Asia-Pacific
Economic Cooperation

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Agenda Item: 6.2.3

Malaysia's Perspective on Autonomous, Automated and Connected Vehicles

Purpose: Information
Submitted by: Malaysia

APEC
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30th Automotive Dialogue
Bali, Indonesia
25 to 28 June 2019

Asia-Pacific Economic Cooperation

Advancing Free Trade for Asia-Pacific Prosperity

MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY

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INSTITUT AUTOMOTIF ROBOTIK DAN IoT MALAYSIA
MALAYSIA AUTOMOTIVE ROBOTICS AND IoT INSTITUTE
(Previously known as the Malaysia Automotive Institute)

MALAYSIAN PERPECTIVE ON AUTOMATED, AUTONOMOUS AND CONNECTED VEHICLES (AACV)

BY MALAYSIA

25-28 June 2019 – Bali, Indonesia

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Malaysia Automotive, Robotics and IoT Institute (MARii)

BACKGROUND

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To further enhance the Automotive Ecosystem in Malaysia, Malaysia has conducted a Global Benchmarking study between year 2017-2018 which aims to:

i. map the automotive policies and technologies in the focus markets;

ii. assess automotive policies and technologies in the focus markets, especially from incentive and benchmark against the National Automotive Policy (NAP); and

iii. recommend measures to enhance the existing NAP

As the outcome of the study, Automated, Autonomous and Connected Vehicles (AACV) which is part of the Next Generation Vehicle (NxGV), has become one of the elements that is expected to drive the growth of Automotive Industry in Malaysia.

AACV DEFINITION

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	N/A (LEVEL 0)	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
What does the human in the driver's seat have to do?	You are driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You are not driving when these automated driving features are engaged – even if you are seated in —the driver's seatll		
	You must constantly supervise these support features; you must steer, brake, or accelerate as needed to maintain safety			When the feature requests, You must drive	These automated driving features will not require you to take over driving	
	These are driver support features			These are automated driving features		
What do these features do?	These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/ acceleration support to the driver	These features provide steering AND brake/ acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met		This feature can drive the vehicle under all conditions
Example features	• Automatic emergency braking • Blind spot warning • Lane departure warning	• Lane centering OR • Adaptive cruise control	• Lane centering AND • Adaptive cruise control at the same time	• Traffic jam chauffeur	• Local driverless taxi • Pedals/ steering wheel may or may not be installed	• Same as L4, but feature can drive everywhere in all conditions

1

Handover
L3: AACV feature will request handover
L4/5: AACV feature will not request handover

2

Operation Condition
L3/L4: Preset condition will define operation.
L5: Unconditional operating parameters (geography/use case)

3

Vehicle Hardware
L4/5: Both can have steering wheel/brake
L4: Can be controlled by teleoperation.

