DESIGNSAFE-CI

A NATURAL HAZARDS ENGINEERING COMMUNITY

Use Case Teams: Visualization

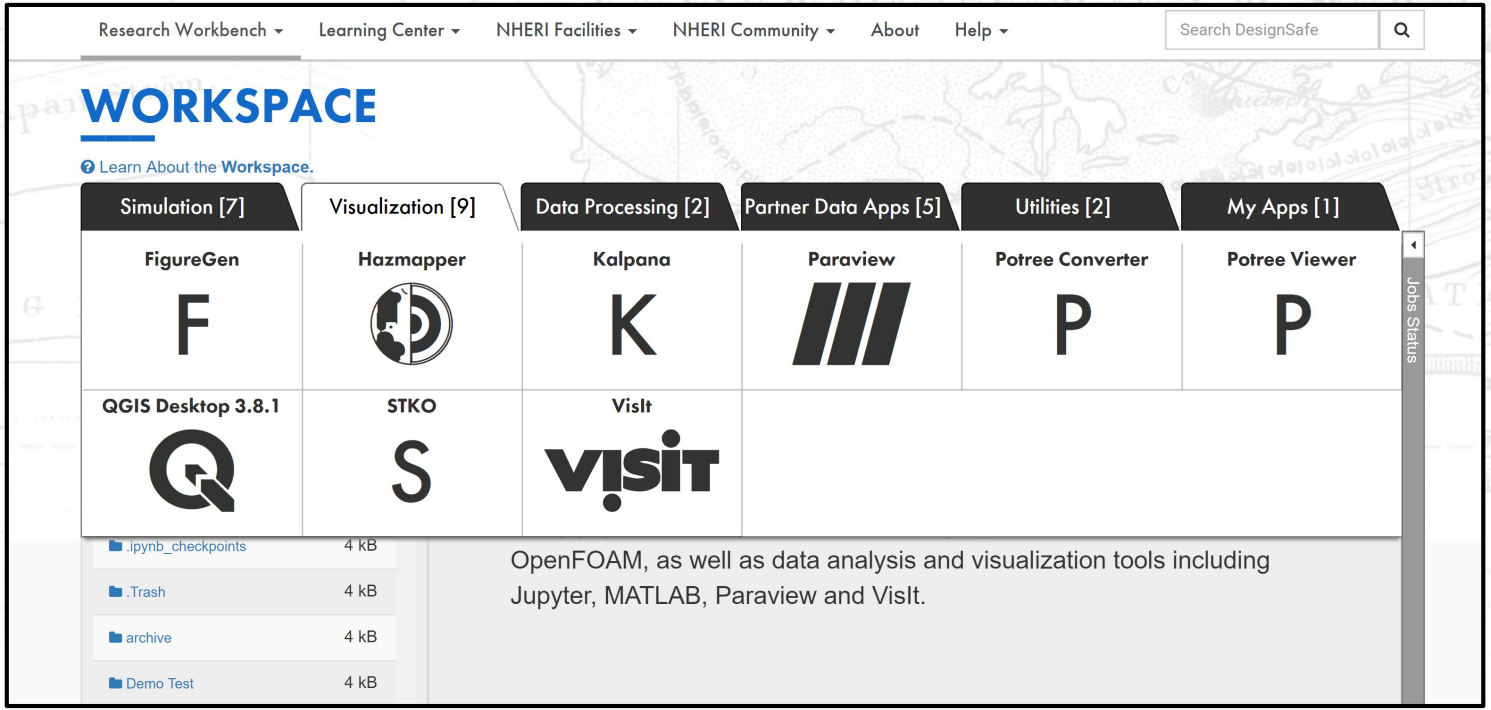
Jamie Padgett

Visualization

- Cloud-based visualization is an important component of the CI because it allows for a deeper understanding of large and complex datasets.

