

# Beyond the Storms

---

## Operationalizing Resilience via Modeling and Analytics

- *Who* will benefit
  - *What* is the ROI
  - *Where* is the value
  - *How* to measure
- 

Dr. Dane Egli  
Johns Hopkins University

# Preparedness Challenges of 2014

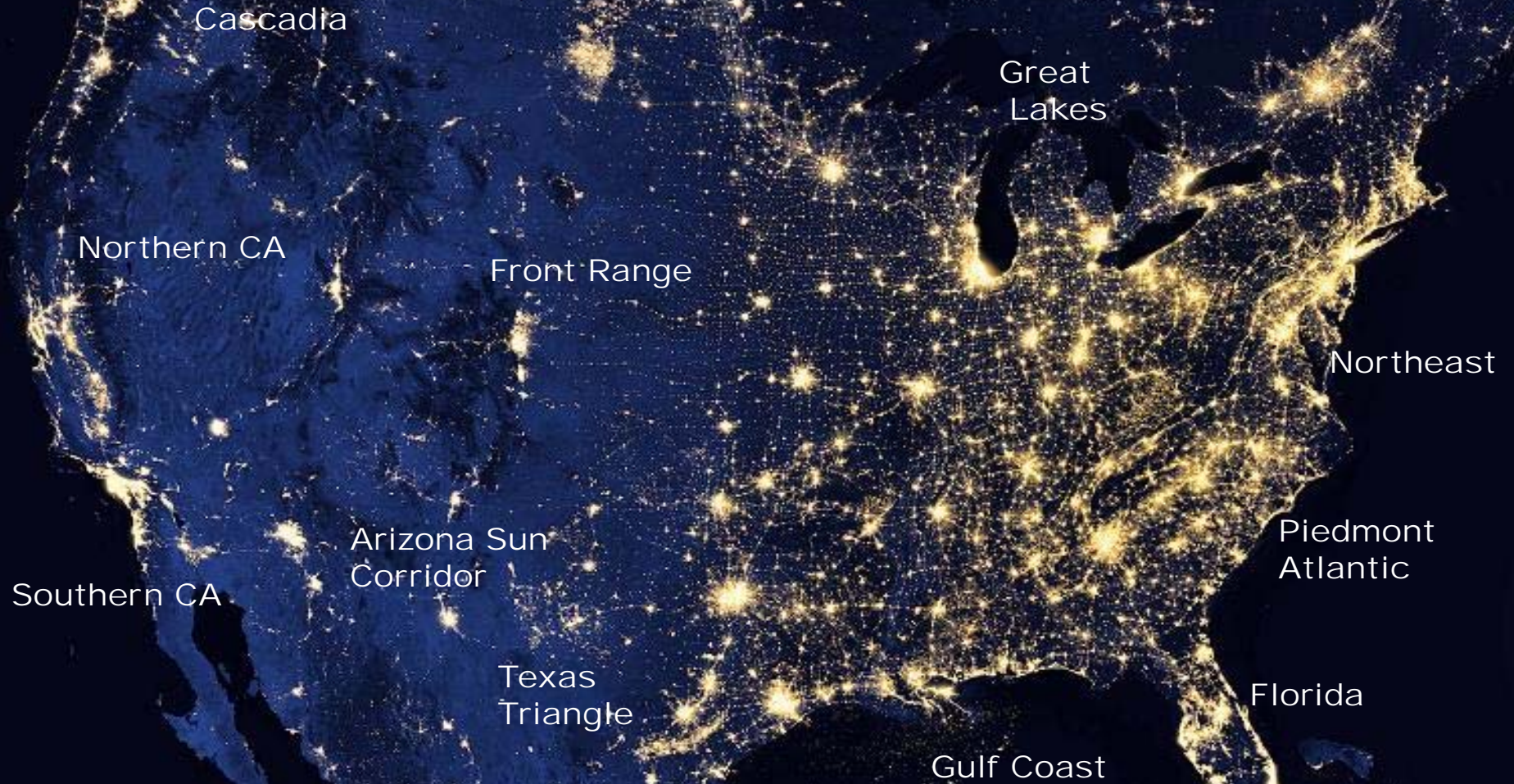
## Starting assumptions

- **Population** and urbanization are increasing
- **Disaster** frequency and intensity are increasing
- **Globalization** increases interdependencies
- **Financial** resources are receding
- **Economic** impact and value proposition is unclear
- **Risk** increasing in complexity and uncertainty
- **Culture** of independence resists regionalization



