CNA

The CNA Supply Chain Operational Engagement (CNA SCOPE™) Method

Motivations and Uses

In an era of increasing urbanization, automation, on-demand delivery, unpredictable weather, and capable nation-state adversaries, 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.

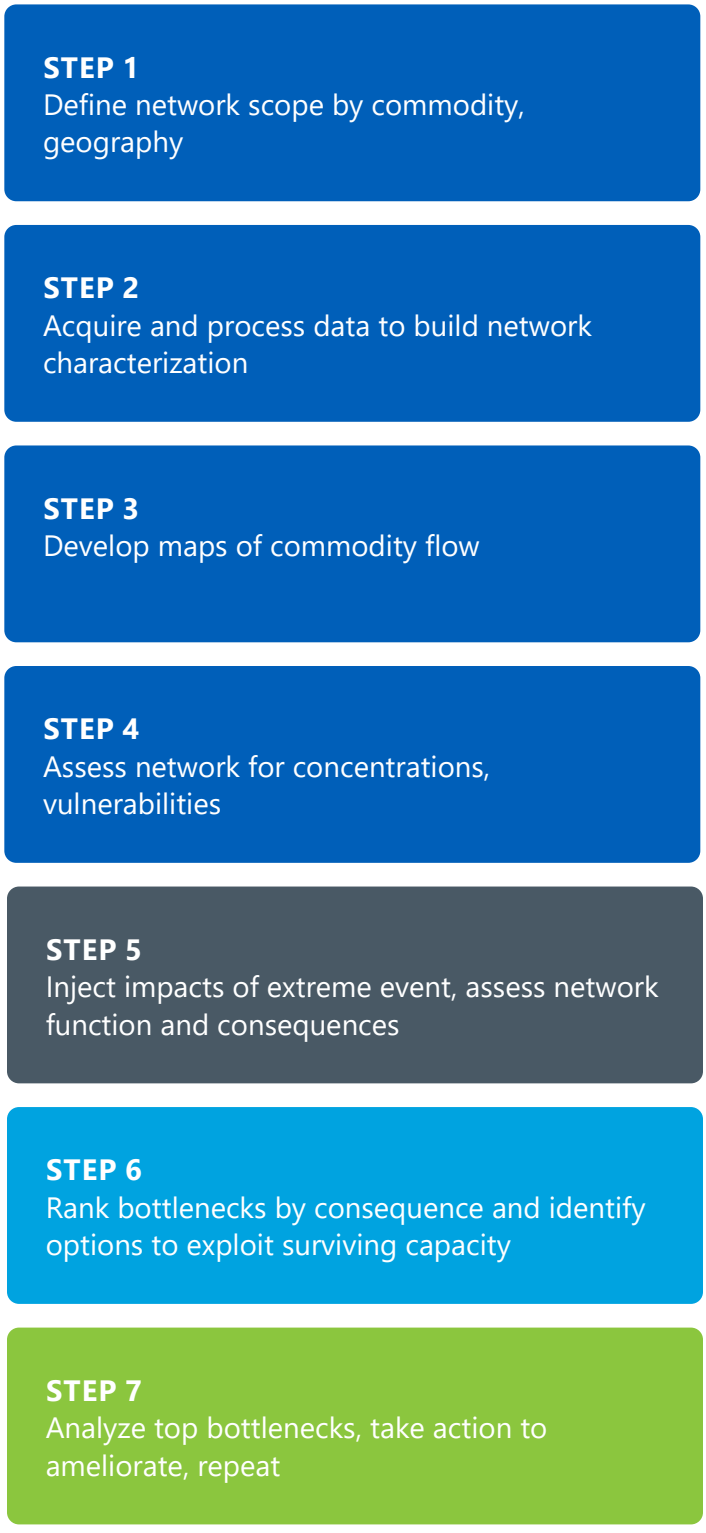
Step 4 uses analysis to develop operationally relevant assessments of the network. For example, geospatial analysis can assess where there are large concentrations of flow, storage capacity, or nodes of a certain type to identify areas with high bottleneck propensity. Different types of analysis can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

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?

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.

