

Interdependency and Infrastructure

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

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Overview

- **Acknowledgement**
- **Background**
- **Domain Space**
 - Conceptually
 - In Application
- **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**



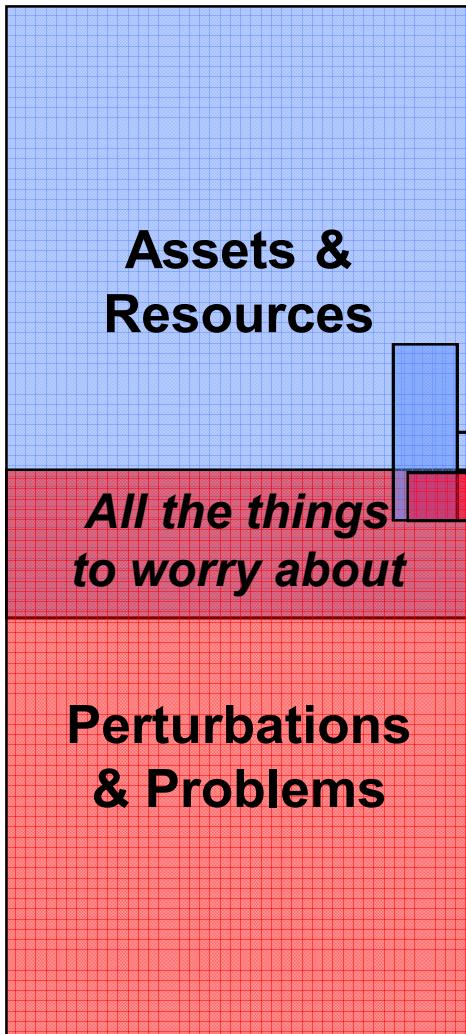
Domain Space

Conceptual: High-Risk Event Analysis



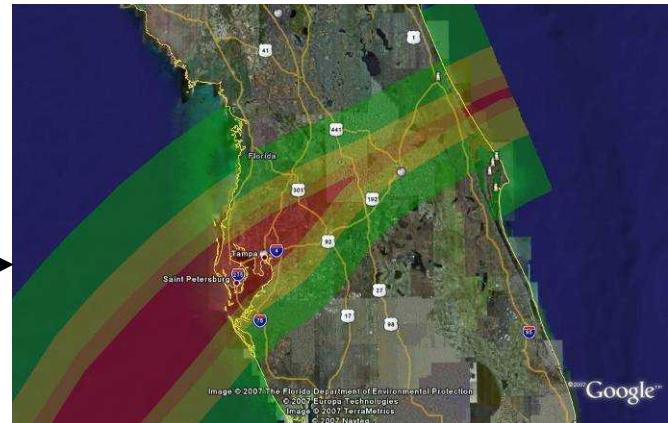
Domain Space

Conceptual: High-Risk Event Analysis



| Sector-Specific Agency | Critical Infrastructure/Key Resources Sector |
|--|--|
| Department of Agriculture ⁴ | Agriculture and Food |
| Department of Health and Human Services ² | |
| Department of Defense ³ | Defense Industrial Base |
| Department of Energy | Energy ⁴ |
| 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 ⁵ | Transportation Systems ⁶ |
| Immigration and Customs Enforcement, Federal Protective Service | Government Facilities |

