

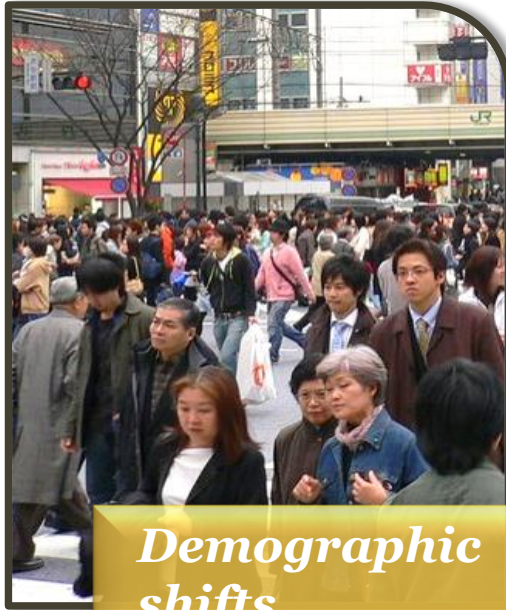
Advisory

Leveraging Smart Infrastructure in smart cities for urban mobility

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Megatrends are forcing a rethink by cities and businesses to address infrastructure needs and developments



Demographic shifts



Economic power shifts



Technological breakthroughs

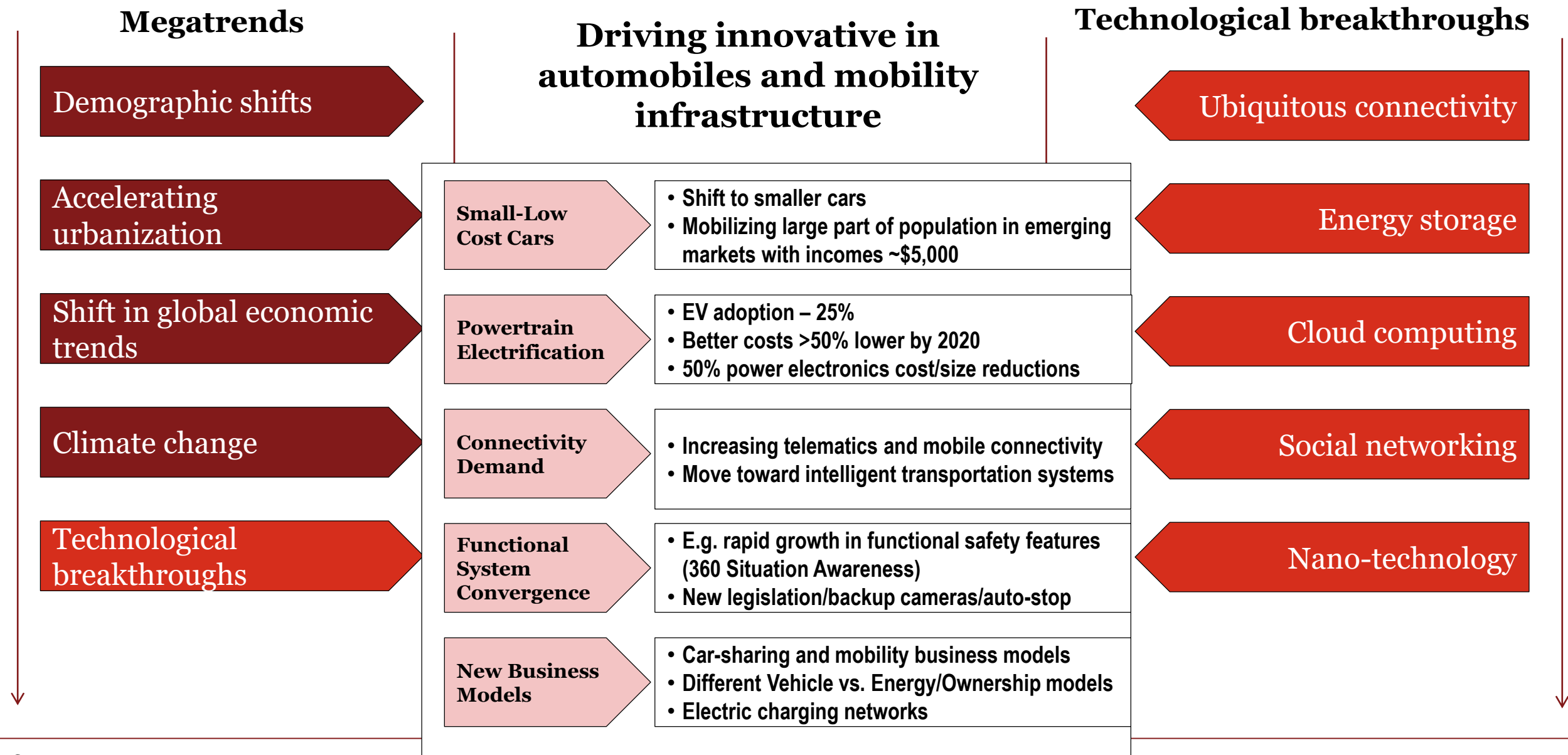


Accelerating urbanization

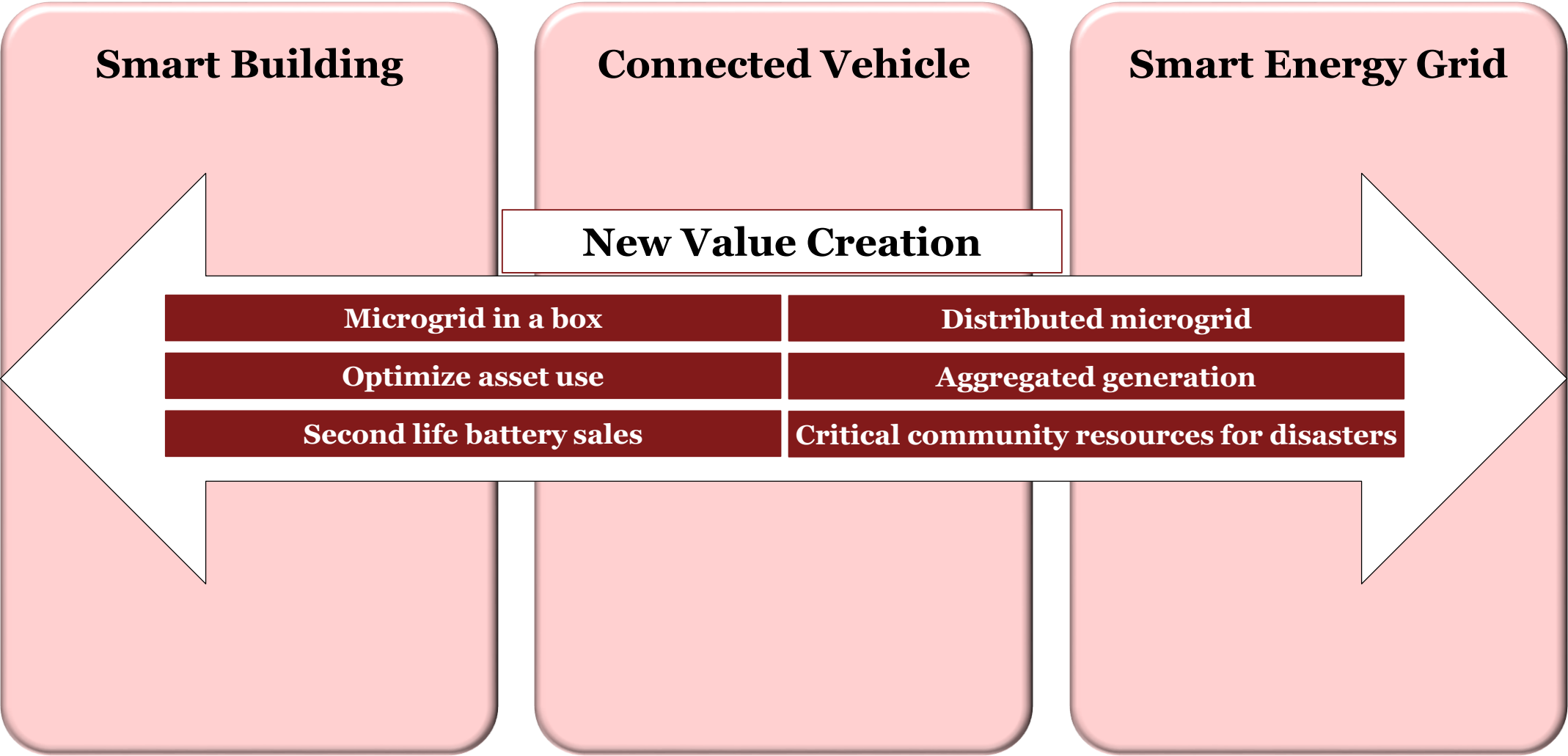


Climate change

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



These new value creation opportunities will happen at the intersection of smart buildings, smart energy grids and the connected car



