

DESIGNSAFE-CI

A NATURAL HAZARDS
ENGINEERING COMMUNITY



New Cyber-Infrastructure Resources for High-Performance Simulation in Natural Hazards Engineering

Pedro Arduino

University of Washington

PEER Annual meeting, Jan 29, 2016

Natural Hazard Engineering Research Infrastructure (NHERI)

- National, shared-use research infrastructure to enable transformative research
 - Network Coordinating Office (NCO)
 - Cyberinfrastructure (CI)
 - Seven experimental facilities (EF)
 - Post-disaster, rapid response research facility (RAPID)
 - Computational Modeling and Simulation Center (SimCenter)
- Replaces similar program for earthquake engineering (NEES) but expanded to include windstorms and associated hazards

DesignSafe-ci.org Leadership



Director
Ellen Rathje
Univ. of Texas



Simulation
Clint Dawson
Univ. of Texas



Data
Jean-Paul Pinelli
Florida Inst. Tech.



ECO
Jamie Padgett
Rice Univ.



CI
Dan Stanzone
Univ. of Texas

Simulation Requirements Team

Clint Dawson, Lead (UT) - Water
Pedro Arduino (U. Wash) - EQ
Ahsan Kareem (Notre Dame) - Wind
Laura Lowes (U. Wash) - EQ
Jamie Padgett (Rice) - EQ, Water



TEXAS ADVANCED
COMPUTING CENTER

Management Requirements Team

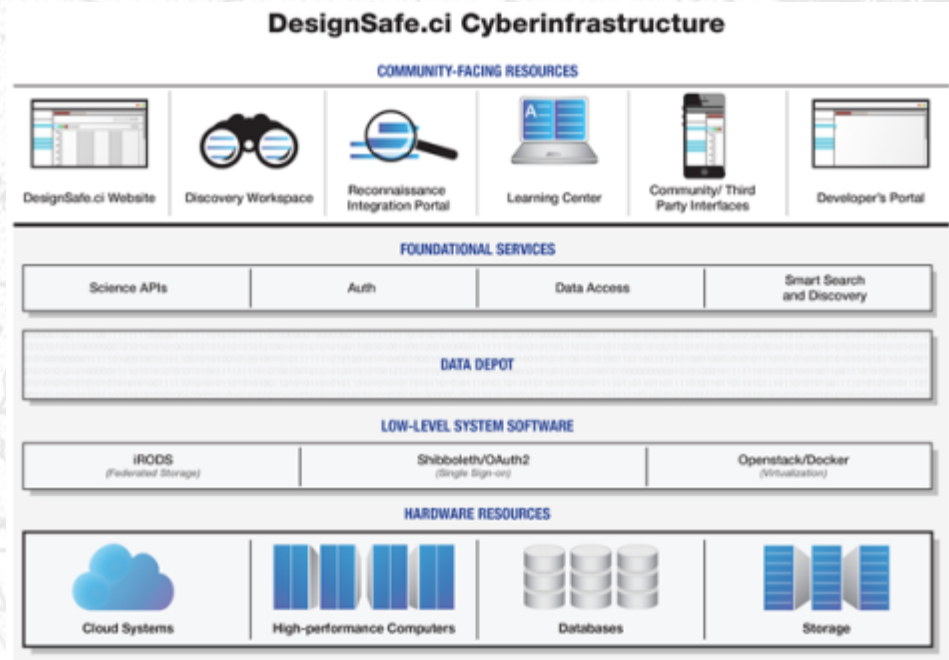
Jean-Paul Pinelli, Lead (FIT) - Wind
Brandenberg (UCLA) - EQ
Frederick Haan (Rose Hulman) - Wind
Gilberto Mosqueda (UCSD) - EQ
Lorraine Haricombe (UT) - Library Science

