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# An Approach to Building Near-Real-Time Situational Awareness of Local Supply Chains Following Disasters

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# Supply Chains in Context

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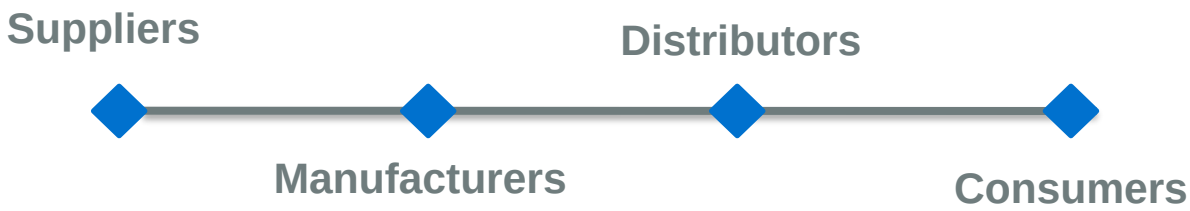
**Supply Chain Description**

*Activities associated with the flow and transformation of goods from raw materials to end-users.*




The flow can be linear or involve communication between and within upstream and downstream components.

# Supply Chains in Context

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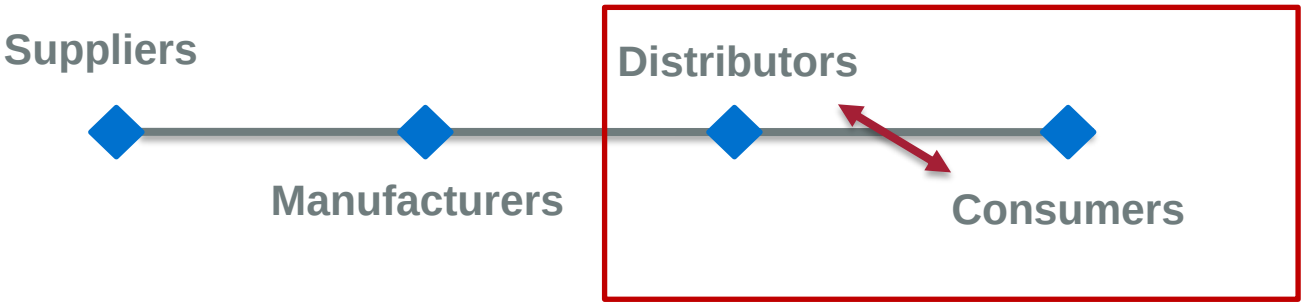
**Key Terms**

- **Supply Node/origin**—Warehouse, distribution center, etc.
- **Demand node/destination**—Grocery store, gas station, pharmacy, etc.



# Risks to Supply Chains

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- Supply chain risk management is concerned with identifying and mitigating a host of risks—from coordination of supply and demand to minimizing disruption of normal activities.
- Today, we'll focus on disruption risks such as:
  - Operational contingencies
  - Natural hazards
  - Terrorism
  - Political instability
- These risks can occur anywhere along the supply chain continuum.

# Simple Local Supply Chain Resilience Analytic Framework

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- Identifying critical supply and demand nodes within or near your community
- Building relationships with key private sector partners
- Gaining and understanding of their reliance on supporting lifeline infrastructure
- Organizing your findings in a logical manner (that can be easily referenced following a no-notice catastrophe)

# Supply Chains and Infrastructure Reliance

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- Most supply and demand nodes are reliant on lifeline infrastructure, such as electricity, water, natural gas, etc.
- This reliance can be described as a dependency, or a linkage or connection between two infrastructures, by which the state of one infrastructure influences or is reliant upon the state of the other.

# Overview

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- **Problem Statement:** Near-real time situational awareness of the operational status of critical supply and demand nodes following a major disaster is needed to inform response and recovery activities; however, this information has generally been observed informally by public safety officials.
- **Goal:** To develop a model that can be used by public safety officials to make informed assumptions regarding the capability of assets (e.g. a grocery store) and systems (e.g. all local grocery stores) to support affected communities following a catastrophic incident.

