The Future of Mobility: Automated Driving, Connected Cars, and Shared Mobility

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THE CENTER FOR AUTOMOTIVE RESEARCH (CAR)

Automotive industry contract research and service organization (non-profit) with more than 30 years experience forecasting industry trends, advising on public policy, and sponsoring multi-stakeholder communication forums.

RESEARCH
Independent research and analysis on critical issues facing the industry.

EVENTS
Industry-driven events and conferences that deliver content, context, and connections.

CONNECTIONS
Consortia that bring together industry stakeholders in working groups and offer networking opportunities and access to CAR staff.
Mobility:
The movement of people and goods from place to place, job to job, or one social level to another (across bridges – physical or assumed).
Smart Mobility: The movement of people and goods with...

TRIPLE ZERO

0 Accidents & Fatalities

0 Carbon Footprint

0 Stress
Driver Assistance Available Today

Source: Texas Instruments

TESLA AUTOPILOT

V2X (Cadillac 2018 models)
Deployment Timeline
Automated Driving Systems (SAE J3016 Levels 3-5)
And Coming Soon (Very Soon in Some Cases)!
Prototypes, Test Vehicles, Early Deployment Vehicles

Robo-Taxis
Waymo
Drive.ai

Low-Speed Shuttles
Navya Arma
May Mobility

Urban Delivery
Nuro
Ford

Long-Haul Freight
Daimler
## Automated Vehicle Deployment Models

### Pilots and Early Deployments

<table>
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<tr>
<th>Robo-taxi</th>
<th>Low-speed shuttle</th>
<th>Urban delivery</th>
<th>Long-haul freight</th>
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<tr>
<td>Waymo Phoenix area, AZ (since Apr 2017)</td>
<td>Navya Sion, CH (Jun 2016)</td>
<td>Ford Ann Arbor, MI (Sept 2017)</td>
<td>Daimler Nevada (since May 2015)</td>
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<td>Ann Arbor, MI (since Jun 2018)</td>
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<td>EasyMile Arlington, TX (since Aug 2017)</td>
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<td>GM/Cruise San Francisco, CA (since Sept 2017)</td>
<td>Berlin, DE (since Dec 2017)</td>
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<td>San Ramon, CA (since Apr 2018)</td>
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<td>Forus, NW (since Jun 2018)</td>
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<td>2getthere Capelle aan den IJssel, NL (since Dec 2006)</td>
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<td>Masdar City, UAE (since Nov 2010)</td>
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<td>May Mobility Detroit, MI (since Jul 2018)</td>
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Note: For robo-taxis, low-speed shuttles, and urban delivery, only pilots and early deployments open to the general public or to a select user group are included.
Market Share: Segment Breakdown
U.S. Light Vehicle Sales 2018 YTD Through September

Note: Electrified Segment consists of BEVs, HEVs and PHEVs; all other segments are sales exclusive of Hybrid models

Source: Ward’s Automotive Reports and CAR Research
Segment Breakdown: U.S. Light Vehicles Sales Percent Change
2018 YTD vs. 2017 YTD Through September

Note: Electrified Segment consists of BEVs, HEVs and PHEVs; all other segments are sales exclusive of Hybrid models

Source: Ward’s Automotive Reports and CAR Research
Automated Vehicle Interior Concepts

- Office on wheels
- GM concept: no steering wheel or pedals
- Mercedes concept: rear-facing seats
- Enhanced accessibility
- Adient concept: rotating seats
Convergence of Automated, Connected, Electrified, and Shared Vehicle Technology
Impact on Vehicle Design

• Largest structural impact will come due to change of powertrain

• Exterior design might not be an important differentiator for consumers anymore (especially for shared, automated)

• Integration of sensors will be a priority for designers

• New challenges and innovations (e.g., biometrics, flexible seating, scratch and bacteria resistance) will emerge

• The end of driver-centric design?
Driving Automation Impact on Insurance

Impact of driving automation:
• Fewer claims and lower premiums (?)
• Significant shifts in coverage only at L4-L5
• Less focus on: driver’s motor vehicle record and characteristics
• More focus on: vehicle physical attributes, where and how the vehicle is used

Paradigm shifts:
• Apportioning blame to driver and manufacturer/suppliers
• Greater reliance on product liability
Driving Automation Levels and Challenges in Apportioning Liability

