

# Next steps for the NGL Consortium



Presentation To: NGL Workshop 2  
Next-Generation Case History Liquefaction Database

*September 24, 2018 – Mong Learning Center  
University of California, Los Angeles*

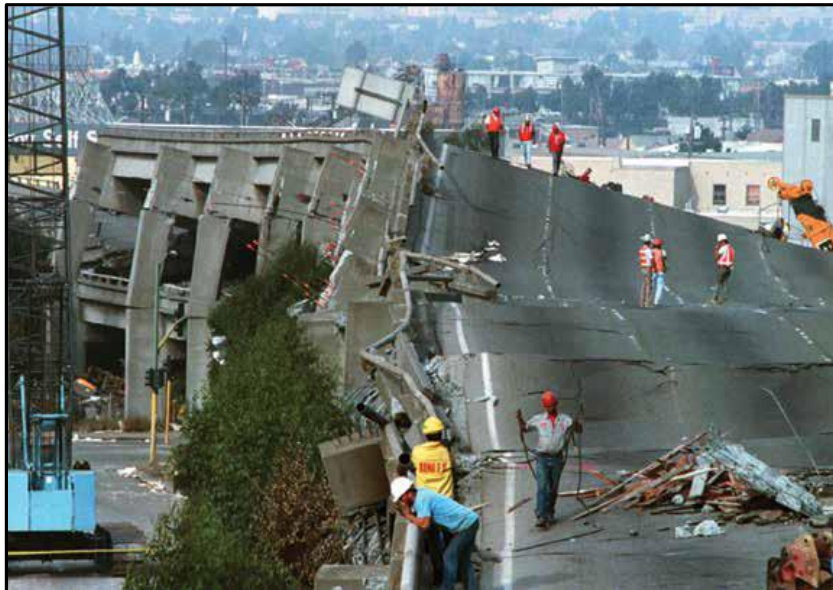
***Dr. John A. Stamatakos and Jonathan Stewart***  
*September 24, 2018*



# Initiation of the NGL Concept

- In 2013, PEER initiated a project to develop a new approach for evaluating liquefaction research and engineering while developing new models that address liquefaction triggering and consequences

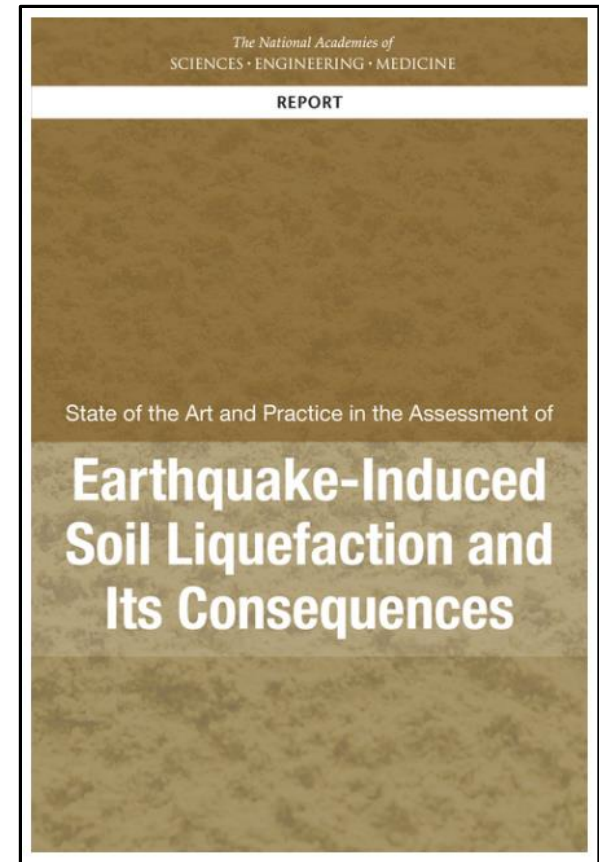
(<http://peer.berkeley.edu/lifelines/projects/ngl/>)



- PEER identified three objectives:
  - New Case History Database
  - Supporting studies to augment the database
  - New model development, especially fully probabilistic models

