Infrastructure, risk and resilience

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Understanding Risk
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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
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?

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

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

Community
1) Creative class
2) Sense of place
3) Social capital
4) Cultural resources

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

Economic
1) Economic and livelihood stabilities
2) Resource diversity
3) Resource equity
4) Economic infrastructure exposure

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

Understanding Drivers of Recovery: Napa, California
Recovery Model Prediction: 12 Months After Event