

Georgia Planning Association Spring Conference 2019

Won't You Be My Neighbor?

A discussion about the great communities of tomorrow and the future of mobility

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Deloitte Consulting LLP

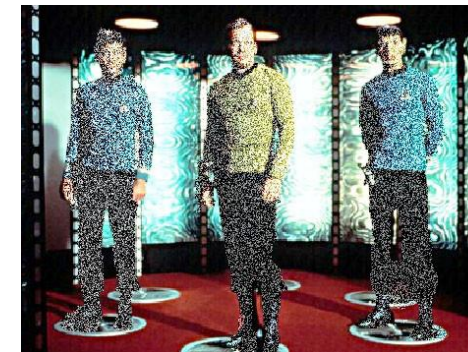
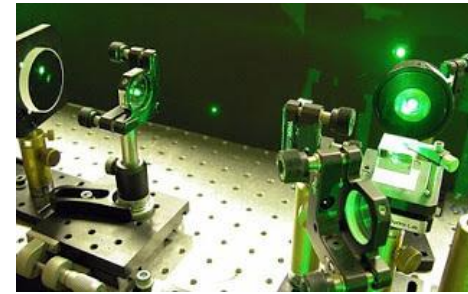
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People on the move is the history of our civilization...and very little will change...but we must adapt to a new paradigm

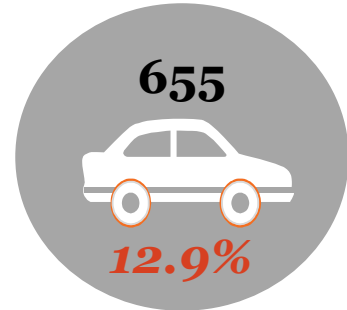
<p>3500BC</p> <p>Fixed wheels on carts are invented - the first wheeled vehicles in history. Other early wheeled vehicles include the chariot.</p> 	<p>3500BC</p> <p>River boats are invented - ships with oars.</p> 	<p>2000BC</p> <p>Horses are domesticated and used for transportation.</p> 	<p>312BC</p> <p>One of the earliest paved roads, the Appian Way, is built. The Romans eventually built over 50,000 miles of paved roads.</p> 	<p>181-234AD</p> <p>The wheelbarrow is invented.</p> 	<p>852</p> <p>Abbas ibn Firnas invents a gliding machine.</p> 
<p>1620</p> <p>Cornelis Drebbel invents the first submarine, a human-sourced submersible.</p> 	<p>1662</p> <p>Blaise Pascal invents a horse-drawn public bus which has a regular route, schedule, and fare system.</p> 	<p>1783</p> <p>First steamboat is demonstrated by Marquis Claude-François de Jouffroy d'Abville - a paddle wheel steamboat.</p> 	<p>1783</p> <p>Joseph Montgolfier and Étienne Montgolfier launch the first hot air balloon.</p> 	<p>1814</p> <p>George Stephenson built the first practical steam-powered railway locomotive.</p> 	<p>1885</p> <p>Karl Benz builds the world's first practical automobile to be powered by an internal combustion engine.</p> 
<p>1899</p> <p>Ferdinand von Zeppelin builds the first successful airship.</p> 	<p>1903</p> <p>Orville and Wilbur Wright fly the first motor-driven airplane.</p> 	<p>1908</p> <p>Henry Ford develops the assembly line method of automobile manufacturing.</p> 	<p>1940</p> <p>Modern helicopters invented.</p> 	<p>1947</p> <p>First supersonic flight.</p> 	<p>1956</p> <p>Hovercraft invented.</p> 
<p>1957</p> <p>First flight of the Boeing 707, the first commercially successful jet airliner.</p> 	<p>1961</p> <p>Yuri Gagarin, the first manned space mission, makes two orbits around the Earth.</p> 	<p>1964</p> <p>Bullet train transportation invented.</p> 	<p>1976</p> <p>Concorde made the world's first commercial passenger-carrying supersonic flight.</p> 	<p>1981</p> <p>First flight of the space shuttle.</p> 	<p>2004</p> <p>First commercial high-speed Maglev train starts operation between Shanghai and its airport.</p> 



