

# Interdependency and Infrastructure

## Lecture 5 –Applications Modeling of Interdependency II: Information Integration Modeling, *Fast*

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# Overview

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- **Domain Space**
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- **Philosophy of Domain Space Development**
- **Problem Space**
- **Development Path**
- **Video and Demonstration**



# Acknowledgement

- **NISAC is**
  - a program of the **Assistant Secretary for Infrastructure Protection, Department of Homeland Security**
  - a core partnership of **Sandia National Laboratories and Los Alamos National Laboratory**

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# Background

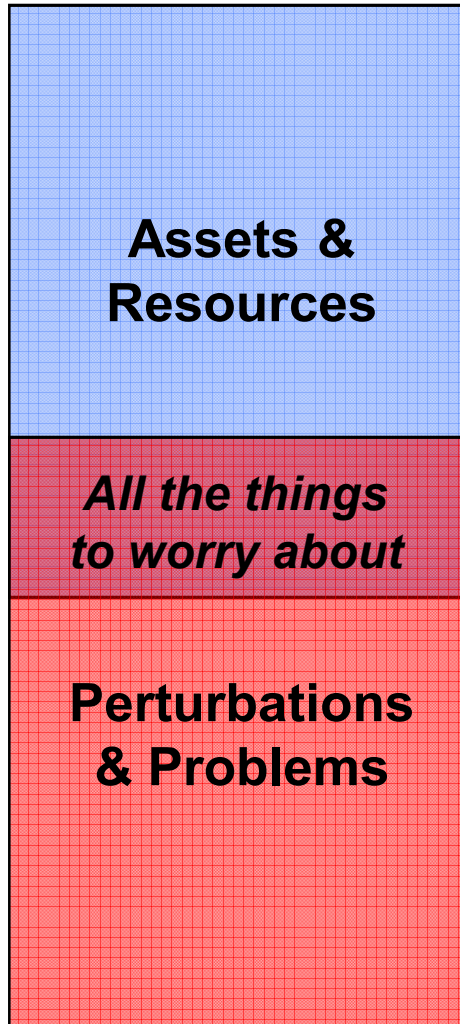
## About NISAC

- **90 scientists & researchers from Sandia & Los Alamos National Laboratories; joint project; building on Kirtland AFB, New Mexico**
- **2001 Patriot Act formally established NISAC, but around since 90s**
- **2007 Homeland Security Approp. Act expanded NISAC mission**
  - “source of national expertise **to address** critical infrastructure protection...”
  - ... counterterrorism, threat assessment, and risk mitigation
  - ... natural disaster, act of terrorism, or other manmade disaster
  - ... modeling, simulation, and analysis ... **to enhance preparedness, protection, response, recovery, and mitigation activities.**”
  - **Directs NISAC share with Federal agencies with departments with critical infrastructure responsibilities under HSPD-7 – NIPP partners**



