

***DHS Science and Technology Directorate
Chemical Supply Chain and Resilience Project:
Data Serves a Core Role***

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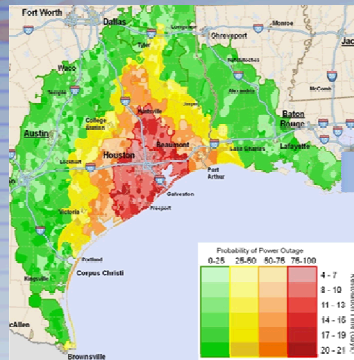


Project Structure

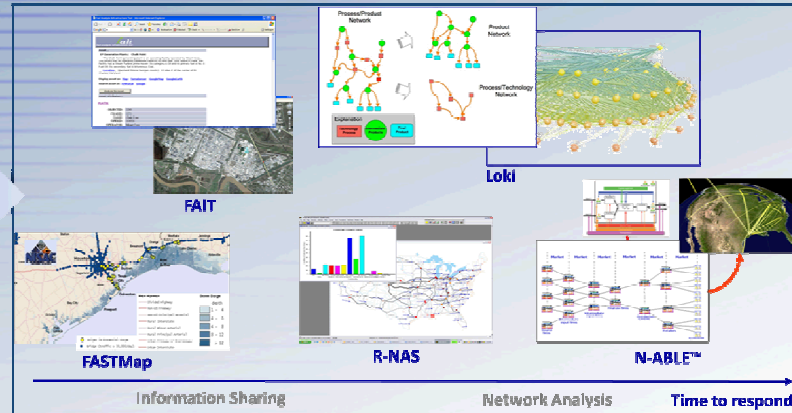
Organization	Role
 DHS Science and Technology (S&T) Directorate, Infrastructure and Geophysical Division	Manage the chemical supply chain and resilience project
 Sandia National Laboratories, Interdependencies and Consequence Management Group	Develop analysis and design capabilities
 National Infrastructure Simulation and Analysis Center (NISAC) (managed by DHS Office of Infrastructure Protection [IP])	Apply completed capabilities to disruptions of critical infrastructures and key resources (CIKRs)



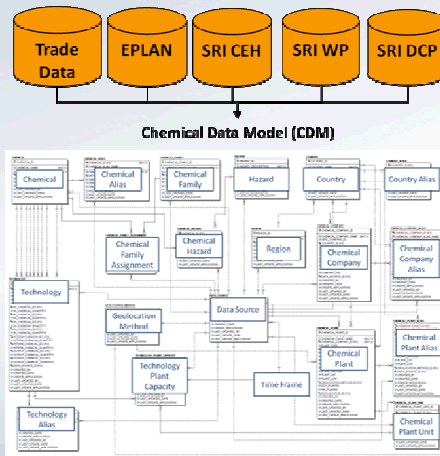
Project Intent: Not Your Father's Supply Chain Analysis



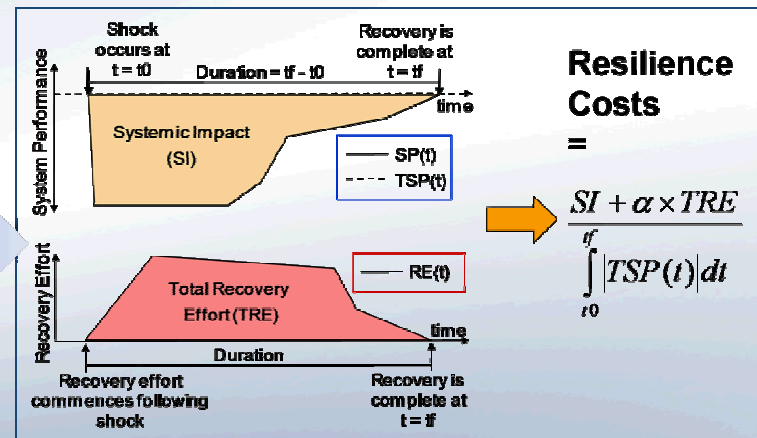
When disruptive
effects occur...



...a suite of analytic capabilities can be brought to bear...



...all drawing on a common
data model...



...to estimate consequences and to calculate resilience.