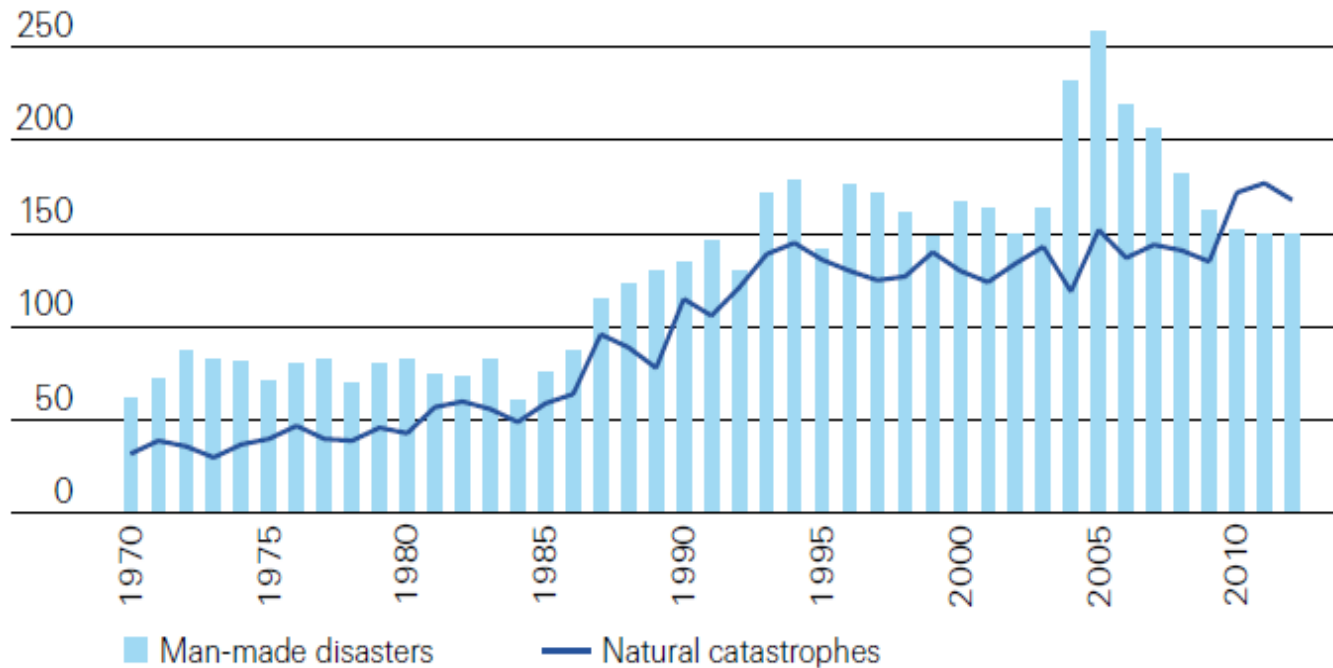
# Population and urbanization are increasing

