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INTERNATIONAL
We Make a Difference

Planning for Uncertainty

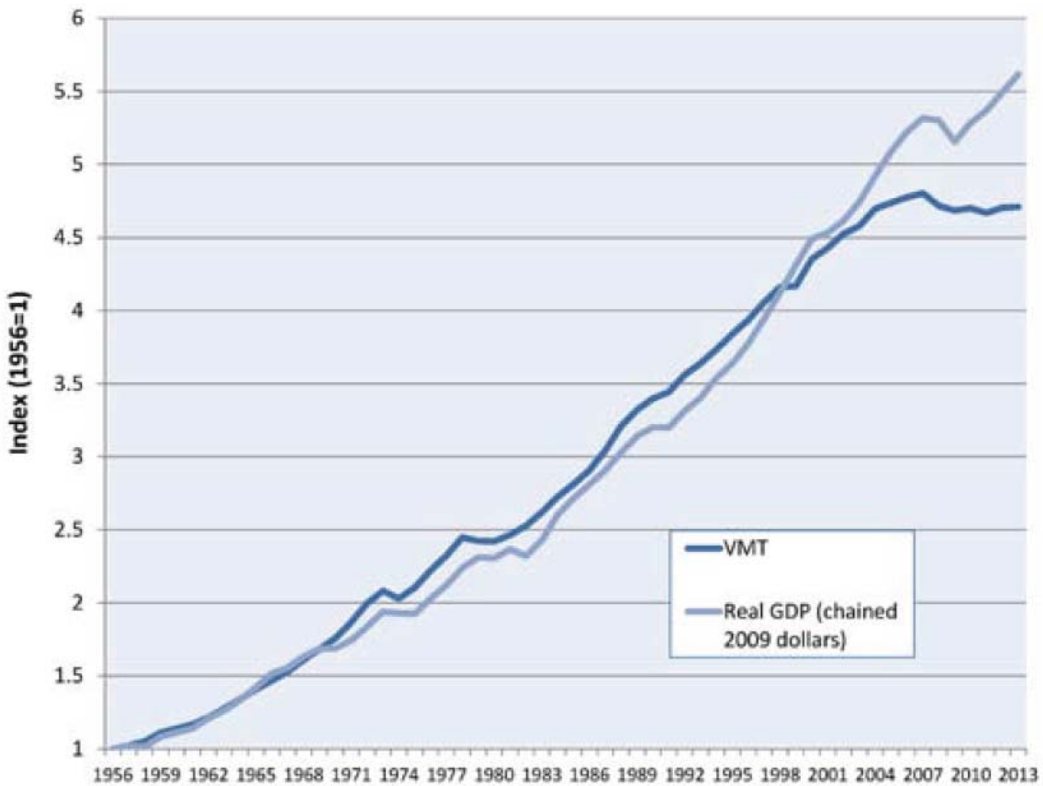
COMPASS March 19, 2018

Lorna Parkins AICP

30 Years of Planning

Explain the past → Predict the future

A funny thing happened around 2004…



→ 2013 Real US GDP

→ 2013 US Vehicle Miles Traveled

Source: *Millennials in Motion*, US PIRG Education Fund & Frontier Group, 2014, p. 19.

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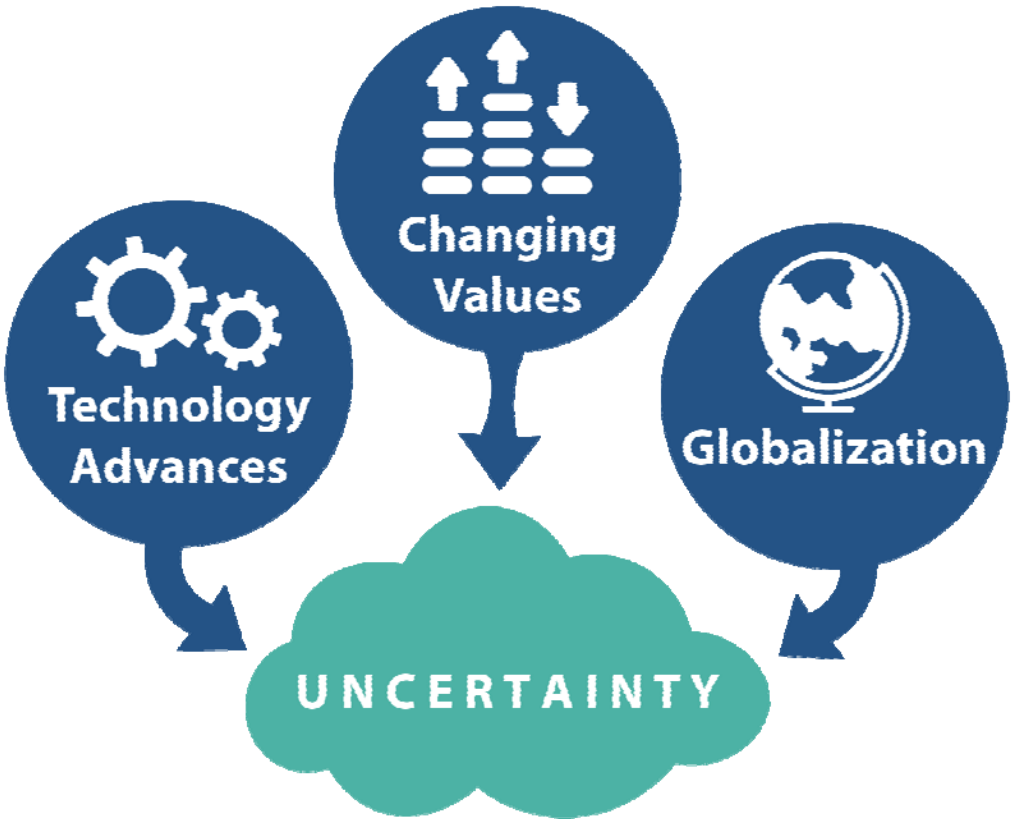
Where do we go from here?

Disruptors cause uncertainty



Exploratory Planning for uncertain times


What is the range of outcomes?


What are the risks?


What are the opportunities?

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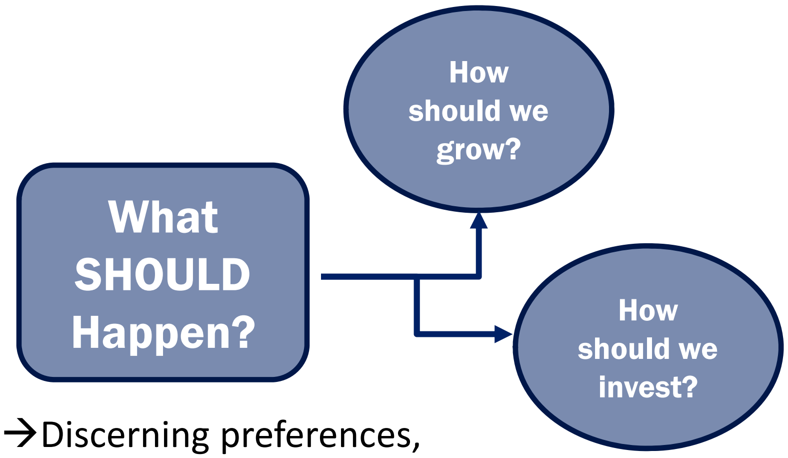
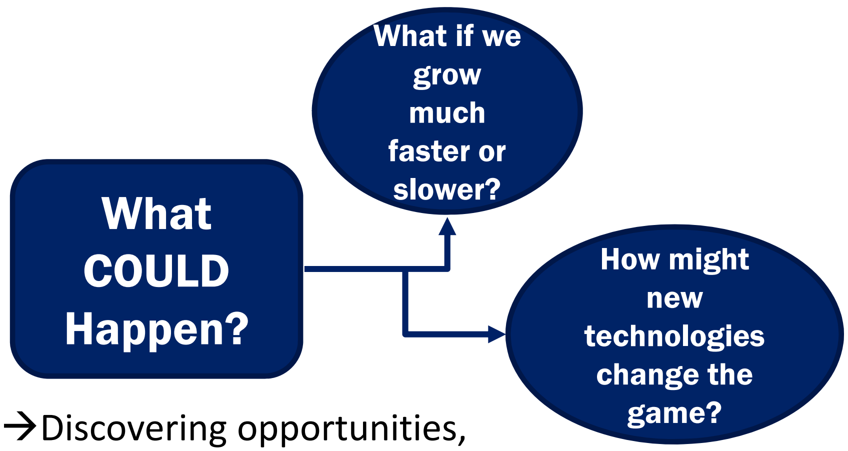
Normative vs Exploratory Planning

Normative scenarios envision what SHOULD happen?



→Discerning preferences, articulating values, shaping vision, strategizing preferred outcomes

EXPLORATORY scenarios ask what COULD happen?



→Discovering opportunities, identifying risks, shaping tactics, optimizing chances of success

What are the big disruptors?