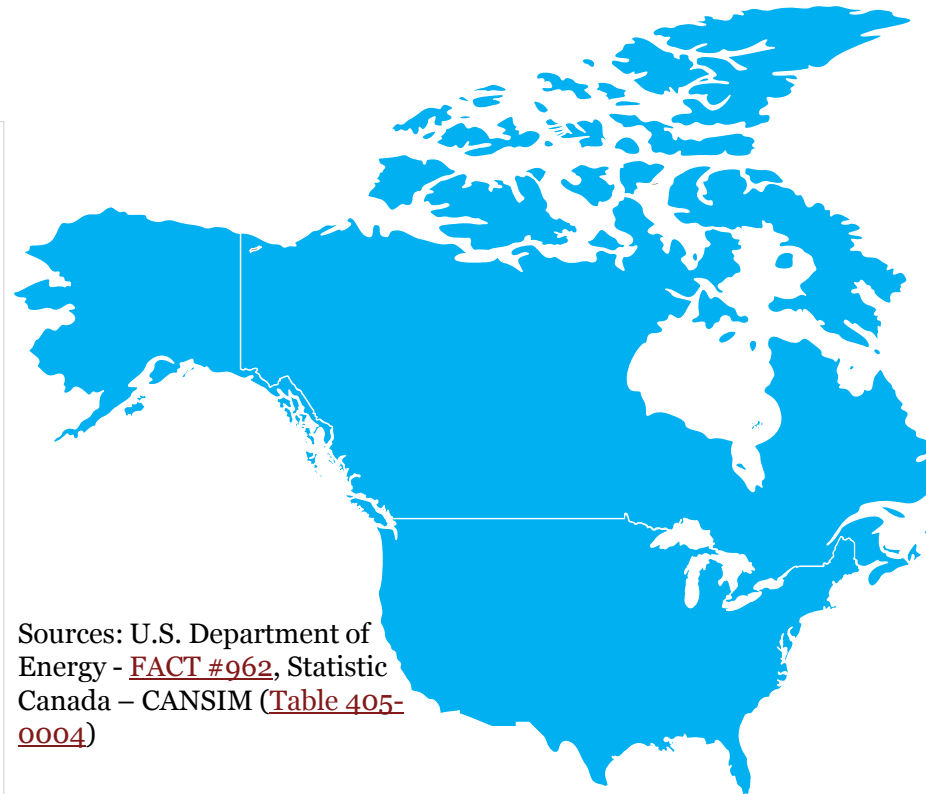
A motorization “saturation” level is emerging in mature economies

Canada

**2014
motorization
rate**
(Vehicles / 1000
inhabitants)



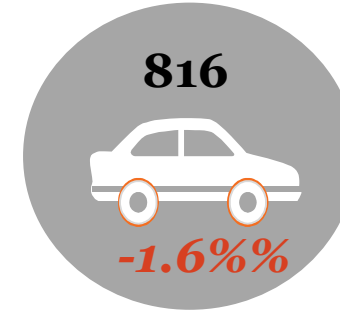
**2004-2014
motorization rate
variation**



Sources: U.S. Department of Energy - [FACT #962](#), Statistic Canada – CANSIM ([Table 405-0004](#))

USA

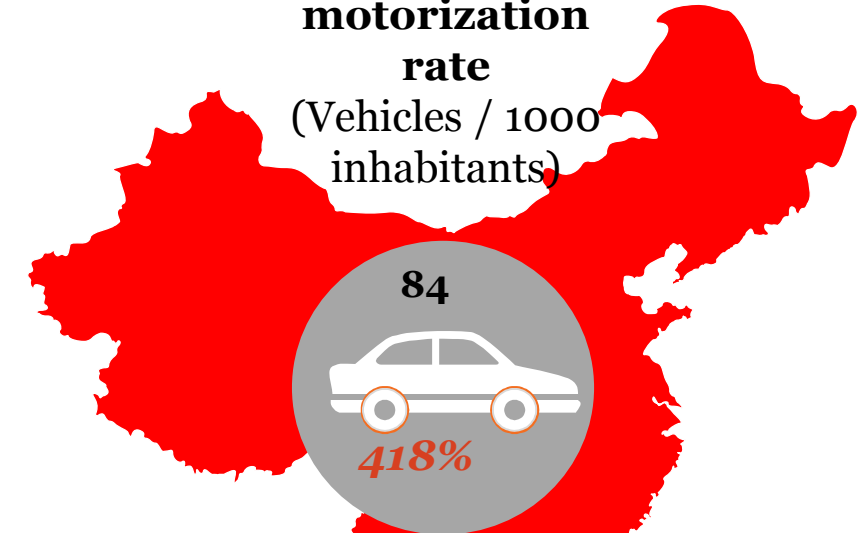
**2014
motorization
rate**
(Vehicles / 1000
inhabitants)