## 11 Socioeconomic Megaregions Over 80% of GDP, over 70% of population



# Disaster frequency and intensity increasing

Disaster Frequency: 1970-2012

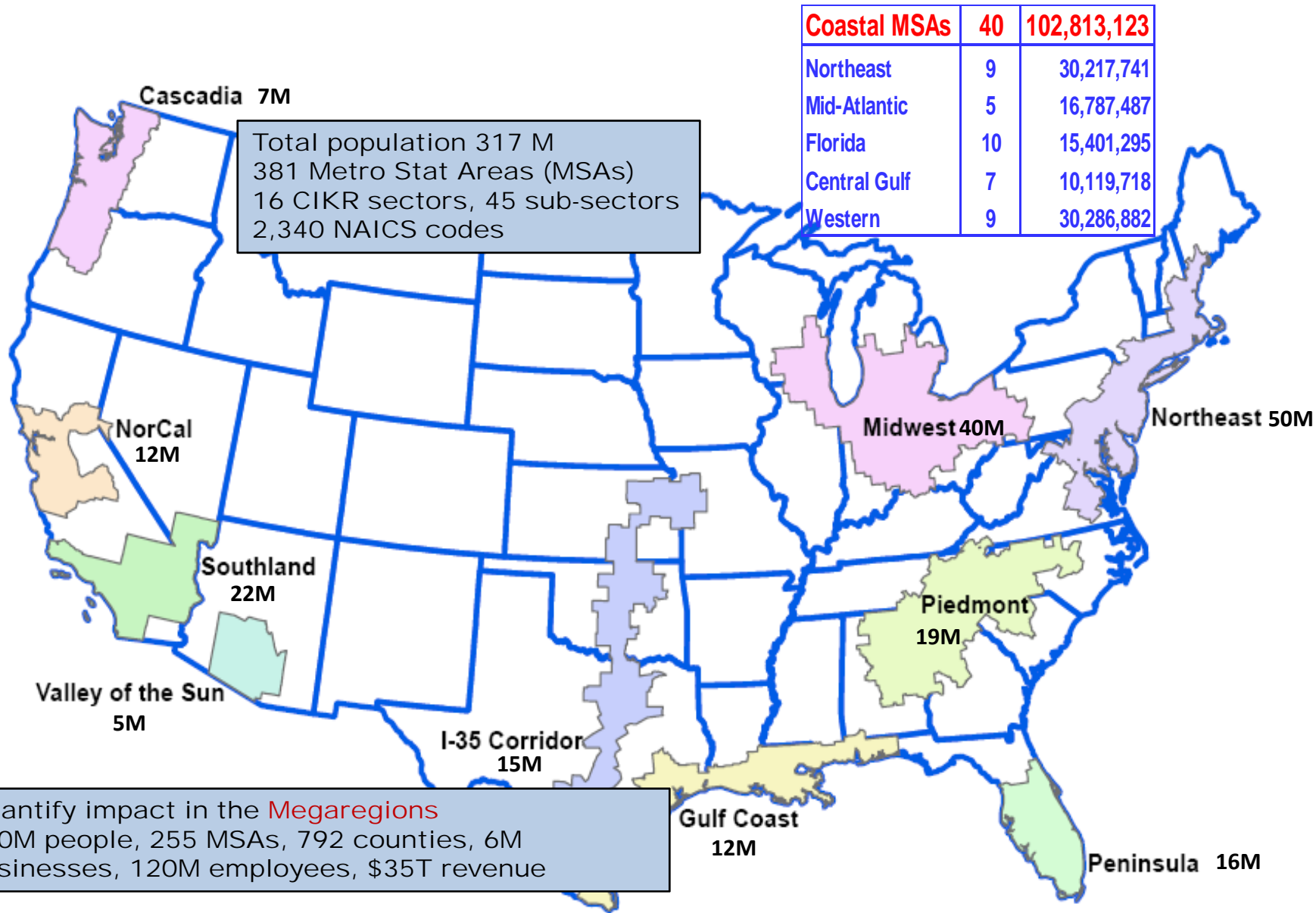