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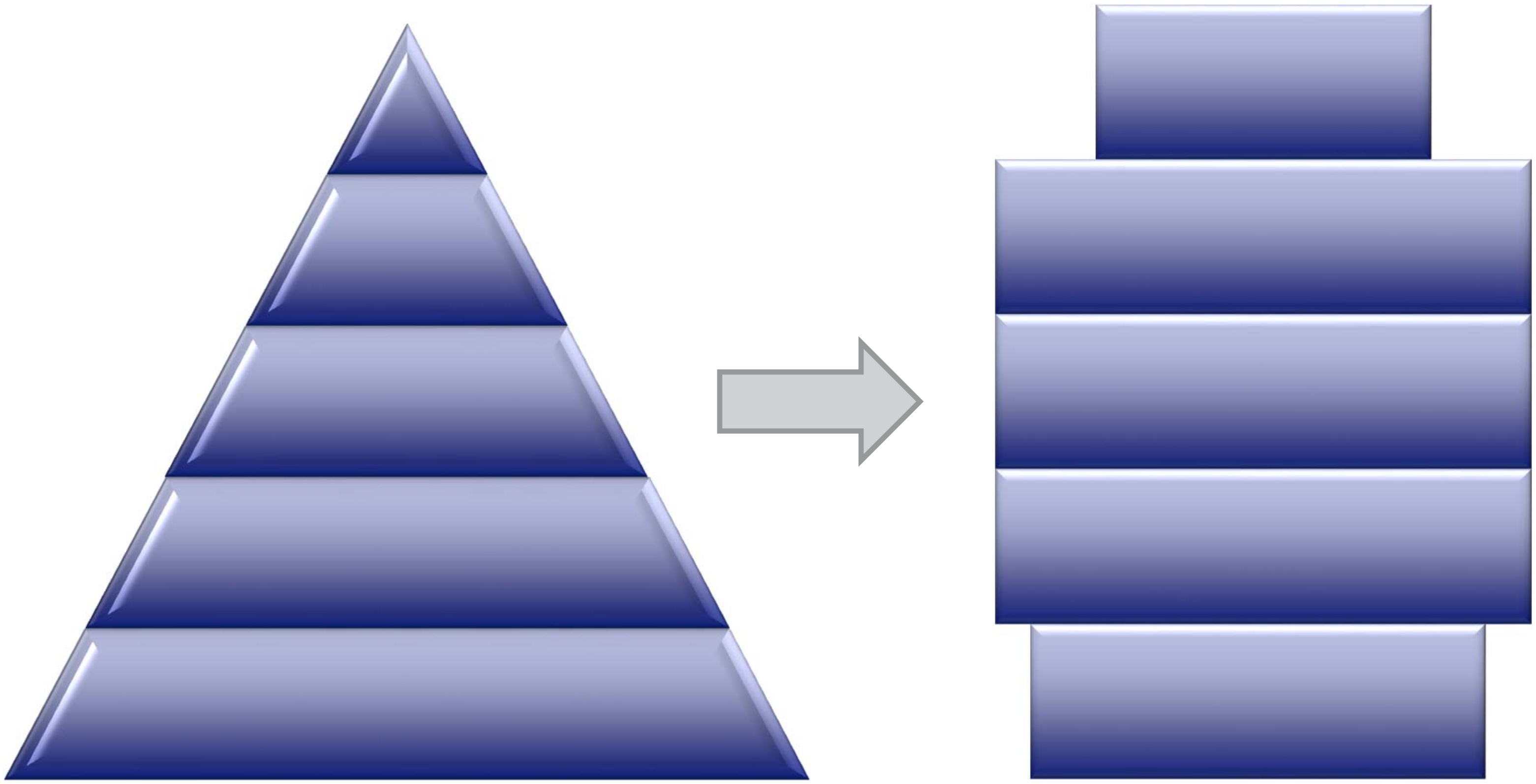
Generational changes

There is a new demographic profile



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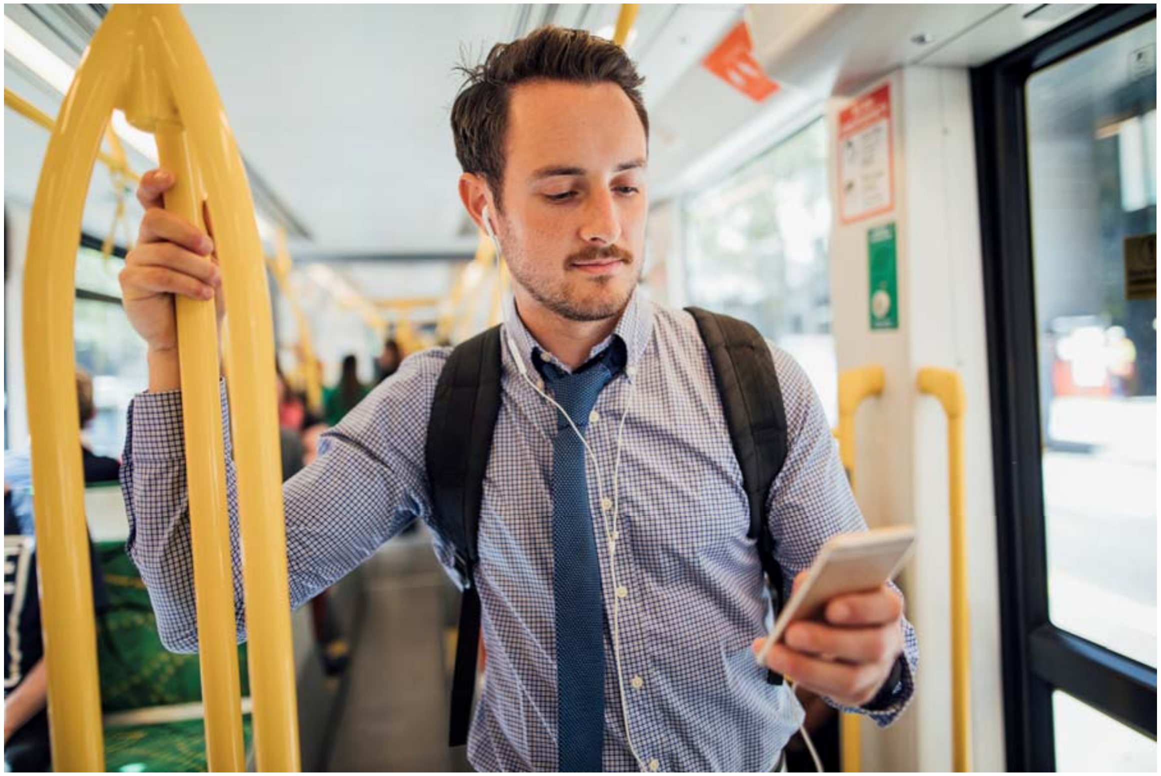
Different values govern life choices



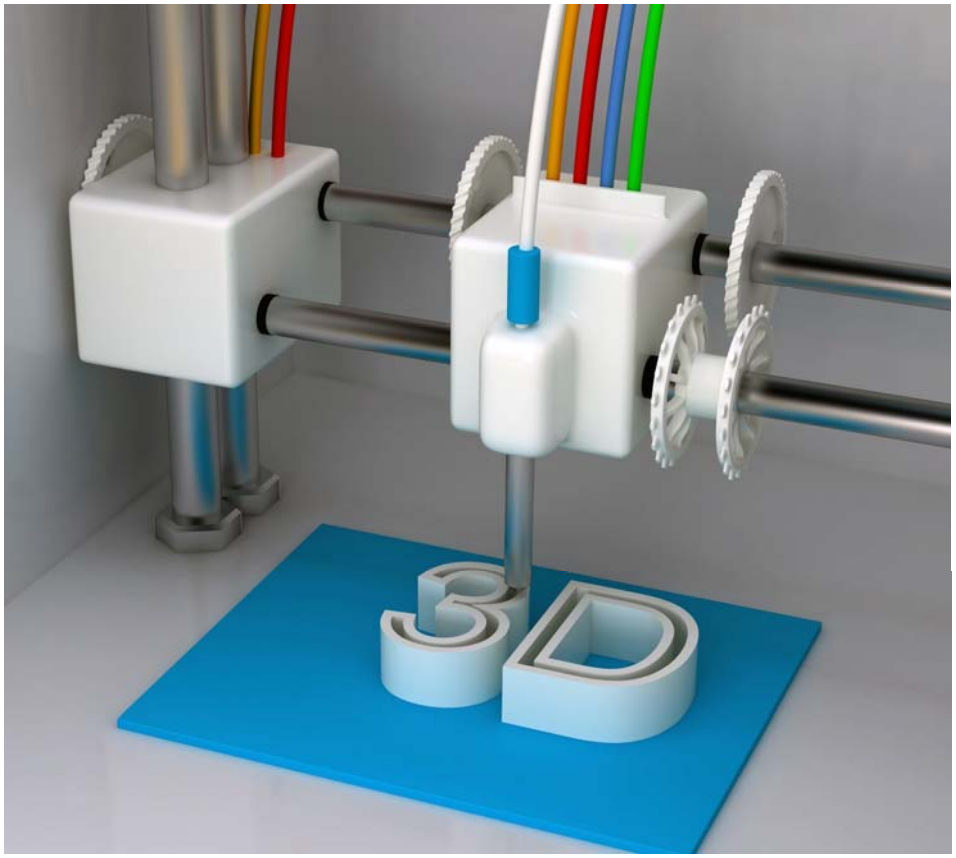
airbnb

UBER

lyft

Millennials and Boomers alike want:

Economic Disruptors



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Economic Disruptors

Supply Chain Dynamics

	1 Driver		2 Operating Effects		3 Transportation Effects
Technology	Information Technology in Transport & Warehousing	→	*Increased* Efficiency (e.g. higher capacity/lower costs)	→	*Decreased* VMT
Delivery Channels	Retail Home Deliveries & Localized Production	→	*Decreased* Efficiency (shorter, smaller, & time-sensitive deliveries)	→	*Increased* VMT

VMT: Vehicle Miles Traveled

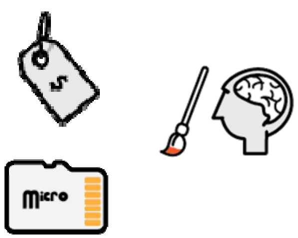
Tell me about economic…

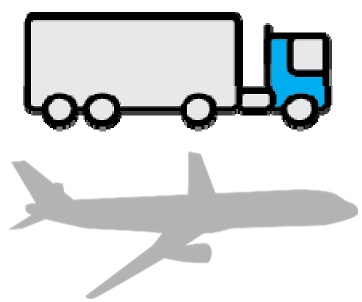
OPPORTUNITIES

- Technology
- Workforce
- Training
- Transportation

THREATS

- Technology
- Workforce
- Training
- Transportation





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Technology Disruptors

- Connected vehicles
- Autonomous vehicles
- Mobility as a service
- Information systems