Assets Relevant to Public Interest and Impact in Question



Area of Projected Impact



Sandia
National
Laboratories

Domain Space

In Application: NISAC Analyses Drive Capability Development

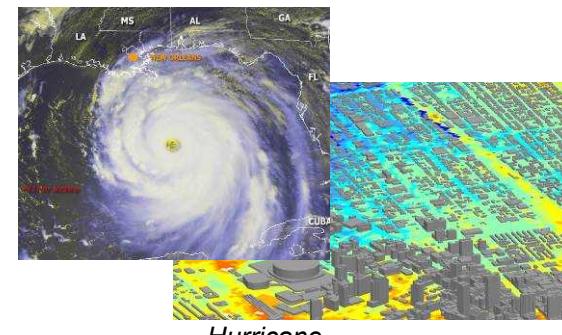
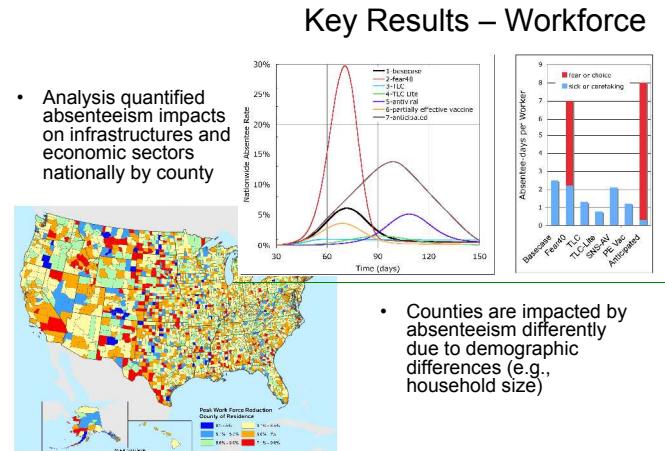
• Planned Analyses

- 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)

