We Are a Virtual EF

We are producing **software applications** and **educational activities** to advance research in NHE.
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We Are a **Virtual EF**

- We have a starting set of tools: *you can contribute*

- We have a starting set of capabilities: *you can help expand them*

- The system is designed to be flexible and extensible to meet community needs as they evolve
SimCenter Goals

• **Develop a computational framework** to support decision-making to enhance community resilience to natural hazards in the face of uncertainty;

• **Seed the framework** with enough data and connectivity to **existing simulation tools** so that it can be employed in the near-term and thus improve as users identify weaknesses and new needs;

• **Create a framework** that is sufficiently **flexible, extensible**, and **scalable** so that any component of it can be enhanced to improve the analysis and thereby better meet the needs of a user group; and

• **Provide an ecosystem** that fosters collaboration between scientists, engineers, urban planners, public officials, and others who seek to improve community resilience to natural hazards. Including an **natural hazards engineering education component**.
Software Products We Are Developing

– **We** are building a number of research applications:
  - **uqFEM**: To enhance FEM applications with UQ & Optimization
  - **EE-UQ**: To provide response of buildings to earthquake events
  - **CWE-UQ**: To provide response of buildings to wind events
  - **PBE**: EE-UQ + CWE-UQ plus Downtime and Loss estimation
  - **RDT**: *To estimate* Regional Resiliency given Multiple Hazards
  - **OTHER**
SimCenter is developing an application Framework that will Enable creation of Scientific Workflow Applications for researchers working in field of NHE

We are Developing Interfaces, Code to meet the Interfaces & Applications. The applications are being designed to be flexible and extensible.
Applications are local and cloud-based

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Workflow wall time: 1 day, 2 hrs
Cumulative job wall time: 47 days, 2 hrs
Cumulative job badput wall time: 30 secs
Research Tools Release Schedule

uqFEM
- V1.0 (June 2018)
- V2.0 (2019)
- V3.0 (2020)
- V4.0 (2021)

CWE-UQ
- V1.0 (June 2018) Bluff Body
- V2.0 (Jan 2019) Building
- V3.0 (2019) UQ

EE-UQ
- V1.0 (August 2018) Uniform
- V2.0 (Sept 2018) Rock Outcrop
- V3.0 (2019) Soil Box

PBE
- V1.0 (Sept 2018) Earthquake
- V2.0 (2019) Wind
- V3.0 (2020) Water
Workflow Testbeds Release Schedule

**Regional Earthquake**
- V1.0 (June 2018) Rupture to DT&L
- V2.0 (2019)
- V3.0 (2020)

**Water**
- V1.0 (Sept 2018)
- V2.0 (2020)
- V3.0 (2021)

**Hurricane**
- V1.0 (2020)
- V2.0 (2021)

**MultiHazard**
- V1.0 (2021)

**RDT**
- V1.0 (2019) Earthquake
- V2.0 (2020) Wind
- V3.0 (2021) Water
Educational Applications

- **MDOF**
  - V1.0 (Oct 2017)
  - V1.1 (Feb 2018)

- **Pile Group**
  - V1.0 (Oct 2017)
  - V2.0 (May 2018)

- **EvW**
  - V1.0 (June 2018)
  - V2.0 (Sept 2019)

- **BFM**
  - V1.0 (Sept 2018)
  - V2.0 (2019)
Educational Applications