Smart cities go hand in hand go with connected and autonomous vehicles

Connected Vehicles

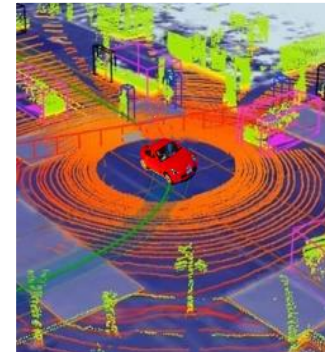
Vehicle Automation

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

Designing EV vehicles to seamlessly integrate into the connected GREEN eco-system will drive additional customer adoption and increase retention



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

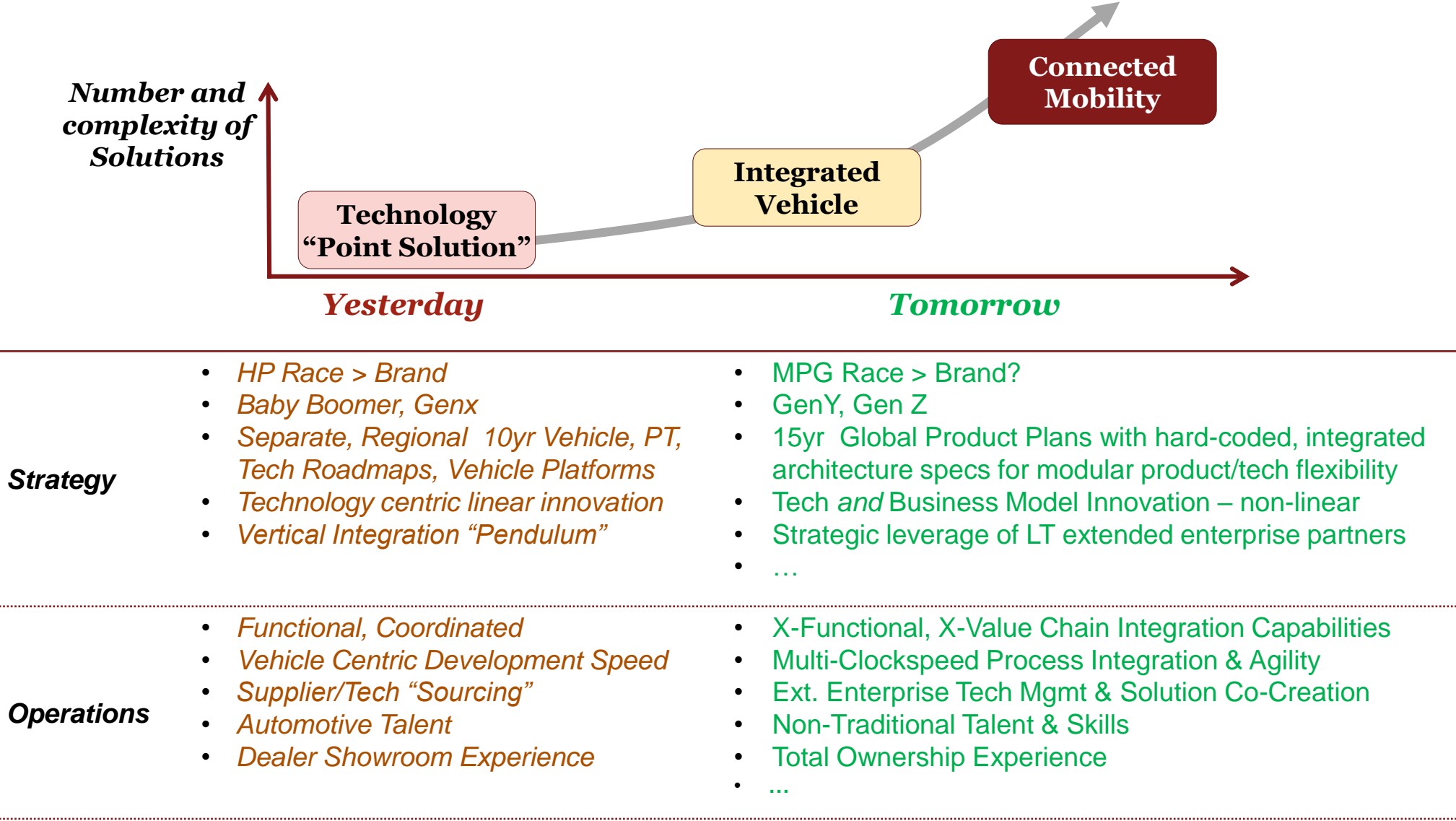


Chevy Volt powertrain with 100kW generation capability

Chevy Volt battery with over 16kW of grid balancing capacity

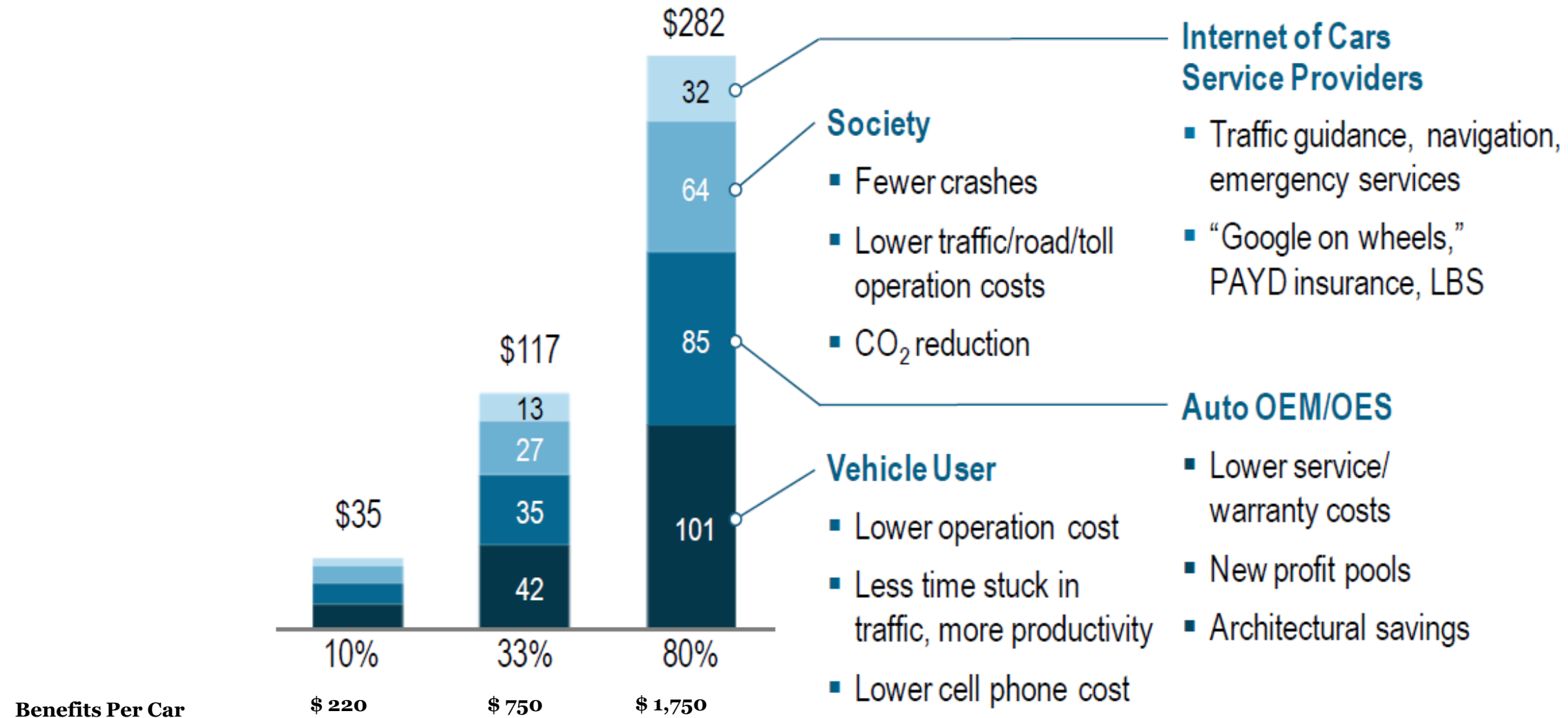


The migration towards connected mobility solutions has clear strategic and operational implications