Evolution of AACV

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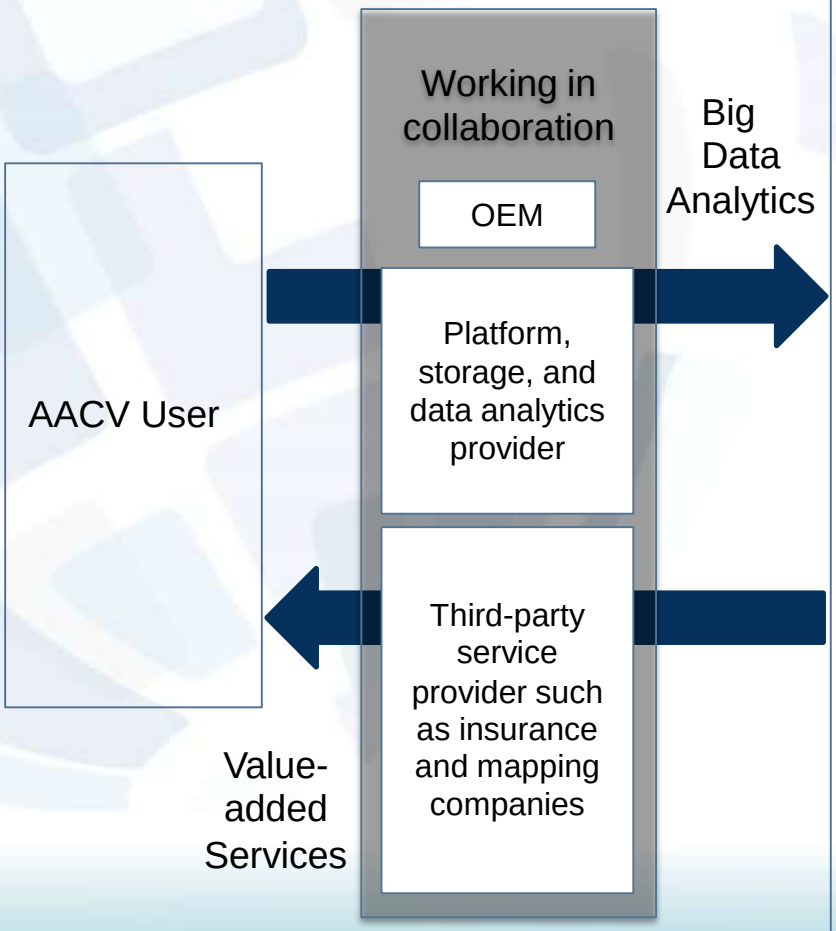
MARKET TRENDS	Mobility Services	Peripheral Services	Logistics Services	Vehicle Services
	Convergence of various fragmented mobility modes that exist today due to automation	OEMs offering value-added services using analyzed connected and autonomous vehicle data.	New modes and mechanisms in various stages of logistics movement will improve efficiency of the services.	As sensors and technology eventually become similar across industry, vehicle services will be the differentiating factor.
TECHNOLOGY TRENDS	Future vehicle platforms will be designed to scale and adopt to L4/L5 autonomy	Vehicles will need to collate various sensor data to get a complete picture of the surrounding, leading to sensor fusion	Data size, connectivity and latency will influence the adoption of computing platform	Scenario-based testing and validation is considered over conventional-driven miles methods
	AACV Vehicle Platform	Sensor Fusion Solutions	Data Storage and Computing	Testing and Validation

