In order to better understand the distribution of risk across ports and to inform transportation resilience policy, we are developing a comparative assessment method to measure the relative climate-risk faced by a face of ports. Our mixed-methods approach combines a quantitative, data-driven, indicator-based assessment with qualitative data collected via expert elicitation. In this presentation, we identify and synthesize over 120 potential risk indicators from open data sources. Indicators represent exposure, sensitivity, and adaptive capacity for a pilot sample of 30 ports. Our exploratory data analysis, uncovered sources of variation between individual ports and between indicators. Next steps include convening an expert panel representing the perspectives of multiple transportation system agencies to find consensus on a suite of robust indicators and metrics for maritime freight node climate-risk assessment. The index will be refined based on expert feedback, the sample size expanded, and additional indicators sought from closed data sources. Developing standardized indicators from available data is an essential step in risk assessment, as robust indicators can be policy-makers monitor resilience strategy implementation, target and justify resource expenditure for adaptation schemes, communicate adaptation to stakeholders, and benchmark progress.

### Definitions

- **Adaptive Capacity**: attributes and resources available that can be used to prepare for and undertake actions to reduce adverse impacts.
- **Climate impact, adaptation, and vulnerability (CAV) decisions**: choices, the results of which are expected to affect or be affected by the interactions of the changing climate with ecological, economic, and social systems.
- **Decision support**: a set of processes intended to create the conditions for the production of decision-relevant information and for its appropriate use [National Research Council, 2009]
- **Decision-relevant information**: yields deeper understanding of, or is incorporated into making a choice that improves outcomes for decision makers and stakeholders or precipitates action to manage known risks.
- **Exposure**: the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places that set conditions could be adversely affected.
- **Indicator**: a measurable, observable variable that serves as a proxy for an aspect of a system that cannot be directly, adequately measured.
- **Open data**: publicly available data structured in a way that enables the data to be fully discoverable and usable by end users.
- **Risk**: the potential for consequences where some value is at stake and where the outcome is uncertain, risk results from the interaction of vulnerability, exposure, and hazard.

### Open Data

Adopting open data for indicator development increases transparency, facilitates reproducibility, and can enhance reliability when using standardized data sources [Jansen et al., 2012].

### Methods

- **Identified 126 potential climate-risk exposure, sensitivity, and adaptive capacity indicators from open sources (e.g., EPA, FEMA, NOAA, NWS, MARAD, USFWS, USACE)**
- **Compiled a dataset with 61 viable indicators (15 exposure, 27 sensitivity, 19 adaptive capacity) for a pilot sample of 30 ports.
- **27 N.E. Medium & High Use Ports (throughput > 1 M tons) plus LA, Long Beach, and Honolulu for contrast.
- **Explanatory data analysis:**
  - Examined correlations and clustering patterns of ports and of indicators.
  - Outputs will inform iterative rounds of expert elicitation to:
    - Reduce dimensionality and seek consensus around the following concepts:
      - How does risk relate to “resilience” as for the MTs?
      - How can indicator data be synthesized to be decision-relevant for port decision makers?