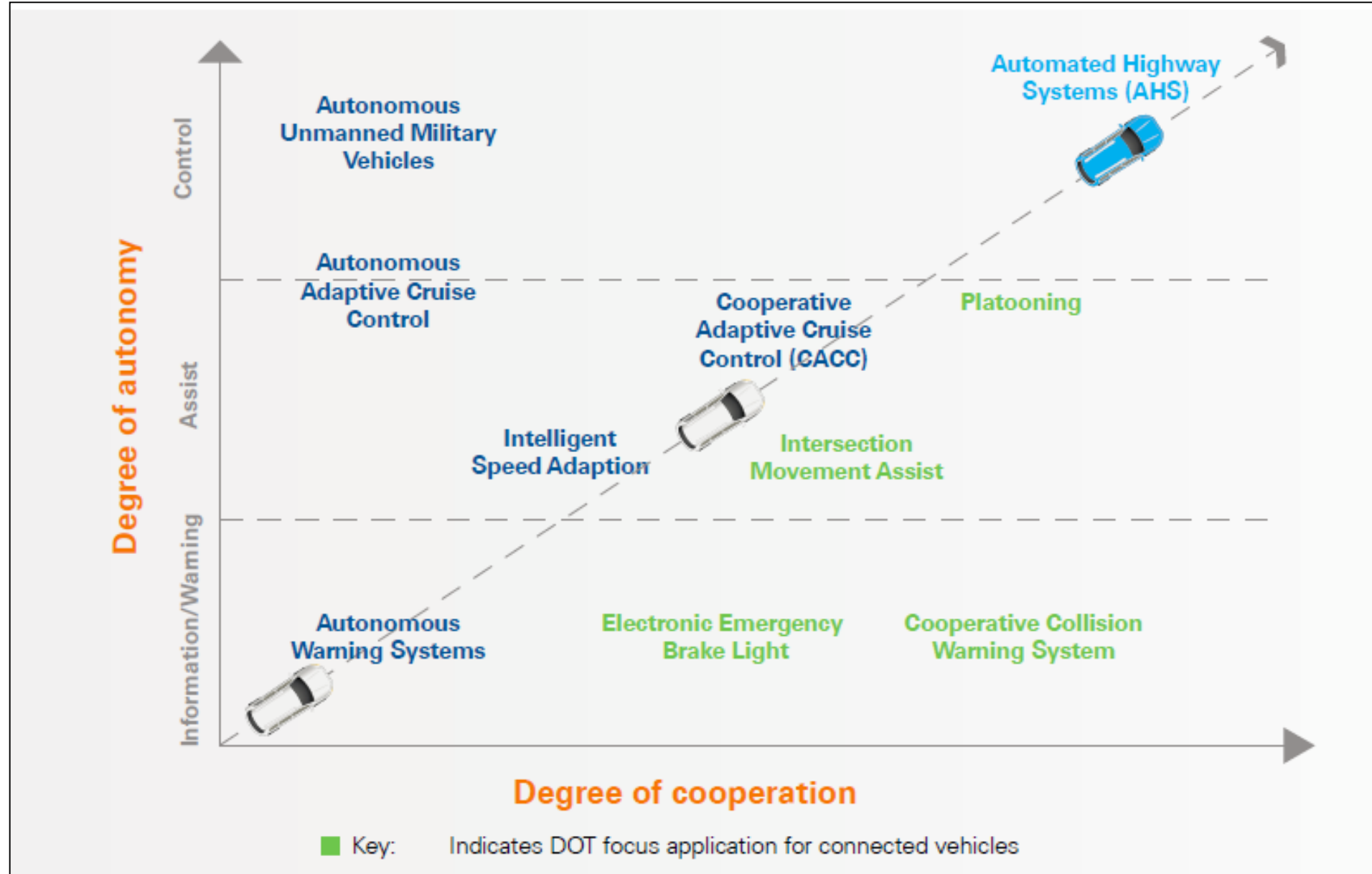


Total Eco-System Benefits of Connected Cars Can Be Substantial...

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



...And convergence of connected vehicle and smart infrastructure will move the industry closer towards autonomous driving and greater asset utilization

