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Automotive AUTOSAR Platform Research Report, 2023

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AUTOSAR research: CP + AP integration, ecosystem construction, and localization will be the key directions

AUTOSAR standard technology keeps upgrading, and the willingness to build open cooperation gets ever stronger.

The trend for the boom in intelligent vehicle basic software brings new development opportunities to AUTOSAR. In recent years, new AUTOSAR standards have been continuously introduced to adapt to the fast-growing automotive standard software market.

In December 2022, AUTOSAR delivered its latest release R22-11. Compared with the previous releases, the new standard proposed the cross-platform concept for the first time. Moreover, the AUTOSAR Classic Platform (AUTOSAR CP) adds V2X and DDS communication support for China; the AUTOSAR Adaptive Platform (AUTOSAR AP) offers additions or improvements in CAN, firewall, service-oriented vehicle diagnosis and other aspects. In the AUTOSAR AP architecture, compared with R20-11, the releases R21-11 and R22-11 remove ara:rest cluster and add ara:idsm and ara:fw clusters.

As the releases like AUTOSAR R20-11, R21-11 and R22-11 are published, the AUTOSAR AP specification is becoming mature. Some basic functions of the AP platform have been mature enough to be marketed, and the relevant software platforms compatible with the AUTOSAR AP, especially autonomous driving-related products, have been rolled out one after another. The first-generation AP-based vehicle models have come into the market, and the launch of more models equipped with the platform will also follow up.

The future automotive industry will be a fully open ecosystem built by third-party collaborative organizations. This is also AUTOSAR's future vision and important direction. As an alliance, AUTOSAR is making continuous efforts on cooperation with third parties. For example, in terms of Vehicle API for vehicle-cloud cooperation, AUTOSAR often partners with COVESA; as concerns data exchange formats, it teams up with ASAM; it cooperates with KHRONOS in hardware acceleration and image acceleration.

AUTOSAR Support in Autonomous Driving Software Platforms of Some Suppliers

Company	Product	Application of AUTOSAR
Nvidia	Autonomous Driving Platform NVIDIA DRIVE	· Its DRIVE OS basic software platform uses AUTOSAR (RTE BSW MCAL)
Bosch	SOA of Vehicle Central Computer (VCC)	· Classic AUTOSAR covers security and high real-time requirements; Adaptive AUTOSAR covers flexible security requirements; Linux only needs QM.
TTTech	TTTech MotionWise	· MOTIONWISE CLASSIC based on AUTOSAR CP · MOTIONWISE supports Classic and Adaptive AUTOSAR™, ROS2™, DDS™, etc.
Z-ONE	SOA Software Platform	· The basic software platform supports AUTOSAR AP/ROS
Neusoft Reach	NeuSAR Vehicle Operating System	· Integrate AUTOSAR CP and AUTOSAR AP, SOA middleware, underlying file system support, etc.
EnjoyMove Technology	EMOS	· Integrate enhanced AUTOSAR AP (adding self-developed deterministic scheduling and communication) and conventional CP
iSoft Infrastructure Software	iSoft Automotive Basic Software Platform ORIENTAIS Adaptive AUTOSAR and Tool Chain Products	· The AUTOSAR standard-compliant platform makes breakthroughs in key technologies such as service-based vehicle communication, software platform health management, unified operating system interface, and security trust chain.
DJI	Autonomous Driving Middleware	· Adapt to Classic AUTOSAR and Adaptive AUTOSAR standards
Untouch	High-safety High-performance Autonomous Driving Middleware	· Implemented by Adaptive AUTOSAR based on the Rust language, with completely independent intellectual property rights and being independently controllable.
HoloMatic	HoloSAR	· The autonomous driving basic components that meet the Adaptive AUTOSAR standard are suitable for the SOA, and support the communication and diagnosis protocols of global DDS, SOME/IP, Zero-copy, and DoIP.

Source: ResearchInChina

Outlook for Collaboration with Third Parties

The future automotive development ecosystem will be jointly provided by different cooperative organizations

Source: AUTOSAR China

Following the development trend of E/E architecture, much more AUTOSAR CP+AP integrated products tend to be supplied.