MEGA TREND ← SUB TRENDS →

Ecosystem of AACV



Stakeholders & Services

Fleet Management

- GPS vehicle tracking
- Operational efficiency
- Value-added services

Insurance Companies

- Usage-based insurance
- Vehicle usage monitoring
- Tracking/theft protection

Smart Cities

- Traffic flow management
- Urban planning
- Parking
- Automated road toll

Retail

- In-car offerings and targeted advertising
- Retail store information

Energy

- Real time location-based promotion
- On-demand services
- Usage insights

OEM & Partners

- New vehicle features
- Design improvement
- Data feedback for R&D optimization

AACV Technology

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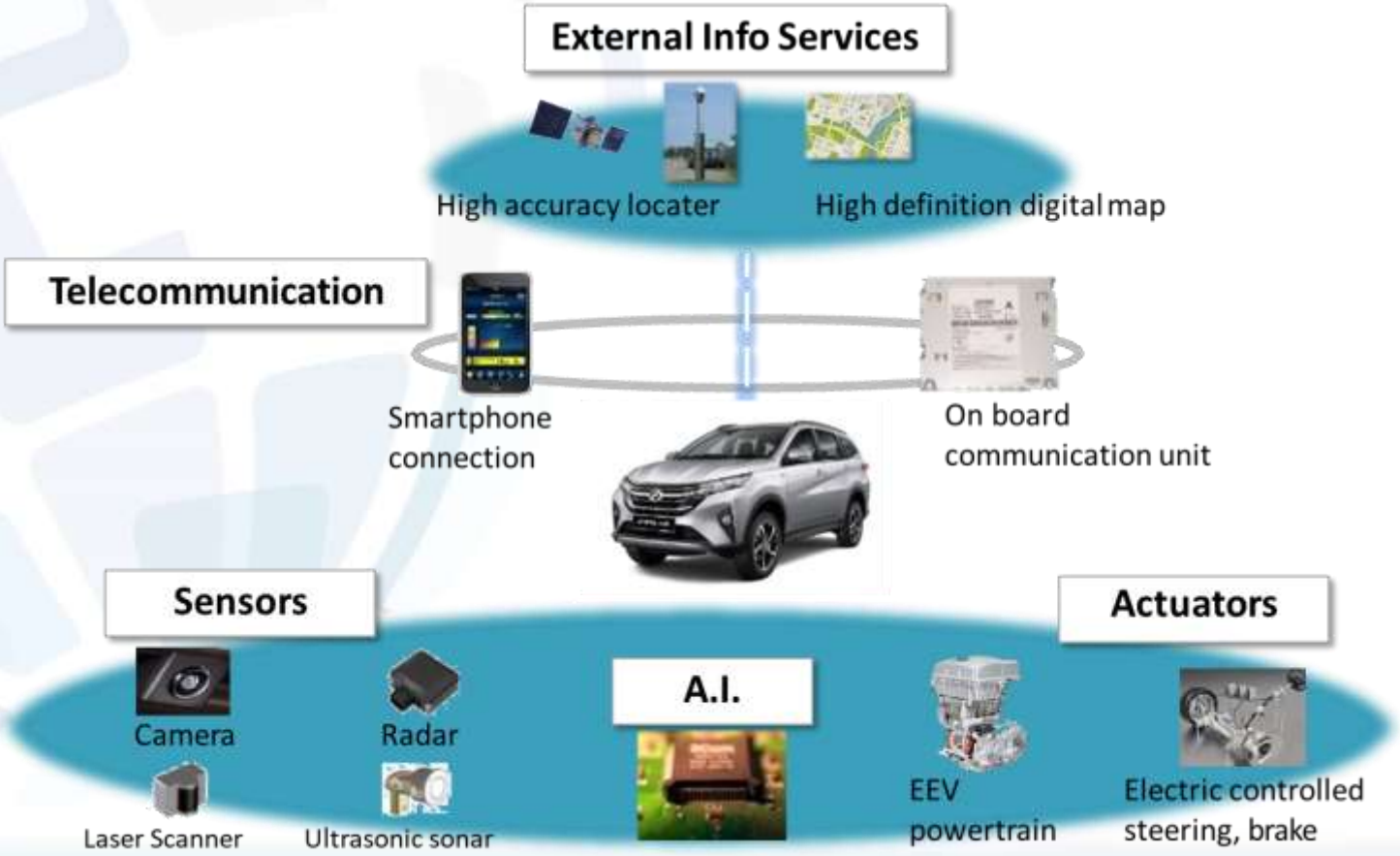

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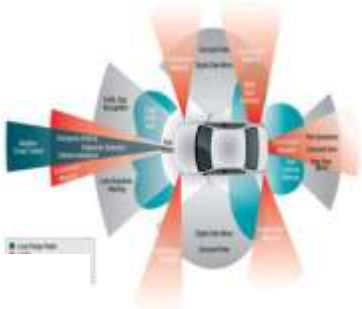
Future Autonomous Vehicle Platform

Future vehicle platforms will be designed to scale and adopt to L4/L5 AACV



Future Sensor Fusion Solutions

Vehicles will need to collate various sensor data to get a complete picture of the surrounding, leading to sensor fusion

Data Storage and Computing

Data size, connectivity, and latency will influence the adoption of computing platform

Testing and Validation

Scenario-based testing and validation is considered over conventional driven miles methods

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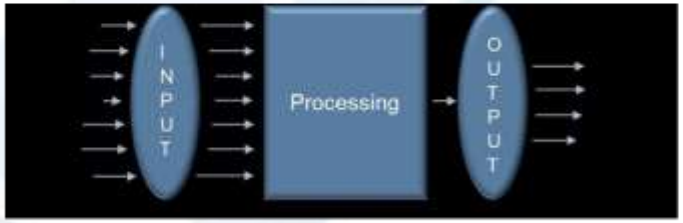
Discrete Sensor Operation

Signals from each sensor need processing and validation. As all sensors work discretely, the process is time consuming and information is less robust.

Sensor Fusion Operation

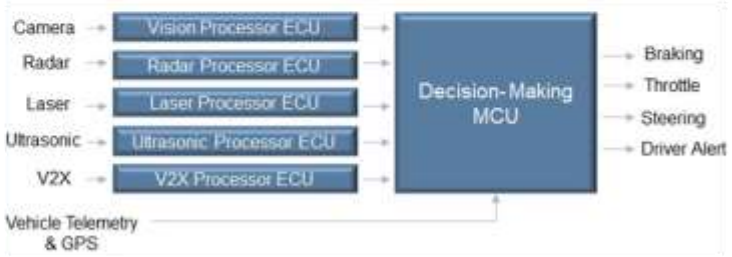
Sensor fusion provides inputs of various discrete sensors and sensor types and uses the combined information to perceive the environment more accurately. This increases perception accuracy, data robustness, and reliability.

