Views on Intelligent and Connected Vehicles

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Budapest

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New Trends for Automotive Industry

Vehicle is changing

Connected

Interactions among vehicle, road, cloud, human, environment

Intelligent

Intelligent driving based on AI technology

Shared

New business mode of shared mobility

Electrical

Change of vehicle architecture and power mode

User requirements are changing

1 **Friendly interface**

Voice and gesture control

2 **OTA update**

Remote update

3 **Connected**

Social, entertainment...

4 **Intelligent learning**

AI

5 **Optimal performance**

High performance and quality

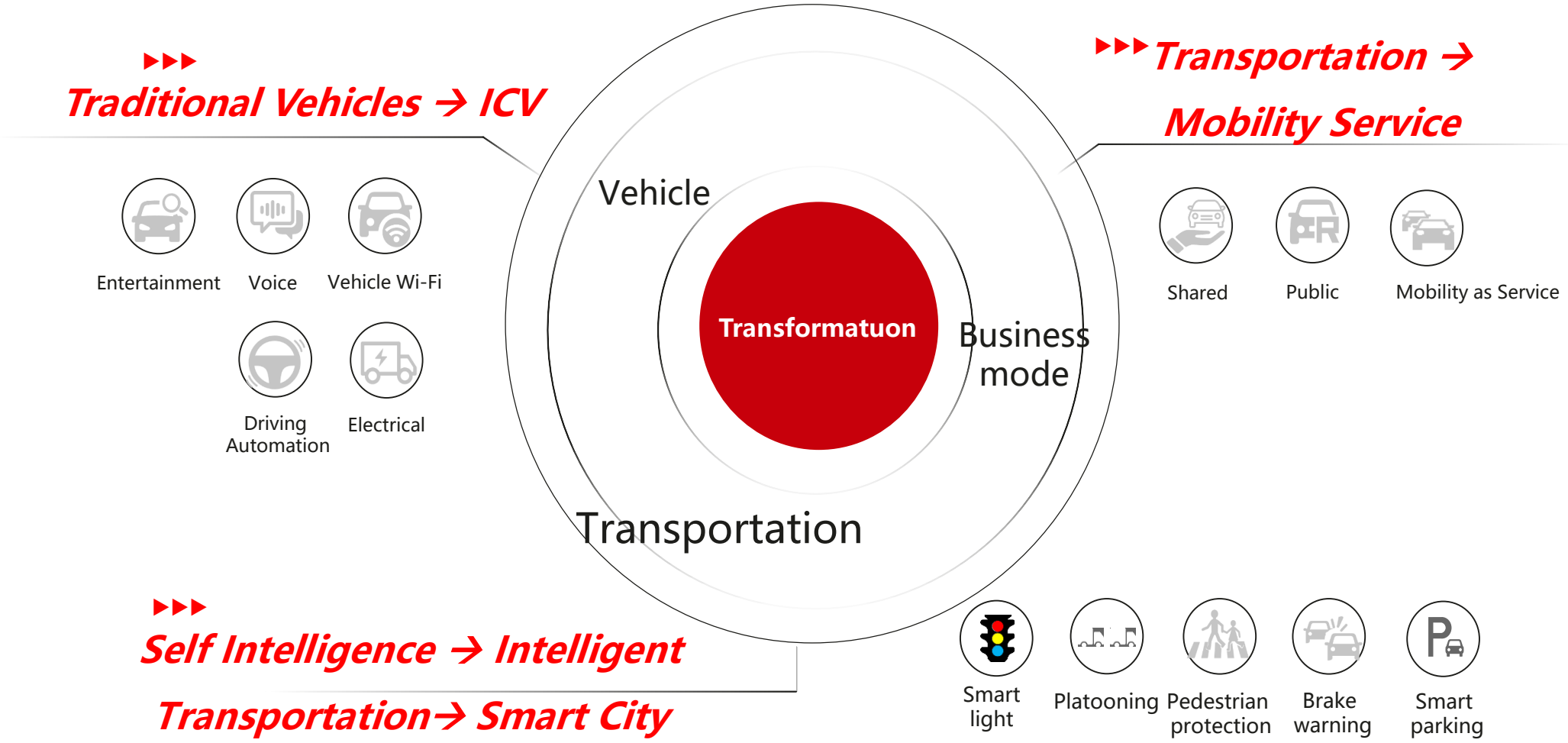
6 **Natural language**

Natural language interface

Requirements for ICT

Chipset | Terminal | Network | Cloud | AI | Big data | New power

Automotive Industry is on the Eve of Revolution



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Global Strategies and Policies to Boost ICV business

USA

- Oct. 2018, USDOT release" Preparing for the Future of Transportation: Automated Vehicles 3.0"
- Sep. 2017, "Self Drive Act."