**2004-2014
motorization rate
variation**

CHINA

**2014
motorization
rate**
(Vehicles / 1000
inhabitants)



**2004-2014 motorization
rate
variation**

But the global motorization trends are still evolving

**Regions with high
motorization rate, but
with tendency to
stabilize / reduce**








**Regions with
medium/high
motorization rate, but
still significant growth**

**Regions with low
motorization rate, and
very fast growth**

**Regions with low
motorization rate, and
moderate growth**

Ride hailing is increasing (doubling?) every year...a business & tech trend

More than 5 bn trips / year (despite regulatory constraints in many Countries), mainly sourced by 5 big players

	592 cities	70 countries	900 M rides / year
	300 cities	1  country	160 M rides / year
	30 cities	6 countries	840 M rides / year
	400 cities	1  country	2,4 bn rides / year
	110 cities	1 country	300 M rides / year

Estimated 2016
Estimates based on press releases

Complication comes with urbanization: variability of trips is increasing

share of stable “home ⇌ work/school” trips less dominant in the total mobility

USA



% of commute vehicle miles of travel (VMT) on total VMT

1969
34%



2009
28%

Source: NHTS, 2011

ITALY



% of trips repeated 5 days / week (urban mobility)

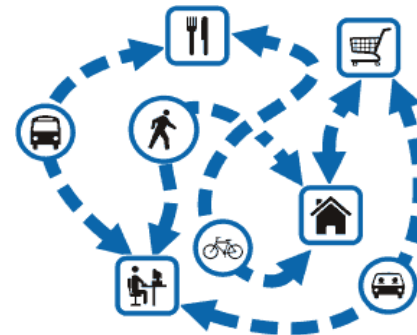
2004*
40%



2014
27%

* Max level in the last 15 years

Source: Isfort, 2017



LONDON



% of trips to “usual workplace” on mechanised trips

1971
56%



2012
29%

Source: Travel in London, Rep.6

Trends: How we move (US DOT)

Population Increase

2015: **320 million people**
2045: **390 million people**

In 30 years our population is expected to grow by about

70 million

... that's more than the current populations of



Bumper-to-Bumper

On average, we spend

over 40 hours

stuck in traffic each year

The annual financial cost of congestion is

\$121 billion



Older Americans — Redefining Longevity

By 2045, the number of Americans over age 65 will increase by

77%



About **one-third of people over 65** have a disability that limits mobility. Their access to critical services will be more important than ever.

Millennials — Shaped by Technology

There are **73 million Millennials** aged 18 to 34. They are the first to have access to the internet during their formative years and will be an important engine of our future economy.

Millennials are driving less. By the end of the 2000s, they drove over **20% fewer miles** than at the start of the decade.



Income Inequality

10% of the population takes home **one-third** of our national income.

Transportation is the **second-largest** expense for U.S. households.



Megaregions and Shifts in Population Centers

11 megaregions are linked by transportation, economics, and other factors.

They represent over **75%** of our population and employment.

In 2014, **365,000** people moved to the South—up **25%** from 2013—and moves to the West doubled.

Trends: how we move better (US DOT)

More and more, the transportation sector is relying on data to drive decisions, and on technology to reimagine how we move people and goods.

Connected Vehicles

Vehicles that communicate are the latest innovation in a long line of **successful safety advances**.

The motor vehicle fatality rate has dropped by **80%** over the past 50 years.

Connected vehicles and new crash avoidance technology could potentially address

81% of crashes involving unimpaired drivers.

Robotics

Advances in robotics are changing transportation operations and will impact **the future transportation workforce**.

Robots will perform vital transportation functions, such as critical infrastructure inspection.

NextGen

GPS and new technologies are leading to a **safer, more efficient** U.S. airspace.

By 2020, **one-second updates** will pinpoint the **aircraft location and speed** of 30,000 commercial flights daily.

