AUTOSAR 框架下的自动驾驶

Autonomous driving for the AUTOSAR framework

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自动驾驶技术所需要的基础软件

自动驾驶不同等级可以实现的功能及时间预测 (From：Arm)
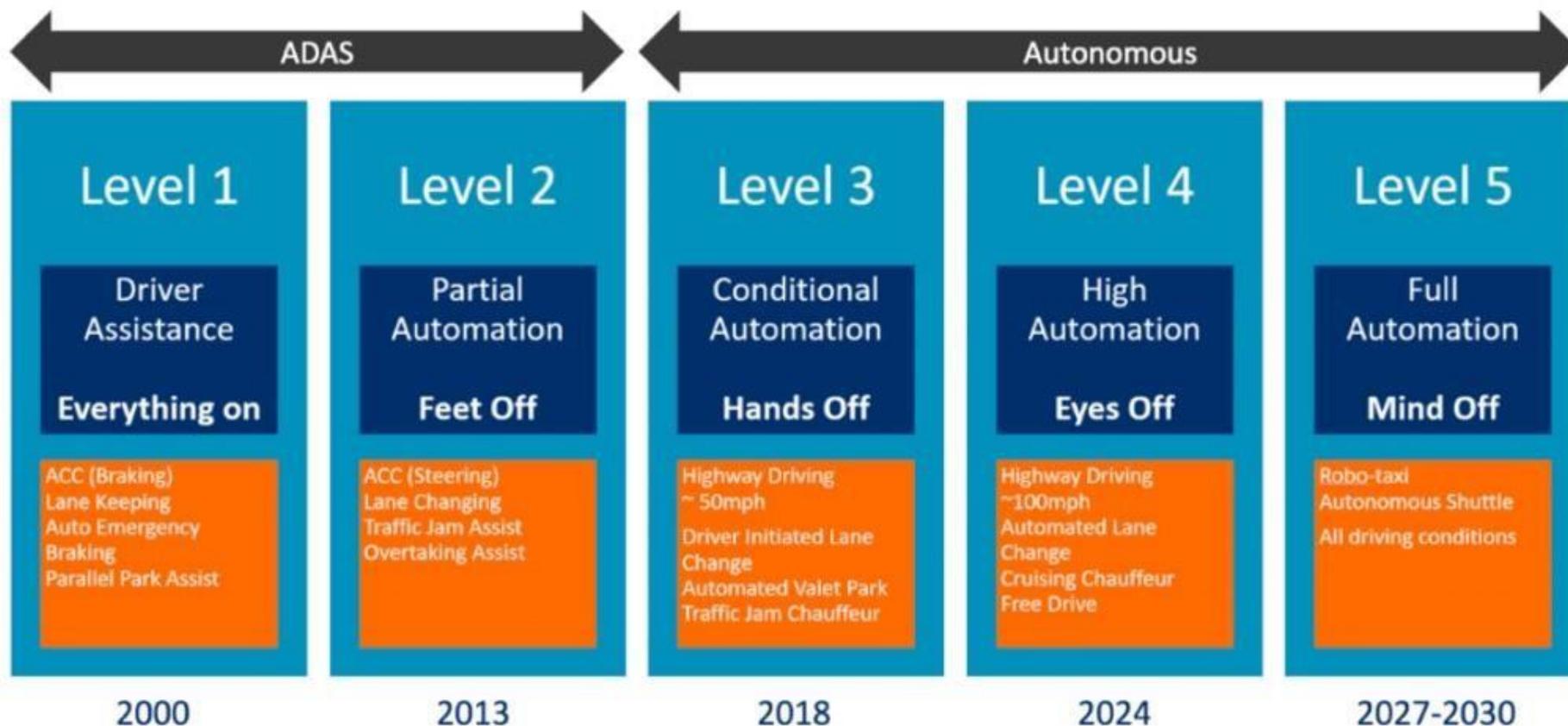
自动驾驶技术所需要的基础软件

当前"自动驾驶"的基本逻辑

Perception ⟹ Cognition **Decision** Plan ⟹ **Execution**

Perception		Decision		Execution
Radar	HD Map	Position	Prediction	Driving
Camera	V2X	Environment	Action	Steering
				Braking
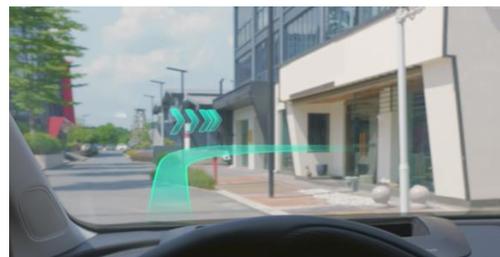
自动驾驶技术所需要的基础软件

