PERFORMANCE-BASED EARTHQUAKE ENGINEERING ASSESSMENT TOOL FOR NATURAL GAS STORAGE AND PIPELINE SYSTEMS

Researchers: J. Bray, N. Abrahamson, J. Watson-Laprey, K. Soga, J. Birkholzer, J. Rutqvist, T. Hutchinson, D. McCallen, T. O'Rourke, J. Eidinger, S. Lindvall, B. Foxall, F. Petrone, C. Bain, P. Hubbard, S. Thompson, J. Unruh, G. Kang, A. Kasalanati, J. Diehl, A. Martin, …

Objectives

- Implement user-driven research to develop seismic assessment tool of natural gas systems.

- Produce an open-source analysis tool that implements updated methodologies for assessment of seismic risk to underground and aboveground natural gas infrastructure.

- New tool, based on SERA software, will have the capability to identify areas of highest risk, overlaid with population information, to help regulators and utilities prioritize seismic risk reduction projects.

## OpenSRA Software
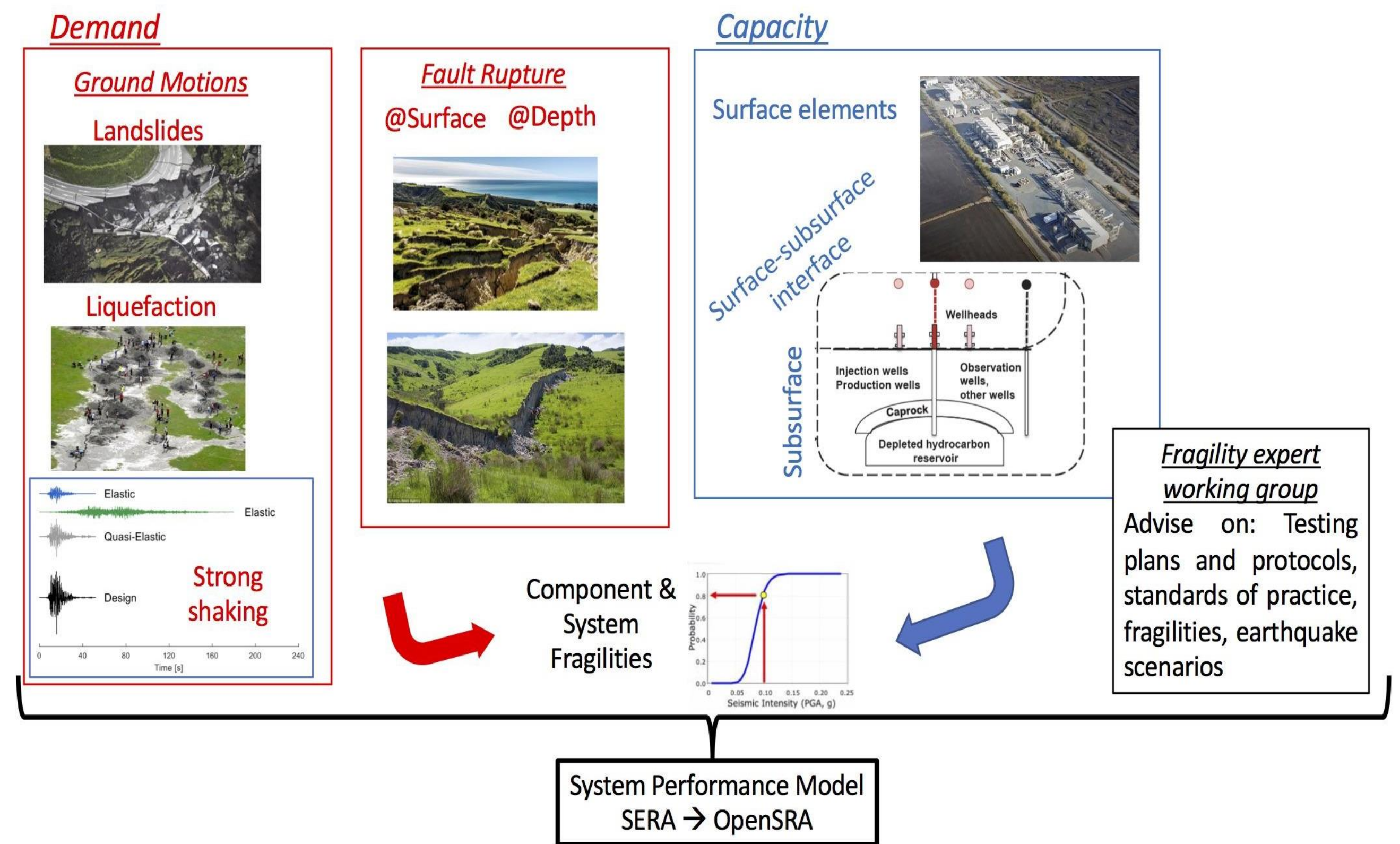
Targeted Research

Research in several areas to better characterize the risk of natural gas infrastructure:

- *Fault Displacement Hazard*

- *Liquefaction-Induced Deformation and Seismically-Induced Slope Displacement*

- *Performance of Natural Gas Storage Well Casings and Caprocks*

- *Performance of Gas Storage and Pipeline System Surface Infrastructure*

- *Smart Gas Infrastructure Sensing of Wells and Pipeline Connections Performance*

- *Synthesis of Component Fragilities into a System Performance Model*
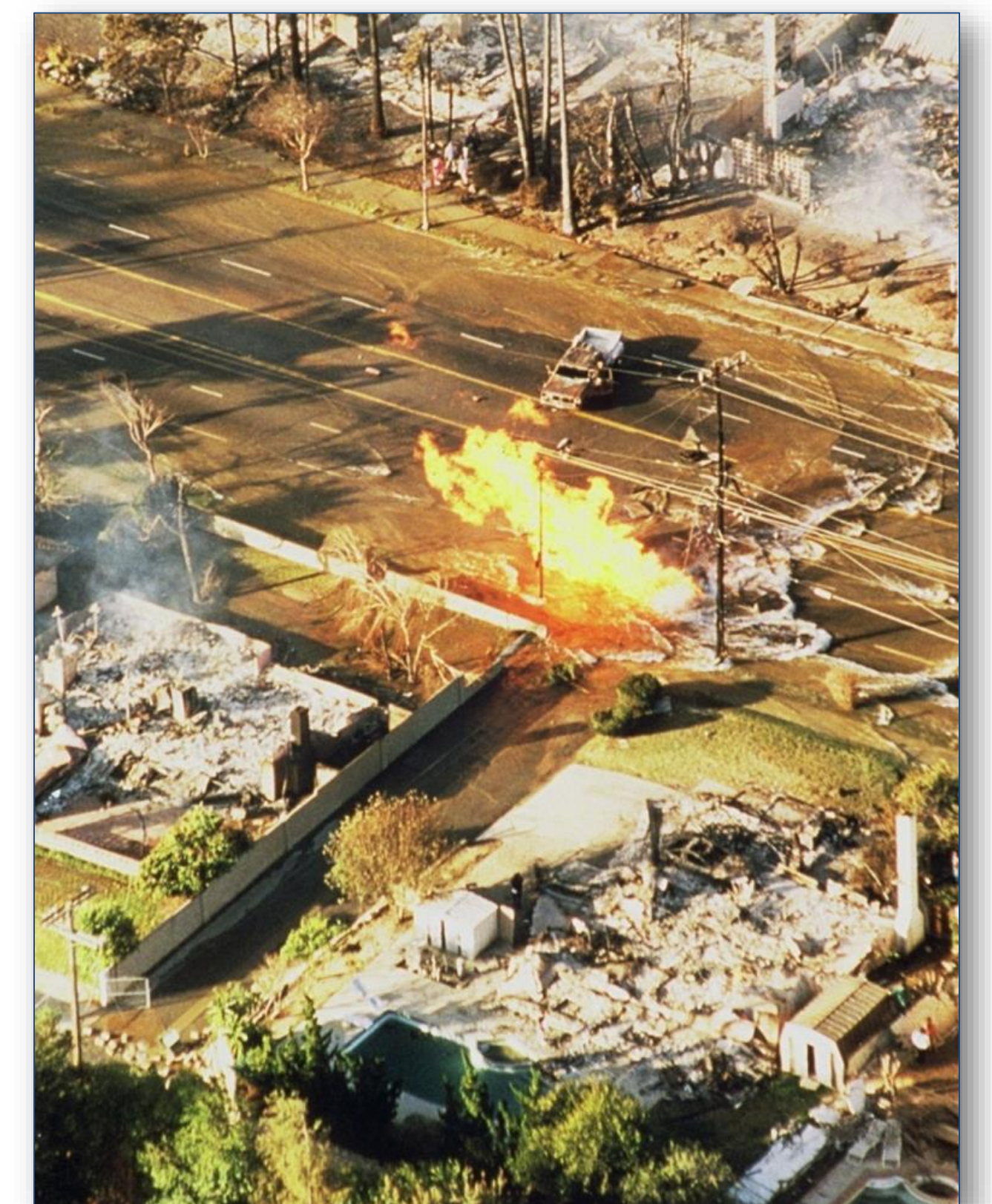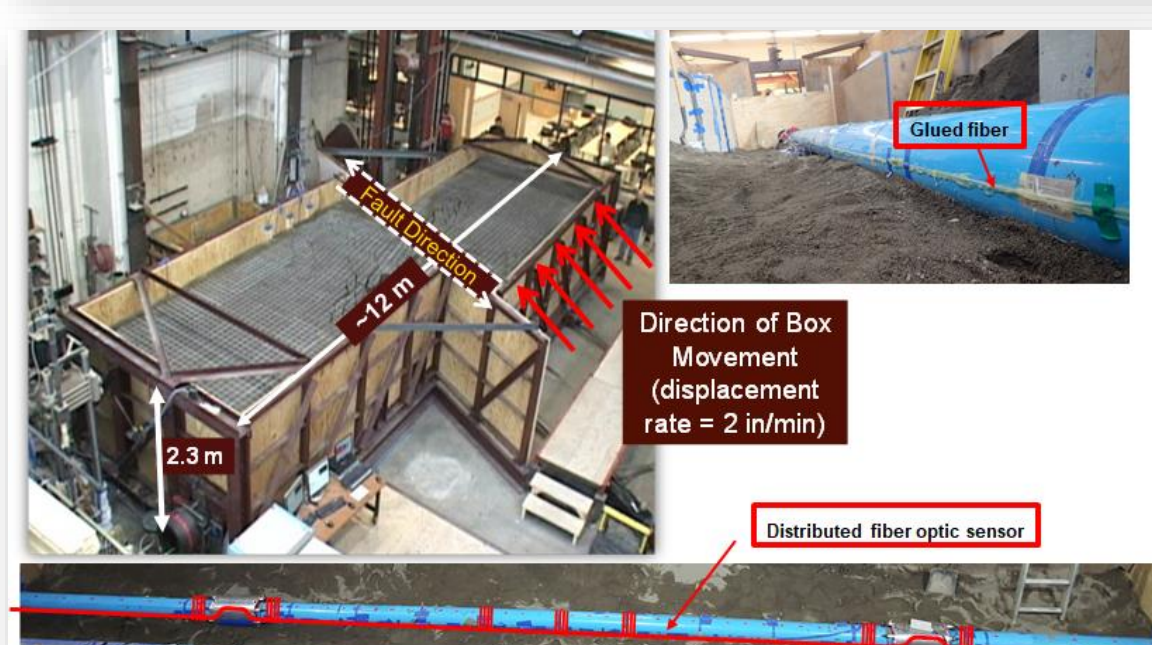

