Future of AUTOSAR
Integrating heterogeneous platforms

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Electronics in Vehicles

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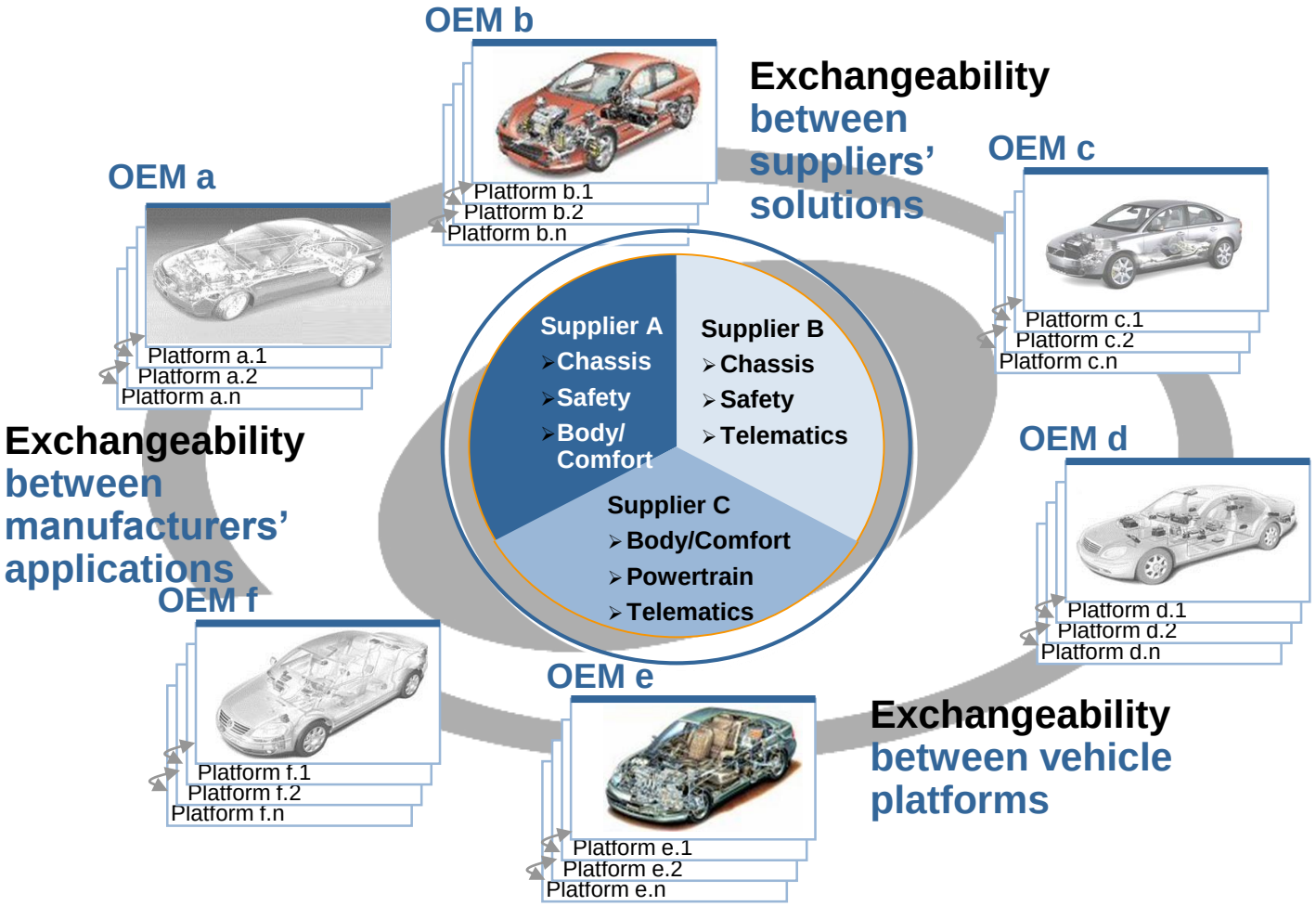
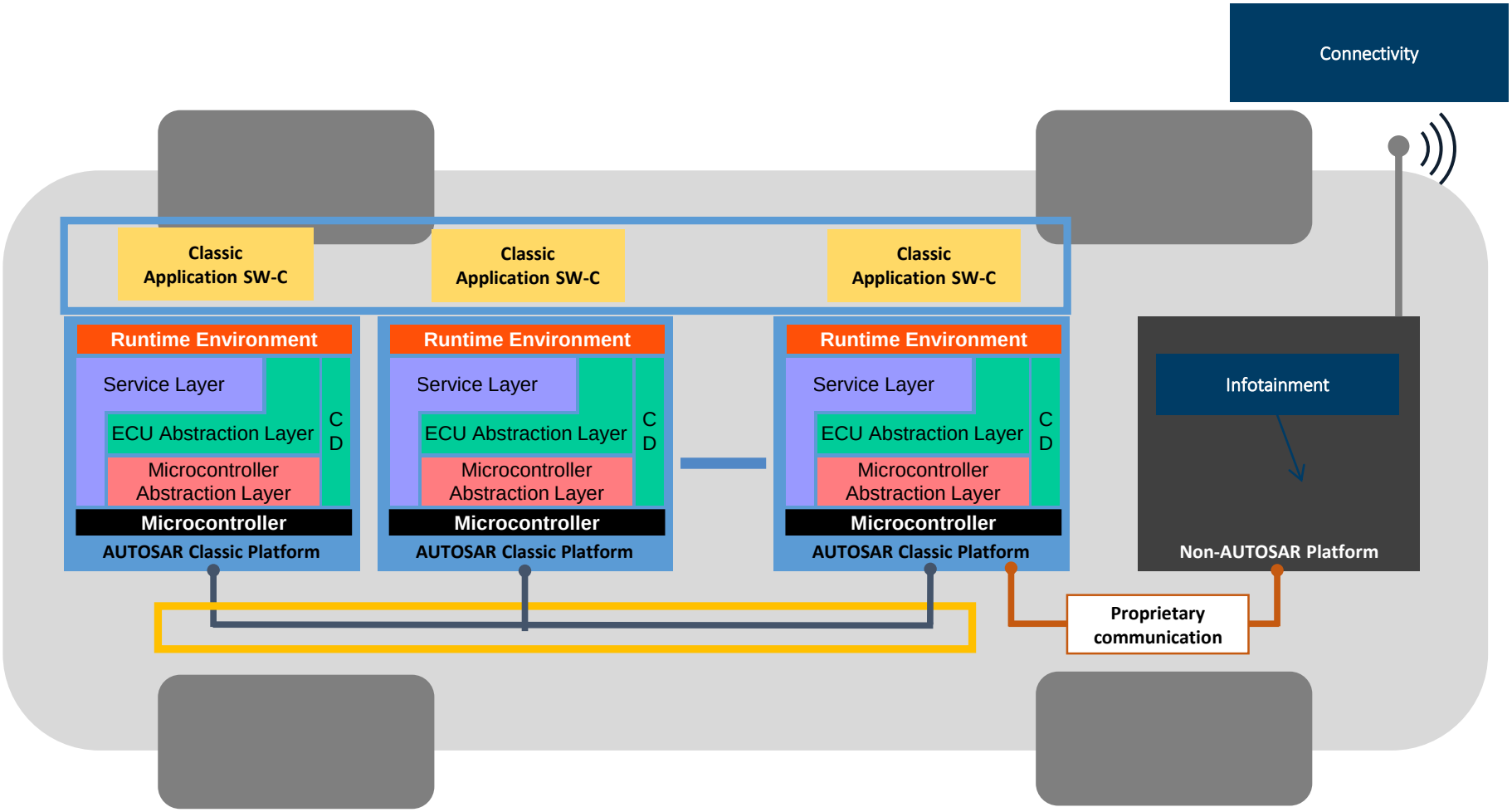
Software platforms and standardization



