2019 ITS-NY Annual Meeting

June 13-14, 2019

"ITS Applications: Technology Advancements and the Human Connection"

Panel 2: Solutions for the First/Last Mile Challenge

Panel Moderator:

- Dr. Robyn Marquis, Project Manager, NYSERDA

Speakers:

- "Lime + New York State: Providing Communities with Micromobility Transportation Solutions." Jeff Goodmark, Operations Manager, Lime
- "White Plains Bike Share Program." Thomas Soyk, PE, PTOE, Deputy Commissioner of Parking and City Transportation Engineer, City of White Plains, NY
- "Impacts of New Technological and Economic Trends on Freight Transportation." Juvena Ng, Research Specialist, Rensselaer Polytechnic Institute
- "Advancing Next Generation Transportation Operations." Aaron Jette, Division Chief, Program Development and Capacity Building, U.S. DOT Volpe Center

Lime + New York State

Providing Communities with First and Last Mile Transportation Solutions

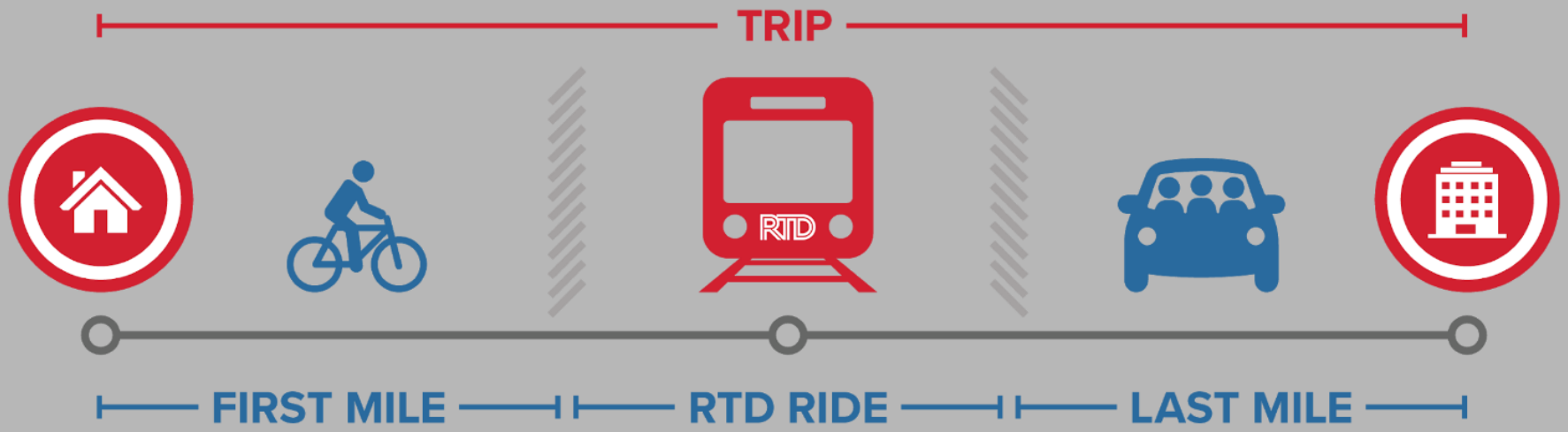
Introduction to Micromobility and Dock-Free Sharing

Revolutionizing Urban Micromobility - by leading the world in *first and last mile* transportation solutions.

Lime's mission is to provide affordable and reliable dock-free transportation for all. Currently serving more than 100 global markets, in 20 Countries on 5 continents, Lime has recorded more than 60 million rides and is the only major provider of a fully multi-modal fleet.

Micromobility:

- Personal vehicles that can carry one or two passengers.. These vehicles include small powered vehicles that run on charged batteries.
- Roughly 70% of all one-way US car trips are 10 miles or less
- That 70% represents a 1 Trillion Dollar industry - and a large environmental issue.
- Replace these trips with scooter and ebike trips.



Unbundling THE CAR

Alternatives to car ownership by trip length

Micromobility
0-5 miles

BIKES & SCOOTERS

motivate, Lime, BIRD, JUMP, scoot, SPIN, /skip/, Razor

60% of trips in the US

Medium distance
5-15 miles

RIDE HAILING

UBER, lyft, Via, Gett

25% of trips in the US

Long distance
15+ miles

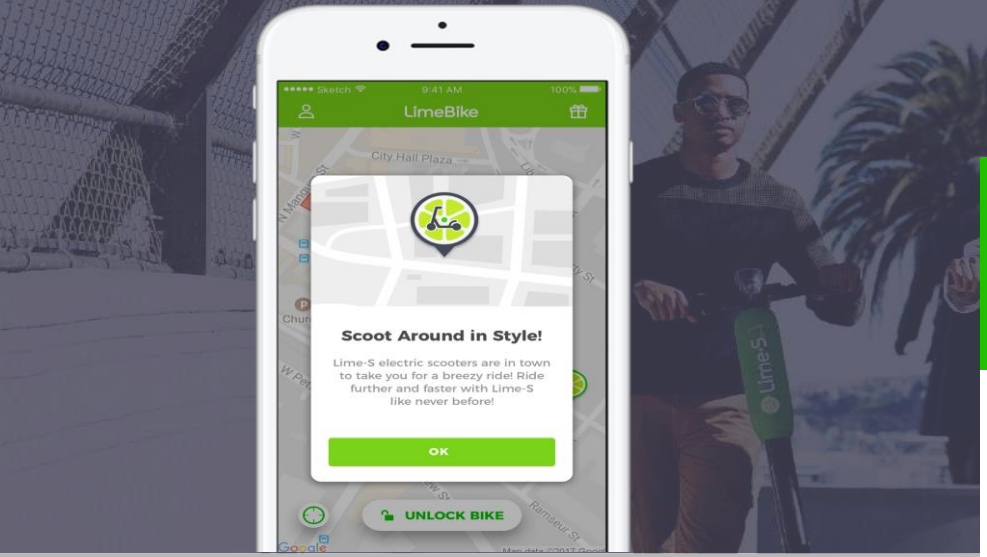
CAR SHARING

MAVEN, CAR2GO, Getaround, TURO

15% of trips in the US

Source: NHTS

CBINSIGHTS



Lime-S 3.0

Electric Scooters

Hop on and ride!

Smaller and more agile than a bike, Lime-S electric scooters are a convenient, new mobility option that lets you zip around the city pedal-free.

They require minimal parking space and are incredibly fun to ride!

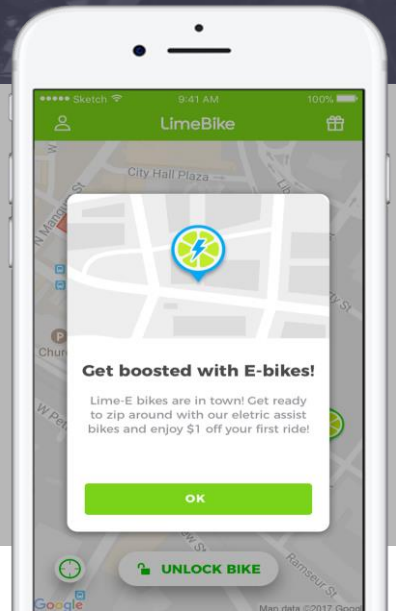
MAX RANGE:
37 miles

MAX SPEED:
14.8 MPH

PRICE FOR USERS:
$1 unlocking fee
$0.15/minute to ride

Lime-E

Electric Assist Bikes



Why go electric?

Lime-E senses the torque being put on the pedals and adds just the right boost to help you get where you're going quickly and effortlessly.

No strain. No sweat. Just a simple, cost effective way to turn the last mile into the last several miles even over the hilliest urban terrain.

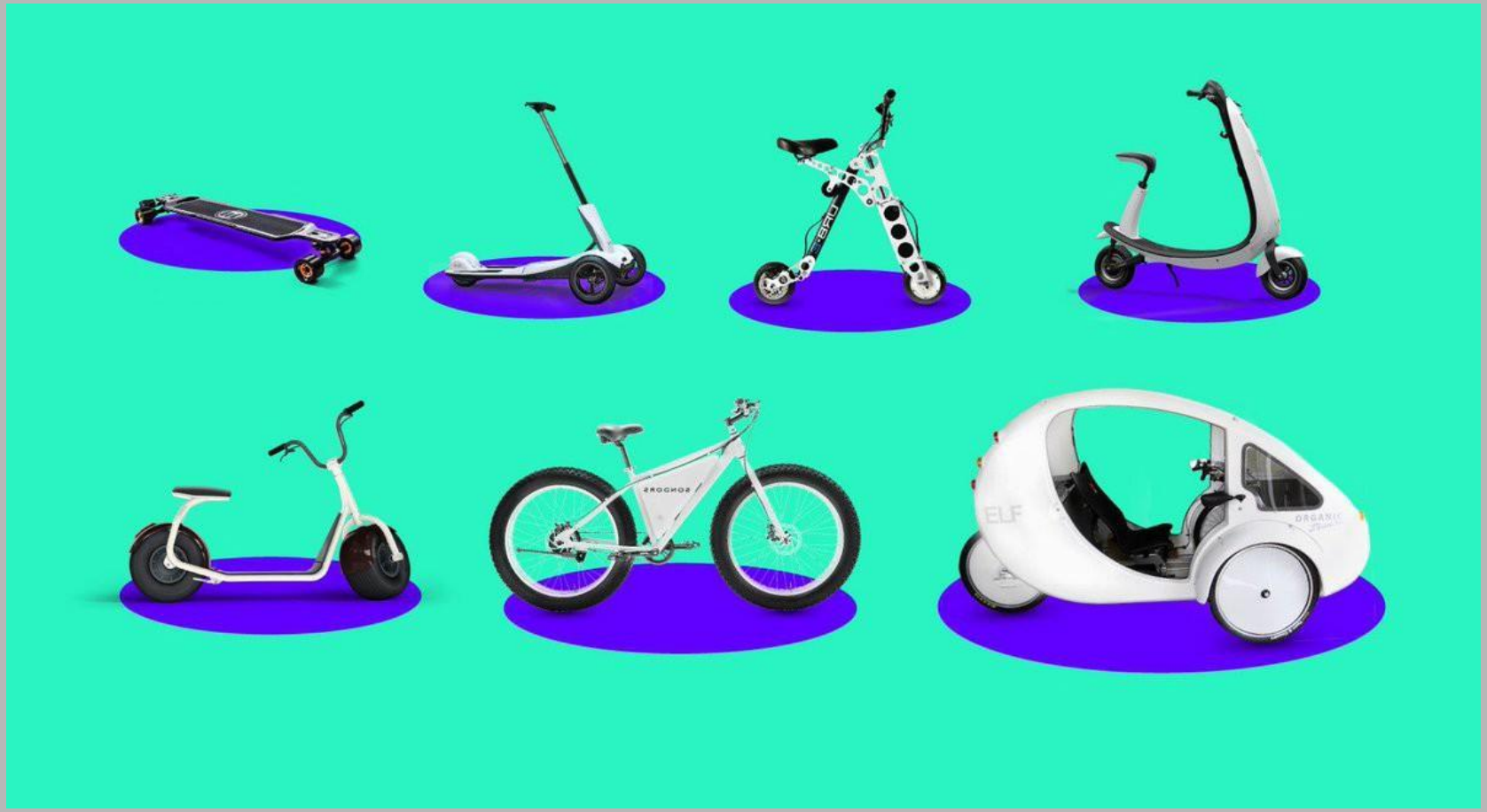
MAX RANGE:
62 miles

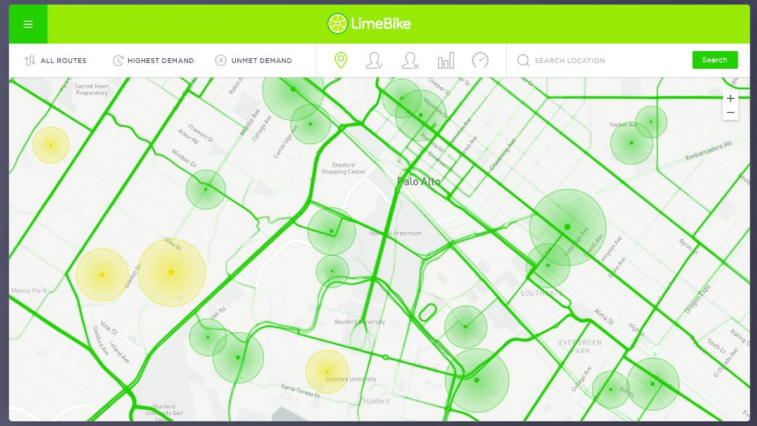
MAX SPEED:
14.8 MPH

PRICE FOR USERS:
$1 basic unlocking fee
$0.15/minute to ride

The scope of micromobility

Revolutionizing Urban Mobility / Unbundling The Future





We use data to make urban mobility smarter

- Free of docking stations, the optimal smart mobility program can be designed based on usage and actual rider demand data
- We share our data with cities for smarter mobility planning
- We support existing public transit, with 27% of our rides starting and finishing near transit stops

4 things you need to know about micromobility

1.) WHERE THEY'RE BEING RIDDEN

2.) WHO'S RIDING THEM

3.) WHY THEY'RE BEING RIDDEN

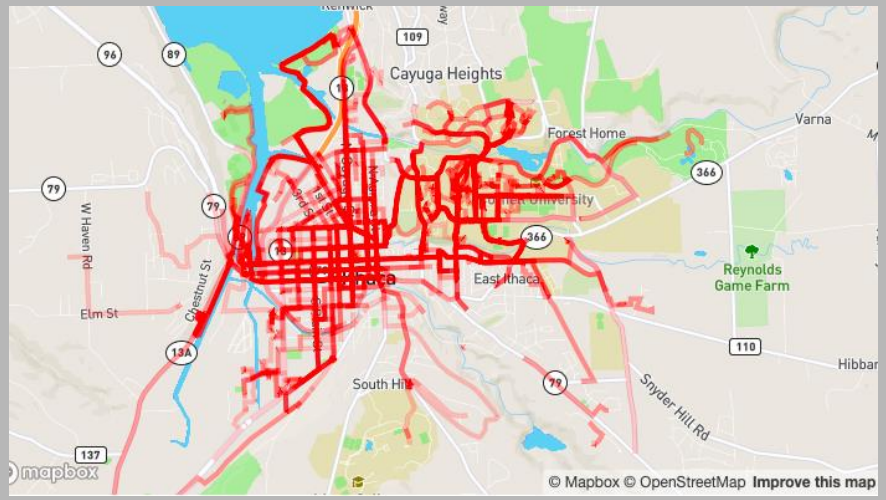
4.) HOW OFTEN THEY'RE IN USE

4 things you need to know about micromobility

1.) WHERE THEY'RE BEING RIDDEN

4 things you need to know about micromobility

1.) WHERE THEY'RE BEING RIDDEN - everywhere.



