# Infrastructure, risk and resilience

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Understanding Risk
Venice, Italy
19 May 2016

Issues

- Before we start
  - Who is at risk vs. who owns the risk
  - Access to information – Australia experience
- Analysing the risk
  - Modelling an infrastructure system
  - Modelling the recovery process
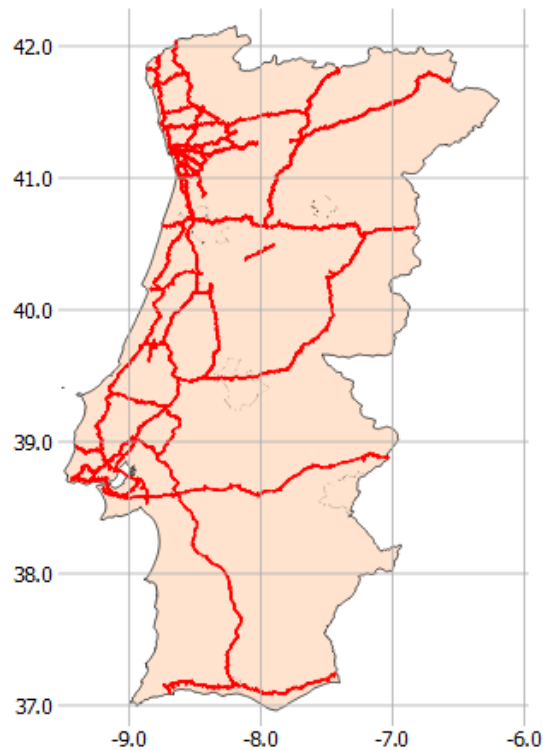- Making decisions
  - Cost vs. benefit

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GLOBAL
QUAKE
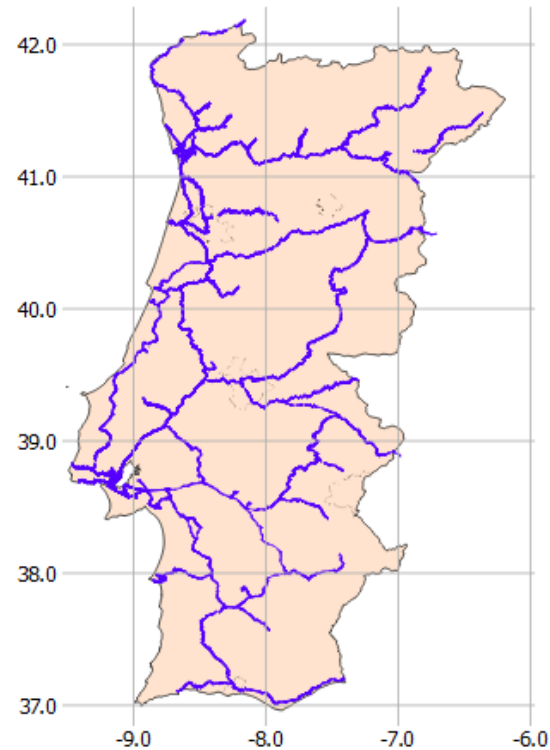MODEL
.ORG
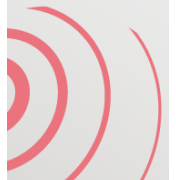
Case study: Portuguese mining company
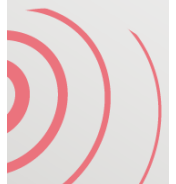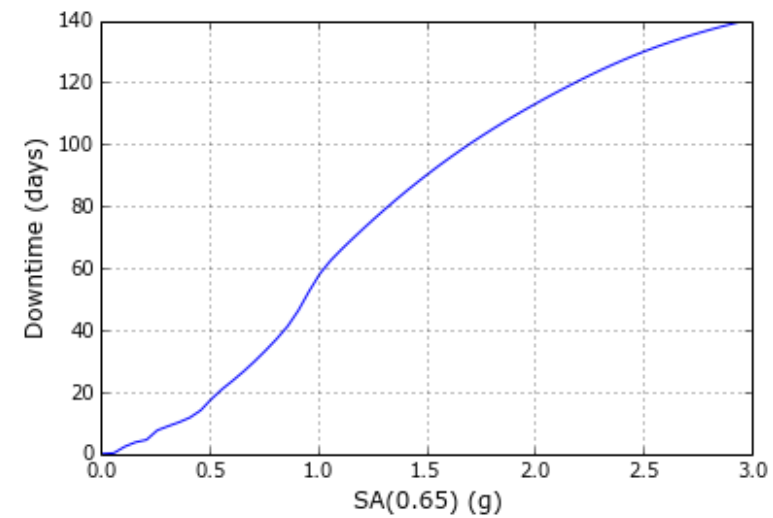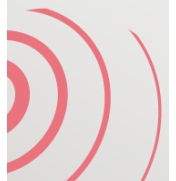
Case study: Exposure model

