NHERI SimCenter
CLOUD-ENABLED RESEARCH TOOLS

Overview

DesignSafe-ci.org is a comprehensive cyberinfrastructure environment for research in natural hazards engineering

- **Data Storage and Sharing**
- **Access to HPC at TACC**

Data Depot — Stampede2

- **Cloud platform for running deployed applications**

OpenSees — Open∇FOAM — ADCIRC — LS Dyna

- **Collaboration Tools**

slack

DESIGNSAFE-CI
NHERI: A NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE

Back-end
SimCenter Application Framework
TACC web API — Agave Platform

SimCenter NHERI
Center for Computational Modeling and Simulation
- Cloud-enabled research tools
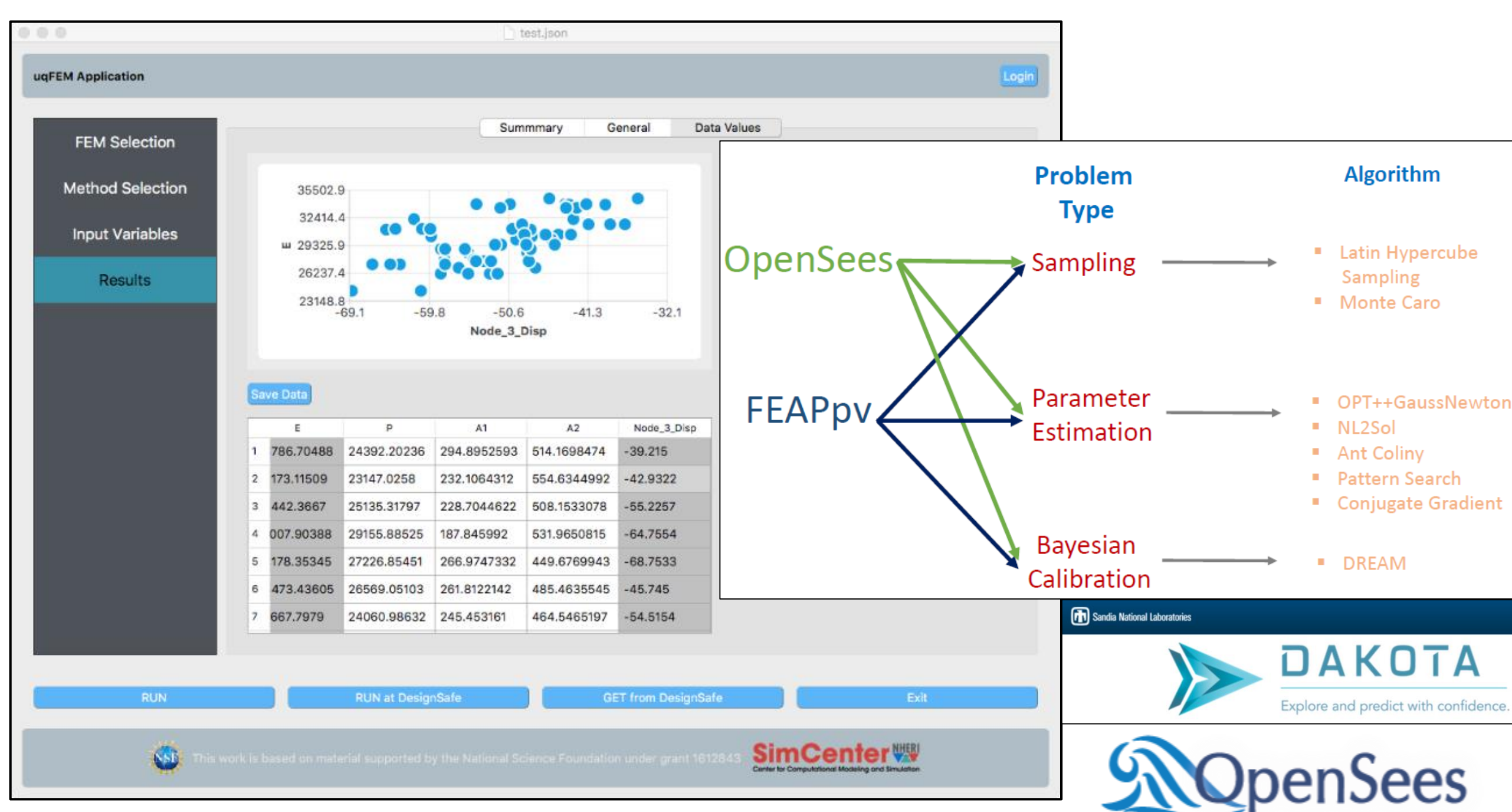- Scalable to run on HPC
- Emphasis on UQ