- AUTOSAR aims to improve complexity management of integrated E/E architectures through increased reuse and exchangeability of software modules between OEMs and suppliers.

The E/E world today from an AUTOSAR perspective



Software Abstraction

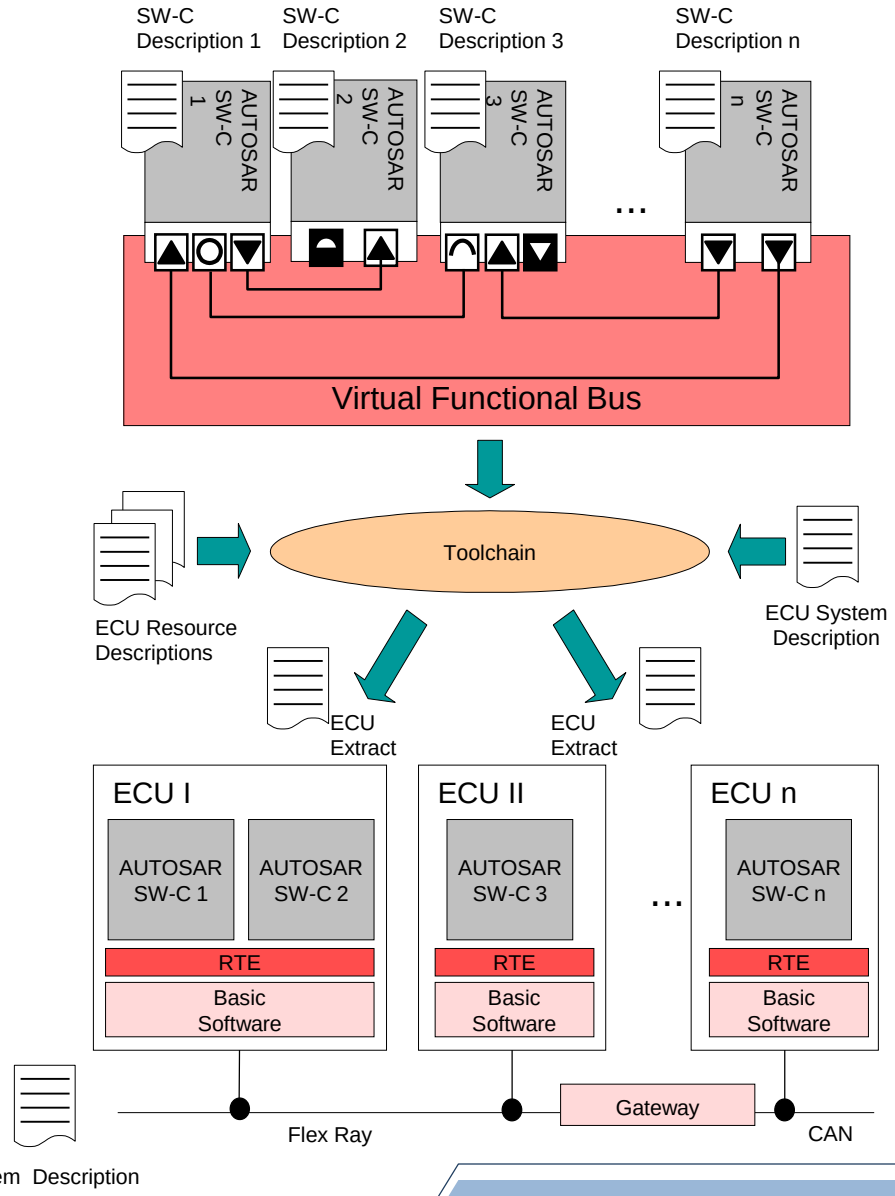
Common Bus Interface Specification

Characteristics of a software platform

Application framework
- **Execution interface**: Interaction with the platform
- **Communication interface**: Interaction with other applications

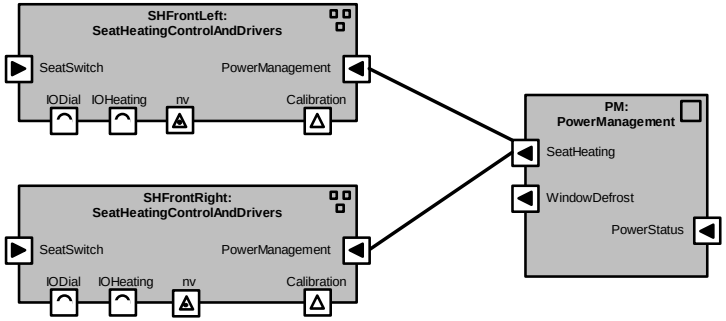
Formats for metadata (templates)
- Integration on the ECU
- Integration with other applications

Reference architecture
- Defines the semantics of the metadata
- Basis for interoperability
- Specify basic infrastructure features and services (e.g. communication infrastructure, libraries, , etc.)

