



SEISMIC PERFORMANCE OBSERVATORY

PEER INTERNSHIP PROGRAM – SUMMER 2012

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INTRODUCTION

Background:

Although there exist a number of archives based on structural performance and behavior, these documents and recordings primarily focus on post-earthquake data and are often inaccessible, unorganized, or lost over time.

PROBLEM:

Earthquake Engineers are hindered by:

- An **unsystematic** method for gathering and storing critical data
- Unavailable pre-earthquake data
- Independent investigations **lacking collaboration**

SOLUTION:

- Develop a **CENTRALIZED, ACCESSIBLE** database that will:
 - ✓ Provide pre-earthquake data for comparison purposes
 - ✓ Offer advanced searching capabilities
 - ✓ Allow users to identify trends
 - ✓ Quantify data
 - ✓ Link users to external resources
- Establish a thorough procedure for both pre and post earthquake investigations

Project Objectives:

1. Develop and improve the interface of SPO
2. Establish a systematic method for effectively gathering data and quantifying damage
3. Provide a **User's Manual** for SPO
4. Pre-populate the database

APPROACH

Locating External Resources

- Presenting project scope to external organizations (Caltrans, USGS, etc.)
- Addressing security concerns

Selecting Structures

- Begin with local seismically instrumented structures around the Bay Area
- Determine structure's vulnerability based on structural system, distance from fault, liquefaction rating, soil type, and much more

Establishing Investigation Plan

1. Collect preliminary information
2. Prepare a set of drawings (specify route, location of instruments, key structural components, etc.)
3. Collect all tools and equipment
4. Photograph the structure and document existing damage