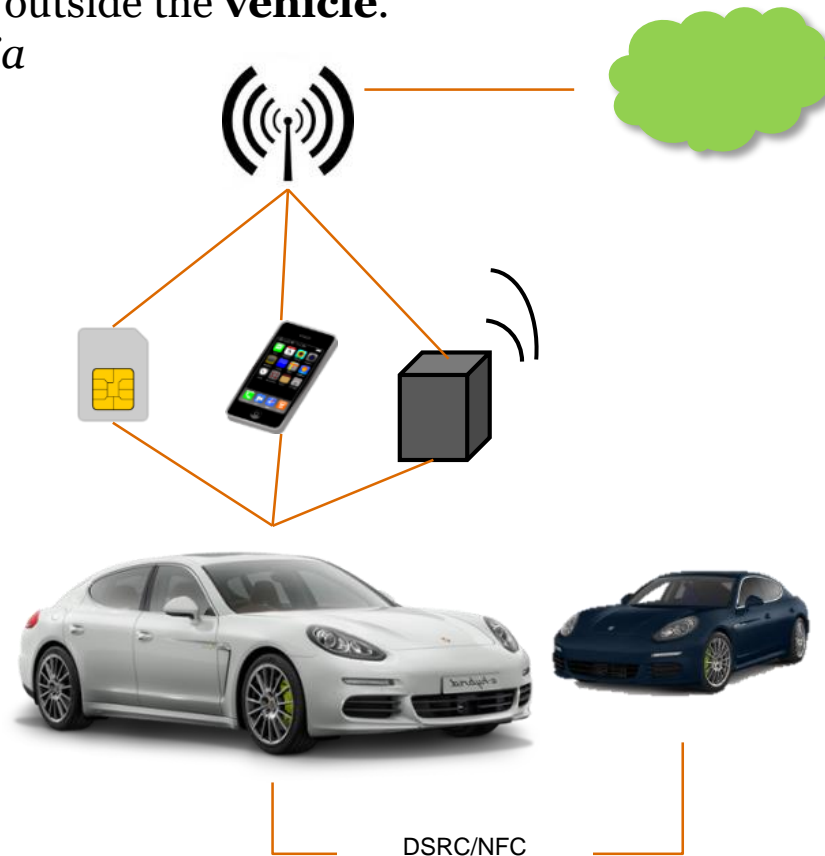


Our Outlook on the Connected Car refers to a broader integrated Mobility Eco-system...

“Narrow” Definition

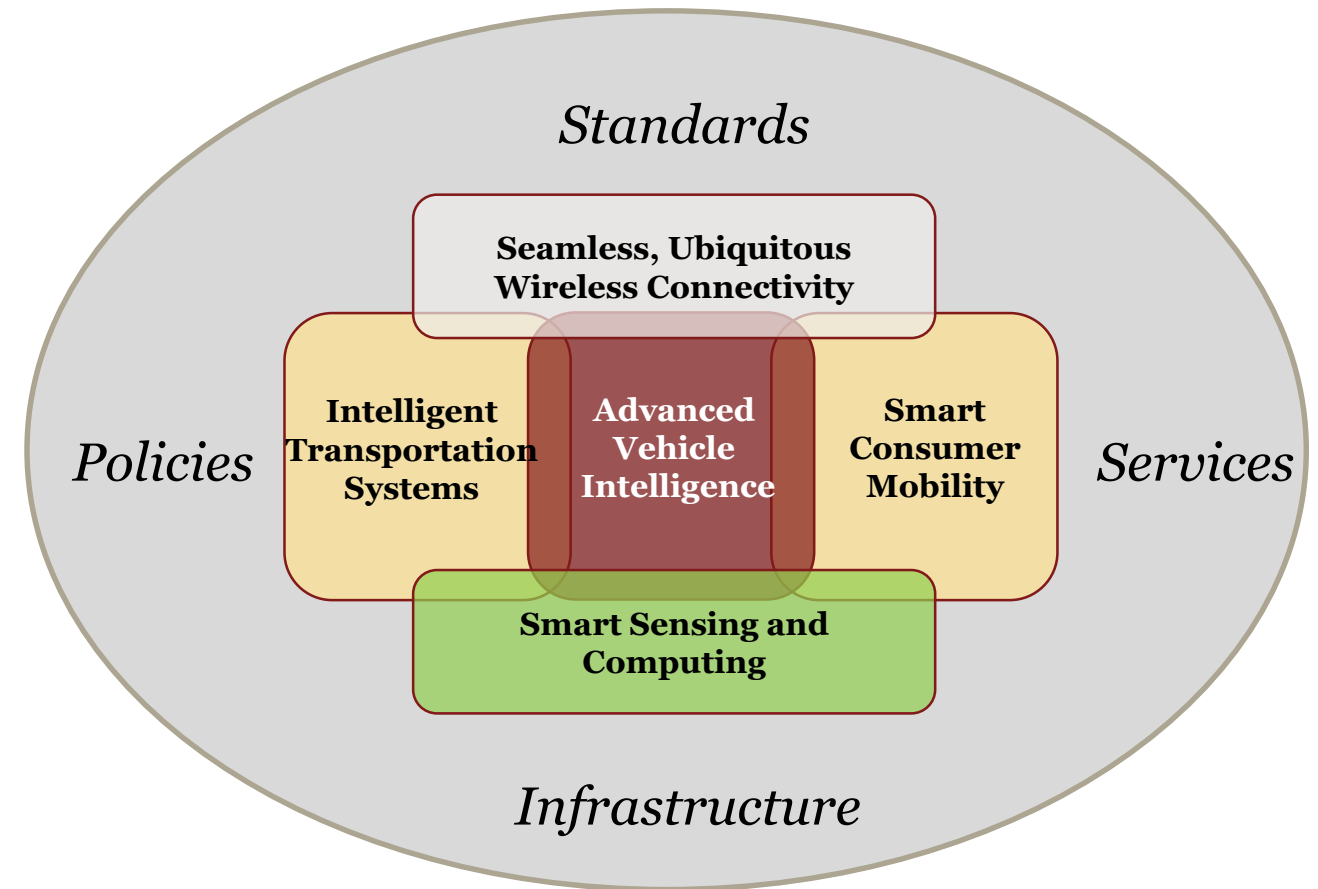
A **connected car** is a **car** that is equipped with internet access, and usually also with a wireless local area network. This allows the **car** to share internet access to other devices both inside as outside the **vehicle**.

