Automotive 4.0 – Threat or opportunity for incumbents?

DHL Automotive Supply Chain Innovation Conference

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Roland Berger
Strategy Consultants

Detroit, MI – April 28, 2015
Disruptive trends are converging, significantly reshaping the automotive landscape and traditional value chain dynamics.

Key drivers

**Major disruptions**

- Re-prioritizing of customer expectations & buying criteria
- New and open eco-system
- Innovation in business models
- Change in value centers
- Fast development cycles

Source: Roland Berger
New entrants and technologies are poised to upset the entire value chain – With a completely different business concept

Time needed to sell 1 million units

'Legacy' Automotive industry


3.2  2.7  years

'iPad mini' (2012)  'iPhone 6' (2015)

2  0.5  days

Source: Roland Berger
New entrants provoke brutal changes in consumer habits and have the potential to completely disrupt industries

Cultural goods illustration: US market [2003 – 2013 ; Base 100]

Source: PricewaterhouseCoopers LLP, Wilkofsky Gruen Associates, Roland Berger analysis
If any doubt, this disruption is real – And it is impacting players in the entire ecosystem

SFO metro area – Revenues p.a. [USD]

- Only 50 m from traditional taxi business
- New market created – at the expense of all players

<table>
<thead>
<tr>
<th>Year</th>
<th>Taxi pre-Uber</th>
<th>Taxi post-Uber</th>
<th>Direct from taxi business</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>140</td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Press research, Roland Berger
And they do it again: Google & Co. are heavily disrupting Nokia's HERE business model

Nokia group revenues [USD bn ; 2003-2014]

- Nokia emphasized on incremental innovation of existing products instead of pushing for disruptive innovation
- Nokia bought Navteq in 2008 for $8.1 b, thinking it would be able to compete against Google and Apple
- In June 2013, Google bought Waze for $1.1 b
- In 2014, Waze in handling 100x more traffic information than Navteq (now Nokia HERE)
- Recently, Nokia estimated that the fair value of Nokia HERE is $2.2 b

Note: Navteq was rebranded as Nokia HERE
Source: Capital IQ, Nokia, Wall Street Journal, Roland Berger analysis
Incumbents are leaving the state of denial and start acknowledging the risk – demonstrating confidence…

**Dr. Dieter Zetsche**  
Chairman of the Board of Management, Daimler AG

*There is tremendous opportunity from the convergence of West Coast technology and the auto industry… We are not afraid. We are confident about our own strength.*  
– March 2015

**Sergio Marchionne**  
CEO, Fiat Chrysler Automobiles

*I am concerned about somebody of that caliber [Apple] playing the disruptor role…*  
– March 2015

**We don't think it's feasible** that Google or Apple have driverless cars ready by 2020…  
– March 2015

**Carlos Ghosn**  
Chairman and CEO, Renault Nissan Alliance

**Continental would be very interested in acting as partner** for technology giant Apple, should they decide to build a car.  
– March 2015

**Elmar Degenhart**  
CEO, Continental AG

**Driverless cars could decrease consumer demand for insurance products.**  
– Annual Report

**LKQ**

*If the number of vehicles involved in accidents declines or the number of cars being repaired declines, our business could suffer.*  
– SEC filing

Source: Press research
There is hope: New revenue pools are arising for the entire industry

Example: new revenue opportunities from automated driving [USD bn]

New software revenues\(^1\) [USD bn] 10-20

New hardware revenues [USD bn]

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2-0.4</td>
<td>3-4</td>
<td>12-15</td>
<td>20-25</td>
<td></td>
</tr>
</tbody>
</table>

CAGR 2015-'30

- **Advanced driving features brings huge opportunities to suppliers**
  - **Hardware:**
    - High-value hardware components, such as cameras, sensors and communication are required by autonomous driving functions
  - **Software:**
    - **Functional:** All new features and components must be programmed and integrated in the vehicle
    - **On-board intelligence:** Advanced prediction & decisions algorithms are needed to allow advanced driving features, including autonomous driving

1) Prediction & decision algorithms; 2) 2020-2030; 3) Excludes cost of current ADAS sensor and ECU package, some of which will be made redundant by, e.g., installation of a central master ECU

Source: Roland Berger
Incumbents are in the best position to capture value from new trends

Major advantages of incumbent suppliers

Industry and market knowledge

> Incumbents have a **deep knowledge** of the industry, with **strong relationships** and partnerships with key players

> Further **strengthening these relationships will be key** in the rapidly changing industry

Existing brand and quality recognition

> Incumbents have strong **customers recognition** due to their long history and **high quality standards**

> Keep developing **high-quality automotive grade** products is essential to maintain current status

Source: Roland Berger
But change is essential to capture new value buckets and avoid being left behind

Action points for incumbents suppliers

1. **Legacy business model**
   Incumbents need to **change their business models**, as the changing OEM buying behavior and value perception are leading to **disaggregated business models** and thus challenging the traditional integrator role.