# Federal Agencies also Looked to Improve Liquefaction Assessments

- In 2016, the National Academy of Sciences documented concerns about seismically induced liquefaction, describing the current state of engineering practice and highlighting the shortcomings of existing methods and models
- The U.S. Nuclear Regulatory Commission (NRC) identified the need to update existing regulatory guidance on the methods used to evaluate seismic soil liquefaction
  - Regulatory Guide (RG) 1.198, “Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites”
  - Associated review guidance found in the Standard Review Plan (NUREG–0800)



# NRC Contracted with SwRI

- In 2016, SwRI (working with UCLA and WU researchers under subcontract) began the development of the NGL Case History Database.
  - SQL relational database with GIS interface, and includes liquefaction, ground failure, and non-ground failure case histories.
  - Site will be mirrored through Design Safe, which is part of the Natural Hazards Research Infrastructure (<https://www.designsafe-ci.org/>)





# Next-Generation Liquefaction Consortium

- **SwRI** is working with PEER to develop the NGL consortium, comprising commercial and governmental agencies to support all three phases of the NGL concept
- **NGL Vision**
  - Community field **case history database** (*well underway*)
  - **Supporting studies** of critical effects poorly constrained by data
  - **Model development:** team meetings, common resources, required parameter space
- SwRI is Not-for-Profit Research and Development Institute dedicated to benefiting government, industry and the public through innovative science and technology
- SwRI runs numerous commercial and commercial/governmental consortium projects, taking advantage of the 1984 National Cooperative Research Act and 1993 National Cooperative Research and Production Act.



# Nest Steps

*Definition of gaps and prioritization of topics for supporting studies*

*discussion on how modeling team could be formed*

*brief description of the NGA-inspired modeling effort,*

# Supporting Studies

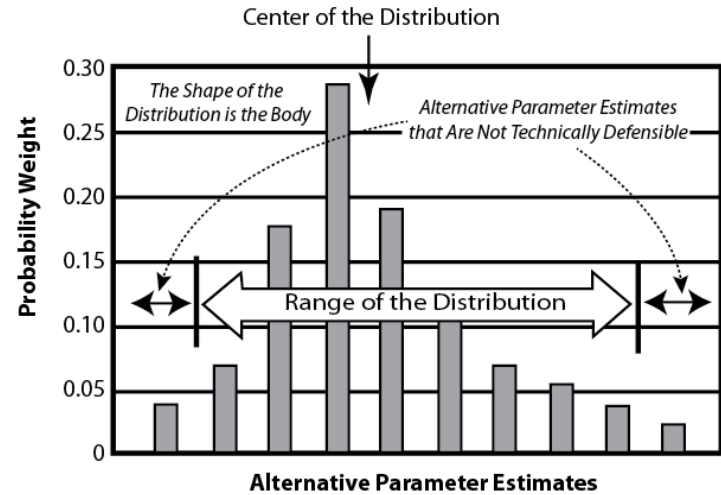
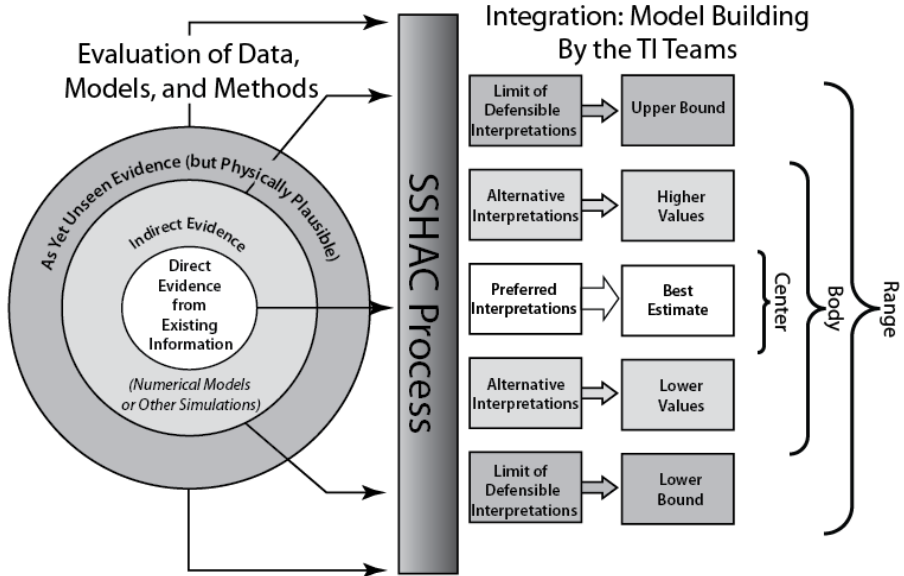
- **Need:** Models must be applicable over range of conditions required for applications:
  - Stress conditions: depths of 1-100 m;  $\alpha = 0-0.3$ .
  - Seismic demands: **M** 5-9.5, PGA 0-1.0 g
  - Soil types: FC 0-100%; nonplastic to limiting plasticity for liquefaction susceptibility; gravels; non-quartz mineralogies of course particles
- Parameter space covered by case histories is narrower
- Extrapolation guided by supporting studies (laboratory, centrifuge modeling, simulations)