Britain

- "The Automated and Electric Vehicles Bill" for insurance and responsibility of ICV

Germany

- Modify "Strassenverkehrsgesetz (StVG)" for ICV responsibility

China

- Joint 3 administrative departments to release ICV test regulation
- Publish ICV standard framework

France

- 《 The Future of Manufacturing - France 》includes autonomous driving
- Roadmap for autonomous driving

Japan

- Sep. 2018, release Safety guidance for autonomous driving vehicles"
- Initiate law amendment for autonomous driving

EU

- Release "On the road to automated mobility: An EU strategy for mobility of the future" , full autonomous driving in 2030

UN

- April. 2016, "Vienna Convention for Road Traffic (Geneva) " sets example for the autonomous driving legislation

South Korea

- Set specific region for autonomous driving test
- Initiate law amendment for autonomous driving

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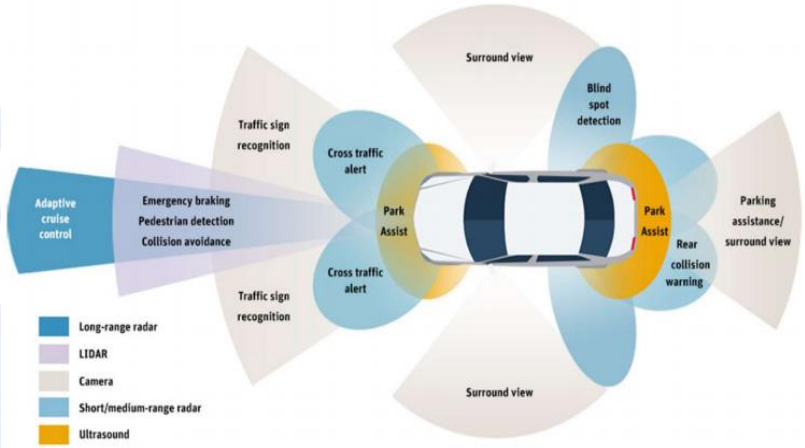
Enabling Technologies for Autonomous Driving

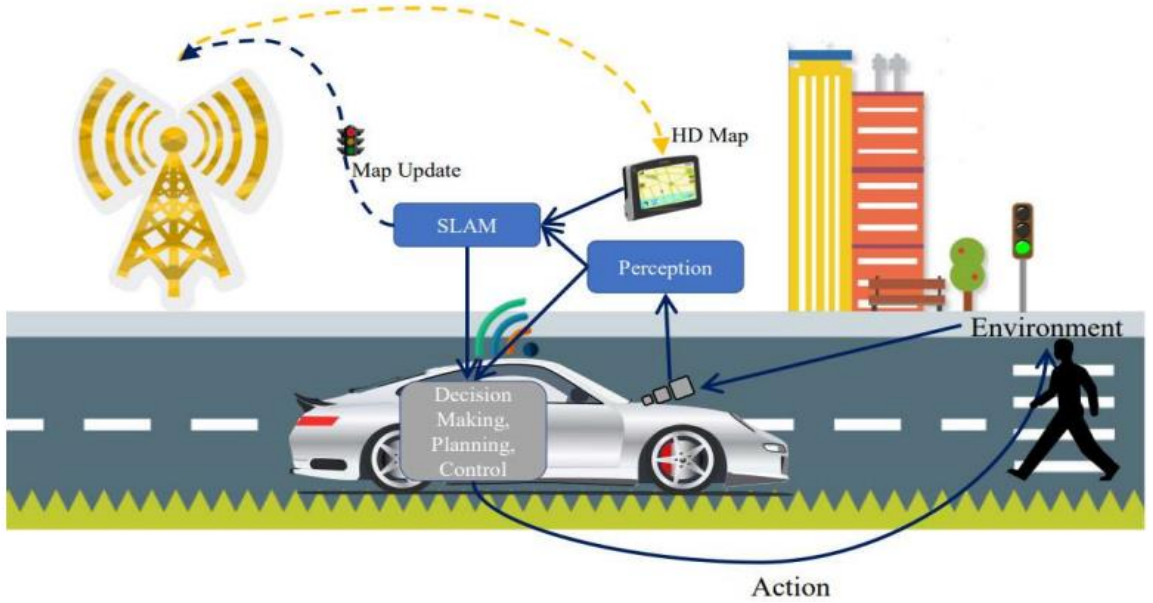
Many technologies are to be studied with consideration for standardization if appropriate.