Vehicle domain controller and vehicle central computer are developing by leaps and bounds, which is accompanied by the gradual evolution of vehicle E/E architecture towards centralized integration. For new-generation powerful processors, basic software of the two is required to pack both AUTOSAR AP and AUTOSAR CP to meet the requirements of the corresponding security domain and high-performance computing domain. The AUTOSAR CP+AP integrated supply becomes a major trend. While meeting technical performance requirements, it can greatly shorten the development cycle of software applications and reduce costs to achieve rapid iterations. In recent years, major suppliers have raced to launch their integrated solutions.

In April 2022, iSoft Infrastructure Software introduced its AUTOSAR CP+AP integrated solution. With features of hard real-time performance, high security, and low energy consumption, the solution meets automotive requirements, supports heterogeneous computing, and builds software system architecture that can be managed flexibly, enabling dynamic communication connection and deployment of applications. It also supports SOME/IP, DDS and other protocols, and can be used in intelligent driving, autonomous driving and Internet of Vehicles, covering such application scenarios as ADAS, intelligent cockpit, T-BOX, and domain controller.

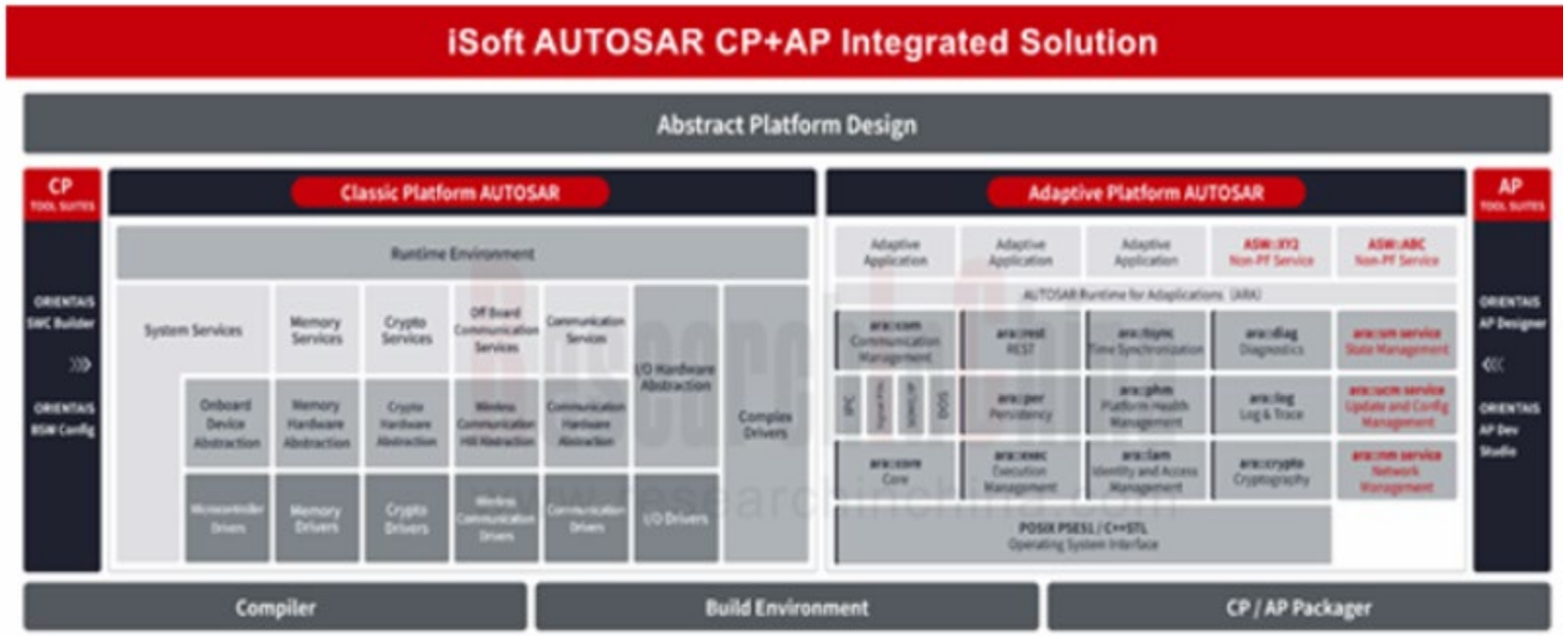
AUTOSAR CP+AP Integrated Products of Major Suppliers

