Next Generation Liquefaction (NGL) Database and Models

12th National Conference on Earthquake Engineering
Salt Lake City, Utah
28 June 2022

S.S.03 NEXT-GENERATION LIQUEFACTION DATABASE AND MODELS

NGL Introduction & Session Agenda

JONATHAN P. STEWART, UCLA

NGL Introduction

Project vision

- NGA-inspired community approach to liquefaction research

- New and legacy case histories in shared, community database

- Collaborative modeling teams using common database

NGL Introduction

Project innovations

- Relational database (efficient storage, facilitates cloud computing)

- New classes of case histories

- Supporting studies: constrain critical effects that cannot be captured through case histories alone

- Model formulations

NGL Introduction

Partners

- Research organizations: PEER, SWRI, NHR3

- Sponsors: State DOTs, NRC-USBR

- "Pooled fund" lateral spreading study (PI Bartlett)

- Research community: advisory board, modelers, contributing community members

This Session

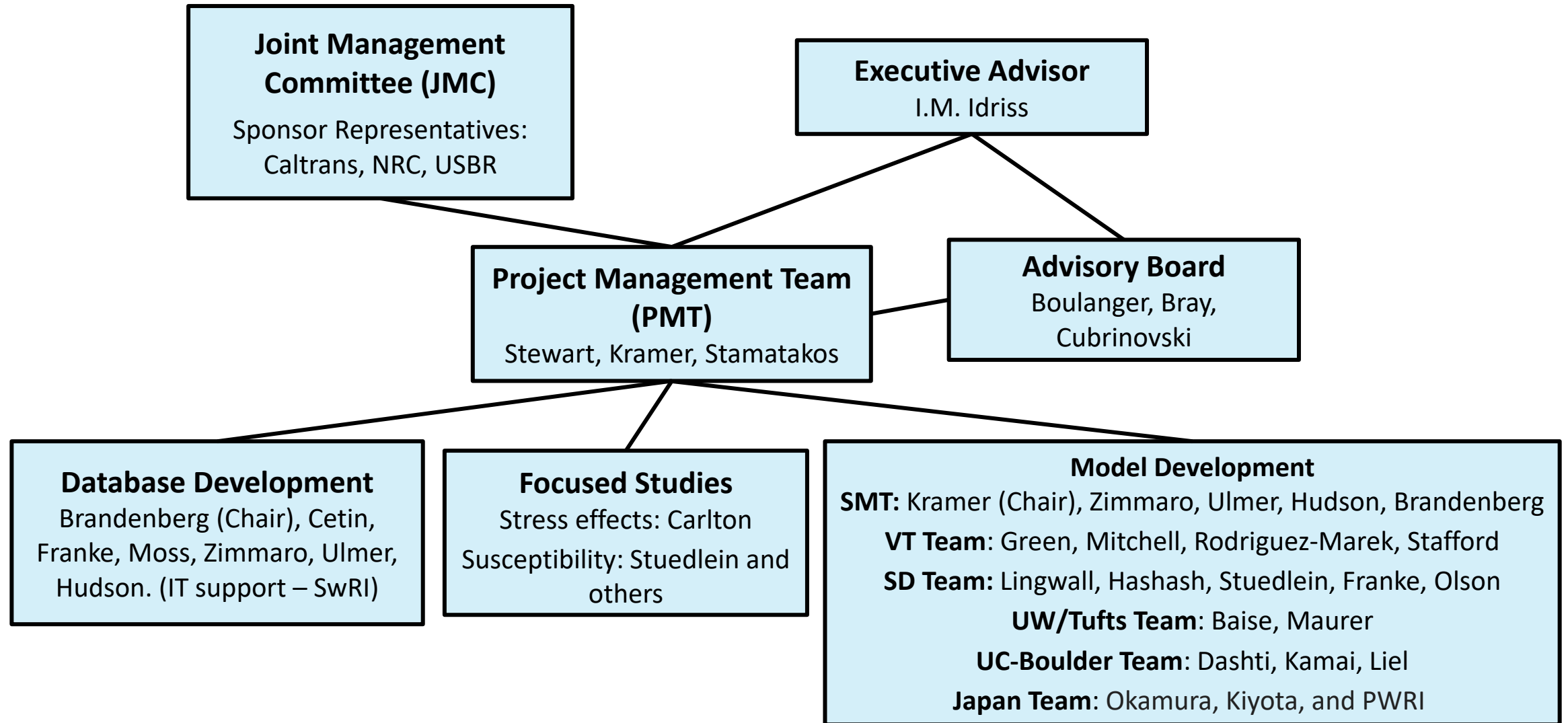| Speaker	Topic
Jonathan P Stewart	NGL Introduction & Session Overview
J Stamatakos	NGL Project
Kristin Ulmer	NGL Database and Cloud Computing
Brian Carlton	Special study on stress effects (K_σ and K_α)
K. Onder Cetin	Turkey-US Modeling Team Update
Ken Hudson	NGL Supported Modeling Team Approach

NGL Project

JOHN STAMATAKOS, SWRI

NGL Project Structure

Joint Management Committee (JMC)

Sponsor Representatives: Caltrans, NRC, USBR

Executive Advisor
I.M. Idriss

Project Management Team (PMT)
Stewart, Kramer, Stamatakos

Advisory Board
Boulanger, Bray, Cubrinovski

Database Development
Brandenberg (Chair), Cetin, Franke, Moss, Zimmaro, Ulmer, Hudson. (IT support – SwRI)

Focused Studies
Stress effects: Carlton
Susceptibility: Stuedlein and others

Model Development
SMT: Kramer (Chair), Zimmaro, Ulmer, Hudson, Brandenberg
VT Team: Green, Mitchell, Rodriguez-Marek, Stafford
SD Team: Lingwall, Hashash, Stuedlein, Franke, Olson
UW/Tufts Team: Baise, Maurer
UC-Boulder Team: Dashti, Kamai, Liel
Japan Team: Okamura, Kiyota, and PWRI

Context for NRC-USBR Project

Existing regulatory guidance:

- **Regulatory Guide (RG) 1.198**, "Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites"
- Associated guidance found in the Standard Review Plan (NUREG-0800).
- **RG 3.11**, "Design, Construction, and Inspection of Embankment Retention Systems at Uranium Recovery Facilities,"
- **RG 3.60**, "Design of an Independent Spent Fuel Storage Installation (Dry Storage).

RG 1.198

- Addresses liquefaction and strength degradation
- FS-based analysis
- Generally based on 1996 NCEER and 1998 NCEER/NSF workshops (Youd et al. 2001).

Project Tasks

Main scope items:

1. Develop community database of liquefaction case histories (**Database working group**);

2. Supporting studies for effects poorly constrained by case history data; and

3. Develop probabilistic model(s) with defined aleatory variability and epistemic uncertainty (**Supported modeling team**)