Snippets: Automotive Digital Cockpit
An Analysis by Draup

These are the snippets from our report on Automotive Digital Cockpit and Opportunities for Technology Service Providers (TSP)

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AGENDA

01 Digital Cockpit - Overview

02 Automotive Digital Cockpit Landscape

03 Cross Industry Collaborations

04 Service Providers Opportunities

Topics Covered:
- Market Overview
- Key Trends
- OEM Collaborations and Focus Segments
- Tech Giants and Start-ups Ecosystem
- Vendor Analysis - Overview

- Evolution of Digital Cockpit
- Automotive Digital Cockpit Landscape
- Cross Industry Collaborations
- Start-ups Ecosystem
- Key Vendor Engagements Analysis

Topics covered only in the Snippets Report

Topics covered only in the Full Report
A digital cockpit is a digital screen in place of a traditional instrument cluster providing a digital experience within a car covering multiple screens, digital assistants and different means of input.

The digital cockpit makes the driving experience safer as it provides a platform where the front, rear and side cameras and sensors (used when changing lanes, parking or reversing) can warn drivers of any hazards.

**Automotive Digital Cockpit**

- **Heads Up Display**
  - A computer-augmented transparent display to present information, data or other visual elements to a user’s focal viewpoint.

- **Mirror Replacement Vision System**
  - Provide a front/back HD camera and display system instead of physical side and rear-view mirrors.

- **Infotainment & Head Unit**
  - In-car entertainment or in-vehicle infotainment is a collection of hardware and software in automobiles to provide audio or video entertainment.

- **Control Display**
  - Enables control of other features such as air conditioning.

- **Digital Cluster**
  - Set of instrumentation including speedometer that is displayed with a digital readout gauge.

**Global Automotive Cockpit Electronics Market**

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Size in USD Billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>34.4</td>
</tr>
<tr>
<td>2020</td>
<td>55.1</td>
</tr>
</tbody>
</table>

**Key Players**

![Bosch](logo_bosch.png)  
![NVIDIA](logo_nvidia.png)  
![Continental](logo_continental.png)  

![Panasonic](logo_panasonic.png)  
![Visteon](logo_visteon.png)  
![Parrot](logo_parrot.png)  

![HARMAN](logo_harman.png)  
![DENSO](logo_denso.png)  
![MAGNETI MARELLI](logo_magneti_marelli.png)

**Note:** These key players occupies more than 50% of the total market share.

**Overview:** Auto electronics vendors are redefining their HMI offerings with the increasing penetration of digital cockpits.
Key Trends: Haptic feedback and speech recognition are highly focused features that are being integrated into first gen Digital cockpit

Current Technology
- Samsung’s (SSNLF) Harman unit unveils a dual-display system that personalize its settings with the help of a paired smartphone.
- Samsung’s Digital cockpit platform combines 5G technology and an IoT platform to support a connected lifestyle without compromising safety or performance while on-the-go.
- Qualcomm demoed an LG Electronics system to put the instrument cluster and main infotainment system on a common 30-inch display, while also delivering content to rear displays built into a car’s seats.
- Volkswagen and Cinemo via Volkswagen’s media control app for iOS or Android to integrate new infotainment content and features into the latest Touareg.

Future Focus
- Introduction of electronically controlled vehicle mechanism
- Reducing tailpipe emissions
- Improving functionality of the braking system, steering control, and throttle control.
- Cloud Computing for cars
- Digital Cockpit platform with 5G technology and an IoT platform to support a connected lifestyle.
- Next five years will see a lot of action in the human machine interface and creation of services platform in cloud.

Automotive Cockpit Electronics Market Key Countries

US
Germany
South Korea
China
Japan
Brazil

Note: Analysis is based on the DRAUP’s proprietary database, updated in Jan 2019
Note: The above insights are curated from news articles, journals and other similar sources.

Market Trends
- Increasing introduction of holographic display
- Inclusion of haptic feedback systems within vehicle infotainment system
- Digitalization - an enhancement to the vehicle interiors and a USP for OEMs
- Connected vehicle technology & IoT

Key Driving Factors
- Increasing demand for connected vehicles
- Increase in awareness about passenger and vehicle safety
- Rapid electrification of vehicles
- Falling prices of LCD/TFT Display will gives economy of scale benefits
- Rapid Rise In Automotive Industry

Expected CAGR (2014 to 2020) - 12.0%
Expected estimated value (2020) - USD 61.5 billion.
Expected market value (2023) - USD 4.71 billion
Expected CAGR (2023)- 29.91%
Expected Market value (2025) - USD 6.60 Billion

US
Germany
South Korea
China
Japan
Brazil
### OEM Collaborations: NVIDIA and Bosch are major go-to market partners for deploying digital cockpit solutions