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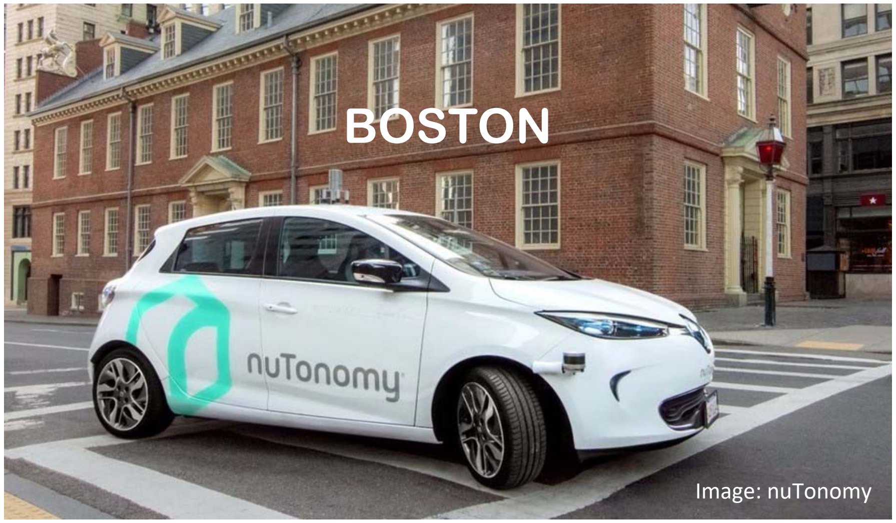
Connected and Automated Vehicles (CAV)

55 international cities are hosting CAV tests or have committed to doing so in the near future

29 international cities are undertaking long-range surveys of the regulatory, planning, and governance issues raised by CAVs, but have not yet started piloting



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Autonomous Shuttles/Transit

Dozens of international cities are conducting autonomous shuttle pilot/deployment programs

Mobility as a Service

UBER

lyft

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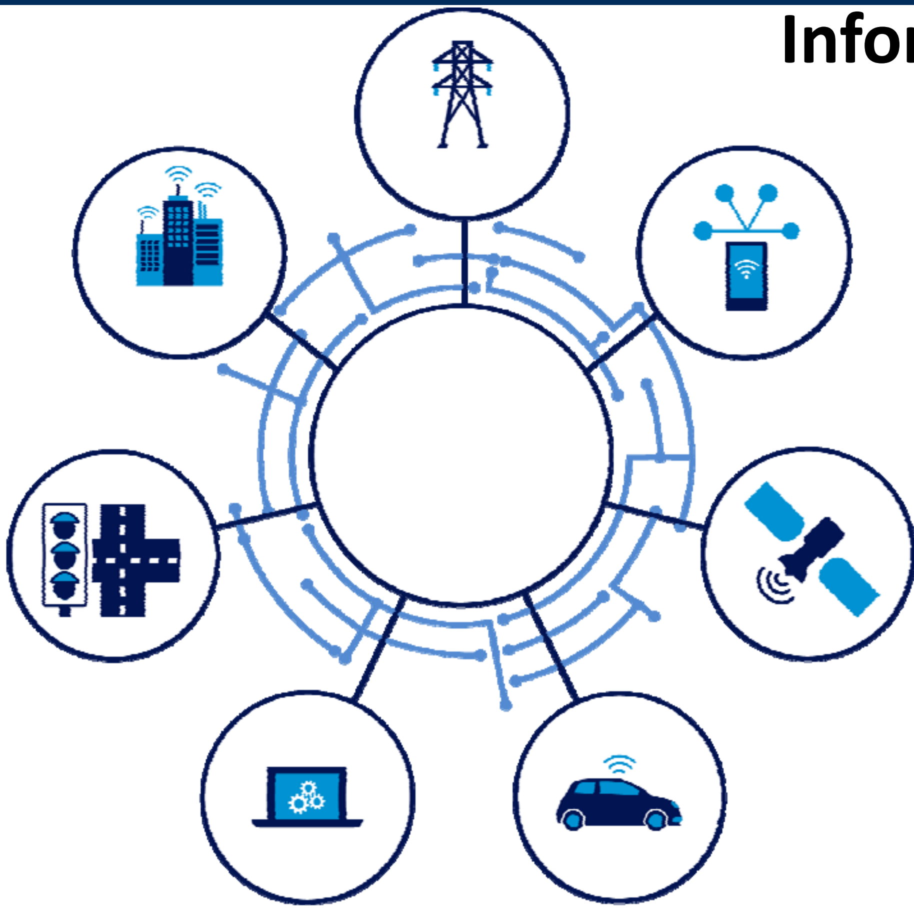
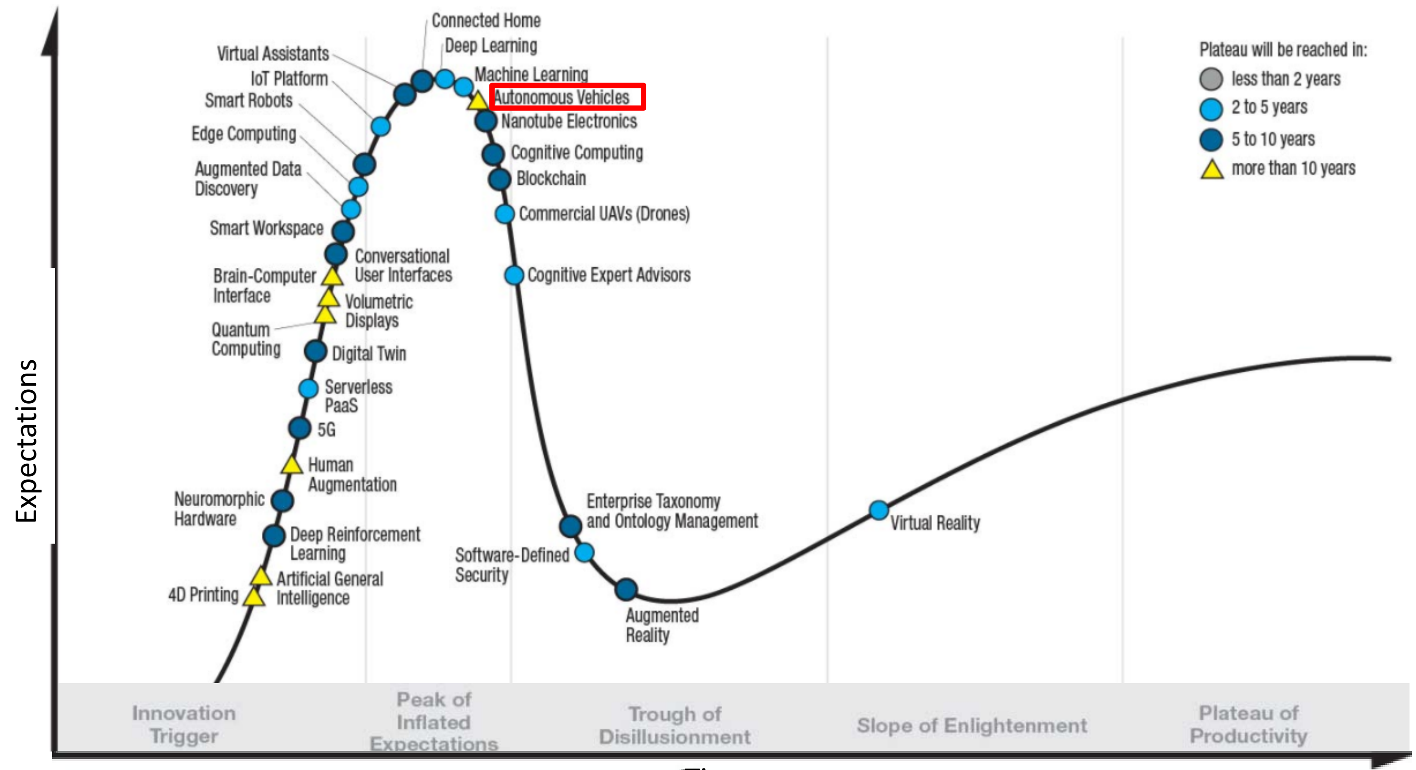
Information Systems