4 things you need to know about micromobility

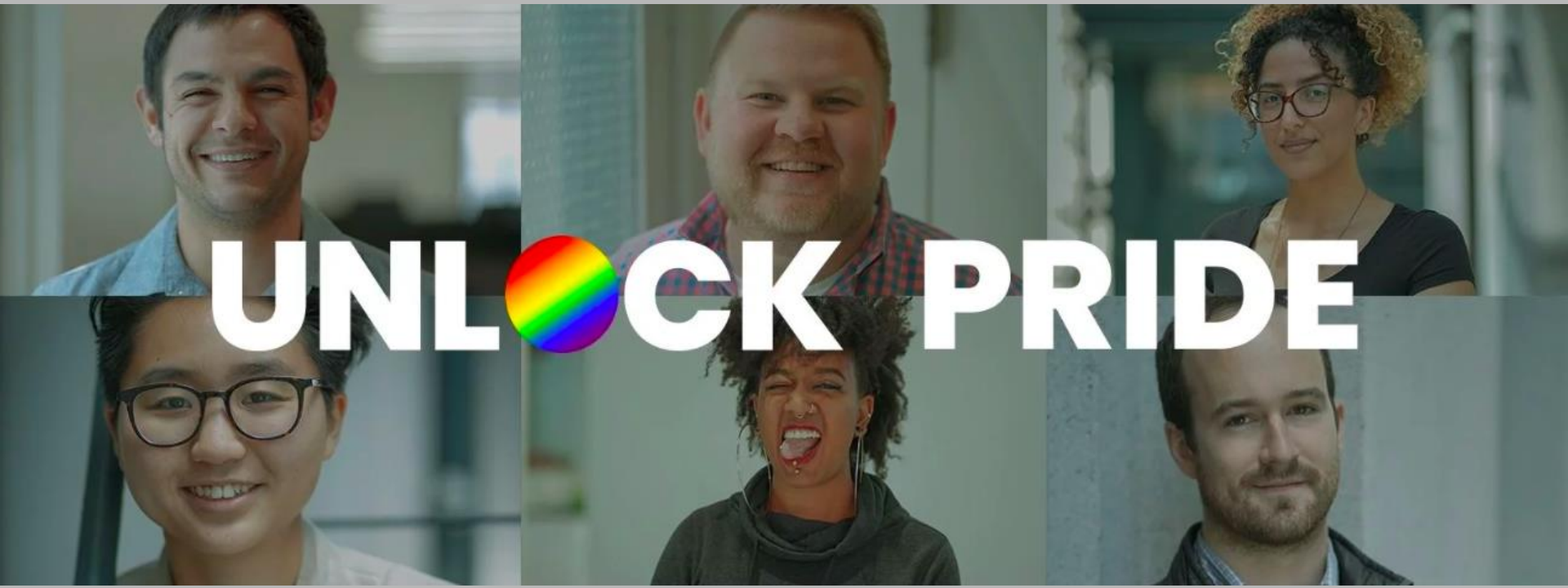
2.) WHO'S RIDING THEM

4 things you need to know about micromobility

2.) WHO'S RIDING THEM - a wide variety of people.

NOT JUST TECH BROS: E-SCOOTER FANS ARE SURPRISINGLY DIVERSE- While prior station-based, non-electric bikeshare services have predominantly been used by men by a factor of 2x to 3x, a new study suggests that electric scooters may enjoy more support and adoption by women. Additionally data also suggests that dockless electric scooters may also enjoy higher adoption rates by lower-income groups.

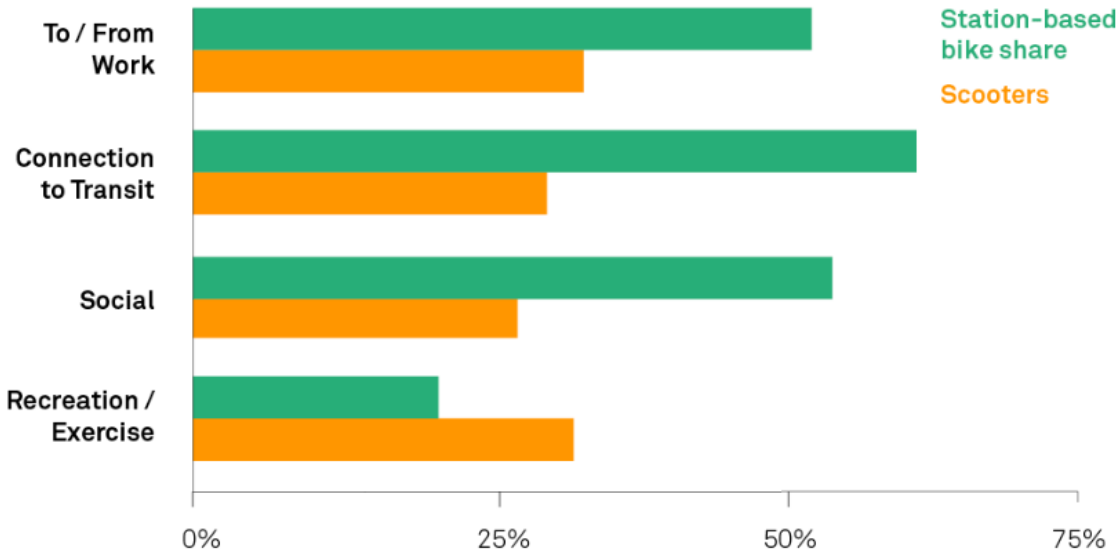
4 things you need to know about micromobility



4 things you need to know about micromobility

3.) WHY THEY'RE BEING RIDDEN

Why People Ride



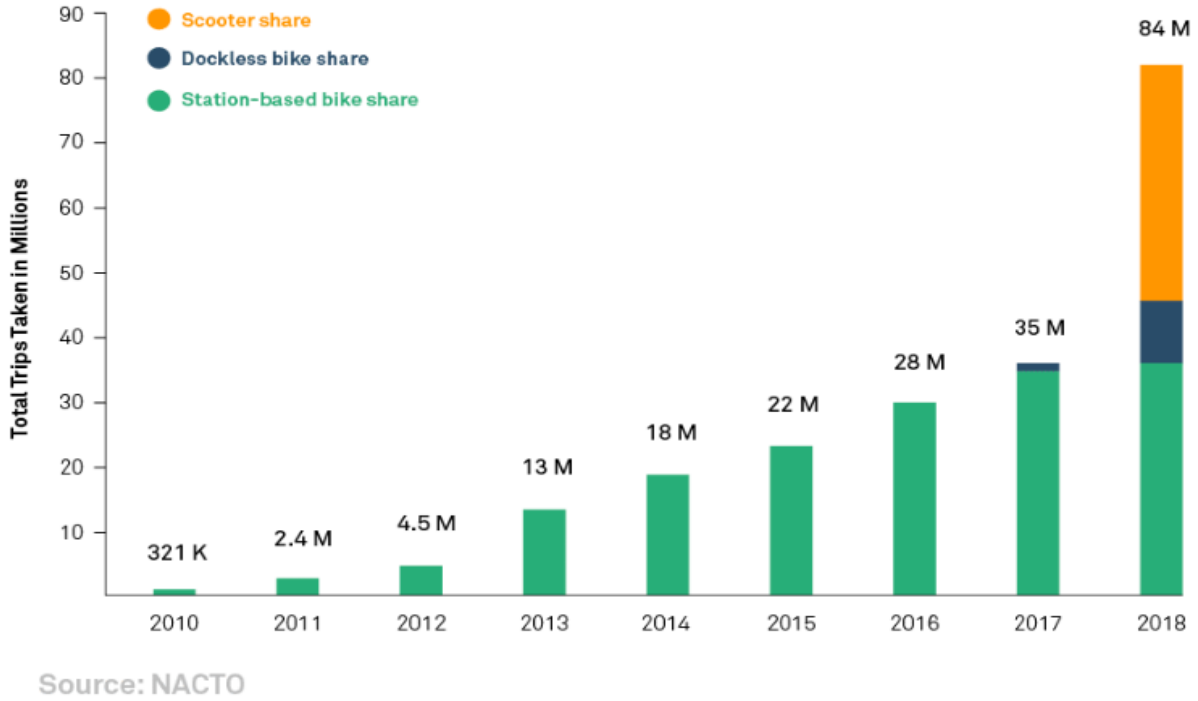
* See methodology for cities used for analysis

Source: NACTO

4 things you need to know about micromobility

4.) HOW OFTEN THEY'RE IN USE

84 Million Trips on Shared Micromobility in 2018



Source: NACTO

Nearly 40% Of St. Louis Lime Riders Use Electric Scooters To Replace Car Rides

Our Programs

Lime Hubs

In partnership with local businesses, Lime Hubs bolster economic development. Business benefits include:

- Increased foot traffic
- Dedicated Lime support
- Scooter availability at storefront
- Lime Discounts/Credit
- Scooter charging via Juicer program

Lime Juicers

Community members can earn money charging Lime scooters!

- Juicers sign up through our app
- Every evening, Juicers reserve scooters for charging
- Juicers retrieve scooters and charge them overnight
- Juicers return scooters to designated locations in the morning - and get $$!

Lime Access

We believe in a mobility solution that is shared, affordable and accessible. We offer participants:

- **Lime Access**
  - 50% discount on all Lime-E electric-assist bike and Lime-S electric scooter rides.
  - Once you've joined Lime Access, you can pay through our app using a credit/debit card or Apple Pay.
- **PayNearMe**
  - Alternatively, you can pay using cash at one of PayNearMe's 27,000+ retail locations.

Hiring Locally

Diversity and Inclusion

- Lime hires locally and wants its workforce to be representative of the communities it's in.
- We hire Mechanics, Ops Specialists, Drivers, and Brand/Safety Ambassadors
- Priority Hiring for NYCHA, Veterans, Rehabilitated / Formerly-Incarcerated
- Living Wage + Benefits

Brand and Safety Ambassadors

- On-the-ground safety ambassadors dedicated to educating local communities about bike & scooter safety
- Safety fairs with responsible riding education, light-up slap bracelets, scooter & bike riding lessons, group rides and more
- Lime Academy 1 on 1 lessons on scooter riding in an urban environment.

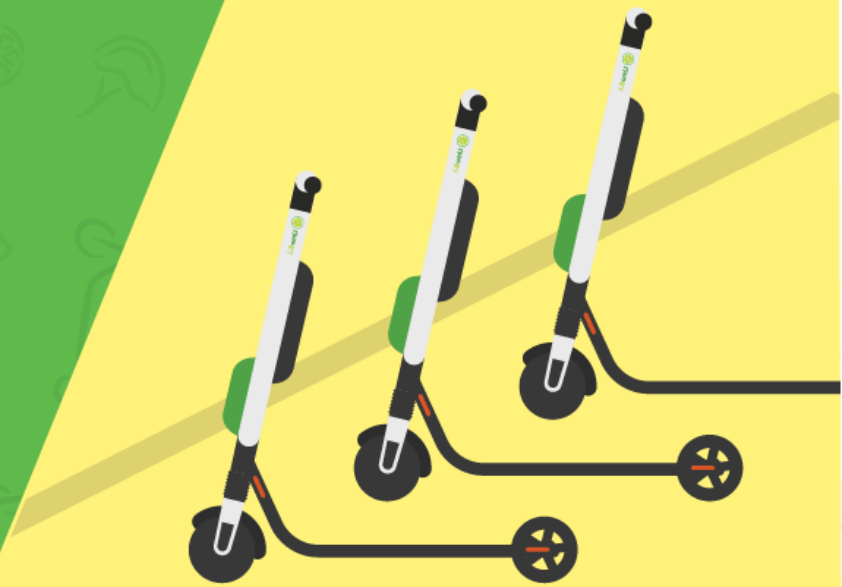
THE BIG 5-->

"Safety is critically important at Lime, and every day we're innovating on technology, infrastructure, and education to set the standard for micromobility safety."

RESPECT THE Ride

WEAR A HELMET • USE BIKE LANES
PARK RESPONSIBLY • BE AWARE

Lime



Lime in New York State - data

534,468+ Trips Taken

96% Operational Fleet

116,158+ Unique Riders

<1% Low Battery

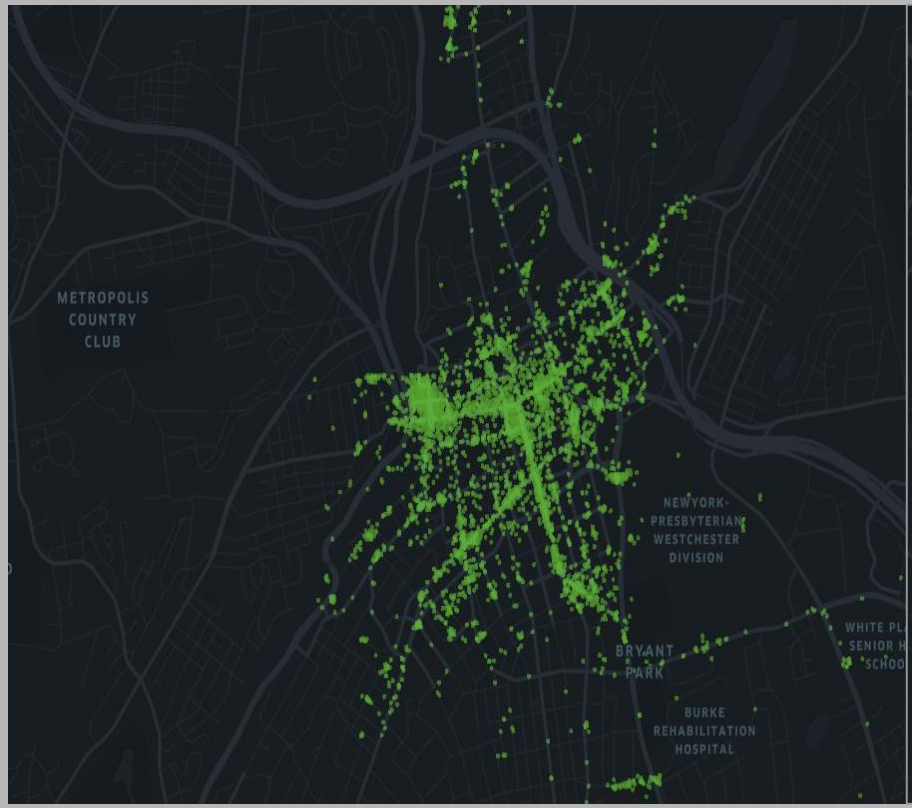
5,000+ Vehicles

5 Complaints Per **1,000** Trips (0.5%)

Lime + NYC *Rider Statistics*

- 70% of Lime riders in the city identify as non-white
- 60% of Lime riders' households earn $50,000 or less
- 40% of these riders identify as female, compared to 25% of New York City's docked bike-share providers
- The Pratt Center for Community Development concluded that, of the 750,000 New Yorkers who travel more than one hour each way to work, "two-thirds of them earn less than $35,000 a year"

