Planning for Automated Vehicles

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Source: Mercedes-Benz, 2016.

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Source: Google, 2014.

The Promise of AVs

- Improved road safety
- Economic benefits of less lost productivity
- More equitable access for all
- Increased travel options
- Reduced stress of driving
- Reduced fuel consumption and emissions
- In the future, greater throughput, reducing congestion

Complexities of AVs

Data

Communications Systems

Technology

Standards

Infrastructure

Ethics

Managing the Transition

Planning

Liability

Consumer Preference

Impact to Jobs

Privacy

Enforcement

Security

Regulation

Human Factors

Safety

Business Models

Economics

Complexities of AVs

Planning

Two Paths

Private Ownership Model

- Driven by Auto Industry
- Incremental Moves in Functionalities
- Mostly Privately Owned
- Here Today

Shared Mobility Model (MaaS/TaaS/Robo-taxis)

- Driven by Tech and TNCs
- Jump to Fully Automated
- Transportation-as-a-Service
- A few (or many, many) years away

Planning for AVs

- **It's no longer "if", but "when" and "how"**
- **It will likely be very, very disruptive**
- **Over time, will likely transform mobility as we know it**
- **Will impact how we design, build and operate not only roads, but likely all aspects of our transportation system**

Key Unknowns

Speed of Technological Advancement

Economics

Public Acceptance

Political Support

Market for a Shared Model

Speed of Technological Advancement

'What we've got will blow people's minds, it blows my mind… it'll come sooner than people think'

– Elon Musk on Tesla Fully Autonomous Car, *Electrek*, August 4, 2016

Uber starts self-driving car pickups in Pittsburgh

– *Tech Crunch,* September 14, 2016

Google starts deploying its self-driving Chrysler Pacifica minivans: first prototypes spotted

– *Electrek*, October 9, 2016

Speed of Technological Advancement

Manufacturer	2016	2017	2018	2019	2020-25	2025-30	2030-35	2035-40	2040+
Audi	2		3		3+	4/5			
BMW	2				4/5				
Ford				2	4/5				
Honda	2				3				3-4
KIA					3		4/5		
Mercedes-Benz	2								
NISSAN	2		3		4/5				
TESLA	2		4/5						
VOLVO / UBER	2	4/5							

