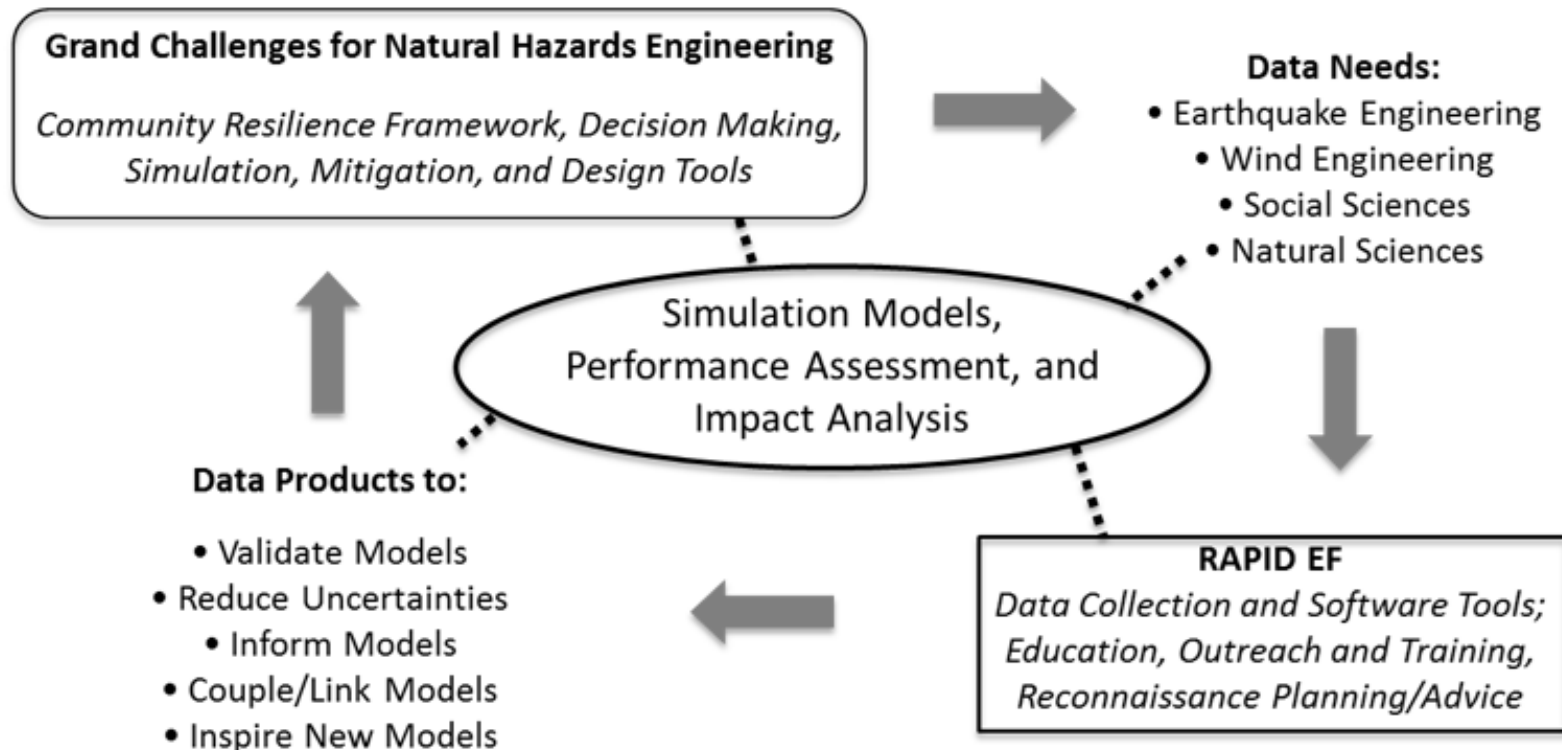
- Enhancing the nation's research infrastructure for research; help U.S. remain a global leader in natural hazards research
- Develop and provide open data products
- Support fundamental discoveries and major advancements in natural hazards; humanitarian and societal benefits, improved public policies
- Public engagement with engineering/science
- Education and training opportunities
- Develop new and strengthen existing international research partnerships

RAPID EF: *Transformative Aspects*

- Unprecedented amount of high-quality, open-source disaster data
 - High-resolution, systematic data collection (reduce biases; increase certainty)
 - Shift from 2D to 3D; leads to new analysis and scientific approaches that consider the 3D nature of these hazards and the systems affected by them
- Collection and integration of engineering, and natural and social science data sets
- Greatly expanded community of reconnaissance investigators

RAPID EF: *Science Plan*

Principal scientific goal: *to inform natural hazards computational simulation models, infrastructure performance assessment, and economic impact analysis by supporting the collection, development, and assessment of high quality disaster data sets.*



RAPID EF: *Science Plan*

Grand Challenges for Natural Hazards Engineering

(modified from NRC, 2011)

- **Community Resilience Framework:** Measure, monitor, and evaluate community-level resilience.
- **Hazard and Impact Simulation and Decision Making:** Computational simulation/forecasting of hazard and its physical and social impacts.
- **Mitigation:** Renewal and retrofit strategies are essential to mitigate hazards; development of effective strategies requires models, design methods, and construction standards are capable of identifying critical vulnerabilities and quantifying the impacts of risk reduction measures.
- **Design Tools:** Improved certainty in the predictive capability of design tools is essential to better exploit more sustainable and resilient building materials



Facility Resources

- Advanced Geomatics Technologies
- Seismic Instrumentation
- Wind and Storm Surge Instrumentation
- Social Science Reconnaissance Equipment
- Ground Investigation
- Imaging Equipment
- Software tools