Lime in White Plains / Trip Start and End Locations



Lime in Yonkers / Most-Used Routes

Lime in Upstate New York

Ithaca, Elmira, Cortland

Lime in Upstate NY - Ithaca, Elmira, Cortland / **Track Record of Operational Excellence**

116,000+ Trips Taken

19,000+ Unique Riders

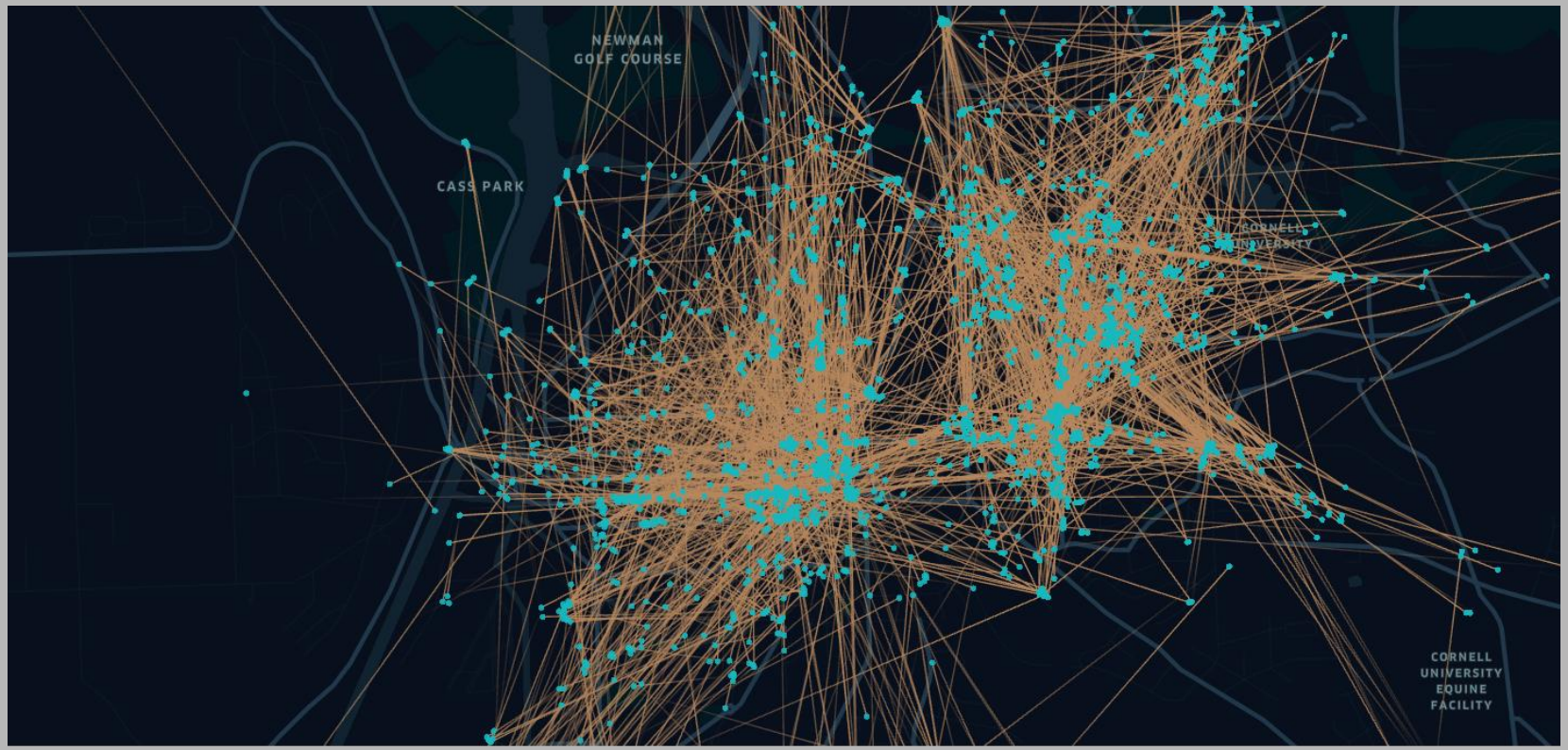
600+ Vehicles

97% Operational Fleet

< 1% Low Battery

5 Complaints Reported Per **1,000** Trips (0.5%)

Trip Start/End in April



Trip Start

Trip End

Summary

10+ million car trips prevented
4,500+ tons of carbon saved
And we’re just getting started

Thank You!

BIKE WHITE PLAINS

WHITE PLAINS BIKE SHARE PROGRAM

BACKGROUND

- The City of White Plains launched its bike share program in June 2018.
- However, we had been looking into bike share for several years prior to launch.
- City efforts initially focused a fully docked system, similar to CitiBike in NYC, and discussions with CitiBike about expanding into White Plains.
- Concerns about cost, sustainability, flexibility, and space for infrastructure for that type of system in a small city.

BACKGROUND

- Fall 2017 - WP Hospital approached the city about sponsoring a bike share program centered around the hospital.
- The program would be funded by the hospital but would offer a limited number of nodes/docks centered around the hospital.
- Concern that this was not necessarily a bike share solution for whole city.
- During this time we saw the introduction of dockless bike share into the market and began watching it closely.
- WP Hospital's proposed contractor eventually came in with a revised proposal for a hybrid system which would have provided docks but also allowed some dockless parking.
- System was still somewhat inflexible due to all bikes having to be secured.

DOCKLESS BIKE SHARE

- The sudden rise of dockless bike share was the game changer for White Plains.

- These systems require no financial commitment from city and do not depend on sponsorships, yet fulfill the first/last transportation mile goal of bike share.

CREATING A WHITE PLAINS BIKE SHARE PROGRAM

- Outreach to other communities to discuss their programs, what worked/did not work for them --Revere, MA, Albany, Rochester, New Rochelle.
- Reviewed ordinances from Seattle, Dallas, Durham, Aurora, Charlotte, San Francisco, Houston, and even London, England to formulate our approach.
- Presentations by operators of dockless and hybrid bike share operators to city staff.
- Internal multi-departmental working group began the process of drafting a city bike share ordinance.
- Ultimately, the city decided to create a pilot program with multiple companies in an effort to create a competitive environment and get the best outcome.

CREATING A WHITE PLAINS BIKE SHARE PROGRAM

- The city's ordinance established a permit process through which dockless bike share operators can operate in the city.
- The ordinance contains a number of operations requirements for permitted operators, including:
  - Maintain staffed operations center within or in close proximity to city
  - Maintain 24-hour customer service phone #
  - Each bicycle must have a unique identifier so individual bikes can be tracked
  - Operator contact info and info on how to report complaints must be affixed to each bike
  - Operator app must remind customers to follow traffic laws, no bike riding on sidewalk, proper parking, encourage riders to wear helmets
  - Must provide customer payment options (cash-based & electronic)

CREATING A WHITE PLAINS BIKE SHARE PROGRAM

- Provide contact info to city for operator's staff responsible for relocating or rebalancing bikes
- Remove bikes that are inoperable or unsafe promptly
- Repair bikes that are inoperable or unsafe
- Operator responsible for cost to repair public infrastructure damaged by a bike and costs incurred by city if it needs to remove a bike
- Any operator with a fleet of 300+ bikes may be directed to deploy 10% or more of fleet to underserved areas

CREATING A WHITE PLAINS BIKE SHARE PROGRAM

- The ordinance also details appropriate bicycle parking and places responsibility for that on the dockless operator.
- It requires operators to maintain detailed records concerning their fleet including: bike locations, parking, customer membership, trip info – time & distance, complaints and complaint resolution, real time trip info (anonymized) and provide regular reports or access to data.
- The ordinance outlines the required components of the permit application process, schedule of fees, the permit review and amendment process, insurance and indemnification, and permit revocation provisions.

WHITE PLAINS BIKE SHARE ORDINANCE & IMPLEMENTATION

- Bike share ordinance passed by Common Council in March 2018.
- Dockless Bike Share application developed and sent to multiple operators.
- 2 operators permitted for 150 bikes each: Lime and ofo.
- WP bike share officially launched June 2018.
- Fees:
  - Initial permit = $250.00 plus $10/bike
  - Annual renewal = $100.00 plus $10/bike

BIKE SHARE OPERATORS

- One operator, ofo, bowed out of almost all of its U.S. operations relatively soon after being permitted by the city.
- The remaining provider, Lime, increased the number of bikes in its WP fleet to make up for the loss of ofo.
- Lime currently maintains 300 bikes in its WP fleet.

BENEFITS OF BIKE SHARE

- Dockless bike share is an affordable and green transportation option:
  - WP is a diverse community. Residents with a wide range of incomes call WP home. Bike share is an affordable transportation option and may be a more viable transportation option for many.
  - Bike share aligns with the city's focus on sustainability and green initiatives (i.e. - EV charging stations, textile recycling, shoe recycling, LED street light replacement, streamlined solar permitting process, phase out of #4 & 6 heating oils, rec/parks impact fee on new downtown residential development, etc.). Bike share is a green transportation option that we can now add to our menu of green transportation options.
- Dockless bike share in particular provides a great first mile / last mile transportation option.

BENEFITS OF BIKE SHARE

- White Plains is particularly well-suited to bike share because of the compact nature of the city, and especially the downtown area.

- In addition to our 60,000 residents, the city's population triples during the day with people coming into the city daily to work, go to school, shop, etc.

- The city's major employers have embraced bike share as a viable transportation option for their employees, including WP Hospital, the city's biggest employer.

BENEFITS OF BIKE SHARE

- Generational changes. It's been well-documented that younger people are moving away from owning a car and driving. The availability of quality mass transit options (train, bus and BRT) in this city, as well as options like zipcar and bike share, appeal to this younger generation.
- Bike share aligns with the city's Complete Streets policy by prompting us to think about how streets are utilized by everyone, not just cars.
- The bike share program was an important factor that prompted the city to apply for a TAP grant to improve and expand our bicycle and pedestrian infrastructure.

WHITE PLAINS BIKE SHARE DATA
9 months in – how is the program doing?

- 43,000 trips taken
- 8,900 unique riders
- Median trip: 9 minutes
- On average, 3.9 trips/rider/month
- Not surprisingly, WP train station is the most popular start/end point for bike share trips
- Other popular destinations: Downtown WP, WP Hospital

WHITE PLAINS BIKE SHARE DATA
9 months In – how is the program doing?

- Complaints have been very low.
- Customers are continuing to use the bikes during the winter months, albeit at a somewhat lower rate than in the warmer weather months.
- 62% of riders who try a Lime bike take another ride within 30 days.
- Local operations team in the city regularly to rebalance bikes.

WHITE PLAINS BIKE SHARE DATA
Accident Statistics

Year	Bike Injury Crashes	Bike Share Crashes
2016	13	0
2017	10	0
2018	7	*1

* - Bike Share Start 6/4/18

BIKE SHARE DAILY TRIPS
History

Month	Weekday Average	Weekend Average
June	301	238
July	213	168
August	288	260
September	236	206
October	222	157
November	196	137

LIME IN THE COMMUNITY

- Lime has been a good partner and has actively engaged the WP community
  - Helmet give-aways
  - On-the-ground safety ambassadors
  - Presence at WP events (ex: Farmers' Market)
  - Smart bike parking education on Lime app
  - Lime to the Polls – free rides to/from polling stations in WP on Election Day 2018
  - Equity – don't have to have a cell phone to use

WHAT'S NEXT FOR WHITE PLAINS BIKE SHARE

- Introduction of Pedal Assist bikes starting in April with official launch May/June.
- Using data from Lime to determine future improvements in bicycle infrastructure.

THANK YOU.

Impacts of New Technological and Economic Trends on Freight Transportation

Juvena Ng

Rensselaer Polytechnic Institute
VREF Center of Excellence for Sustainable Urban Freight System (CoE-SUFS)
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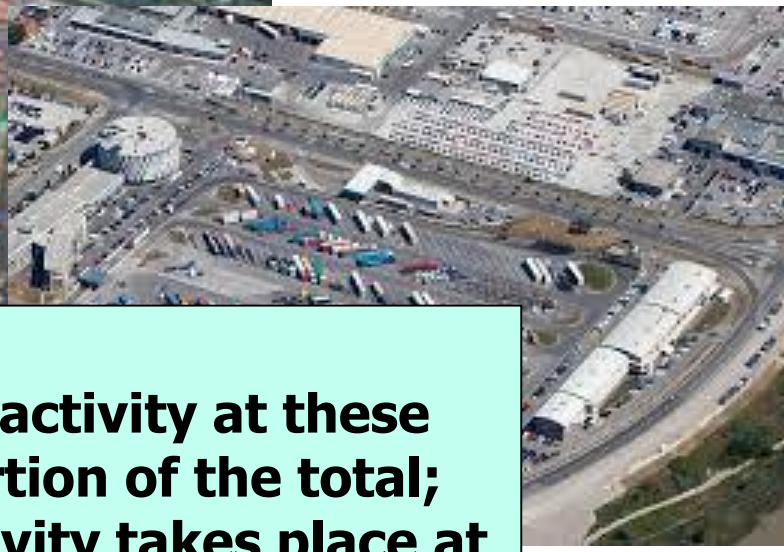
When people think of freight, most think about…

Intermodal terminals



In reality:
(1) the amount of freight activity at these facilities is a minuscule portion of the total;
(2) freight activity takes activity takes place at all levels: global, national/regional, metropolitan/urban, neighborhood, block, household/establishment

and DCs

Outline

- Overview of freight activities in metropolitan area
- Impacts of new technological and economic trends

Metropolitan Economies and Freight Activity

Freight and the metropolitan economies...