Supplier	Product	AUTOSAR CP+AP Integrated Product
Neusoft Reach	NeuSAR Vehicle Operating System	Neusoft Reach NeuSAR is the first "AUTOSARAP + CP + middleware" full-stack software platform product to be mass-produced and implemented in China, and also the world's first one to be upgraded to AUTOSAR R21-11. NeuSAR integrates AUTOSAR CP and AUTOSAR AP, SOA middleware, underlying file system support, etc., and builds NeuSAR SF (Service Framework), a cross-domain fusion framework that complements AUTOSAR standards.
iSoft Infrastructure Software	AUTOSAR CP+AP Integrated Solution	Standardize the interfaces and architectures of different operating systems, underlying hardware and protocol software to enable service-oriented architecture; fully cover the software development of perception, decision, and control systems of intelligent connected vehicles to support the development from conventional vehicles to intelligent connected vehicles.
Novauto	NOVA Drive	The highly reliable system software for intelligent driving is compatible with AUTOSAR AP & CP standards, meeting the requirements of next-generation automotive E/E architecture.
ETAS	Highly Integrated End-to-end Software Solution	Its solution provides the vehicle OS cloud-native software stack and vehicle containers on the kernel of general operating system Linux, allowing for rapid iteration, update and even function upgrade of various new vehicle applications; AUTOSAR Classic, AUTOSAR Adaptive, Safety & ADAS/AD and Vehicle Edge middleware, operating system manager and ESCRYPT's cyber security solutions are used for continuous deployment and operation of vehicle software stacks.
Continental Elektrobit	EB Xelor	The AP & CP integrated software platform is optimized for next-generation new scalable HPC environments, shortening the development cycle.

Source: ResearchInChina

AUTOSAR CP+AP Integrated Solution of iSoft Infrastructure Software

In addition, in the trend for AP+CP integrated supply, the architecture and methodology of the two are tending to integrated, which has started from the release AUTOSAR R21-11. Before R20-11, the architecture and methodology of AP and CP were separated. In the latest release R22-11, the concept of cross-platform is just proposed for the first time.



