Policies to Prepare for an Automated Future

Walking and Bicycling in an Automated Future (Part II)

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August 31, 2017

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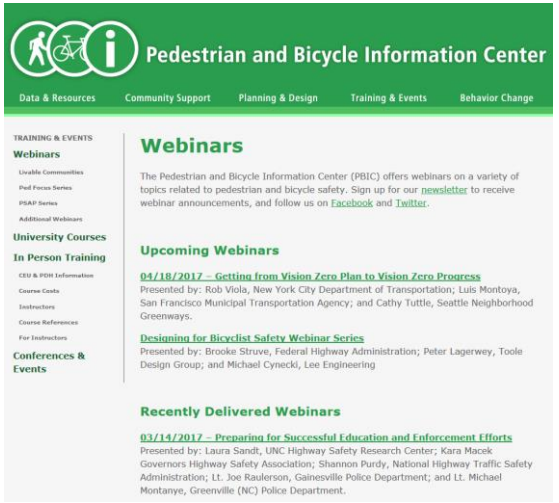


New Automated Vehicles Resource

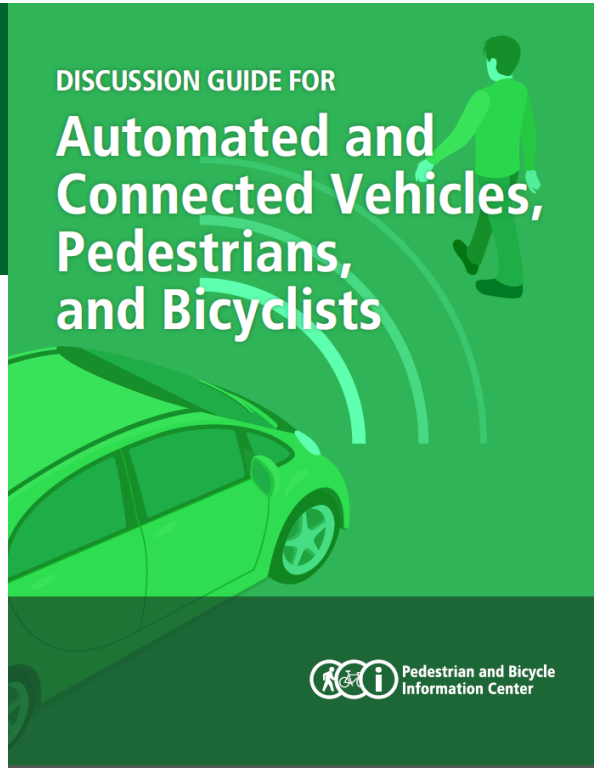
New paper from PBIC explores opportunities and challenges for bicycling and walking in an automated future.

Review of Terminology

Safety and Mobility Considerations for Pedestrians and Bicyclists

10 Challenge Areas Moving Forward

- Detection
- V2X
- Passing
- Driver Handoff
- Mode Shift
- Communication
- Right-Of-Way
- Pick-Up/Drop-Off
- Speed
- Data



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Envisioning Great Cities with AV Technology

NACTO

Major shift in US cities: Singular goal of vehicular movement is giving way…

… to streets that serve many purposes.

AVs carry many promises

...what does the path look like?

Reduce traffic violence?

Decrease carbon footprint?

Free up public space?

Decrease travel costs?

Decrease vehicle ownership?

Decrease congestion?

Do “driverless” cars mean a people-less city?

What's happening today?
Federal Automated Automated Vehicle Policy

Issues:

1. Federal Preemption of State and Local Authority
2. AV compliance with local rules of the road
3. Local government representation on advisory council
4. Data sharing
5. Safety exemptions
6. Funding and resources for NHTSA

NACTO supports automated vehicle policies and regulations designed to:

» promote safety for all street users

» Reduce environmental impacts of vehicle travel

» Support the future vision of cites as great places to live, work, and play

» Rebalance the right-of-way

» Support public transit

» Improve mobility for all

www.nacto.org/policy

Making Automated Vehicles Work for Cities

1. Improving Safety
2. Sharing Data
3. Expanding Transit
4. Democratizing the Curb

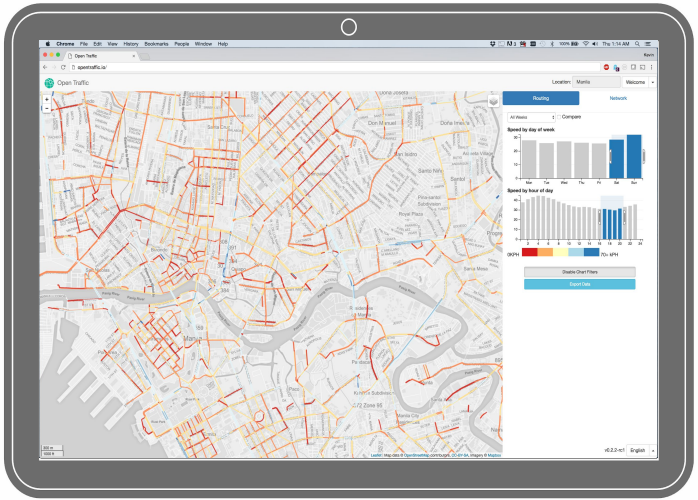
1. Improving Safety

1. Improving Safety

1. Improving Safety

2. Sharing Data

Manage Streets in Real Time



CITY DATA SHARING PRINCIPLES:
INTEGRATING NEW TECHNOLOGIES
INTO CITY STREETS

NACTO

VISION STATEMENT

Data is the foundation of 21st century transportation systems. As new transportation technologies rapidly emerge they create data streams with vital information for management, proactive planning, and policymaking. These data created on city streets must be available to cities in an accessible format in order to support sustainable, accessible, and affordable transportation.

NACTO's data sharing standards aim to facilitate better working relationships between cities and private transportation providers by elevating and standardizing the process of data sharing. These will enable more proactive, data-driven transportation planning solutions and allow private mobility providers to exchange data with cities in the most secure, cost effective, and efficient manner possible.

NACTO's data sharing standards set a path forward for:

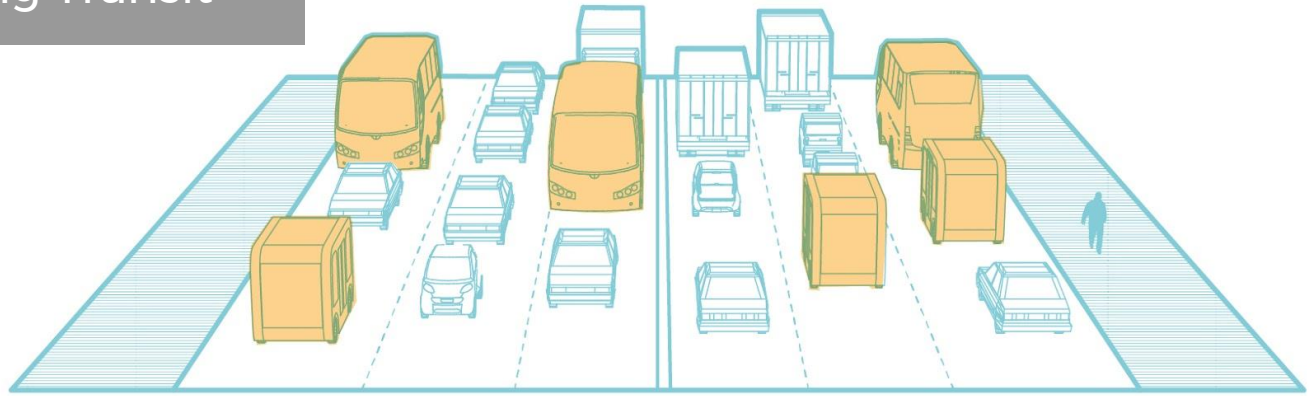
1. **Better Data for Transportation Planning**
2. **Inclusion in Mobility Options**
3. **Better Tools for Safety**

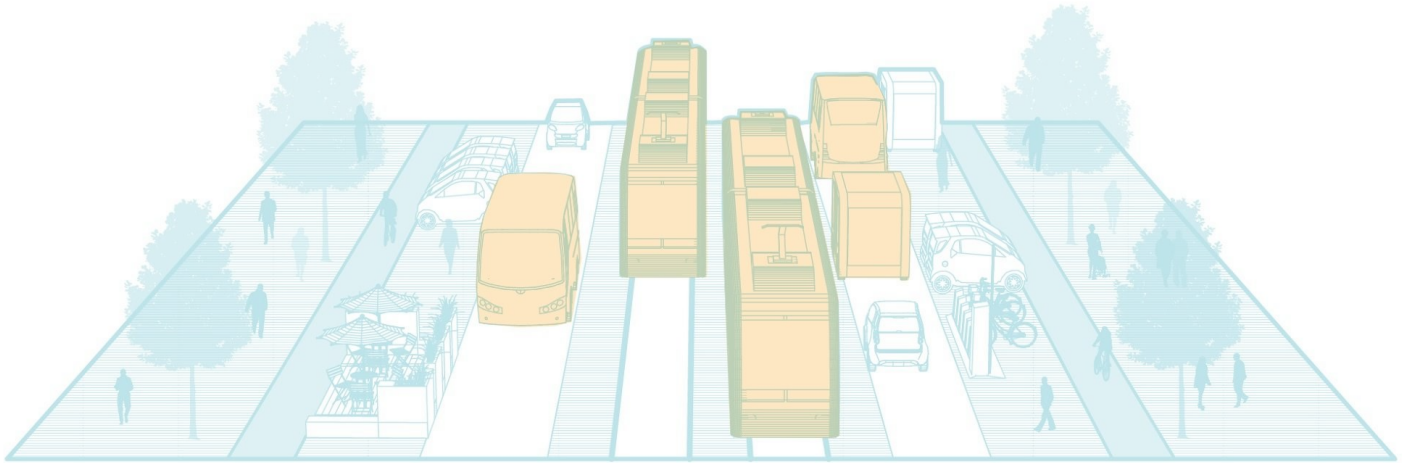
1. BETTER DATA FOR TRANSPORTATION PLANNING

Cities seek the best data to understand, manage, and maintain increasingly constrained transportation networks. This data comes from real time information about operations on city streets. New mobility providers and other GPS- or AVL-enabled fleets collect information that can provide unique insights to cities on the operation of their streets. Sharing of this data in an accessible, secure, and interoperable manner will allow cities to manage, maintain, and proactively plan based on accurate data. The following information should be available to cities from all mobility providers and fleets operating on city streets.

- **Manage City Streets:** Corridor level trip routing information including speed, travel time, and volume data is essential for better street management.
- **Manage Curb Space:** Curb space has become increasingly desirable among mobility providers in cities. Provision of information on pick-up and drop-off locations allows cities to properly allocate and dynamically manage curb space to prevent congestion and ensure safe operations on city streets.