- 60% of Global GDP → Produced in top 600 cities
- In the US, metro/micropolitan areas represent:
  - 83% of establishments, 78% of employment, and 76% of the value of manufactures
  - 80% of US cargo transported (top 100 metro areas)
- Statistics about freight transported:
  - USA (entire country) → USA: 114 kg/person-day
  - New York City, USA → 45 kg/person-day
  - Beijing, China → 35 kg/person-day
  - Medellin, Colombia → 25 kg/person-day
  - Port-au-Prince, Haiti → 8 kg/person-day
- Amount of cargo transported increases with income… with rising incomes → Things will get worse

Freight Intensive vs. Service Intensive Sectors

NAICS	Freight-intensive Sectors (FIS)
11	Agriculture, Forestry, Fishing,
21	Mining, Quarrying, Oil / Gas…
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
72	Accommodation and Food Services

NAICS	Service-intensive Sectors (SIS)
51	Information
52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional,Scientific,Tech.
55	Management of Companies /
56	Administrative,Support,Waste
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
81	Other Services
92	Public Administration

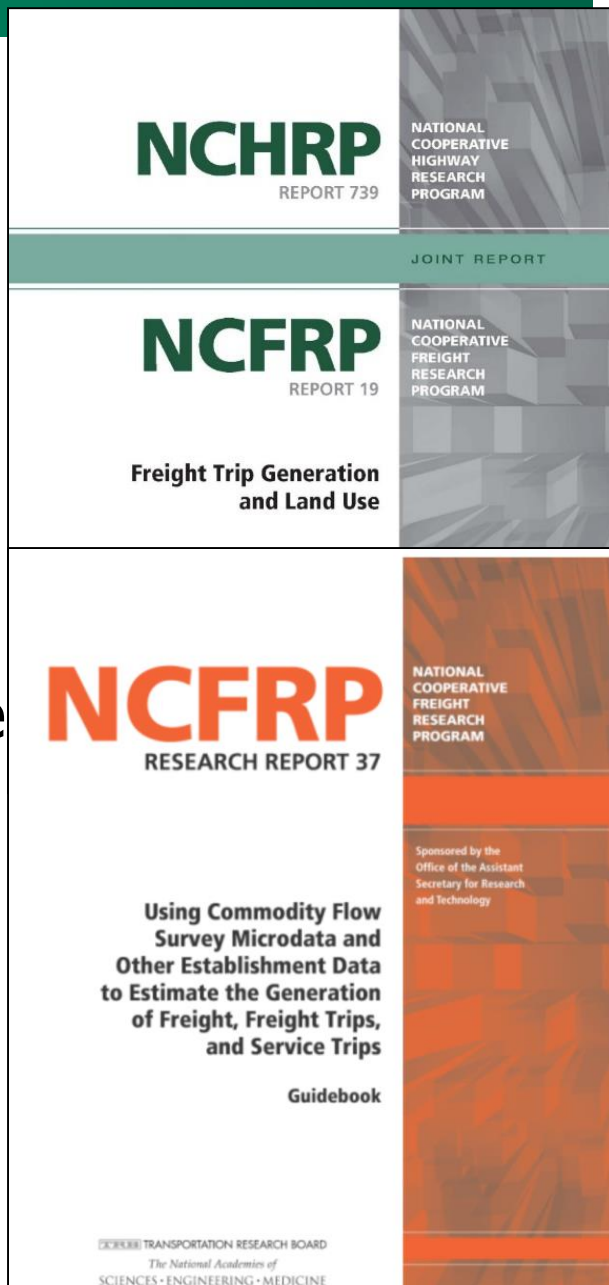
45% of establishments and about half the employment are in FIS

Freight Trip Generation Techniques

- Based on Establishment Surveys
  - Collected data about **deliveries** received and **shipments** sent out
  - Estimated models to predict deliveries and shipments using employment
  - Freight-Trip Generation is estimated from the deliveries and shipments
  - More accurate, flexible, and transferable than any other modeling alternative

$$FTA = \frac{FD}{CF_{FTA}} = \frac{\text{Deliveries Received}}{\text{Avg. Deliveries per trip}}$$

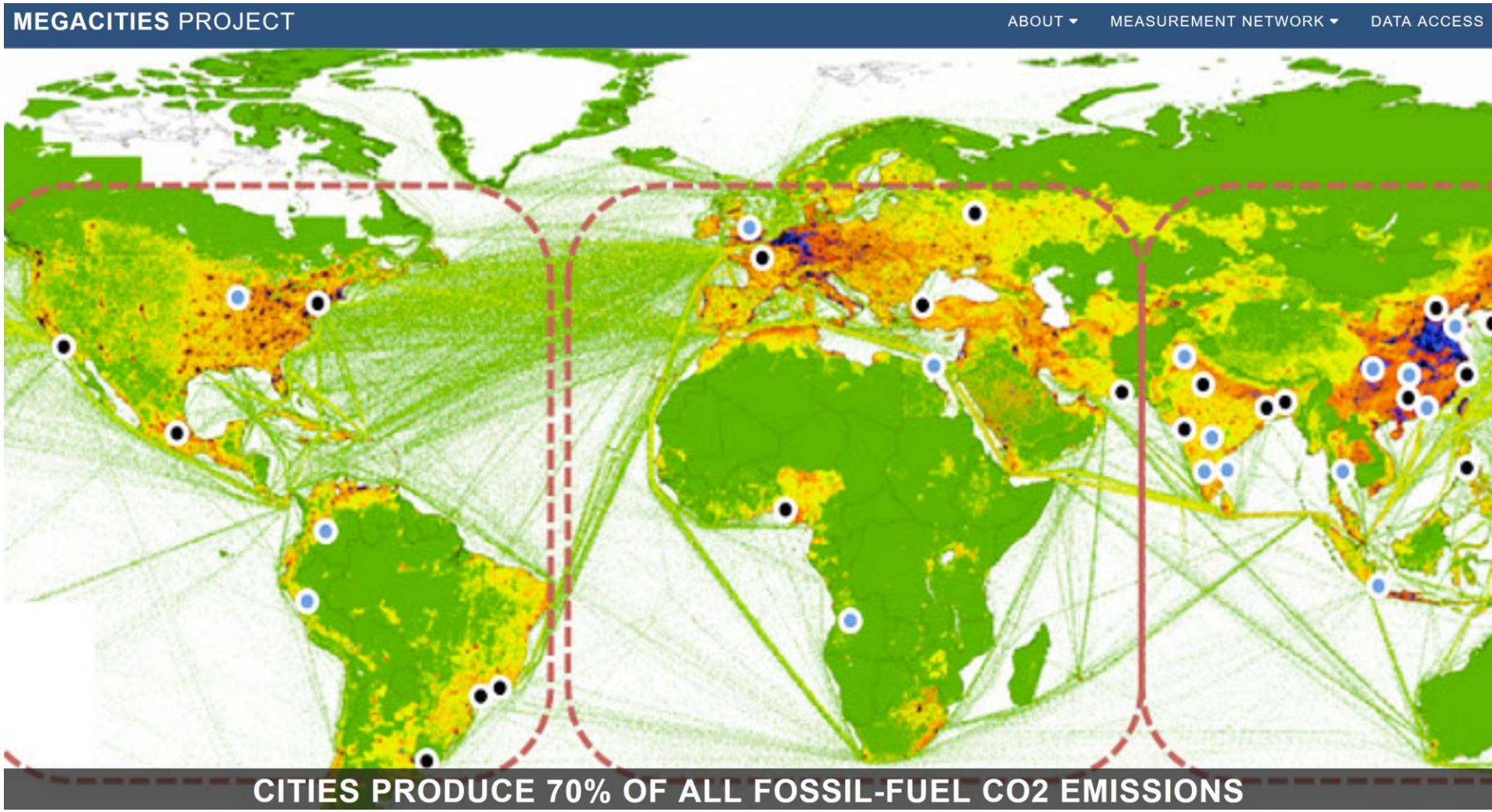
$$FTP = \frac{FS}{CF_{FTP}} = \frac{\text{Shipments Sent Out}}{\text{Avg. Shipments per trip}}$$



Freight and Service Activity for Key Cities

	Kansas City, KS	Austin, TX	Colum-bus, OH	San Jose, CA	Seattle, WA	Washin-gton, DC	Boston, MA	New York, NY
Population (2016)	151,042	916,906	852,144	1,023,031	688,245	672,391	669,158	8,560,072
Total Area (km2)	323.3	830.8	566.2	459.8	217.1	158.4	125.2	777.9
Population density	467.23	1103.60	1505.08	2225.14	3169.76	4246.19	5344.31	11003.60
All Sectors								
Establishments (est)	2,965	33,661	20,106	20,508	33,019	21,264	13,071	245,009
Employment	66,670	629,432	472,088	375,824	595,301	511,541	404,412	3,786,192
FTG/day	17,277	117,216	87,997	80,165	117,681	56,647	43,929	873,380
STA/day	1,493	12,222	8,176	7,495	15,082	11,695	6,824	88,640
FTG/est-day	5.83	3.48	4.38	3.91	3.56	2.66	3.36	3.56
STA/est-day	0.50	0.36	0.41	0.37	0.46	0.55	0.52	0.36
FSA trips/km2	58.06	155.79	169.86	190.66	611.45	431.59	405.34	1,236.64
FSA trips/p-day	0.12	0.14	0.11	0.09	0.19	0.10	0.08	0.11
Internet Deliveries to Households								
Deliveries/day	18,125	110,029	102,257	122,764	82,589	80,687	80,299	1,027,209

CO_2 Produced by Cities



Source: https://megacities.jpl.nasa.gov/portal/

Key Trends and Technologies

Trends Considered

Economic Trends

- Globalization
- Anti-globalization
- Rising income
- Internet economy
- Sharing economy
- Advanced manufacturing

Technological Trends

- Novel vehicular technologies
  - Unmanned delivery vehicles
  - Connected and autonomous trucks
- Artificial Intelligence and big data
- Internet of Things (IoT)
- Electrification

Societal Trends

- Ageing population
- Rising geographic mobility
- Urbanization

Environmental Trends

- Changing Climate
- Rising environmental awareness

Most Relevant Trends to Freight Activities

Economic Trends

- Globalization
- Anti-globalization
- Internet economy
- Sharing economy
- Advanced manufacturing

Technological Trends

- Novel vehicular technologies
  - Unmanned delivery vehicles
  - Connected and autonomous trucks
- Artificial Intelligence and big data
- Internet of Things (IoT)
- Electrification

Societal Trends

- Urbanization

Environmental Trends

- Rising environmental Awareness

In the short and medium-term, the most impactful forces on land use are: the Internet Economy and Novel Vehicular Technologies

Impact of Trends and Technologies

Levels of Impacts

Trends impact these choices

Individual Decisions

Geographical area
- Local/Urban
- Regional/Metropolitan
- National/Global

Land-use choices
- Distance to suppliers or customers
- Establishment size
- Number of establishments

Logistical choices
- Total demand
- Shipment frequency
- Shipment size

System-level Impacts

Direct Land-use impact
- Density
- Land value
- Land-use diversity

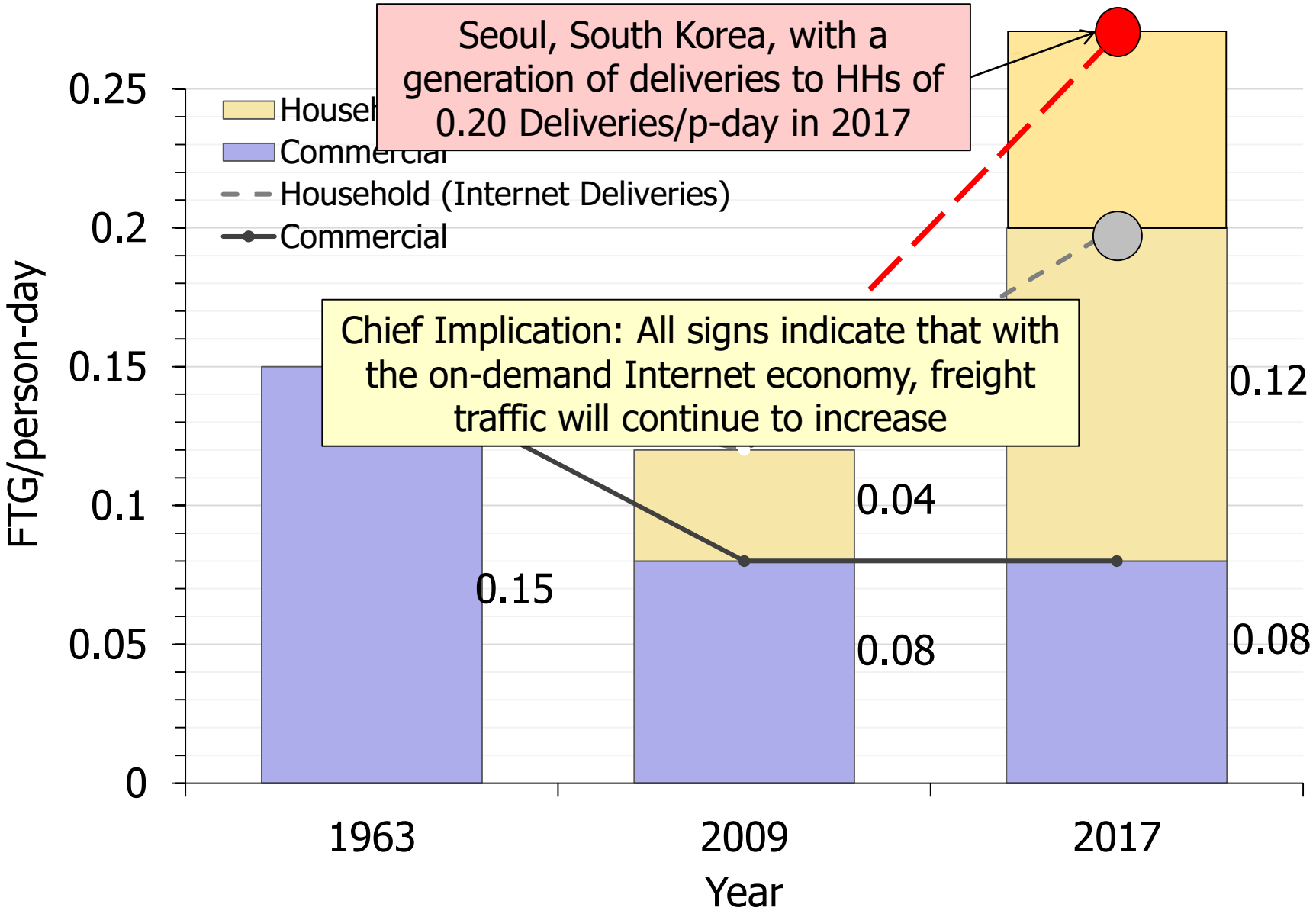
Direct Transportation impact
- Travel time
- Truck VMTs
- Truck trips