Real-time Travelers

Mobile access to everything from **traffic data** to **transit schedules** informs our travel choices.

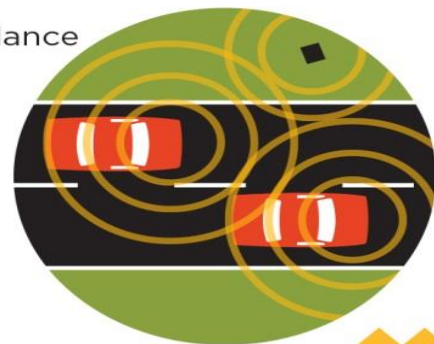
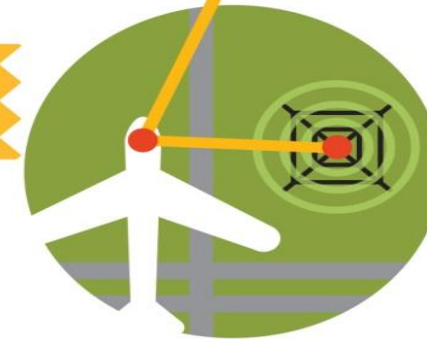
90% of American adults own a mobile phone.

20% use their phones for **up-to-the-minute** traffic or transit information.

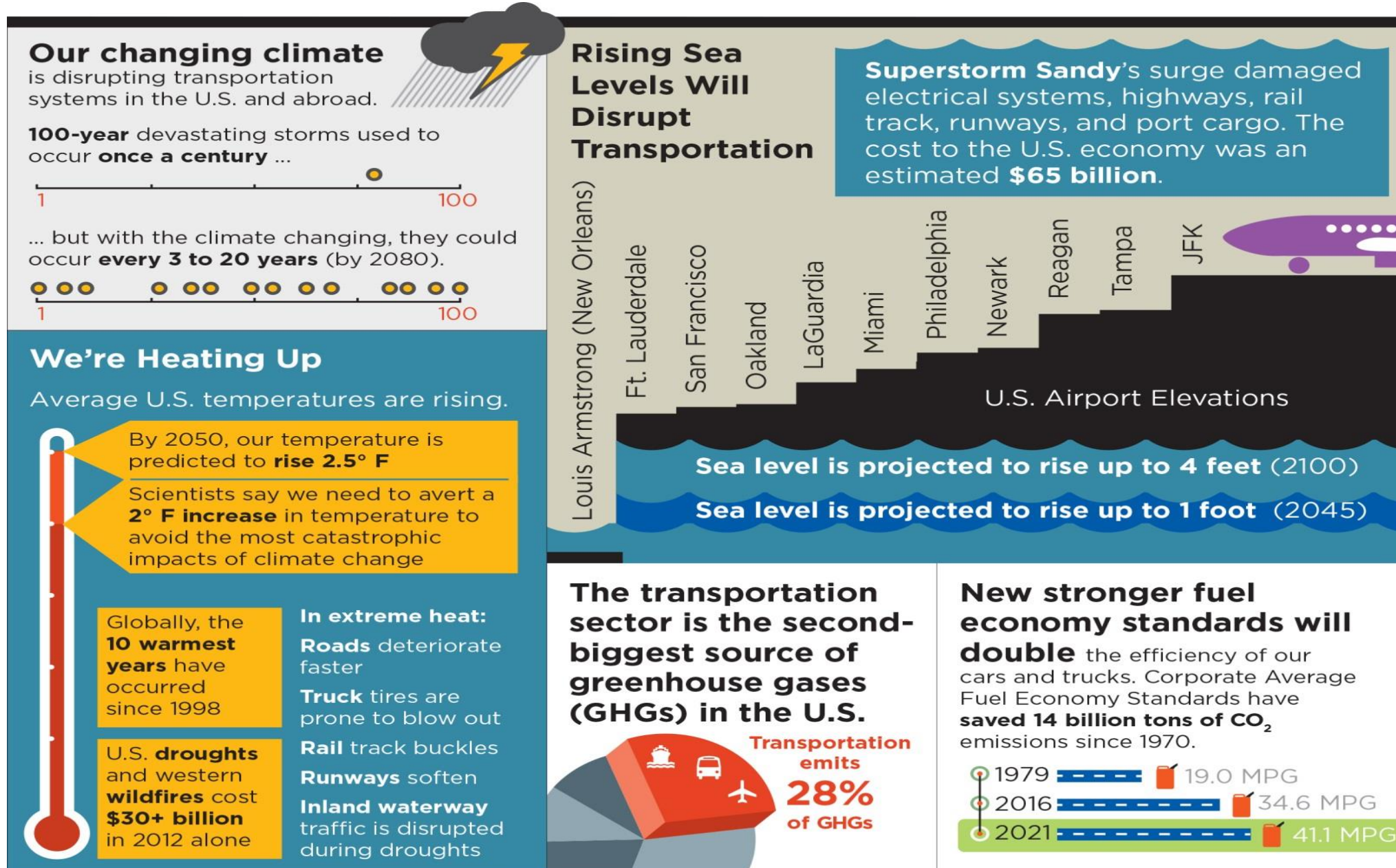
Smartphones are regularly used for **turn-by-turn navigation**.

