The future of the automotive industry: Trends and Implications
Top 10 Transformational Shifts Expected to Shape the Future of Mobility

- Connected Vehicles
- New Mobility Business Models
- Manufacturing Evolution
- New Retailing Models
- Women Empowerment
- Health Wellness and Well-being
- Vehicle Electrification
- Tech Invasion
- Cognitive Era
- Autonomous Vehicles

Source: Frost & Sullivan
Connectivity will Drive a Tsunami of Innovation across the Entire Automotive Industry – “behind challenges lie opportunities”
5G in Cars Will Make Our Cars Cognitive and Intelligent
European Commission has signed strategic deals with Asian market leaders in 5G technology, Japan and South Korea and China to rollout 5G by 2020

High to Fully Automated Driving
Over 2 Gb data needs to be harnessed at a given point. Needs 5G speed

Over the Air Updates
Reducing the update time from 3-4 hours to less than 5 min requires 5G speeds

Augmented and Virtual Reality
Continuous processing of real-time information to windshield

Source: Frost & Sullivan
New Business Models - Growth of Car Sharing

The global carsharing market is expected to cross 16.5 million by 2020.

**TRADITIONAL**

- **VEHICLES**: 111,000 in 2015, 212,000 in 2020
- **MEMBERS**: 7 million in 2015, 16.9 million in 2020

**PEER-TO-PEER**

- **VEHICLES**: 203,000 in 2015, 437,000 in 2020
- **MEMBERS**: 2.5 million in 2015, 6.2 million in 2020

**CORPORATE**

- **VEHICLES**: 4,952 in 2015, 84,649 in 2020
- **MEMBERS**: 350 companies in 2015, 4K companies in 2020

*Europe

Source: Frost & Sullivan
New Mobility Business Models & Partnerships Enable First/Last Mile

In both B2C and B2B environments customers are demanding intuitive services; many players investing significantly to deliver a seamless proposition & user experience for Integrated Mobility.
Auto Manufacturing Shift to Industry 4.0

Intense competition in product markets is set to create a surge in service opportunities across the automotive market. OEMs such as BMW, GM, Daimler have adopted innovations in auto manufacturing.

**Industry 4.0**
- Internet of Things
- Smart Clouds
- Wireless intelligence
- Integrated Industries
- IP centralization
- Big Data
- Distributed Manufacturing

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**Key Benefits**
- Lower plant expenditure
- Energy cost reduction
- Preventative maintenance
- Open source frameworks
- Reduced time-to-market
- Efficient training mechanisms
- Local manufacturing
- Reduced complexity

Source: Frost & Sullivan
Additive Manufacturing in the automotive industry is poised to become a $2.2 billion global business by 2020.

**Mass Production**
Mass production treats large groups of customers as anonymous individuals.

**Mass Customization**
With mass customization every consumer is identified for their unique demands.

**Specialized and lightweight components**

**Crowd sourced design and manufacture**

**Adaptable supply chain**

**Aftermarket customization**

**OEMs:**
- BMW
- Ford
- Local Motors

**3D Printer Manufacturers**
- 3D Systems
- Stratasys
- Arcam AB
- Z Corporation
- MakerBot

**Retailer**
**Customer**
**Factory**
The Future of Automotive Retailing
Transformational shift from a transactional model towards a more experience based model leveraging digital technology throughout the customer journey.
The Showroom of the Future

The digital showroom is strategically located in the heart of a mega city; equipped with digital tools, offering virtually unlimited models and configurations to customers.

Source: Frost & Sullivan
Women as Customers - What does a Cars for Women Should Look Like?

There is a market of vehicles designed for women. 1 in 5 want a car made for them while 2 out of 3 express a demand for personalisation options.

SUV body type

High visibility windows – 360 vision

Leather and high strength fabric interiors

Storage for personal items

Fuel type – petrol or hybrid

Run flat tyres

Adjustable seats, pedals and steering

Auto assist functions - park assist and sensorised doors

Integrated touch screen infotainment

Lease option

7 years+ warranty period

Maintenance and tyres package
Women in the Auto Industry – Both sides of the table
The Automotive industry has an average of 16% women in management positions, much lower than the market average of 26% across 7 industries ranging from ICT to healthcare to energy.