Front-end
SimCenter Research Applications
UQ FEM — EE UQ — PBE

Uncertainty Quantification for Earthquake Engineering
EE UQ

- Quantify uncertainty in building response when subjected to an earthquake
- User specifies the building model and uncertainty in loading and model parameters
- Uncertainty in typical Engineering Demand Parameters (EDPs) are computed and presented

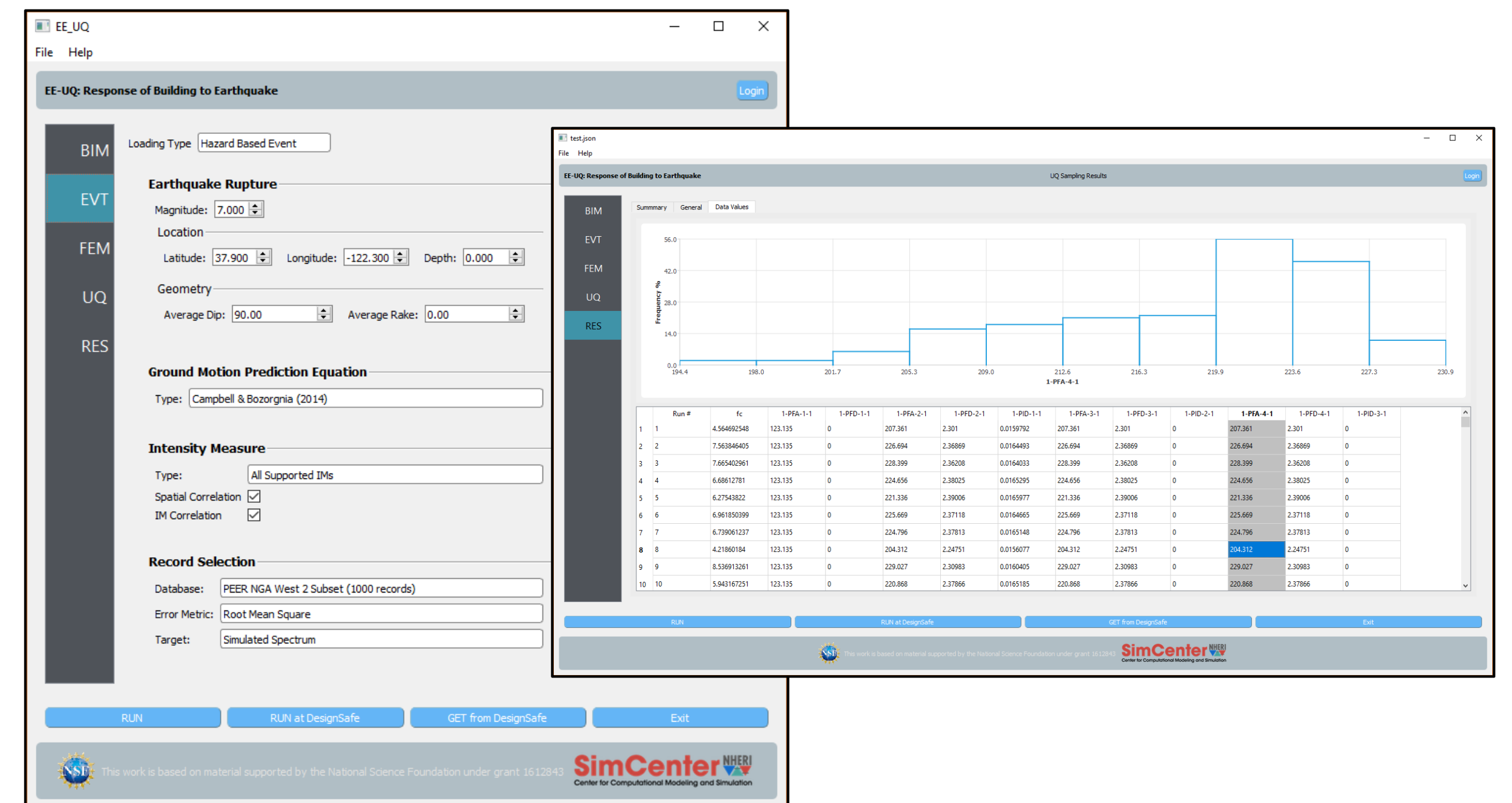## Uncertainty Quantification In Finite Element Modeling
UQ FEM