Big data is all around us. Global data generated is projected to grow by **40%** annually.

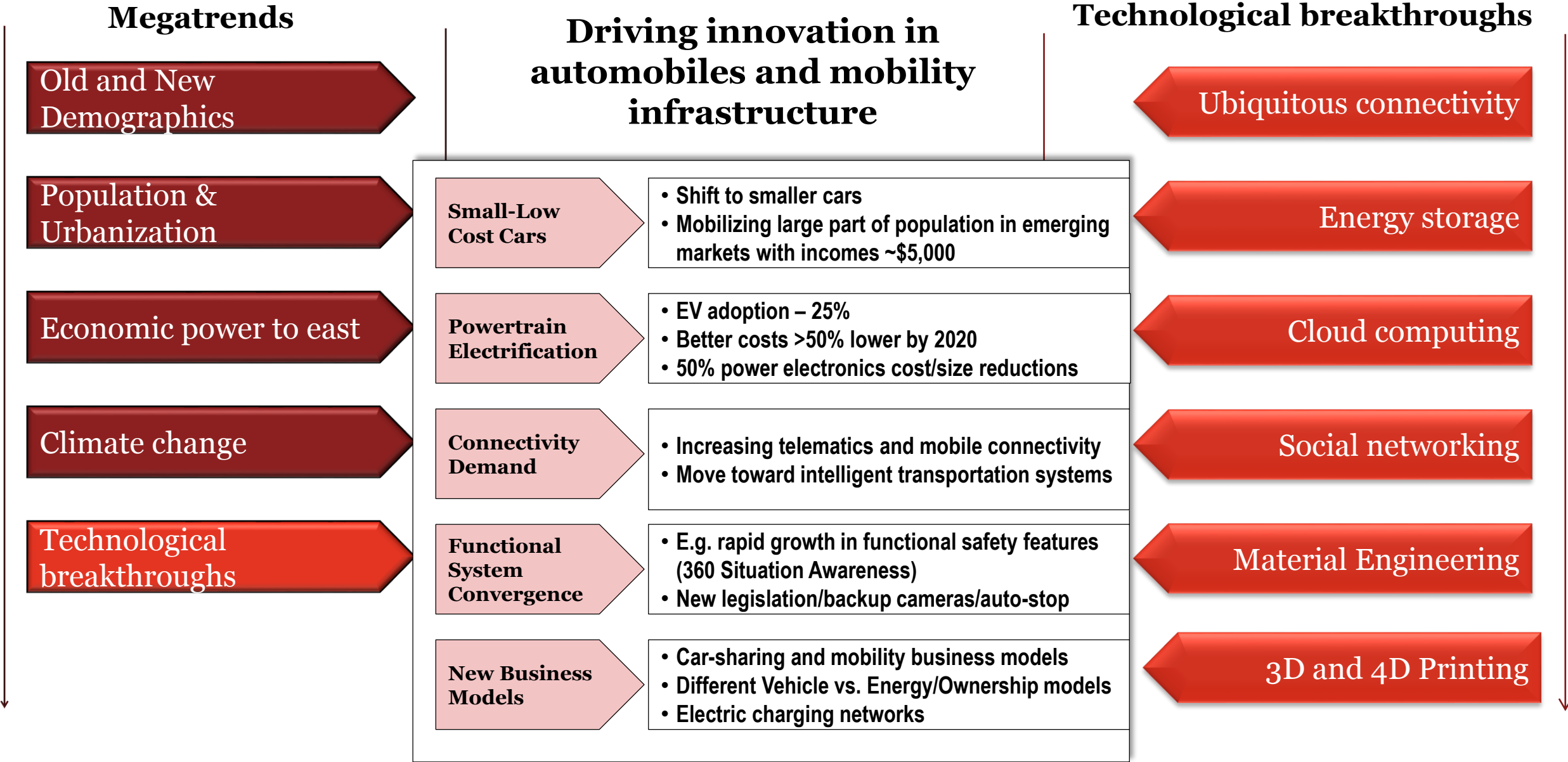
Data enables innovative transportation options, such as **car-sharing, ride-sharing, and pop-up bus services**, and more **rapid delivery of goods**.