One outstanding example: An AI driver needs to see as well as an human driver. But how does AI see the outside world? how are senorial signals(camera, infrared ray, LIDAR, miliimetric wave)) representing the outside real world converted and processed in **a format most suitable for machines?**

- ***The answer may be VCM (Video coding for Machines).***
- ***VCM performance of recognition base on machine vision should attain at least the same level as humans.***
- ***VCM is expect to have unique strength in Multi-object detection, Object segmentation, Object (Lane) Tracking, Activity recognition, event prediction, Optical Flow.***

Other enabling technologies include: 5G V2X, decision making (reinforcement learning), edge computing, GAN learning, etc.





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Huawei’s Role in Automotive Industry

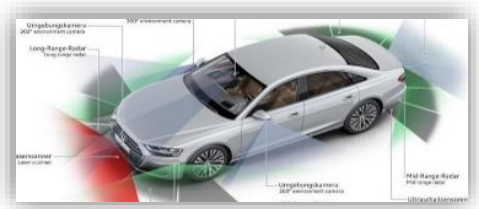
“Huawei does not manufacture vehicles. Huawei is the incremental component supplier for intelligent and connected vehicles (ICV). We are determined to help vehicle manufacturers to produce high quality and high performance vehicles with advanced information and communication technologies (ICT). ”

Eric Xu

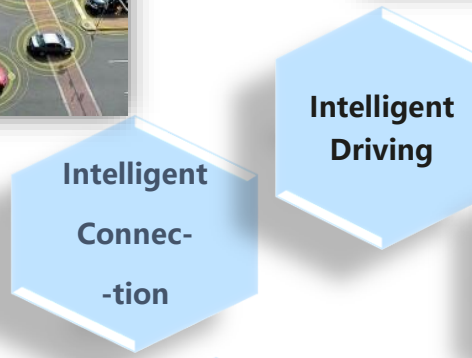
Rotating Chairman of Board of Huawei

Huawei Product Portfolio for ICV

- MDC (Mobile data center) for intelligent driving
- Autonomous driving Algorithms

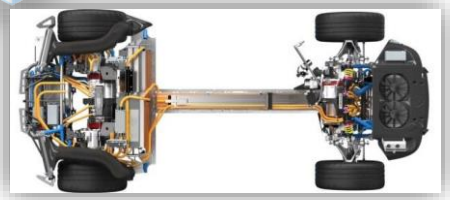


- C-V2X Product for intelligent connection



- Hi-Car for intelligent communication in car
- Cockpit

- Octopus for cloud service for autonomous driving simulation and training



- mPower for intelligent energy management (Electric Driver, BMS etc)