Auto Industry Lagging in Gender Diversity – Cultural Shift required
The 3 Cornerstones - The Body, Mind and Soul
Contribute To Humans Definition of Health, Wellness and Well Being

- Personal values
  - Personal fulfilment
  - Self image / self actualisation

- Mind
  - Mood
  - Stress levels
  - Mental health
  - Sense of optimism
  - Attitude
  - Security
  - Safety

- Soul
  - Sight / vision
  - Touch & feel
  - Smell / breathing
  - Sound
  - Temperature
  - Wellness

- Body
  - Wellness
Health, Wellness and Wellbeing the Next Big Differentiation Factor for OEMs

Size, cost, and functionality trends around sensor technologies enable a wide spectrum of potential in-built passenger monitoring/tracking services.

Built-in (Embedded)

Brought-in (Peripheral Integration)

Cloud-enabled (Broadcast)

Source: Frost & Sullivan
Key Powertrain Market Trends

Global emissions norms (EURO VI/VII, EPA, 2020 ACEA) and fuel economy standards (CAFE, CAFC) constantly encourage OEMs and the automotive value chain to innovate and adopt varying global powertrain strategies.

**Turbo Engine Downsizing**
- 2- and 3-cylinder engines, reduced engine displacement, down-speeding

**Powertrain Modularity and Lightweighting**
- Aluminum, modular construction, parts commonality

**Emission Reduction & Fuel-efficient ICE Technologies**
- DI, VVT, SCR, EGR, LNT, start-stop, cylinder deactivation, GPF
- **Drivers**: Euro6, ACEA, EPA, CAFE

**High-speed Transmissions**
- High-speed DCT, 8/9/10-speed

**Emission Testing Procedures**
- Migration from NEDC to WLTP, RDE

**Powertrain Electrification**
- PHEVs, diesel hybrids, transmission electrification, EVs, range extenders

Source: Frost & Sullivan
Global Uptake of Electrification in Passenger Vehicles
Electrified Vehicles to go from 2.8 million in 2016 to about 14M units by 2025 (12% of global automotive sales)

Sales forecasts for hybrid, electric and fuel cell vehicles (Global), 2012-2025

Note: Regions include North America, Europe, China, Japan, India, South Korea and Australia
Tech Invasion – New Companies Entering the Automotive Space

New OEMs entering the Market will disrupt product lines

- Next EV
- Faraday
- Apple
Tech Invasion – the Way Forward
The development of new mobility solutions and autonomous vehicles is driving a plethora of new market players set to disrupt the existing ecosystem and value creation model.

<table>
<thead>
<tr>
<th>Established Players (from ADAS)</th>
<th>Emerging Players (outside the ecosystem)</th>
<th>Margins</th>
<th>Services</th>
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<tbody>
<tr>
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<td>Silicon</td>
<td>Vehicle</td>
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<td>Luxoft</td>
<td>freescale</td>
<td>GM</td>
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<td>Green Hills Software</td>
<td>Bosch</td>
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Margins:
- Established Players: 10 to 20%
- Emerging Players: 5 to 10%
- Silicon: 1 to 5%
- Vehicle: 2-10%
- Services: 15 to 25%
The Cognitive Era: Artificial Intelligence Driven Industry Transformation

From hands free to mind free – the market Value of artificial intelligence for enterprise application will reach more than $11 billion by 2025.
Evolution of Vehicle Manufacturers’ Value Creation Model
Shift from developing and selling hardware to delivering services throughout the life cycle of the vehicle, and leverage “Asset Light” models

- **Car Independent**
  - Integrated Mobility: Journey Planning, Booking & Payment
  - City Planners & Lifestyle
  - Energy creation & storage

- **Car Services**
  - Carsharing & Ride-Sharing
  - Parking & Charging
  - On-demand Features
  - Taxi & Limousine
  - Automated Driving

- **Car Ownership**
  - Finance
  - Maintenance Contracts & Warrant Extension
  - Connected Services (Infotainment)

**Vehicle Development, Sales & Aftersales**
Thank You for Your Attention - Questions & Answers

Future of Mobility Video

Watch our latest Video on the Future of Mobility, filmed live at Frost & Sullivan’s Annual Mobility Workshop

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