Network data extracted from OpenStreetMap
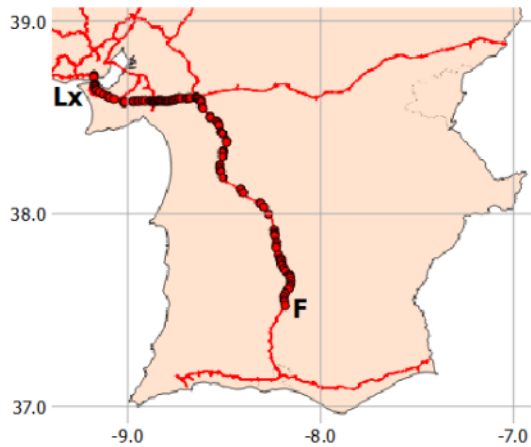

Highway network

Railway network
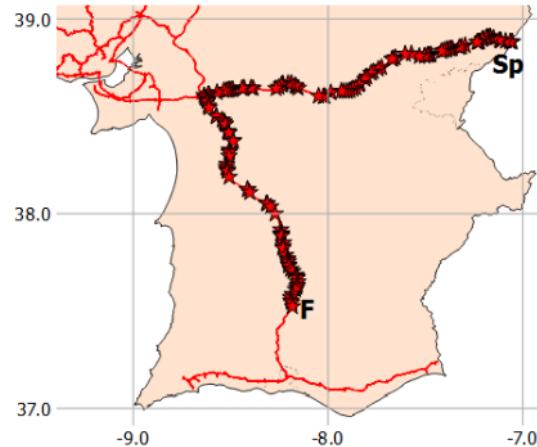
Case study: critical paths
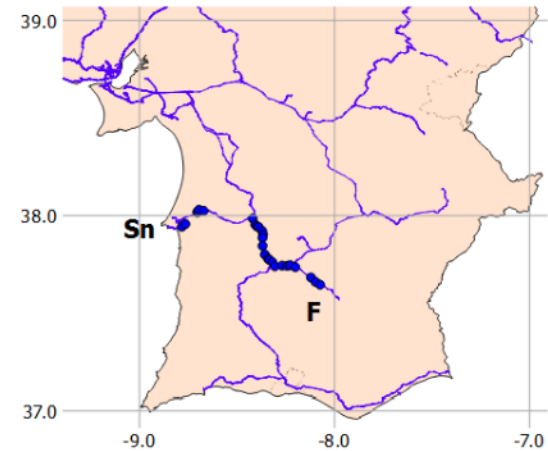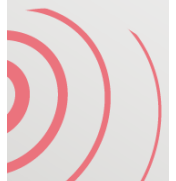