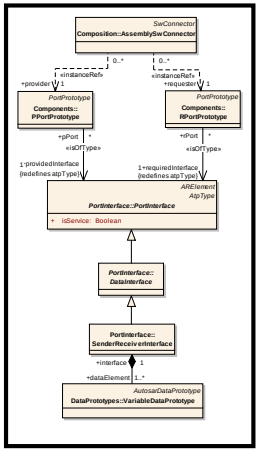


AUTOSAR Classic Platform

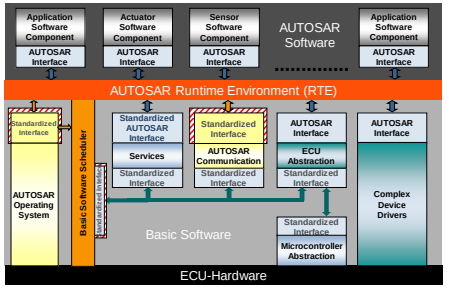
Application framework
- Support of **control applications**
- Signal based communication



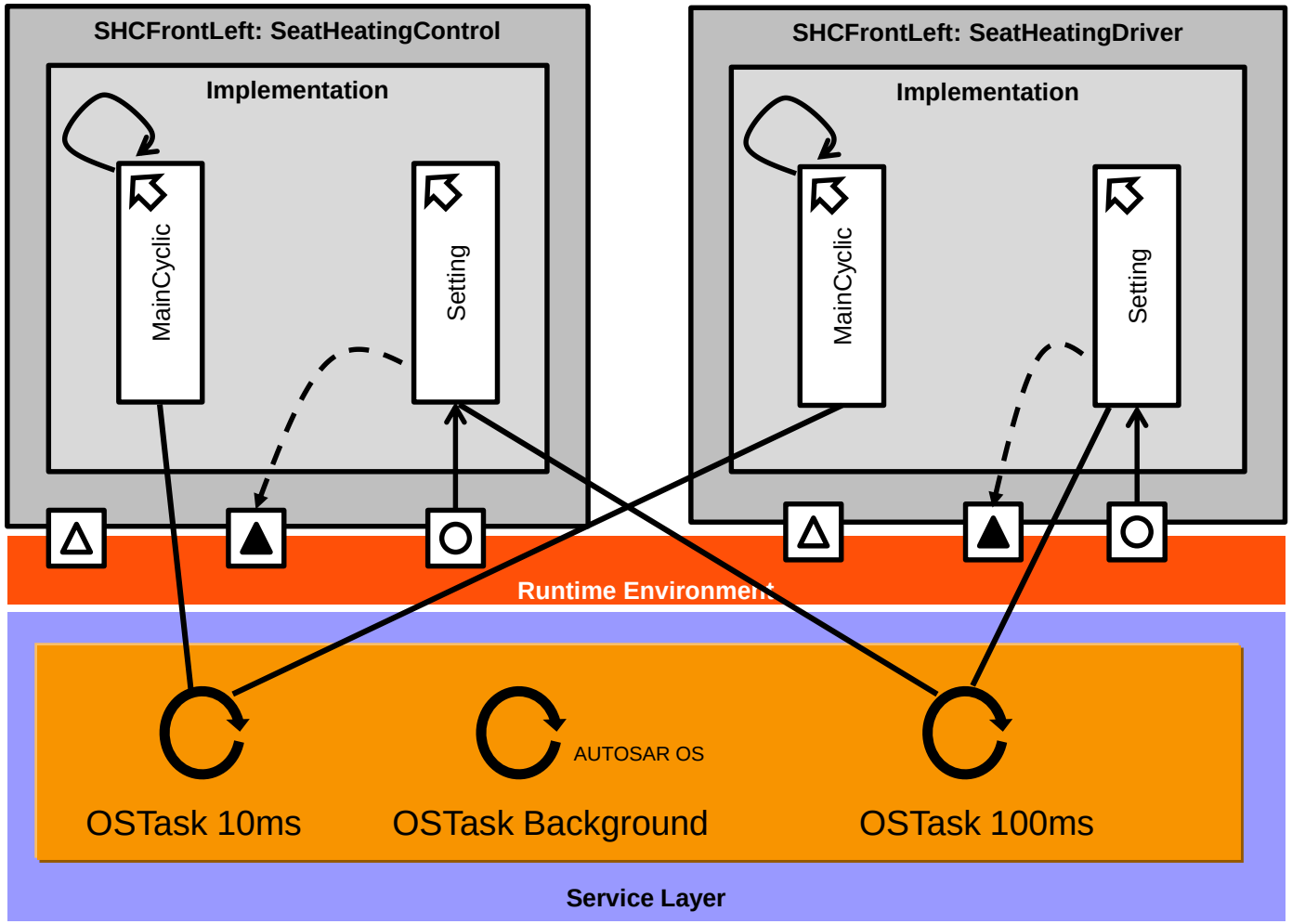
Formats for design data
- Support automotive specific work-share scenarios
- Support of **resource efficient** integration
- Enable optimization strategies