**Waffle House Index**

***"If you get there and the Waffle House is closed? That's really bad. That's where you go to work."—Former FEMA Administrator, Craig Fugate***

# GRID-M Logic

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- The operational status of each supply and demand node can be characterized as operational, partially operational, or not operational.
- These statuses are obtained by matching real-time outage or disruption data from utility providers with predetermined specific coping strategies (e.g. backup power) based on a pre-incident limited infrastructure survey.
- The following sectors are currently included within GRID-M:
  - Electric
  - Natural Gas
  - Water
  - Wastewater
- Dependencies between nodes are also captured.
- This information can also be paired with a limited damage survey (e.g. a windshield damage assessment) to further provide situational awareness for each node within supply chains of interest.
- GRID-M displays all outputs within a Geographic Information Systems environment with additional prepopulated layers such as real-time traffic and demographics information of the affected communities.

# Sample Results

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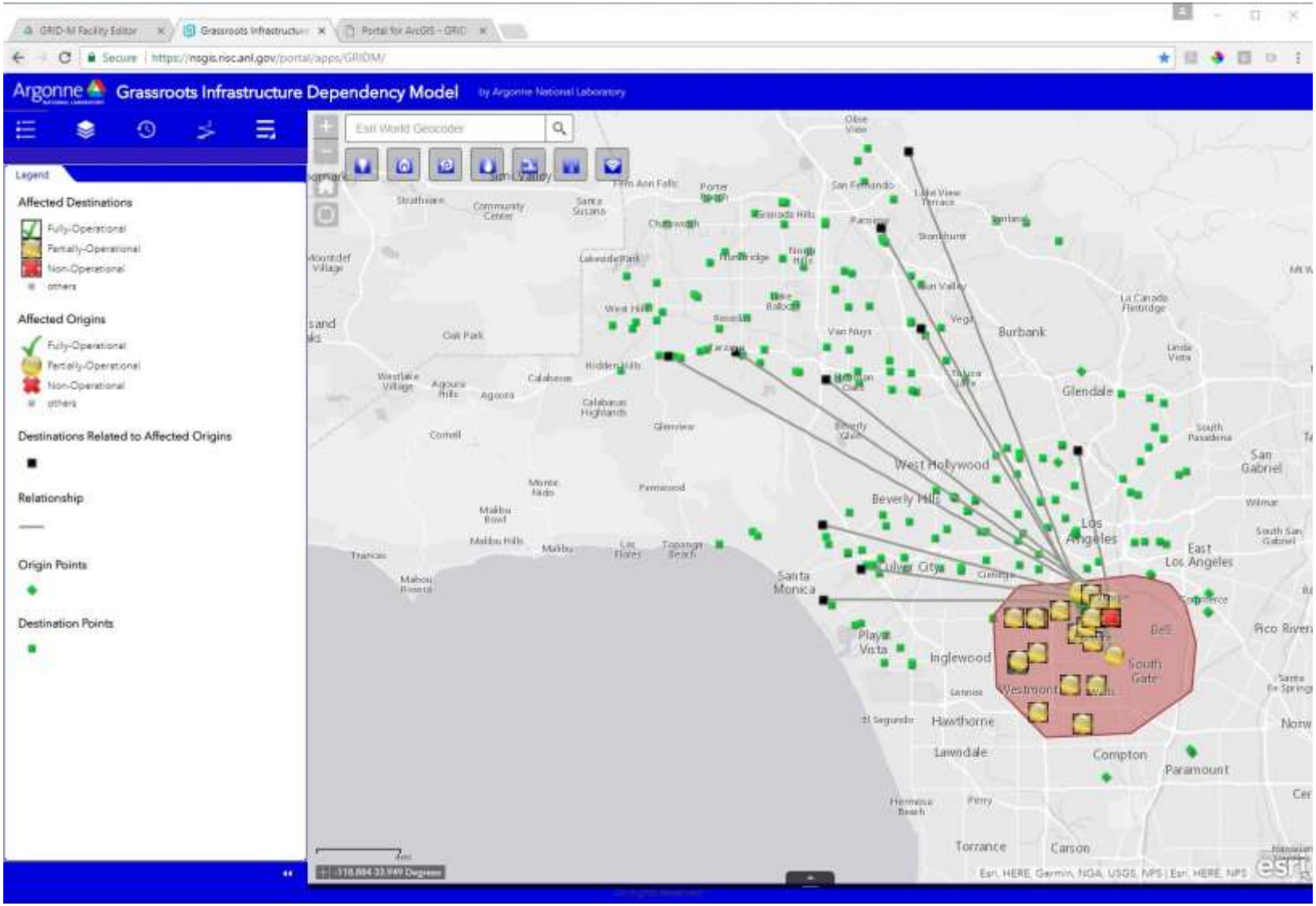