Source: Swiss Re Economic Research & Consulting

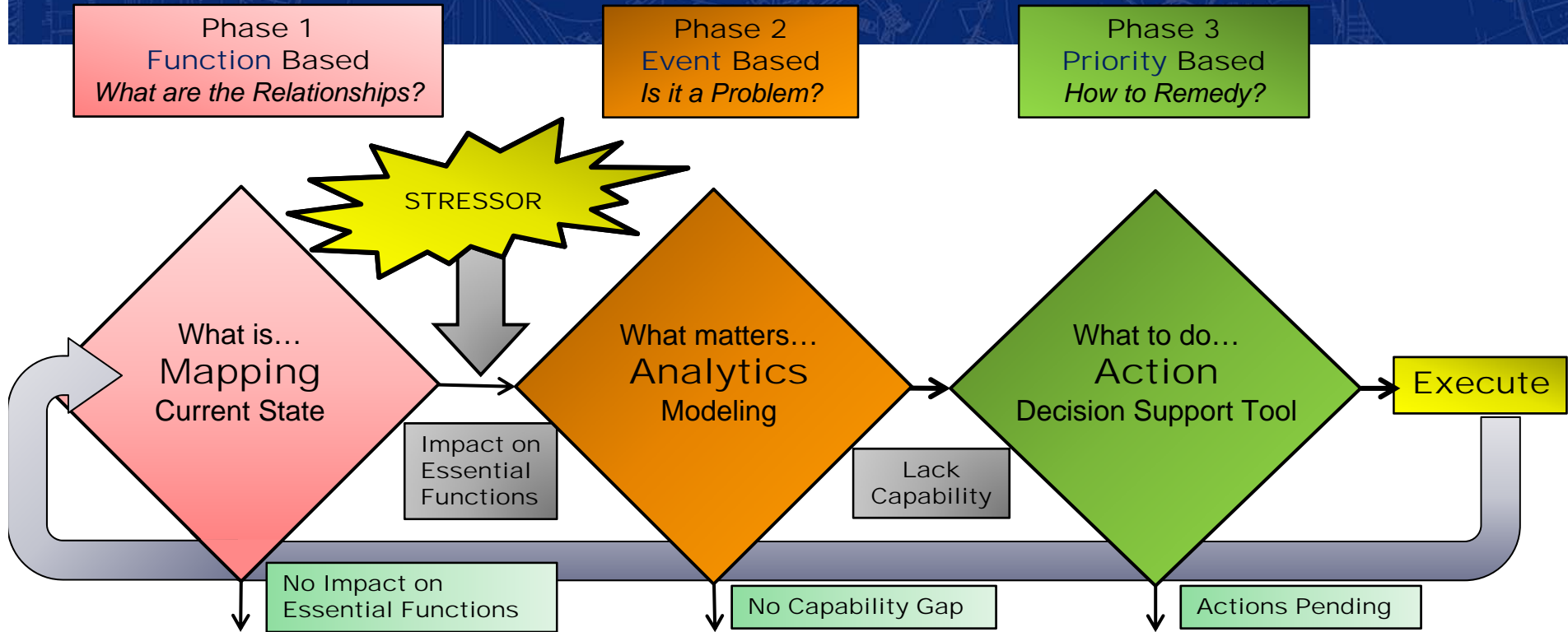
National Climate Assessment (May '14) projects increased frequency of extreme weather



