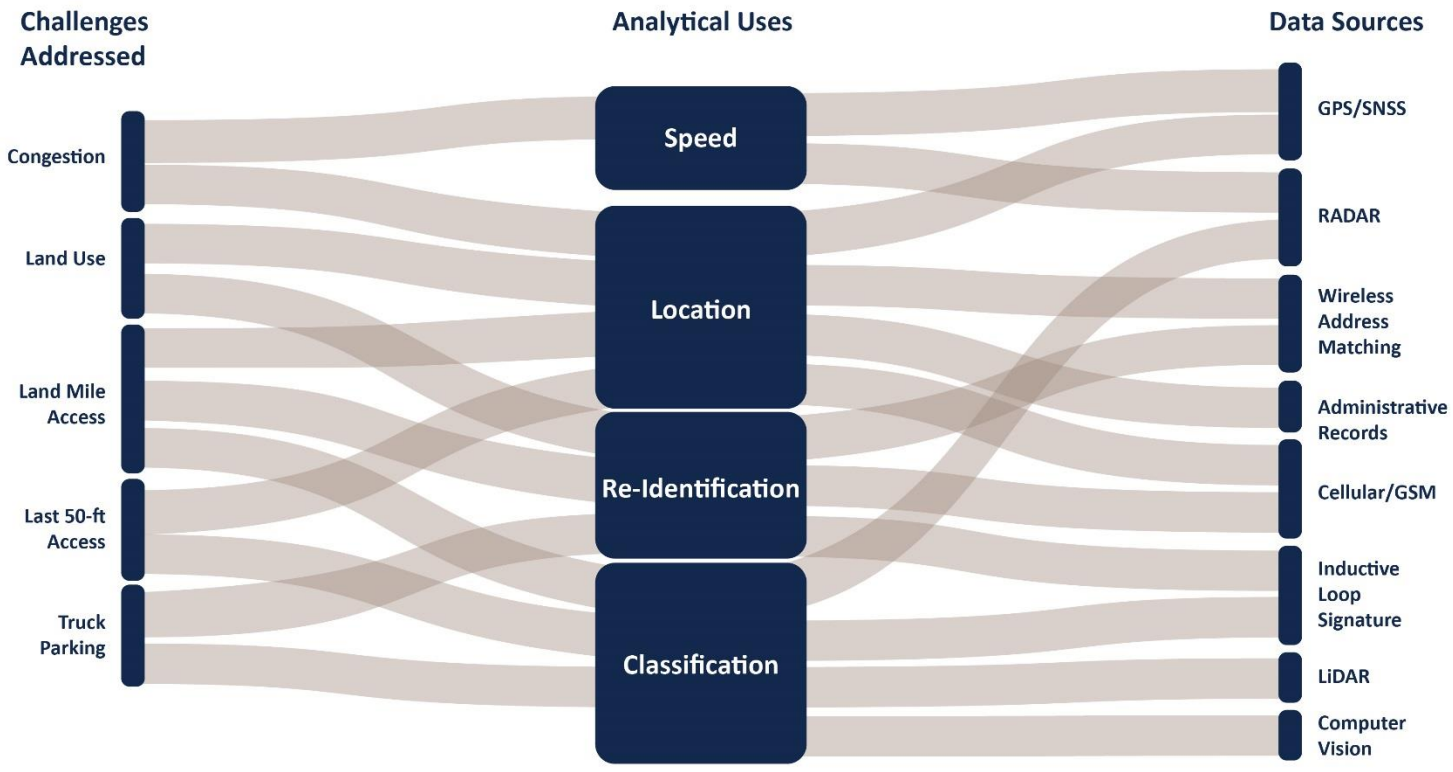
Unlocking the Value of New Freight Data Through Data Fusion

Executive Brief

A key finding of this research is the concept of ***data fusion***, or the combination of data from multiple sources to generate new actionable insights. For example, combining origins and destinations from truck GPS data with land use or business location data can yield insights into the types of freight being carried on specific routes.