- Integrates simulation applications with UQ engine(s)
  e.g. OpenSees + DAKOTA
- Inputs are a FE model and uncertainty specifications
- Suitable for general purpose finite element models
  e.g. Geotechnical applications


Performance-Based Earthquake Engineering
PBE

- Carries out damage and loss calculations taking into account the uncertainty
- Powered by **PELICUN**, a Python library developed by the SimCenter for probabilistic loss assessment
- User specifies building model and uncertainty in loading, model parameters and building contents
- Outputs repair cost, downtime, red tag probability, … etc.
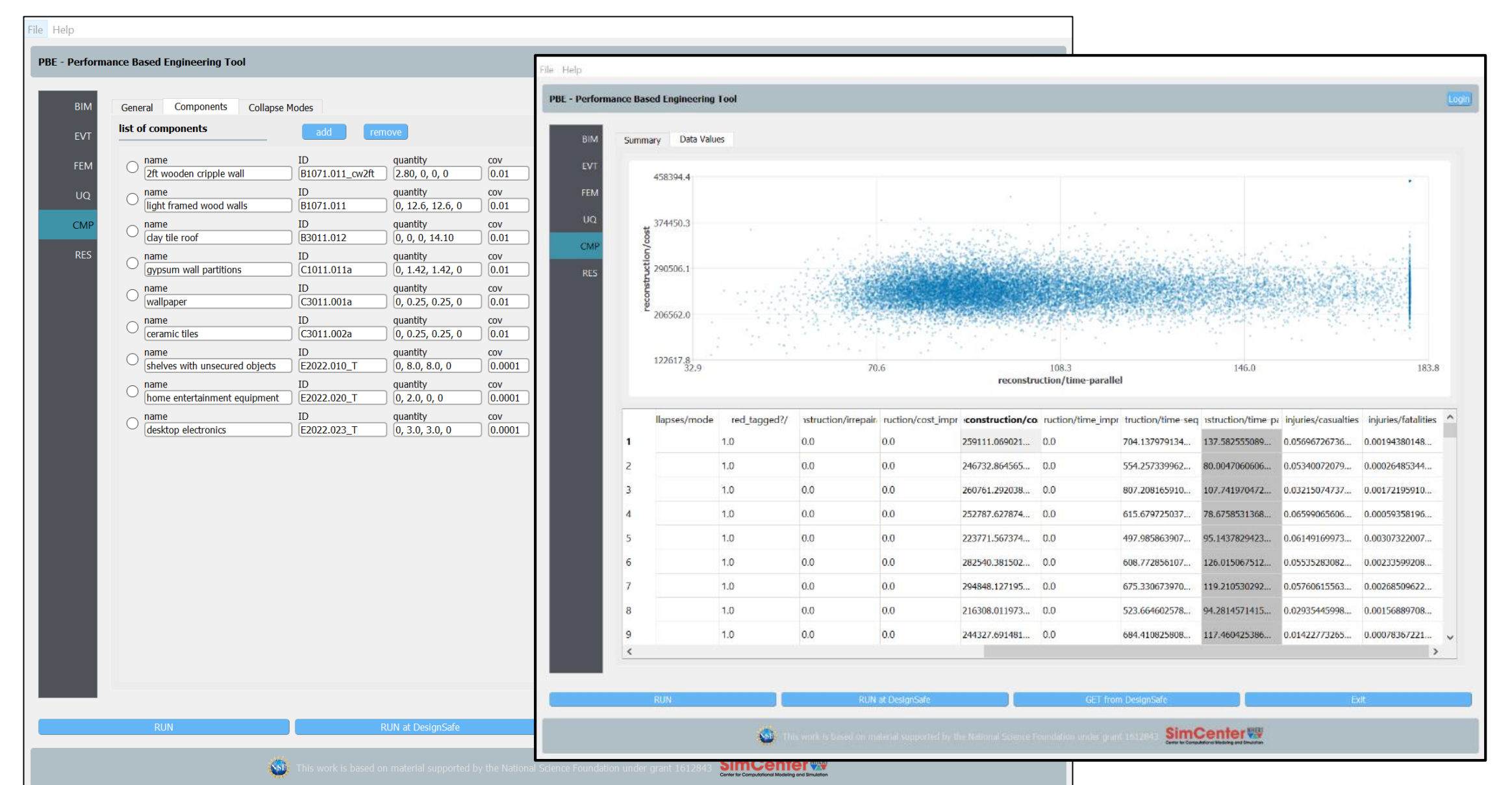
Tools for Regional Simulation