# Model Development

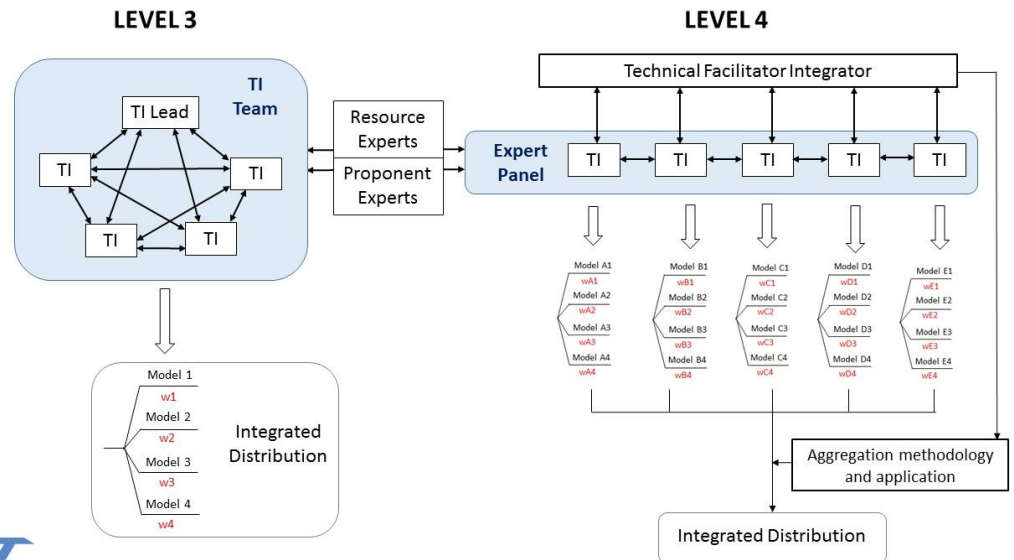
- Researcher participation
  - Meeting attendance required
  - Sharing of results required
  - Coordinated publication
- Model features
  - Applicable over project-specified parameter space
  - Defined uncertainty
- Types of models:
  - Susceptibility & triggering
  - Effects:  $\varepsilon_v$  and  $\gamma_{\max}$ ,  $S_{u\text{-liq}}$ , etc.