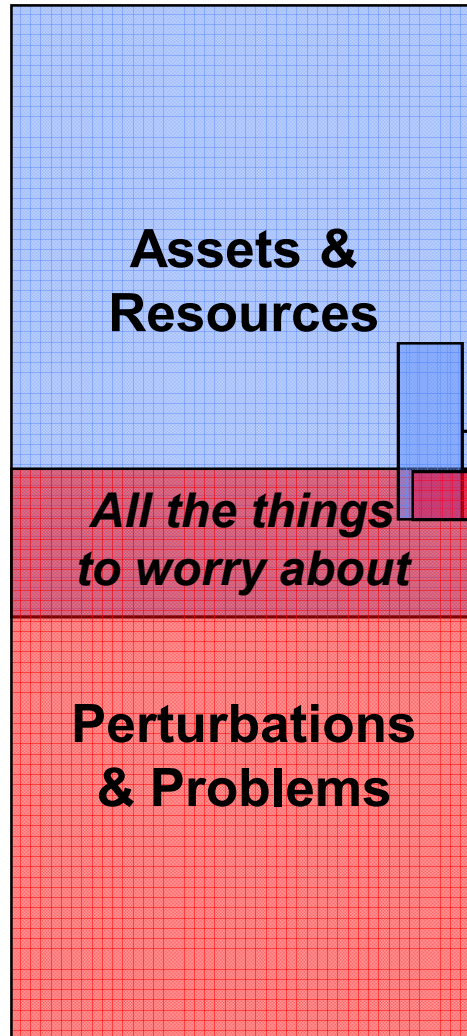
# Domain Space

Conceptual: High-Risk Event Analysis



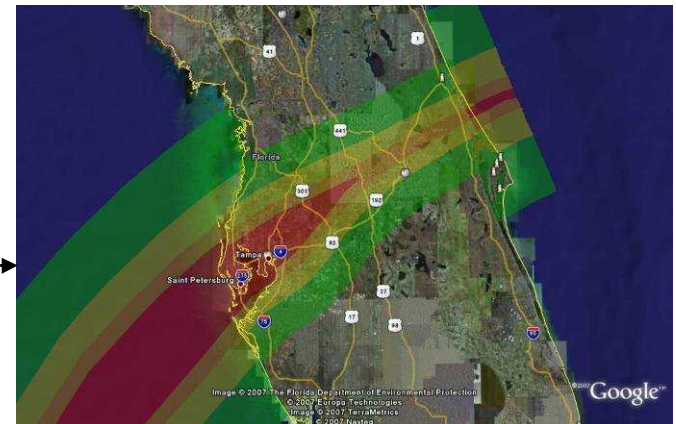
# Domain Space

## Conceptual: High-Risk Event Analysis



Sector-Specific Agency	Critical Infrastructure/Key Resources Sector
Department of Agriculture <sup>1</sup> Department of Health and Human Services <sup>2</sup>	Agriculture and Food
Department of Defense <sup>3</sup>	Defense Industrial Base
Department of Energy	Energy <sup>4</sup>
Department of Health and Human Services	Public Health and Healthcare
Department of the Interior	National Monuments and Icons
Department of the Treasury	Banking and Finance
Environmental Protection Agency	Drinking Water and Water Treatment Systems
Department of Homeland Security Office of Infrastructure Protection	Chemical Commercial Facilities Dams Emergency Services Commercial Nuclear Reactors, Materials, and Waste
Office of Cyber Security and Telecommunications	Information Technology Telecommunications
Transportation Security Administration	Postal and Shipping
Transportation Security Administration, United States Coast Guard <sup>5</sup>	Transportation Systems <sup>6</sup>
Immigration and Customs Enforcement, Federal Protective Service	Government Facilities

**Assets Relevant to Public Interest  
and Impact in Question**



**Area of Projected Impact**

# Domain Space

## In Application: NISAC Analyses Drive Capability Development

### • Planned Analyses

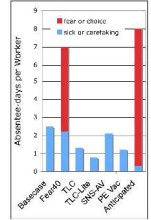
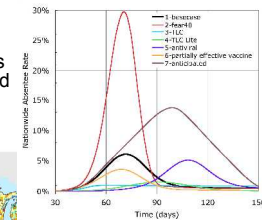
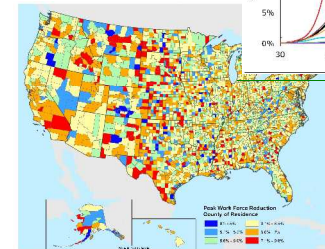
- Pandemic Influenza Impacts
- New Madrid Seismic Zone Infrastructure Impacts
- Southern California Earthquake Impacts
- Long-term Economic Impacts of Hurricane Gulf Katrina
- Pacific NW port security impacts
- National rail system asset disruption

### • Fast Analyses

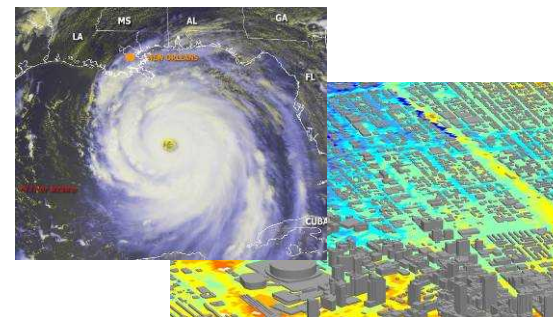
- 2007 California Fires
- 2007 Ardent Sentry Exercise Support (NE07, NUDET)
- Pre-Hurricane Season Scenario Analyses
- Transit tunnel analyses - London bombing
- Hazardous Chemical Transportation Policy
- Economic Impacts of 2003 BSE discovery
- Hurricane Analysis
  - 2007: Dean, Flossie
  - 2006: Ernesto
  - 2005: Dennis, Emily, Katrina, Ophelia, Rita, Wilma
  - 2004: Frances, Ivan, Jeanne
  - 2003: Isabel (2003)

### Key Results – Workforce

- Analysis quantified absenteeism impacts on infrastructures and economic sectors nationally by county



- Counties are impacted by absenteeism differently due to demographic differences (e.g., household size)



Hurricane



# Philosophy of Domain Space Development

- **Time to respond is short...**
  - ...and growing shorter
- **Automation of tasks should be used...**
  - ...to perform tasks which automation is useful for
    - always remembering
    - addition and multiplication
    - replicating past products for a common look and feel
  - ...to free up analysts to be analysts rather than data processors
- **We have developed capabilities to improve the quantity and quality of our fast response products, and coordinated development with analysts and (where possible) analysis consumers**