L2/L2+/L2.9/L2.99...ADAS的功能
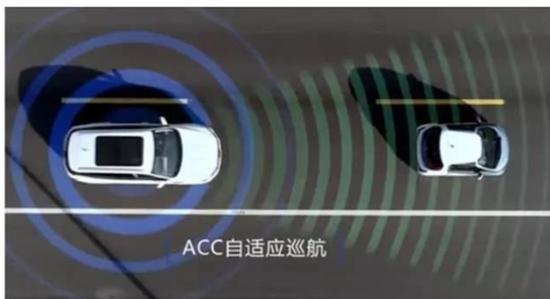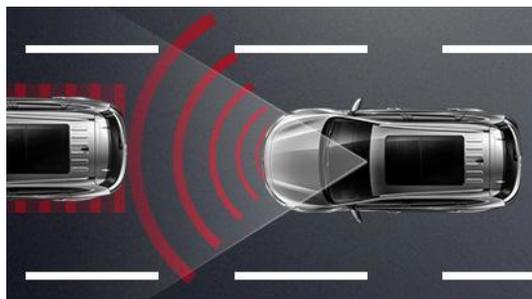
ACC	AEB	LKA	APA
BSD	DMS	LCA	RPA
DAW	DAW	LDW	HPA
FCW	FCA	RCW	AVP

...

自动驾驶技术所需要的基础软件

当前主流ADAS的软件架构

ADAS/AD App	ACC	AEB	LKA	APA	...

Funcation	Perceptron	Position	Decision	Control	HMI

| Middleware	AP	ROS/ROS2		CP
Operation System	Linux			
Hardware	SoC		MCU	
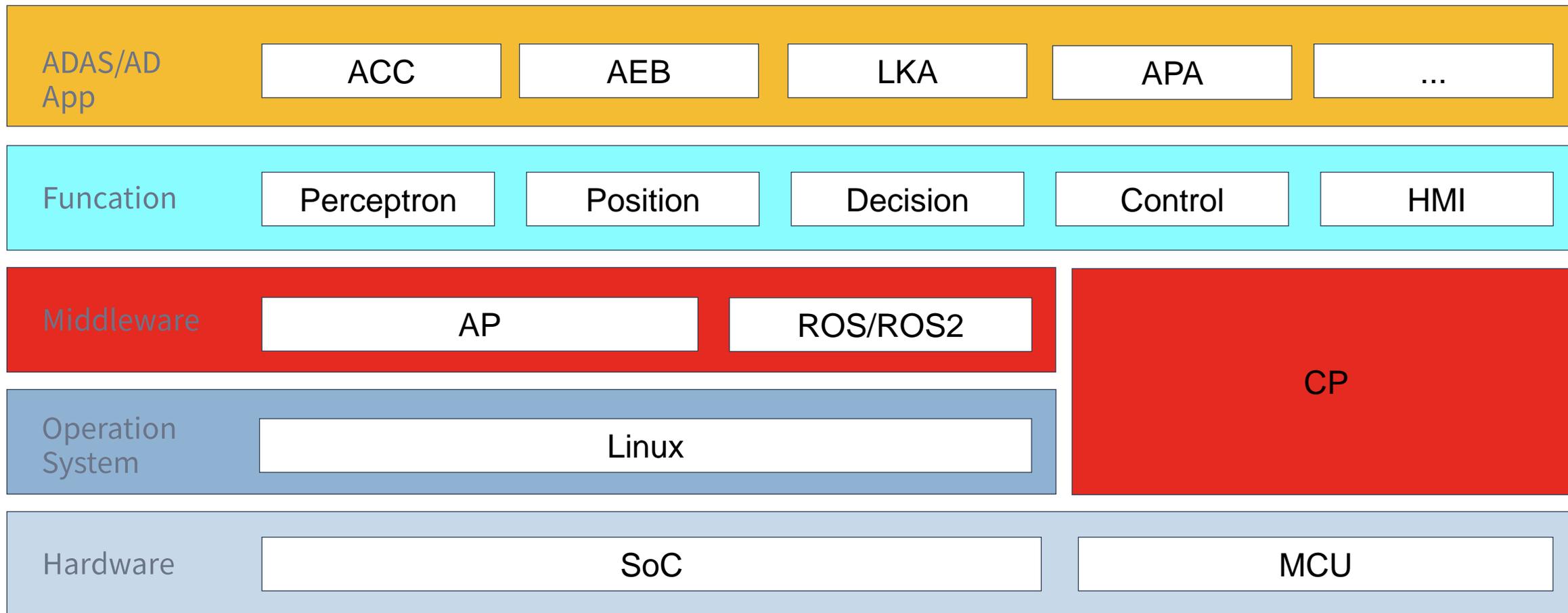
# AP AUTOSAR 对高级别自动驾驶的意义

