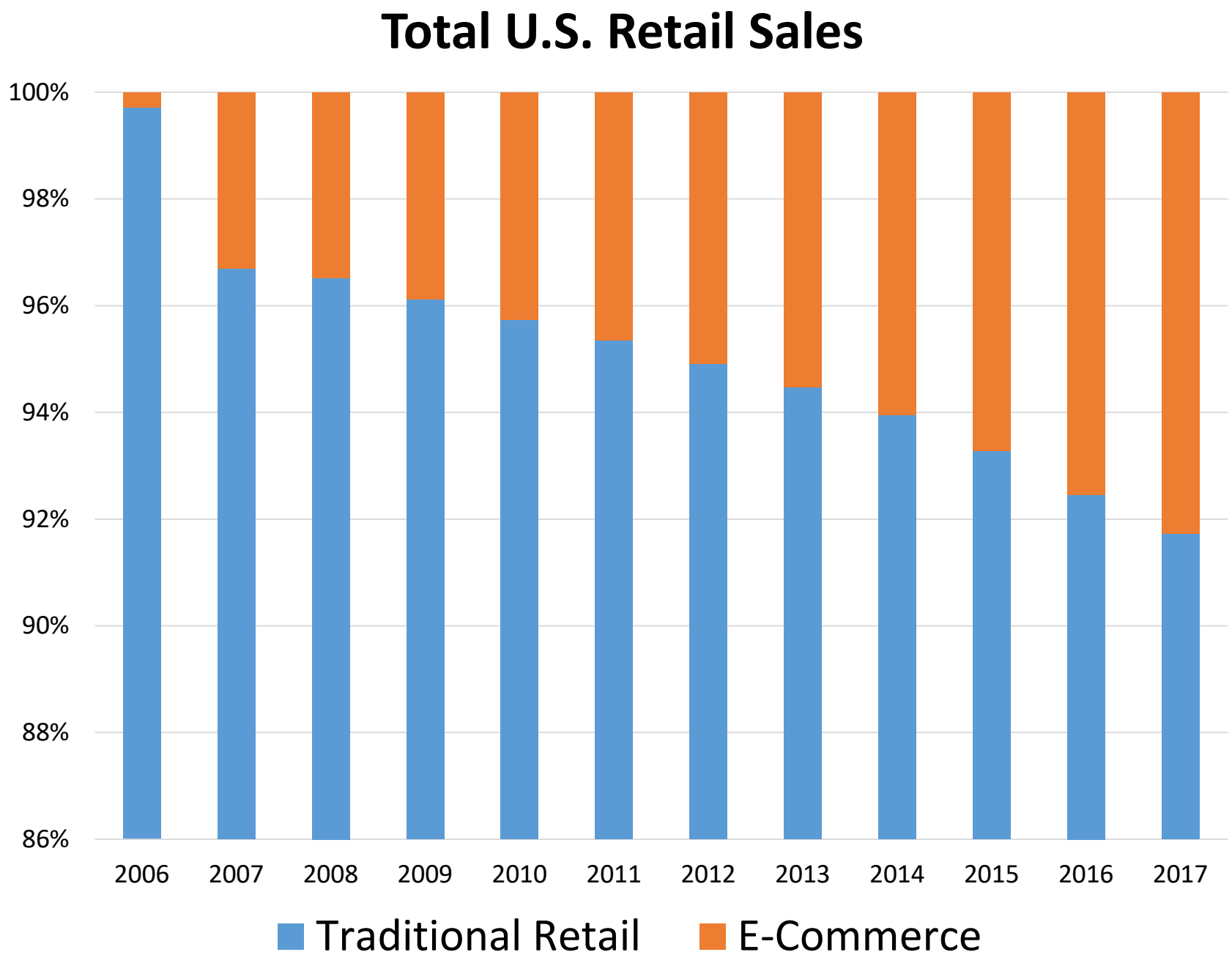
Growth of E-Commerce and Ride-Hailing Services is Reshaping Cities

The Urban Freight Lab's Innovative Solutions

Anne Goodchild
Director, Supply Chain Transportation and Logistics Center

August 15, 2018

E-Commerce sales were $453.5 billion in 2017, up 16% from 2016.