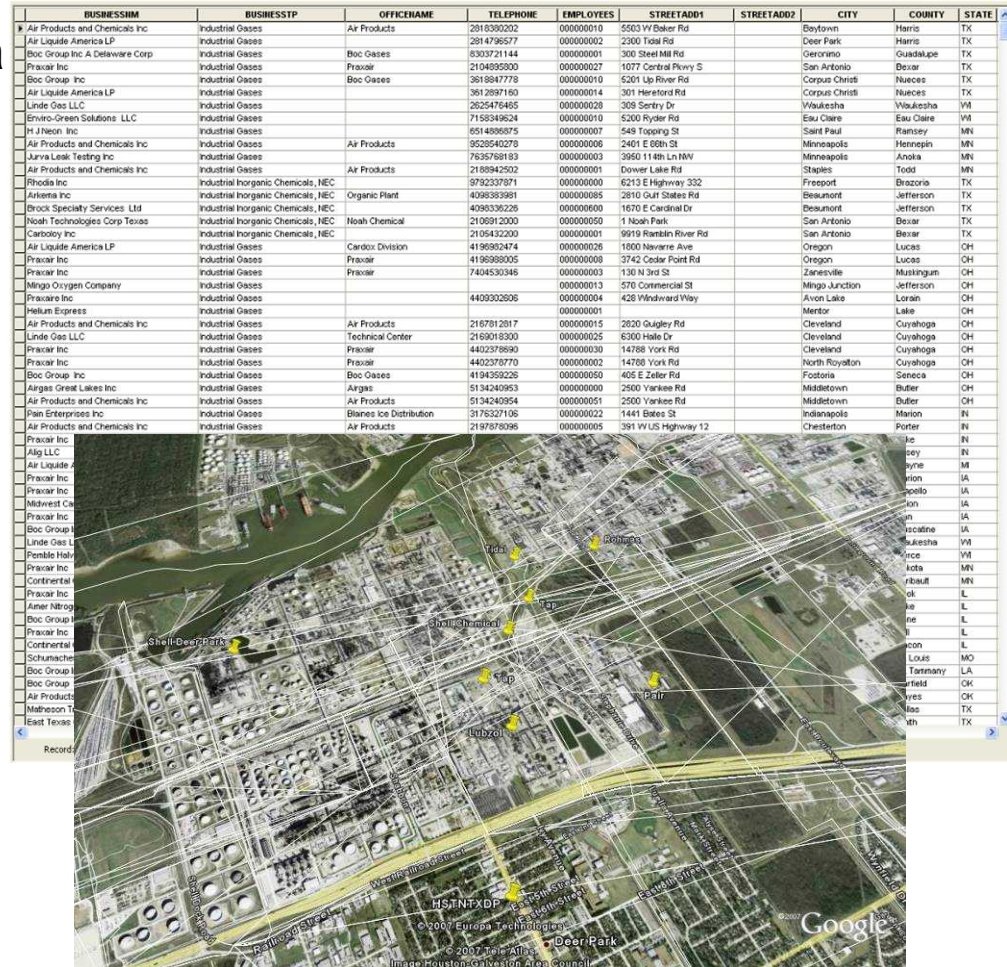


# Problem Space

- **Common Elements of Fast Analyses**
  - Questions tend to be centered on
    - An asset (or group of assets)
    - A ‘disruptive effect’ (or an area)
  - Products tend to be centered on
    - Infrastructure consequences
    - Economic consequences

# Problem Space

- **Geospatial (and associated) data**
  - provides a useable frame of reference for associating information with
    - Individual assets
    - Classes of assets
    - Infrastructure and geospatial grouping
- but it requires
  - translation to plain language
  - methods for information verification
  - a platform for
    - automatically associating elements of infrastructure based on SME knowledge
    - associating information gained in an analysis





# **Development Path**

## **Infrastructure Connectivity Modeling**

- **Subject Matter Experts help to define**
  - **classes of assets available**
  - **relationships between assets**
    - **Same asset class (supply chains)**
    - **Same infrastructure**
    - **Across infrastructures**
- **Rules used to define relationships incorporate spatial and logical concepts based on properties of the data**
- **Result is an ability to identify candidate interdependencies and associations between assets, which can be applied to data**
  - **Flexible Network Development**



# Videos and Demonstration

- Video Demonstration
  - [Developing an Information Collection](#)
  - [Providing Comparative Metrics](#)
- Live Demonstration
  - [fait link](#)