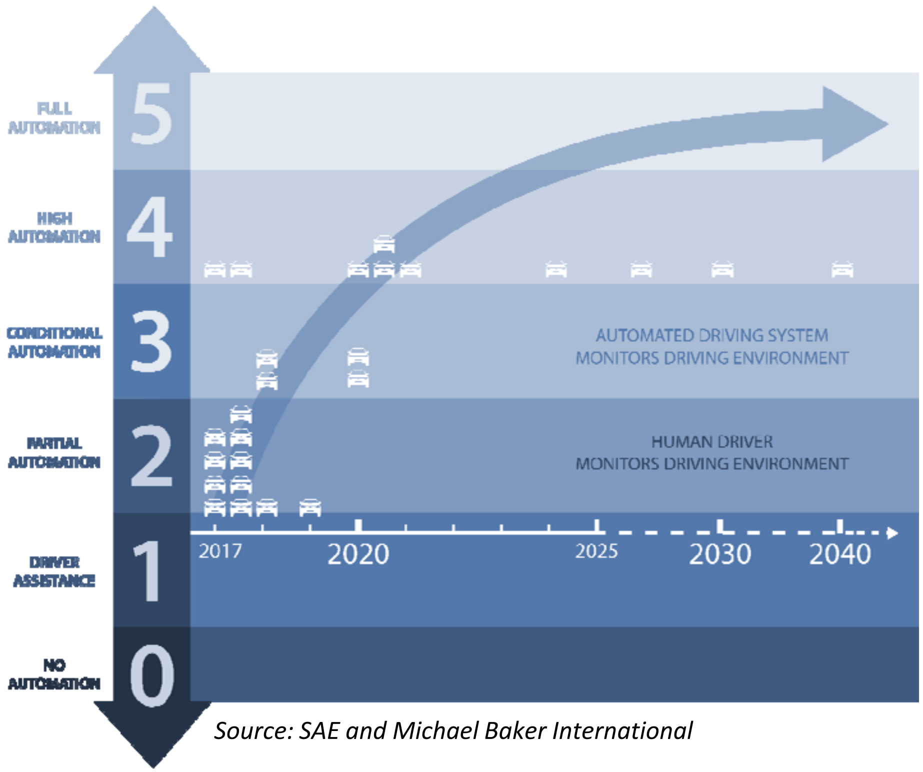


Hype Cycle for Emerging Technologies

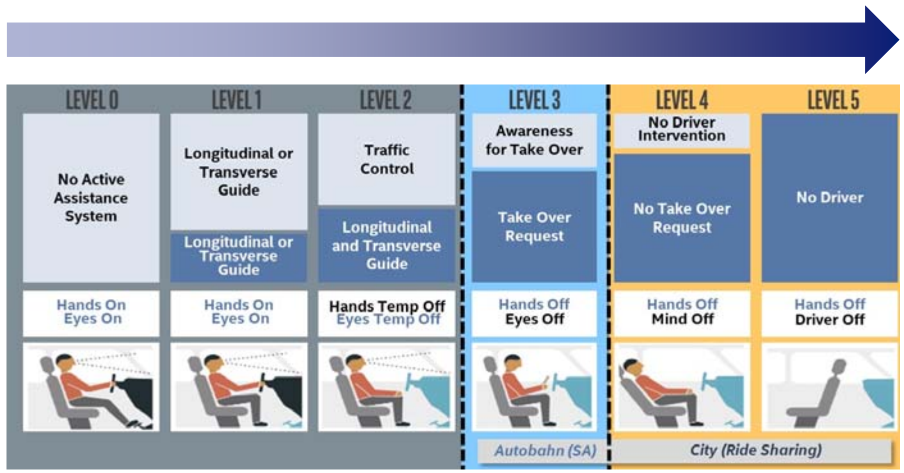


Source: Gartner 2017

Levels of Vehicle Automation



Source: SAE and Michael Baker International



Source: Siemens

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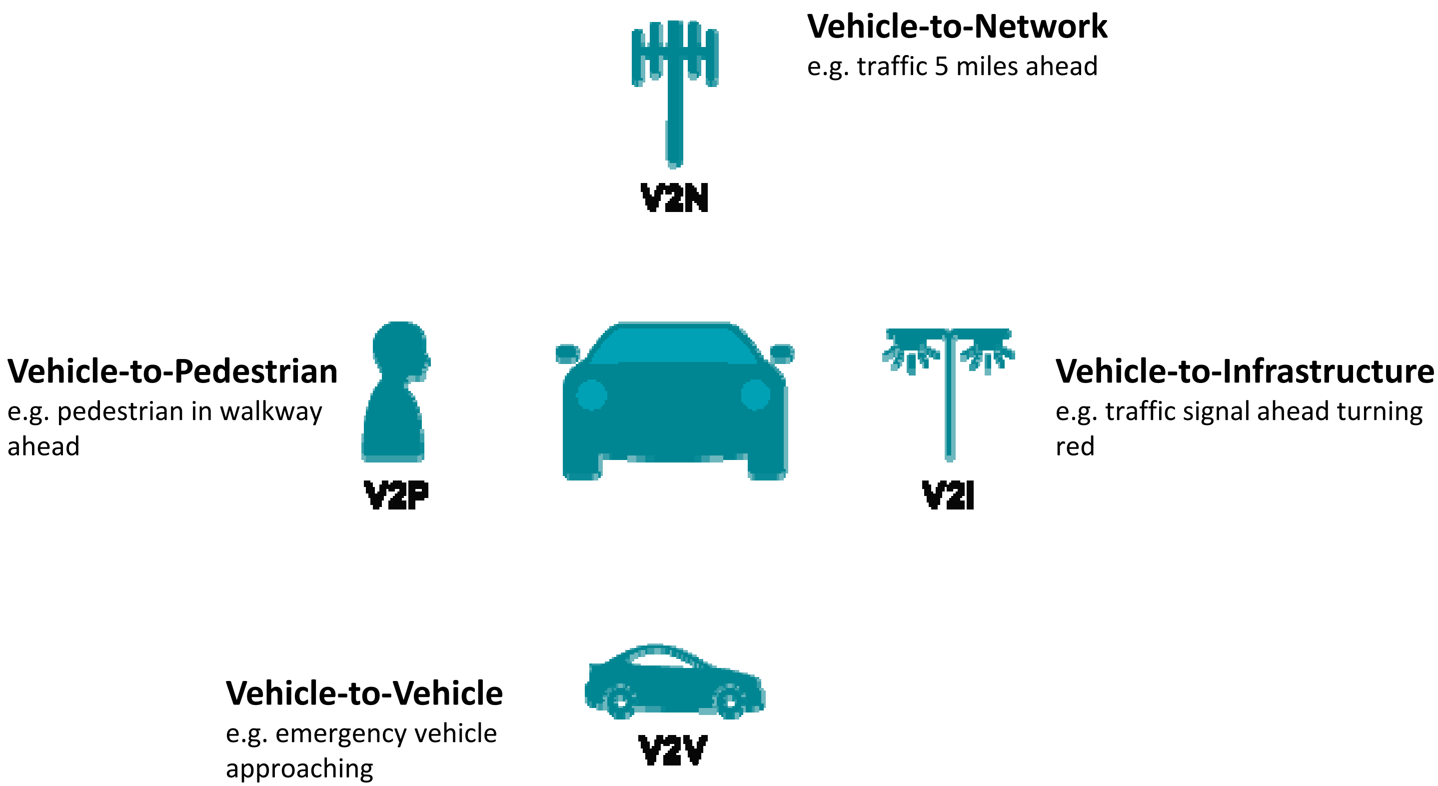
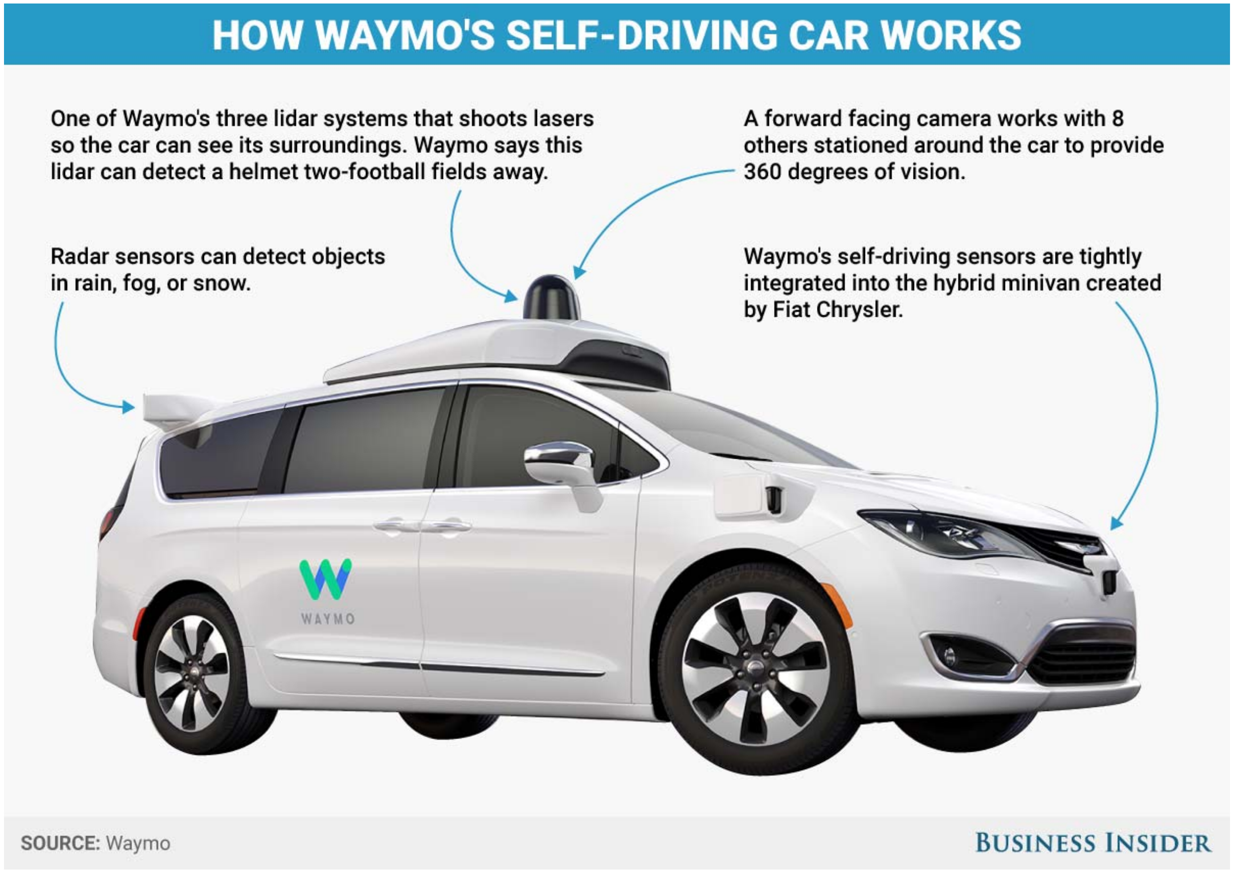
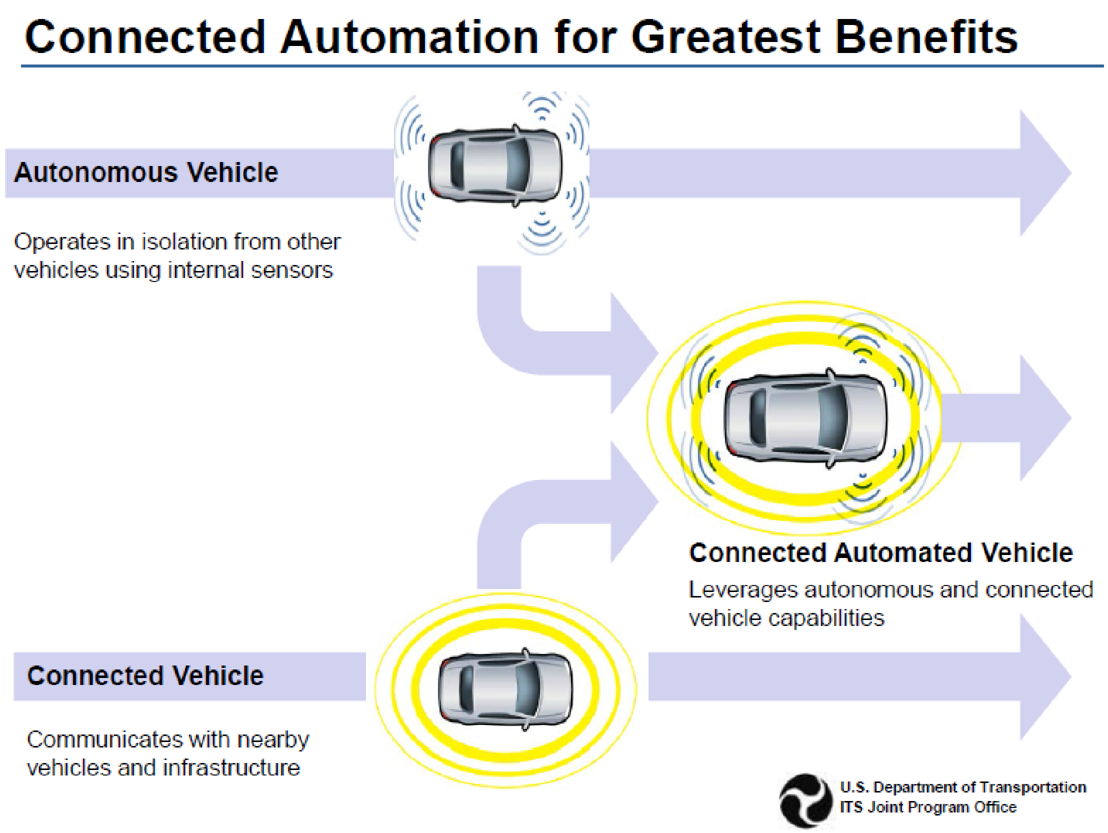
Connected vehicles