# Economic Impact is Unquantified



# Resilience Implementation Process (RIP)

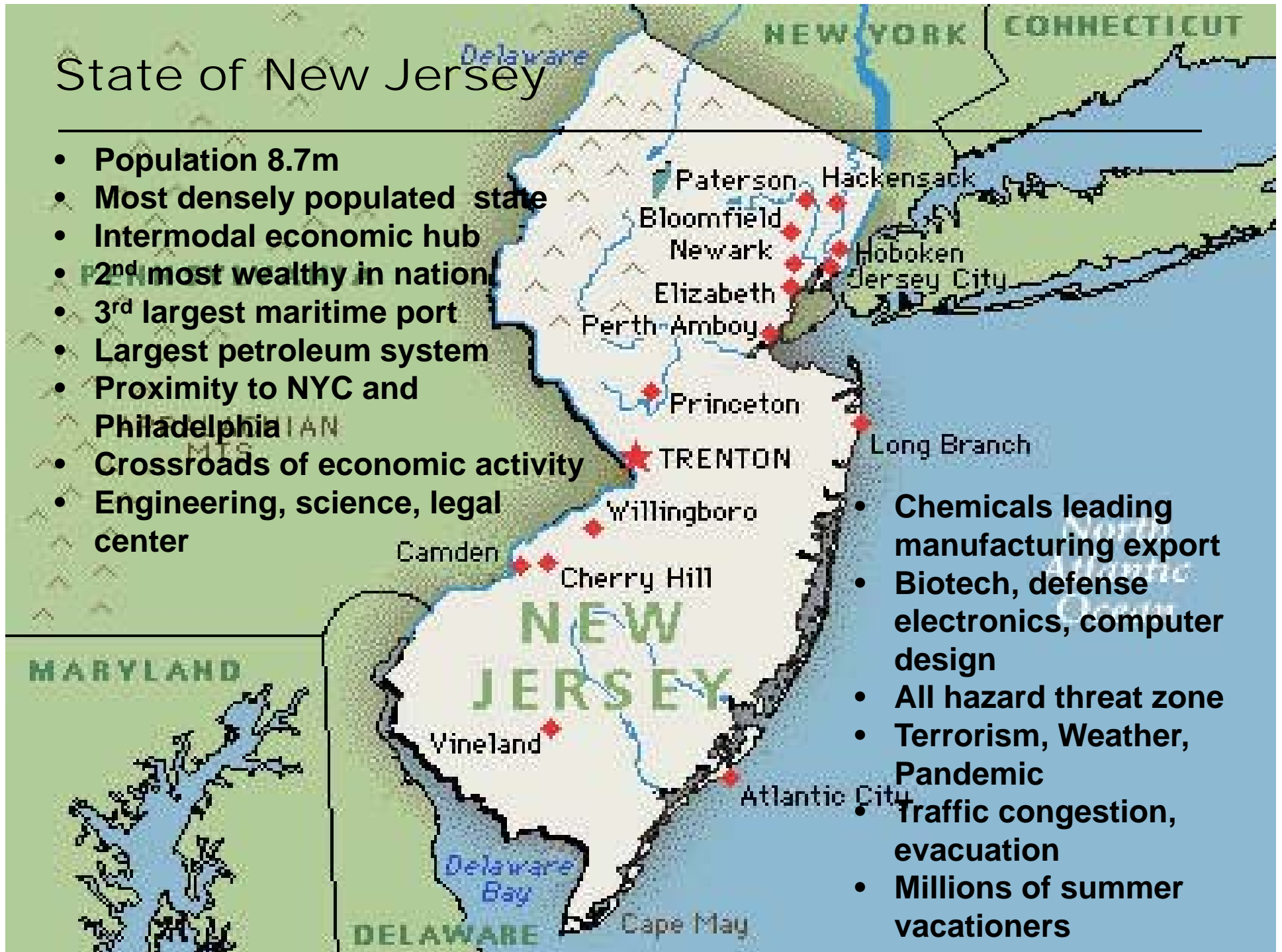


Connectedness	Assessment Criteria	Operationalize	Operating Variables
Physical & Virtual	Qualitative & Quantitative	Materiel & Non-materiel	
Dependencies	Criticality	Governance, Operations, Systems	
Interdependencies	Capabilities	Time, Cost, Scope	

# State of New Jersey

- Population 8.7m
- Most densely populated state
- Intermodal economic hub
- 2<sup>nd</sup> most wealthy in nation
- 3<sup>rd</sup> largest maritime port
- Largest petroleum system
- Proximity to NYC and Philadelphia
- Crossroads of economic activity
- Engineering, science, legal center