Are cities ready for an explosion of e-commerce and ride-hailing growth?

A 20% e-commerce compound annual growth rate (CAGR) would more than double goods deliveries in 5 years.

If nothing changes, this could double delivery trips in cities; thereby doubling the demand for load/unload spaces.

City load/unload space strategies have not kept pace with change

Innovation is needed to manage scarce curb, alley and private loading bay space in the new world of on-demand transportation, 1-hour e-commerce deliveries, and coming autonomous vehicle technologies.

There is not enough curb capacity, now

A recent curb parking utilization study in the City of Seattle indicated 90% or higher occupancy rates in Commercial Vehicle Load Zones (CVLZs) for some areas for much of the workday.

Photo by Chris Eaves, Seattle Department of Transportation (SDOT)

Growth in on-demand passenger services

Ride-hailing services such as Uber and Lyft are also creating new demand for load/unload spaces at city curbs.

In 2017 more than 23 million people took a Lyft, up from 12 million in 2016; while Uber completed 4 billion rides.

These services create a negative feedback loop affecting curb demand, as parking problems are the top reason people use the service instead of driving.

Photo by AP, Feb. 25, 2018

The Urban Freight Lab

- The Urban Freight Lab at the University of Washington (UW), in partnership with the City of Seattle Department of Transportation (SDOT), is using a systems engineering approach to solve delivery problems that overlap cities' and businesses' spheres of control.

- The Urban Freight Lab is a living laboratory where potential solutions are generated, evaluated, and pilot-tested inside urban towers and on city streets.

- Members of the Urban Freight Lab - Charlie's Produce, Ford Motor Company, Kroger, Nordstrom, UPS and USPS - fund the Lab and dedicate senior executives' time to solving problems in it.

Final Fifty Feet Research

The final 50’ of the urban delivery system:

- Starts when a truck driver parks in a load/unload space;
- Includes delivery persons’ activities as they maneuver goods over curbs, along sidewalks and through intersections;
- Ends inside urban towers when they complete their deliveries.

Photo by Urban Freight Lab, UW

The Final Fifty Feet is a New Research Field

The Final 50’ project is the first time that researchers have analyzed both the street network and cities’ vertical space as one unified goods delivery system.

It focuses on:

- The use of scarce curb, buildings’ internal loading bays, and alley space;
- How delivery people move with handcarts through intersections and sidewalks; and
- On the delivery processes inside urban towers.

Photo by Anna Alligood, UW

Final 50’ Research Goal #1

Reduce dwell time, the time a truck is parked in a load/unload space.

Public and private benefits include:

- Lower costs for delivery firms, and therefore potentially lower costs for their customers;
- More efficient use of truck load/unload spaces creates more capacity without building additional spaces; and
- Room for other vehicles to move through alleys.

Photo by Urban Freight Lab, UW, 2017.

Final 50’ Goal #2

Reduce failed first deliveries to:

- Improve urban online shoppers’ experiences and protect retailers’ brands;
- Lower traffic congestion in cities, as delivery trucks could make up to 15% fewer trips while still completing the same number of deliveries;
- Cut costs for the retail sector and logistics firms;
- Cut crime and provide a safer environment.

Photo by Urban Freight Lab, UW, 2017.

How should cities innovate to meet demand?

Step 1: Map and measure the complete truck load/unload space network

Very few cities have curb space allocation data or documentation of loading/parking signage in a systematic, digitized format. A step ahead of many, in 2016 Seattle's geospatial databases included one part of the truck load/unload network: CVLZs at the curb.