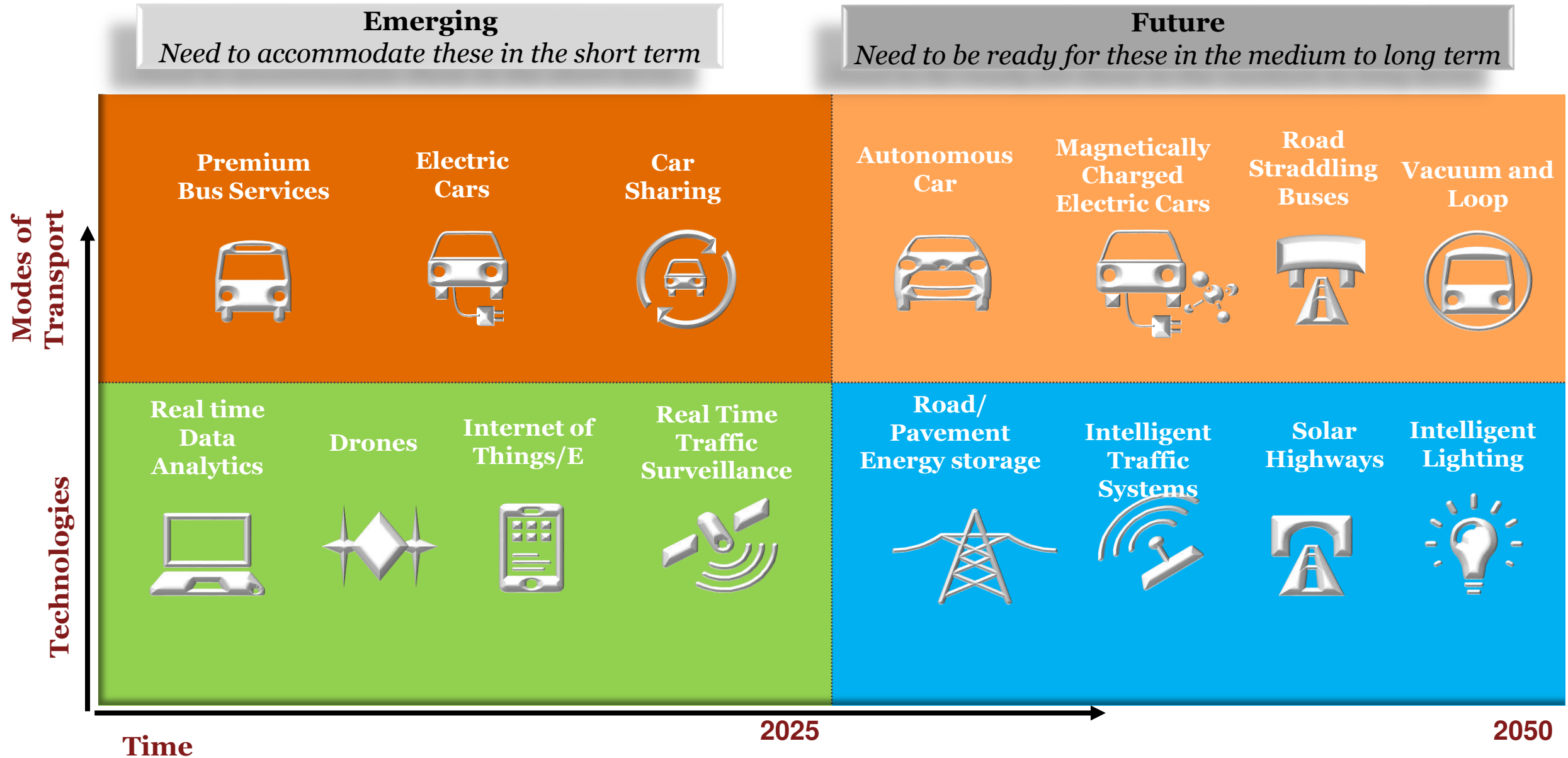
Trends: How we adapt (US DOT)



