# ORION Fleet Telematics

**Fusing real-time traffic data with historical travel times to improve the efficiency of last-mile deliveries.**

CASE STUDY



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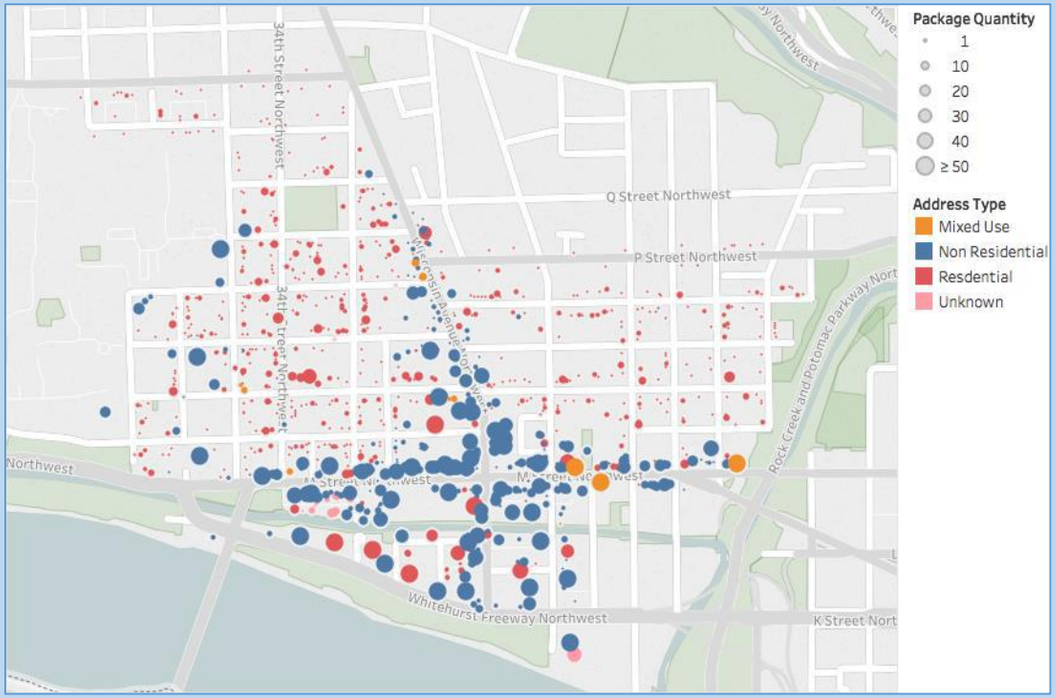
| **Freight Challenges** | Congestion, final 50 feet |
| **Data Sources Used** | Administrative Records, Global Positioning System |
| **Analytical Approaches** | Speed, Location |




**Delivery Breakdown by Address Type**

*Source: Govtech, Urban Package Delivery Heads to the Classroom. Available: http://www.govtech.com/education/Urban-Package-Delivery-Heads-to-the-Classroom.html*

## WHAT ARE THE FREIGHT CHALLENGES?

UPS handles more than 16 million shipments each day, and operates more than 102,000 vehicles worldwide. Since the company operates on such a large scale, UPS trucks not only create congestion but traffic congestion can also cost the company significantly. Even small travel time improvements in delivery vehicle routing can yield large financial savings and community environmental benefits.

## WHAT WAS THE GOAL OF THE PROJECT?

Delivery companies like UPS improve the efficiency of their delivery vehicle routes using software that calculates an optimal vehicle path through a road network based on a set of inputs such as delivery locations, delivery times, road network maps, business hours of operation, road speed, truck size restrictions, and loading/unloading times. This route optimization can be further enhanced by the addition of traffic and congestion data, which is used to improve estimates of travel speeds at specific times. The ultimate goal using this software is to reduce the costs of operation by reducing the number of miles driven and reducing the amount of equipment needed. UPS has developed its own suite of routing software called On-Road Integrated Optimization and Navigation (ORION).

## WHAT DATA SOURCES WERE USED?

Each morning, routes for a set of stops are generated using start time, committed delivery time, pick-up times, special customer needs, and a set of proprietary road maps. These proprietary maps include information from data on average travel times for specific locations and hours of the day. Additionally, the ORION system receives real time traffic data from both public and private sources, and continually recalculates and updates routes to reflect these real-time traffic conditions.