In 2017 – 2018 the UFL GIS-mapped and measured two additional elements of the urban goods delivery network in Seattle's Center City:

1. Privately-owned loading docks and bays, and
2. Truck spaces in alleys.

The Urban Freight Lab Defined the Three Elements of the Commercial Vehicle Load/Unload Space Network

Curb Parking Spaces

Alleys

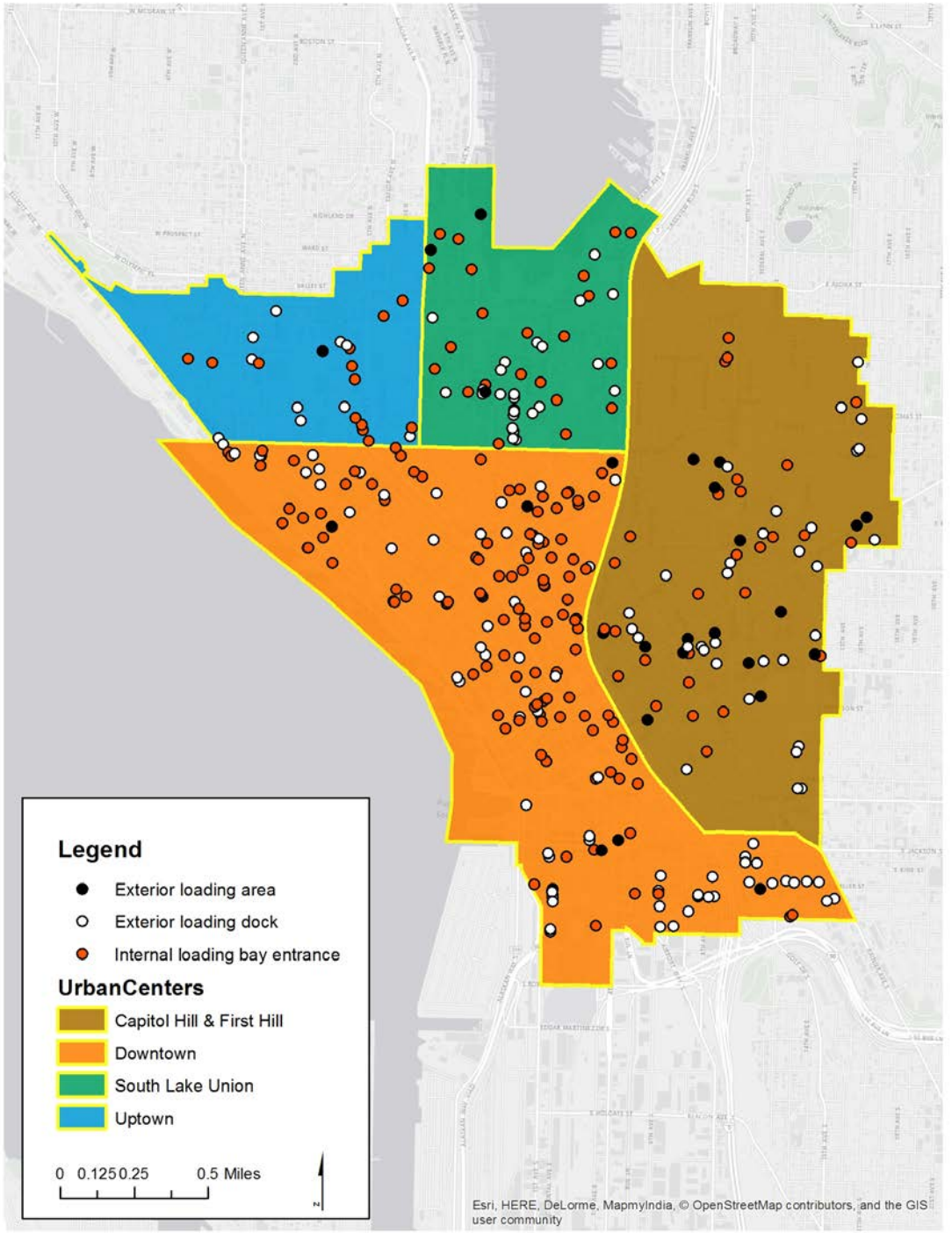
Private Loading Bays and Docks

Photos: G. Giron, Urban Freight Lab, University of Washington, Seattle, 2018

UFL Survey of Center City Loading Bays and Docks

- 87% of Seattle's Center City buildings rely solely on deliveries from curb and alley load/unload spaces, documenting the importance of public spaces.