自适应性是高级别自动驾驶所需的重要特性
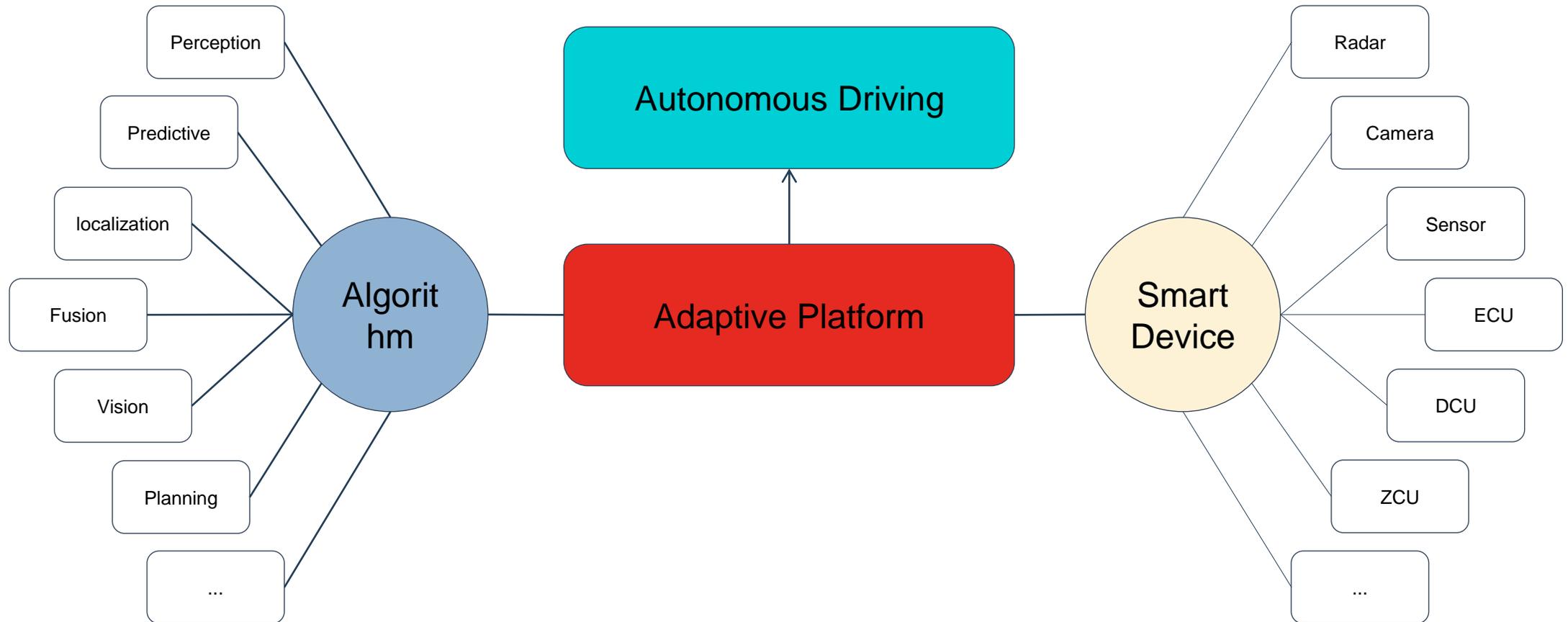
AP AUTOSAR 对高级别自动驾驶的意义

