Empowering the Automotive Industry

The new Road ahead for Connected and Autonomous Vehicles

Fran Dougherty – CTO
Automotive Industry
Microsoft Corp.
The automotive industry is transforming

By 2030

<table>
<thead>
<tr>
<th>Feature</th>
<th>Target</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Autonomous</td>
<td>10-15%</td>
<td>of new cars projected to be fully autonomous</td>
</tr>
<tr>
<td>Connectivity</td>
<td>100%</td>
<td>of new cars projected to be connected, up from ~25% today</td>
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<td>Electric</td>
<td>~25%</td>
<td>Share of new auto sales</td>
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<tr>
<td>Shared</td>
<td>32%</td>
<td>of miles driven on new cars will be in shared rides</td>
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Sources: McKinsey; Accenture; Microsoft analysis
Technology’s Role
People-centered experiences
Ubiquitous computing
AI
People-centered experiences
DIGITAL FEEDBACK LOOPS

1. Data
   - Capture digital signal across business

2. Intelligence
   - Connect and synthesize data

3. Action
   - Improve business outcomes

- Engage customers
- Deeper relationships
- More efficient ops
- Optimize operations
- Operational data
- Employee signal
- Better products
- Product telemetry
- More effective employees
- Transform products
- Empower employees
Microsoft’s Role
Microsoft’s Automotive digital transformation principles

Technology partners approach to automotive

1. Complements OEMs and Mobility Service providers – not compete
2. Ensures your data is always under your control
3. Guarantees the brand and customer experience belongs to you

Technology driven transformation

- Connected Vehicle
- Autonomous Development
- Smart Mobility
- Marketing, Sales, Service
- Connected Factory
- Emerging
Supporting end-to-end business transformation
Our digital transformation focus areas for the new automotive ecosystem
Daimler AG: Digital Transformation through Big Data and AI

“For a long time it was a dream for us to operate Big Data on the basis of a cloud platform and to make them available to all parts of the company worldwide. Microsoft Azure brings exactly the data protection and data security features that have propelled us into the cloud.”

— Guido Vetter, Head of Corporate Center of Excellence Advanced Analytics & Big Data, Daimler AG
Public Festival
FictionZ Music Festival

Main Artist Lineup:
Emm Che
Harvici
Nadalütte

Gilli van Nili
Salad Motion
Mel Itch
DJ Rupert
Monsieur Q.

Boutique camping
Based Hostels available
Microsoft Connected Vehicle Platform

Combining advanced cloud and edge computing services with a strong partner network to empower automotive companies to build connected driving experiences.

- In-vehicle experiences
- Connectivity and over-the-air updates (OTA)
- Autonomous driving
- Telematics and predictive services
- Customer engagement and insights
- Advanced navigation
“Volkswagen, as one of the world’s largest automakers, and Microsoft, with its unique technological expertise, are outstandingly well-matched. Together, we will play a key role in shaping the future of auto-mobility”

— Dr. Herbert Diess, CEO of Volkswagen
Autonomous development workflow & partner ecosystem

1. Phase One: Ingest and prepare
   - Test vehicle data generation
   - Ingest/store
   - Process/Sample/Reduce
   - Tag
   - Render/Convert/Store

2. Phase Two: Train and simulate
   - Algorithm Testing
   - Train
   - Replay
   - Simulate/Store
   - Connectivity-based validation

3. Phase Three: Build and validate
   - Control Logic Validation
   - Build
   - Integrate
   - Generate Code
   - Performance Simulation
   - Test-Drive

Massive Data Computational Intensity Traceability Integration AI Models

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Azure Express Route
Azure Compute
Azure Data Box
Azure Batch AI
Cognitive Services
Databricks & HDInsight
Azure Machine Learning
Cycle Cloud
Azure IoT Edge
Azure Kubernetes Service
Azure Key Vault, AAD
“Thanks to the cloud, the question of storage capacity and computing power has finally been answered. We can fully concentrate on developing and securing our technical solutions for automated and autonomous driving”.

— Adrian James,
Head of Automated Driving Safety, AUDI AG
# Key Industry Ecosystem Engagements

<table>
<thead>
<tr>
<th><strong>American Center for Mobility</strong></th>
<th><strong>Baidu 百度</strong></th>
<th><strong>apollo</strong></th>
<th><strong>BOSCH</strong></th>
<th><strong>L3 Pilot Driving Automation</strong></th>
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<tbody>
<tr>
<td>Cloud and Analytics partner for ACM, an autonomous and smart mobility test facility</td>
<td>Open source AD Platform</td>
<td>OpenADx</td>
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<td>Collaborate with FEV on L3pilot.eu</td>
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<td>Leveraged by all OEMs, tier ones and technology start ups</td>
<td>200+ Member Consortium</td>
<td>Interoperable Eclipse Framework</td>
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<td>Enable SAE Level 3 functions to be tested in fleets while minimizing the number of errors in order to ready them for series production in the follow-up of the study.</td>
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<td>Engaged with ACM to develop standards</td>
<td>Microsoft is the cloud provider for Project Apollo worldwide except for China</td>
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What’s Next?
EMPOWERING CITIES & CITIZENS
Cities are where the action is

4.8 billion people will live in cities by 2025

80% of the world’s energy is consumed in cities

80% of GDP is created in cities

Microsoft CityNext

Smart Transportation Council

OMF OPEN MOBILITY FOUNDATION

Stanford ALLIANCE TO SAVE ENERGY

Smart Transportaion Council
Thank you

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