GeoMAT Mini- CAVE



Data from the 2015 Ghorka Nepal Earthquake

Beyond the Hype

Data Quality Control

Data Extraction

Immersive, interactive
experience

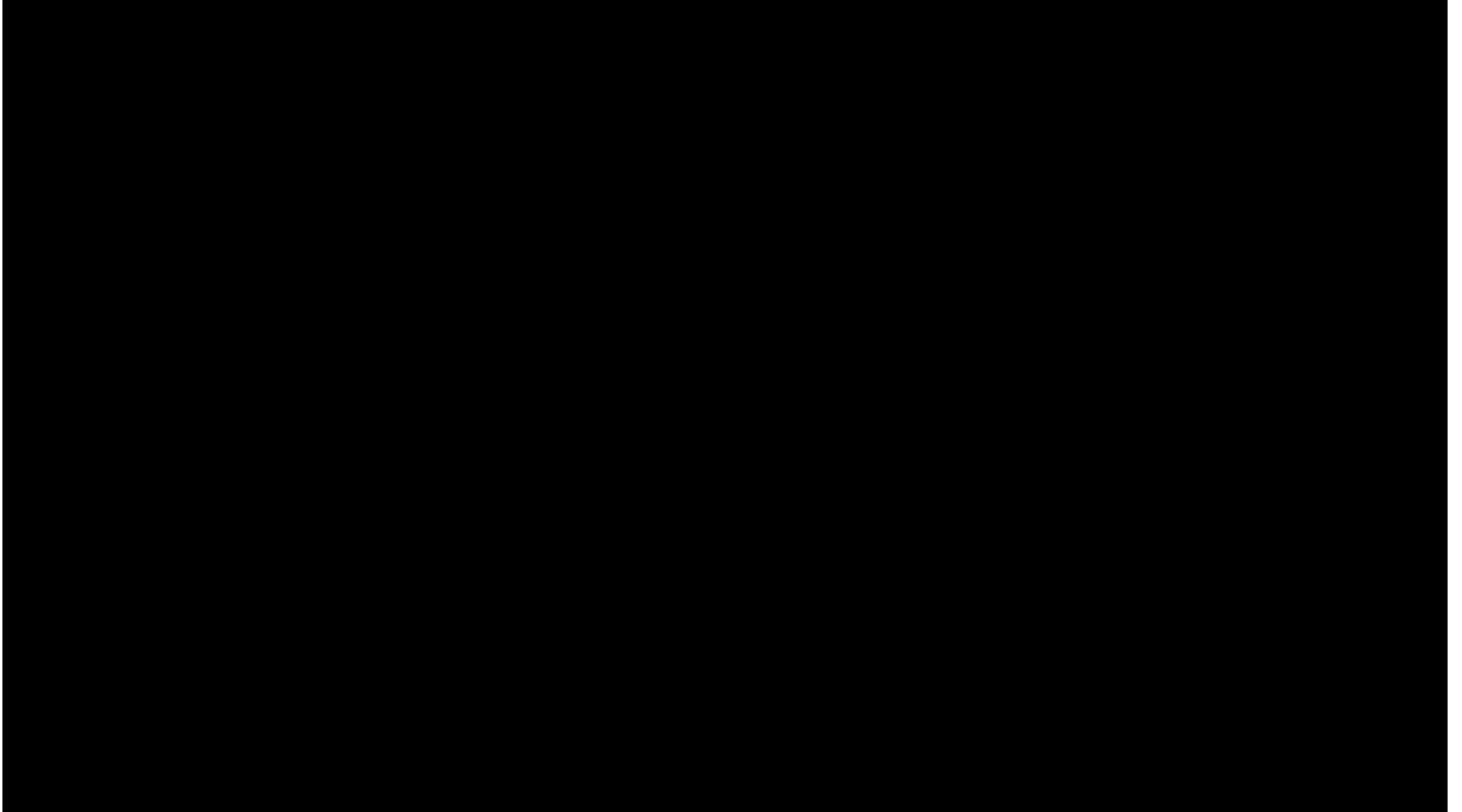
Observations in context

Unlimited measurement
extraction

Perform visual
assessments

Geometric modeling &
Analysis

CAVE



Using the RAPID

We Support:

- NSF RAPID Grants
- Reconnaissance Organizations (GEER, EERI, ASCE)
- Other Research Efforts That Would Use Our Equipment
- Information will be Available on DesignSafe

We Provide:

- Equipment
- Staff
- Logistics Support



RAPID Timeline

- January 2017: Community and User Needs Workshop
- September 2017: Equipment Aquisition
- Spring/Summer 2018: User Training Workshops
- Summer 2018: User Rates and Fees Posted
- September 2018: Deployment of Staff and Equipment with Users Begins



Training

- **One-week immersive workshops held each summer**

- Hands-on instruction on instrumentation fundamentals/use/data processing
- Human subject research protocols (e.g., polling and surveys).
- Strategic planning
- Preparation of health-and-safety plans
- Working with other teams and local and national governments/agencies
- NHERI data archiving policy
- Legal and professional ethics
- Preparation of RAPID proposals

- An outdoor field reconnaissance for a hypothetical natural hazard event
- Participants will be designated as “RAPID Fellows”

- **One-day traveling seminar**

- Familiarize the natural hazards research community with capabilities
- Inspire research ideas involving use of the facility.
- Galvanize the community around field-data gathering opportunities identified in the science plan.

- **Development of training manuals**