3. Expanding Transit





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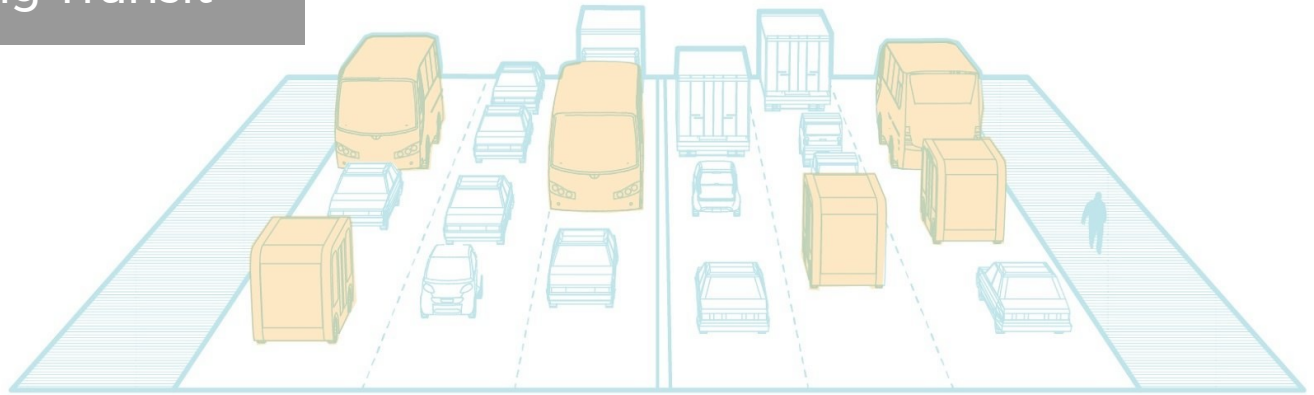

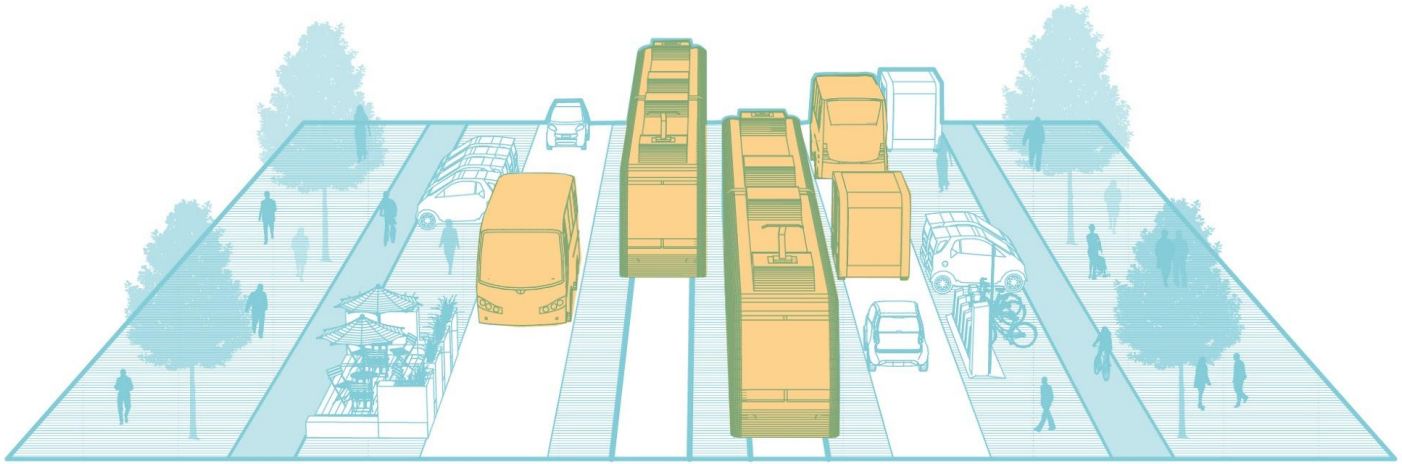

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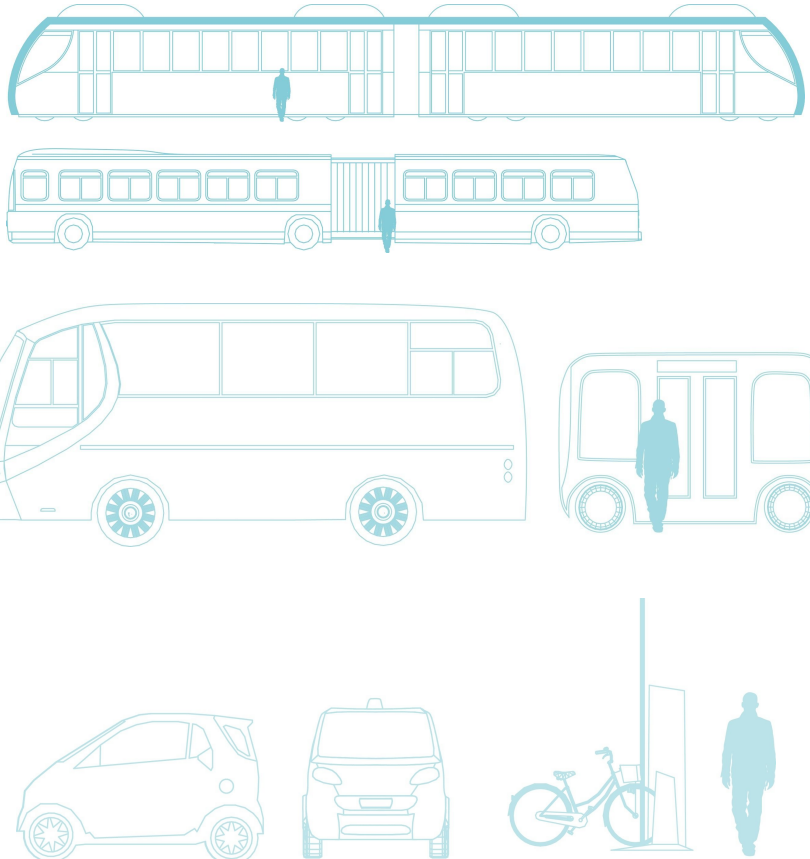
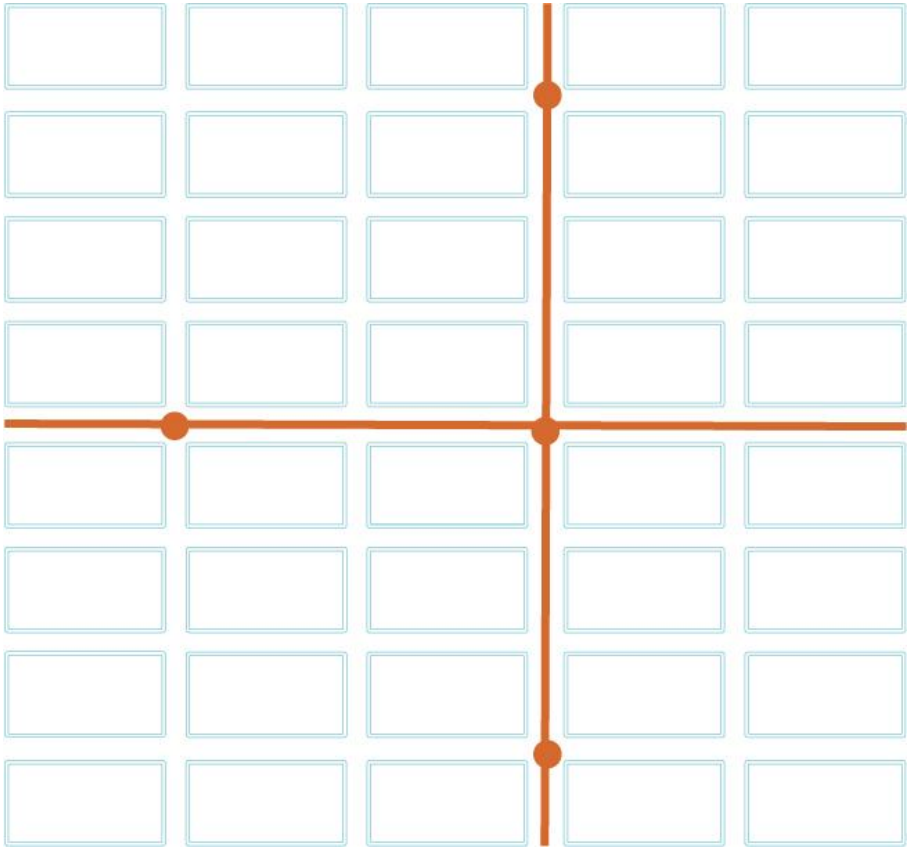


Focus on Fixed



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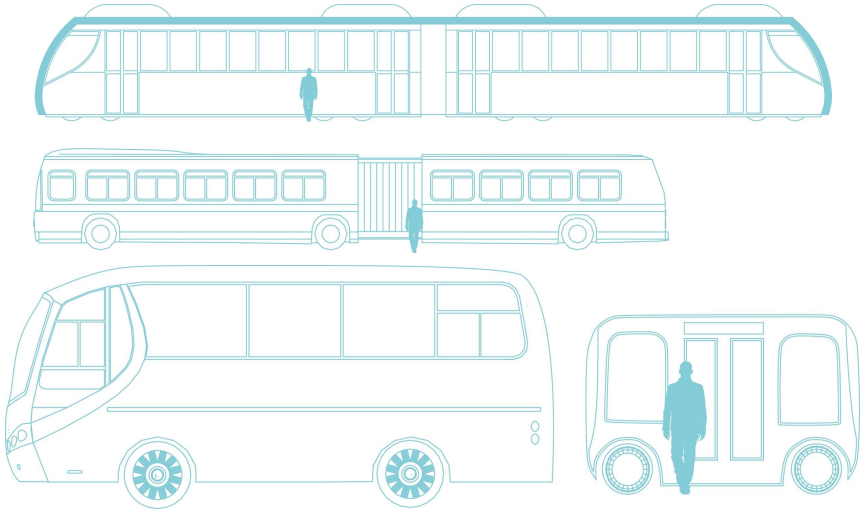
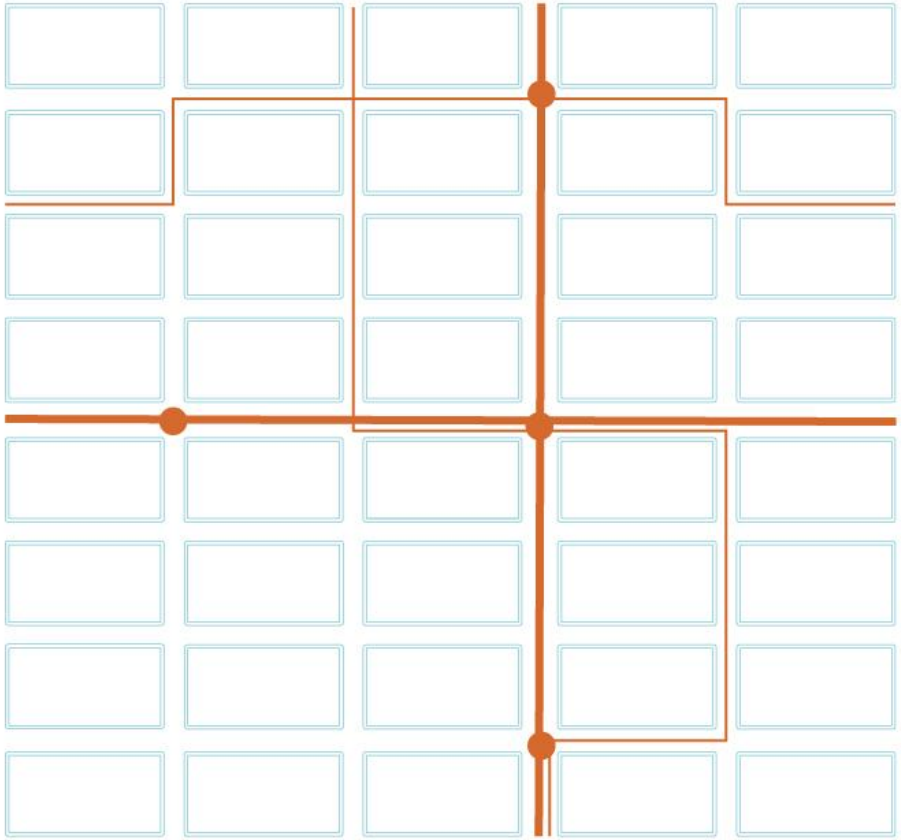