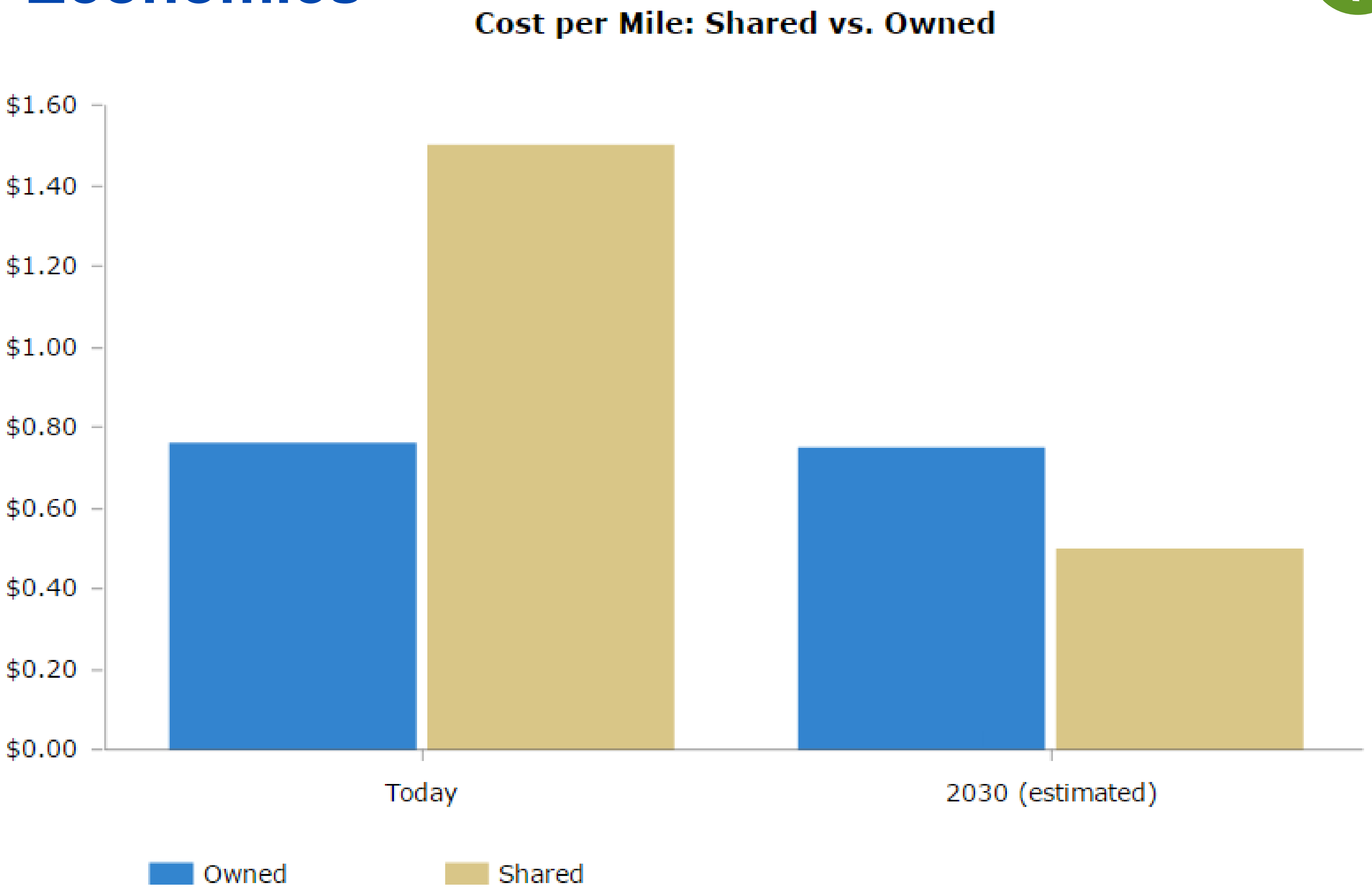
Source: Mashable


WOOD STREET
GALLERIES