In cities, technological breakthroughs will spur an avalanche of automotive innovation to address mobility issues and create new value chains



Innovations will change how we view mobility within a few decades



Connected and autonomous vehicles will fundamentally change the mobility character of the smart“er” city and the user experience

Connected Vehicles

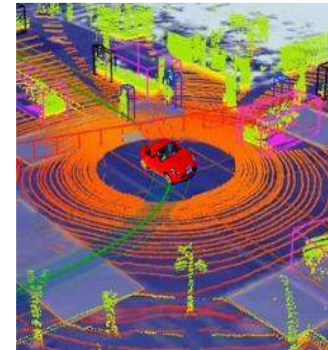
Vehicle Automation

Internet of Things

Machine Learning

Big Data

Mobility on Demand



Connected-Autonomous Vehicles and Instrumented Street Furniture



Benefits

- Order of magnitude safety improvements
- Reduced congestion
- Reduced emissions and use of fossil fuels
- Improved access to jobs and services
- Reduced transportation costs for gov't and users
- Improved accessibility and mobility

EV vehicles integration can further the adoption of a GREEN economy and drive user adoption of beneficial mobility solutions



Data analytics via OnStar or vehicle to grid communication



Transient power needs can be balanced to cut peaks and decrease rates

Power from solar parking arrays or building mounted panels stored in vehicle batteries



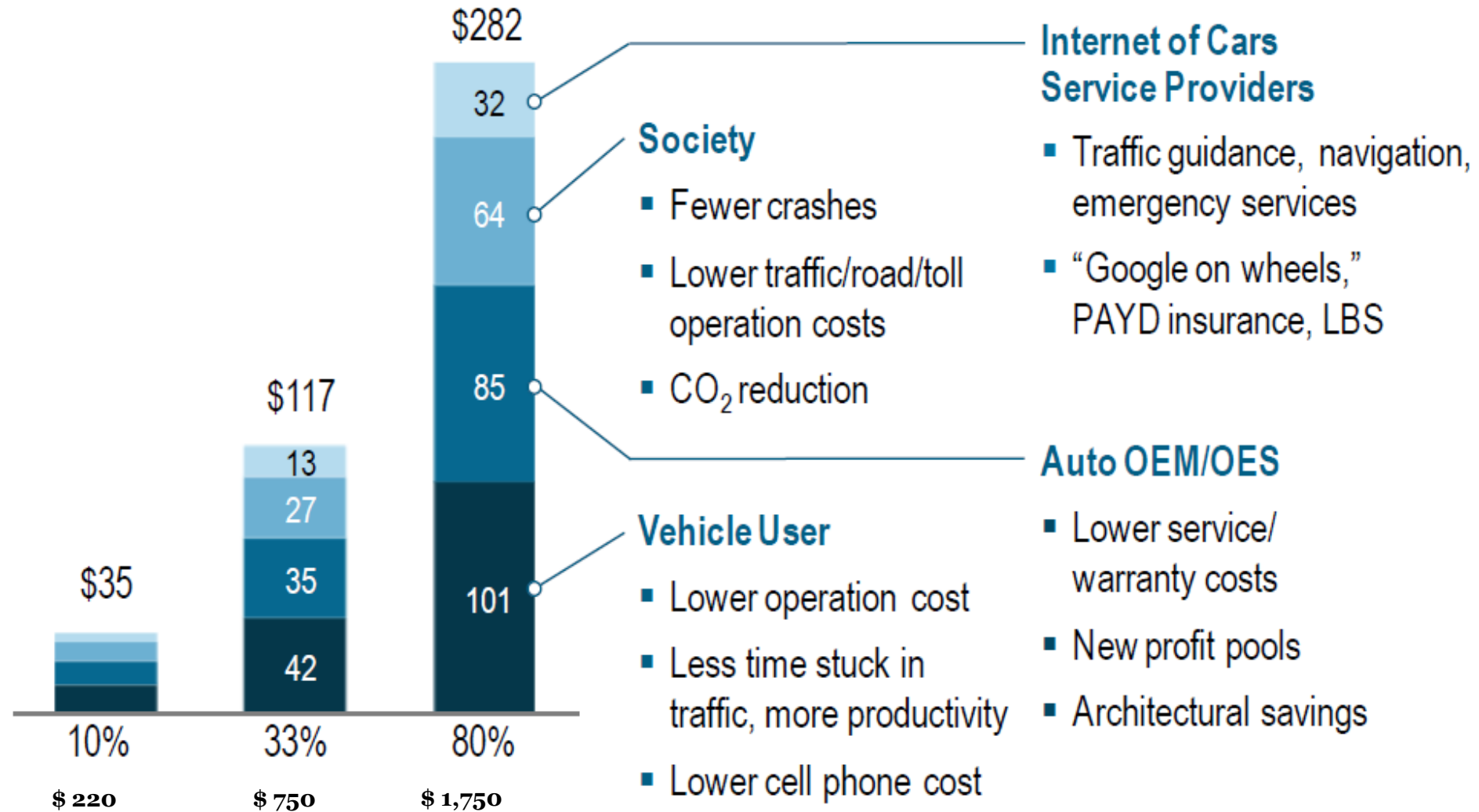
Chevy Volt powertrain with 100kW generation capability