Flexible Route



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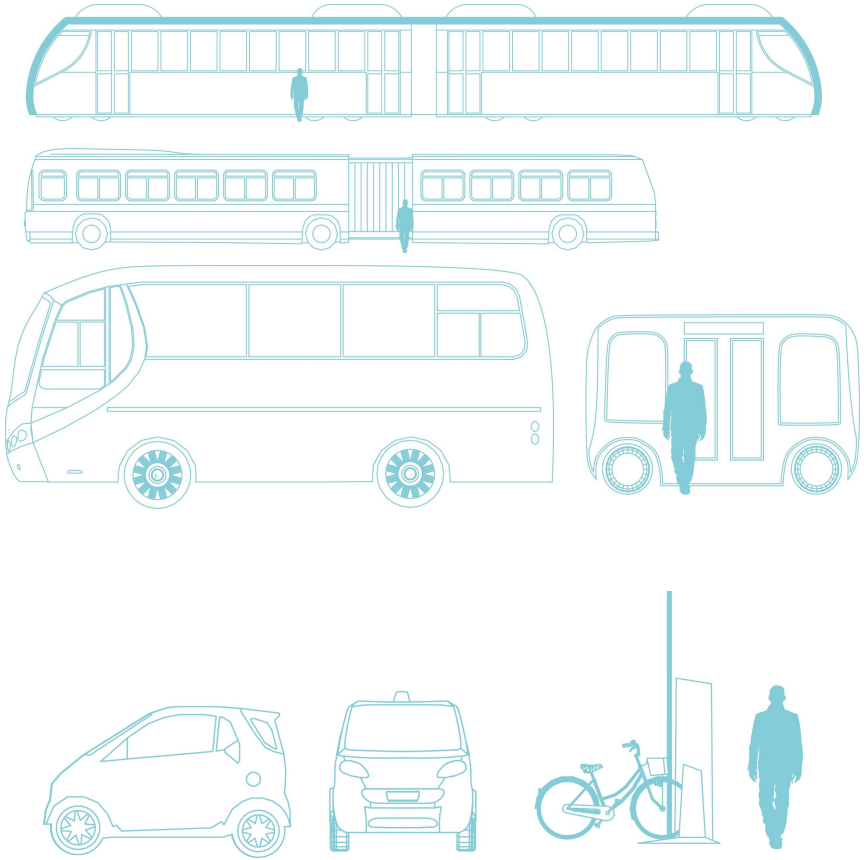
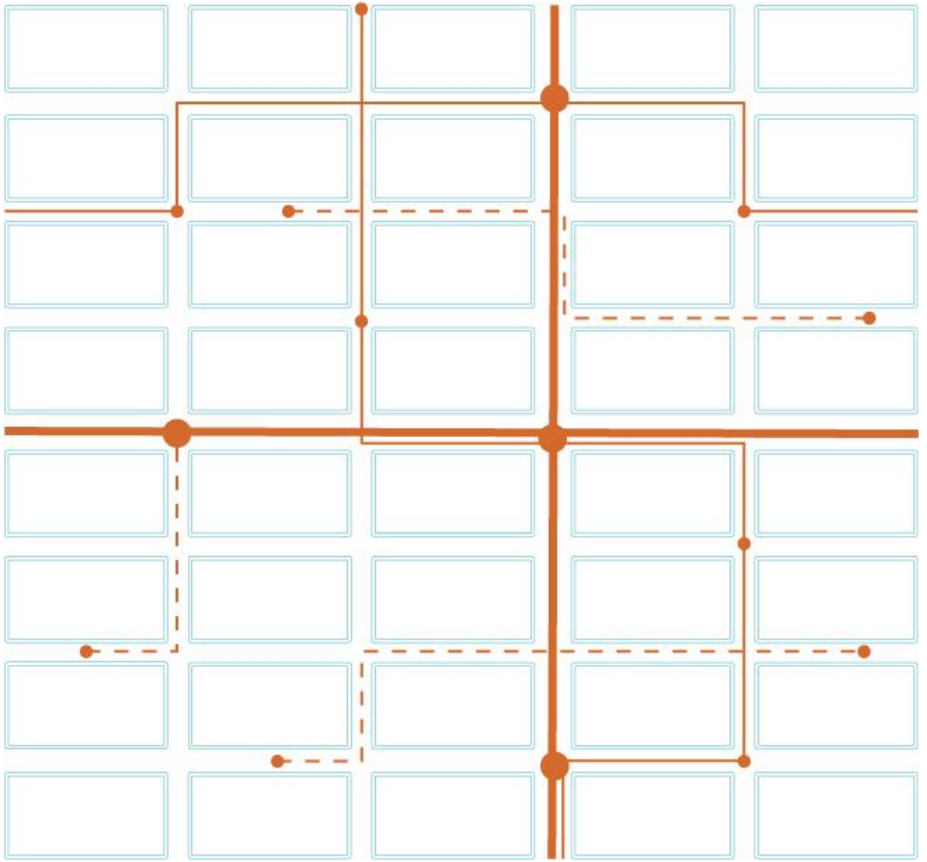


Point to Point



4. Democratizing the Curb

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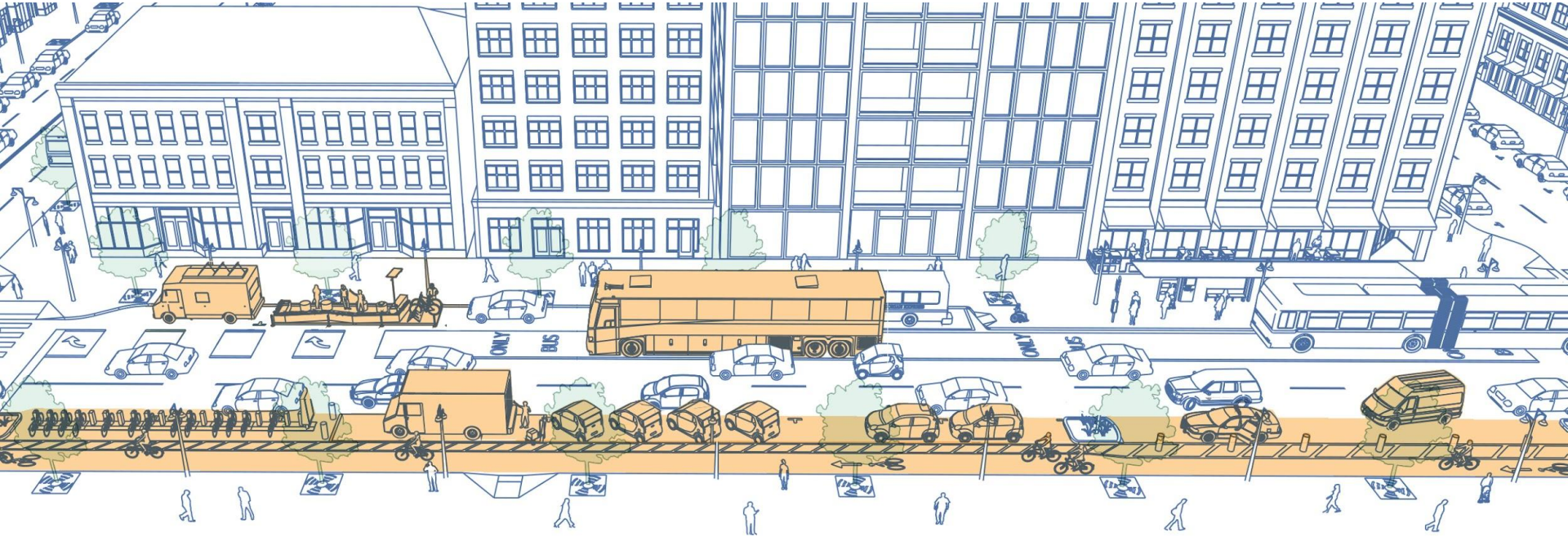

Making Automated Vehicles Work for Cities

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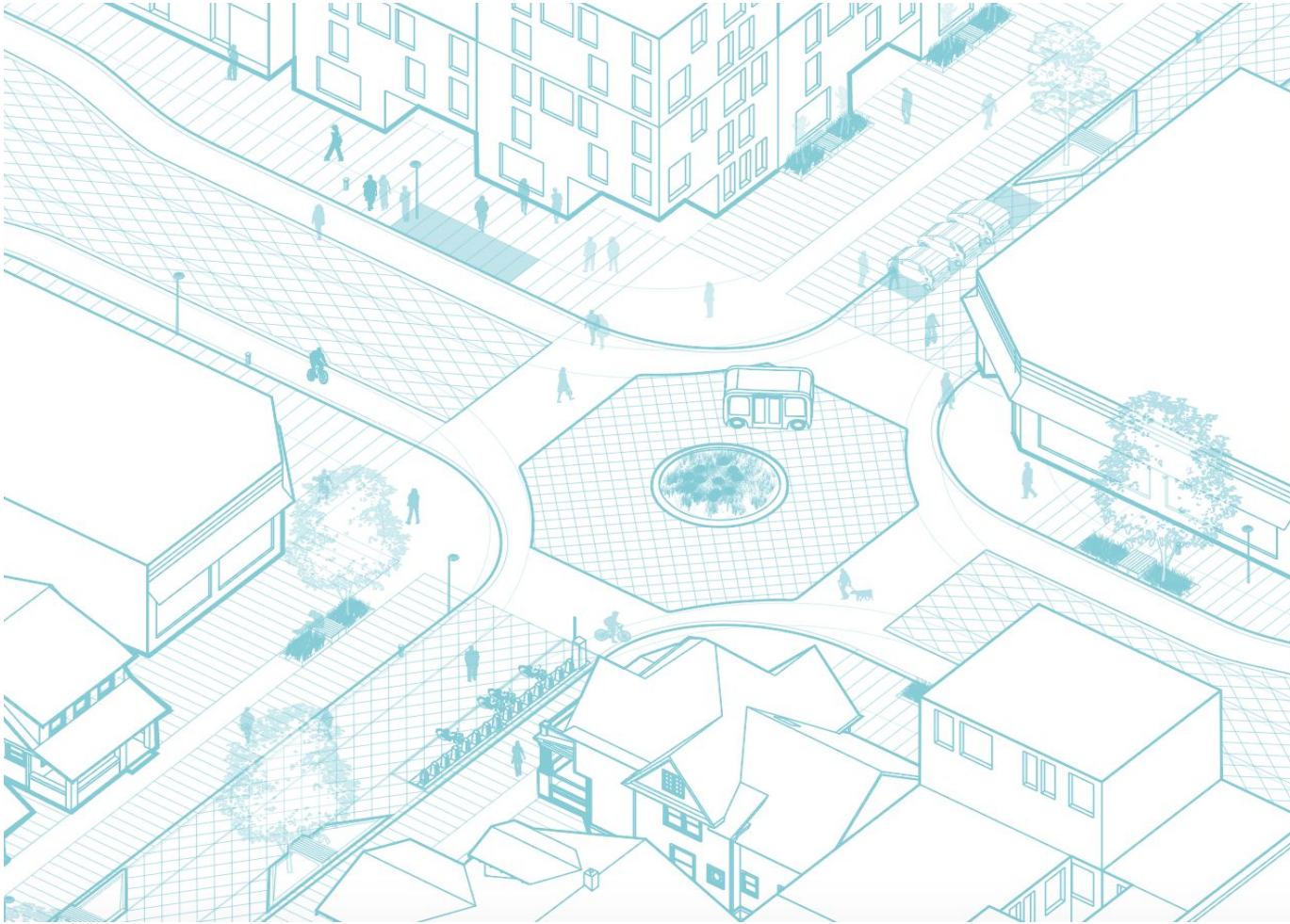

Active Travel and the 3 Revolutions
Policy Considerations

Susan Handy

National Center for Sustainable Transportation

Institute of Transportation Studies

University of California, Davis

8/30/17

National Center for Sustainable Transportation

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3 REVOLUTIONS

Sharing, Electrification and Automation

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Automated Vehicles

Collision avoidance
Connected V2X
Autopilot capable
Self-Driving
Driverless

Ride Pooling

Shared ownership
“vehicle shedding”
Shared trips
Transit

Zero-Emision Vehicles

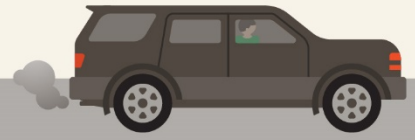
Plug-in Electric
Fuel cell
Human-powered

Three Revolutions in Urban Transportation

Business-as-Usual Scenario

20th Century Technology

Through 2050, we continue to use vehicles with internal combustion engines at an increased rate, and use transit and shared vehicles at the current rate, as population and income grow over time.



2 Revolutions (2R) Scenario

Electrification + Automation

We embrace more technology. Electric vehicles become common by 2030, and automated electric vehicles become dominant by 2040. However, we continue our current embrace of single-occupancy vehicles, with even more car travel than in the BAU.

3 Revolutions (3R) Scenario

Electrification + Automation + Sharing

We take the embrace of technology in the 2R scenario and then maximize the use of shared vehicle trips. By 2030, there is widespread ride sharing, increased transit performance—with on-demand availability—and strengthened infrastructure for walking and cycling, allowing maximum energy efficiency.