- Carries out damage and loss calculations for many buildings across a region, e.g. **City-scale simulation**
- User specifies building inventory, ground motions, configuration file and compute resources
- Loss assessment results are provided for all buildings
  e.g. Downtime, repair cost, red tag probability…etc.
- Supports user defined data, configuration and applications

NHERI
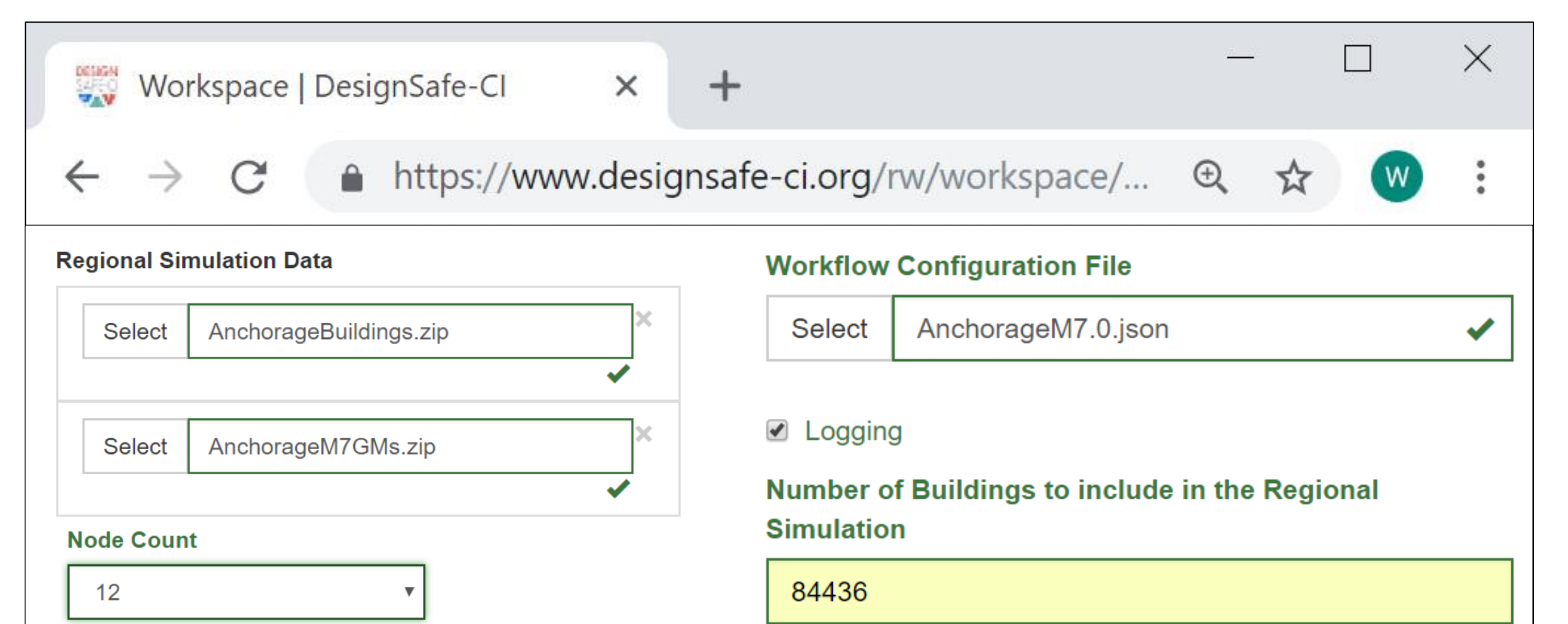
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