U.S. Department of Homeland Security
Science and Technology Directorate

Consequence Analysis for Chemical Infrastructure

■ Consequence analysis capability must consider

- Disruptions of the chemical sector and/or interdependent infrastructures, and
- National, regional, and facility perspectives.

■ We need to address direct impact questions, such as

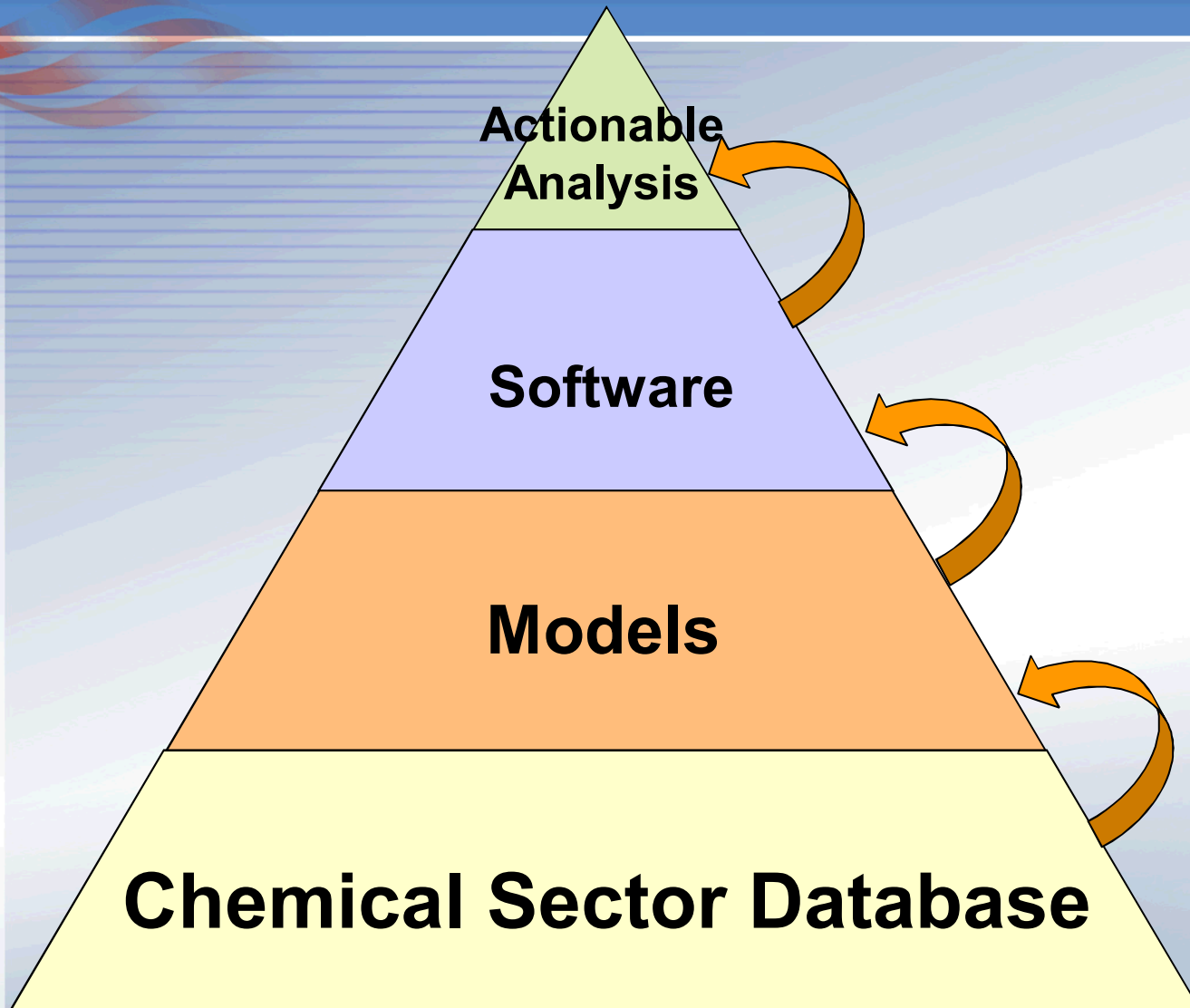
- What is the area of direct impact?
- What chemical facilities are directly affected?
- What chemicals do they produce?
- What percentage of capacity does this represent?