Economics

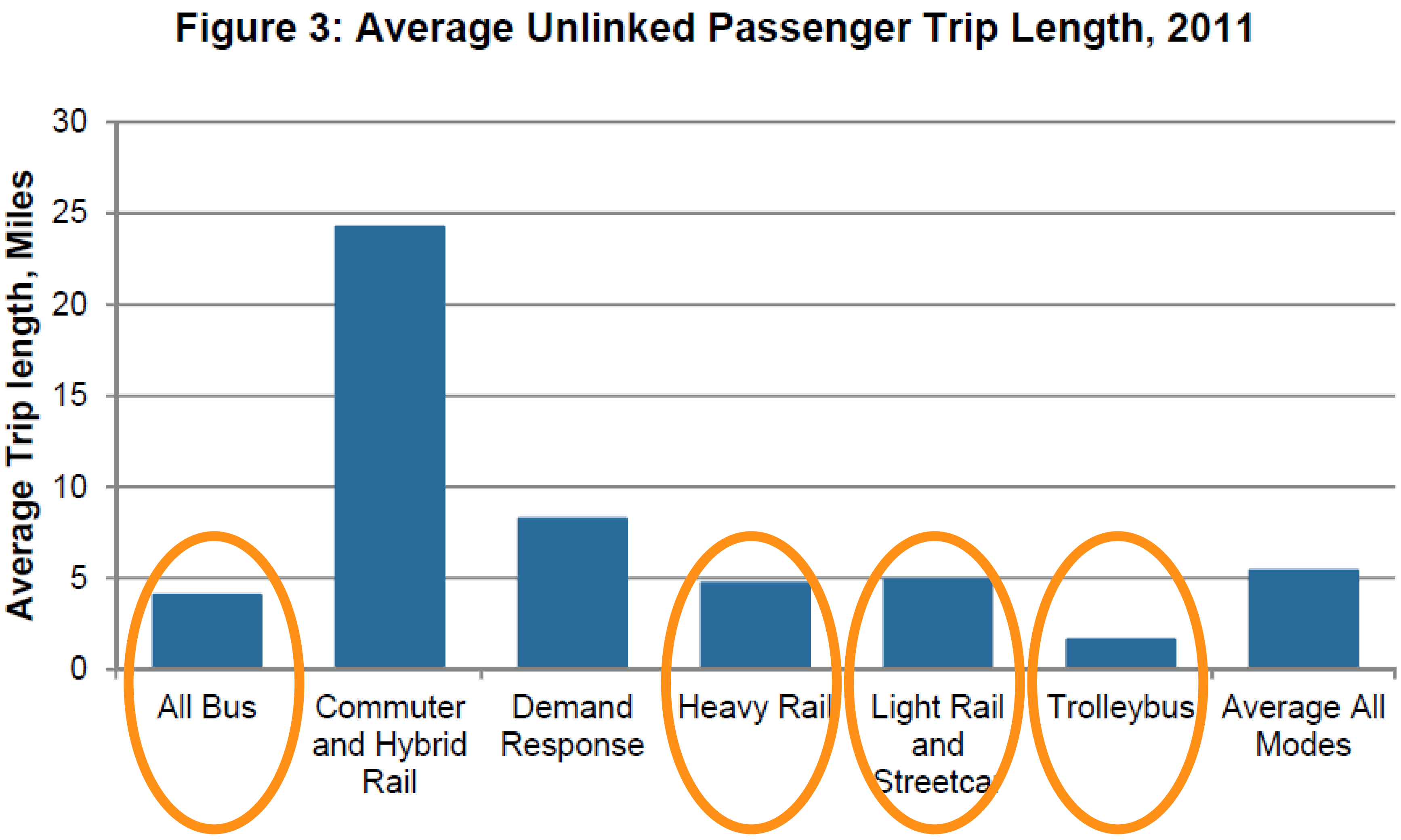
Source: ARK Investment Management