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





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

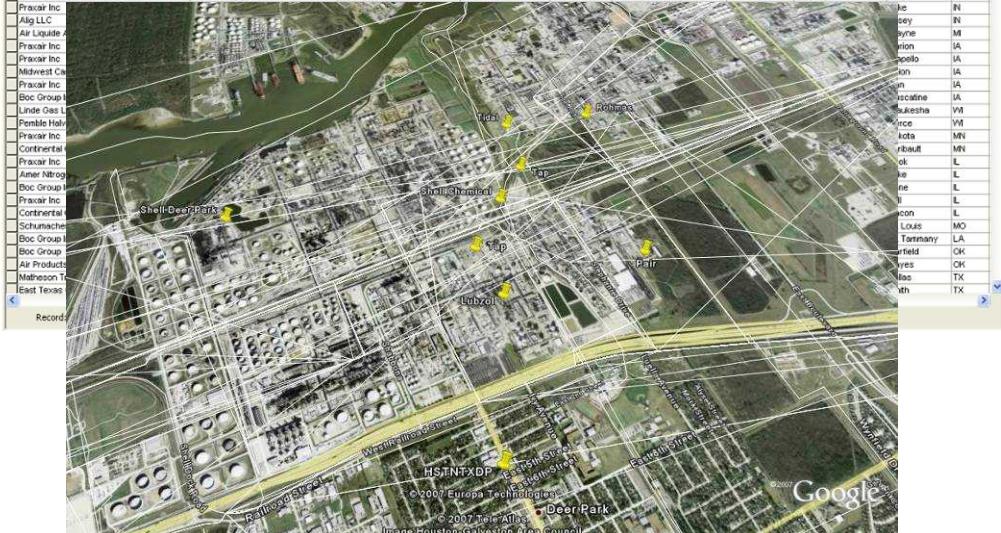
Problem Space

- **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

| BUSINESSNAME | BUSINESSP | OFFICERNAME | TELEPHONE | EMPLOYEES | STREETADD1 | STREETADD2 | CITY | COUNTY | STATE |
|--------------------------------|-------------------------------------|--------------------------|------------|-----------|-----------------------|------------|-----------------|------------|-------|
| Air Products and Chemicals Inc | Industrial Gases | Air Products | 281830002 | 000000010 | 5503 N Baker Rd | | Baytown | Harris | TX |
| Air Liquide America LP | Industrial Gases | | 281479557 | 000000002 | 2900 Total Rd | | Deer Park | Harris | TX |
| Boc Group Inc, A Delaware Corp | Industrial Gases | Boc Gases | 830450044 | 000000001 | 3000 Steel Rd | | Geronimo | Guadalupe | TX |
| Box Group Inc | Industrial Gases | Praxair | 210450000 | 000000007 | 1001 Central Petty St | | San Antonio | Bexar | TX |
| Box Group Inc | Industrial Gases | Boc Gases | 361881777 | 000000010 | 5201 Up River Rd | | Corpus Christi | Nueces | TX |
| Air Liquide America LP | Industrial Gases | | 361289160 | 000000014 | 301 Heriotrd Rd | | Corpus Christi | Nueces | TX |
| Linde Gas LLC | Industrial Gases | | 262576465 | 000000028 | 305 Semin Rd | | Waukesha | Waukesha | WI |
| Enviro-Ozone Solutions LLC | Industrial Gases | | 7153349624 | 000000010 | 5200 Tyler Rd | | Eau Claire | Eau Claire | WI |
| H J Heinz Inc | Industrial Gases | | 651496657 | 000000047 | 545 Topping St | | St Paul | Ramsey | MN |
| Air Products and Chemicals Inc | Industrial Gases | Air Products | 9529540278 | 000000006 | 2401 E 69th St | | Minneapolis | Hennepin | MN |
| Jurva Leak Testing Inc | Industrial Gases | | 763578913 | 000000003 | 39601 14th Ln NW | | Minneapolis | Anoka | MN |
| Air Products and Chemicals Inc | Industrial Gases | Air Products | 2189842502 | 000000091 | Dover Lake Rd | | Staples | Todd | MN |
| Rhodia Inc | Industrial Inorganic Chemicals, NEC | | 9792337971 | 000000000 | 6213 E Highway 332 | | Freeport | Brazoria | TX |
| Arkema Inc | Industrial Inorganic Chemicals, NEC | Organic Plant | 4098338981 | 000000085 | 2810 Galt State Rd | | Besumont | Jefferson | TX |
| Brock Specialty Services Ltd | Industrial Inorganic Chemicals, NEC | | 4098336226 | 000000000 | 1670 E Cardinal Dr | | Besumont | Jefferson | TX |
| Noah Technologies Corp Texas | Industrial Inorganic Chemicals, NEC | Noah Chemical | 2106912000 | 000000050 | 1 Noah Pl | | San Antonio | Bexar | TX |
| Carbotech Inc | Industrial Inorganic Chemicals, NEC | | 2105432200 | 000000001 | 9919 Rambln River Rd | | San Antonio | Bexar | TX |
| Air Liquide America LP | Industrial Gases | Cardox Division | 4195682474 | 000000026 | 1800 Navarre Ave | | Oregon | Lucas | OH |
| Praxair Inc | Industrial Gases | Praxair | 4196988005 | 000000076 | 3742 Cedar Point Rd | | Oregon | Lucas | OH |
| Praxair Inc | Industrial Gases | | 7404530348 | 000000003 | 570 N 3rd St | | Zanesville | Muskingum | OH |
| Miller Oxygen Company | Industrial Gases | Praxair | | 000000013 | 570 Commercial St | | Miller Junction | Jefferson | OH |
| Praxair Inc | Industrial Gases | | 4400302608 | 000000004 | 428 Whidbey Way | | Avon Lake | Lorain | OH |
| Helium Express | Industrial Gases | | | 000000001 | | | Mentor | Lake | OH |
| Air Products and Chemicals Inc | Industrial Gases | Air Products | 2167812817 | 000000015 | 2820 N Igley Rd | | Cleveland | Cuyahoga | OH |
| Linde Gas LLC | Industrial Gases | Technical Center | 2160018300 | 000000005 | 6300 Hale Dr | | Cleveland | Cuyahoga | OH |
| Praxair Inc | Industrial Gases | Praxair | 4402378900 | 000000030 | 14780 York Rd | | Cleveland | Cuyahoga | OH |
| Praxair Inc | Industrial Gases | Praxair | 440237870 | 000000002 | 14780 York Rd | | North Royalton | Cuyahoga | OH |
| Box Group Inc | Industrial Gases | Boc Gases | 4194359226 | 000000050 | 405 E Zeller Rd | | Fostoria | Seneca | OH |
| Airgas Great Lakes Inc | Industrial Gases | Airgas | 5134240953 | 000000000 | 2500 Yankee Rd | | Middletown | Butler | OH |
| Air Products and Chemicals Inc | Industrial Gases | Air Products | 5134240954 | 000000051 | 2500 Yankee Rd | | Middletown | Butler | OH |
| Pain Enterprises Inc | Industrial Gases | Blaines Ice Distribution | 3176321105 | 000000022 | 1441 Bates St | | Indiana | Marion | IN |
| Air Products and Chemicals Inc | Industrial Gases | Air Products | 3912978908 | 000000051 | 391 W Us Highway 12 | | Chesterfield | Porter | IN |





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