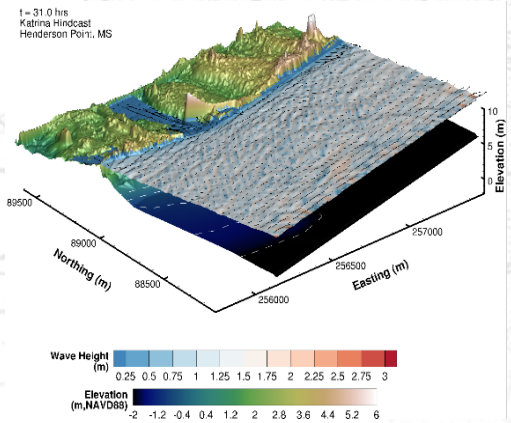
- Members of this Use Case team will utilize and enhance the existing DesignSafe visualization tools to explore large-scale simulation and experimental datasets within DesignSafe.

Visualization Tools



Visualization

- Role in interpreting, understanding and communicating research in the natural hazards engineering (NHE) community and beyond
- Diverse data types and visualization needs across NHE



Use of FigureGen and QGIS for visualization of storm surge-wave simulations by Dr. Bret Webb at U. of S. Alabama.

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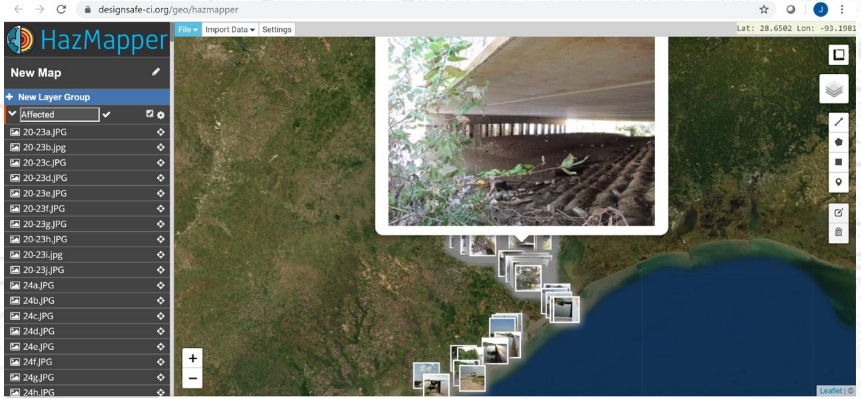

Use of HazMapper for visualization of bridge-roadway infrastructure damage following Hurricane Harvey by Dr. Jamie Padgett at Rice U. (GeoJSON in published dataset)

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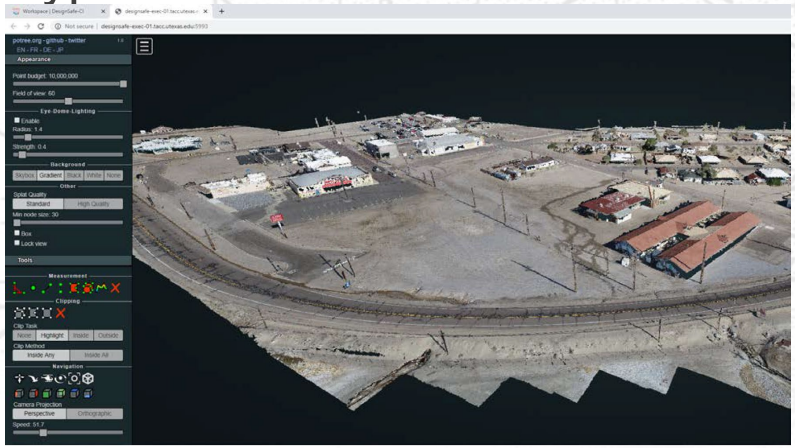


Use of Potree Converter and Potree Viewer for visualization of UAV / LiDAR data collected with following Ridgecrest earthquake sequence by GEER team.