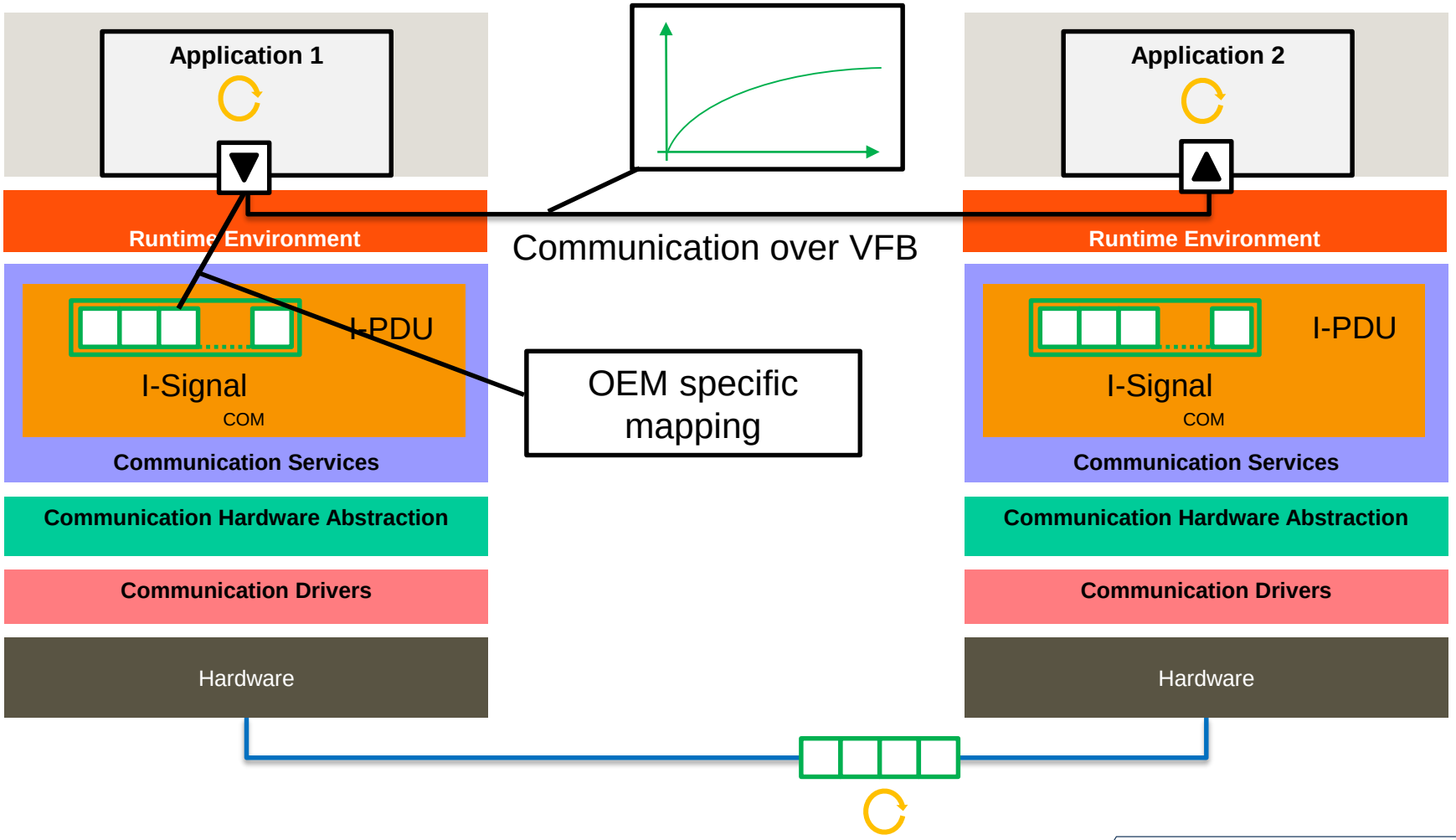
Reference architecture
- Support of **resource efficient** implementations
- Low-bandwidth busses
- Support safety requirements