Externalities
- Congestion
- Pollution (noise, air)
- Pavement damage

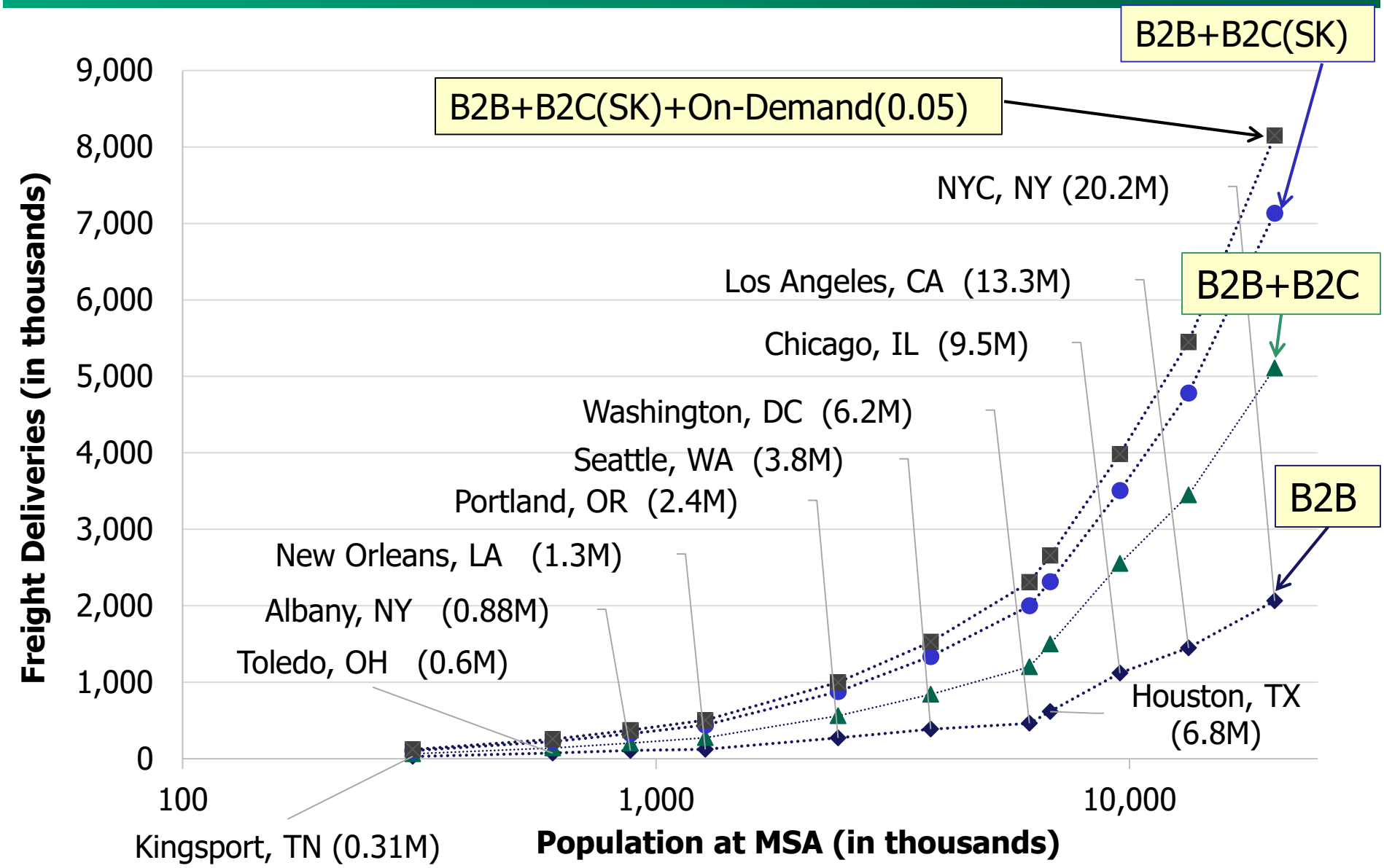
Impacts at the system level will depend on the net effects produced by the counterbalancing forces

The Impacts of the Internet Economy

A Long View of Freight Trip Generation

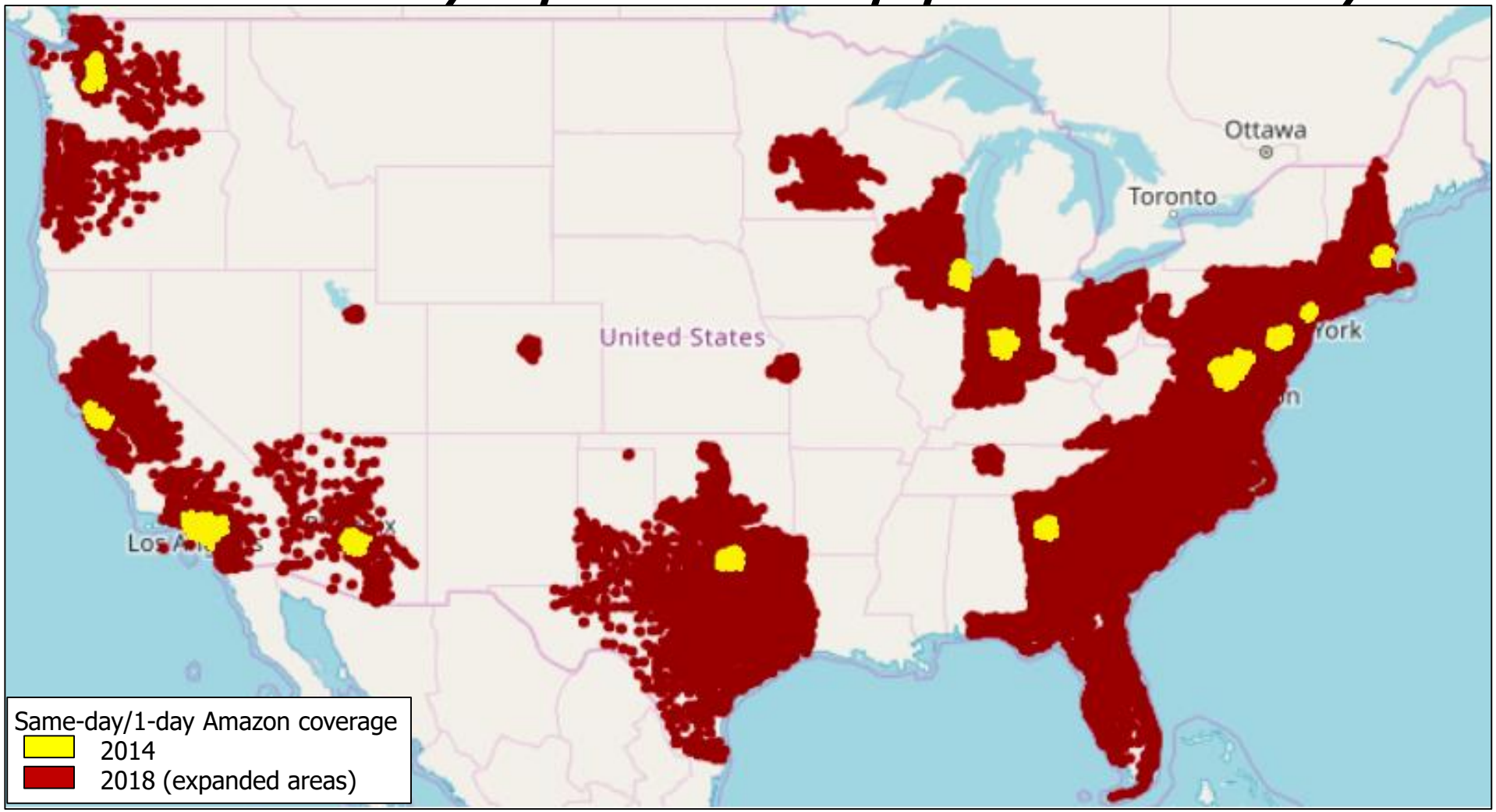


Anticipated B2C Traffic



Ecommerce Impacts on Land Use

"Amazon can already ship to 72% of US population within a day…"



Source: https://www.cnbc.com/2019/05/05/amazon-can-already-ship-to-72percent-of-us-population-in-a-day-map-shows.html

Vehicular Technologies

A Tsunami of New Technologies…

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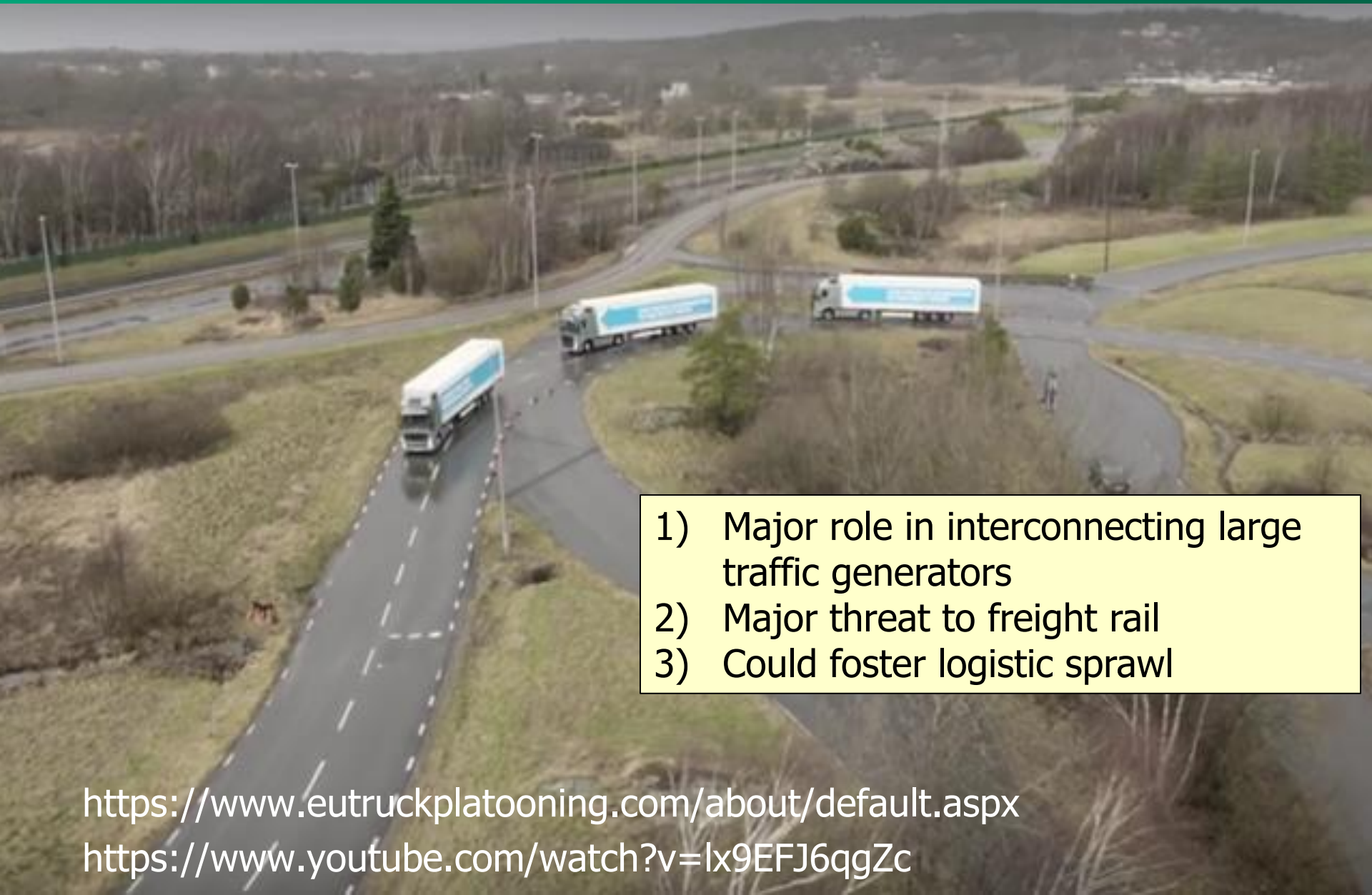
FREIGHT SYSTEMS

Truck Platooning, Driverless Trucks

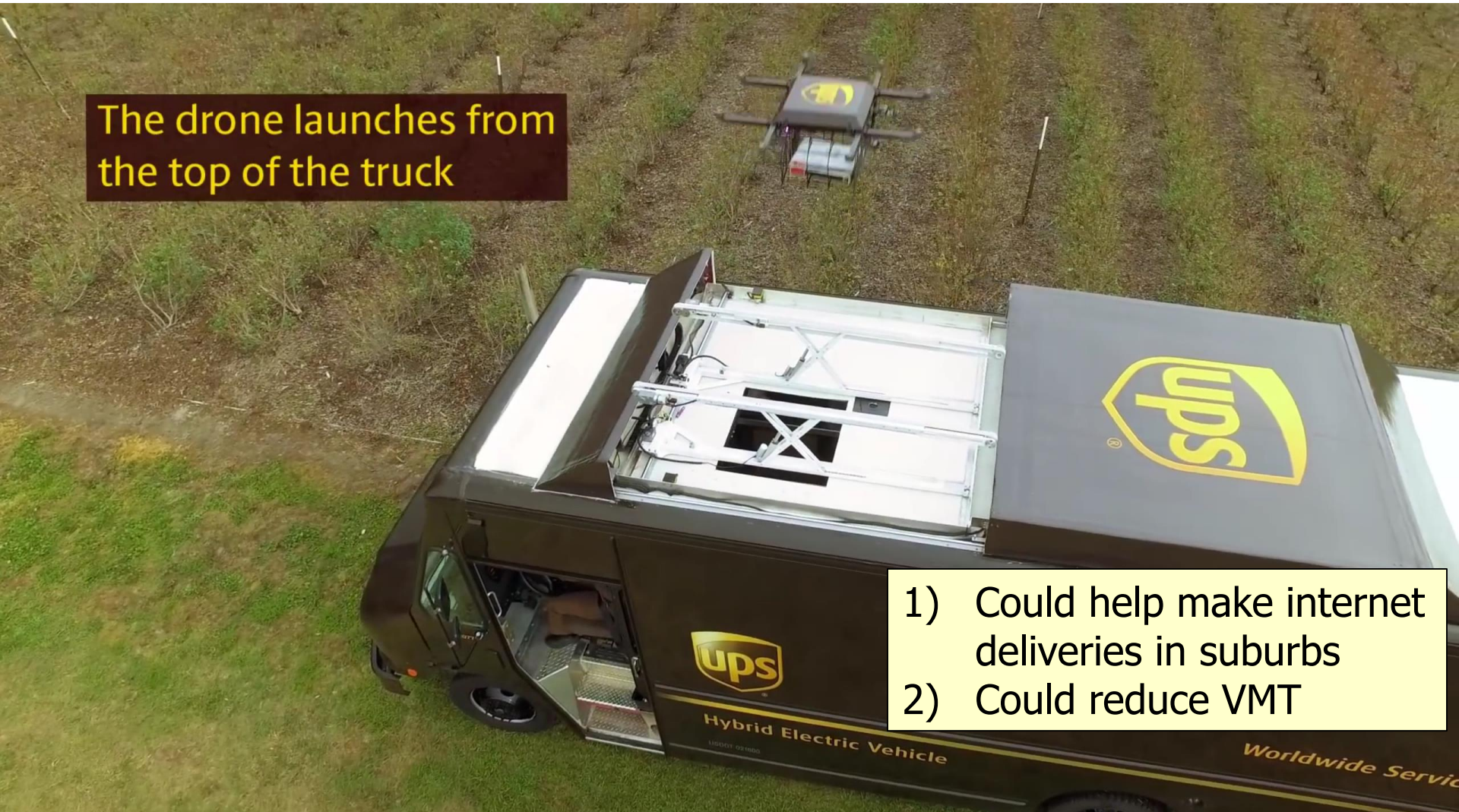


1) Major role in interconnecting large traffic generators
2) Major threat to freight rail
3) Could foster logistic sprawl

