



THE CNA SUPPLY CHAIN OPERATIONAL ENGAGEMENT (CNA SCOPE™) METHOD

MOTIVATIONS AND USES

In an era of increasing urbanization, automation, on-demand delivery, and unpredictable weather, large urban areas are more vulnerable than ever to supply chain disruptions for lifeline commodities that can turn a disaster into a catastrophe. Recognizing that 1) public sector relief channels cannot match the scale of need for lifeline commodities in large, concentrated populations, 2) no one entity has a complete picture of commodity flow, and 3) actions taken by the public sector can both alleviate and exacerbate bottlenecks, CNA has developed a methodology to characterize lifeline commodity networks to inform both public and private sector decision makers. The critical elements to this method are a focus on commodity flow, a view that encompasses the whole “ecosystem” of nodes, links, players, and interdependencies involved in that flow, and targeted assessment to meet the lifeline commodity needs of a dense, urban population.

A PATHWAY TO INSIGHT AND ACTION

The CNA SCOPE™ method can be broken up into two parts: in Steps 1-4, we develop a characterization of the supply chain network as it normally operates; in Steps 5-7, we assess what happens to the network during a disaster, how to prioritize response, and how to recover.

Step 1 defines the problem space by selecting the commodity of interest, understanding its supply chain in a general sense, and defining the population of interest by drawing an envelope around it to delineate the study area.

Step 2 covers the acquisition and processing of data to characterize the supply chain. The data sources should be as complete, timely, and accurate as possible, and include information on nodes, connectivity, dependencies, and vulnerability/resilience. State/local level and owner-operator data may be needed. Focus is placed on obtaining data that help quantify commodity flow, storage, and respective capacities.

Step 3 uses the data and understanding of network features (from local experts and owner-operators) to develop maps of commodity flow. This may require combining data sources, making key assumptions, and completing geospatial analysis (e.g., routing). These maps should highlight where commodities travel, and particularly, key areas carrying large proportions of regional flow. At this step, it is critically important to get local stakeholders and supply chain owner-operators to validate the regional picture of commodity flow.

Step 4 uses analysis to develop operationally relevant assessments of the network. For example, geospatial analysis can assess where there are large concentrations of flow, storage capacity, or nodes a certain type to identify areas with high bottleneck propensity. Different types of analysis can identify where populations are vulnerable due to a lack of retail node access, distance from supply sources, and other socioeconomic considerations.

The CNA SCOPE™ Method

STEP 1: DEFINE NETWORK SCOPE BY COMMODITY, GEOGRAPHY

STEP 2: ACQUIRE AND PROCESS DATA TO BUILD NETWORK CHARACTERIZATION

STEP 3: DEVELOP MAPS OF COMMODITY FLOW

STEP 4: ASSESS NETWORK FOR CONCENTRATIONS, VULNERABILITIES

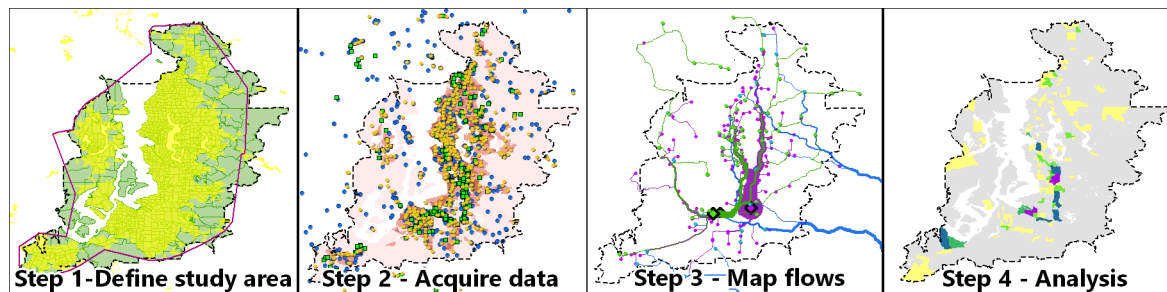
STEP 5: INJECT IMPACTS OF EXTREME EVENT, ASSESS NETWORK FUNCTION AND CONSEQUENCES

STEP 6: RANK BOTTLENECKS BY CONSEQUENCE AND IDENTIFY OPTIONS TO EXPLOIT SURVIVING CAPACITY

STEP 7: ANALYZE TOP BOTTLENECKS, TAKE ACTION TO AMELIORATE, REPEAT

Step 5 introduces the complications of a disaster scenario (real or simulated) that affects the network. Using the network characterization developed in steps 1-4, it will be possible to assess consequences with respect to commodity flow. For example, how much flow will need to be redirected if a bridge falls? If major distribution centers are destroyed, how much capacity is lost, which retail nodes are affected, and which areas are most dependent on those retail nodes? Given a power outage, how many facilities will be out of operation, in limited operation, or fully operational? Based on observed flows or demands, where will existing flow capacity be exceeded?

Steps 1-4 build a characterization of the network as it normally operates and can be completed prior to a disaster.



Step 6 focuses on initial triage and response. First, which disruptions identified in Step 5 are most consequential? In a widespread disaster, where is there surviving capacity that can be exploited in the short-term to restore flow? What are some options for ensuring commodity flow continues? At this step, it is critical to communicate across the response community – and especially with the private sector – to develop a full picture of consequences, limitations, and dependencies that are affecting flow.

Step 7 focuses on recovery. Given the most consequential disruptions identified in Steps 5 and 6, what interventions will most improve commodity flow? Answering this question requires active public-private engagement to assess individual nodes or bottlenecks and identify mitigation options. These options might include installing a generator, debris clearing, contracting a repair crew, flying in trained personnel, identifying an alternate route, or a wide variety of other options. As each situation is addressed, move to the next most consequential disruption, and repeat the process. The ultimate goal is to identify how to best ensure commodity flows can reach survivors in a disaster

BENEFITS OF THE CNA SCOPE™ METHOD

The CNA SCOPE™ Method is unique in providing wide-area, network-oriented views of specific commercial commodity flows. Through this method, we are able to provide jurisdictions with material insights and benefits, including:

- A common map of lifeline commodity flows into and through the region
- Deeper understanding of supply chain networks, including critical dependencies, players, and bottlenecks
- A process for developing and validating network characterizations that productively engages both the public and private sectors
- Improved public and private sector disaster preparedness through uncovering of significant vulnerabilities within the networks and for specific populations; identification of key network resources and monitoring points; and prioritization of opportunities for improving overall supply chain system resilience
- Insights that allow for better targeting of government relief operations in a disaster

ABOUT CNA CORPORATION

CNA is a nonprofit research and analysis organization dedicated to the safety and security of the nation. It operates the Institute for Public Research — which serves civilian government agencies — and the Center for Naval Analyses, the Department of the Navy's federally funded research and development center (FFRDC). CNA is dedicated to developing actionable solutions to complex problems of national importance. With nearly 700 scientists, analysts and professional staff, CNA takes a real-world approach to gathering data, working side-by-side with operators and decision-makers around the world. CNA's research portfolio includes global security and great power competition, homeland security, emergency management, criminal justice, public health, data management, systems analysis, naval operations and fleet and operational readiness.

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