Importation

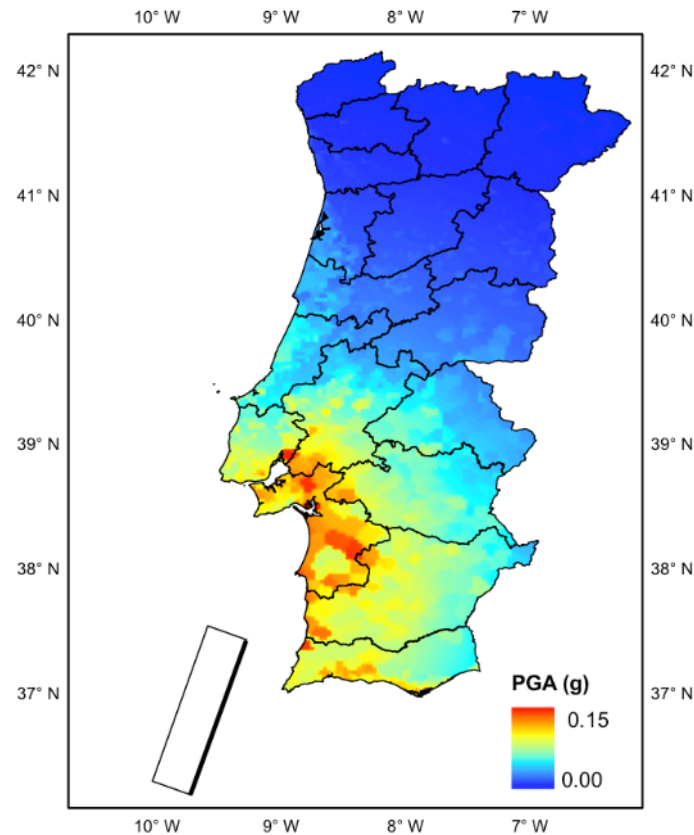Lisbon (Lx) → Factory (F)

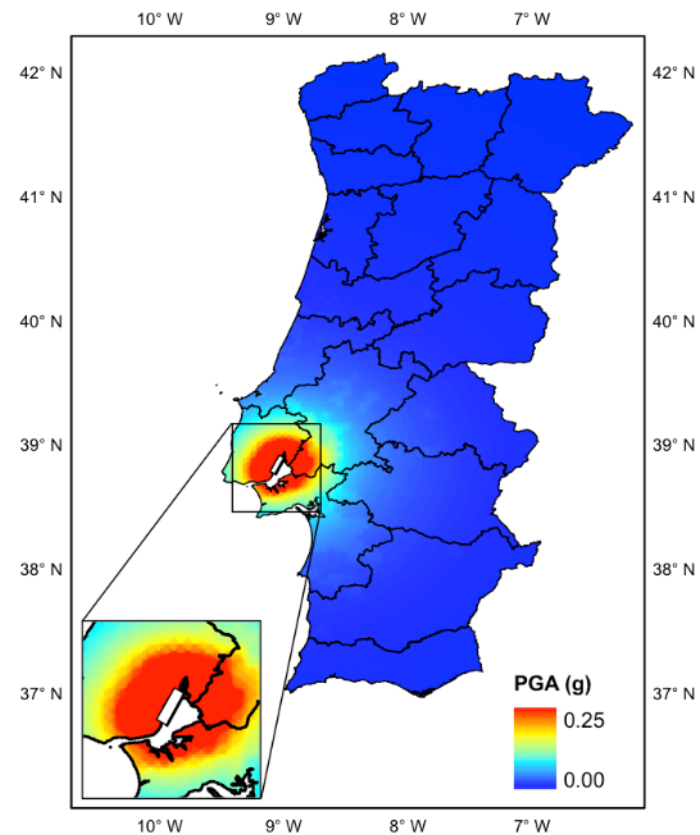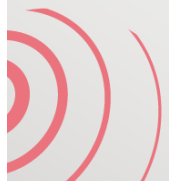Spain (Sp) → Factory (F)

Exportation

Factory (F) → Sines (Sn)