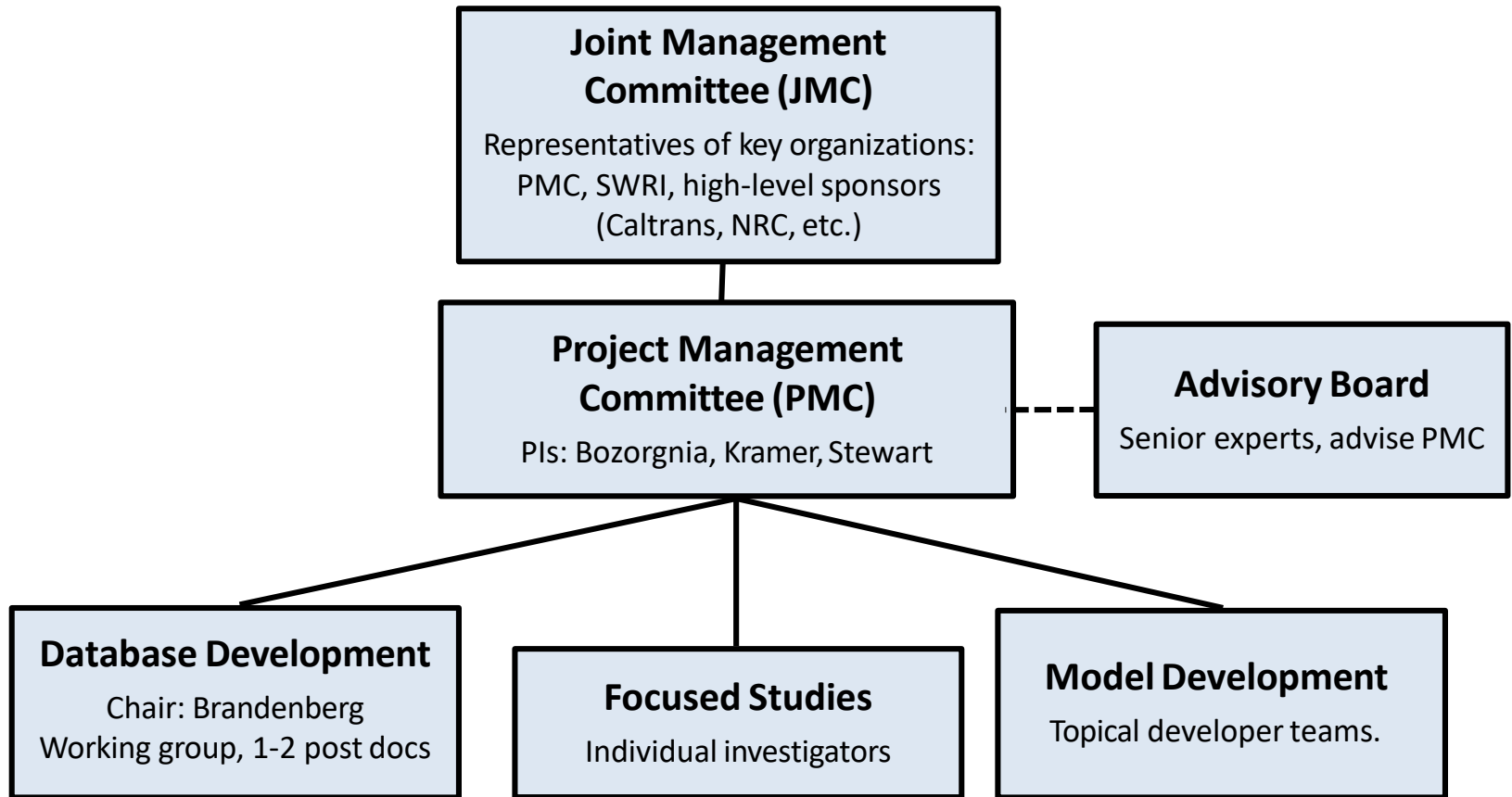
# Developing New Consensus Models



*Vision is to use a structured process (like SSHAC) to capture center, body, and range of technically defensible interpretations and models.*



# NGL Organization



# Participation in the NGL Consortium

- We are seeking additional members to fund and implement supporting studies and modeling
  - Finances overall research activities
  - Enables input through JMC
  - Opportunities for research on sponsor priority topics
- The September UCLA meeting will also serve as the kickoff meeting for the NGL consortium
- We are open to follow up meeting for more detailed discussions, including a more detailed technical presentation by Drs. Stewart and Kramer

***Thank you!***