Number of Vehicles on the Road by 2050

= 250 million vehicles

2.1 billion

2.1 billion

0.5 billion

CO_2 Emissions by 2050

= 500 megatonnes of CO_2

4,600 megatonnes

1,700 megatonnes

700 megatonnes

www.itdp.org

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Sharing, Electrification and Automation
3 REVOLUTIONS

ITS UCDAVIS
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Policy Brief

February 2017

Active Transportation in an Era of Sharing, Electrification and Automation

Author
Susan Handy, National Center for Sustainable Transportation, UC Davis

Contributors
Neelima Shah, Bullitt Foundation
Sahar Shirazi, Governor's Office of Planning and Research*
* For identification purposes only

In November 2016, the Institute of Transportation Studies at the University of California, Davis (ITS-Davis) convened leading academic, government, private industry, and public interest stakeholders to explore science-based policies that could steer the three transportation revolutions- shared mobility, electrification, and autonomous vehicles, toward the public interest.

This policy brief reflects the opinions of the authors and not UC Davis. This brief is one in a series that presents a range of policy concepts, recommendations and research needs discussed at the Three Revolutions Conference.

Contact
Mollie D'Agostino
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Summary

Revolutionary change is happening within and around active travel modes. Sharing and electrification of bikes, scooters, and skateboards could complement auto electrification, automation, and sharing. Prioritizing safety, implementing sustainable planning, and reinventing our built environment with bikes and walking in mind will ensure that active travel modes benefit from and in turn support the three revolutions.

Introduction

Addressing the needs as well as the potential of active travel modes is critical for integrating the three revolutions into our communities in a way that enhances their safety and vibrancy. This brief introduces key findings and a set of policy recommendations to address how the three revolutions in ridesharing, vehicle electrification, and automation are impacting and reinventing active travel.

Walking and bicycling are low-cost, low-polluting, and healthy ways to travel. Communities that invest in so-called active travel modes rather than gas-powered

Credit to:
Neelima Shah, Bullitt Foundation
Sahar Shirazi, Governor's Office of Planning & Research

https://3rev.ucdavis.edu/wp-content/uploads/2017/03/3R.Active.InDesign.Final_.pdf


Photocredit: Reuters.com- Vanke Bldg Testing Centre - Driverless vehicle testing area in Dongguan, China

Active travel *supports* the 3Rs… Sharing *needs* active travel

- Sharing means lower auto ownership
- Lower auto ownership means reliance on suite of mobility options including active travel – “mobility integration”

Trip Length	Share of Trips
< 1 mile	25 %
< 2 miles	40 %

3Rs *in* Bicycling

	Positives	Negatives
Electrification	• Enables bicycling for more people (e.g. older) for more trips (e.g. longer, hillier, stuff/kids to carry, rural areas). • Generates new mode options (e.g. electric skateboards and other devices).	• May reduce physical activity. • May not mix safely with other modes, e.g. pedestrians, e-bikes on shared-use paths. • May compete with transit. • High cost may be prohibitive for low-income households. • Heavy weight reduces ease of storage, use with transit.
Automated BikeSharing	• 4th generation bike sharing reduces need for docking stations.	• Bike costs are higher for service provider though capital costs are lower.
Bikesharing	• Expands access to bicycles, e-bikes. • Helps to build bicycle culture. • Supports transit use.	• Generally not feasible in low-density areas.

Implications of the 3Rs for Active Travel

	Positives	Negatives
Electrification	• Improves active travel environment owing to less noise and lower emissions.	• Reduces safety when active travelers can't hear them coming.
Automation	• Lowers crash risk BUT many technical issues remain to be worked out. • Lowers crash severity IF used to limit speeds. • Leaves more space for active modes IF driving doesn't increase.	• Raises ethical dilemmas. • Drop-offs could be safety issue for bicycles.
Sharing	• Complements active modes for longer trips. • Enables multimodal lifestyle and may reduce auto reliance and ownership. • Improves active travel environment IF less driving overall.	• Could compete with bicycling for some trips.

Policies to harmonize AT and the 3Rs

"To maximize the societal benefits of the three revolutions, policies should prioritize human mobility and community livability over vehicle mobility. Communities should be designed for people, not vehicles; AVs should serve the community, rather than the community serving AVs."

Policies with respect to…

- Built environment
- Automated vehicles
- Planning processes and practices

At all levels of government…

Built Environment Policies

Policy	State	Region	City
Adopt strong growth management policies, such as urban growth boundaries, that limit suburban sprawl.		X	X
Adopt zoning and financial incentives that encourage infill development and mixed-use development, particularly pedestrian-oriented retail.			X
Prioritize bicycle and pedestrian infrastructure in allocating transportation funding.		X	X
Adopt “fix-it-first” policies that prioritize spending on road maintenance over road expansion.	X	X	X
Adopt “complete streets” policies that prioritize active modes in reallocating road space.	X		X
Revise parking policies to reduce or eliminate requirements for developers to provide a minimum number of parking spaces and to impose fees for on-street and off-street public parking.			X

Automated Vehicle Policies

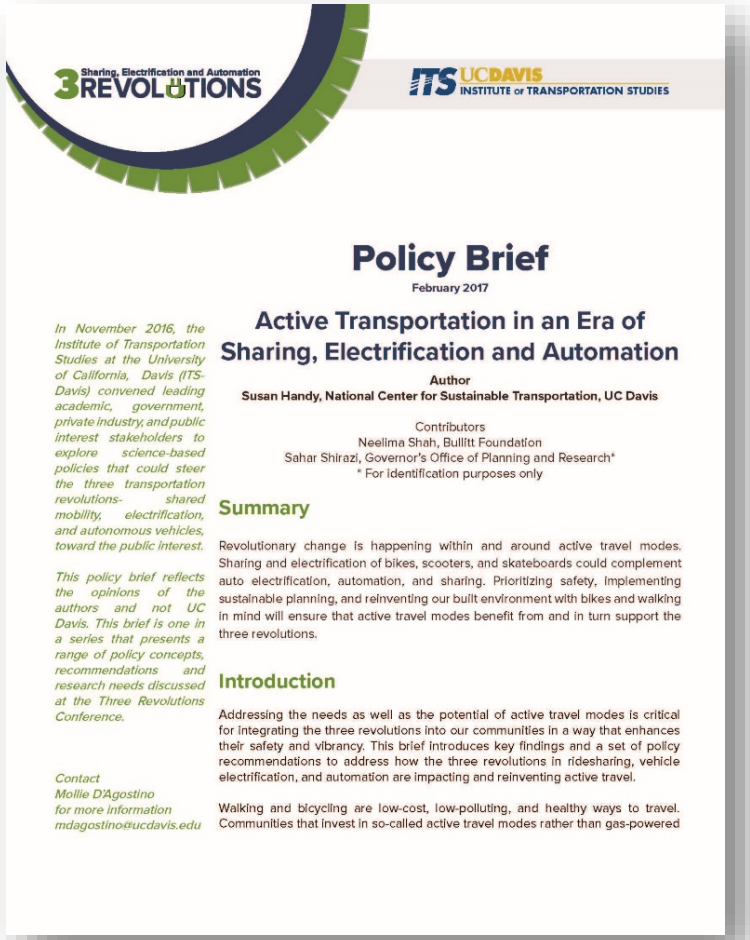
Policy	Fed	State	City
Adopt requirements that bicycle and pedestrians are accounted for in the development of on-board AV systems as well as wayside connected vehicle systems.	X	X	
Establish protocols for clear communication between AVs and bicyclists and pedestrians.	X	X	
Adopt lower speed limits on facilities shared with active travel modes, coupled with technological restrictions on speeding for AVs that operators cannot override.	X	X	X
Adopt regulations and/or pricing that restrict AV circulation within residential areas, school areas, shopping areas, and other areas with high levels of pedestrian activity.		X	X
Prioritize multiple-occupant AVs over single-occupant AVs through pricing and road access policies.		X	X
Establish designated drop-off and pick-up zones for shared AVs to minimize conflicts between AVs and active modes.			X
Involve bicycle and pedestrian interest groups in the development of AV policies at all levels of government.	X	X	X

Planning Processes and Practices

Policy	Fed	State	Region	City
Adopt a true multimodal approach to transportation planning that enhances the range of options available to travelers and enhances the ease with which they can mix-and-match among these options to better meet their own needs.		X	X	X
Revise travel demand forecasting models and other planning tools to reflect the expanding suite of mobility options and revise traditional assumptions about travel behavior.			X	
Adopt new performance metrics for the transportation system that are consistent with a focus on human mobility and community livability, for example, measures of health benefits and accessibility to jobs and services.	X	X	X	X
Improve data collection for active modes, including data on amount of active travel and safety outcomes.	X	X	X	X
Improve coordination of transportation planning across jurisdictions and levels of government, and ensure that pedestrian and bicycle interest groups are involved in planning processes.		X	X	X

Questions for Research

- How should we design streets to minimize conflicts between active modes and AVs? Where and how should we mix modes, and where and how should we separate them?
- What is the likely trajectory for parking demand for each possible trajectory of AVs? What parking policies can be adopted now to ensure sufficient flexibility to respond to changing demand in the future?
- How can AVs and shared-ride services be used to collect better data on walking and bicycling, including how many people are walking and bicycling where?



Sharing, Electrification and Automation 3 REVOLUTIONS

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Thanks!

Susan Handy

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National Center for Sustainable Transportation

ITS UCDAVIS INSTITUTE OF TRANSPORTATION STUDIES

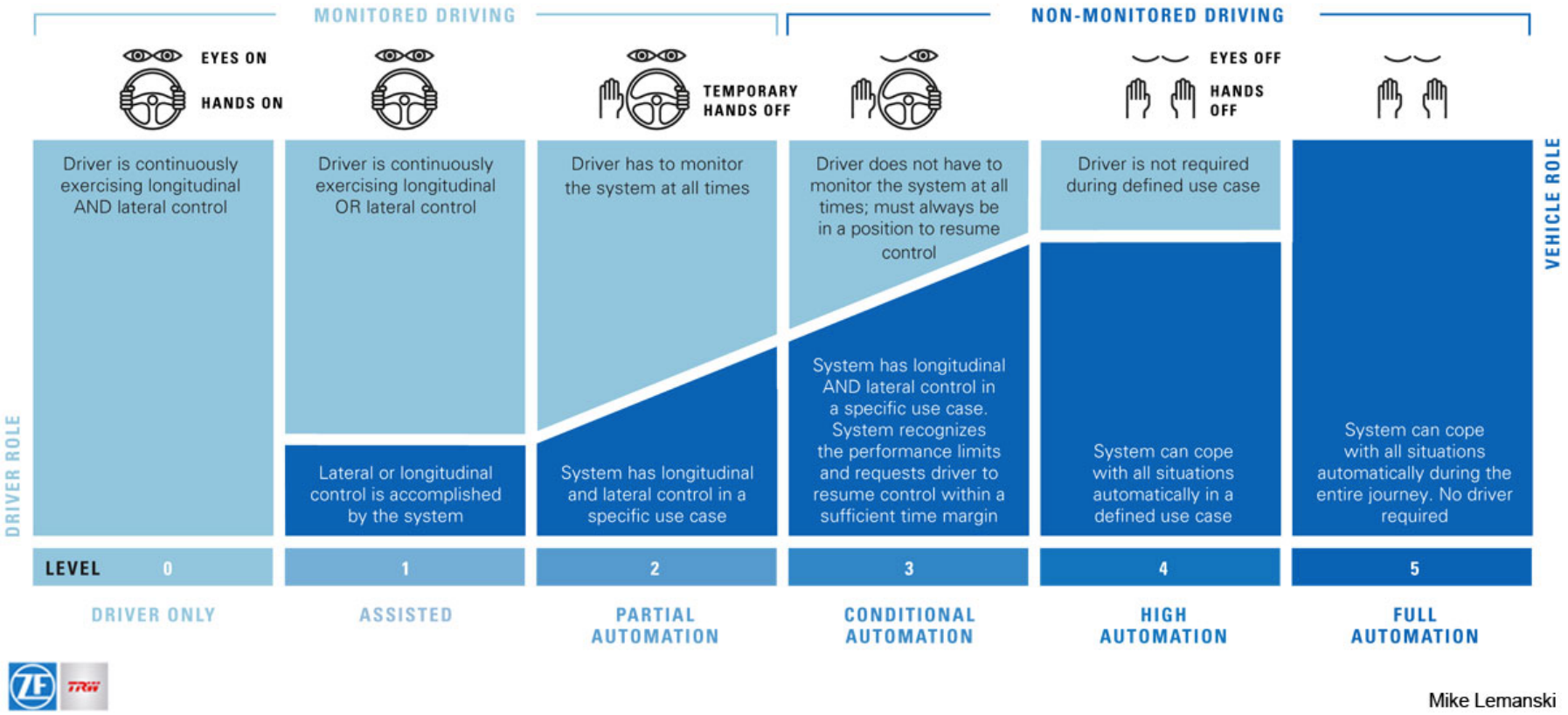
Joe Iacobucci New Mobility Practice Leader
Sam Schwartz Consulting

DRIVERLESS FUTURE

A POLICY ROADMAP FOR CITY LEADERS

Sam Schwartz

Stages of Autonomy



Mike Lemanski

What does this mean for cities?