DesignSafe-ci Vision

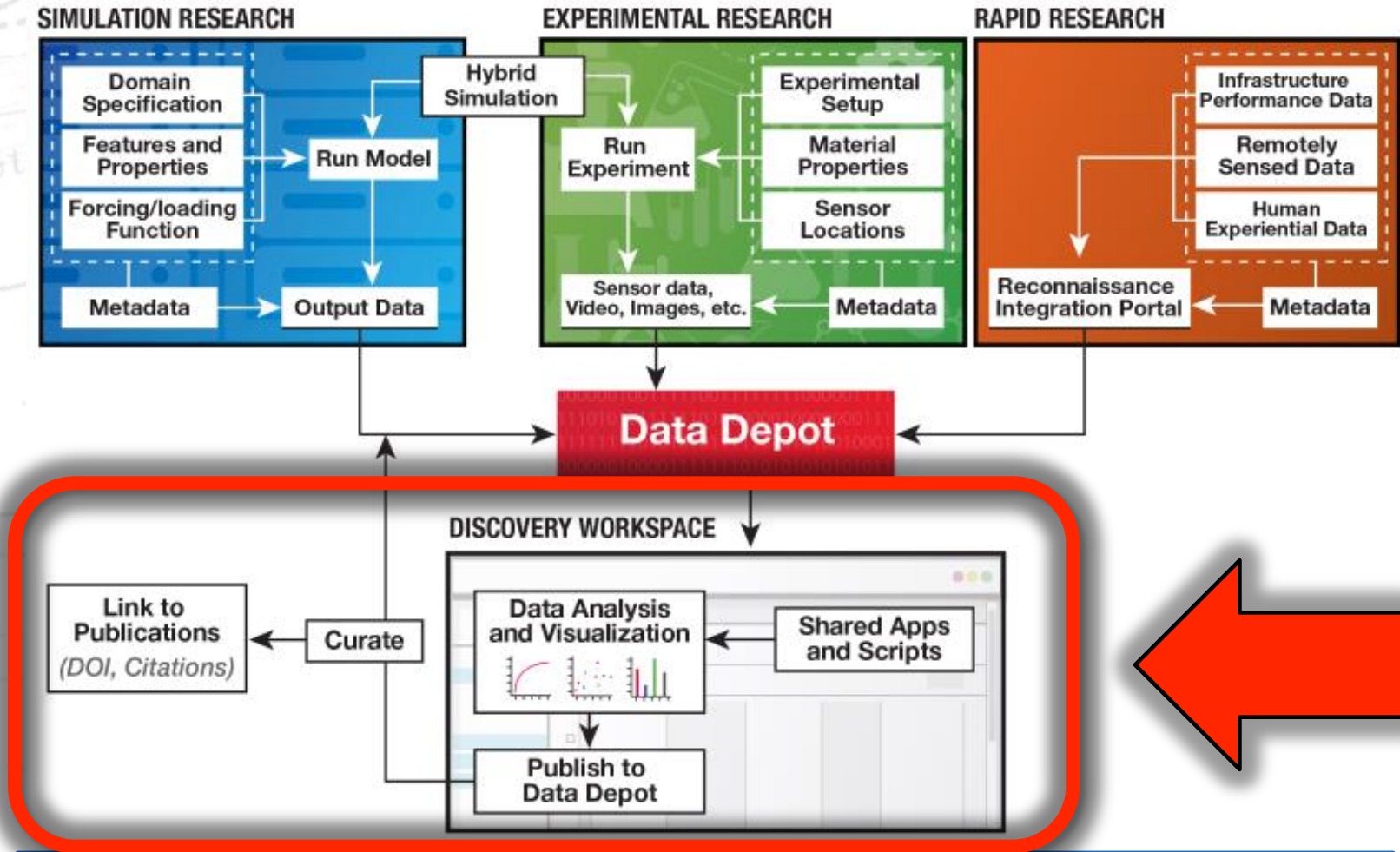
- Provide a CI that becomes an integral and dynamic part of research discovery
- Cloud-based tools that support the analysis, visualization, and integration of diverse data types
 - Key to unlocking the power of “big data”
- Support end-to-end research workflows and the full data lifecycle
- Enhance, amplify, and link the capabilities of the other NHERI components
- CI open to a broad community

DesignSafe-ci Components

- Web Portal
- Data Depot
- Reconnaissance Integration Portal
- Discovery Workspace
- Developer's Portal
- Learning Center



DesignSafe: Enabling Research



Simulation and Analytics

- **Vision:** Provide access to open source and commercial software within Discovery Workspace and provide a venue to share simulation/analysis results
- Simulation Requirements Team
 - Represents the broad natural hazards community
 - Interact with the larger community to identify user requirements
 - Prioritize user requirements