Economics



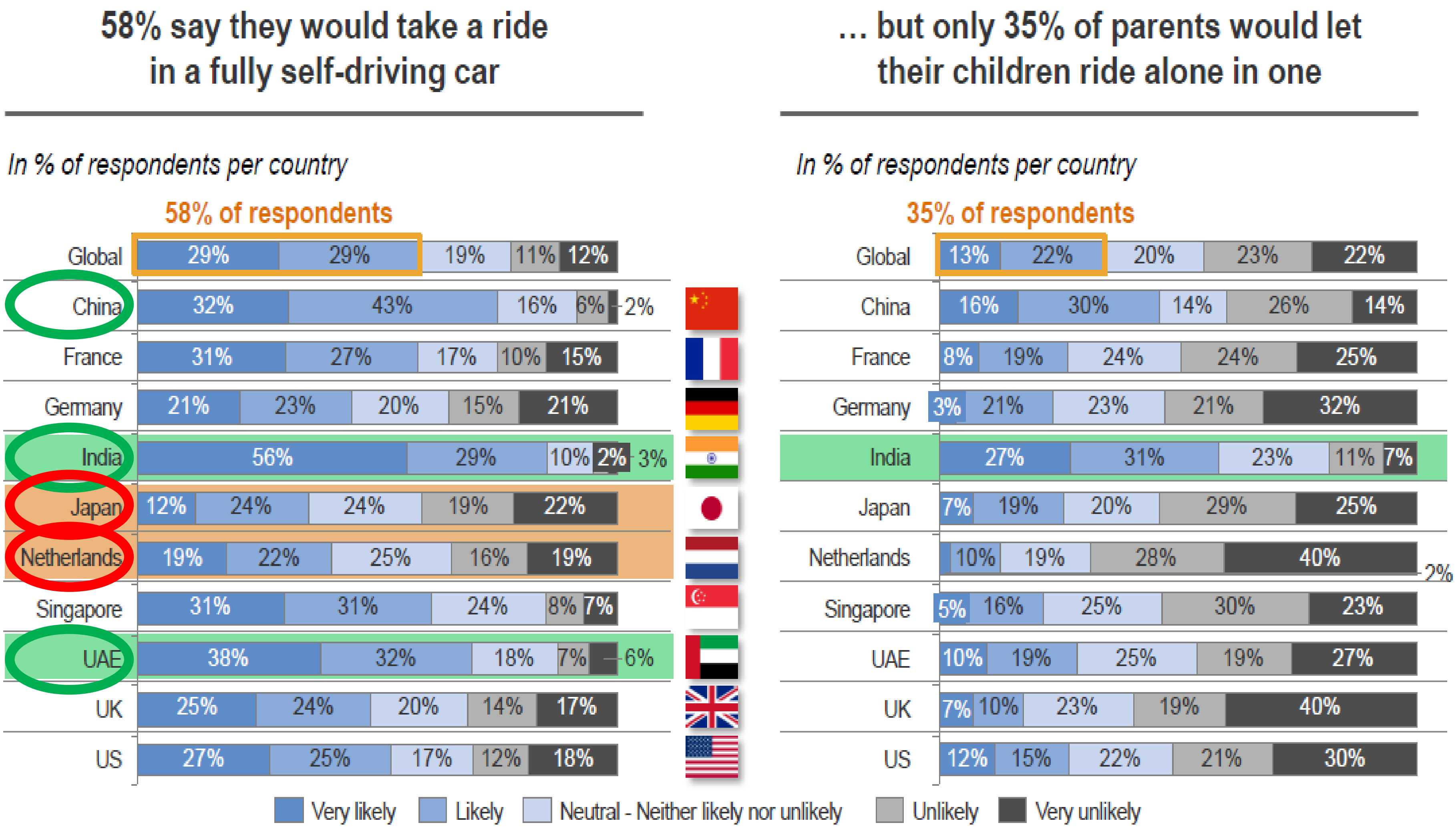
Source: Morgan Stanley (2016)