Seismic scenarios for Portugal

Offshore scenario
$M_w = 7.6$

Onshore scenario
$M_w = 5.7$

Silva et al., 2014

Transport network damage for 2 events
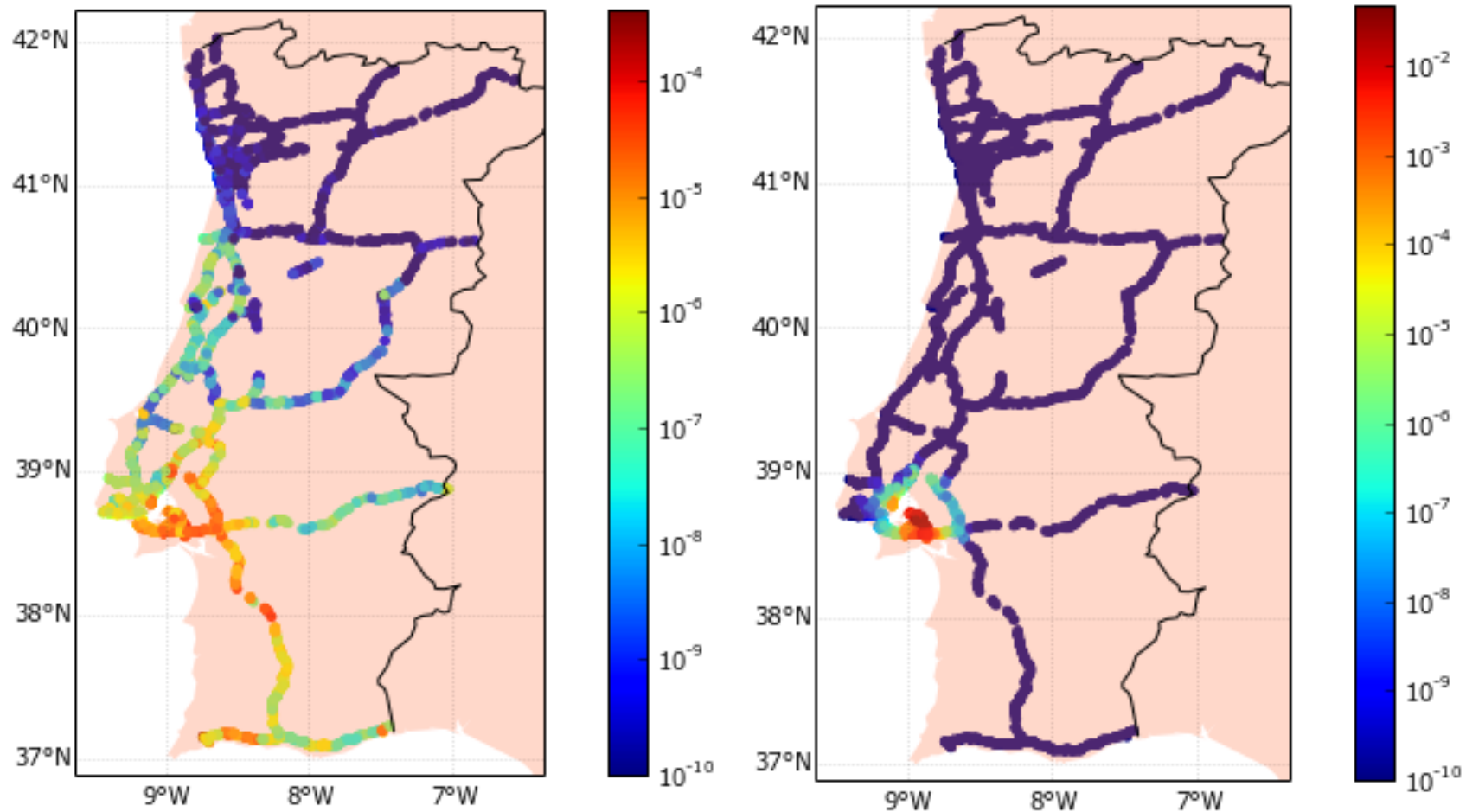
Vulnerability Science

- What circumstances place people and places at risk?

- What enhances or reduces the ability of populations to **respond to and recover** from environmental threats?

- What are geographic patterns among and between places?