2. **Lack of speed**
   Players must **become agile to adapt**, as the value chain is transforming into a fluid ecosystem where players are changing roles and new players are entering – One-dimensional players will be squeezed out.

3. **Lack of skills**
   Finally, companies have to **find creative ways to fill their gaps**, as additional/new products, services, and business models are needed to survive in the new automotive world.

Source: Roland Berger
The traditional role as integrator is under threat due to changing OEM buying behavior and value perception

Threat to traditional integrator role – Example cockpit electronics

**Today's value chain**

<table>
<thead>
<tr>
<th>Tier 2</th>
<th>Tier 1</th>
<th>Tier 1/OEM</th>
<th>OEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/ware (OS, apps)</td>
<td>IVI integration incl. s/ware and h/ware value add</td>
<td>System integration</td>
<td>Vehicle integration</td>
</tr>
<tr>
<td>H/ware (RM, screen)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S/ware (OS, apps)</td>
<td>IC(^1) integration incl. s/ware and h/ware value add</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H/ware (RM, screen)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Tomorrow's potential value chain**

<table>
<thead>
<tr>
<th>Tier 2</th>
<th>Tier 1</th>
<th>3rd Party</th>
<th>OEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>IVI s/ware</td>
<td>IVI/IC s/ware module integration</td>
<td>Lifecycle services incl. connected services, updates, upgrades, analytics</td>
<td></td>
</tr>
<tr>
<td>IC s/ware</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IVI h/ware</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IC h/ware</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Insights**

- Today's integrators capture value from Tier 2 sourcing and integration of modules and systems.
- OEMs view E/E systems as core to future value, and want a larger role in integration.
- This is seen in leading Premium OEMs today and is likely trend for some Volume OEMs.
- OEM direct-sourcing key E/E s/ware and h/ware threatens integrators.
- OEMs using 3rd party hardware integrators (e.g. Ford and Flextronics) adds further pressure.

1) IC = Instrument Cluster

Source: Roland Berger
Example Audi: OEMs are already pursuing progressive partnerships with Tier 2 semiconductor manufacturers at eye level

Audi’s electric/electronic supply chain sourcing strategy

**PAST**

<table>
<thead>
<tr>
<th>Tier 2</th>
<th>Tier 1</th>
<th>Audi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Materials</td>
<td>Raw Materials</td>
<td>Raw Materials</td>
</tr>
<tr>
<td>Semiconductor</td>
<td>Semiconductor</td>
<td>Semiconductor</td>
</tr>
<tr>
<td>System on chip</td>
<td>System on chip</td>
<td>System on chip</td>
</tr>
<tr>
<td>ECU</td>
<td>ECU</td>
<td>ECU</td>
</tr>
<tr>
<td>Vehicle</td>
<td>Vehicle</td>
<td>Vehicle</td>
</tr>
</tbody>
</table>

**PRESENT/FUTURE**

<table>
<thead>
<tr>
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<th>Tier 1</th>
<th>Audi</th>
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<tr>
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<td>System on chip</td>
<td>System on chip</td>
</tr>
<tr>
<td>ECU</td>
<td>ECU</td>
<td>ECU</td>
</tr>
<tr>
<td>Vehicle</td>
<td>Vehicle</td>
<td>Vehicle</td>
</tr>
</tbody>
</table>

Tier 1 holds the key relationship with both, the OEM and Tier 2 suppliers

Tier 1 is squeezed due to direct buy by Audi and Tier 2s moving into system on chips

Source: Audi; Roland Berger
Example module fusion: Addressable value heavily under threat due to hardware disaggregation