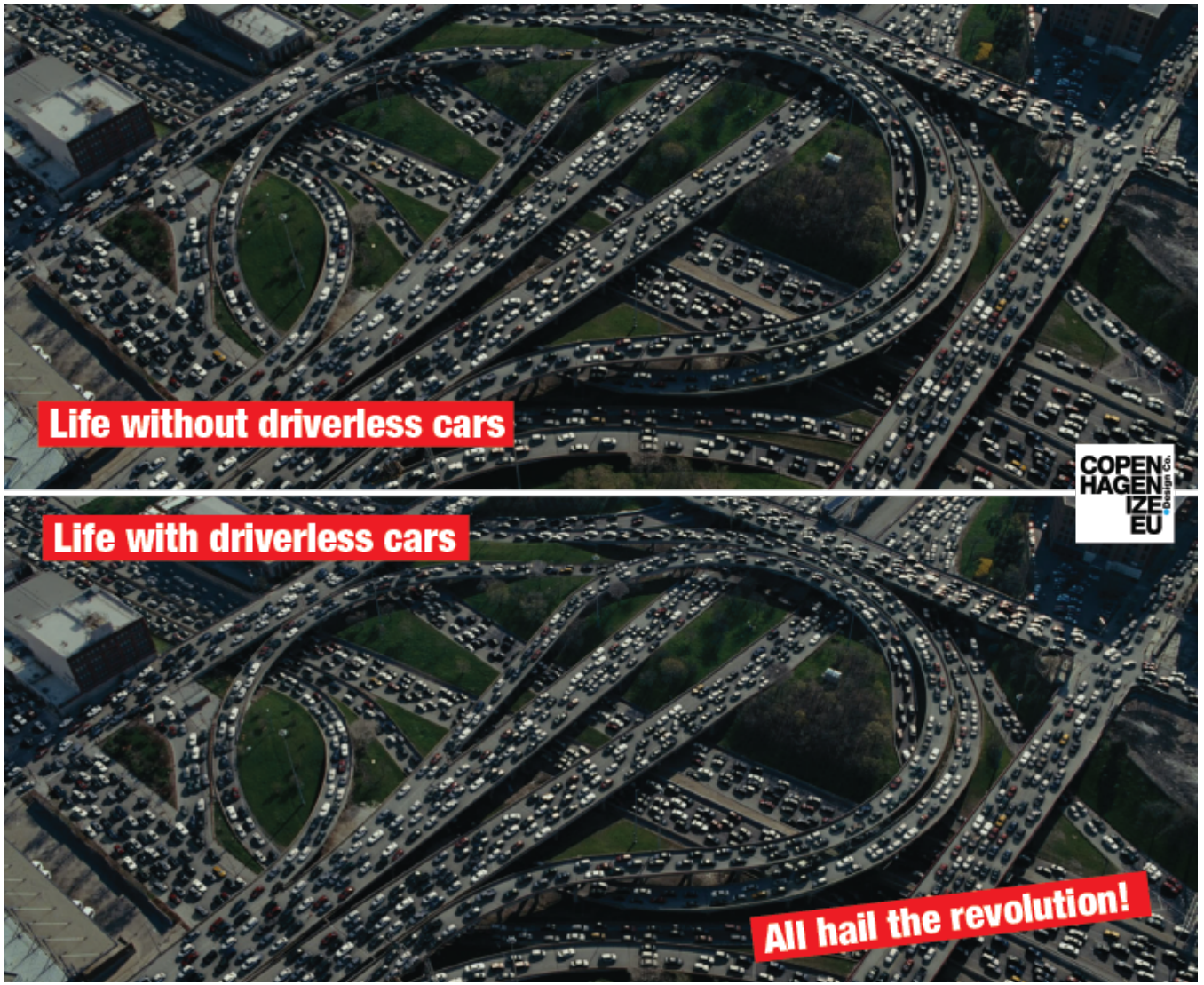
2015 NATIONAL STATISTICS

POLICE-REPORTED MOTOR VEHICLE TRAFFIC CRASHES

Fatal	32,166
Injury	1,715,000
Property Damage Only	4,548,000
Total	**6,296,000**

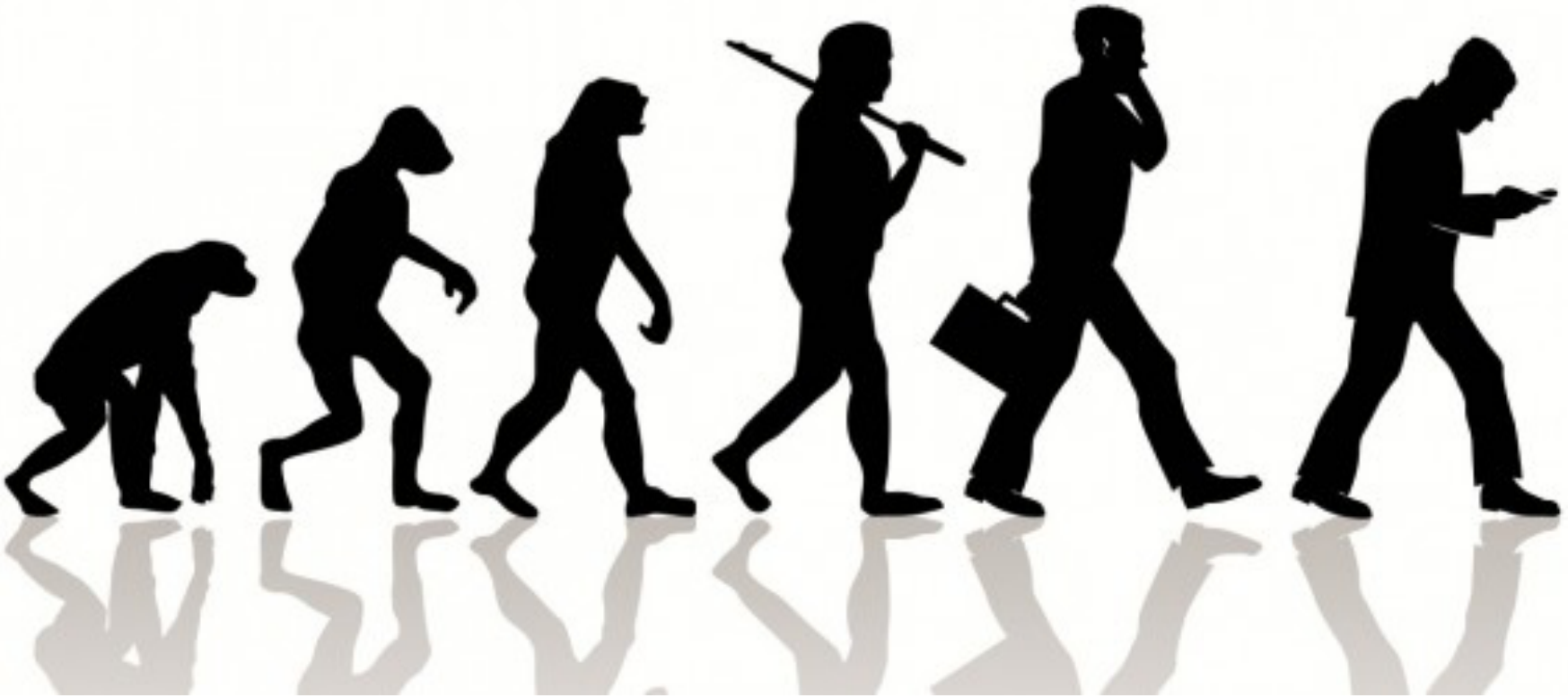
USDOT - NHTSA

Congestion



Sam Schwartz

What else does this mean for the future of cities?

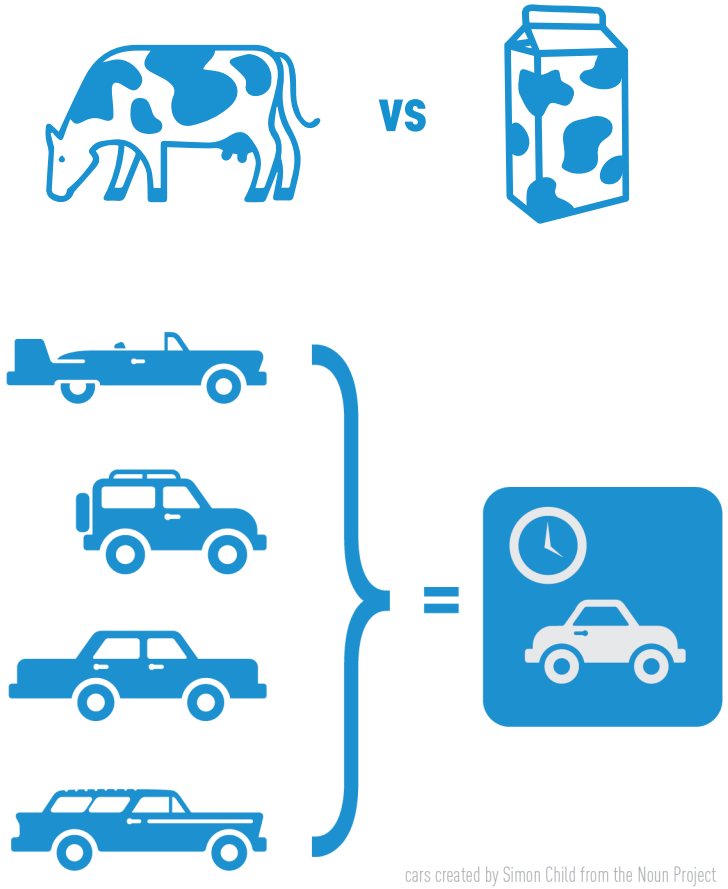


Sam Schwartz

Shift in the value of ownership

Commodifying trips: outputs (trips) purchased and sold, instead of users owning means of production (vehicles).