Natural Systems

Built Environment /Engineered Systems

Social Systems
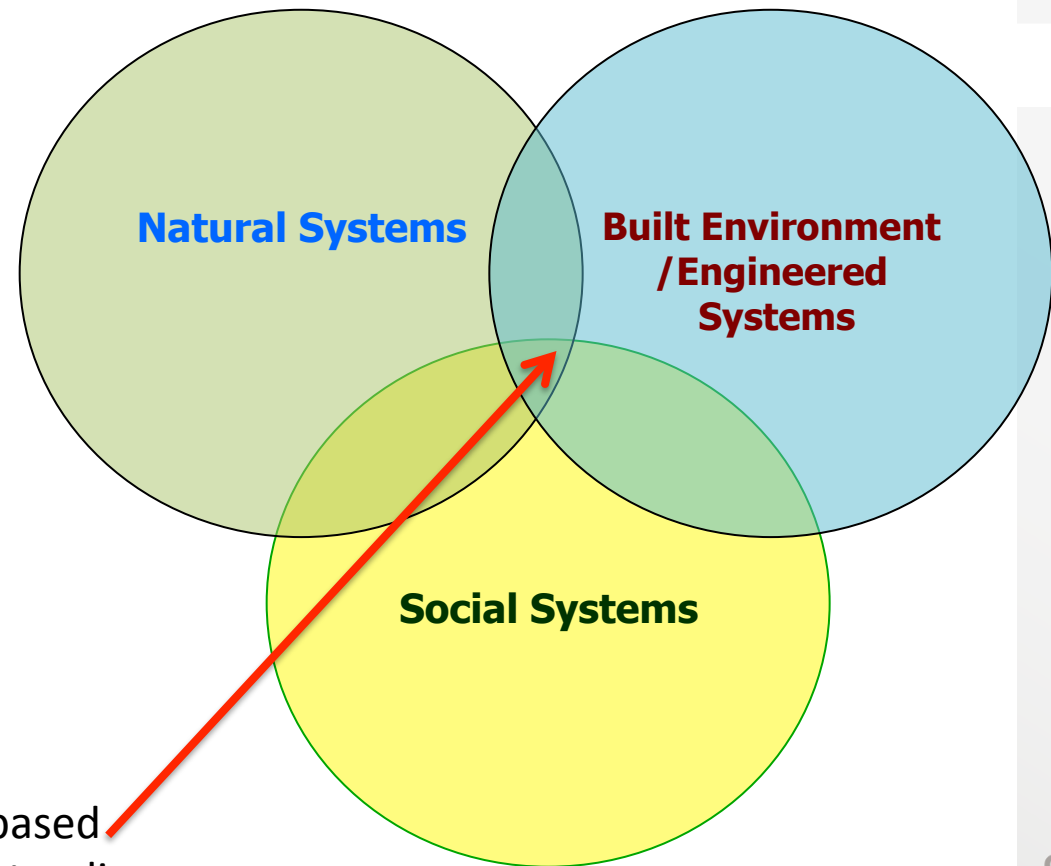
Place-based Understanding

Goal: To provide the basis for risk reduction policies and mitigation initiatives; to facilitate pre- and post-disaster planning

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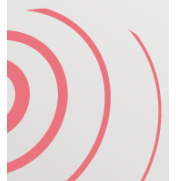
Variable Selection

Underlying Dimensions

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Social
1) Social capacity
2) Community health and well-being
3) Equity