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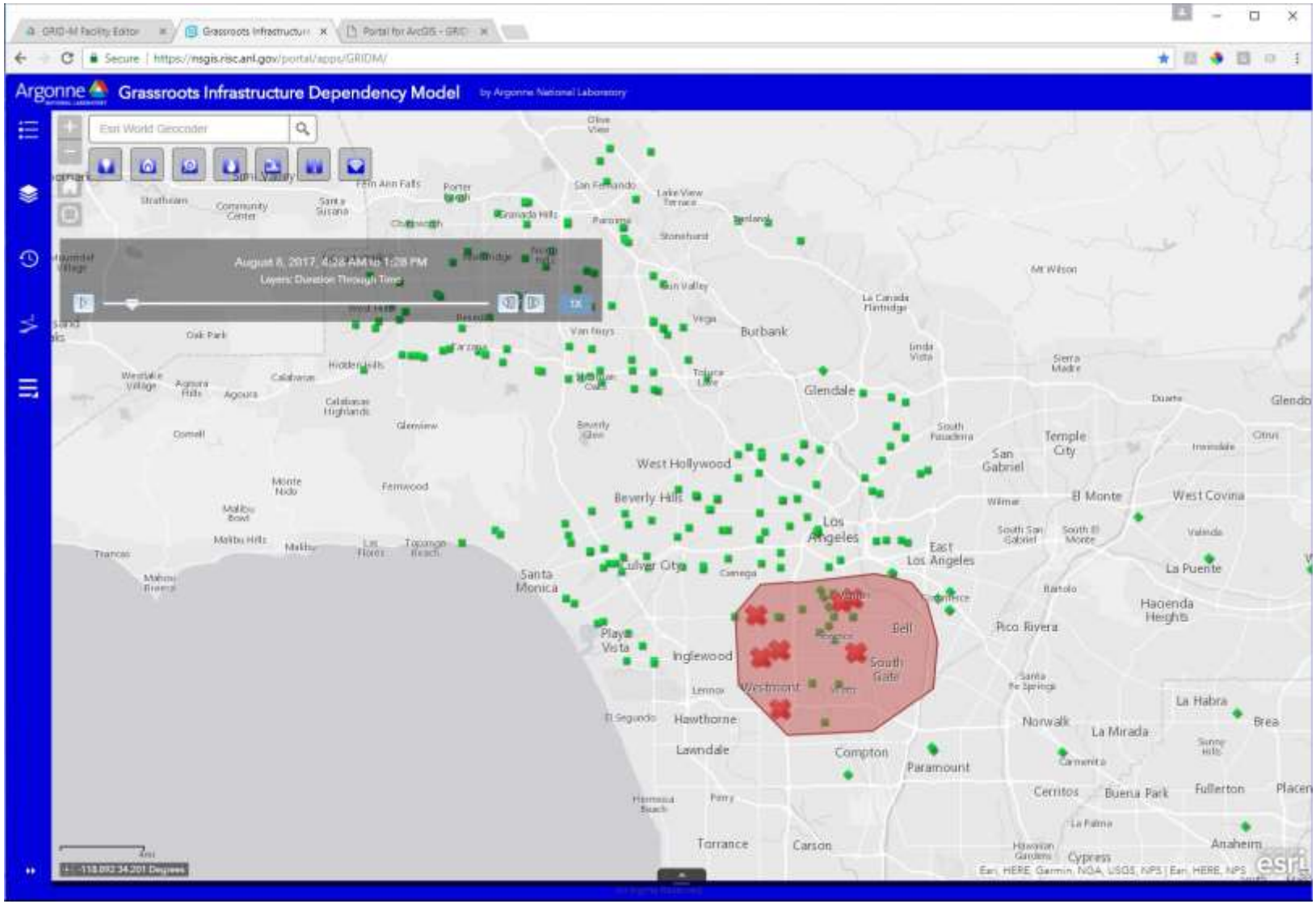