基于SOA构建的自动驾驶
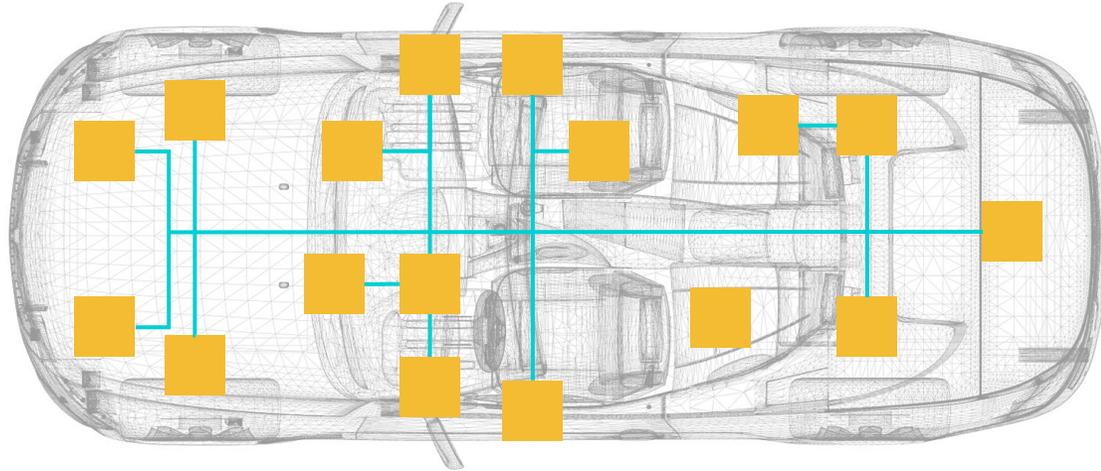
Signal Base
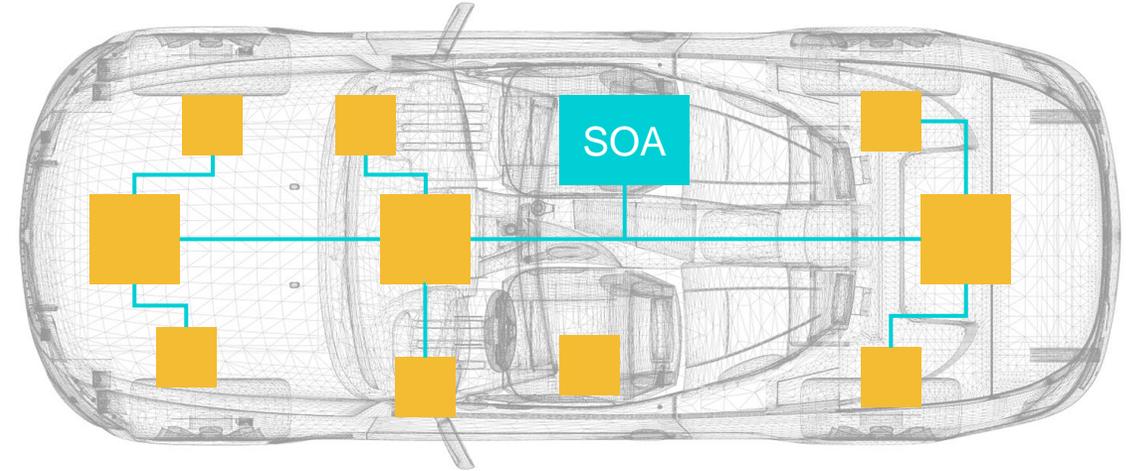
Service - Oriented Architecture