<table>
<thead>
<tr>
<th>Services:</th>
<th>Key Partners:</th>
</tr>
</thead>
</table>
| • BMW Operating System 7.0 display  
• Replacement of BMW iDrive Controller  
• Advanced touch and audio gesture control  |
| Models: | BMW 8 Series, BMW X5 |

<table>
<thead>
<tr>
<th>Services:</th>
<th>Key Partners:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Generation of driver-assistance technology (ADAS)</td>
<td></td>
</tr>
</tbody>
</table>
| Models: | Volkswagen Jetta  
Volkswagen Golf R |

<table>
<thead>
<tr>
<th>Services:</th>
<th>Key Partners:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Formations of next-gen digital dashboards</td>
<td></td>
</tr>
</tbody>
</table>
| Models: | Mercedes-Benz A-Class  
Mercedes-Benz E-Class |

<table>
<thead>
<tr>
<th>Services:</th>
<th>Key Partners:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• MMI infotainment system replaces the instrument cluster that can display everything from a digital speedometer to Google Maps satellite images.</td>
<td></td>
</tr>
<tr>
<td>Models:</td>
<td>Audi A4, Audi A3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Services:</th>
<th>Key Partners:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Virtual Cockpit of programmable and digital instrument panel along with high-definition electronic display</td>
<td></td>
</tr>
</tbody>
</table>
| Models: | Skoda Octavia  
Skoda Superb & Kodiaq |

<table>
<thead>
<tr>
<th>Services:</th>
<th>Key Partners:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Digital Instrument Cluster configurable layout with multiple styles of displays</td>
<td></td>
</tr>
<tr>
<td>Models:</td>
<td>Ford Mustang</td>
</tr>
</tbody>
</table>

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<tr>
<th>Services:</th>
<th>Key Partners:</th>
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</table>
| • Android-based Auto infotainment system  
• Apple’s rival product, CarPlay  |
| Models: | Chevrolet Malibu |

<table>
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<tr>
<th>Services:</th>
<th>Key Partners:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Intelligent Personal Cockpit - voice recognition, audio control via an artificial intelligence system, and Internet of Things</td>
<td></td>
</tr>
<tr>
<td>Models:</td>
<td>SoundBeard</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Services:</th>
<th>Key Partners:</th>
</tr>
</thead>
</table>
| • Glass Cockpit System  
• Interfacing navigation displays with alarms and options such as Autopilot and Joystick Driving  |
| Models: | Volvo XC90 |

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| • Android-based Auto infotainment system  
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| Models: | Chevrolet Malibu |

**Note:** Analysis is based on the DRAUP’s proprietary database, updated in Jan, 2019
As vehicle dashboards are crowded with more digital Electronic Control Units or ECUs, OEMs will partner with specific cockpit solution providers for each model to offer unique solutions.

Focus Segments

- Developed Infotainment system - MBUX
- NVIDIA DRIVE CX is a hardware and software solution that enables advanced graphics and computer vision for navigation, infotainment, digital instrument clusters, and driver monitoring.

Development of
- SmartCore Cockpit Domain Controller.
- Phoenix Infotainment system.
- Augmented Reality Head-Up Display
- Launched Curved instrument cluster.
- Continental created AR-Head-up Display technology
- Hybrid Instrument Cluster.
- MultiViu Professional 12 TFT display.
- Panasonic launched SPYDR 2.0 a single brain cockpit domain controller solution featuring a Driver Monitoring System (DMS) with Head-Up Display (HUD) Integration.
- Features 3D Touch panel that combines multi touch panel with gesture recognition over the touch panel.
- Panasonic’s smart mirror technology adjusts the image according to the mirror tilting.

- Samsung’s Bixby voice assistant - control functions for moving the QLED display control each and every feature of the cockpit by a set of recognizable voice commands.
- Center displays and infotainment.
- Advanced driver assist systems (ADAS)
- Design Holistic human machine interface (HMI) technology and cameras.
- The digital cockpit enables a highly immersive digital driver experience by designing - HMI for digital instrument, IVI (in-vehicle infotainment and rear-seat entertainment systems.
- DENSO developed various HMI products, such as instrument clusters, car navigation systems and head-up displays that contribute to the safety and the convenience of automobiles.
- DENSO and Intel provide a highly functional, virtual cockpit including a safety-certified digital instrument cluster that will be the new gold standard in the automotive industry.

Note: Analysis is based on the DRAUP’s proprietary database, updated in Jan, 2019
Tech-giants, Start-ups and Service providers – Overview

**Tech Giants**
- Intel manufactures specialized SoCs with optimized power efficient processing which supports all the latest Android Software Security features.
- Google offers voice-controlled Google Assistant, Google Play Store, Google Maps and other Google services through its infotainment and connected solutions segment.
- Microsoft through its cloud backed connected Vehicle Platform supports end user with personalized user experience inside the car along with the support of Cortana (Microsoft Assistant).
- The Car Play is a major contribution from Apple in the connected car space. Most of the car play features can be accessed using Siri (Apple’s Digital assistant).
- The AWS Solutions offer OEM/Tier1 supplier a secure connection between Vehicle IoT to AWS cloud along with managing the underlying infrastructure operations.