Source: iSoft Infrastructure Software

Overview of Major Changes in AUTOSAR R21-11

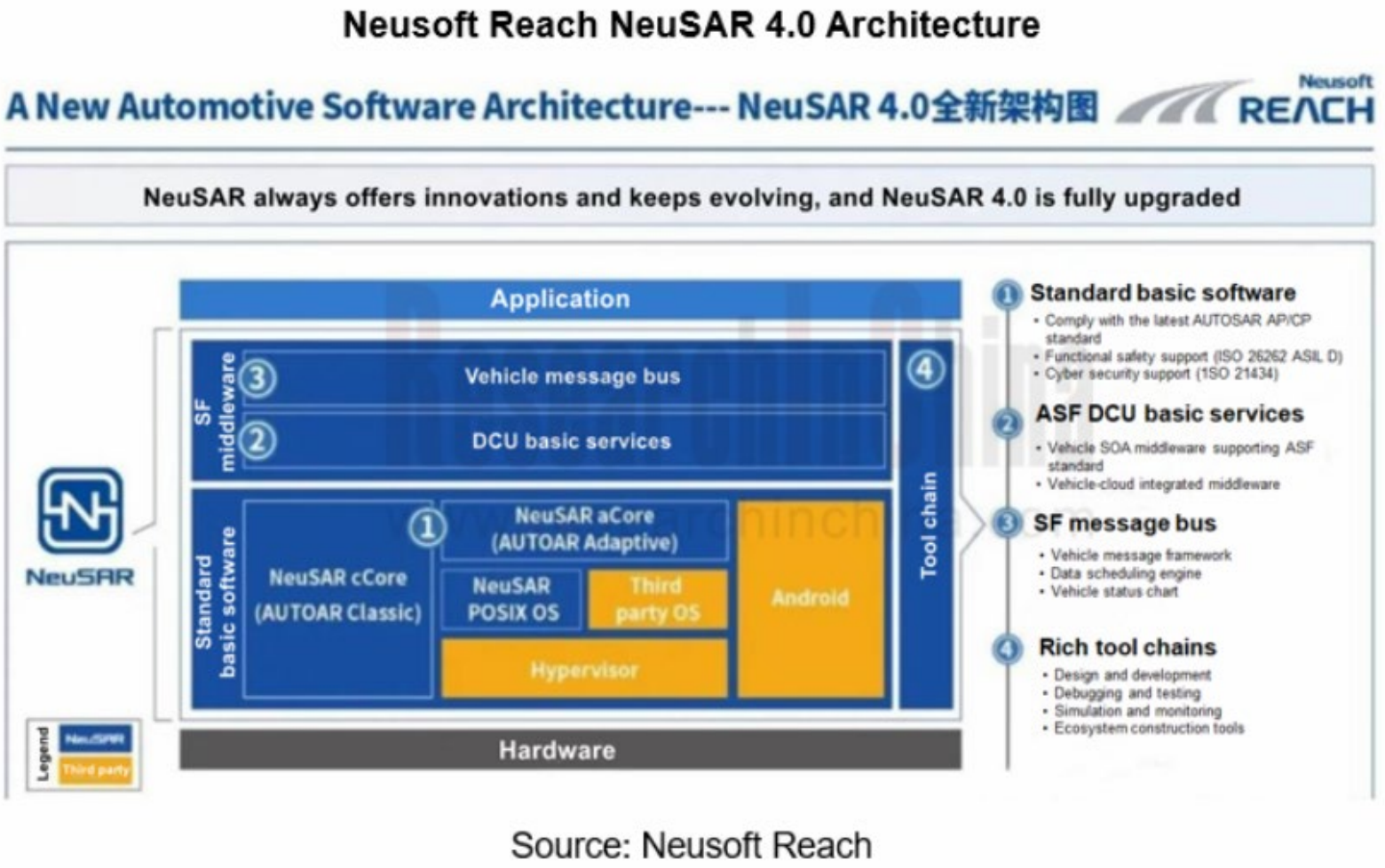
Source: AUTOSAR China

Chinese suppliers are working hard to deploy, and the localization of AUTOSAR in China is accelerating.

In the context of increasingly high requirements for vehicle development speed and function iteration, conventional software products and software development modes no longer fully adapt to the current market. In the face of the fast-paced intelligent vehicle market, suppliers, especially Chinese local suppliers, make an active response and keep launching new marketable products, answering the needs of customers for rapid iteration.

Neusoft Reach joined AUTOSAR in 2017 as a Premium Member. In December 2022, Neusoft Reach announced a new release of basic software - NeuSAR 4.0. As a new automotive software application development framework, NeuSAR 4.0 provides AUTOSAR standard-compliant components, including Classic AUTOSAR - NeuSAR cCore and Adaptive AUTOSAR - NeuSAR aCore. In this upgrade, both cCore and aCore are iterated to the release AUTOSAR R21-11.

NeuSAR 4.0 not only still offers improvements in AUTOSAR, but also introduces a new automotive software application development framework for the cross-domain integration stage and upgrades the NeuSAR SF (Service Framework) and NeuSAR DevKit tool chain. It moves the development view from the domain controller level to the full vehicle level to solve the problem in software deployment for multi-core heterogeneous domain controllers, and also releases NeuSAR DS (Domain System) for prototype development platforms that integrates the latest AUTOSAR components and SF middleware.