AUTOSAR Classic Platform – static execution model



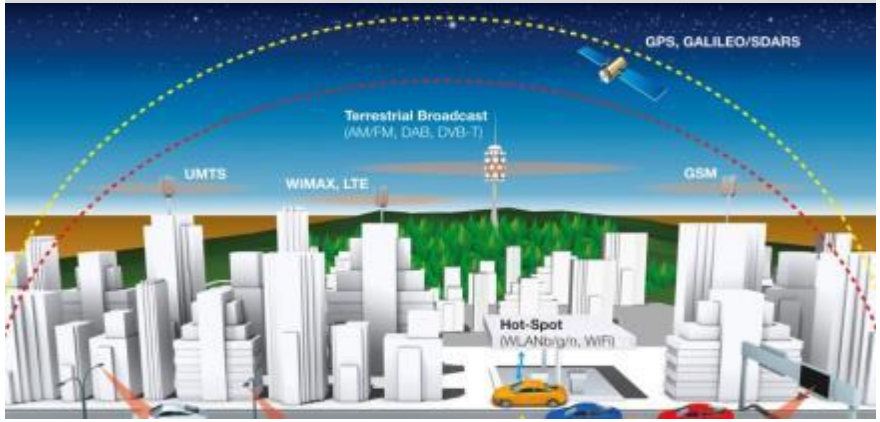
AUTOSAR Classic Platform – static communication relationships

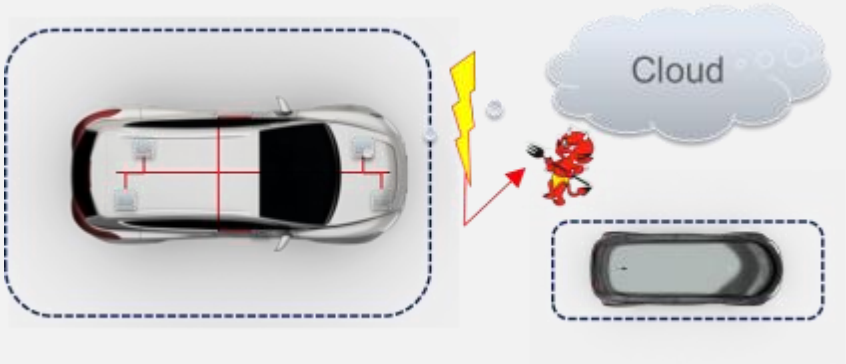


Main drivers for a new software platform

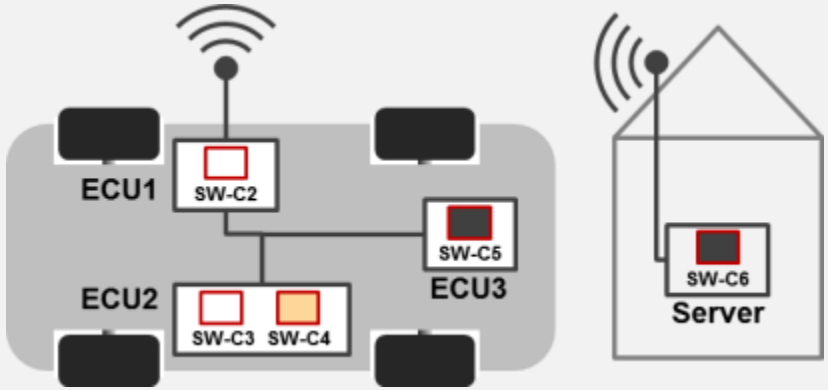
Highly automated driving

Car-2-X applications





Vehicle in the cloud

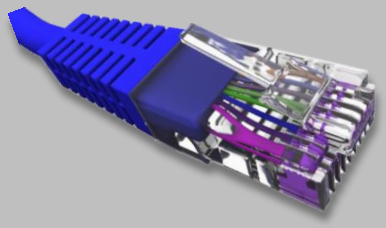


Increased connectivity

Technology drivers

Ethernet

- High bandwidth
- Communication system is not limiting aspect any more
- Switched network
- Efficient point-to-point communication
- Efficient transfer of long messages