Balboa Boulevard pipeline failures following the 1994 Northridge earthquake - LA Times

Laboratory Experiments
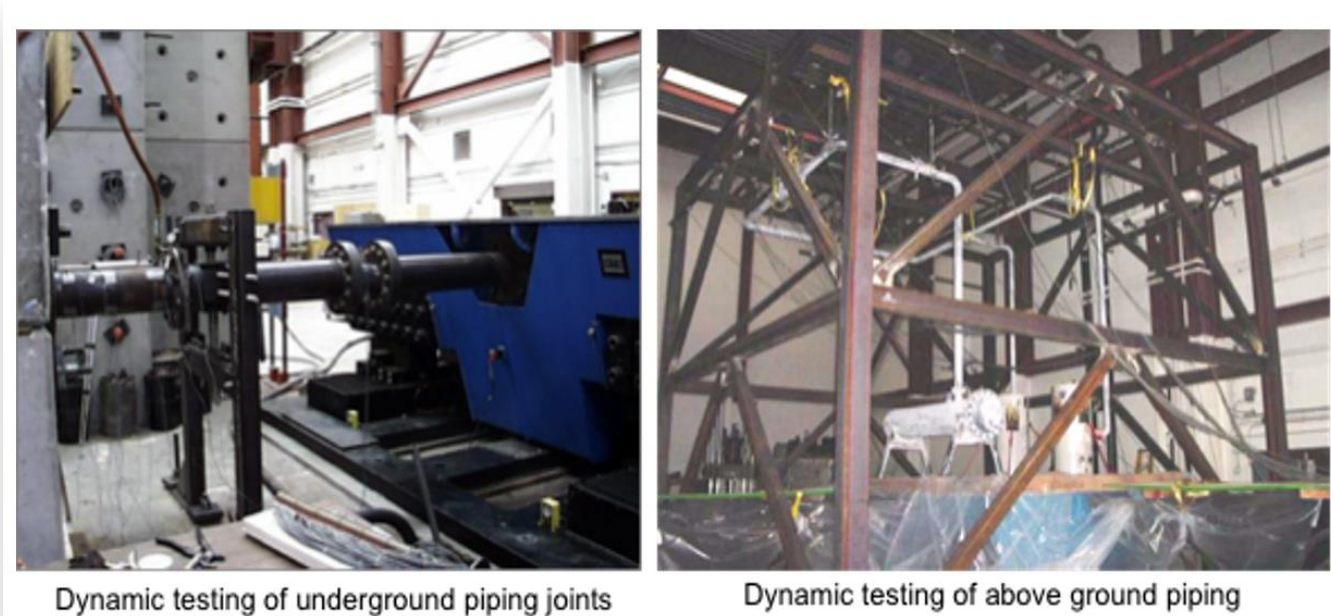
Seismic testing of piping systems
University of Nevada Reno

Dynamic testing of underground piping joints   Dynamic testing of above ground piping

Distributed fiber optic sensing for pipeline monitoring across fault movement
UC Berkeley and Cornell University

Path Forward

- Project Kickoff – December 4, 2019
- Project Duration – 34 Months