AP AUTOSAR 对高级别自动驾驶的意义

自动驾驶场景中的协议支持
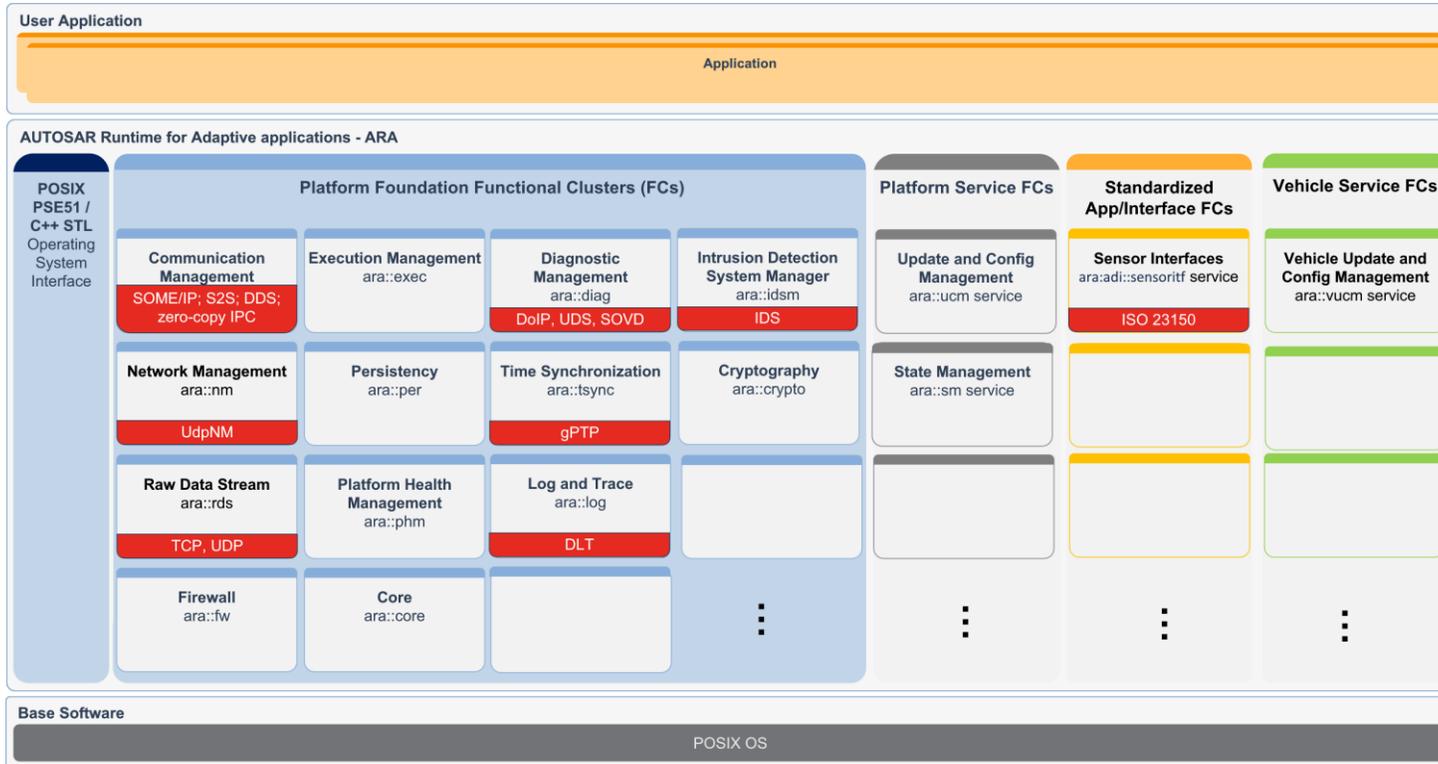
Functional Cluster	Supported protocols
Communication Management	SOME/IP protocol incl. service discovery protocol
	S2S - Signal2Service
	DDS - Date Distribution Service (by OMG)
	zero-copy IPC - Inter-Process Communication
Diagnostic Management	DoIP - Diagnostics over IP (ISO 13400-2)
	UDS - Unified Diagnostic Services (ISO 14229-1)
	SOVD - Service Oriented Vehicle Diagnostics (by ASAM)
Intrusion Detection System Manager	IDS - Intrusion Detection System Protocol
Sensor Interfaces	ISO 23150 - Data communication between sensors and data fusion unit for automated driving functions
Network Management	UdpNM - AUTOSAR Network Management Protocol
Time Synchronization	gPTP = IEEE 802.1AS
	AUTOSAR provides the Time Synchronization Protocol Specification which is an extension and profiling of this IEEE Norm
Raw Data Stream	TCP - Transmission Control Protocol for IPv4 and IPv6
	UDP - User Datagram Protocol for IPv4 and IPv6
Log and Trace	DLT - Log and Trace Protocol Specification

