The Vehicle’s Digitalization: Continental’s digital journey
Ralf Lenninger
Continental Automotive GmbH
Digitalization drives Innovation
The 3 Digital Waves Model
Digitalization Drives Innovation
The 3 Digital Waves Model

Revenue

Year

1985

2016

Wave 3
Wave 2
Wave 1
Wave 1 “Mechatronics”
Digitalization Makes Mechanics Intelligent

Revenue

Year

1985
2016

Wave 1 „Mechatronics“

Revenue

1985
2016

Wave 1 „Mechatronics“
Wave 1 “Mechatronics”
From Opportunity to Business

1. Mass Market
   - 1980+: Digitally controlled:
     - Engines
     - Brakes
     - Clusters
     - Tires
     - ...

2. Growth Strategy
   - Step 1: Acquisition
   - Step 2: Integration
   - Step 3: Growth

3. Implementation
   - TEVES
   - SIEMENS
   - VDO
   - MOTOROLA
   - TEMIC

4. Result
   - Revenue
   - > 12 bn €

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Wave 2 “Systems Integration”
Networking of Mechatronics Makes the Car Intelligent
Wave 2 “Systems Integration”
From Opportunity to Business

1. Market
   - Up to 90 mechatronics, ~15,000 interfaces / protocols
   - Integration in a perfect network
   - OEM demanding strong support (mechatronics ++)

2. Growth Strategy
   - Step 1: Acquisition
   - Step 2: Integration
   - Step 3: Growth

3. Implementation
   - Elektrobit

4. Result

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Wave 3 “Mobility Services“
Networking of Cars Makes Mobility Intelligent

Revenue

Year

1985

2016

Wave 3 „Mobility Services“
Wave 3 “Mobility Services“
Services Principles: Value Add Chain

Crude Oil → Refinery → Gas Station → Consumer

Data → Big Data Analytics → Services

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The Internet of Everything
The Connected Car
The Vehicle as Part of the IoE
What are the Benefits?

“Visible” services
→ Attractive car

Intelligent Transportation Systems
→ Better traffic

“Invisible” services
→ Better car
The Vehicle as Part of the IoE
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"Visible" services

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"Invisible" services

→ Better car
The Better the Vehicle Knows the Road, The Better the Vehicle Will Be

- More Efficient
- Cleaner
- Safer
- More intelligent
CV Cruise Control – SOP 2012

3% Average Fuel Savings
That Means:

- 267 Mio. Liter of Diesel
- 704,236 Tons of CO$_2$
- €360 Mio. Fuel Costs
# Evolution of the eHorizon (dynamic)

## Predictive Maintenance

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Safety</th>
<th>Comfort</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curve Speed Warning</td>
<td>Road Hazard Warning</td>
<td>Advanced Retarder Control</td>
<td>Remote Diagnostics</td>
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<tr>
<td>Intelligent ACC</td>
<td>Traffic Light Assist</td>
<td>Preview ESC</td>
<td>Platooning</td>
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<td>Eco Driving</td>
<td>Intelligent Energy Mgmt.</td>
<td>Speed Advisor</td>
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<td>Smart Cruise Control</td>
<td>Remote Function</td>
<td>48V Eco Drive System</td>
<td>Predictive Maintenance</td>
</tr>
<tr>
<td>Control</td>
<td>Submit Parking lot availability</td>
<td>Green Wave Assist</td>
<td>Predictive Suspension Control</td>
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<td>SW Update OTA</td>
<td>Strategic Routing</td>
<td>Advanced Shifting</td>
<td>Vehicle Lifecycle Management</td>
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<td>Bump/Pothole Warning</td>
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## Evolution

- **2016**
  - Curve Speed Warning
  - Road Hazard Warning
  - Advanced Retarder Control
  - Intelligent ACC
  - Eco Driving Smart Cruise Control
  - SW Update OTA
  - HD Map Update

- **2017**
  - Speed Advisor
  - Preview ESC
  - 48V Eco Drive System
  - Intelligent Energy Mgmt.
  - Remote Function
  - Strategic Routing
  - Submit Parking lot availability

- **2018 – 2019**
  - Damping Control
  - Platoonung
  - Advanced Shifting
  - Remote Diagnostics
  - Vehicle Lifecycle Management

- **2020 ...**
  - HAD
  - Highway Chauffeur
  - Predictive Suspension Control
  - Predictive Maintenance
  - City Toll
eHorizon References
Connected Enhanced Cruise Control \textit{powered by eHorizon}

- Road Model delivers precise and lane specific speed limit information
- ACC longitudinal control adapts to speed limits and curve radiiuses
- or AFFP gives feedback while vehicle is manually driven
## Evolution of the eHorizon (dynamic)

Submit Parking lot availability

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**Note:** Smart cruise control includes intelligent ACC.

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**Public**

**01th of July 2016**

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Park&Go @SG
First concrete result for Singapore‘s population & Smart Nation

Parking App is the first product out of the collaboration: Continental + I²R + TUM
Thank you for your attention. Any questions or comments?