Use Cases

- Project 1: Visualization throughout the distributed infrastructure risk assessment workflow (J. Padgett)

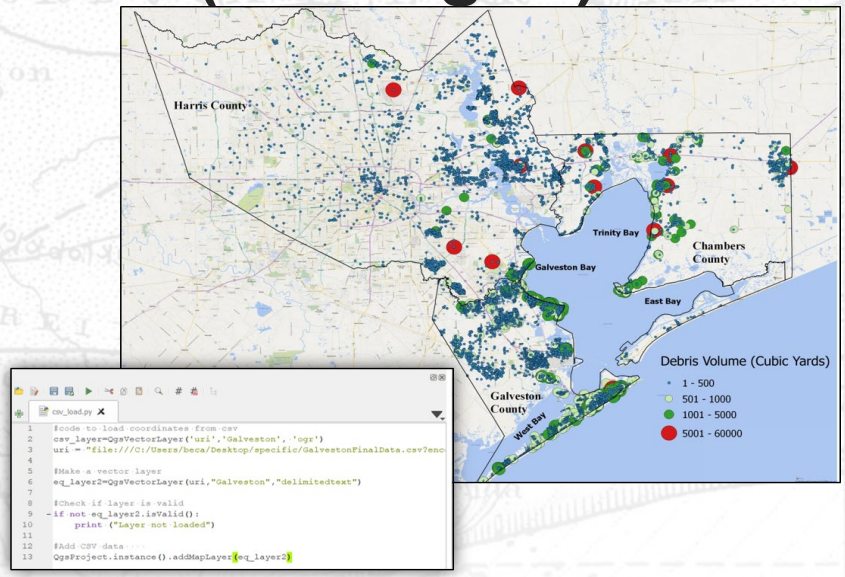
- Project 2: Recon Image Analysis App that will allow easy browsing, tagging, and analysis of large datasets of images from reconnaissance (F. Haan)

Project 1: Viz throughout Infrastructure Risk Assessment Workflow (J. Padgett)

- Regional risk assessment of distributed infrastructure systems relies upon diverse data sources and benefits from visualization for testing and communicating the impacts on communities.
- Jupyter notebook will be developed that can serve as a template for visualizing diverse geospatial data sources at key stages along the infrastructure risk modeling workflow.
- This work will explore and demonstrate the capabilities of Jupyter notebooks, Pandas, iPython packages, and QGIS within the DesignSafe-CI to support the diverse data, modeling, and visualization needs of the infrastructure risk modeling community.

Project 1: Viz throughout Infrastructure Risk Assessment Workflow (J. Padgett)

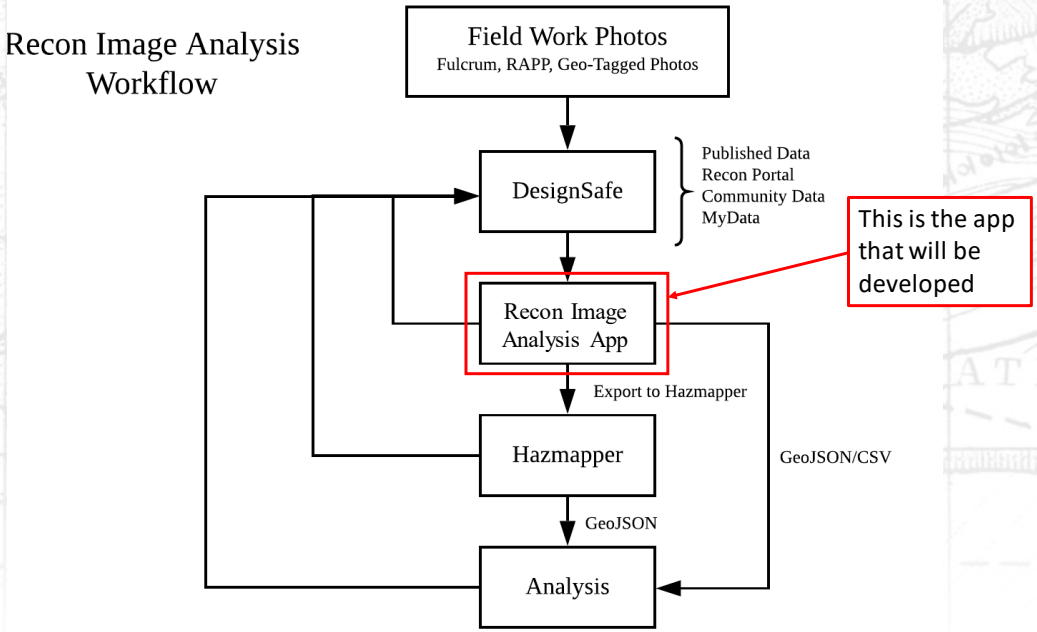
- Automation and integration of diverse datasets across spatially distributed regions
- Offers base Jupyter notebook for visualizing distributed infrastructure data that can be adapted by future researchers



Debris data from Hurricane Ike (preliminary coding for automated data processing and visualization by NHERI REU students R. Molina and B. Dukes.)