ECU-LEVEL SENSOR FUSION



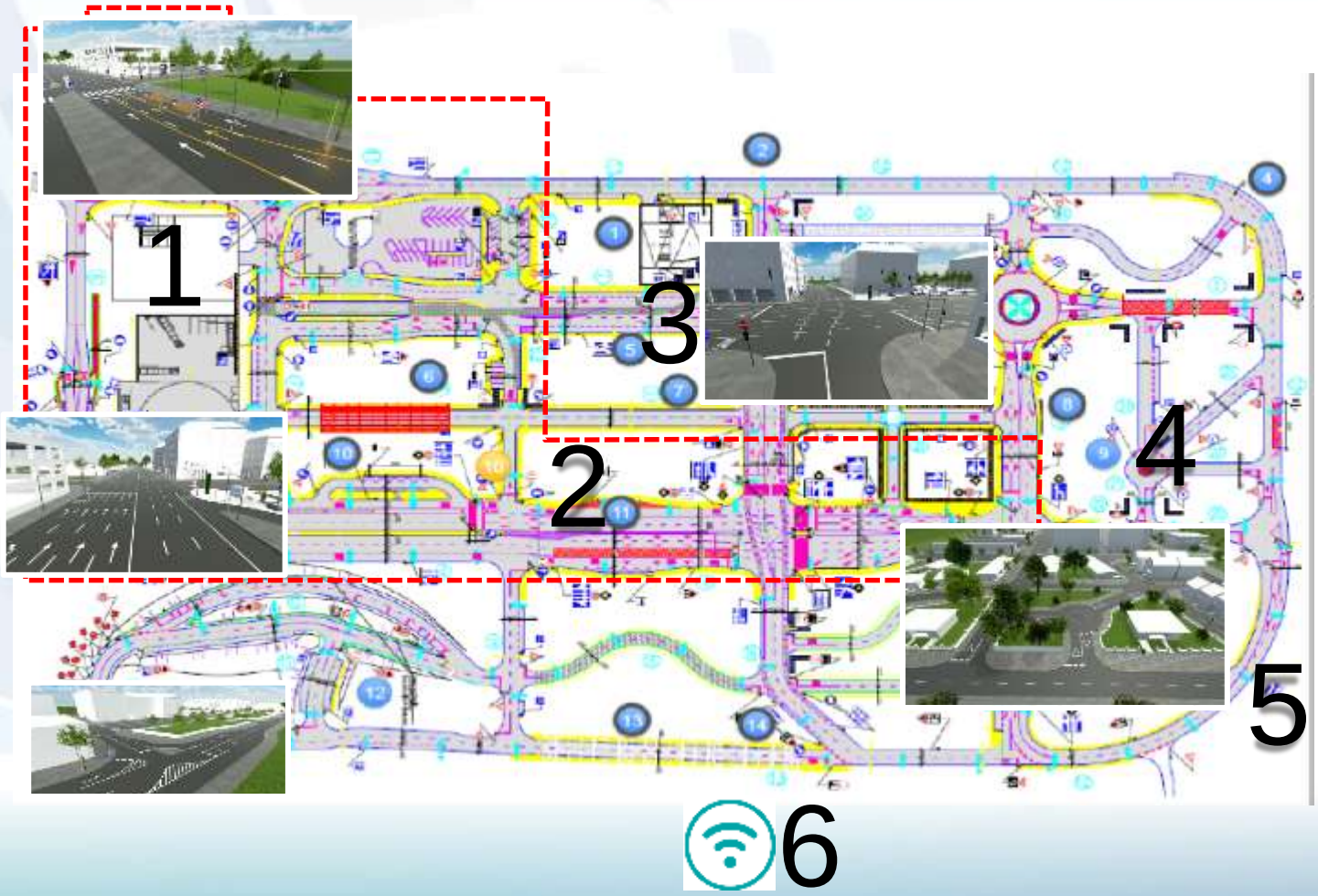
Data from multiple raw sensors are processed in a single central unit. This approach reduces data loss due to pre-processing or compression. However, the ECU will need high-processing power.