Highly automated vehicles

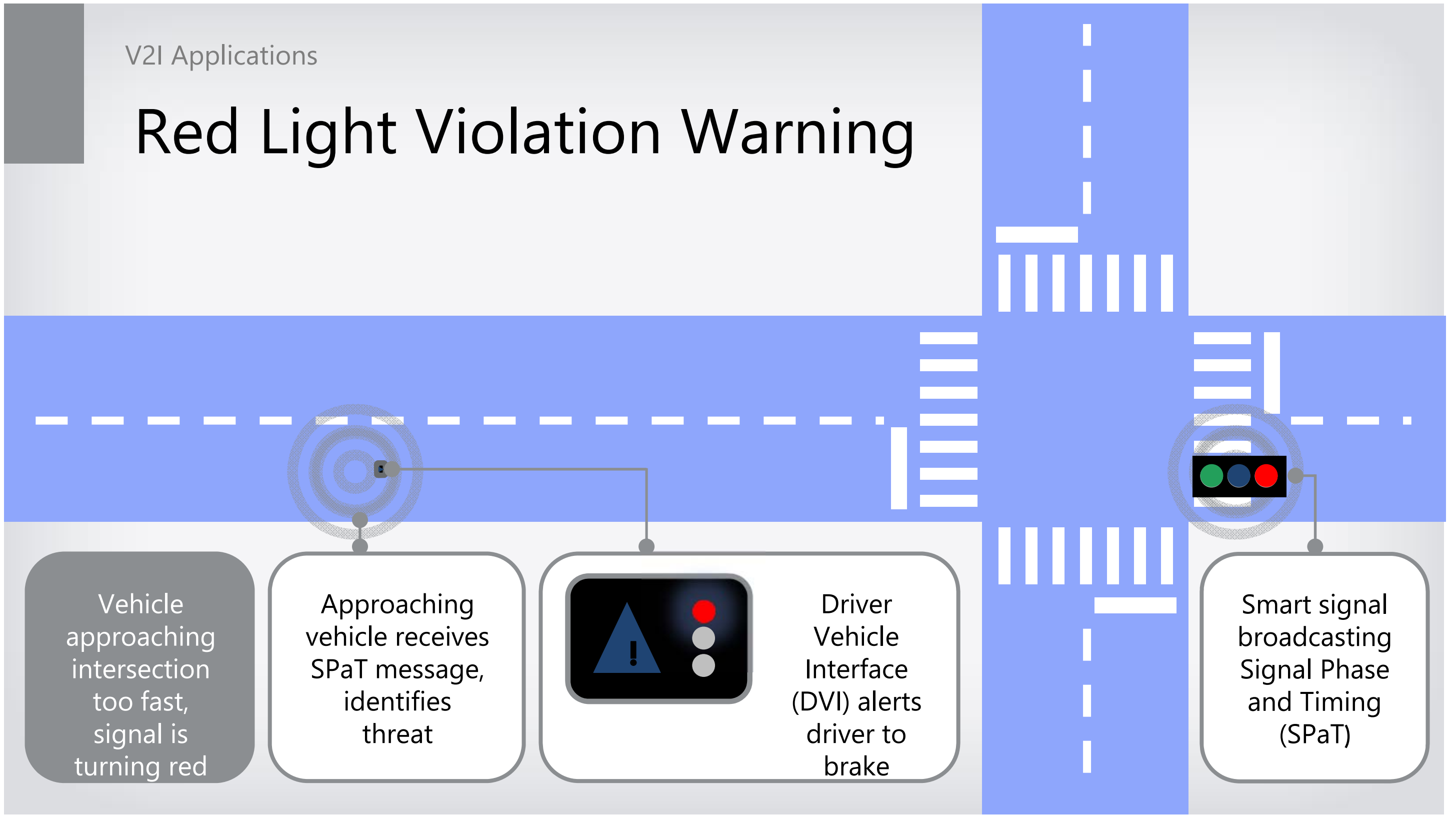


Vehicles will be connected and automated



V2I Applications

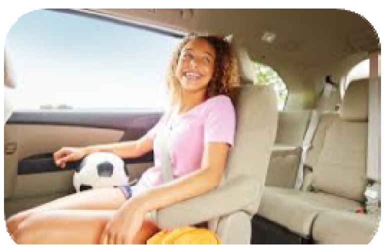
Red Light Violation Warning

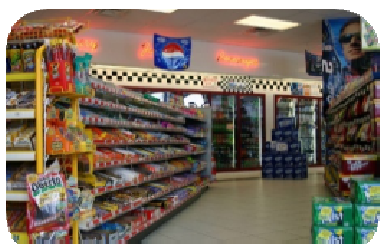


Technology and travel behavior

How Transportation Technology Could Impact Travel Demand

Induced Mobility ↑ | ZOV Trips ↑ | Longer Commutes ↑



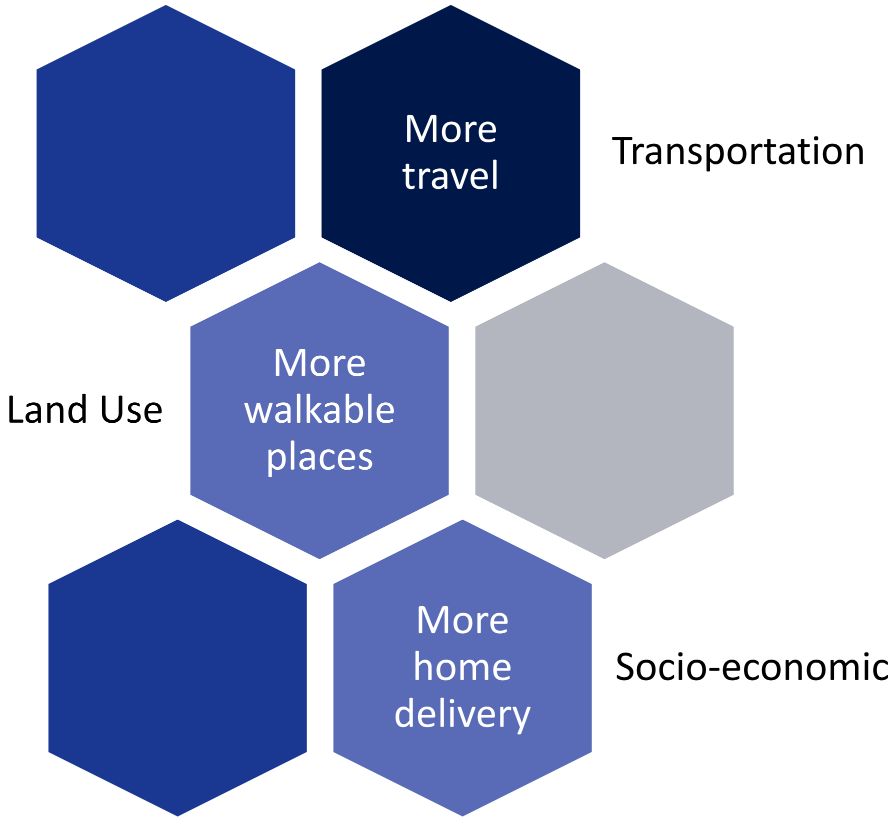


Induced Mobility ↑ | Short Trips ↑ | Parking ↓

Technology could contribute to roadway travel demand by increasing mobility options for those who cannot currently drive, generating new zero-occupancy vehicle trips, facilitating longer distance commutes, generating additional convenience-based trips, and by potentially reducing time and miles spent searching for parking.

As we think about disruptors…

We begin to see potential causes and effects …



…and the benefits of exploring the range of outcomes

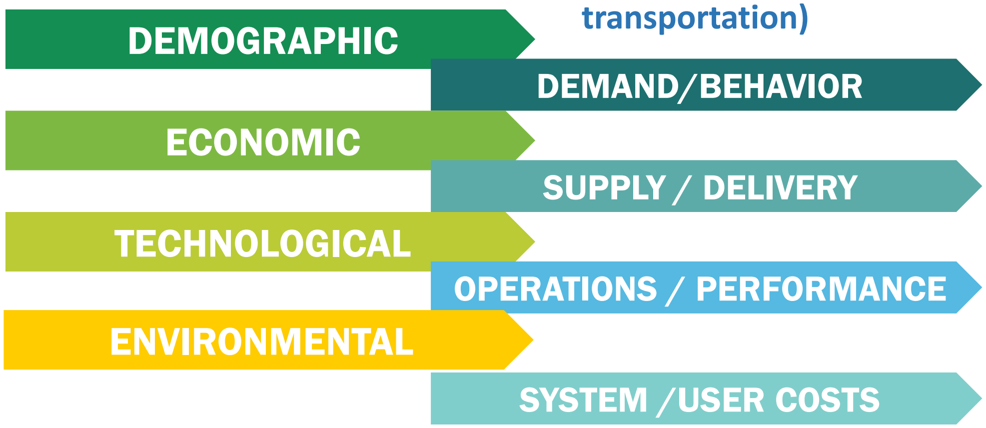
Preparing for Uncertainty: Exploratory Planning