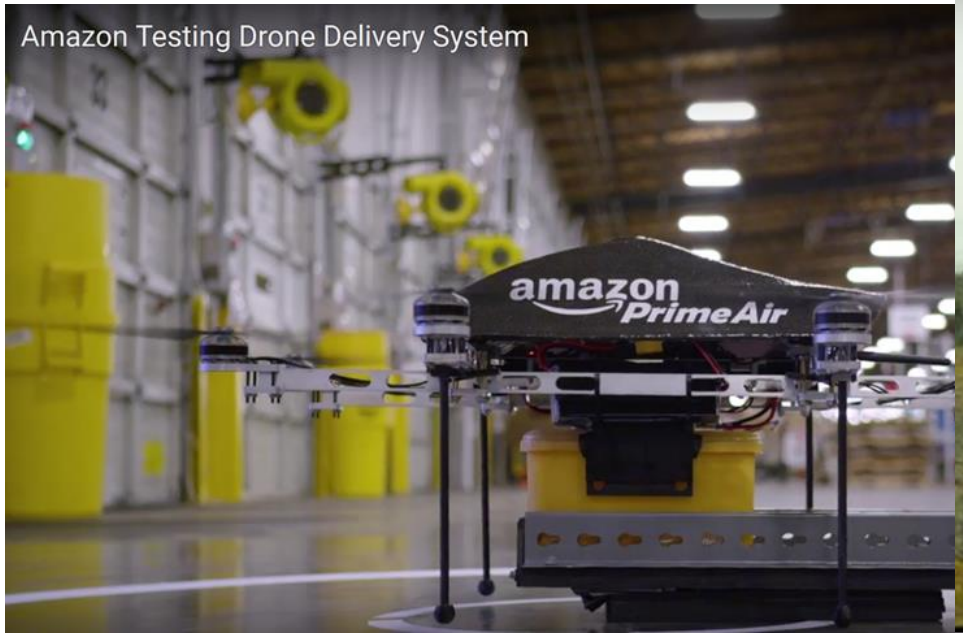
https://www.eutruckplatooning.com/about/default.aspx
https://www.youtube.com/watch?v=lx9EFJ6qgZc

Truck-drone combinations

- https://www.youtube.com/watch?v=xx9_6OyjJrQ



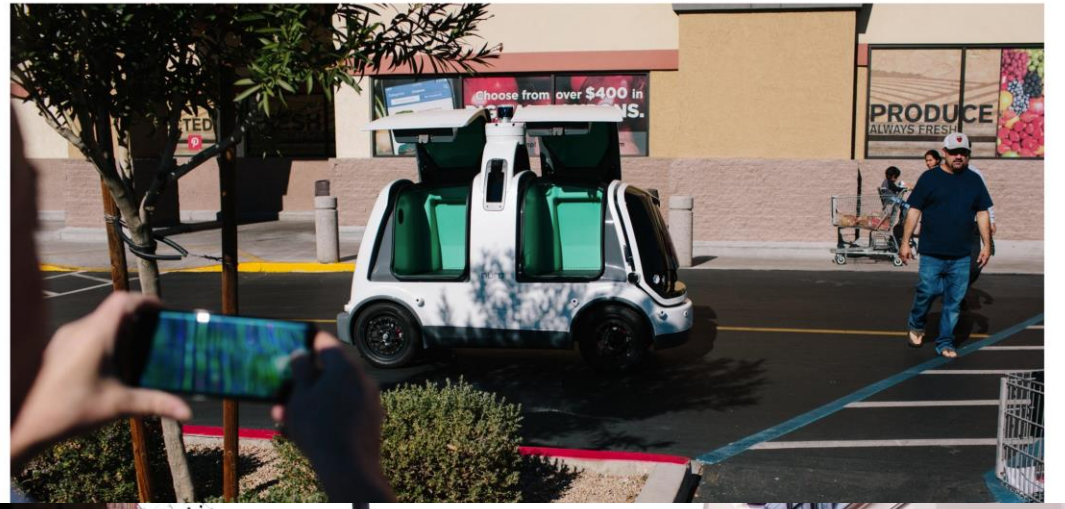
Drones



1) Likely to be used in suburbs, low density cities
2) Large and dense cities not the best targets

Delivery robots

A Toaster on Wheels to Deliver Groceries? Self-Driving Tech Tests Practical Uses



Postmates has created a robot to automate its deliveries

It can carry 50 pounds of cargo, and travel 30 miles on a single charge

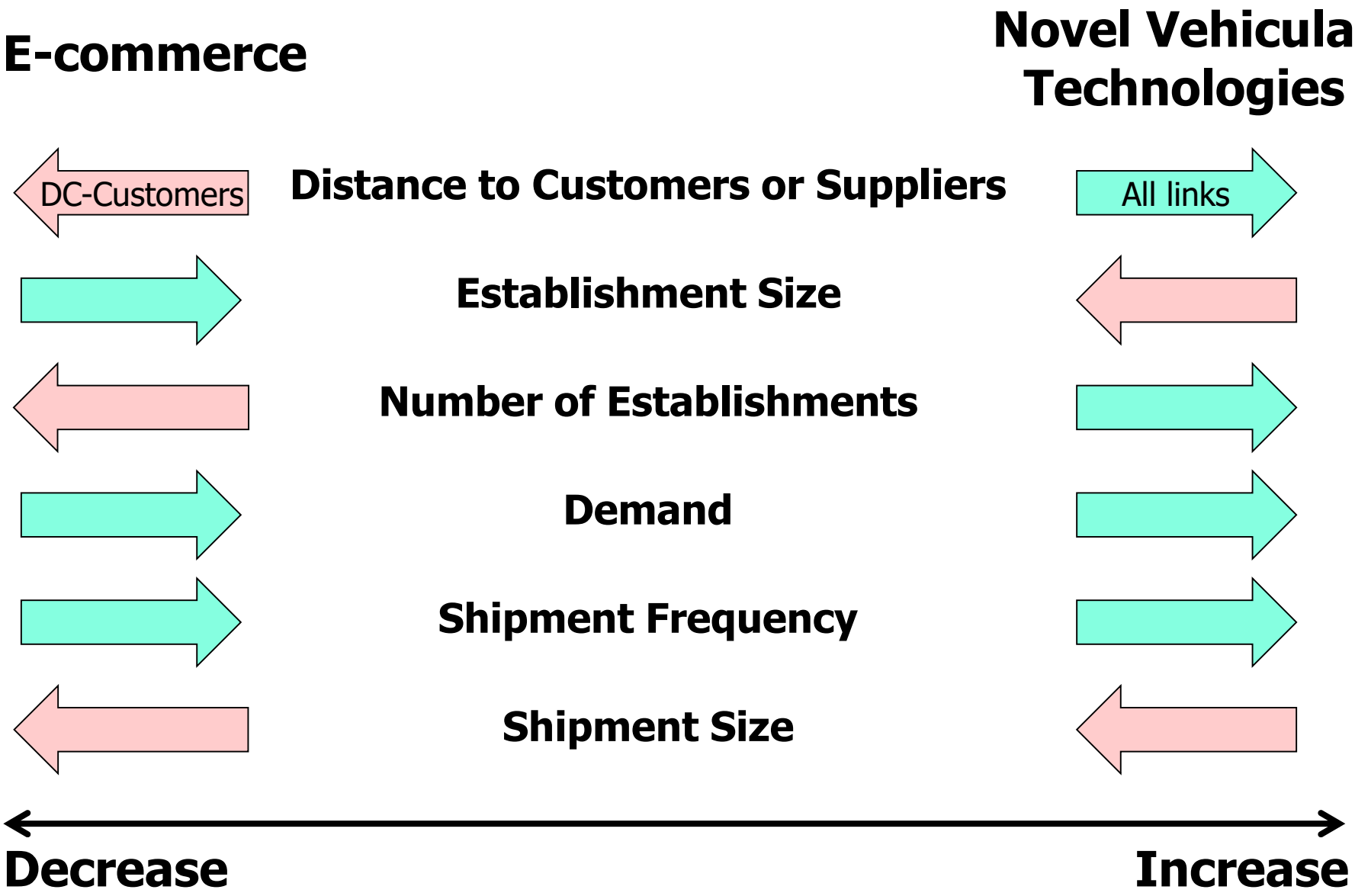
By Jon Porter | @JonPorty | Dec 13, 2018, 12:12pm EST

SHARE

1) Will necessitate major changes in curbside / sidewalks
2) Conflicts with pedestrians

Net Effects ?

Net Effects


E-commerce
Novel Vehicular Technologies
DC-Customers
Distance to Customers or Suppliers
All links
Establishment Size
Number of Establishments
Demand
Shipment Frequency
Shipment Size
Decrease
Increase

Individual Decisions Affecting the System

Individual Decisions \ System-Level Impacts	Density	Land value	Land-use mix	Travel times	Truck VMTs	Truck trips	Congestion	Pollution (noise, air)	Pavement damage
Increase Distance to Customers or Suppliers	−	−	−	+	+		+	+	+
Increase Establishment Size	+	+ / −	−						
Increase Number of Establishments	+	+	+						
Increase Demand				+	+	+	+	+	+
Increase Shipment Frequency				+	+	+	+	+	+
Increase Shipment Size				−	−	−	−	−	+

Key Insights

- This is an era defined by social, economic, and technological transformation
- The various trends are producing, and will continue to produce counterbalancing effects
- The net effects will be determined by the balance of these forces
- The Internet economy and the development of novel vehicular technologies stand out for their impacts
- More than ever before, transportation and land use decision makers must frequently update policy procedures in these changing times

Thanks!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FREIGHT SYSTEMS





Advancing Next-Generation Transportation Operations Using Technology and the Foundation of SHRP2

Aaron Jette
U.S. DOT Volpe Center
Cambridge, Massachusetts

U.S. Department of Transportation
Federal Highway Administration

Changing Transportation Environment

- Challenging fiscal and physical environment limits opportunities for increasing road capacity.
- Heightened customer expectations.
- Emerging technology and data offer opportunities to enhance operations.
- Increased reliance on information and technology.
- Growing emphasis on measurable outcomes and performance-based management and investment.
- Strong foundation for TSMO is critical.

What is TSMO?

Transportation Systems Management and Operations

"[A set of] integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects" (MAP-21, Section 1103, a, 30).

"Integrated strategies" means:

- Regional integration
- Intermodal coordination
- Interagency collaboration
- Technical integration

Evolving TSMO Strategies/Solutions - Examples

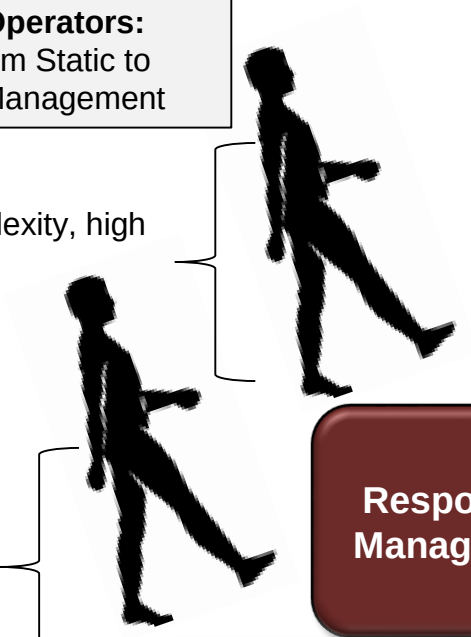
- Work Zone Management
- Traffic Signal Coordination
- Traffic Incident Management
- Traveler Information
- Managing Special Event Traffic
- Road Weather Management
- Freight Management
- Integrated Corridor Management (ICM)
- **Active Transportation and Demand Management**
- Managed Lanes
- Congestion Pricing
- Parking Management
- Mobility as a Service/ Shared Mobility
- Multimodalism

Active Traffic Demand Management

Transportation agencies **attain** the capability to **dynamically** monitor, control, and **influence** travel, traffic, and facility **demand** of the entire transportation system and over a traveler's entire trip chain.

Moving Towards Active Management

Transportation Agency Operators:
Moving from Static to Proactive Management



- High complexity, high reward
- Emerging

- Low risk
- Proven

Proactive Management

- Respond to predicted changes in supply and demand
- Ability to delay or eliminate breakdowns

Responsive Management

- Respond to current conditions
- Account for traffic impacts due to conditions
- Reduce time of degraded operation

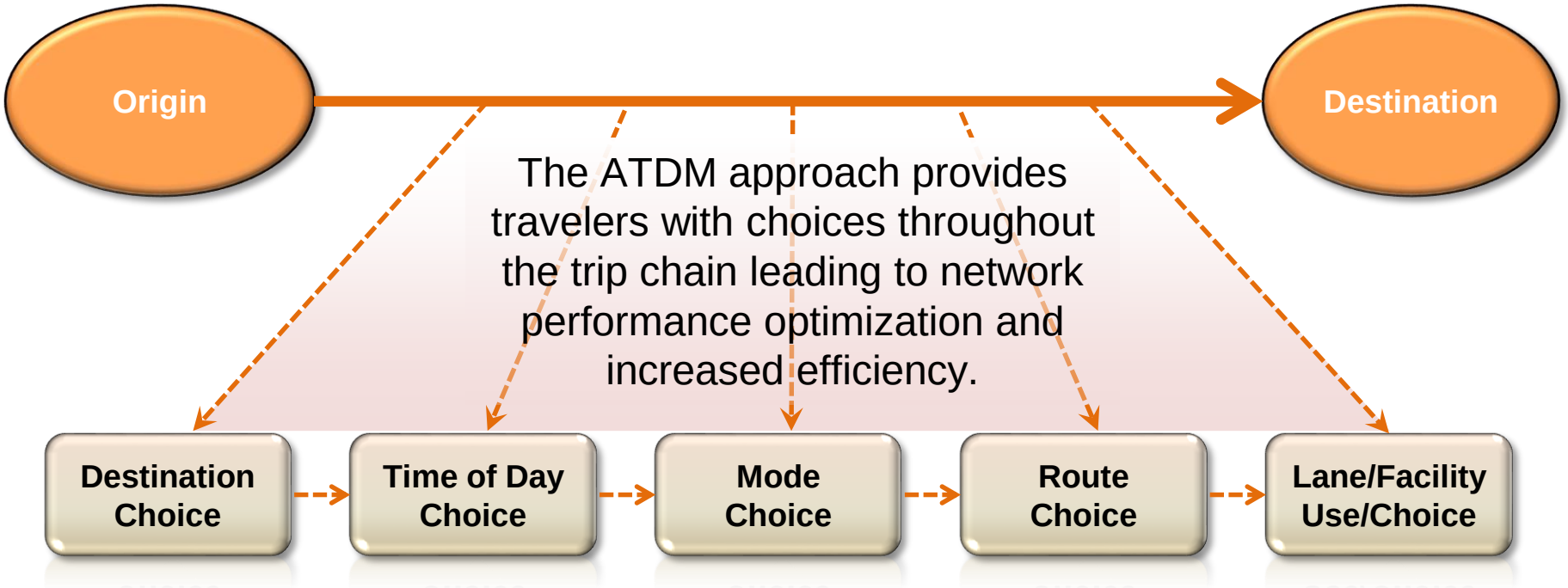
Static Management

- Time of day
- Set-it and forget it
- Will work when there is limited variability