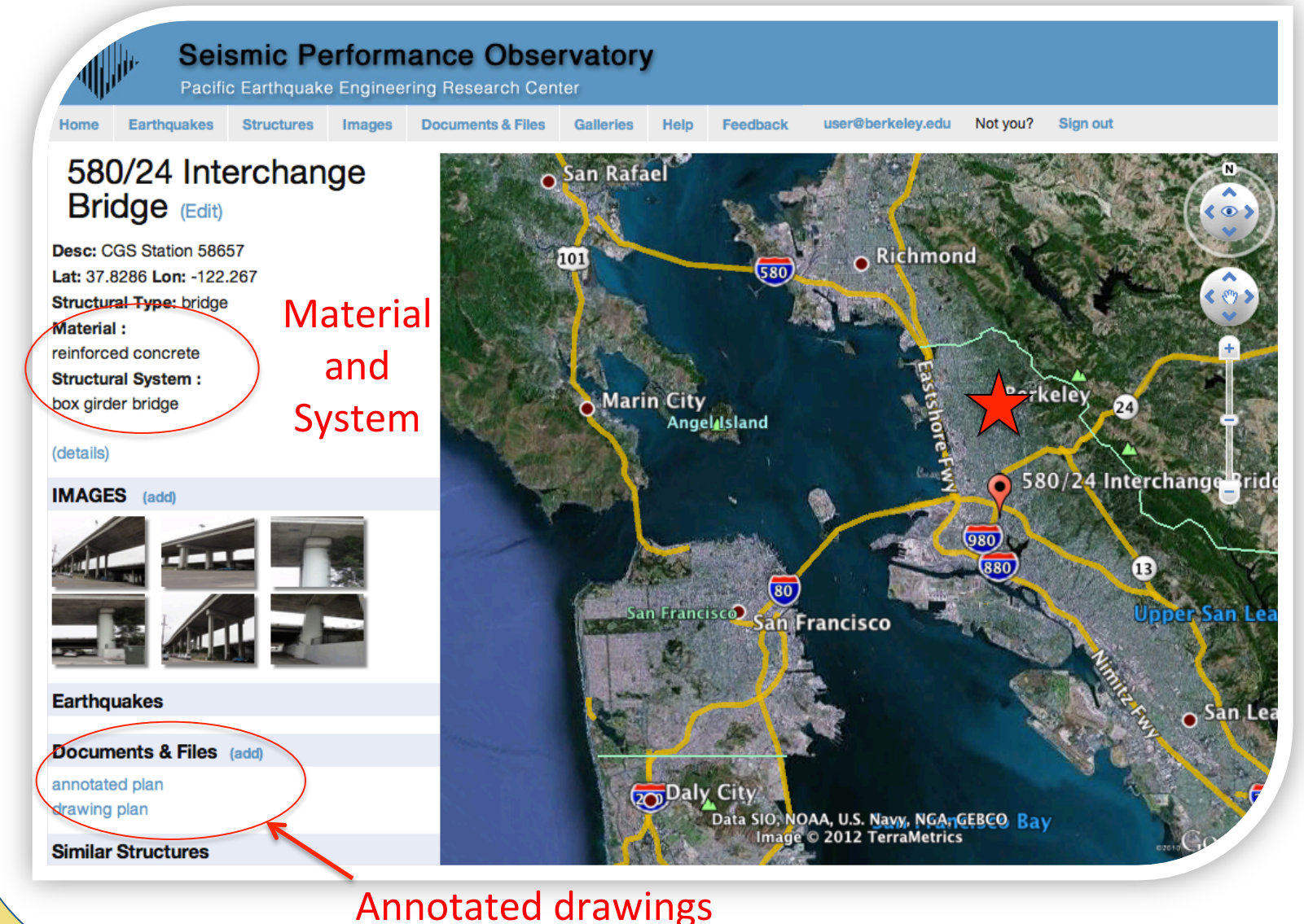
Inputting Data into SPO

1. Create a structure
2. Create a gallery and assign it to the structure
3. Edit images and define damage
4. Upload all available drawings and documents within the structure's profile
5. If applicable, associate the structure with a specific earthquake

ULTIMATE GOAL:

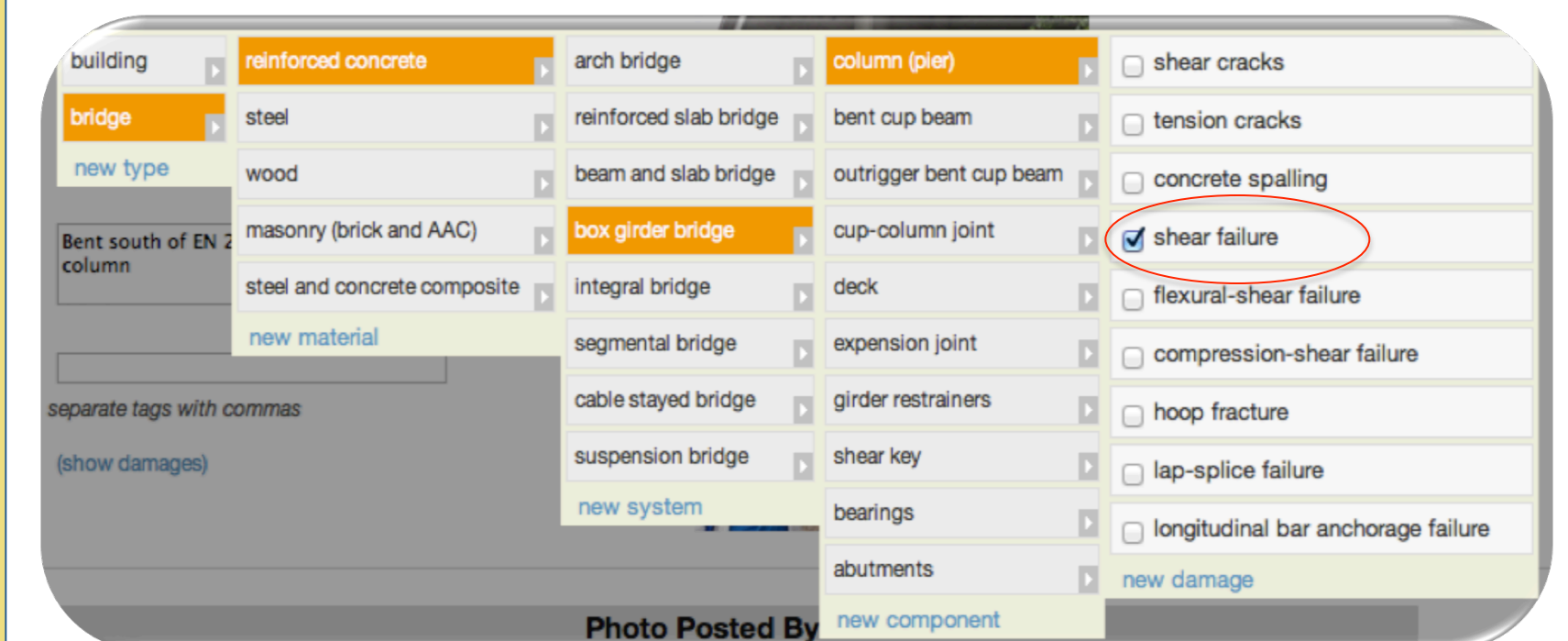
Produce fragility curves based on the collected data regarding the progression of structural damage