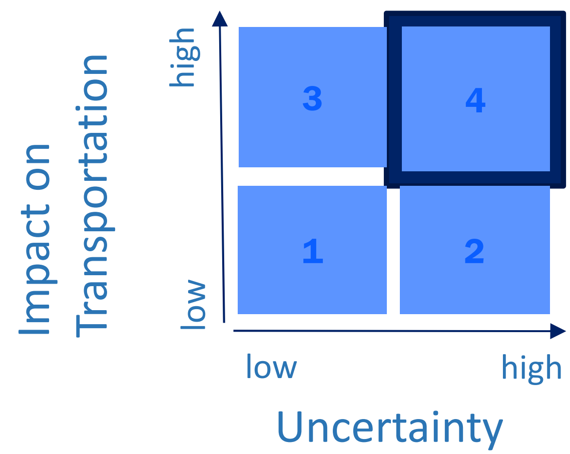
OVERVIEW

Start with drivers

DRIVERS
(What drives change globally)

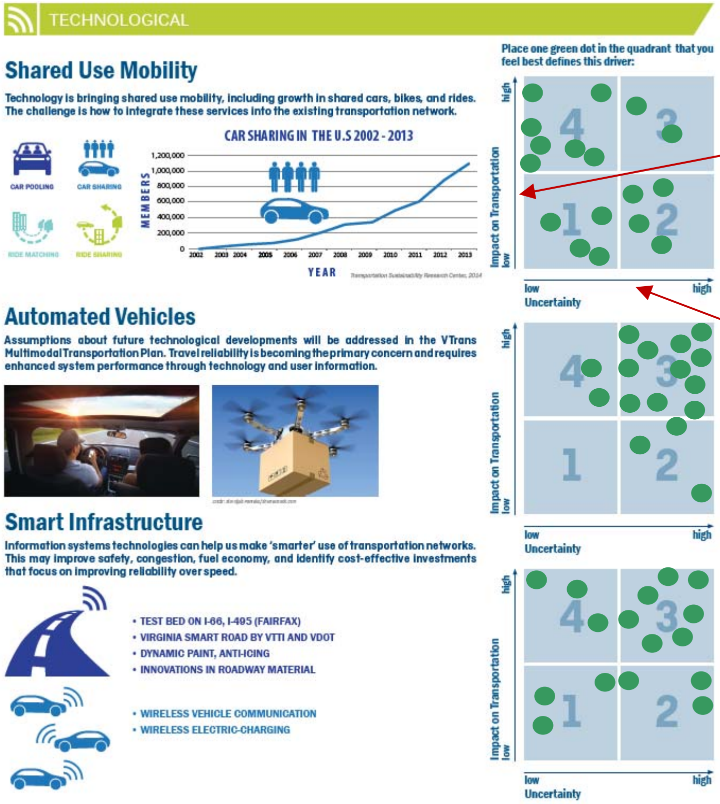
TRANSPORTATION OUTCOMES
(How global change can affect transportation)





Assessing drivers

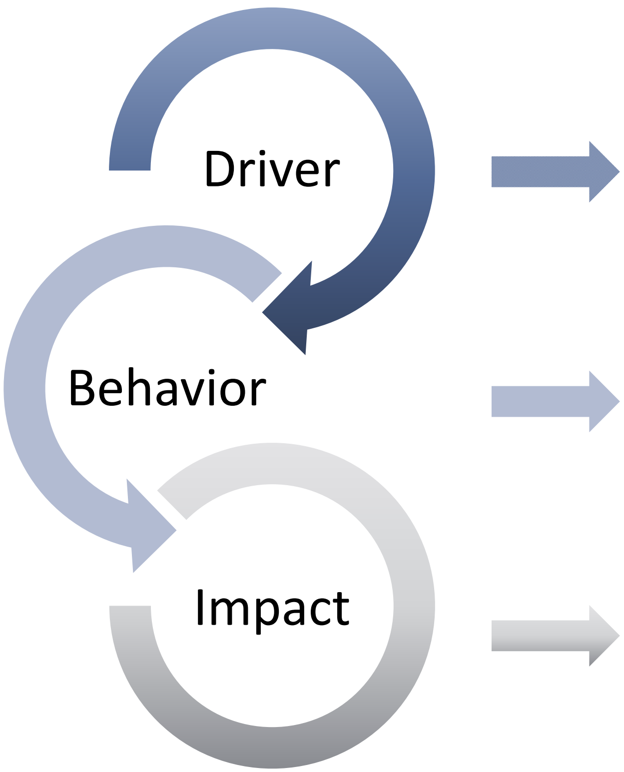
Example of Public Input Received on Technology Drivers



Y-Axis – Impact on Transportation

X-Axis – Degree of Uncertainty

Chain of logic from inputs to outputs

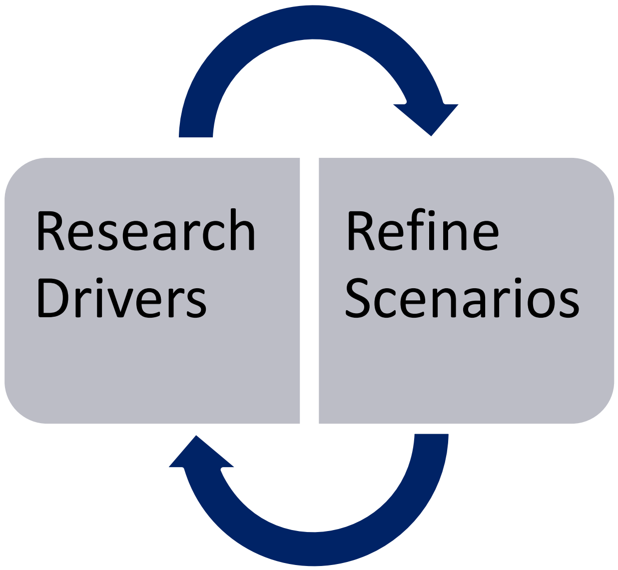


Research, data analysis, extract data from models

Research, expert input, public input

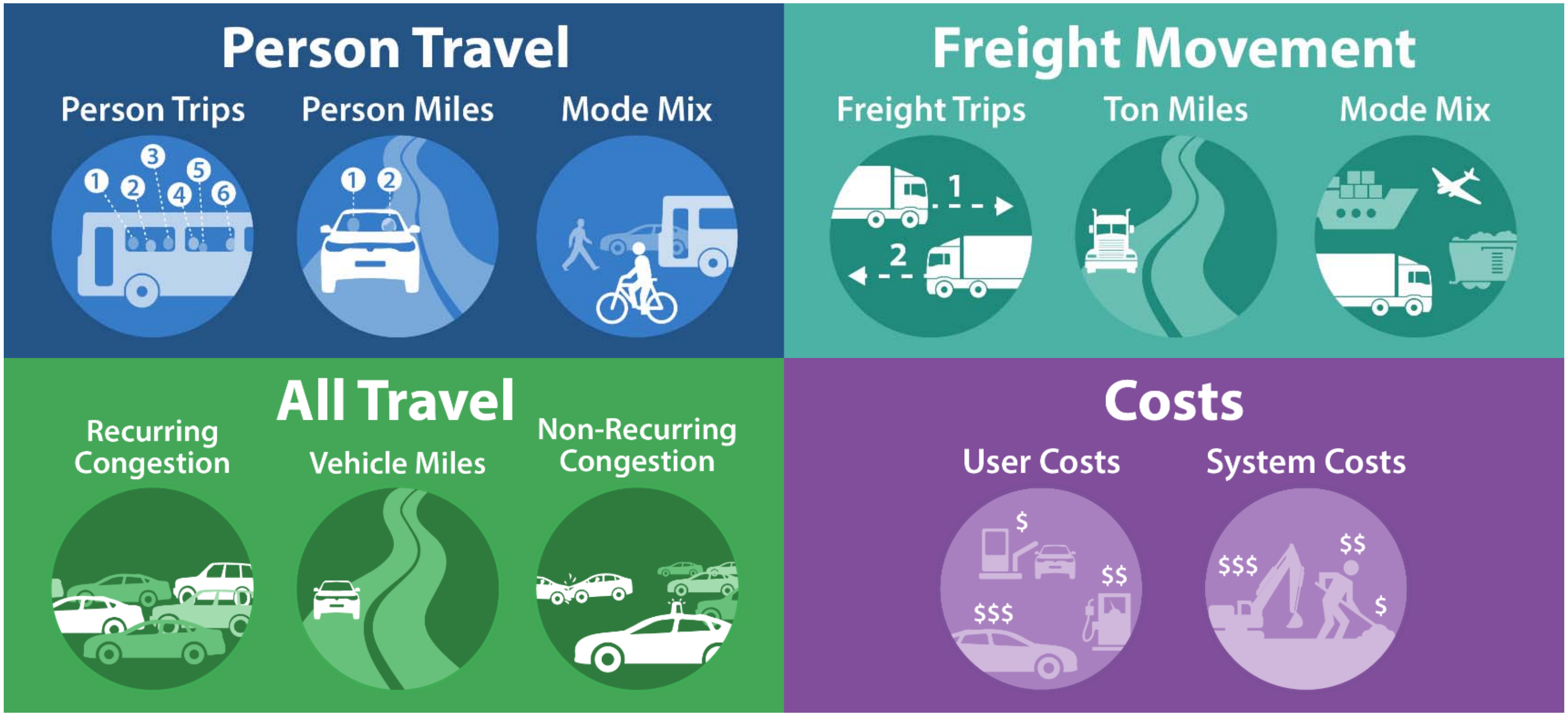
Research, data analysis, apply models

Iterative process to define scenarios



- Iterative Process
- Adapt to achieve:
  - Internal consistency
  - Range of outcomes

Potential exploratory planning outputs



Exploratory Planning Toolkit

DRIVERS

- Demographic
- Economic
- Environment/ Energy
- Technology/ Mobility

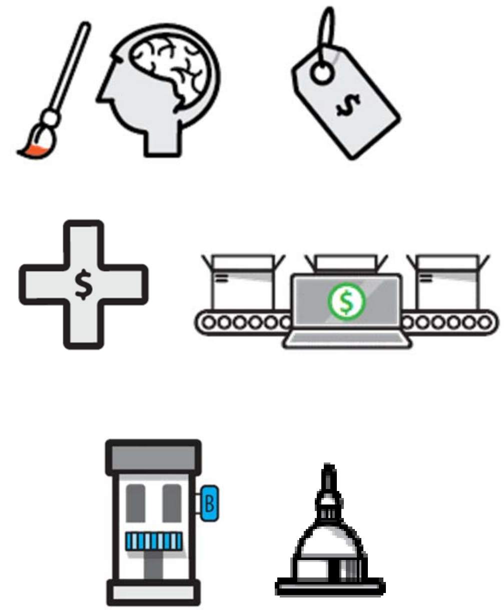
COMMUNITY TYPES

- V6 – Multimodal Urban
- V5 – High Density Suburban
- V4 – Multimodal Suburban
- V3 – Small Town/Suburban
- V2 – Low-Density Suburban
- V1 – Rural