Economic
1) Economic and livelihood stabilities
2) Resource diversity
3) Resource equity
4) Economic infrastructure exposure
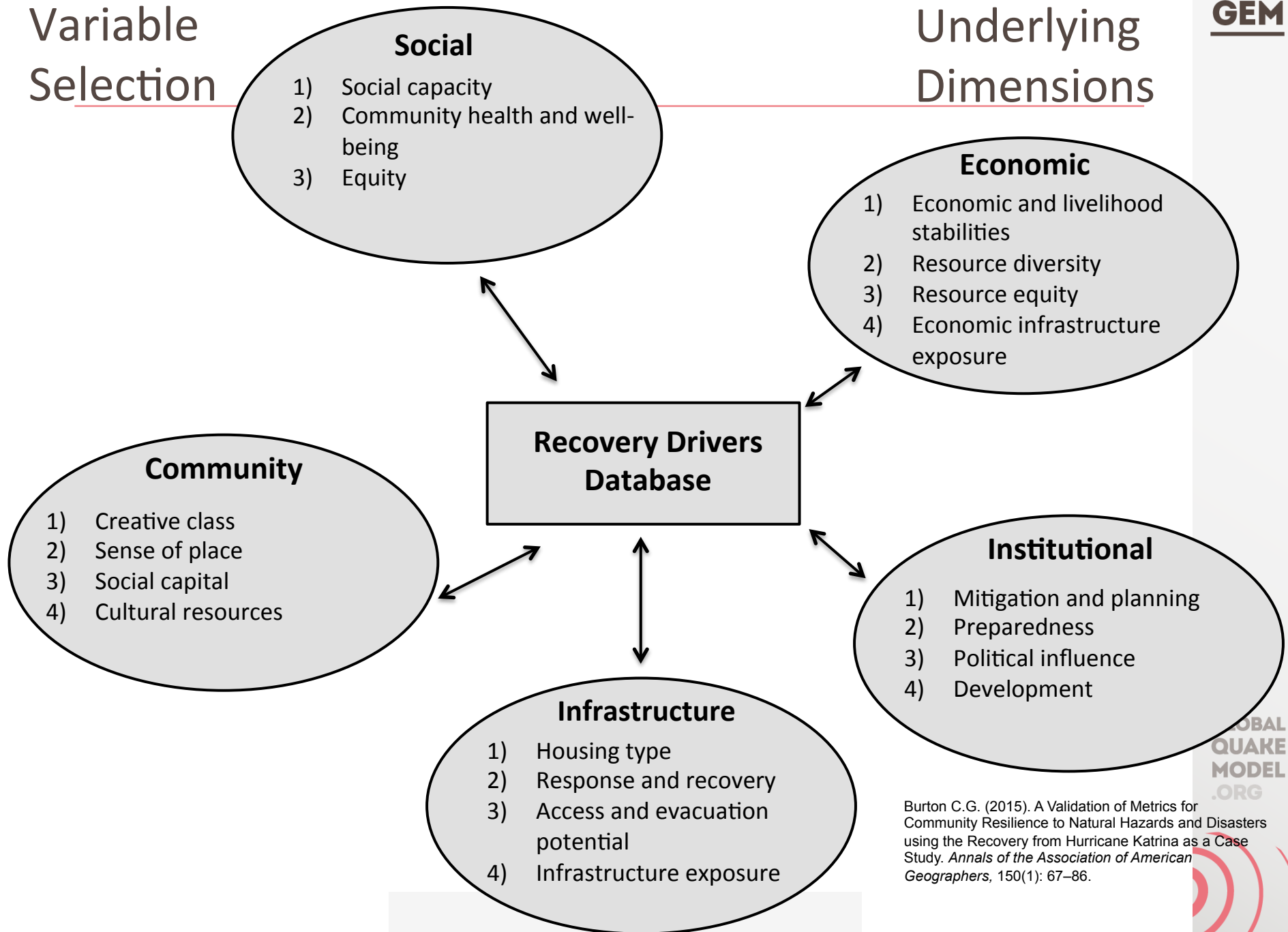
Community
1) Creative class
2) Sense of place
3) Social capital
4) Cultural resources

Recovery Drivers Database

Institutional
1) Mitigation and planning
2) Preparedness
3) Political influence
4) Development