Project 2: Reuse of Recon Images (F. Haan)

- Large numbers of damage reconnaissance photos from extreme events are difficult to reuse but represent a valuable repository of data on real structural behavior
- An app will be developed that will enable browsing, tagging, and subsequent analysis of these photos to enable analysis of both structural response and extreme loading.



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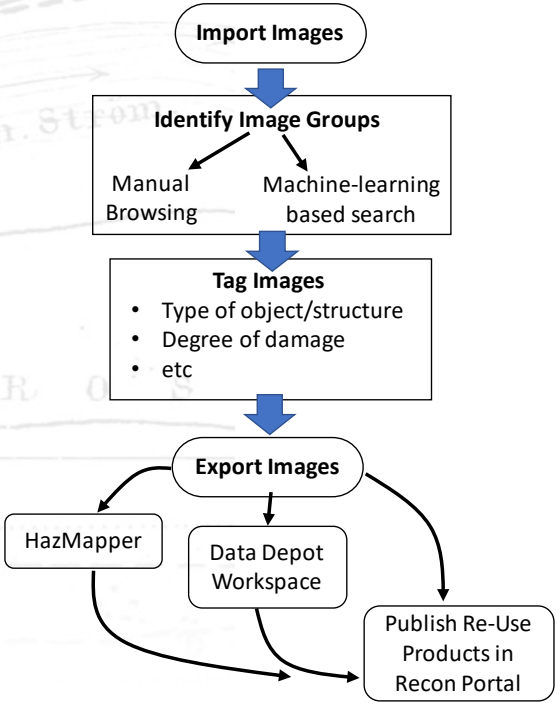

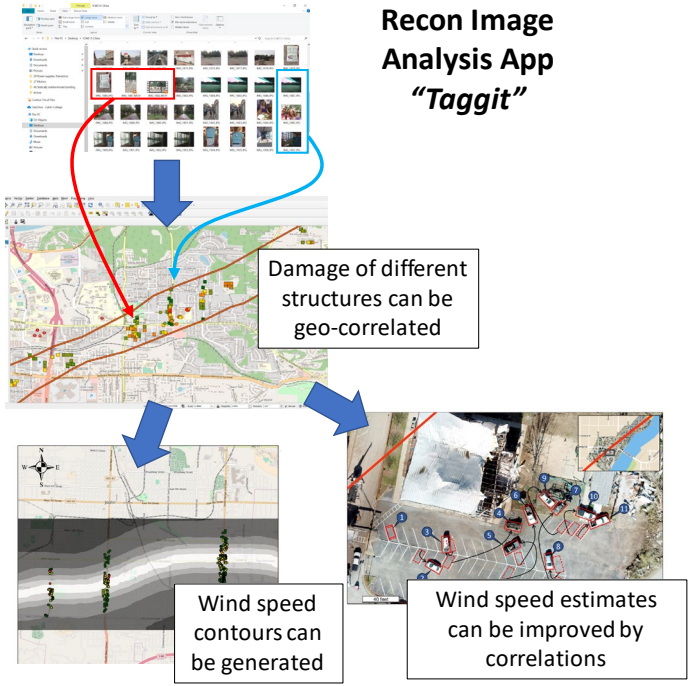

The "Taggit" image analysis app can be used to map damage from geolocated photos and improve wind speed estimates after extreme wind events.

Use Cases

- Note that many other examples presented earlier also have key visualization components
  - Using Paraview, Potree, FigureGen, Kalpana, QGIS
  - For wind, earthquake, storm surge/wave applications
  - To visualize simulation, experimental and field data

- Use cases offer apps and example Jupyter notebooks that can be adapted by the NHE community to leverage and expand CI visualization capabilities