- There are 338 private loading bays and docks in the urban core.



Truck Curb Occupancy Study

The Seattle Department of Transportation (SDOT) commissioned this study to understand the current commercial vehicle use of curb load/unload zones in Seattle's Center City area.

Urban Freight Lab data collectors observed vehicles loading and/or unloading at the curb around five buildings. They documented the 'minutes vacant' and 'minutes occupied' for:

1. Commercial vehicles in all curb load/unload spaces, and
2. Passenger and other vehicles in Commercial Vehicle Load Zones (CVLZs).

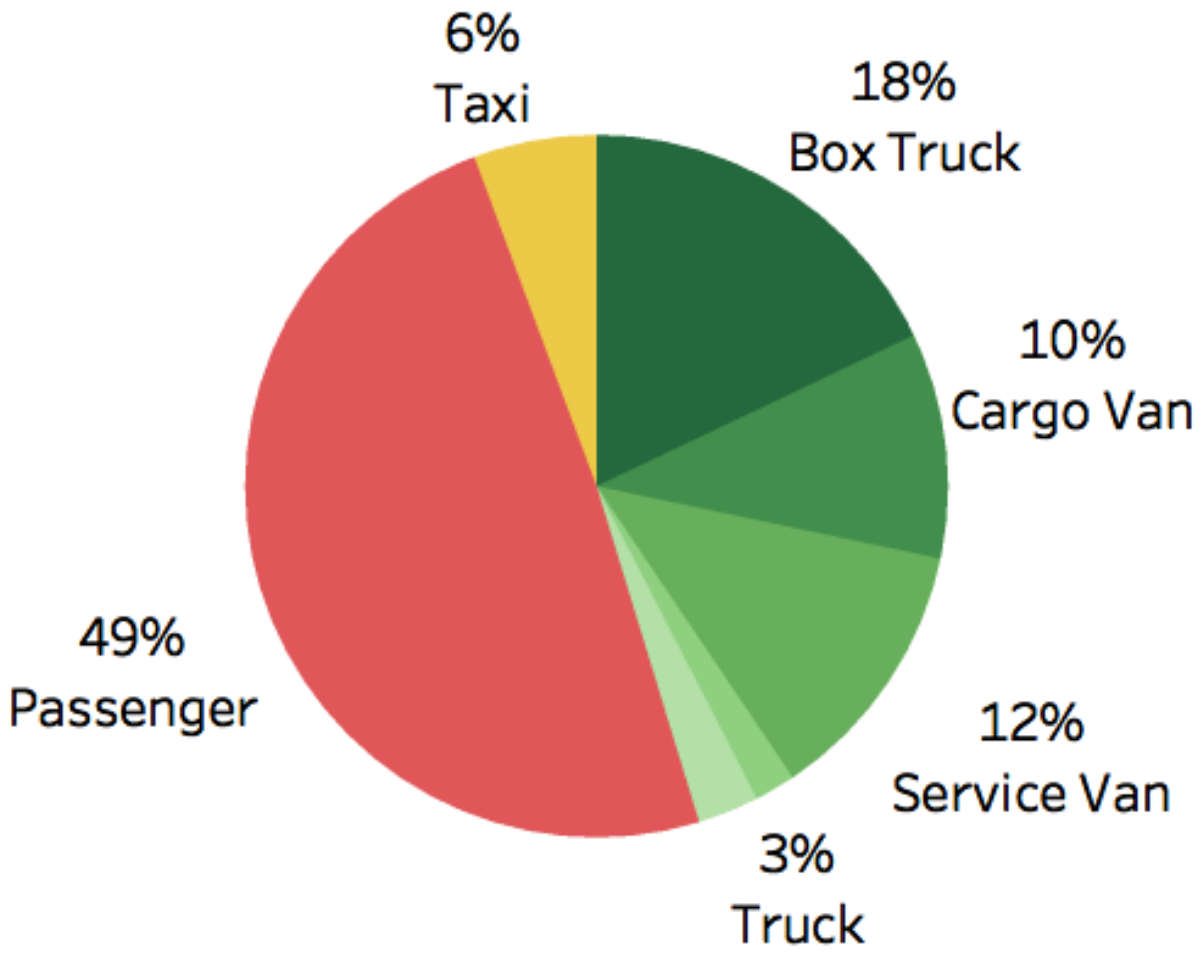
Research Findings:

53% of Trucks and Vans Parked in Passenger Load Zones

Case study near the Four Seasons Hotel and Harbor Steps Apartments, on 1st Avenue between Pike and Seneca Streets.

	CVLZ	PLZ	Paid Parking	Illegal Parking	Grand Total
Box Truck	19	58	12	12	101
Truck	3	3	1	3	10
Cargo Van	11	43	4	8	66
Service Van	13	30	19	9	71
Van	2		1		3
Grand Total	48	134	37	32	251

Half of the Vehicles Parked in the CVLZs Were Cars



Step 2: Offer Goods Trip Reduction Strategies to building developers and managers

Emerging strategies include:

- Install Common Carrier Locker Systems(mini-distribution nodes in buildings to gain delivery density);
- Use integrated technologies to actively manage and increase the productivity of all load/unload spaces in the city's network.
- Require developers to provide loading bays in every new building.

Seattle Municipal Tower, a 62-story office building studied in the Urban Freight Lab

Seattle Municipal Tower Common Carrier Locker Pilot Test

March - April 2018

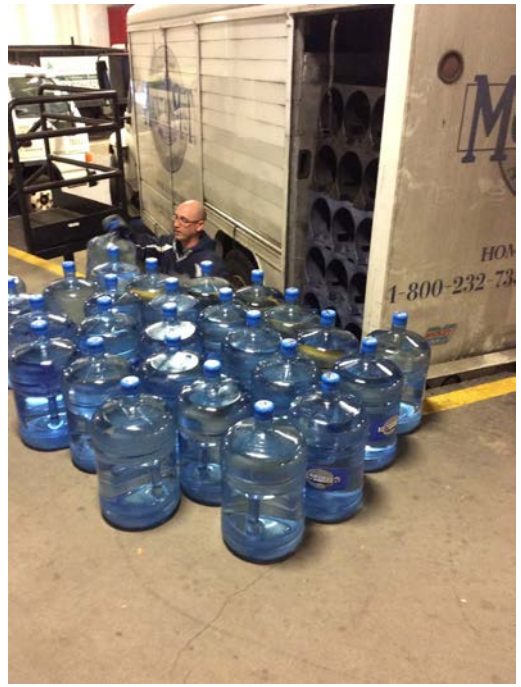
The aim of this research pilot project was to:

1. Test whether creating delivery density via a smart locker system reduces the:
   - Number of failed first delivery (FFD) attempts, and
   - Parcel delivery time in an urban tower.