**Key Start-ups**
- Rightware offers tools and services for development of advanced digital user interfaces.
- HUDWAY offers application and accessories that helps drivers in navigation by looking at their windshield.
- Mapillary offers maps with street level imagery. It collects the map data through crowdsourcing.
- Drust offers a personalized user experience through a mobile app called AKOLYT. The community-based app features real-time guidance for improving driving skills and managing car condition.
- Gestigon offers software packages that interprets user gestures and behaviour while driving with a focus to enhance user experience in the connected car environment.

**Key Service Providers**
- Heads-up display and Driver Information Systems
- Android based auto apps
- Reusable HMI frameworks
- ECU Hardware & Software Design
- Smartphone integration
- HMI/User interface
- Personalization
- Audio/Video/Speech multimedia codecs
- Tata Elxsi Open IVI Software Platform
- Middleware support
- Voice Recognition and acoustic technologies

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Note: Analysis is based on the DRAUP’s proprietary database, updated in Jan, 2019.
**Tech-Giants:** Integration of personalized settings, android features and voice enabled navigation are key solution that trigger partnerships

<table>
<thead>
<tr>
<th>Use-Cases</th>
<th>Partnership</th>
<th>Key Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personalized Settings</td>
<td>Microsoft + LG</td>
<td>This Strategic partnership helps LG to utilize Microsoft ‘Azure cloud and Artificial Intelligence (AI) technologies to grow its Autonomous Vehicle &amp; Infotainment business. LG incorporates Microsoft’s Virtual Assistant Solution accelerator in it’s infotainment systems.</td>
</tr>
<tr>
<td>Personalized Settings</td>
<td>Microsoft + Volkswagen</td>
<td>Volkswagen had partnered with Microsoft to develop its own Cloud to enhance its digital and mobility offerings. This Automotive cloud provides the consumers a personalized settings in making calls, personalized music list, Calendar appointments etc….</td>
</tr>
<tr>
<td>Google Services Access</td>
<td>Google + Renault Nissan Mitsubishi</td>
<td>This Partnership, helps Renault Nissan Mitsubishi Customers to access Google’s maps, app store and voice assistant from their vehicle’s dashboards</td>
</tr>
<tr>
<td>Native Android System</td>
<td>Google + Volvo</td>
<td>Volvo had partnered Google to help in the build its native android system. This is expected to be released in 2020 Volvo model cars</td>
</tr>
<tr>
<td>Navigation-Voice Assistant</td>
<td>Amazon + HERE</td>
<td>Amazon Alexa and HERE are working together to integrate Alexa with HERE’s in vehicle navigation software. Consumers using HERE Navigation On-Demand can experience the intuitive virtual assistant.</td>
</tr>
<tr>
<td>Navigation-Voice Assistant</td>
<td>Amazon + Telenav</td>
<td>Telenav and Alexa partners to bring a voice conversational interface for in car navigation. The drivers can have hands-free access to the in-vehicle connected navigation system and also can get help from Alexa regarding traffic and directions information.</td>
</tr>
<tr>
<td>Integrated Digital Cockpit</td>
<td>Intel + Luxoft</td>
<td>Intel and Luxoft partners to build an Integrated Digital Cockpit computer reference platform. This platform allows flexible integration of third party applications.</td>
</tr>
</tbody>
</table>

*Note: Analysis is based on the DRAUP’s proprietary database, updated in Jan, 2019*
Service Providers: Embedded Testing is the highly outsourced segment in Automotive Digital Cockpit

39 Active Outsourcing Partners

4000 – 5000 Workforce split across Outsourcing Partners

Key Buying Locations
- Barcelona Area, Spain
- Bengaluru Area, India
- Braunschweig Area, Germany
- Bucharest, Romania
- Chennai Area, India
- Gothenburg, Sweden
- Greater Atlanta Area, United States
- Mexico City Area, Mexico
- Shanghai Area, China
- Sodertalje, Sweden
- Stuttgart Area, Germany
- Ulm Area, Germany
- District Mlada Boleslav, Czechia

Key Provider Locations
- Barcelona Area, Spain
- Bengaluru Area, India
- Berlin Area, Germany
- Birmingham, United Kingdom
- Brasov County, Romania
- Chennai Area, India
- Gothenburg, Sweden
- Greater Atlanta Area, United States
- Nanjing, China
- National Capital Region, India
- Nurnberg Area, Germany
- Paris Area, France
- Prague, Czechia
- Stockholm, Sweden

Outsourcing Intensity by Sub vertical
- Embedded Testing: 43%
- Design: 33%
- Development: 23%
- Others: 1%

Note - Above analysis is based on the DRAUP’s proprietary Outsourcing module, updated in January, 2019.
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