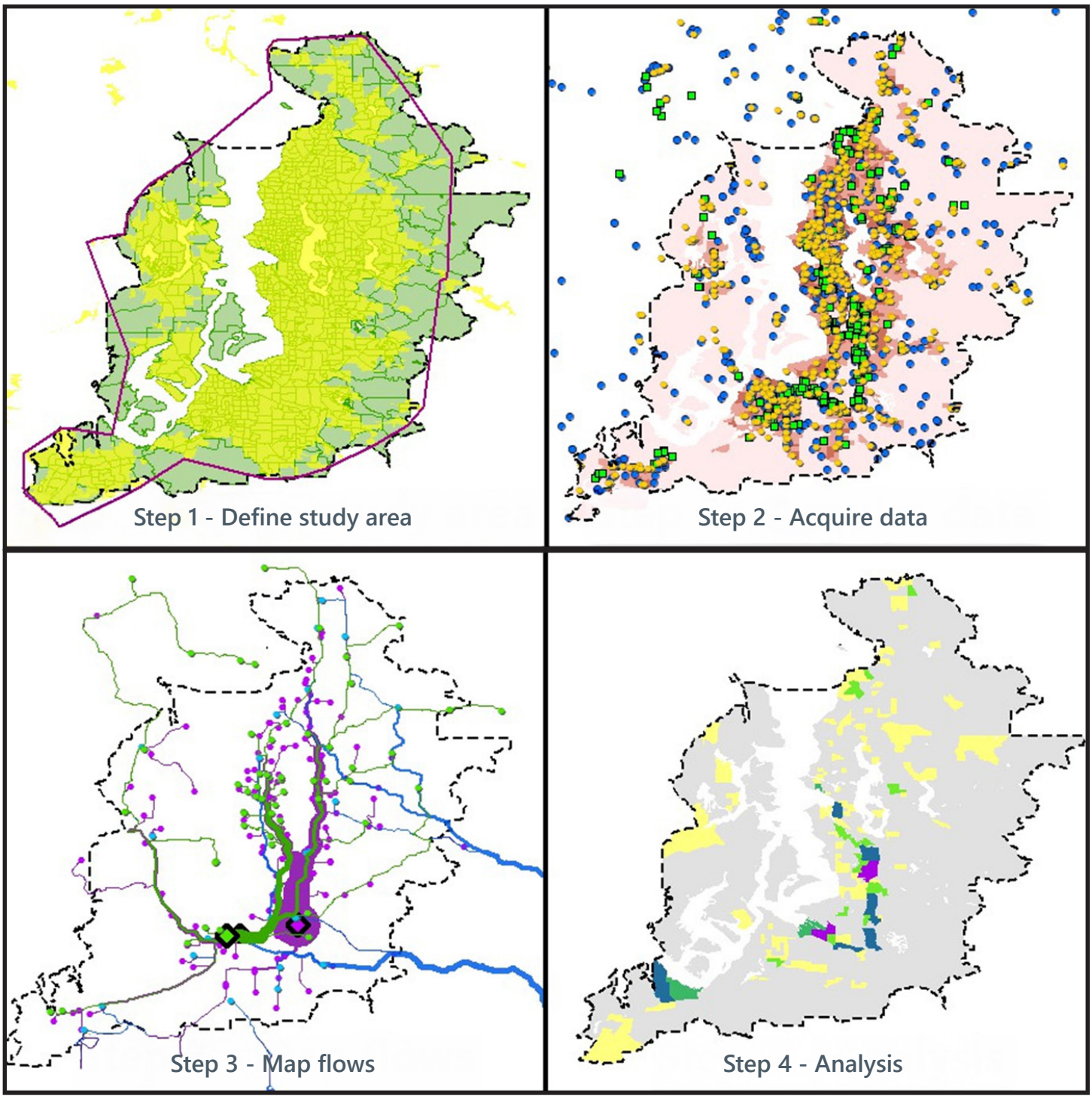
Step 7 focuses on recovery. Given the most consequential disruptions identified in Steps 5 and 6, which interventions will most improve commodity flow? Answering this question requires active public-private engagement to assess individual nodes or bottlenecks and identify mitigation options. These options might include installing a generator, clearing debris, contracting a repair crew, flying in trained personnel, or identifying an alternate route. 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.

Figure 1. The CNA SCOPE method



Source: CNA.

Figure 2. Steps 1–4: Build a characterization of the network as it normally operates and can be completed prior to a disaster



Source: CNA.

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 provide jurisdictions with material insights and benefits, including the following:

- 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 facilitate better targeting of government relief operations in a disaster

About CNA

CNA is a not-for-profit analytical organization dedicated to the safety and security of the nation. With nearly 700 scientists, analysts, and professional staff across the world, CNA's mission is to provide data-driven, innovative solutions to our nation's toughest problems. It operates the Center for Naval Analyses—the Department of the Navy's federally funded research and development center (FFRDC)—as well as the Institute for Public Research. The Center for Naval Analyses provides objective analytics to inform the decision-making by military leaders and ultimately improve the lethality and effectiveness of the joint force. The Institute for Public Research leverages data analytics and innovative methods to support federal, state, and local government officials as they work to advance national and homeland security.

For more information, please contact David Kaufman, Vice President and Director, Safety and Security | 202-423-9227 | kaufmand@cna.org