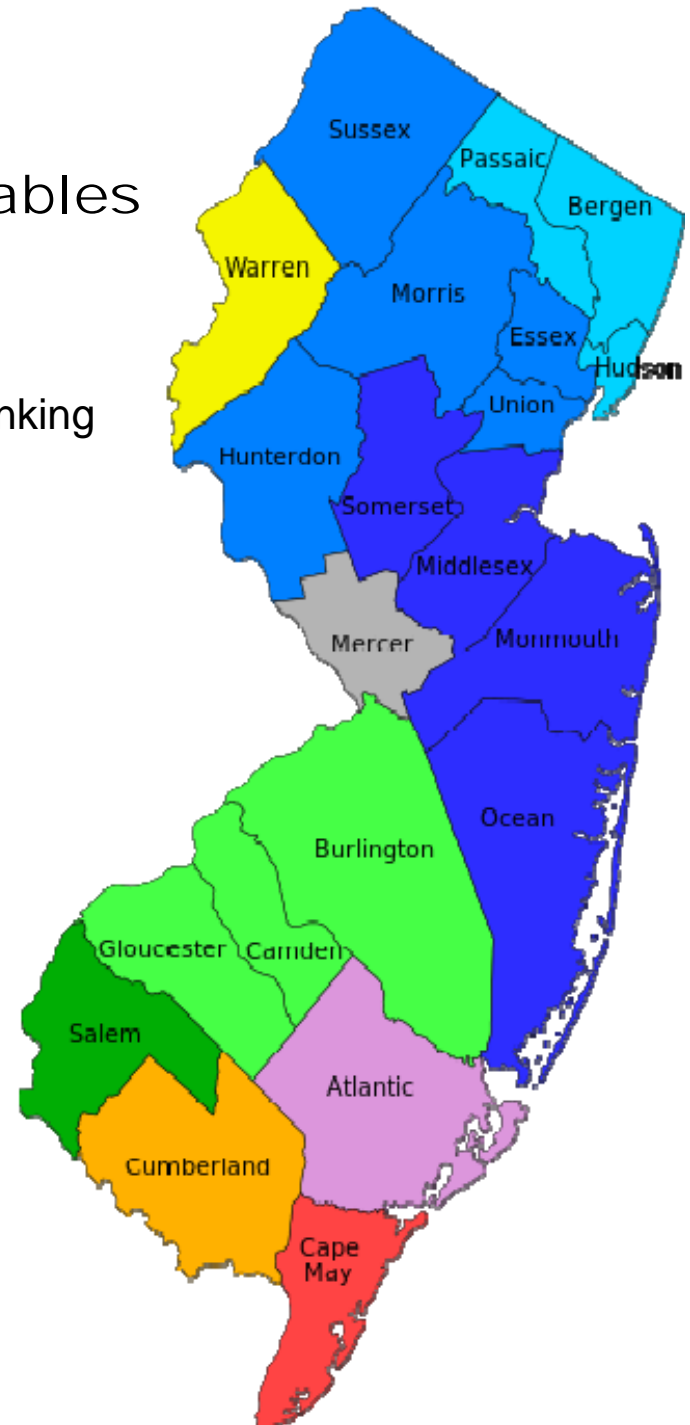
- Chemicals leading manufacturing export
- Biotech, defense electronics, computer design
- All hazard threat zone
- Terrorism, Weather, Pandemic
- Traffic congestion, evacuation
- Millions of summer vacationers



# New Jersey

## Agriculture Resilience Planning Variables

- Risk mitigation: complex adaptive system of systems
- Operational resilience: systemic adaptation to stress
- CIKR requirements: power, comms, transp, water, banking
- Research potential: UARC, R&D centers, universities
- Governance: national, regional, state, local polices
- Coordination: info-sharing across 21 counties
- Resources: potential funding to operationalize
- Economic: 12 Metropolitan Statistical Areas (MSAs)
- Land use: production decreasing since 1997
- Employment: accounts for over 300K jobs
- Regional food systems: include PA, NY, DE
- Interdependencies: Cross-linked agriculture systems
- Market analysis: increased dependence on imports
- Current state: What/where is produced in state
- Import requirements: milk, meat, produce
- Convening power: leverage existing IAC potential
- Climate change: impact on food systems
- USDA: Agriculture Management Assistance (AMA)
- NRCS: Natural Resources Conservations Service