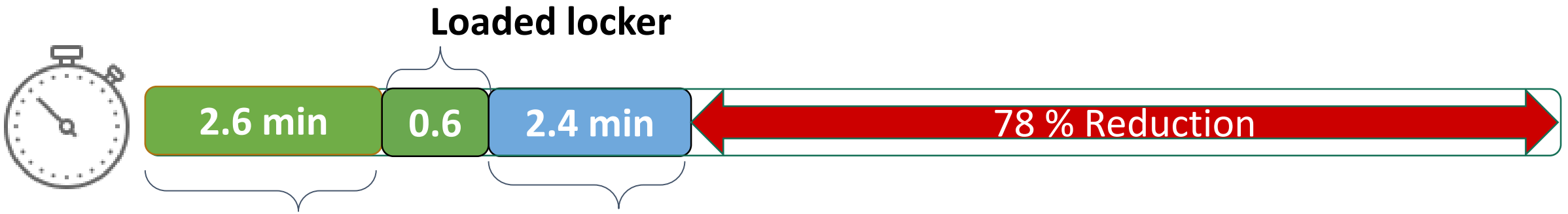
2. Begin to develop a functional business model to provide Common Carrier Locker Systems in public spaces that any retailer, goods delivery firm, and user may access.

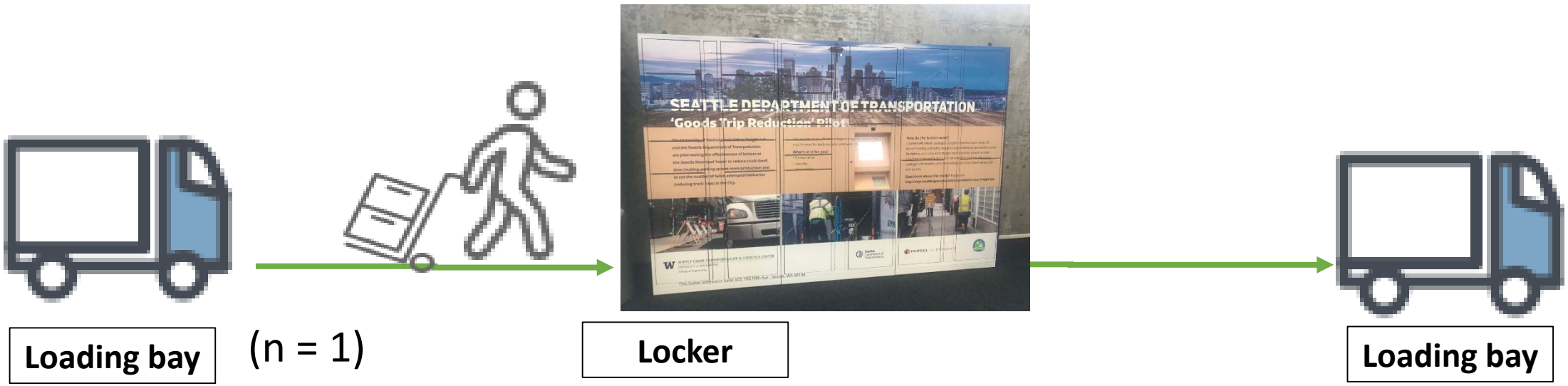
Common Carrier Locker Solution Can Reduce the Parcel Failed First Delivery Attempt Rate to 0%

But over-sized goods still need to be delivered to the tenant's door.



Pilot Test Results: Common Carrier Locker System Reduced Total Delivery Time By 78%





Next Step: Actively Manage the City Load/Unload Network

Pilot test more effectively managing the load/unload space network to reduce parking seeking behavior by delivery drivers:

1. Develop data applications to collect, correct, store, and analyze occupancy sensor data from load/unload spaces in the Center City area and return information to users on a web-based and/or mobile platform to inform real-time decisions.

2. Include impacts of infrastructure constraints on operations into the load/unload network design in the pilot test area. One area to explore is allowing different types of vehicles to park in the same spaces based on the amount of time they need.

3. Create delivery density and security by placing common carrier locker systems near load/unload zones and transit stops in the pilot test area.

4. Engage building managers to consider offering vacant spaces in privately-owned loading bays to other users in off-peak delivery hours, to increase the total load/unload network capacity in the test area.

Questions?

Please contact:

Anne Goodchild

Professor, Civil and Environmental Engineering

Director, Supply Chain Transportation and Logistics Center

University of Washington

annegood@uw.edu

http://depts.washington.edu/sctlctr/