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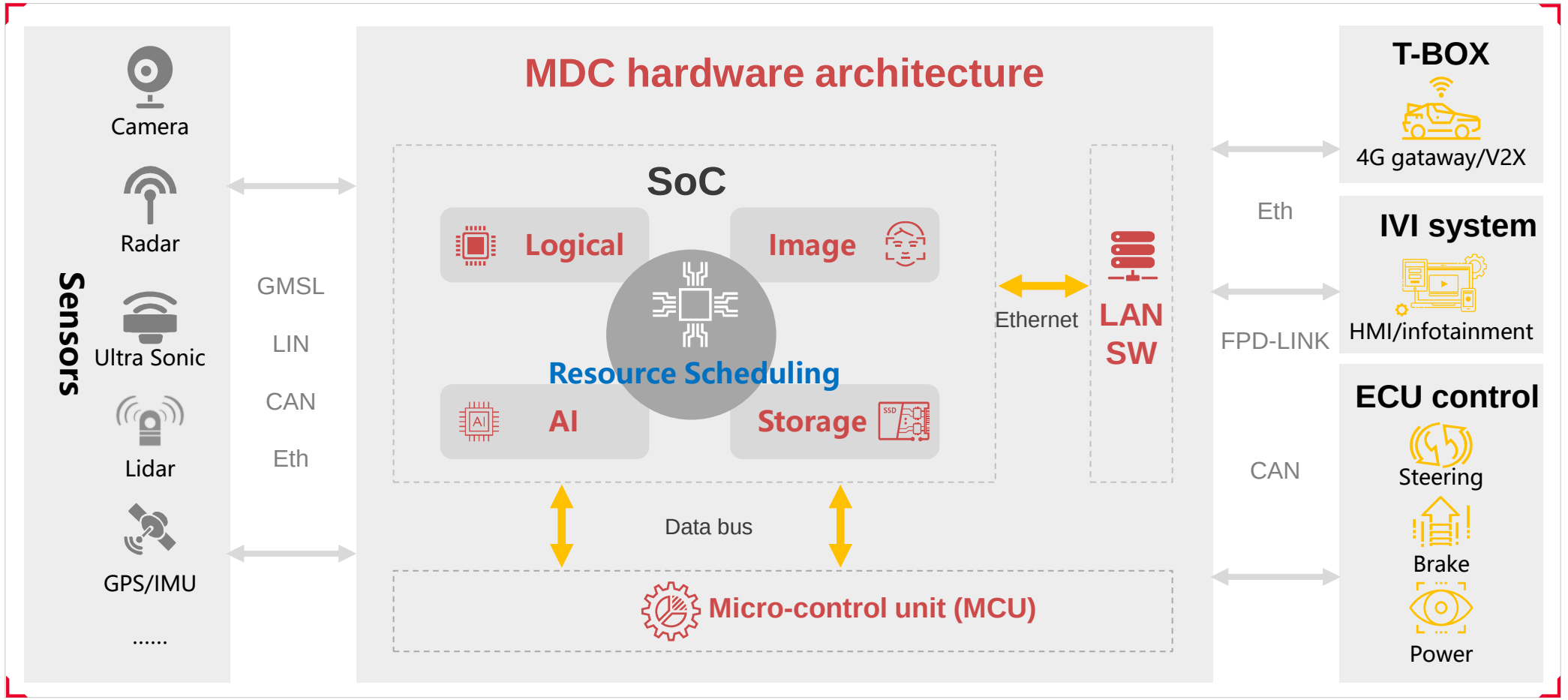
MDC Hardware Platform: Highly Integrated SoC

- High integration: ARM, AI, Image, Storage on a complete SoC
- Open interface: multiple sensors, communication module, infotainment (IVI) and ECU control



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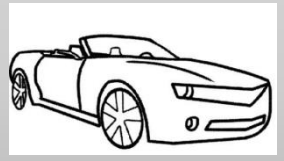
Requirement for Policies and Laws to Enable ICV



Steps	Design	V&V	Commercial	After Sale
Requirements	• Adjust vehicle design, e.g, Steering wheel, Display, Brake, etc.	• Allow test in all scenarios, e.g, highway, parking etc.	• Set up certification mechanism, e.g, virtual simulation, certification test and real world test	• Set up insurance, recall, monitoring mechanisms

Policies and Laws

Considerations for ICV Certification Framework

	Different scenarios	Method and target for verification	Required regulation/standard
Performance Requirements	Typical scenario	Open road test	• Open road test cases and criteria.
	Critical scenario	Closed road test. Verify difficult driving scenarios.	• Closed road test cases and criteria, e.g, highway, urban, parking.
	Edge scenario	Simulation. For all scenarios, especially for the extreme dangerous scenarios.	• Test scenario formats and database.
		Safely and security procedure audit.	• Functional safety • Security safety
Monitoring Requirements	NA		• OTA monitoring • Vehicle situation monitoring

Thank you.

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