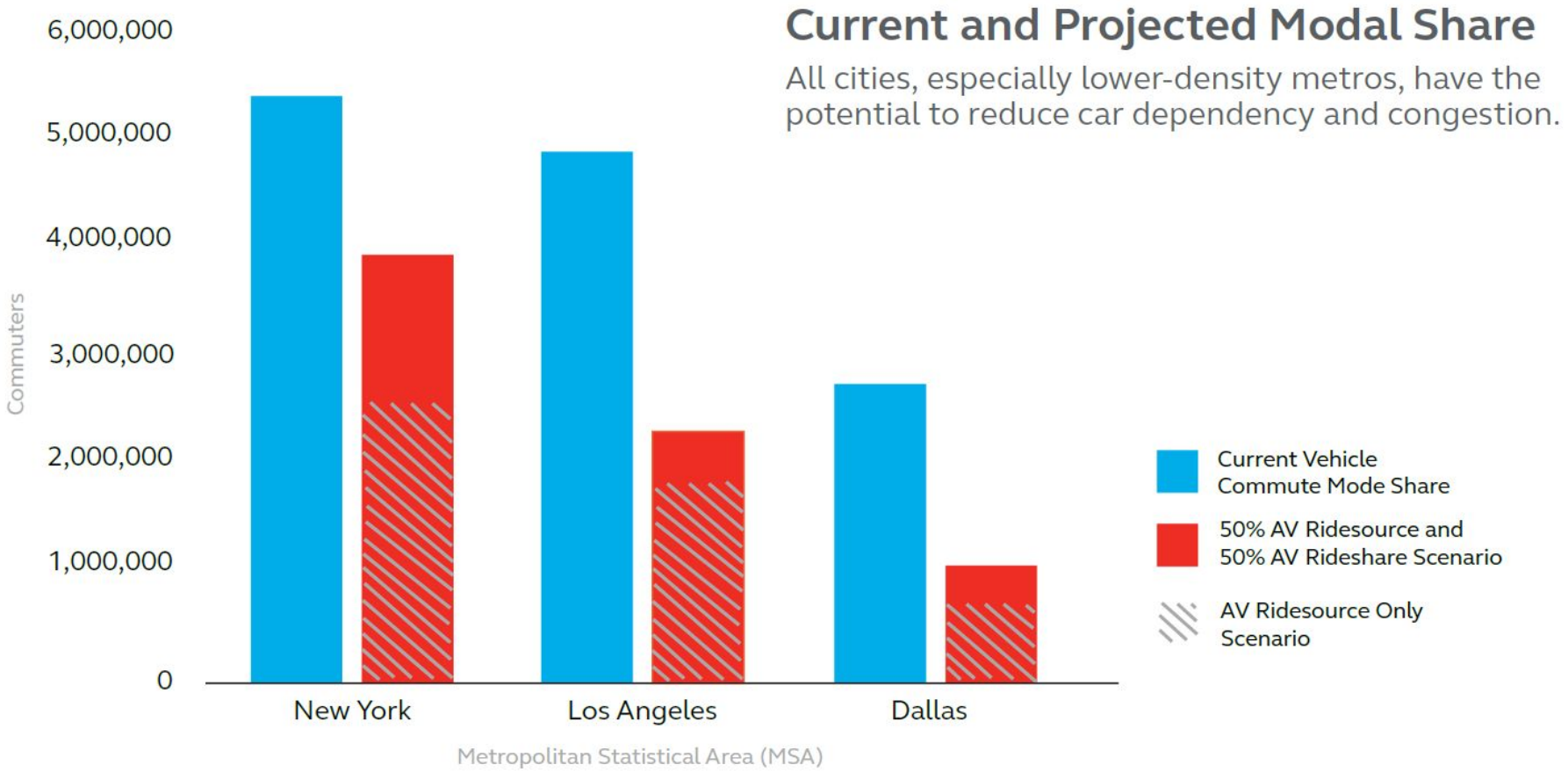
Functionality dominates while form, brand, and identity lose importance.



cars created by Simon Child from the Noun Project

Sam Schwartz

Shift from Vehicle Ownership

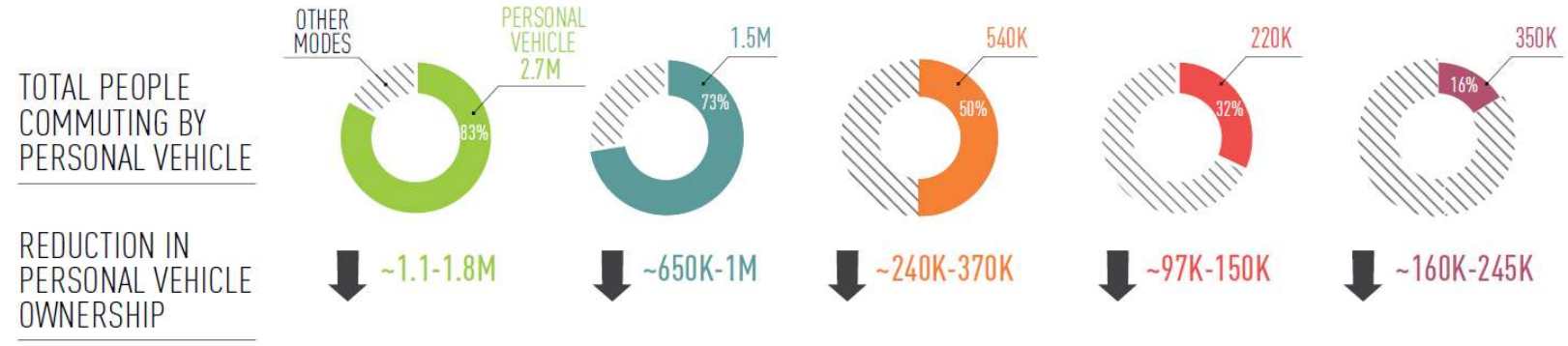


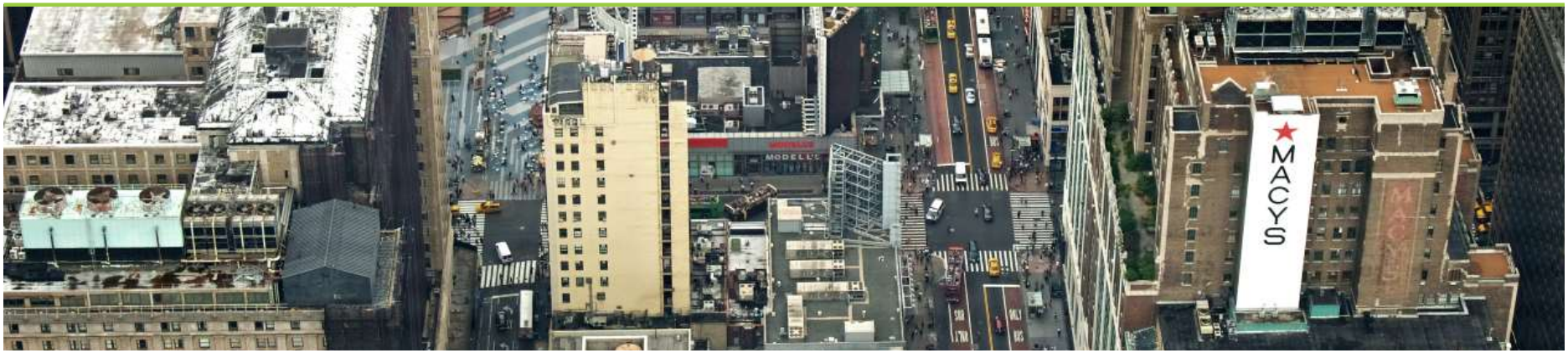
Sam Schwartz

Shift from Vehicle Ownership

New York-Newark-Jersey City, NY-NJ MSA

Could experience a shift of 46% to 60% (2.4 million to 3.6 million cars) from personal vehicles to shared AVs.





Sam Schwartz

What needs to be done

The Road Ahead

Six policy priorities for City leaders

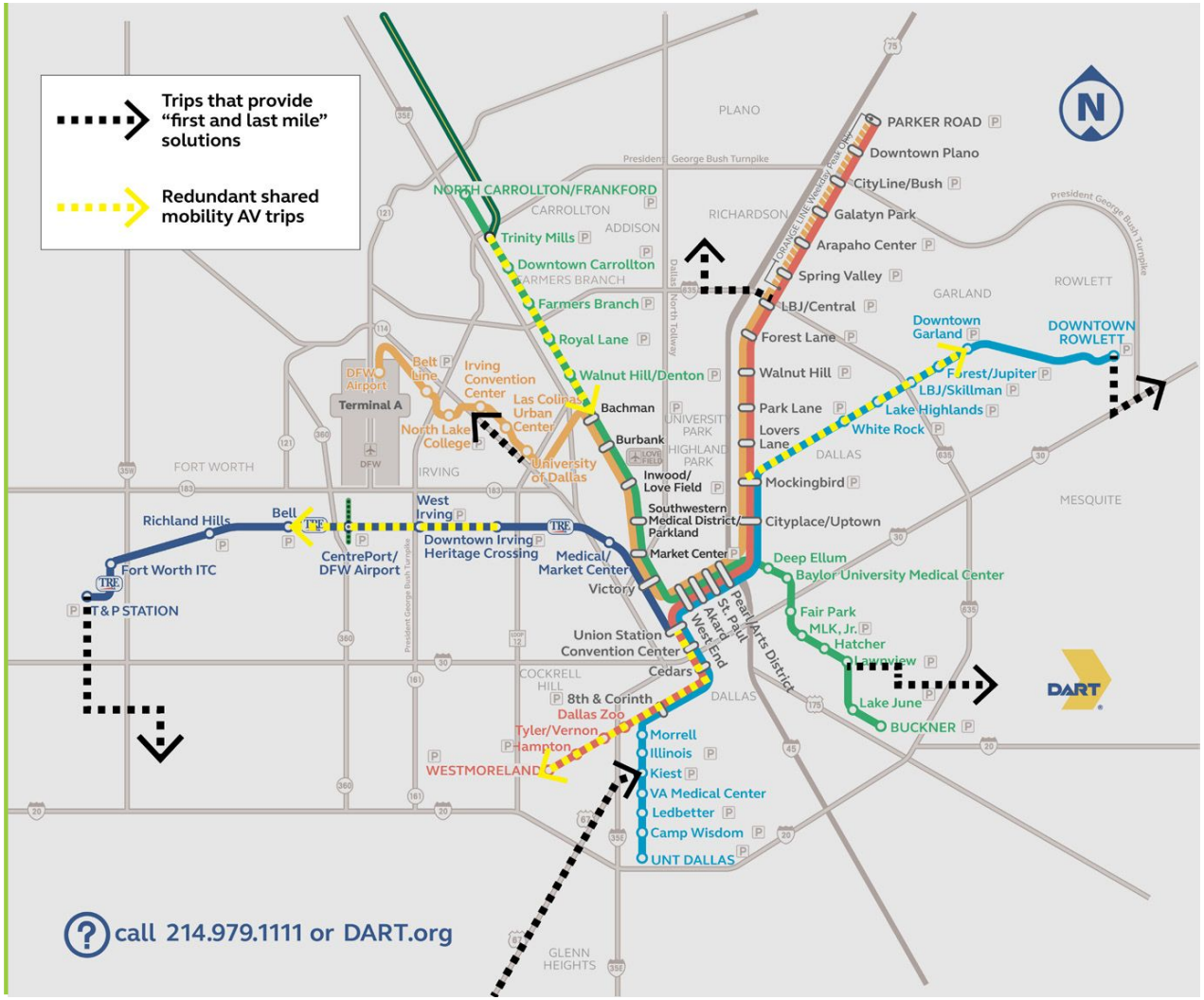
1 Leverage Technology to Enhance Mobility	2 Prioritize & Modernize Public Transit
3 Implement Dynamic Pricing	4 Plan for Mixed-Use, Car-Light Neighborhoods
5 Encourage Adaptable Parking	6 Promote Equitable Access to Jobs & Services