Economics



Source: APTA 2011 Fact Book

Public Acceptance – Trust of AVs



Source: World Economic Forum/Boston Consulting Group, 2015.

Political Support

Helsinki "announced plans to transform its existing public transport network into a comprehensive, point-to-point "mobility on demand" system by 2025"

– July 10, 2014 • *theguardian.com*

L.A. Mayor Eric Garcetti:

We Will Be the First City to Do Autonomous Vehicles Right

– September 29, 2014 • *citylab.com*

Uber stops San Francisco self-driving pilot as DMV revoked registrations

– December 21, 2016 Techcrunch.com

Political Support

Factors Influencing a Shared Model

- **Economics need to come down to make this viable**
- **Will likely be market-driven**
- **Shared use will likely not work in lower density areas, and demand (i.e., revenue) may be too low to justify an operator supporting them in certain locations**
- **So…..there will likely still be a strong market for privately-owned AVs**
- **Public acceptance will likely not only vary regionally, but even within regions, due to public perceptions, demographics, etc.**
- **Support to create AV–only facilities or zones will permit smaller, lighter vehicles, which will make the economics more favorable**

Key Unknowns

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Market for a Shared Model

Without a clear understanding of the future,

how do we plan?

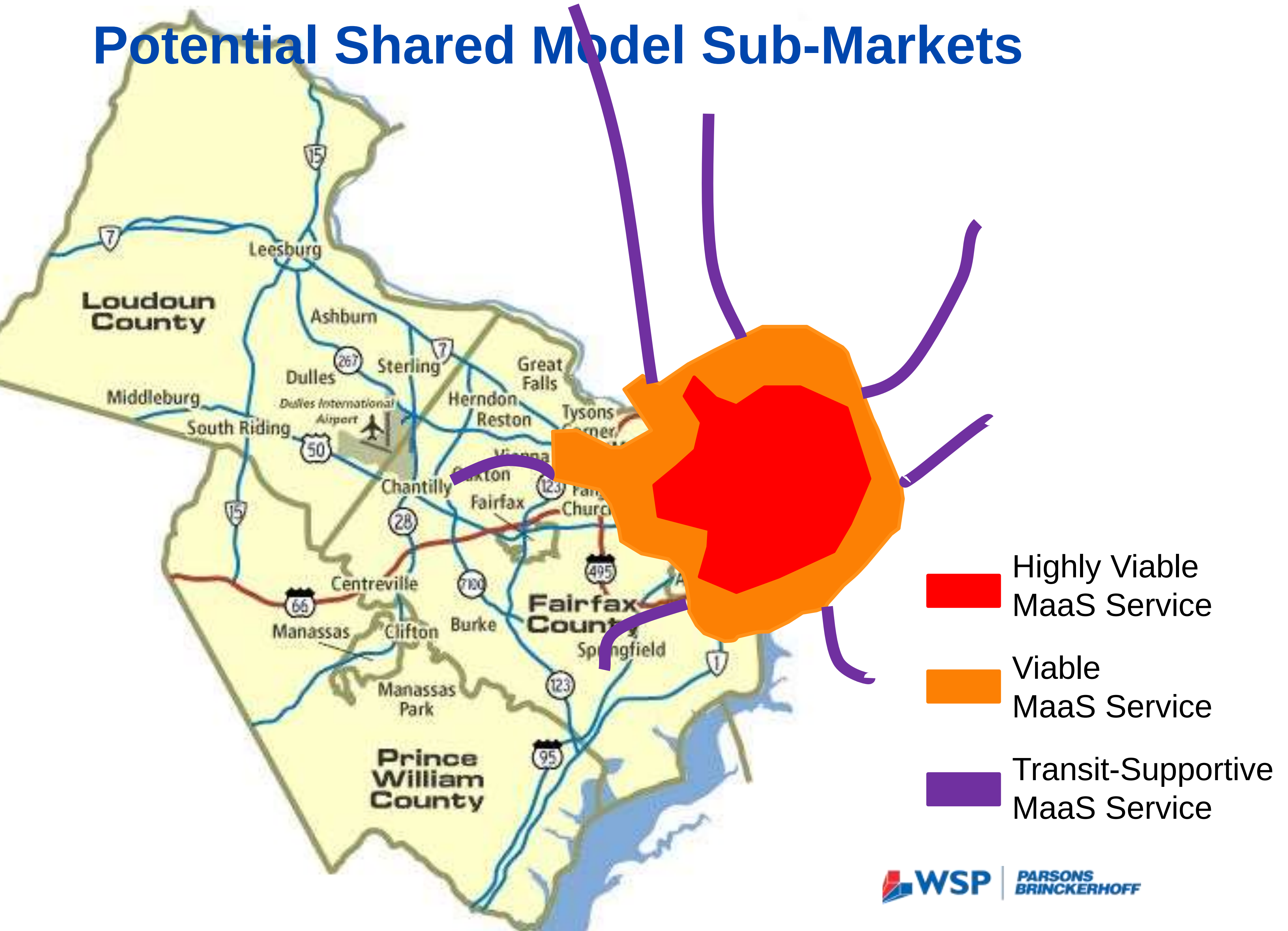
Key Short-term Challenges in Shaping Policy

- **This is currently being driven by the market**
- **Most regions, cities and transit agencies aren't at the table**
- **Complex issue with lots of moving parts and unknowns, so we don't have a clear understanding, making it difficult to advise our leadership and elected officials**
- **Currently lack the methods and tools to help us better inform the discussion**

Realities

- **Many planners believe that this will unfold in a thoughtful and controlled way**
- **This WILL be market-driven by consumer preference and pricing**
- **Conversation is currently being driven by businesses that have HUNDREDS of BILLIONS at stake**
- **There are companies in this space that are driven primarily by profit motivations**