Chevy Volt battery with over 16kW of grid balancing capacity



Total Eco-System Benefits of Connected Cars Can Be Substantial...

Benefits of Connecting U.S. Vehicles by Penetration (\$B per Year)



Benefits Per Car

\$ 220

\$ 750

\$ 1,750

...If implemented correctly a connected car service programs can create value for all players involved...

Value creation across telematics based insurance eco-system

Benefits

- Better risk-adjusted pricing
- Access to new customer segments
- Fewer accidents
- Less fraud
- Increased customer touch points/ interaction



Fees

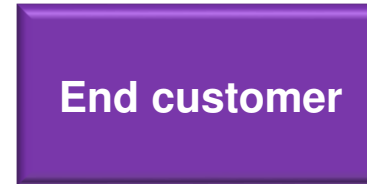
Sales of granular data or universal score



Benefits

- Scale up volume
- Sell data to multiple insurance companies
- Up-selling

Insurance products and services



Value-added services, and feedback on driving behavior

Benefits

- More transparent risk-based pricing/ discount
- Value-added services
- Improved customer service
- Driving improvement information

Access to driving data

ILLUSTRATIVE

Government and society

Benefits

- Safer roads, resulting from fewer accidents
- Environmental benefits from decreased driving
- Reduced costs from public property damage
- Government resource reduction (less law enforcement, reduced accidents, etc.)
- Improved driving experience and road safety through real-time accident information

1) Can be **third party providers, auto OEMs or even insurance companies**

2) Value creation for this segment is driven by choice of go-to-market strategy (not detailed in this phase).

... But Key Barriers for Wider Adoption Still Need to Be Addressed

Consumer Readiness (Demand)

- 1 Consumer Acceptance**
 - HMI / Driver Education
 - Trust in assist / control functions
 - Cost

- 3 Privacy**
 - Customer data including location and travel data

Vehicle/Technology (Supply)

- 2 Technology**
 - Differing vehicle and connectivity lifecycles
 - Unpredictable vehicle operations
 - Cost-effective, scalable, fault tolerant architectures

- 4 Liability**
 - Security - Hacking, viruses, hijacking
 - Distraction
 - Safety



- 5 End-End Eco-System Integration**
 - Technical Integration – Roads, Vehicles, Data, etc...
 - Business Integration and Profitability
 - Eco-system Roles and Ownership
 - Investment Risk
 - Political/Regulatory Alignment

High Risk/ Barrier – Partial/No Solutions ●
Moderate Risks- Only Partial Solutions ●
Moderate Risk – Plans in Place ●

Smart Urban Mobility must be the SUM of many parts and inclusive for all through equity in development and design