Embrace and manage shared, connected, and autonomous vehicles

Harmonization with the Transit Network

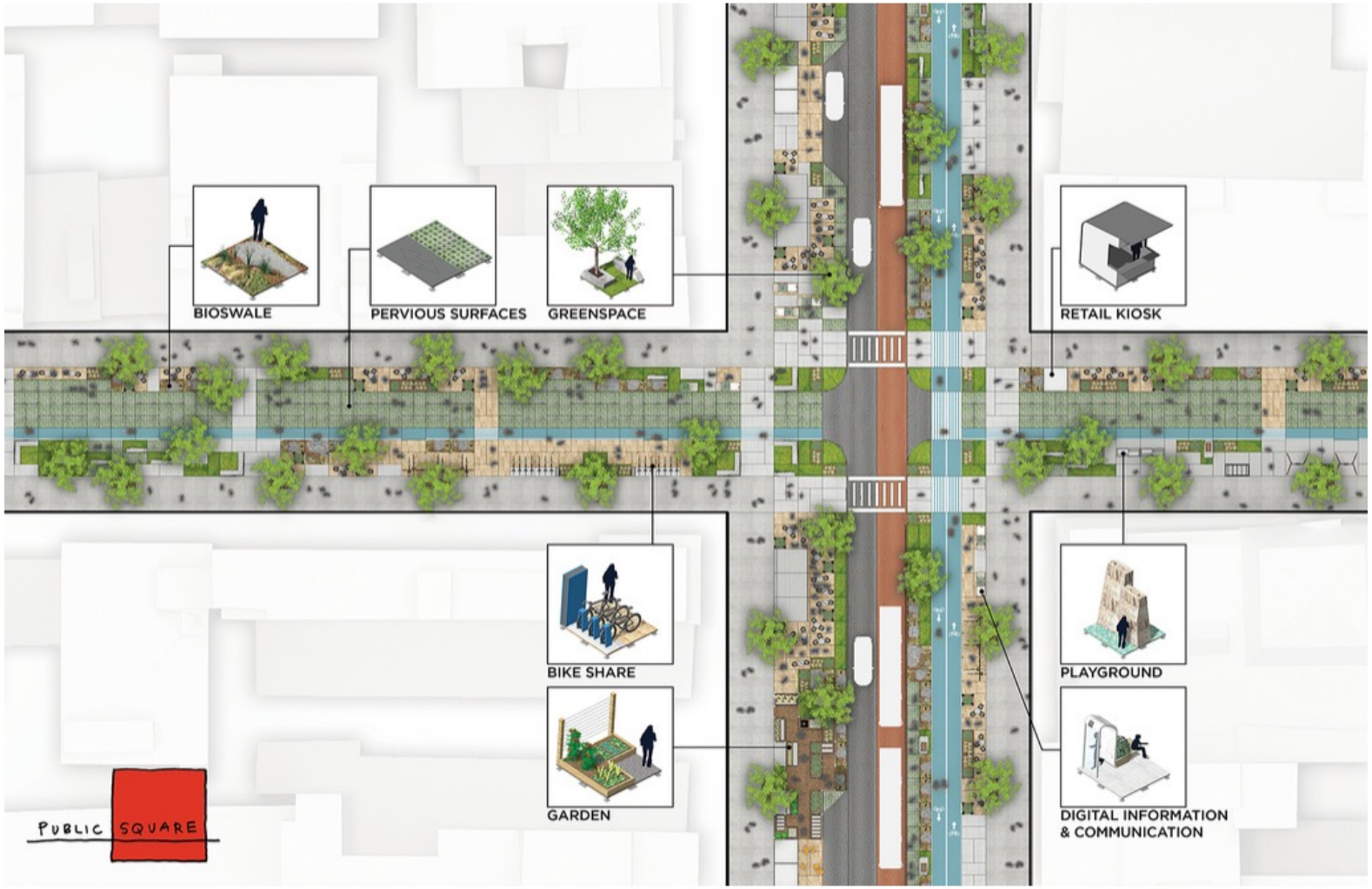
Transit and Shared Mobility

Shared mobility services may complement or compete with public transit depending on public policy or lack thereof.



Sam Schwartz

Harmonization with the built environment



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Continuing to design the ROW for all users

CDOT/CTA Loop Link

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Explore partnerships. Be critical. Look for the triple bottom line.

Pittsburgh Welcomed Uber's Driverless Car Experiment. Not Anymore.

By CECILIA KANG MAY 21, 2017

205

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Sam Schwartz

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New Mobility Practice Leader
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Portland's Smart Autonomous Vehicles Initiative: Making AVs Work for Us

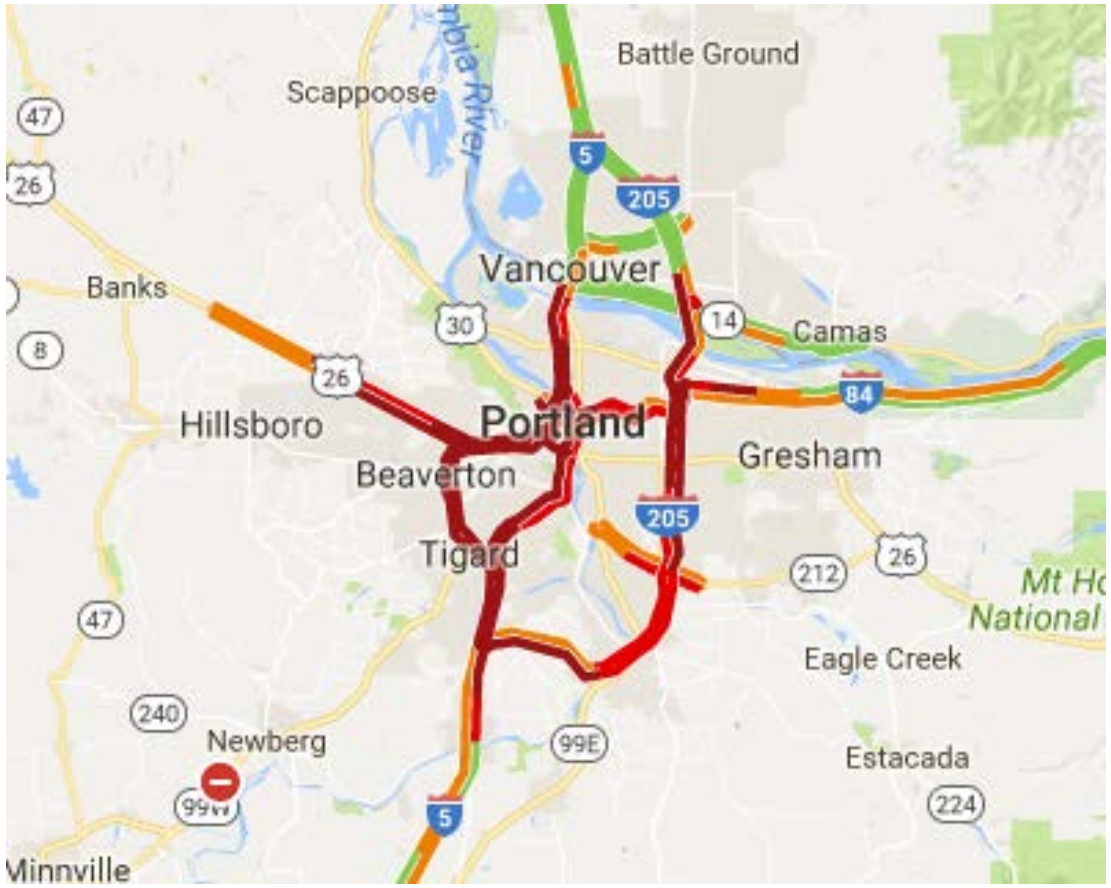
PBIC Webinar

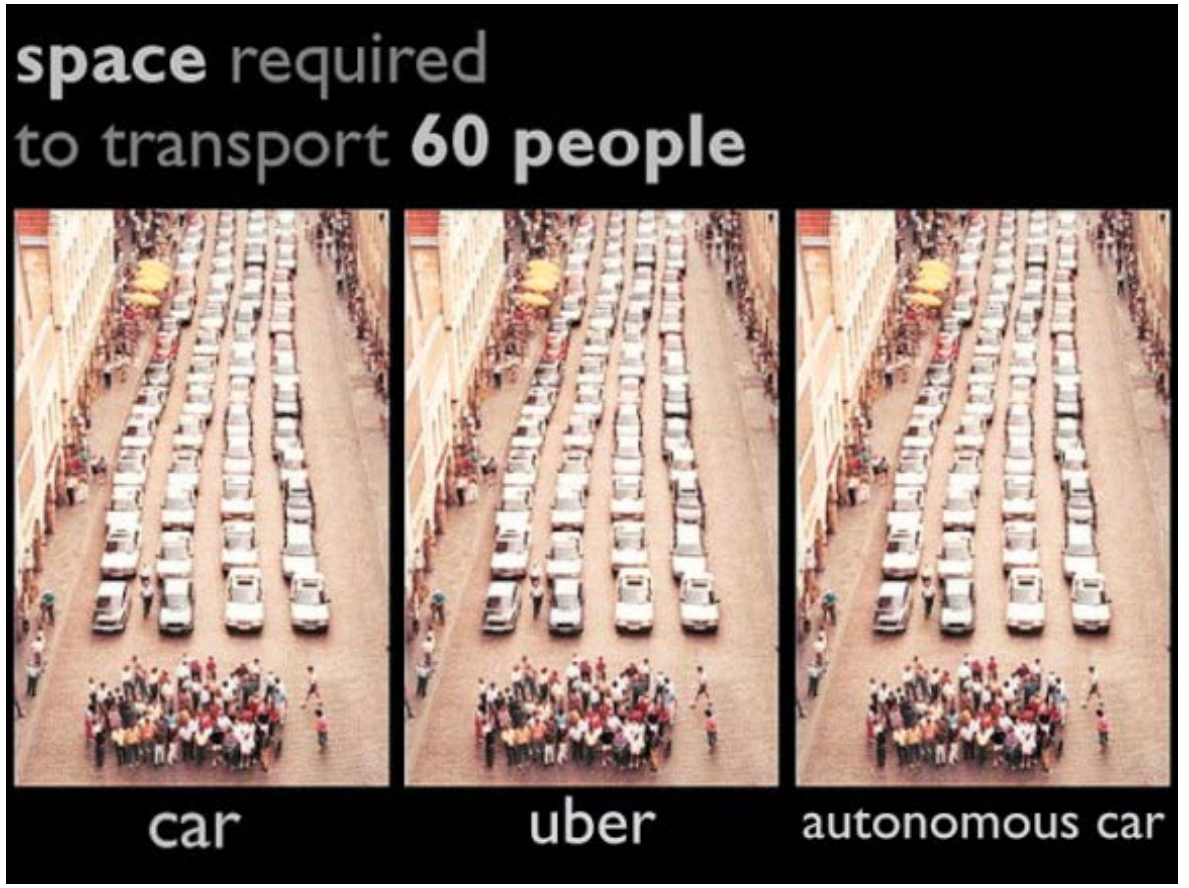
August 31, 2017

PBOT
PORTLAND BUREAU OF TRANSPORTATION

Is This What 10,000 Steps Looks Like?

Automated Vehicles & Congestion





We use our cars 5% of the time and at 25% utilization

Getting Ahead:
Portland's Smart Autonomous Vehicle Initiative

Mayor & Transportation Commissioner

Invites AV Testing in Portland

Four elements

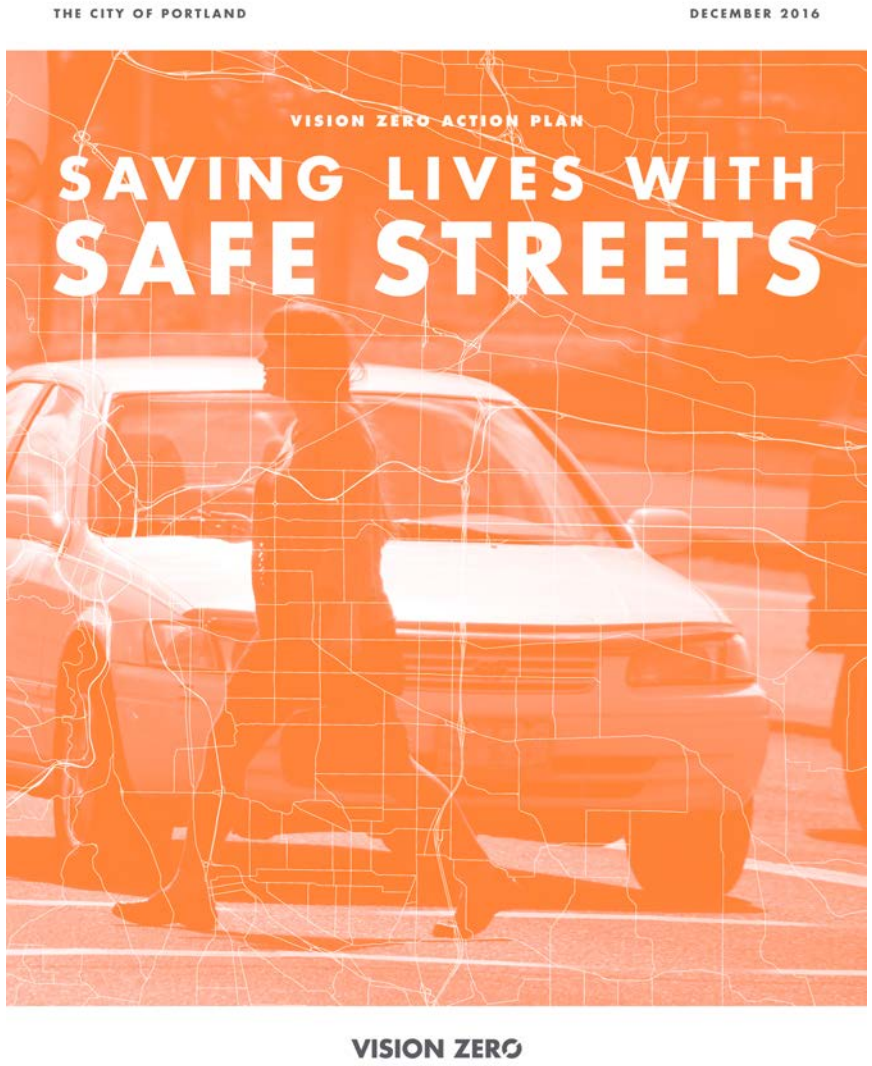
1. Policy foundation
2. Request For Information (RFI)
3. Administrative Rule: framework for permitting, data collection
4. Public Engagement

"We want to do AV right."