Actively Managing Operations

Source: FHWA

ATDM Throughout the Trip Chain



Key Takeaway: Active management occurs before, during, and at the end of the trip chain

Source: FHWA

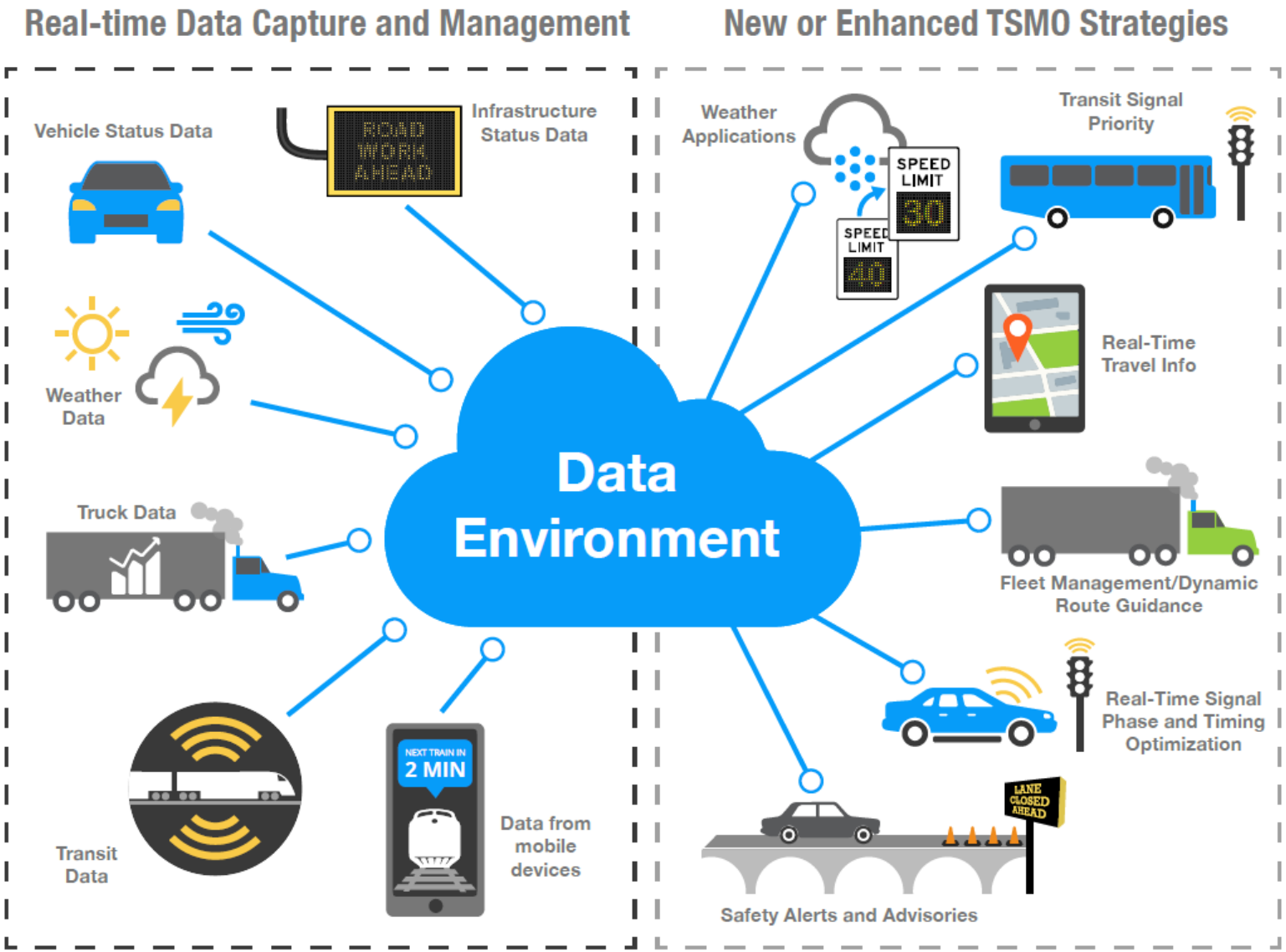
What Does ATDM Include?

- **Active Demand Management (ADM)**: A suite of strategies intended to reduce or redistribute travel demand to alternate modes or routes.

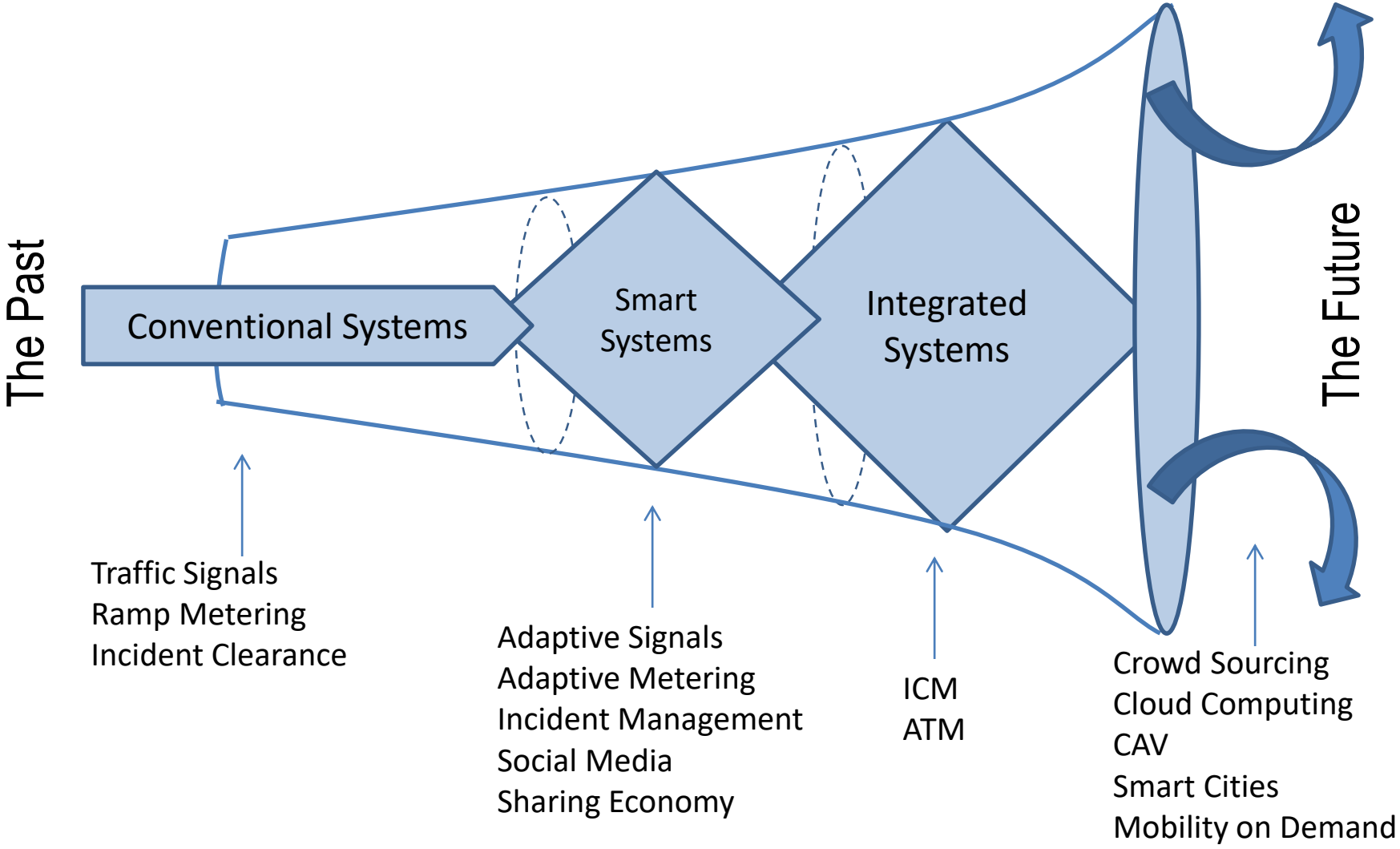
- **Active Traffic Management (ATM)**: A suite of strategies that actively manage traffic on a facility.

- **Active Parking Management (APM)**: A suite of strategies designed to affect the demand on parking capacity.

TSMO and Technology

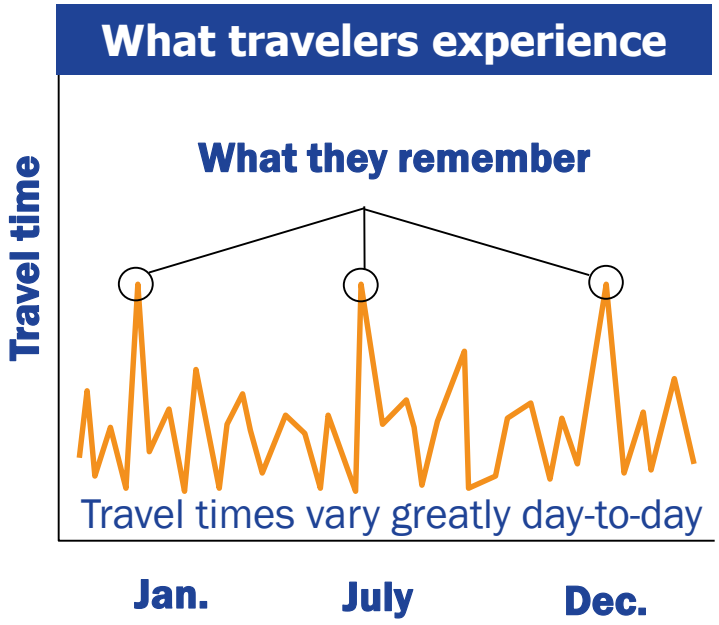


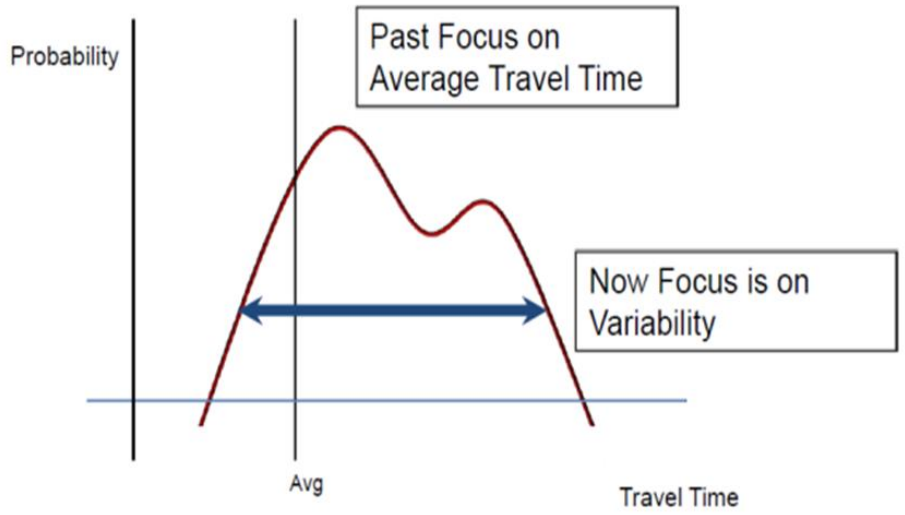
Evolution of TSMO Strategies



Value of Travel-Time Reliability

- Customers care about predictability of travel.
- Agencies need tools to better understand and identify strategies to improve travel-time reliability.





SHRP2 and TSMO

Reliability Focus Area: Reducing congestion and creating more predictable travel times through better operations.

- SHRP2 arrived at just the right time to help.
  - Tipping point.
  - New energy, attention, funding, and tools.
  - Helped agencies figure out how to advance TSMO .
  - Created new training and resources for the TSMO workforce.
  - Highlighted the importance of the predictability of travel time and provided new ways to analyze it.
- All of this is helping agencies mainstream TSMO as more of a core program integrated within their agency.

SHRP2 Reliability Product "Bundles"

TSMO Organizational Capabilities

Reliability Data and Analysis Tools (TSMO Decision Support)

National TSMO Community

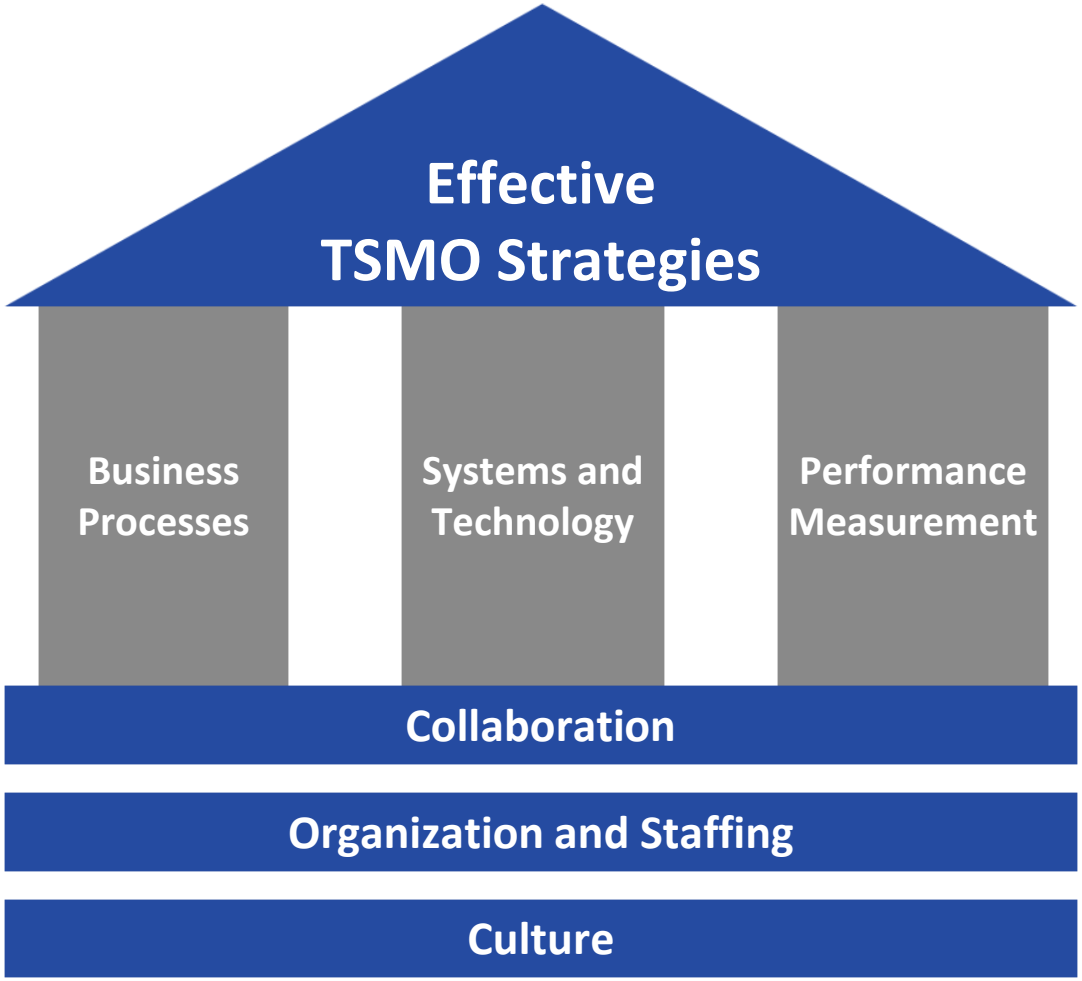
Advanced Operations Strategies

Effective TSMO Strategies: What Makes the Difference?