GENERATIONS

- Baby Boomer
- Generation X
- Millennial
- Generation Z

INDUSTRY MIX



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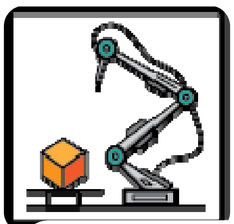
Example Exploratory Scenarios



High Growth Industrial

- Less Urban
- Higher VMT Assumptions

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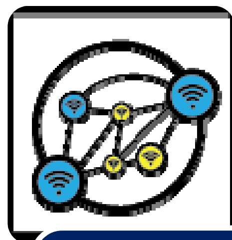


High Growth High Tech

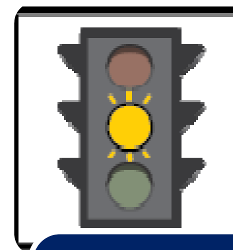
- More Urban
- More Multimodal

Whfkwrsld

Moderate Growth

- Older Demographics
- Walkable Places

Vlozhu#Djh



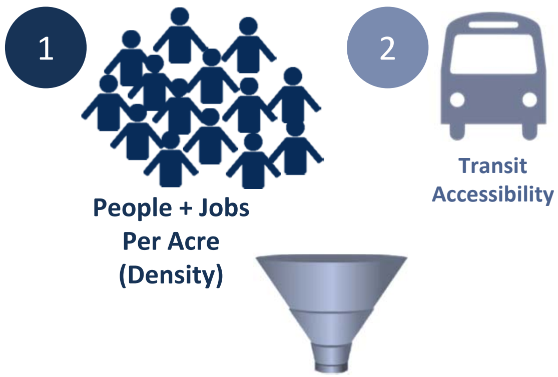
Reduced Growth

- Federal Spending Reduced
- Slower adoption of technology

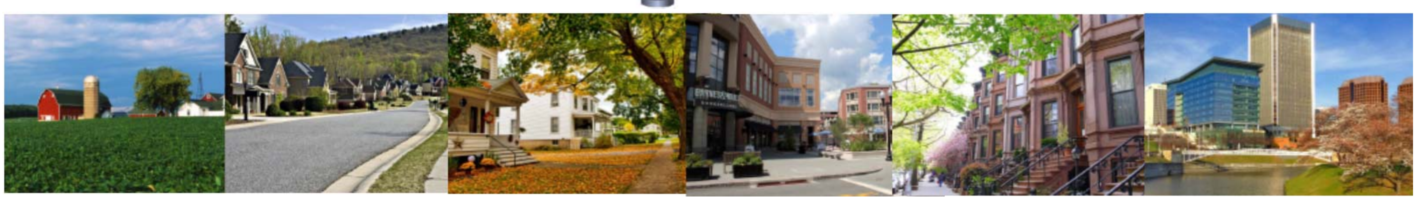
Jhqhudo# Vorzgrzq

Linking land use and transportation

Two Key Criteria to Define Placetypes

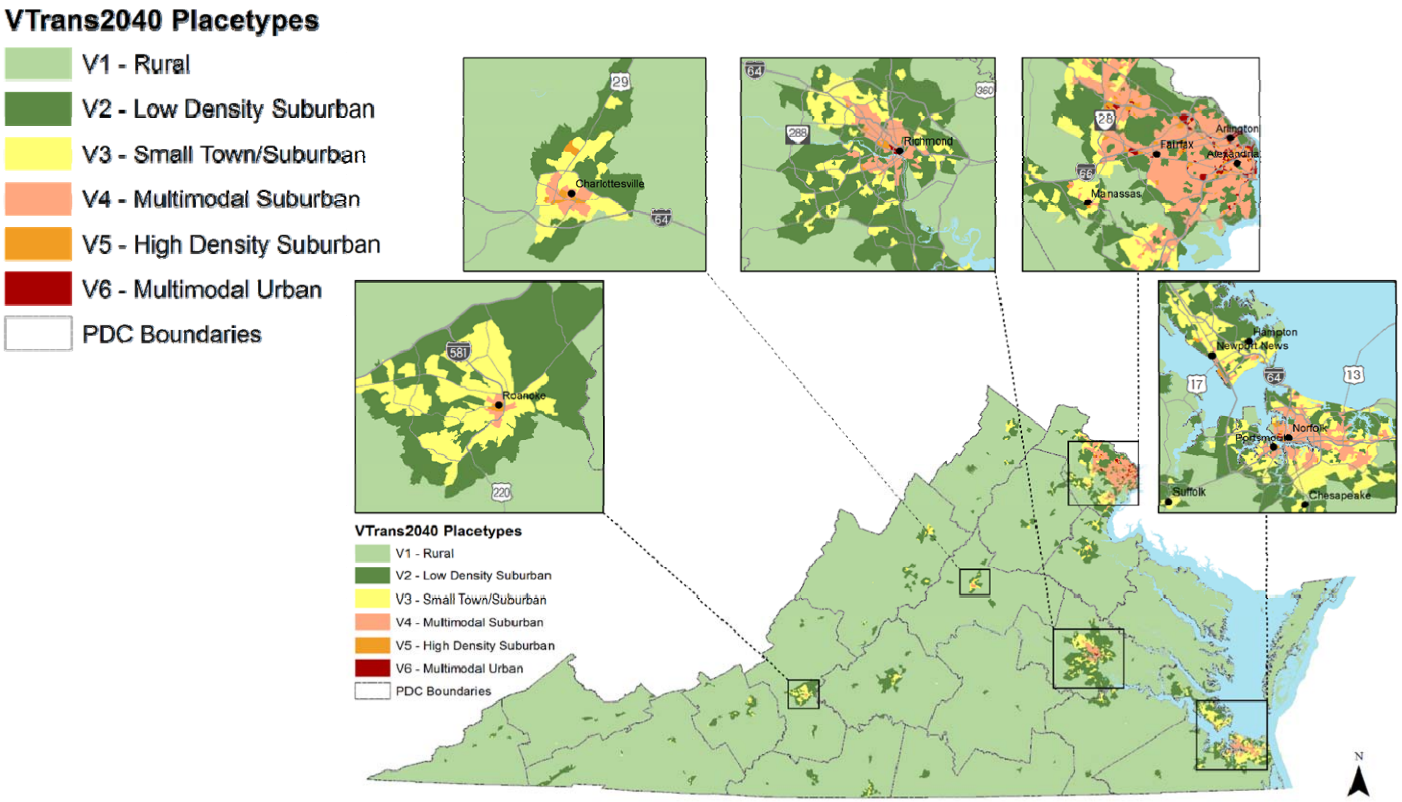


The Placetypes reflect areas with noticeable differences in travel behavior as it relates to land use patterns.



V1 – Rural	V2 – Low-Density Suburban	V3 – Small Town/ Suburban	V4 – Multimodal Suburban	V5 – High Density Suburban	V6 – Multimodal Urban

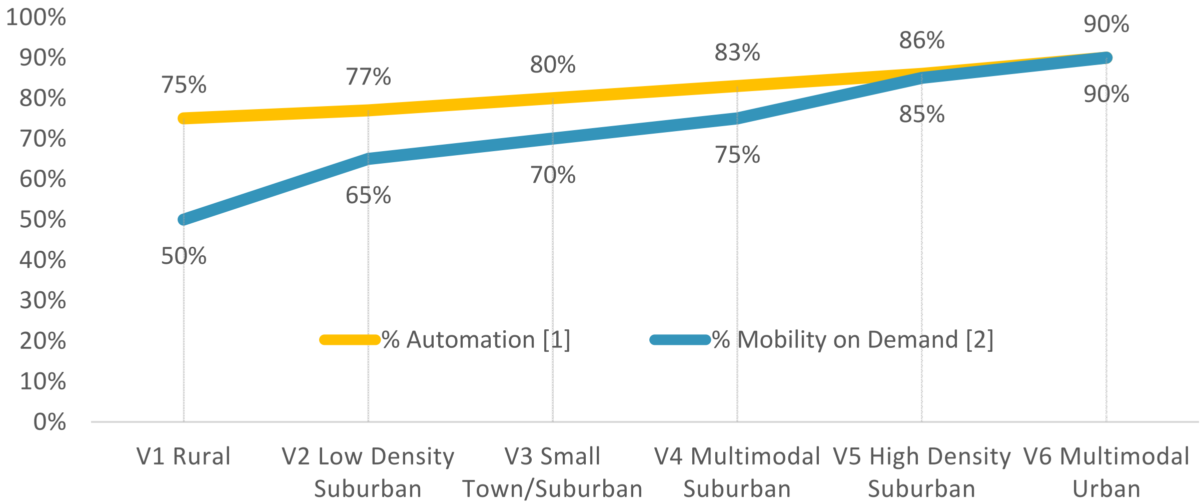
Linking land use and transportation



Differentiate:

- Mode Split
- Demographics
- Trip Rates
- Technology Implementation

Baseline Technology Assumptions



[1] [2] Information above was inspired by public input

V2V connectivity. I-95 Corridor Coalition

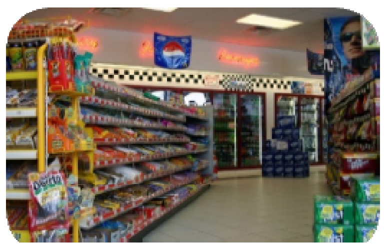
Technology and travel behavior

Assumptions become more robust when applied differently to different placetypes

Induced Mobility ↑

ZOV Trips ↑

Longer Commutes ↑



Induced Mobility ↑

Short Trips ↑

Parking ↓

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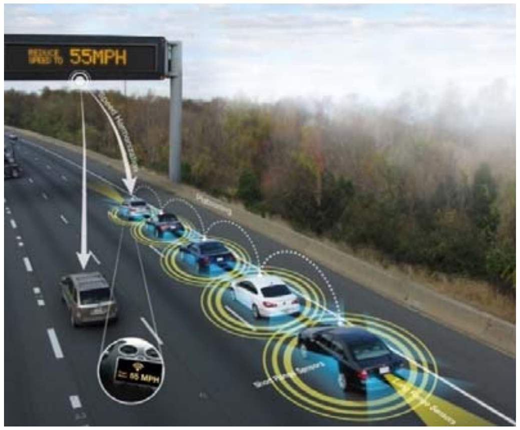
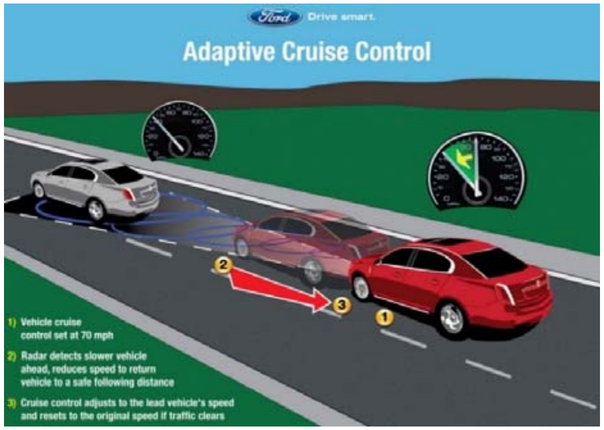
Technology and roadway capacity

CAV Capacity Benefits



Vehicle Platooning. Source: USDOT



V2V connectivity. I-95 Corridor Coalition

Although VMT is expected to increase, vehicle technology & infrastructure improvements will help increase travel efficiency and throughput (effectively increasing roadway capacity)

What about transit?

Anticipate a Spectrum of Services…

Rail → BRT → Fixed-Route Bus → Custom Route Bus → Circulator Shuttles → Personal Transit

Fixed Route
High Capacity

↔

Demand-Responsive
Lower Capacity

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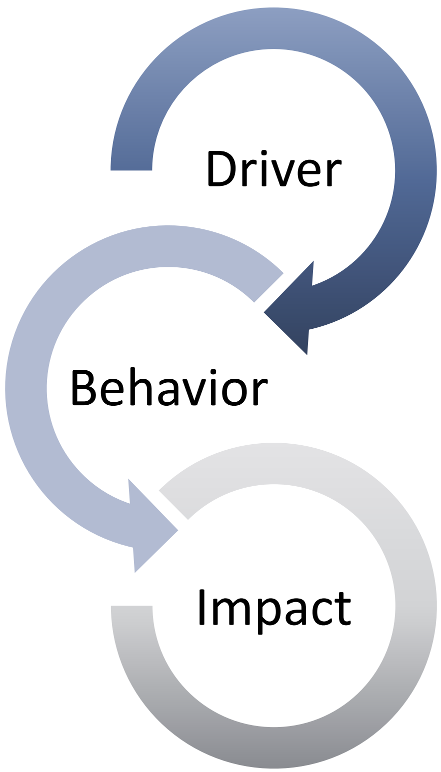
Chain of logic from inputs to outputs



Research, data analysis, extract data from models

Research, expert input, public input

Research, data analysis, apply models

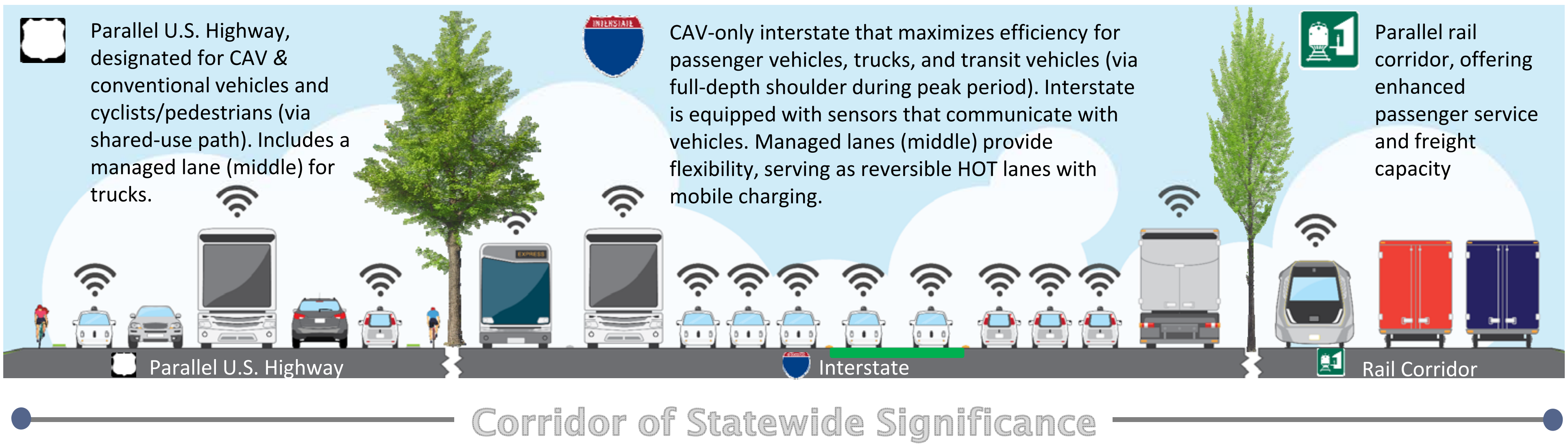
Exploratory Planning Outcomes

Comparing scenarios – high level insights

		Industrial Renaissance	Techtopia	Silver Age	General Slowdown
DEMAND	Pop.	↑↑	↑↑	↑	↑
	VMT	↑↑↑↑	↑↑↑	↑↑↑	↑↑↑
SYSTEM CAPACITY	PTP	↑↑	↑↑↑	↑↑	↑

PTP: Person Through-put

Inter-City Corridors



Urban Networks

Envisioning the Future…

1. Separated bike lanes and walkways
2. High quality rapid transit systems with dedicated lanes or tracks
3. Autonomous transit shuttles to connect to high volume transit corridors
4. Inductive charging strips in pavement offers charging boost for electric vehicles
5. Mobility-on-demand services, like bikeshare
6. "Smart intersections", equipped with sensors that seamlessly relay traffic and safety information to motorists
7. Smaller freight vehicles (trucks, vans) and drone delivery

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Small Towns

Envisioning the Future…

1. Smaller vehicle, flexible-route transit service
2. Mobility-on-demand services, like bikeshare and carshare
3. Pedestrian/bike-friendly intersections that alert vehicles/motorists of pedestrian and cycling activity
4. Designated pick-up and drop-off areas for autonomous vehicles
5. "Smart intersections", equipped with sensors that seamlessly relay traffic and safety information to motorists

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Key Findings: *How can we prepare for the future?*

Anticipate Increased Demand

- Automated and on-demand vehicles will unleash growth in travel demand
- Foreseeable changes in travel behavior with connected and automated vehicles (CAV) will increase travel demand
- Tech. innovations in the economy as well as transportation will spur growth in freight traffic

Technology Will Enhance System Performance

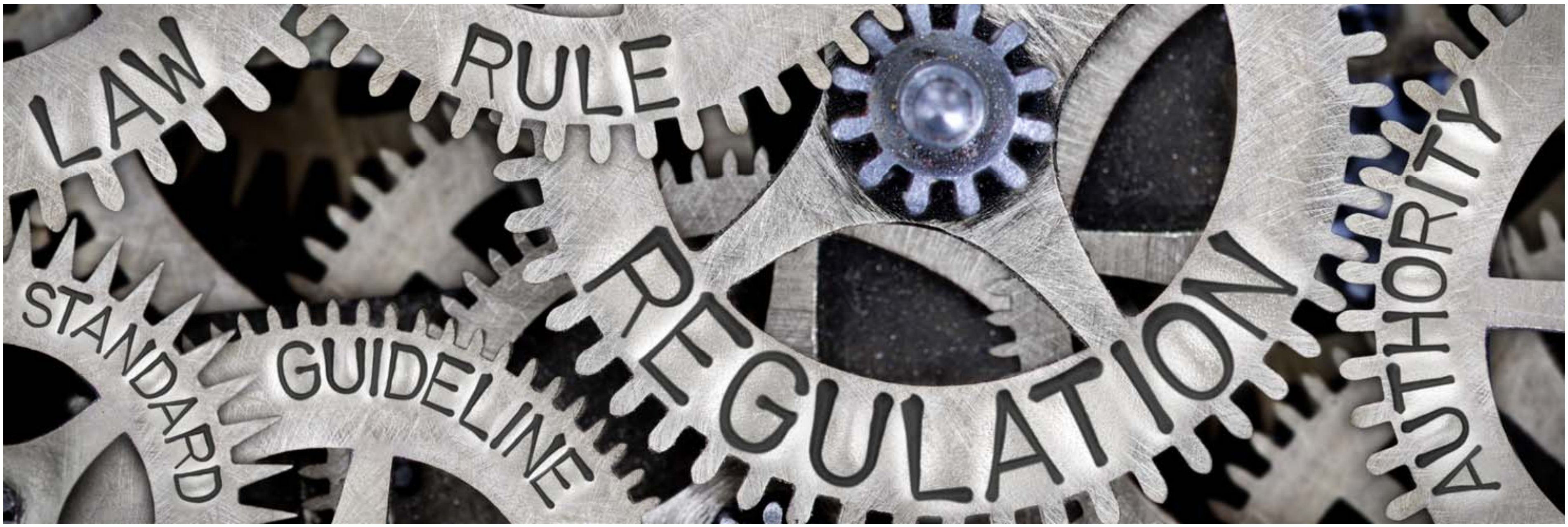
- Safety improvements will reduce congestion from incidents
- Information will improve efficient use of the whole system
- Vehicles will become safer, smaller, and able to travel closer together

Timing is Key – Balancing these two sides of the technology future is critical

Design is also Key – Walkable and multimodal places have the most balanced outcomes

Focus on risks and opportunities

Develop policies to be prepared



Monitor trends, impacts and investments

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Questions and Discussion