Portland's Draft AV Policy

Use AV's to advance goals

Vision Zero
Climate
Equity
Health
Economic Opportunity
Great Places
Cost Effectiveness



Portland's Draft AV Policy

People Movement Priorities

Walking

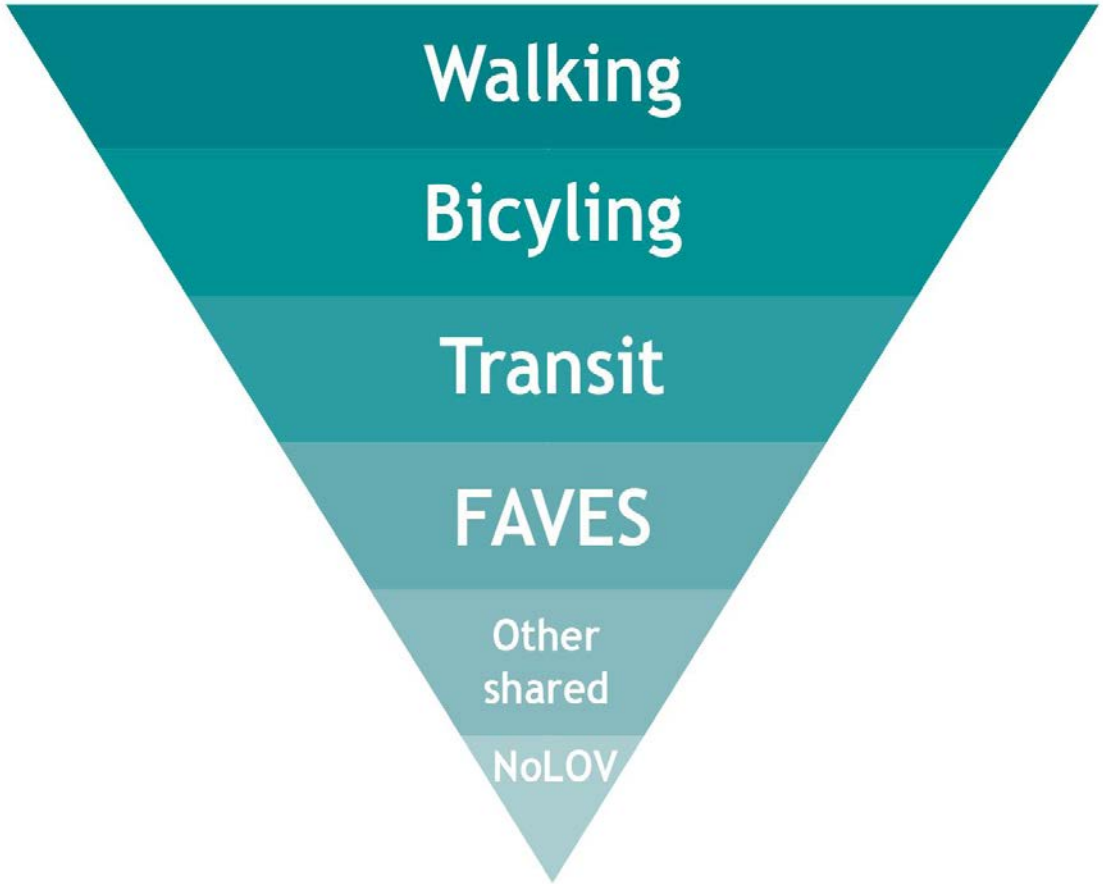
Bicycling

Transit

Fleets of electric, fully automated, multiple passenger vehicles

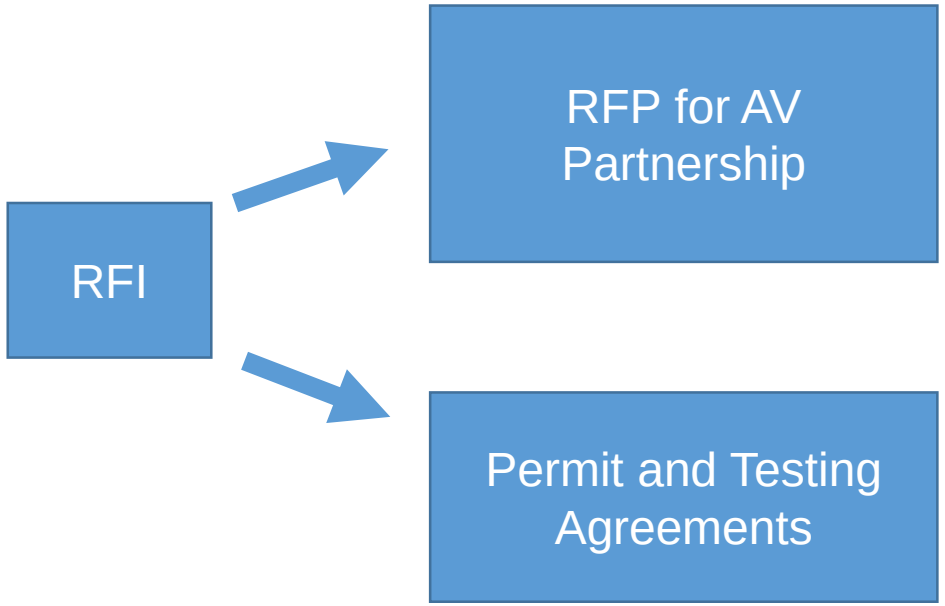
Other shared vehicles

No or low occupancy, fossil-fueled, non-transit



Portland's AV Request for Information

- Invites organizations to identify potential AV tests/Pilots that advance Portland's goals
- Builds off AV proving grounds application
- Asks them what they need from us (e.g. pick-up & drop-off zones, testing facility(PIR), permit to operate, Transit last mile funding partnership)
- Identifies what outcomes we want and what data we need to evaluate success
- Informs public engagement approach
- First step toward partnerships, to be followed by permit assistance and/or specific RFP for operating partnerships



RFI Received 18 responses from 5 states

Clear Federal, State, and Local Roles

Federal Role

- Vehicle safety testing and certification
- Funding for state and local V2I and pilot projects

State Role

- Vehicle Registration
- AV operations on state roads
- Funding for V2I and pilot projects

Local Role

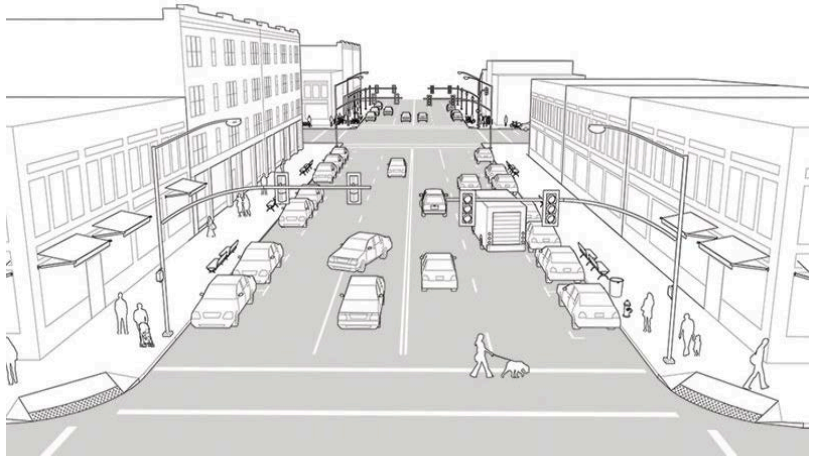
- AV operations on local roads (City Engineer authority)
- Pilot projects
- Managing Mobility Services

Unique Role for Local Agencies

Managing Automated Vehicle Operations

- Street design
- Speeds
- Pick-up and drop-off Zones
- Freight loading and unloading
- Smart V2I infrastructure
- Efficiency incentives
- AV parking
- EV charging
- Technology on poles or in pavement
- New maintenance requirements

What should your agency be considering?



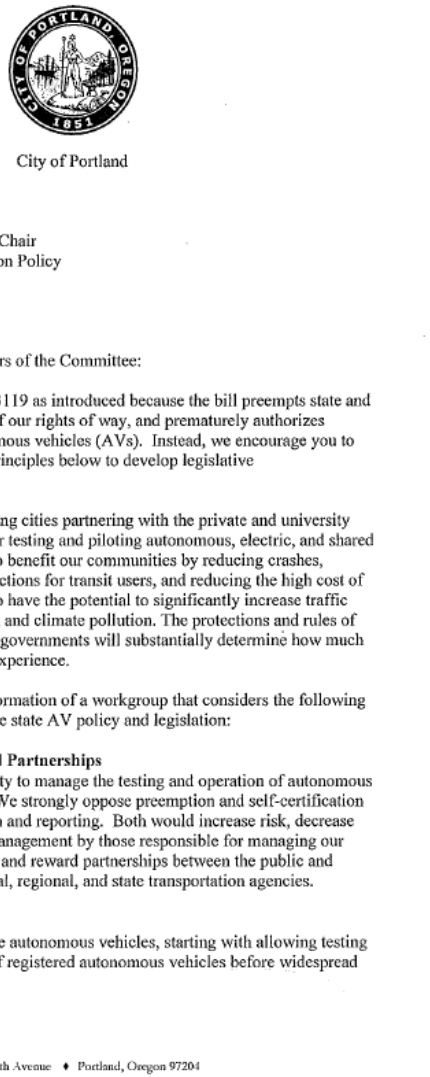
What You Can Do: Letter to Legislators

Portland supports AV testing

Five Principles:

1. Maintain local authority (no pre-emption)
2. Phasing: start w/testing
3. Advance Goals/Outcomes
4. Register and Inform
5. Financial Responsibility: User Pays

Request Interagency Legislative Workgroup



City of Portland

March 29, 2017

Representative Caddy McKeown, Chair
House Committee on Transportation Policy
900 Court Street NE, HR D
Salem, Oregon 97301

Dear Chair McKeown and Members of the Committee:

The City of Portland opposes HB 3119 as introduced because the bill preempts state and local authority to ensure safe use of our rights of way, and prematurely authorizes widespread deployment of autonomous vehicles (AVs). Instead, we encourage you to form a workgroup using the five principles below to develop legislative recommendations.

Portland is one of the world's leading cities partnering with the private and university sectors to develop best practices for testing and piloting autonomous, electric, and shared vehicles. AVs have the potential to benefit our communities by reducing crashes, improving first and last mile connections for transit users, and reducing the high cost of owning a private vehicle. AVs also have the potential to significantly increase traffic congestion, vehicle miles travelled, and climate pollution. The protections and rules of the road adopted by state and local governments will substantially determine how much benefit and how much burden we experience.

The City of Portland requests the formation of a workgroup that considers the following five principles to evaluate and shape state AV policy and legislation:

1. **Maintain Authority; Build Partnerships**
Maintain state and local authority to manage the testing and operation of autonomous vehicles in our rights-of-way. We strongly oppose preemption and self-certification as a replacement for registration and reporting. Both would increase risk, decrease transparency, and undermine management by those responsible for managing our rights-of-way. Instead, support and reward partnerships between the public and private sectors and between local, regional, and state transportation agencies.

2. **Phasing**
Phase in authorization to operate autonomous vehicles, starting with allowing testing and piloting a limited number of registered autonomous vehicles before widespread deployment.

1221 SW Fourth Avenue ♦ Portland, Oregon 97204

Questions?

Discussion

- Send us your questions 
- Follow up with us:
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  - Susan Handy slhandy@ucdavis.edu
  - Joe Iacobucci jiacobucci@samschwartz.com
  - Art Pearce art.pearce@portlandoregon.gov
  - General Inquiries pbic@pedbikeinfo.org
- Archive at www.pedbikeinfo.org/webinars