■ And cascading impacts questions, such as

- How long before we return to normal?
- What additional facilities will be affected?
- What additional supply chains will be affected?
- What is the total loss to the system?



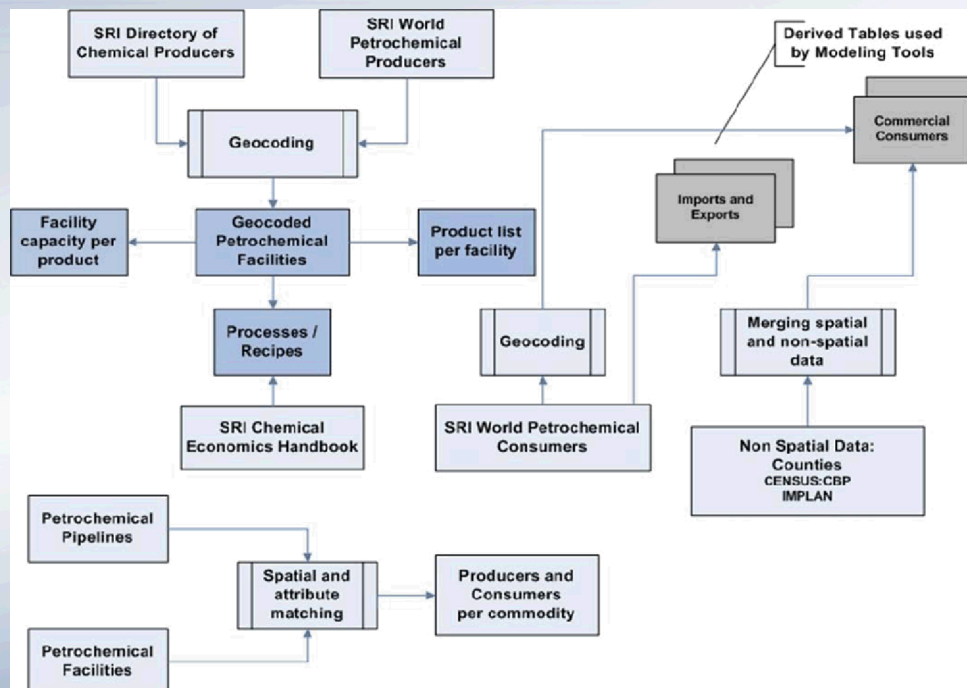
Technical Structure



Chemical Data Model (CDM)

■ Data foundation for the project

- All models are driven from the same set of core input data
- Differences in model output are due to modeling approaches, not disparate input datasets



Chemical Data Model (CDM)

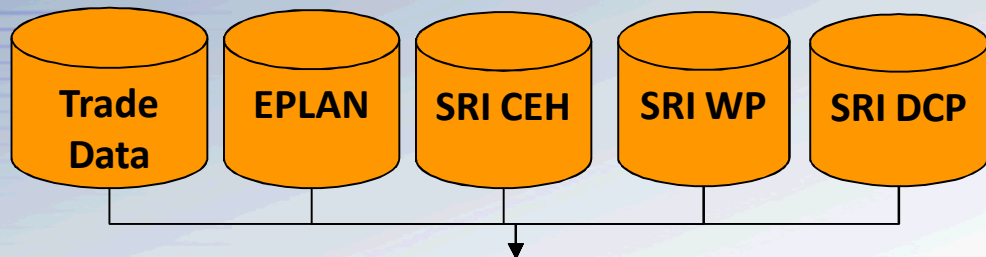
■ Information assembled under Chem S&T

- Plant facilities
 - Name
 - Location (address and geocodes)
- Facility productions
 - Chemical types
 - Quantities
 - Processes
- Infrastructure dependencies
 - Transportation (rail, pipeline, etc.)
 - Energy (electric power, natural gas, petroleum products)
 - Quantities
- Consumption
 - Categories
 - Locations
 - Quantities
- Imports/exports
 - Locations
 - Quantities
- Other factors
 - Economics
 - Population distribution
 - Emergency services

