ADAS – Current & Future Perspectives

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Helena Perslow, Senior Analyst, +44 1933 408074, helena.perslow@ihs.com

Jeremy Carlson, Senior Analyst, +1 310 524 4065, jeremy.carlson@ihs.com
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CONTINUALLY REINVENTING ADAS

TECHNOLOGY COMING TO MARKET

ADAS FORECAST OUTLOOK

FROM ADAS TO AUTOMATION TO AUTONOMY
Continually Reinventing ADAS
Assisting the driver in more ways than one

New added benefits being realized

Traditional Value Proposition of ADAS

Safety

AEB
ESC
AHB
BSI
LKA
LDW
Auto Pilot
TSR
TJA

Comfort & Convenience

360PA
Cam PA
US PA
AutoPA

Efficiency

Maps
Powertrain
Braking
Acceleration
Transmission
Comprehensive sensor coverage

Many sensor choices to build an ADAS portfolio – and more possible
Decisions will differ by brand, segment and market

V2V + V2I
DSRC
Cellular

GPS
Maps
Navigation

ESC
Transmission
Powertrain

Driver Biometrics
Digital Agenda
Wearables

Radar
Camera
Ultrasound
New Sensors Causing Disruption – 77 GHz MRR

79 GHz UWB sensors also under development
Balance of cost and functionality may differ by brand and segment
Sensor Fusion

77 GHz MRR

Mono or Stereo Camera

77 GHz LRR
New sensors causing disruption – trifocal camera

Trifocal camera a significant threat to displace stereo-camera
Trifocal camera may replace mono-camera in long-term autonomous future
Technology Coming To Market
ADAS Going Mainstream – Technology Tiers Emerging

Everything At Once
- Audi Q7
- 77 GHz MRR

More tech, improved functionality
- Chevrolet Volt
- 77 GHz MRR

Par for the near-luxury course
- Lincoln MKX

Strategic deployment
- Nissan Titan, Toyota Tacoma

Mainstream Models
- Radar deprioritized – Camera incredibly popular – Lidar proliferating

RADAR +
- Ford Mustang
- Honda Pilot
- Hyundai Tucson
- Jaguar XE
- Seat Leon
- Skoda Superb
- Volkswagen Sharan

CAMERA
- Citroen Berlingo
- Citroen DS5
- Honda Civic
- Honda Jazz
- Mazda CX-3
- Peugeot Partner
- Peugeot 208
- Opel Karl
- Renault Kadjar

NAIAS / CES

Geneva
ADAS Forecast Outlook
EU production surpassing worldwide averages for every major ADAS
ADAS outlook – North America vs Europe

North American production shifts from FCW only towards AEB
European regulation and tech-forward strategy significantly outpaces North America
From ADAS To Automation To Autonomy
### Defining the terminology

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<th>Automated</th>
<th>Autonomous</th>
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<td>Cooperative</td>
<td>Car-Driver Relationship</td>
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<td>Driver in</td>
<td>“In the loop”</td>
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<td>Driver</td>
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<td>0 → 3</td>
<td>NHTSA Levels</td>
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<td>Evolutionary</td>
<td>Approach</td>
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<td>Automotive Industry</td>
<td>Proponent</td>
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Current state of the art & announced plans as of June 2015

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Level 2 debatable – many are capable but limit functionality for liability (US) or regulatory (EU et al) reasons

“The major distinction between level 1 and level 2 is… that the driver is disengaged… by having hands off the steering wheel AND foot off pedal at the same time.” -- NHTSA Automated Vehicle Preliminary Policy

IHS Level 5: Fully autonomous **without** driver controls
Automated driving evolution

Autonomous vehicle sales forecast

Source: IHS

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Thank you!