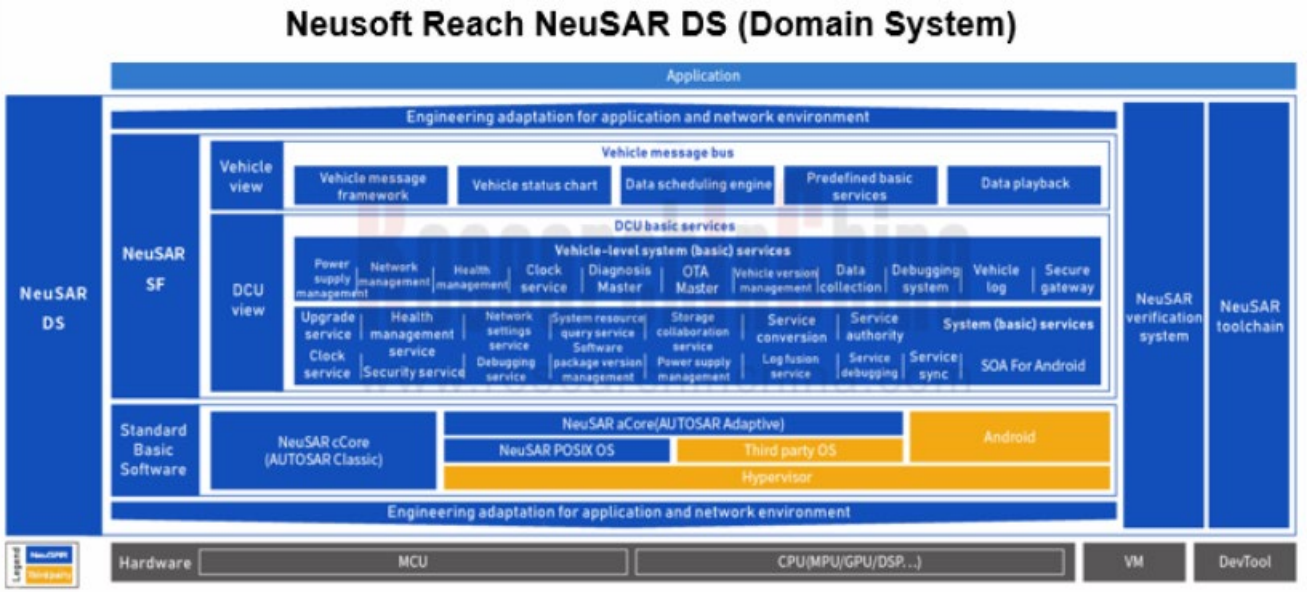
Source: Neusoft Reach

Chinese suppliers are working hard to deploy, and the localization of AUTOSAR in China is accelerating.