What is the key factor for explaining the success (or lack of success) of TSMO strategies at transportation agencies?

- It's not all about **$$$$** or technology deployment.
- It's about whether effective TSMO processes and organizational capabilities are in place.

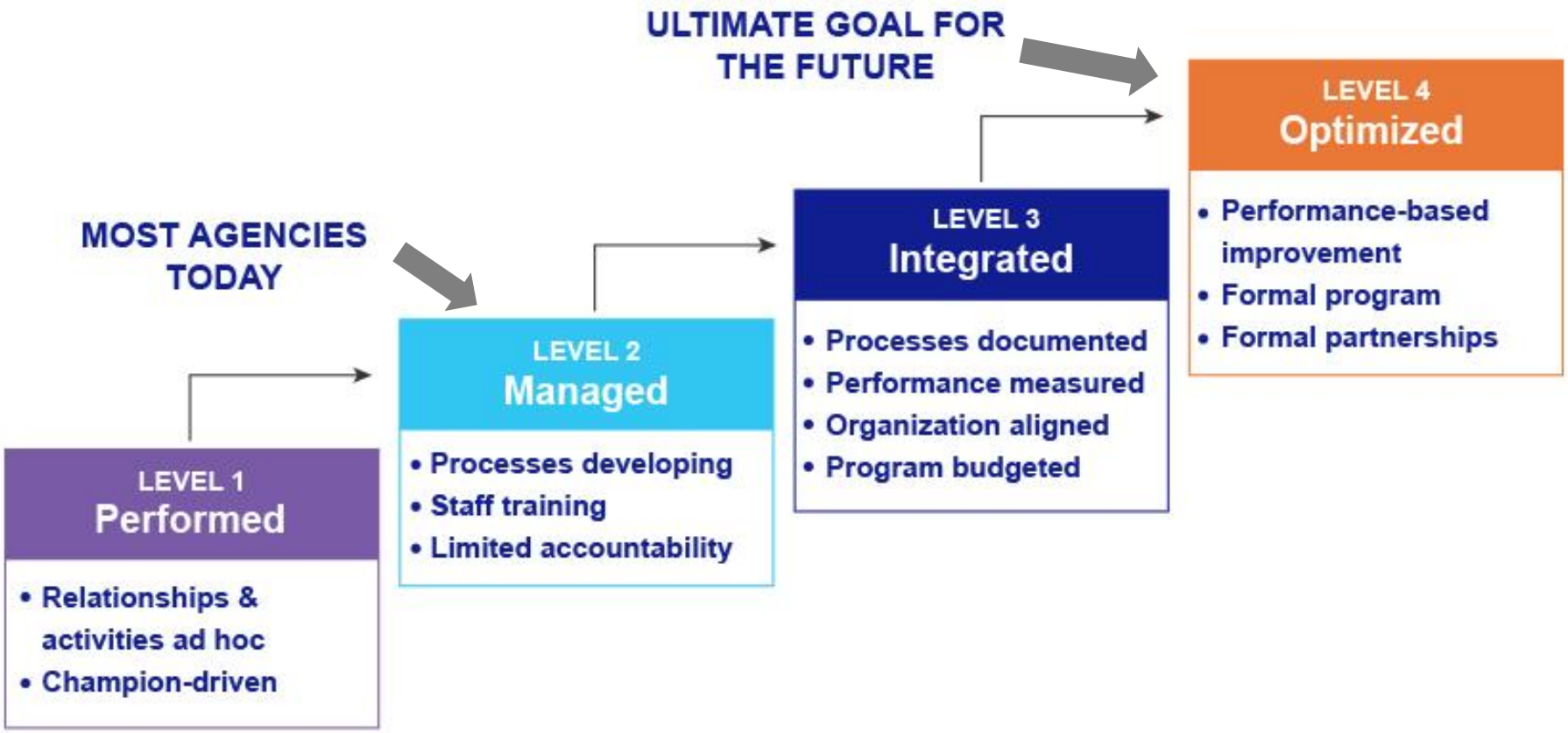
Dimensions of TSMO Capability



Business and technical processes

Organization and relationships

Levels of Capability Maturity



Results – How SHRP2 is Helping Advance TSMO

- More than 50 States, Districts, MPOs, and Regional Groups have used the assessment to improve TSMO.
- Focused efforts on strategic planning for TSMO.
- Success in gaining buy-in for TSMO from senior leadership and key stakeholders.
- State DOTs reorganizing to make TSMO a higher priority.
- Re-evaluating existing partnerships.

Reliability Data and Analysis Tools: From Data to Decisions

Data Collection

Establishing a Travel Time Reliability Monitoring System

Analysis

Effects of Designs

Highway Capacity Manual

Benefit-Cost Analysis

Reliability in Simulation

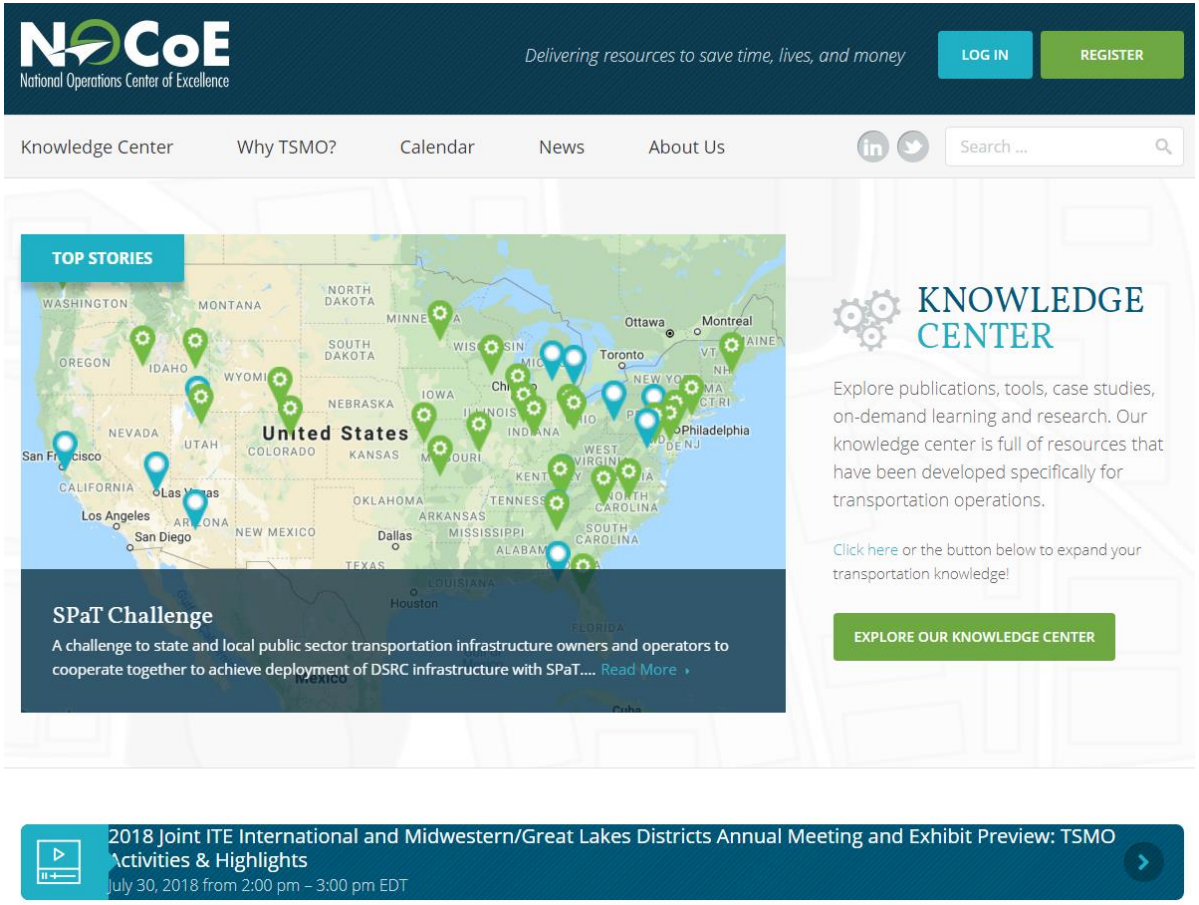
Economic Benefits

Work Zones

Decision

Reliability in Planning and Programming

National Operations Center of Excellence

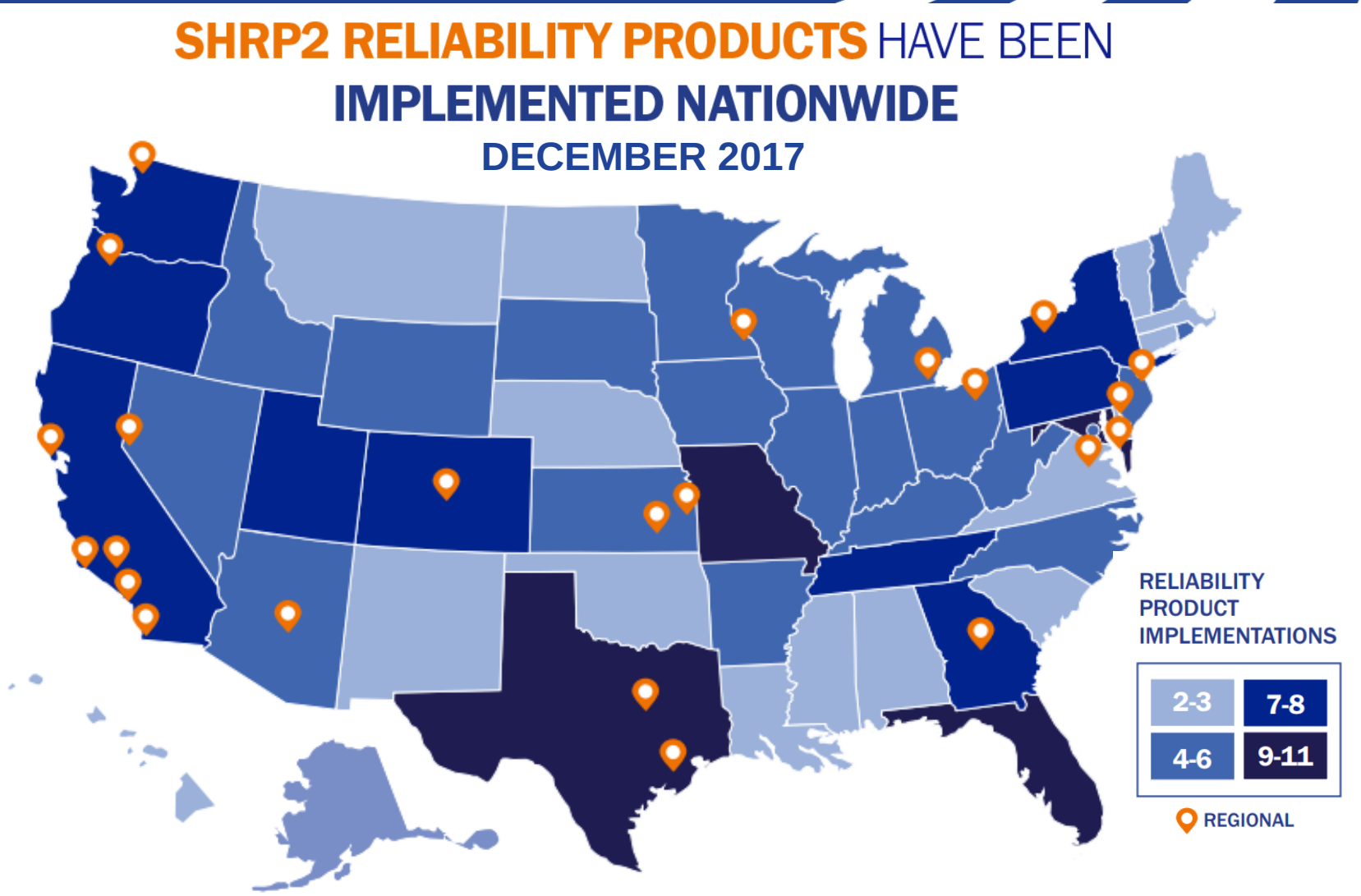


- Launched early 2015
  - Collaboration of AASHTO, ITE, ITSA with support from FHWA
- Website and Technical Services
  - Technical resources
  - Calendar of events
  - Discussion forums
  - Peer exchanges
  - Webinars
  - Newsletter, and more

National Traffic Incident Management (TIM) Responder Training Program

- Interactive, hands-on training bringing together police, firefighters, tow operators, medical personnel, and other incident responders.
- More than 400,000 responders trained.
- Established a national network of TIM training champions.
- Fosters relationship building both in-State and State-to-State.

SHRP2 Reliability Deployment



TSMO Fact Sheets

https://ops.fhwa.dot.gov/plan4ops/focus_areas/integrating/tsmo_factsheets.htm

Websites and Contact Info

- FHWA SHRP2 Solutions
  www.fhwa.dot.gov/goshrp2/
- FHWA Planning & Organizing for Operations
  ops.fhwa.dot.gov/plan4ops/index.htm
- National Operations Center of Excellence
  www.transportationops.org
- Tracy Scriba, FHWA Office of Operations
  tracy.scriba@dot.gov