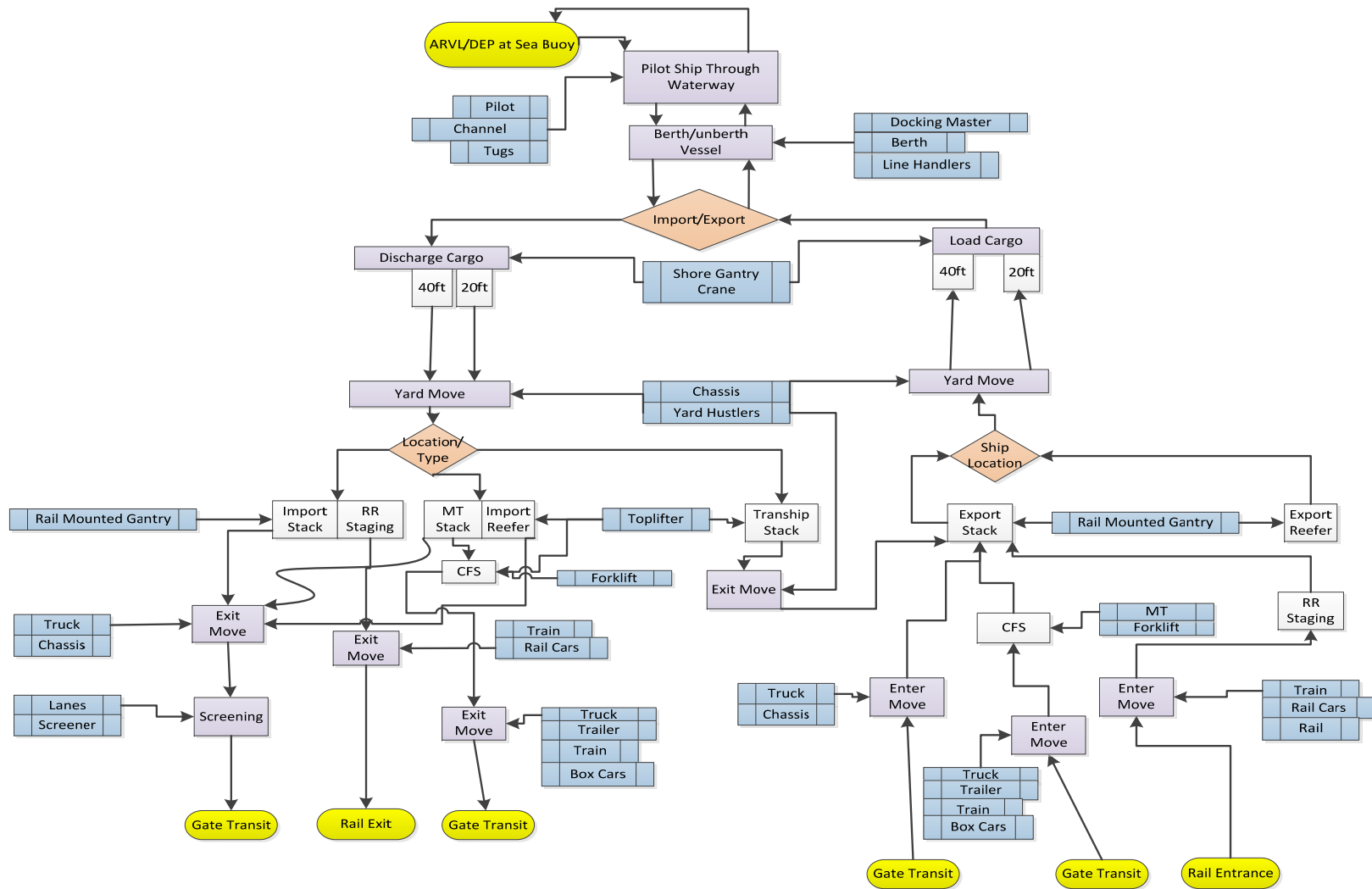
# Select a key intermodal location

Measure operational & economic impact of resilience at a port





# Port Container Import/Export Flow

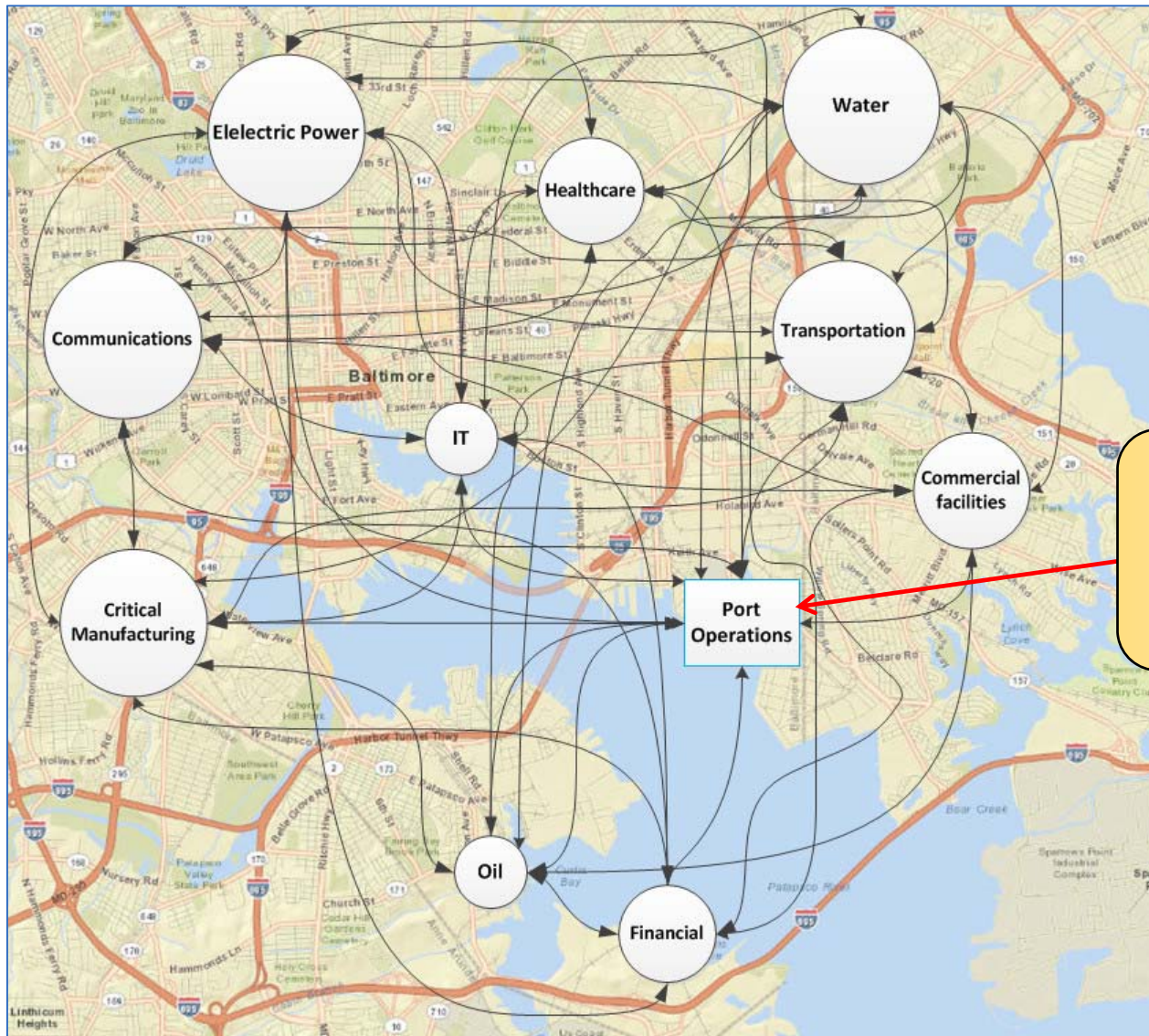


# Metric/Unit of Analysis: Throughput





# Expand to interdependent system of systems



Map port operations as part of an interconnected complex system

# The Value Proposition...

- Disruptive events **are inevitable** and to be expected from natural and man-made causes
- Resilience requires an understanding of **interdependencies and cascading effects** that can trigger disruptions and failures
- Resilience focuses **on economic ROI** by restoring capabilities that enable rapid recovery and adaptation
- **Market competition** is influenced by the ability of communities to withstand disasters and how rapidly they can recover
- People will invest in businesses and choose to live in **parts of the country that are more resilient**, and avoid areas that are less resilient and less secure