Example consolidated modules

<table>
<thead>
<tr>
<th>Sum of parts case [USD/unit]</th>
<th>Consolidated case [USD/unit]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infotainment (IVI) USD 600</td>
<td></td>
</tr>
<tr>
<td>Cluster USD 200</td>
<td>Core 1</td>
</tr>
<tr>
<td>Telematics (TCU) USD 100</td>
<td>Core 2</td>
</tr>
<tr>
<td>Audio Module USD 100</td>
<td>Core 3</td>
</tr>
<tr>
<td>Audio Module USD 100</td>
<td>Core 4</td>
</tr>
<tr>
<td>CAN bus</td>
<td>Virtualization</td>
</tr>
<tr>
<td></td>
<td>USD 600</td>
</tr>
<tr>
<td></td>
<td>Cluster USD 150</td>
</tr>
<tr>
<td></td>
<td>IVI USD 150</td>
</tr>
<tr>
<td>1,000</td>
<td>300</td>
</tr>
<tr>
<td>(100%)</td>
<td>600</td>
</tr>
<tr>
<td>-10%</td>
<td>(67%)</td>
</tr>
<tr>
<td>-40%</td>
<td>(33%)</td>
</tr>
</tbody>
</table>

Insights

> A sample set of consolidated cockpit modules results in a drop in piece price value of approx. 10%

> In addition, 33% of new value at risk due to disaggregation of peripheral displays…

> … resulting in a potential 40% value drop

1) Reference Volume: 500k units; Reference segment: Mid-range

Source: Expert interviews; Roland Berger
The new ecosystem is fluid – Players need to be agile and flexible to occupy highest value positions

Connected vehicle eco-system evolution and implications

**Insights**

> Value chain being quickly transformed into a fluid eco-system

> New players are entering and actively moving to occupy highest value positions

> Players are combining products and services to create compelling offers and stay competitive

Source: Roland Berger
Example Harman: Adaptation to threats of losing integrator role by diversifying business model

Case study – Harman

2010

Core hardware integration business
- Infotainment
- Lifestyle audio
- Professional audio

2015

Core hardware integration business
- Infotainment
- Lifestyle audio
- Professional audio

Impact

Revenue split [USD bn]¹

<table>
<thead>
<tr>
<th>Year</th>
<th>Specialized software</th>
<th>Cloud services</th>
<th>Analytics</th>
<th>Content</th>
<th>Navigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015E</td>
<td>3.4</td>
<td>2.5</td>
<td>0.9</td>
<td>0.5</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Software Hardware

"The money is actually in software. It’s in the software design and architecture and safety, which is what we’re spending our money on right now”

- Dinesh Paliwal, Harman CEO

¹ 2015 revenue split based on 75% software revenue from Harman public statements, 2010 revenue split is illustrative; 2010 revenue is actual, 2015E from statement Jan. 29, 2015

Source: Press research; Roland Berger
Additional products, services, and business models are needed to expand value creation potential.

Expansion opportunities for Electronics players

1) Market size by 2020 [USD bn] – estimates depending on the scope of included components; ADAS includes autonomous driving systems; CAGR for 2015-2020

Source: Roland Berger

Insights

> Players with strong functional skills will have the chance to expand their market positioning.

> As an example, players involved with cockpit electronics can expand to ADAS, market with much higher growth rates.
Example Corporate Ventures: A smart strategic lever to manage industry disruption – Only a few players active

### CVC investments in 2014

<table>
<thead>
<tr>
<th>Industry</th>
<th>Value [USD m]</th>
<th>Count [#]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software</td>
<td>2,511</td>
<td>339</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>811</td>
<td>98</td>
</tr>
<tr>
<td>Media and Entertainment</td>
<td>682</td>
<td>86</td>
</tr>
<tr>
<td>Medical Devices and Equipment</td>
<td>290</td>
<td>48</td>
</tr>
<tr>
<td>Industrial/Energy</td>
<td>268</td>
<td>46</td>
</tr>
<tr>
<td>Automotive1)</td>
<td>49</td>
<td>7</td>
</tr>
</tbody>
</table>

### Formal CVC

- DAIMLER
- TOYOTA
- GM
- VOLVO
- HONDA
- DELPHI
- BASF
- HITACHI
- BOSCH

### Minor initiatives

- Volkswagen
- Mazda
- MAGNA
- VOLVO
- VOLVO
- DELPHI
- BASF
- HITACHI
- BOSCH

### Nothing in place

- Over 30 OEMs (LV, CV, OH)
- Over 90 Suppliers
- All others2)

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1) Investments in 2014: Bosch 3, BMW i Ventures 2, GM Ventures 1 and Daimler 1; Total volume of investments is an estimation
2) OEMs and suppliers with over USD 10 bn and USD 2 bn in revenue, respectively

Source: NVCA MoneyTree Report, Crunch Base; Capital IQ; Roland Berger
When you’re fumbling around, that’s the moment where opportunity and disaster are close at hand.

But if you can push it to opportunity, you’ll get something really special.

—Bruce Springsteen