Potential Shared Model Sub-Markets



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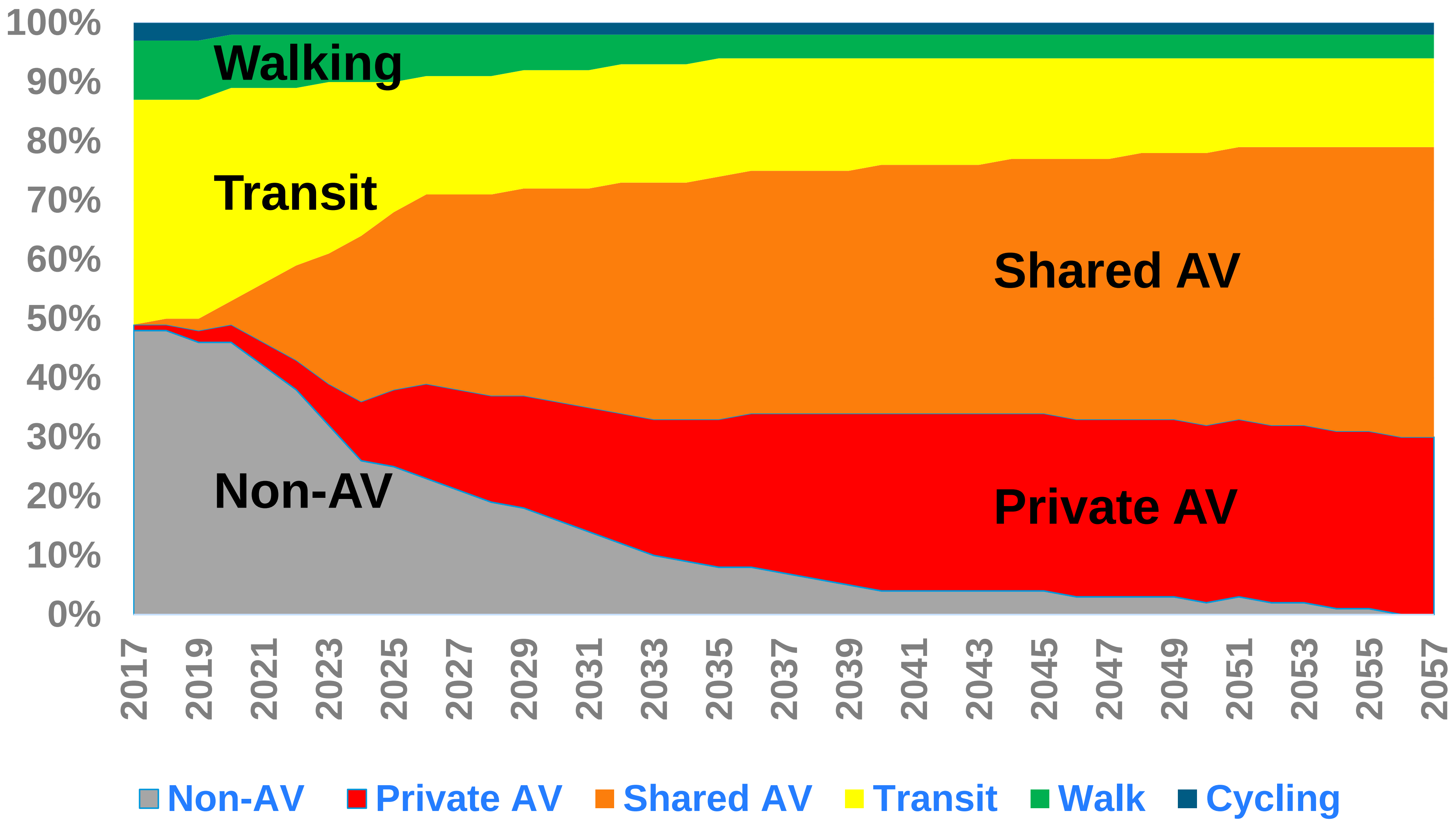
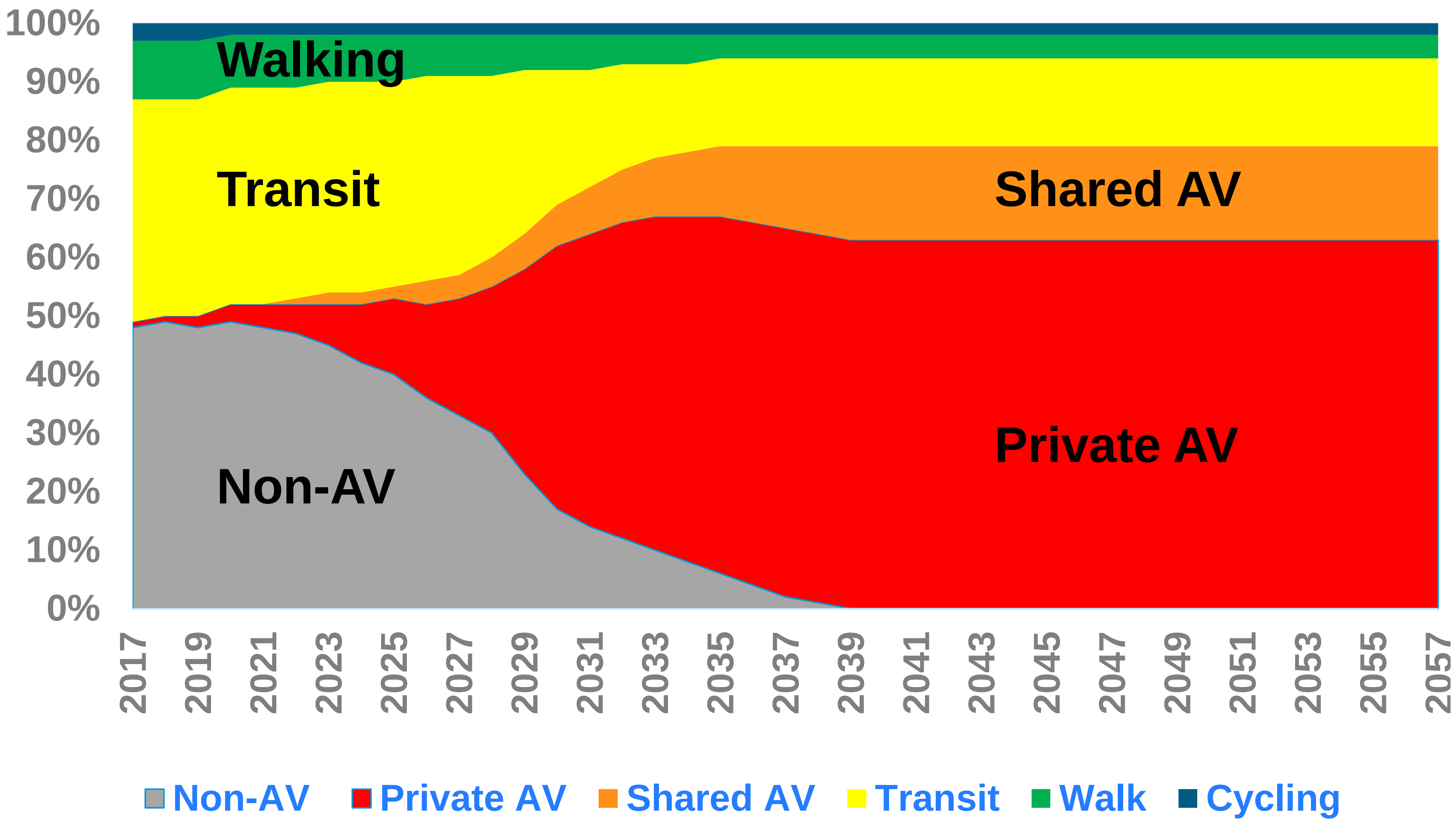
Scenarios – Shared Leads