SYSTEM LEVEL SENSOR FUSION



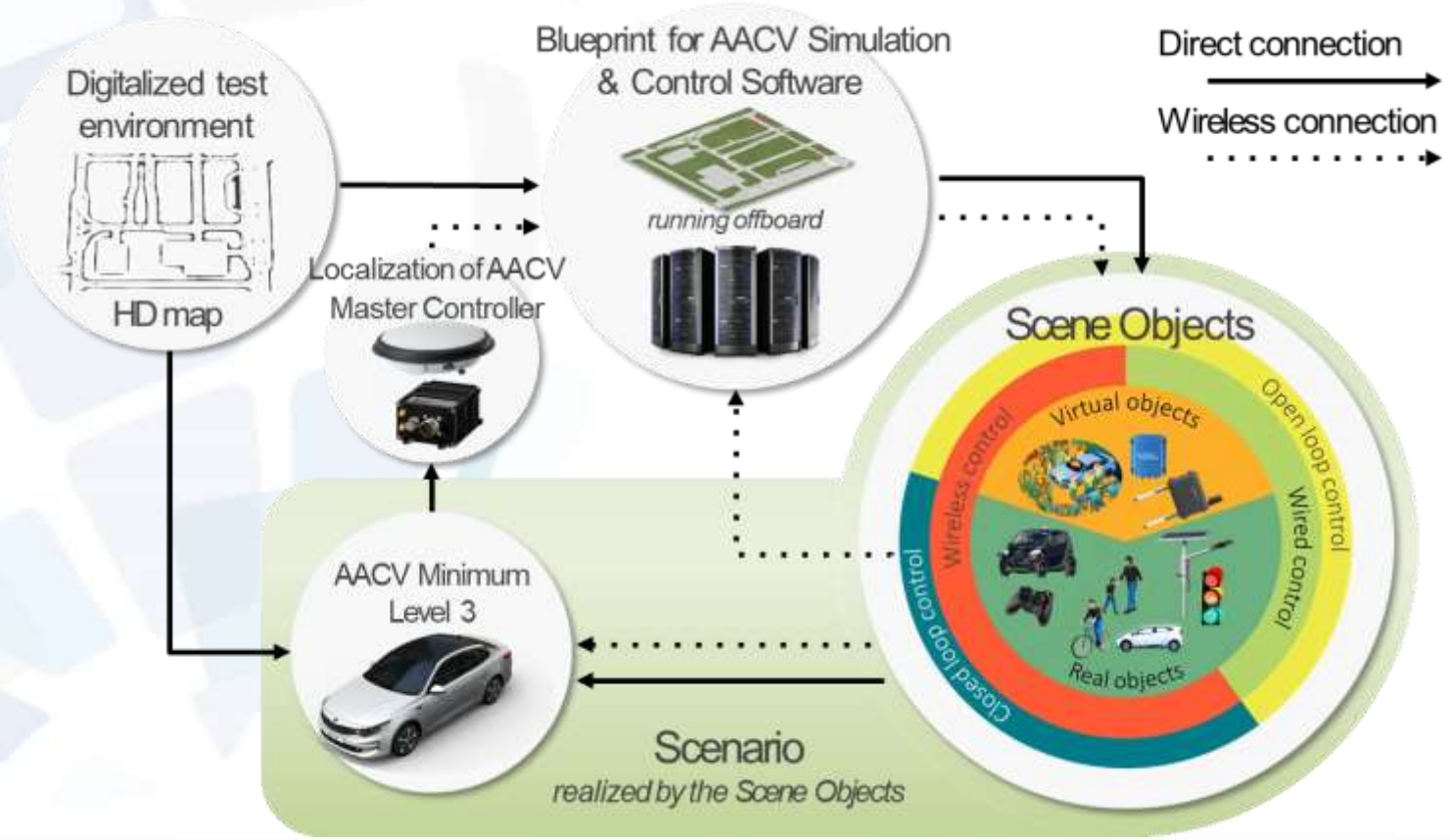
Smart sensors perform data processing and sensor-based decision making locally in the sensor modules. Only processed data is sent back to a central Multipoint Control Unit (MCU) for actionable decision making.

AACV Testing and Validation



1. Low-speed, parking area
2. Multi-lane high speed area
3. Downtown area
4. Suburban area
5. T-junction area
6. 5G Connectivity

AACV Testing and Validation



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Thank You