- Assigning liability for SAE L1 to L3
- Lengthy litigation between manufacturers, suppliers, and vehicle operator/driver
- Shifting from driver-focused insurance laws to vehicle-focused laws
Guidelines for the Insurance Industry

• Strengthen technical underwriting capabilities and AV knowledge

• Prepare for incremental changes to cost structures

• Prepare to navigate with insufficient or incomplete data, and exploit emerging sources

• Explore new categories of risks
Connected Vehicle Applications

- V2V & V2I Communication
- Autonomous Navigation & Collision Avoidance
- Location Based Services
- Smart & Resilient Infrastructure

Courtesy of Prof. Dorota Brzezinska, OSU
Internet of Things and Transportation

- Multimodal
- Integrated Payment & Trip Planning
- Shared pick-up and drop-off vehicles
- Seamless integration of travel data
- Better Modeling
Internet of Things Applications in Cities

- New and Improved Infrastructure
- Decreased Carbon Footprint
- Ensured Safety by Location
- Infrastructure Monitoring

Courtesy of Prof. Dorota Brzezinska, OSU
Digital Twin Technology for Smart Cities

Digital twin is the best way for cities to manage growth and becoming “smart”...

- Digitization of physical assets and systems - transportation, communications, infrastructure etc.
- While initial investment may seem high, over time robustness will increase and costs will come down
- Enables modeling of physical assets, systems and potential strategies
- To optimize operations, processes and solutions

Image Source: http://www.atdi.com/wp-content/uploads/2012/05/coverage_lte_ics_designer2.jpg
Leveraging Ubiquitous Connectivity for the Insurance Sector

Impact of vehicle connectivity:
- Abundance of real-world data
- More predictability, less fraud

Paradigm shifts:
- New risks: cyber threats at the individual, vehicle, fleet, infrastructure level

Guidelines:
- Establish advanced analytics capabilities
- Plan for product and business-line shifts
Shared Mobility Services

Shared mobility services are transportation solutions enabled by emerging technologies and wireless connectivity that allow for more convenient, efficient, and flexible travel.
Enhanced Human Services (EHS)

Multi-Modal Trip Planning Application

Integrated Common Payment System

Inclusive Mobility

Common Payment Systems
Shared Mobility Services

Opportunities for the Auto Industry

The rise of shared mobility services is part of a mobility evolution that brings many opportunities for the auto industry.

- New services
- New vehicle concepts
- New functionalities
- New ownership models
- New business partnerships
Major Automakers’ Partnerships Related to Mobility, Connectivity, and Driving Automation
Ridesourcing Adoption

Adoption and Utilization of Ridesourcing in Major U.S. Metropolitan Areas

Growth of North American Carsharing Programs

Yearly data represents July numbers, unless otherwise specified. Totals include one-way and round-trip carsharing and exclude P2P programs. Proxies were used for five of the 32 round-trip operators.

Shared Mobility Services in North America

- 600+ cities with ridesourcing
- 20+ cities with pooled rides
- 10+ cities with microtransit
- 400+ cities with carshare (round trip, free floating, P2P)
- 400+ cities with bikeshare (stationed, dockless) & scooters

Source: Shared Use Mobility Center
Shared Mobility Services in North America

Ridesourcing

Pooled rides and ridesharing

Microtransit

Bikesharing (stationed)

Bikesharing (dockless)

Scooter sharing

Carsharing (round trip)

Carsharing (free floating)

Carsharing (P2P)

Source: Shared Use Mobility Center, CAR research
Insuring Manually Operated Mobility Services

Paradigm shifts:
- Vandalism and theft will become more prevalent risk categories

Challenges:
- Adoption of mobility services will vary by geography and demographics
- How to insure a vehicle used for personal use and ridesourcing and carsharing?
- Will we need ‘safety profiles’ for every mobility user and operator?

Guidelines:
- Retrain claims adjusters to interpret intricacies of shared mobility services
Insuring Automated Mobility Services

Paradigm shifts:
• From driver-centric insurance to mobility operator-centric

Challenges:
• Threat from non-traditional competitors (manufacturers, mapping companies, startups)

Guidelines:
• Develop new insurance products (e.g., coverage against sensor or communication failure, recall risk, risks related to infrastructure)
THANK YOU

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