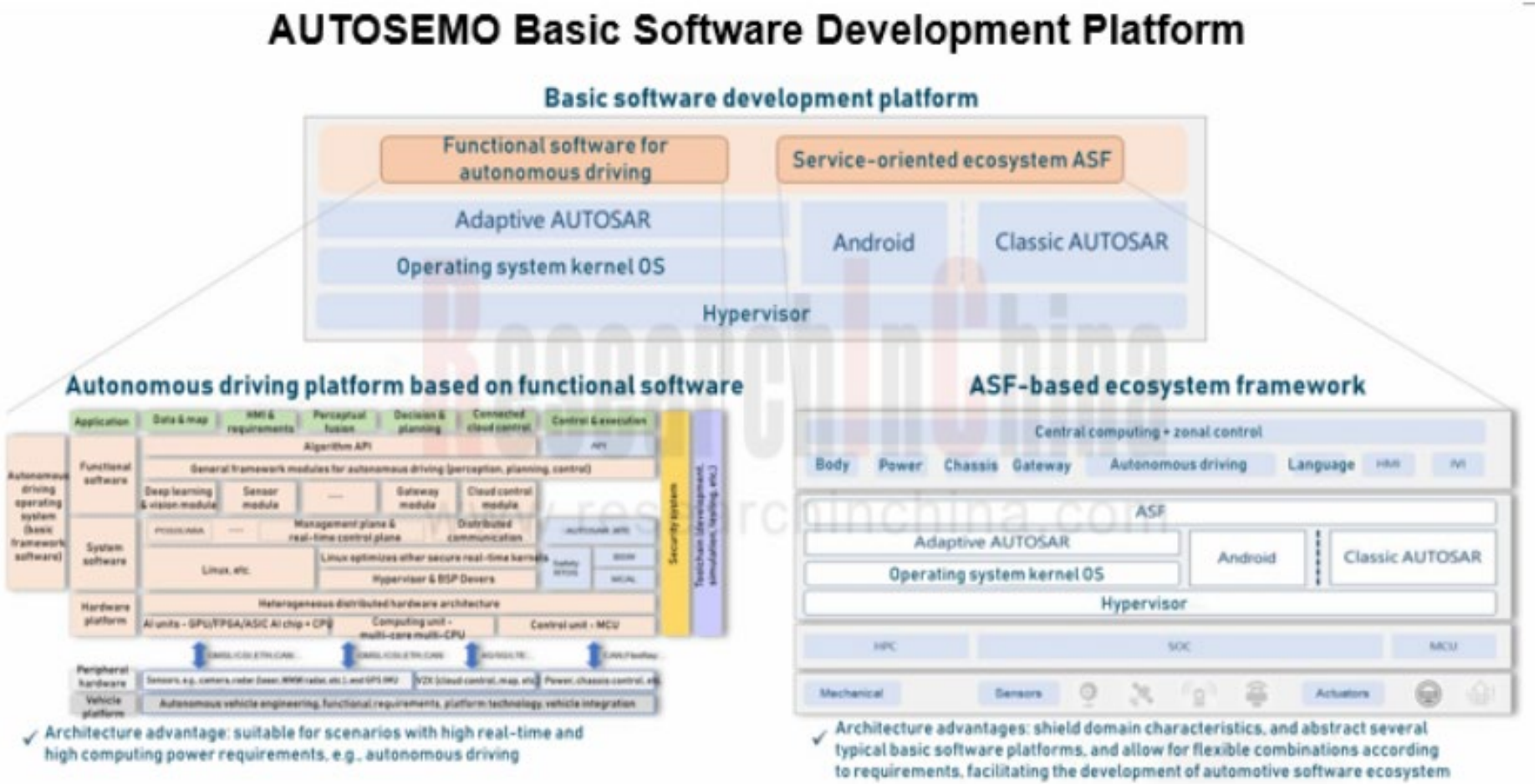
In recent years, in the background of the boom of intelligent vehicles in China and the increasing number of Chinese partners, AUTOSAR has valued the Chinese market more highly. Based on the original AUTOSAR User Group in China, in April 2022, AUTOSAR established the AUTOSAR China Hub, the third regional center outside of Japan and the US, aiming to enhance services and support for Chinese partners and carry out a range of AUTOSAR-related training or popularization activities.

Meanwhile, in 2022, the latest release AUTOSAR R22-11 added the new feature of "V2X Support for China" to the CP to further support China's V2X technical standards. It is known that this feature is jointly developed by Huawei, Neusoft Reach, Bosch, BMW, Volkswagen Audi, Continental and HingeTech among others.

Based on the AUTOSAR architecture standards, China established the China Automotive Basic Software Ecosystem Committee (AUTOSEMO), with the aim of coordinating and organizing members to introduce a range of basic software standards and specifications, for example, providing white papers on the development of automotive basic software, ASF technical specifications, and vehicle-cloud integration technical specifications. Wherein, in the white papers on the development of automotive basic software, the basic software development platform is built on AUTOSAR AP and AUTOSAR CP; the ASF is an expansion of general basic software, and also expands the service management framework of AUTOSAR, facilitating localization of AUTOSAR in China.



Source: Neusoft Reach



Source: AUTOSEMO

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