AP AUTOSAR 对高级别自动驾驶的意义

自动驾驶场景中的功能安全
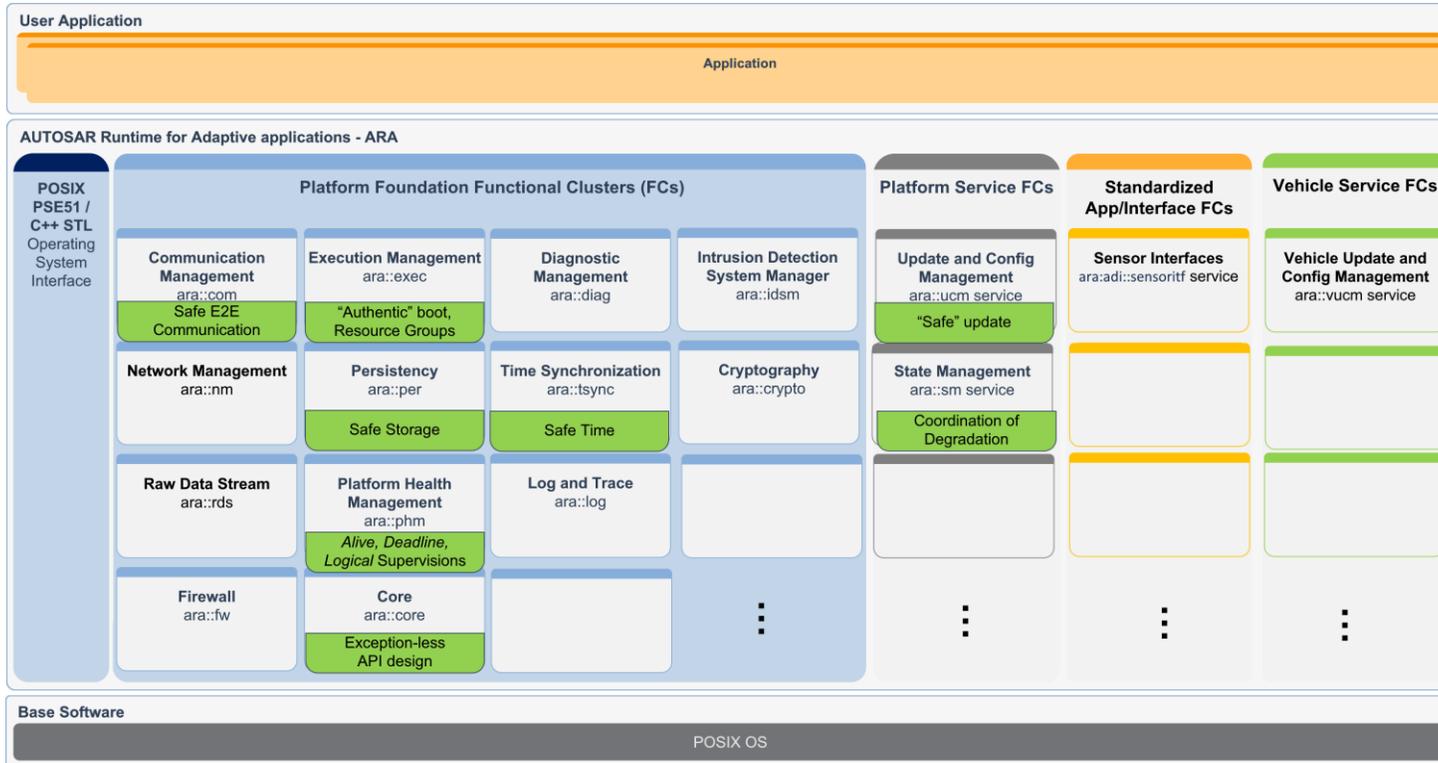
| Functional Cluster	Safety feature
Communication Management	Safe E2E Communication
Execution Management	Trusted Platform
	Resource Groups
Update and Configuration Management	Safe update
Persistency	Safe Storage
Time Synchronization	Safe Time
State Management	Coordination of Degradation
Platform Health Management	Alive/Deadline/Logical Supervisions
	Watchdog
Core	Exception-less API design