Simulation Requirements Team

Clint Dawson, Lead (UT) - Water

Pedro Arduino (U. Wash) - EQ

Ahsan Kareem (Notre Dame) - Wind

Laura Lowes (U. Wash) - EQ

Jamie Padgett (Rice) - EQ, Water

Simulation and Analytics

- Identify initial simulation codes/tools to be deployed
- Access to commercial codes: “Bring Your Own License” (BYOL) approach
- Discovery Workspace will provide mechanism for users to share simulation codes/tools
- Application programming interfaces (APIs) will be available through the Developer’s Portal to develop additional interfaces
- *DesignSafe-ci* Extended Collaborative Support Services (ECSS) can assist users

Data

- **Vision:** Allow users to easily store, share, document, and publish the data associated with their research, supporting the full data lifecycle
- Data Requirements Team
 - Represents the broad natural hazards community
 - Interact with the larger community to identify user requirements
 - Prioritize user requirements
- NSF new Proposal Guide (Jan 2016) will require public access of data created as part of NSF projects

Data Management Requirements Team

Jean-Paul Pinelli, Lead (FIT) - Wind

Scott Brandenburg (UCLA) - EQ

Frederick Haan (Rose Hulman) - Wind

Gilberto Mosqueda (UCSD) - EQ

Lorraine Haricombe (UT) - Library Science

Data Management Philosophy

- Progressive curation, integrated with the research lifecycle
- Focus on achieving community's research goals
- Modular data model that supports how researchers organize their data
- Drag and drop upload and cloud import will encourage users to use the Data Depot throughout the data/research lifecycle
- Should not be a burden to researchers
- Work with NHERI awardees to gather data model/metadata requirements

What about NEEShub?

- NEEShub will be available until all functionality has been transitioned to DesignSafe
- Migrate NEES Project Warehouse data to DesignSafe
 - Map NEES data to new data models
- Migrate tabular NEES Databases to DesignSafe
- Re-assign existing DOIs to new locations within DesignSafe
- Prioritized NEEShub tools (e.g., OpenSees) will be transitioned to Discovery Workspace

Education and Community Outreach

- Train the user community
 - Community awareness of *DesignSafe-ci* functionalities
 - Online training modules, webinars and in-person training

LEARNING CENTER

DesignSafe provides training, user support, and student engagement opportunities for the natural hazards engineering community. Training provides insight and guidance on how to use this portal to conduct your research. User support provides access to our staff who will assist you with questions regarding the use of the portal, as well as extended collaborative support services (ECSS) to provide in-depth, longer-term engagement of our staff with your research team. Student engagement spans learning opportunities for all ages, from K-12 through undergraduate and graduate opportunities.



Training Resources

Self-paced online training, upcoming webinars and user guides.



User Support/ECSS

User assistance including email and phone support, and extended collaboration support.



Student Engagement

Opportunities for students to learn about and participate in natural hazards engineering research.

Strategic Partnerships

- NatHaz Modeling Laboratory at the University of Notre Dame (Ahsan Kareem): Vortex Winds CI
- Southern California Earthquake Center (SCEC): Archiving of broadband simulations
- Dataset Partners
 - Hyogo Earthquake Engineering Research Center, NIED, Japan (E-Defense)
 - Schofield Centre for Geotechnical Modelling at Cambridge Univ
 - Tokyo Polytechnic Univ Wind Engineering Research Center
 - Florida Coastal Monitoring Program (FCMP) at the Univ Florida
 - QuakeCoRE Center at Univ of Auckland/ Univ of Canterbury

Interface with Other Awardees

- Experimental Facilities (EF)
 - Together develop and implement end-to-end data management infrastructure
- RAPID Reconnaissance Facility
 - Together develop Reconnaissance Integration Portal and tools to improve reconnaissance
- SimCenter
 - Developed tools shared through Discovery Workspace
- Network Coordinating Office (NCO)
 - Together develop policies and broad ECO activities

Important Schedule Milestones

- September 30, 2015: NEEShub transitioned to UT/TACC
- September 30, 2015: Initial DesignSafe website released (www.designsafe-ci.org)
- Fall/Winter 2015: Visit with each Experimental Facility
- January 2016: Community User Requirements Workshop (Austin, TX)
 - October 2015: Community User Requirements Webinars
- **Spring 2016 (March 1)**: DesignSafe-ci Release 1 including Discovery Workspace and Data Depot
- **Python, Matlab, Jupyter**
- **OpenSees, OpenFoam, AdCirc**