Wikipedia

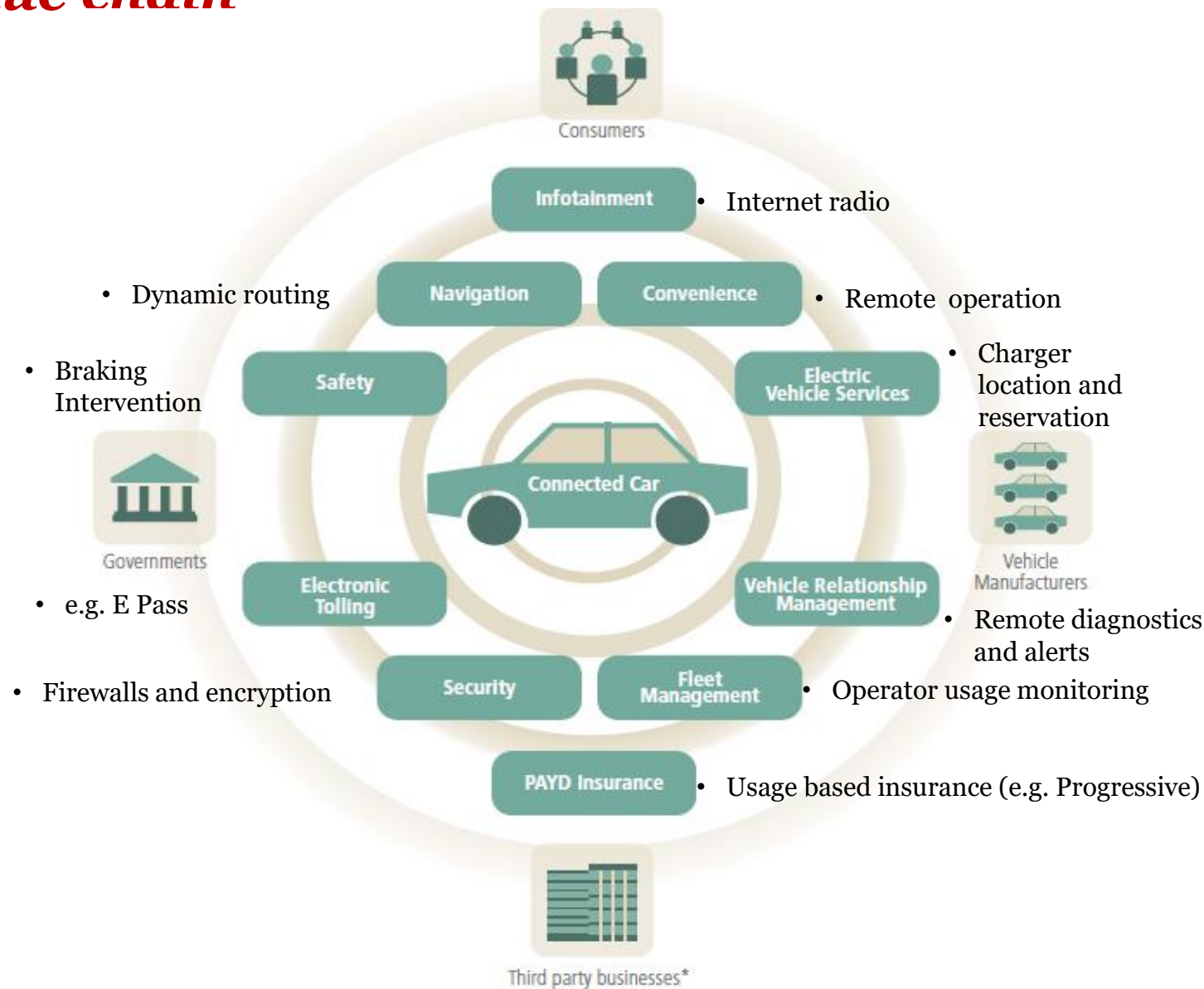


Suggested Broader View

“Connected Car” refers to the broader integrated Mobility Eco-system that enables vehicles, customers, [smart buildings](#), and intelligent transportation systems to interact through seamless wireless connectivity and enhanced sensing and computing infrastructure



...One which contains endless potential service areas for suppliers across the value chain



Mobility Eco-system Value Chain Players

Original Equipment Manufacturers (OEMs)

Technology companies

Content providers