AP AUTOSAR 对高级别自动驾驶的意义

自动驾驶场景中的信息安全
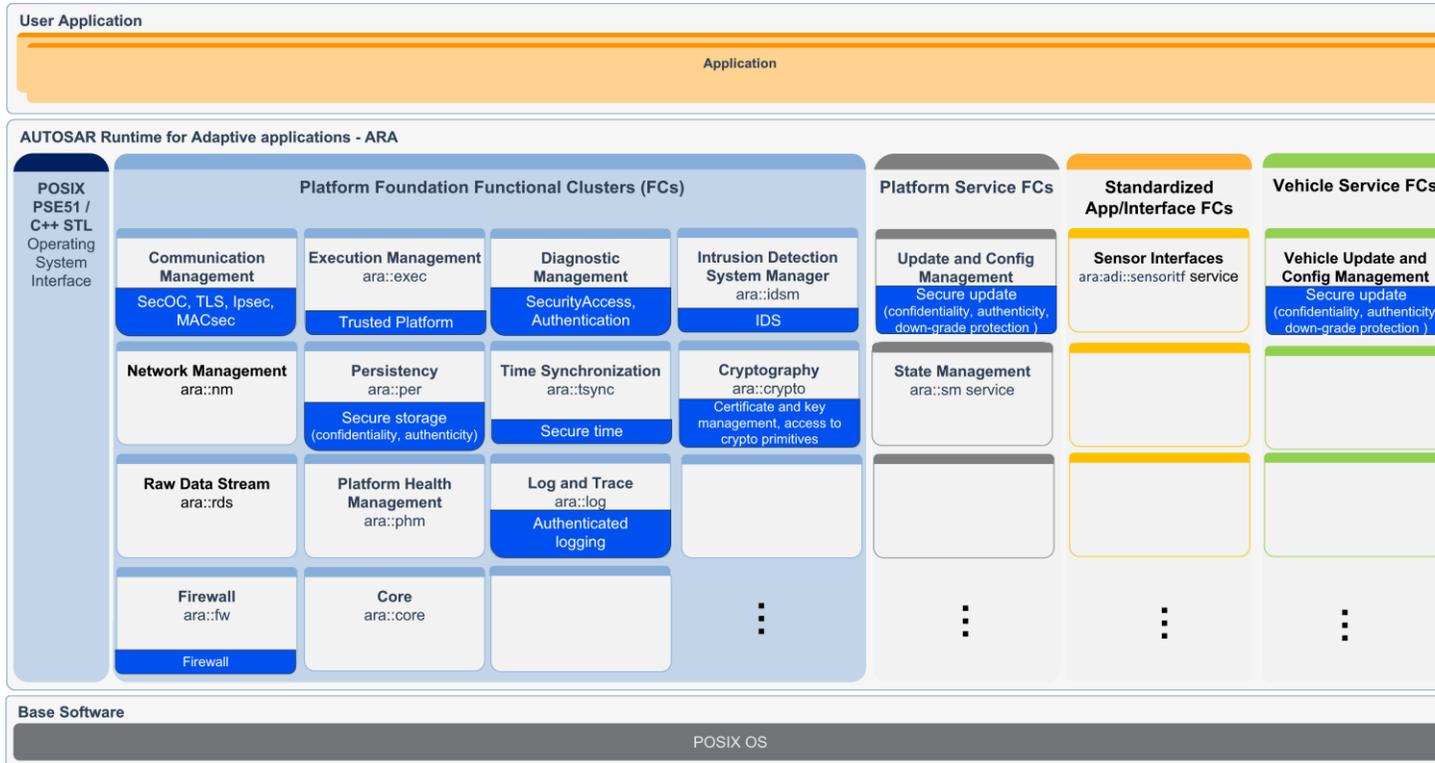
Functional Cluster	Security features
Communication Management	SecOC - Specification of Secure Onboard Communication Protocol (PRS UID 969)
	(D)TLS - (Datagram) Transport Layer Security (by IETF)
	IPSeC - Internet Protocol Security (by IETF)
	MACsec - MAC Security IEEE 802.1AE
Execution Management	Trusted Platform
Diagnostic Management	SecurityAccess - Service 0x27 in UDS
	Authentication - Service 0x29 in UDS
	Authorization - SOVD
Intrusion Detection System Manager	IDS - Intrusion Detection monitoring and reporting
Update and Configuration Management	Secure update - confidentiality/authenticity/down-grade protection
Vehicle Update and Configuration Management	Secure update - confidentiality/authenticity/down-grade protection
Persistency	Secure storage - confidentiality/authenticity
Time Synchronization	Secure time - authenticated time synchronization
Cryptography	Certificate and key management/access to crypto primitives
	Access to secure hardware (e.g TPM/HSM/TEE)
Log and Trace	Authenticated services for logging
Firewall	Filtering on inbound messages based on rules

AP AUTOSAR 对算法、算力支持的发展思考

自动驾驶时代 基础软件的边界变化与影响

ADAS/AD App	ACC	AEB	LKA	APA	...

Funcation	Perceptron	Position	Decision	Control	HMI

Middleware	AP				CP
Operation System	Linux				

Hardware	SoC	MCU

AUTOSAR™

Thanks