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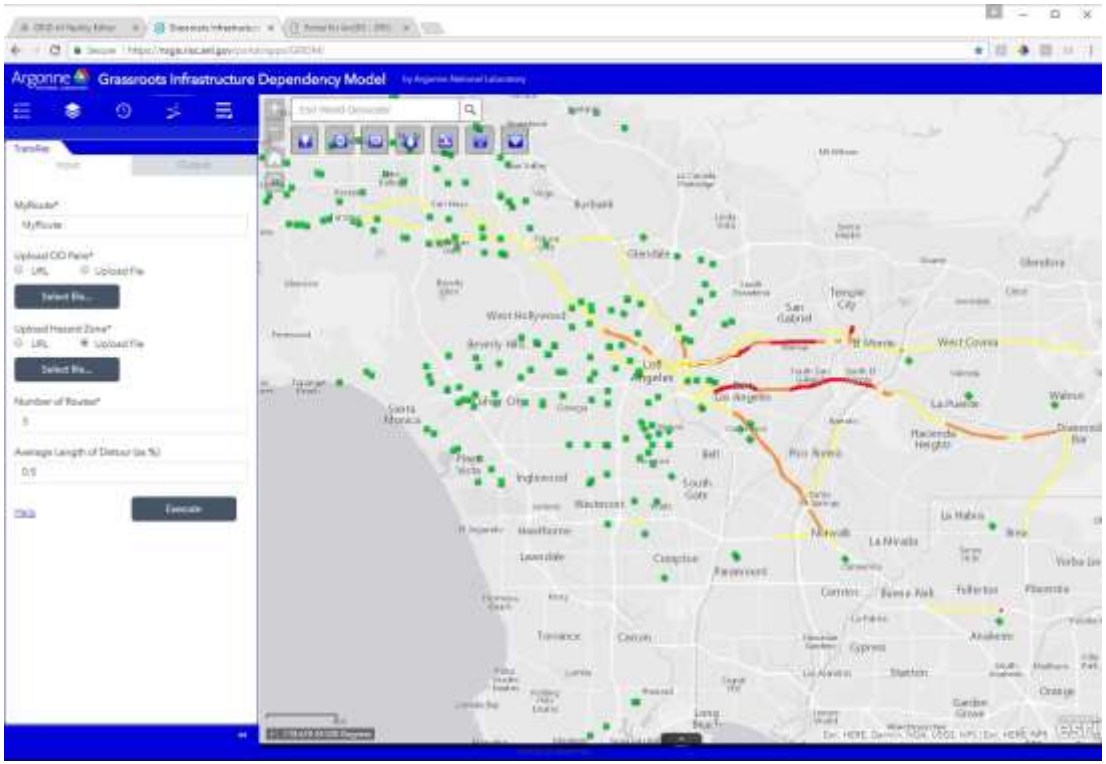


# Example Use Cases

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- The identification of priority infrastructure using a “planning” view;
- Exercise simulations;
- Real world “grassroots-fed” situational awareness of the likely operational status of supply and demand nodes based on several external and internal variables;
- The development of Incident Action Plans;
- The prioritization of restoration activities; and
- Quasi-predictive operational status for future planning efforts.