## WHAT ANALYTICAL APPROACHES WERE APPLIED?

GPS tracking devices in UPS trucks collect information on speed and location throughout the day. Archives of this data can be used to determine average speeds and thus travel times at specific times and locations in the road network. This travel time information can then be used to improve ORION's pathfinding abilities by enabling the software to more accurately estimate trip times. Since UPS is a private company, specific details on their approach to synthesizing and analyzing historical and real-time traffic information are commercially sensitive, proprietary and protected as intellectual property.

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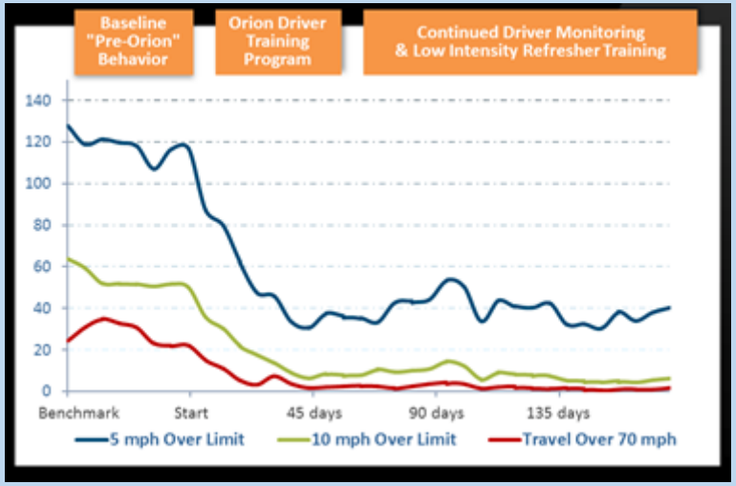


**Speed Reduction on Local Streets Due to Truck Deliveries**
*Source: Orion Fleet Intelligence. https://www.orionfi.com/*

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## WHAT ANALYTICAL APPROACHES WERE APPLIED (Cont.)?

While UPS's and other companies' route optimization efforts are a private sector activity, the public sector can be a contributor to and beneficiary of this optimization. The traffic speed information collected by public infrastructure like LiDAR and radar sensors or machine vision could be made publicly-available, and incorporated into private optimization software, which could improve freight flow and potentially reduce truck VMT in dense areas. Private companies such as UPS may also be willing to share their travel data with public agencies for use on specific projects. An example of this data sharing is discussed below.

## WHAT WERE THE RESULTS?

UPS estimates that ORION saves the company's vehicles 100 million miles, or 10 million gallons of fuel per year. Additionally, the system collects over 200 data points on topics such as speed, mileage, number of stops, and fuel economy from 80,000 vehicles each day (UPS, 2017).

## HOW WERE THE RESULTS VISUALIZED OR COMMUNICATED?

Since UPS is a private company operating in a highly competitive marketplace, it does not share much information about how ORION works. However, the truck trip information generated by onboard truck GPS and saved by a system like ORION may be available to public agencies for use on specific projects. For example, UPS has shared its delivery vehicle data with cities looking to solve problems such as reducing the delivery truck traffic that is generated by repeat delivery attempts when parcel recipients are not available to receive deliveries. A good example of the potential value of partnership between private firms, public agencies, and academia is UPS' 2017 partnership with Georgetown University's Urban and Regional Planning program, and the Washington, DC Department of Transportation (DDOT).

Students in an urban data "studio" class were tasked with developing projects that answered one of two questions: (1) how do final 50-feet delivery services function in urban environments, and how can they be improved through planning, and (2) what kinds of data are used and collected by freight systems, what can be collected in the future, and how can this data be applied to urban planning problems? The students were given a sample of UPS' telematic data from ORION, and developed their own research projects and applications, which are listed below. DDOT policy staff helped students evaluate the policy considerations associated with the research project and its recommendations: (1) An evaluation of the potential value of programming ORION software automatically selects or combine multiple delivery methods such as trucks, bicycles, and delivery on foot. Two students estimated the effect these combinations made on delivery costs such as fuel consumption, time spent on deliveries, lost packages, and parking tickets. (2) An identification of an optimal pilot test area for pick-up and drop-off package lockers. These lockers were proposed as a means to reduce the impacts of last-mile congestion and last-50 foot parking issues on UPS delivery routes, reduce package theft, and reduce the number of repeat delivery attempts for package recipients who are unavailable. (3) A study of whether or not bicycles were are a feasible alternative to trucks for the last mile of deliveries in the congested Georgetown neighborhood of Washington DC. (4) An evaluation of what additional data could be collected in real time from instrumented UPS trucks, such as air pollution, natural gas leaks, or traffic or pedestrian counts.