Infrastructure
1) Housing type
2) Response and recovery
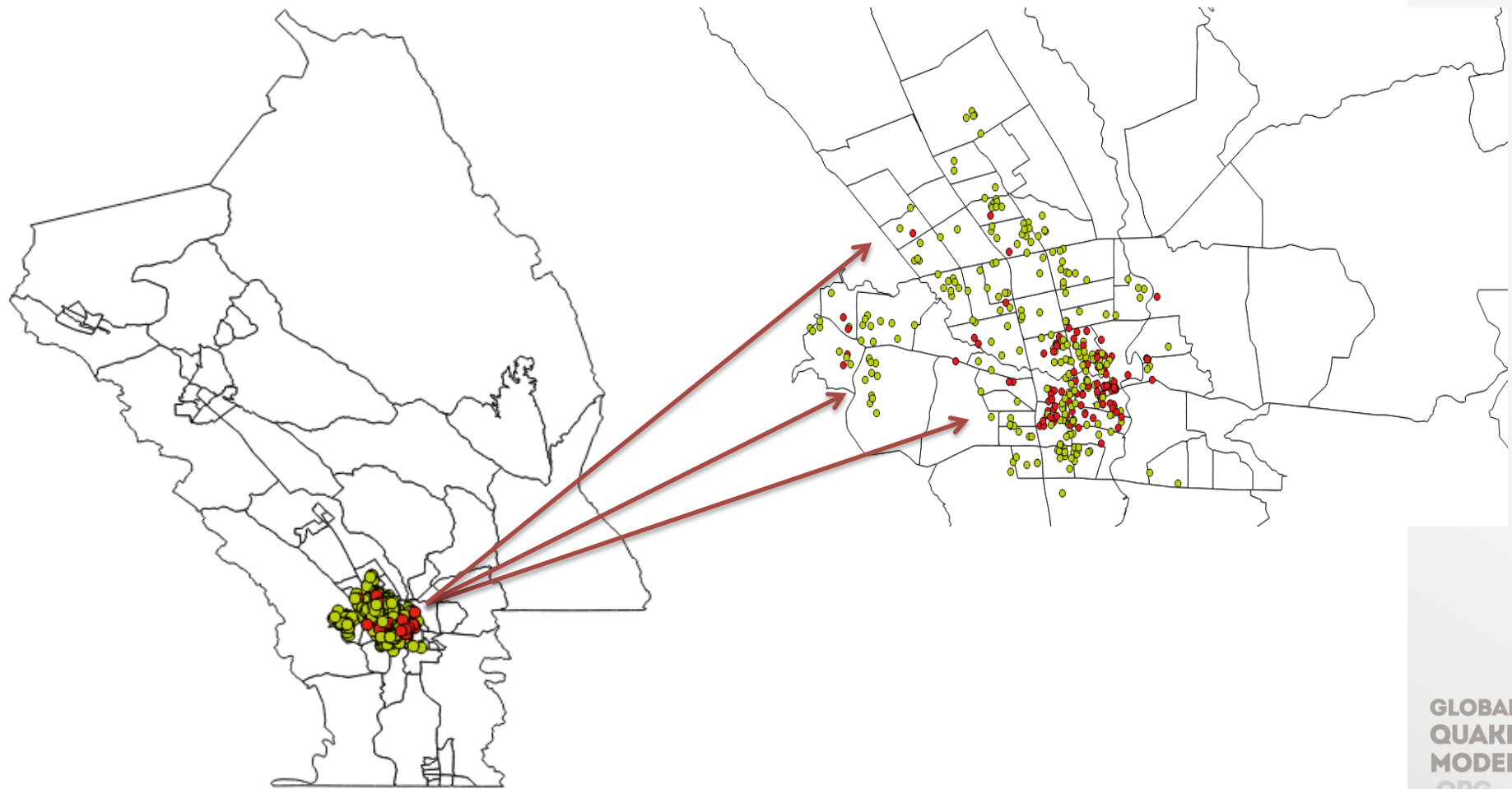3) Access and evacuation potential
4) Infrastructure exposure

Burton C.G. (2015). A Validation of Metrics for Community Resilience to Natural Hazards and Disasters using the Recovery from Hurricane Katrina as a Case Study. *Annals of the Association of American Geographers,* 150(1): 67–86.

GLOBAL QUAKE MODEL .ORG

Understanding Drivers of Recovery: Napa, California

Despotaki et al. – In preparation
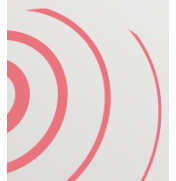
Recovery Model Prediction: 12 Months After Event