SPO INTERFACE



DAMAGE TAXONOMY

The taxonomy below provides the user with very specific options when defining damage.

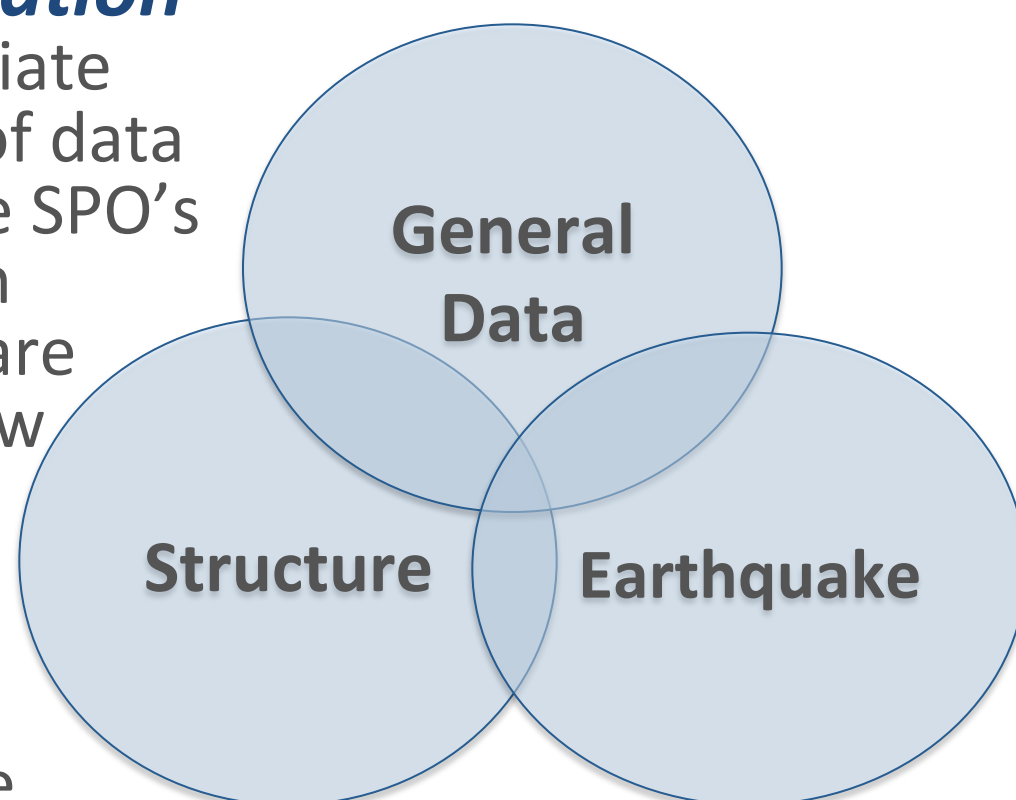


Shear Crack Failure

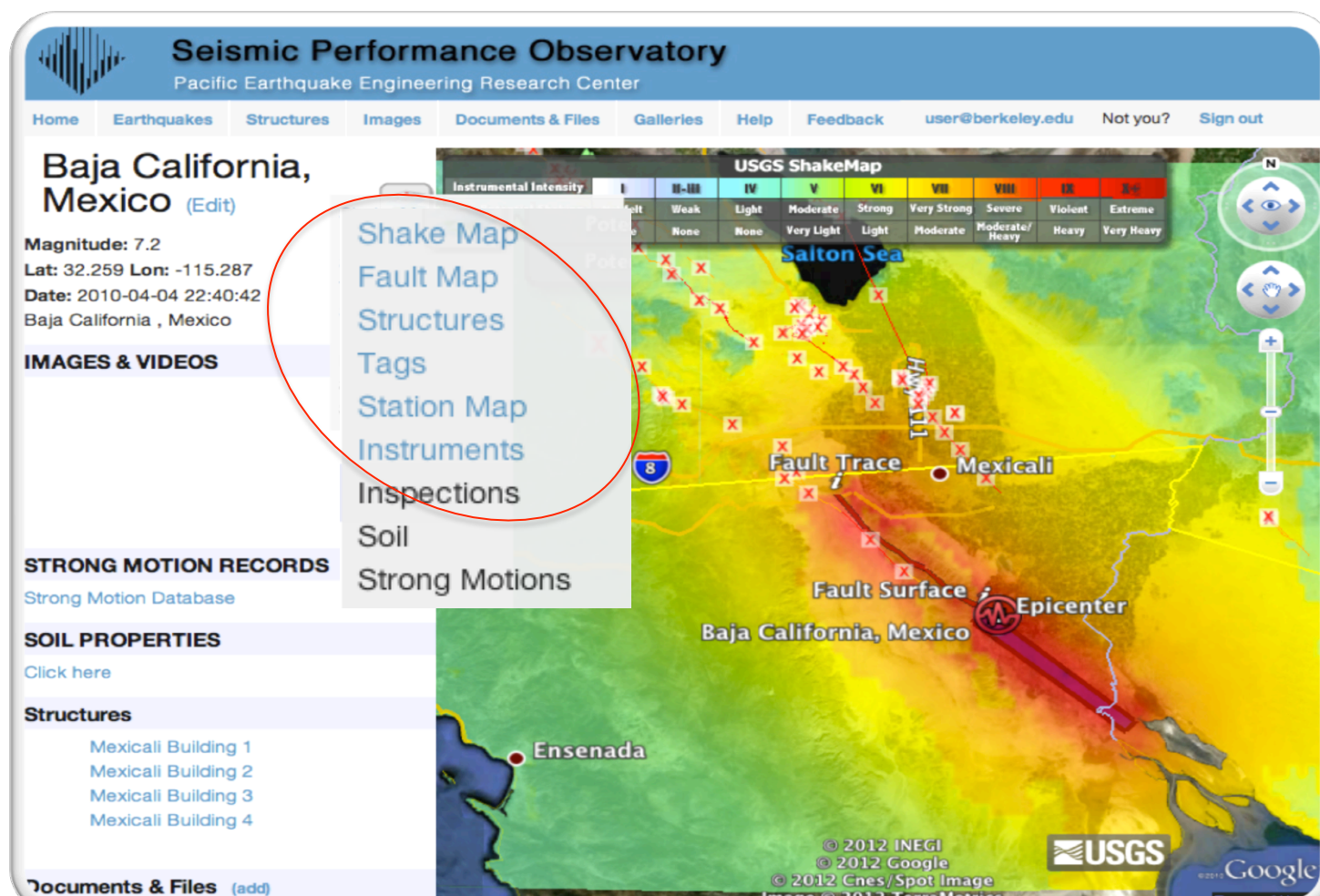
ANALYSIS

Metadata Association

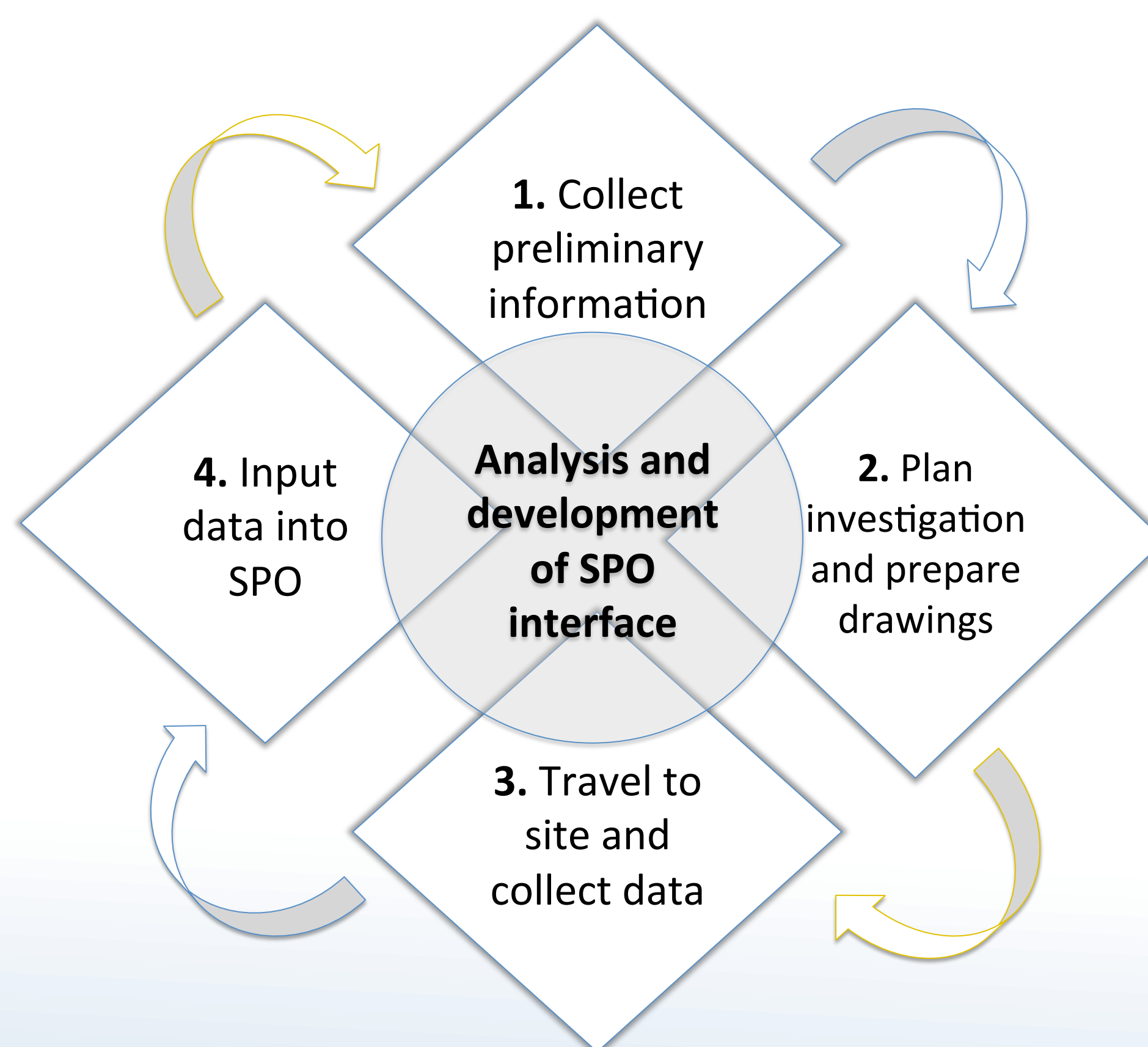
- Users may associate these 3 classes of data
- Users may utilize SPO's advanced search engine to compare findings and draw relationships between types of damage, structural systems, and the degree of ground motion



Earthquake Documentation



METHODOLOGY



REFERENCES

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 Caltrans, "PEQIT Manual 2012." Last modified January, 2012. Accessed June 27, 2012.
 United States Geological Survey, "2009 Earthquake Probability Mapping." Last modified November 4, 2010.
 United States Geological Survey, "Soil Type Map." Last modified June 8, 2012. Accessed June, 2012.
 Combined Strong-Motion Data, "Strong Motion Stations In Northern California." Last modified March 23, 2011.
 Mahin, S.A., H.A. Faison, V. Terzic, and J. Way. "Development of a System for Visualization and Management of Information on the Earthquake Performance of Structures." PEER, University of California, Berkeley.

CONCLUSION

What's Next:

- Continue performing investigations and inputting data into SPO
- Inform others of SPO's objectives
- Gain the interest of external agencies
- Encourage the engineering community to **contribute**
- Continue improving and developing SPO's interface

Ultimately, we hope to offer researchers and professionals the tools necessary to advance seismic performance analyses.

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