Scenarios – Private Leads



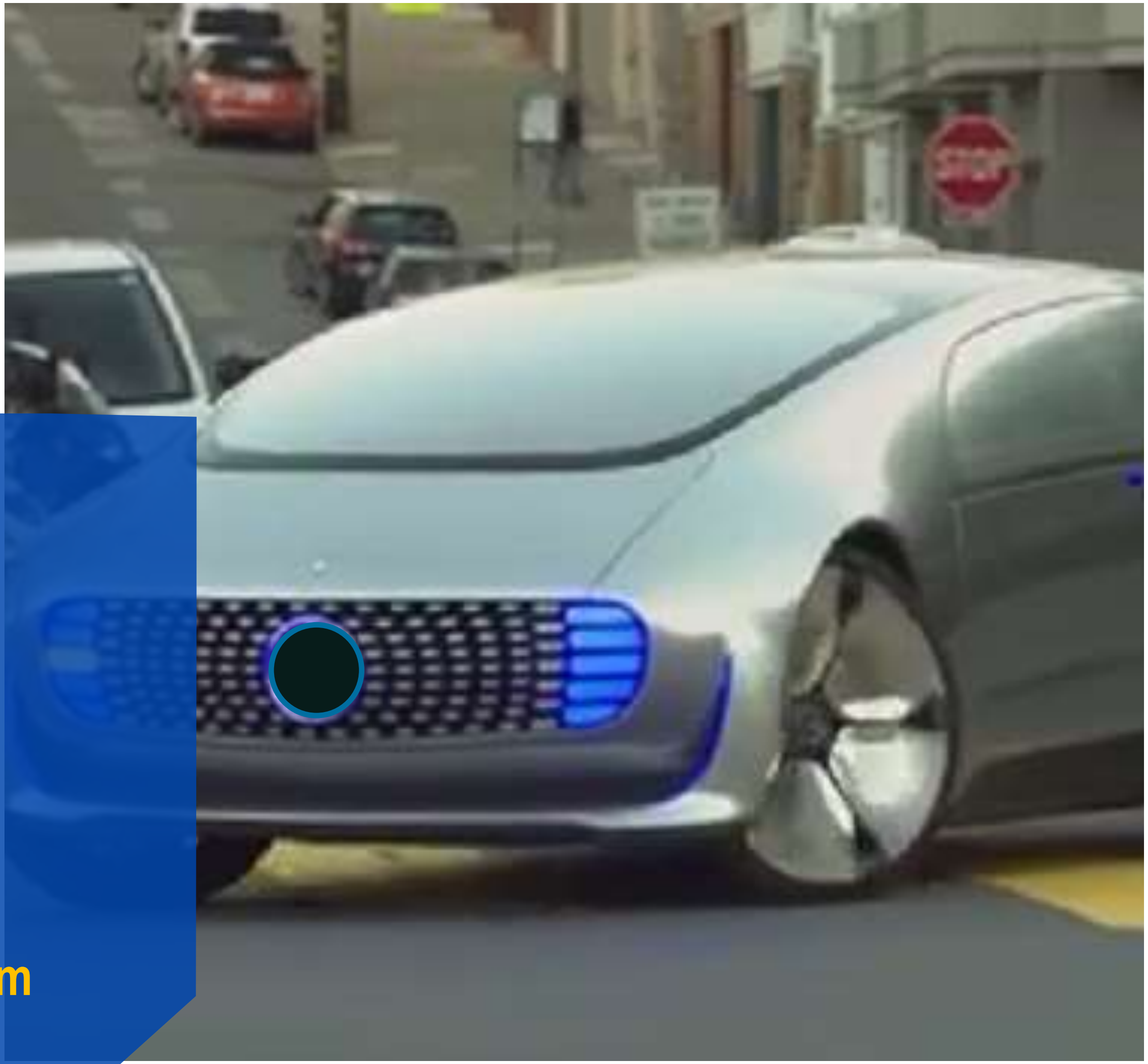
Steps for Cities, Regions and Transit Agencies

- **Create a multi-departmental AV working group**
- **Educate the work team, broader staff and senior leadership about potential futures**
- **Engage in scenario planning to identify the opportunities and challenges of potential futures**
- **Review scenarios with senior leadership to determine if there are futures that we definitely do (or don't) want**
- **Develop a work plan that will support that direction**

Takeaways

- **This is coming fast – guide it or respond to it**
- **While still many unknowns, we need to start factoring AVs into long-range planning**
- **Cities, regions and transit agencies have a chance to shape this, but need to move**

“The best way to predict the future is to create it.”



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