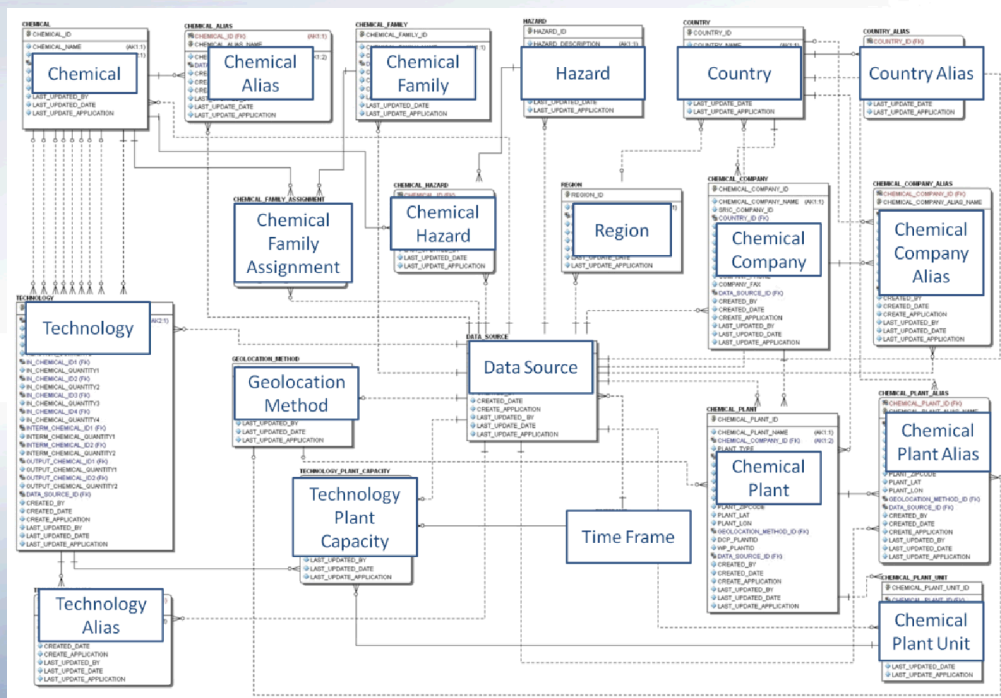


■ CDM Building Process

- Gather
- Process and integrate
 - ◆ Merge datasets into a common, Oracle-based framework
- Authenticate
- Test
 - ◆ Ensure compatibility with end use
- Iterate
- Document



Chemical Data Model (CDM)



Chemical Data Model (CDM) Sources

Dataset Name	Provider
World Petrochemicals Program 2009	SRI Consulting
Chemical Economics Handbook 2009	SRI Consulting
Directory of Chemical Producers 2009	SRI Consulting
Oil & Gas Pipelines	NGA HSIP Gold 2008 (PennWell)
Oil & Gas Facilities	NGA HSIP Gold 2008 (PennWell)
United States Census 2000	U.S. Census Bureau
County Business Patterns 2007	U.S. Census Bureau
County Business Patterns Employees Estimation 2007	U.S. Census Bureau



Chemical Data Model (CDM) Sources

Dataset Name	Provider
Geographic Names Information System	U.S. Geological Survey
IMPLAN States Summary 2002	Minnesota IMPLAN Group
International Trade Statistics 2007	U.S. Department of Commerce
Refinery Location Data	Argonne National Laboratory*
2005 Commodity Flow Survey, Department of Transportation	2005 Waybill Sample, Surface Transportation Board
2007 Class I Railroad Statistics, Association of American Railroads	2007 Producer Price Index, Department of Labor
E-Plan Emergency Response Information System	U.S. Environmental Protection Agency/U.S. Department of Homeland Security

*** Argonne data were updated using 2007 domestic data from the Energy Information Administration (EIA) and foreign data from SRI Consulting.**



- **Available data drive the level of granularity and complexity within CDM which in turn drive the level of analysis that can be performed**
 - Also requires caveats
- **‘Data management’ is a continuous enterprise and is best performed in a cooperative, two-way environment**
- **Beginning a similar effort for another area? Define data requirements first.**