Wireless providers

Fleet and rental companies

Insurance companies

Repair shops

Aftermarket retailers/distributors

Aftermarket telematics suppliers

Dealers

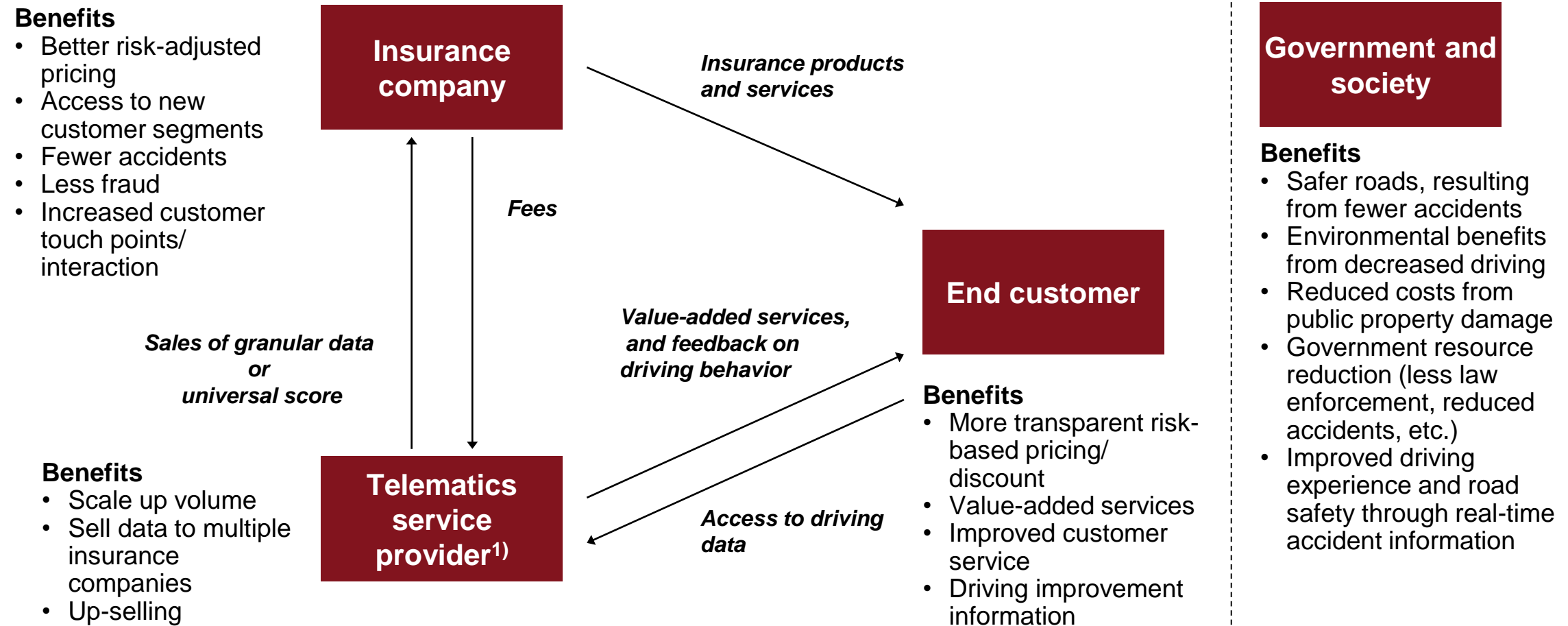
OEM part suppliers

*Third party businesses include: Insurance companies, Fleet management, Traffic concerns

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

Value creation across telematics based insurance eco-system

ILLUSTRATIVE



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 Removed

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