Data fusion is valuable because the combination of data sources unlocks the value of both new and existing data sources by shining a light on previous blind spots. Fusing data sources is becoming increasingly feasible as data and analytical tools become more easily available and affordable. To leverage data fusion, agencies must understand and decide to what end and how data sources will be analyzed, i.e. which persistent urban and metropolitan freight challenges will the analyses address.

The **Source-Use Concept Map** below shows how different types of data, analytical methods, and challenges are linked. The five **Persistent Challenges** identified in this research are on the left. Emerging and new **Data Sources** are on the right. The middle shows how **Analytical Approaches** fuse a variety of data sources from the right into insights for decision-making. This Brief further details the four analytical approaches (next page).



Also see our other Executive Briefs in this series:

- **Persistent Urban and Metropolitan Freight Challenges**
- **Defining and Describing Emerging Sources of Freight Data**

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Speed

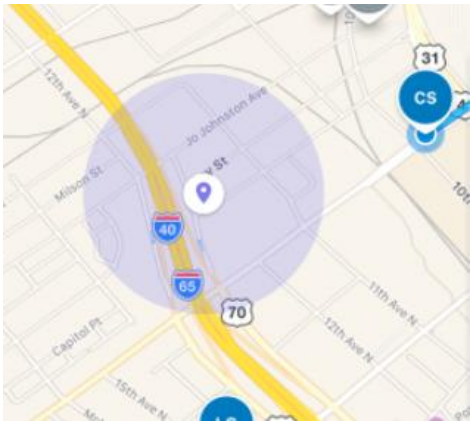
Measuring the average travel speed of commercial vehicles can provide information for traffic flow management strategies, road network performance analysis, and studies of travel delay and congestion. These types of evaluations can provide some of the insights necessary to understand or address the freight challenges of congestion, last-mile access, and land use conflicts. For example, the image at left shows observed truck travel speeds as derived from GPS tracking data, with blue areas free-flowing, and red areas slow.

Image source: NYC DOT

Location

Location refers to knowledge of the exact or approximate geographic placement of a vehicle or user within the transportation network at a specific point in time. Knowing where vehicles are located is a critical element in the analysis of travel behavior and demand. In the context of urban and metropolitan freight movement, location information can aid in studying parking behavior, land use, use of commercial facilities such as distribution centers, loading zones, as well as vehicle ownership and commodity flow.

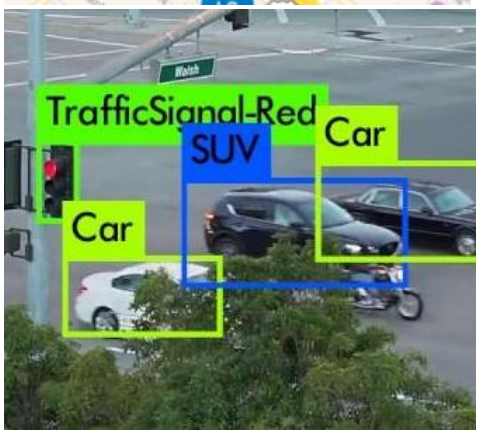
Image source: Fleetio



Classification

Classification refers to the act of categorizing vehicles (such as cars vs trucks) based on their physical characteristics such as shape, size, weight, and number of axles. Land use planning, traffic signal design, emission analysis, traffic regulations, and infrastructure performance analysis are some of the topics that can be informed by vehicle classification information. The image at right provides an example of automatic vehicle classification performed in real-time by a machine vision system.

Image source: nVidia



Re-Identification

Re-identification is the process of capturing unique identification about a vehicle and using this information to repeatedly identify that vehicle again at other times and/or locations. Vehicle re-identification data can inform origin-destination studies, route assignment algorithms, and travel time and speed analysis. An example of re-identification using induction loop signatures is provided at right. Each truck (above) generates a unique magnetic signature (below) that can be read by detectors and used to track its route through the network.

Image source: University of Arkansas