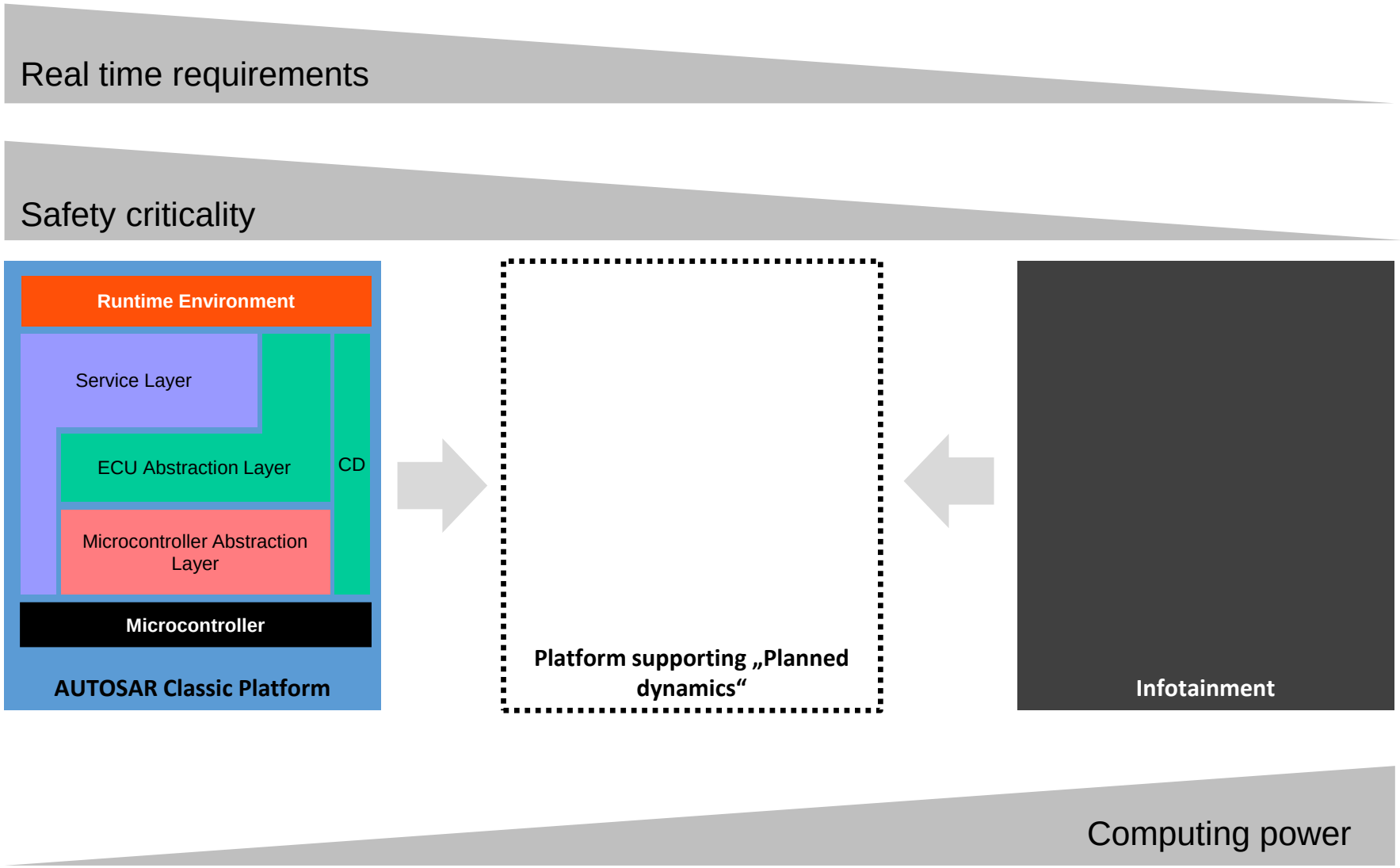
Processors

- Switch from microcontroller to processors with external memory (and maybe filesystems)
- Many core processors
- Parallel computing
- „Cheap“ availability of computing power

Heterogeneous architectures

- Special purpose processors

Another platform for different applications

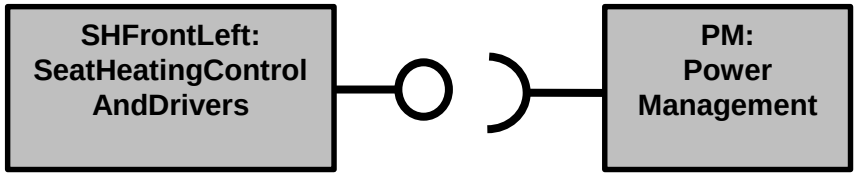


AUTOSAR Adaptive Platform – Characteristics

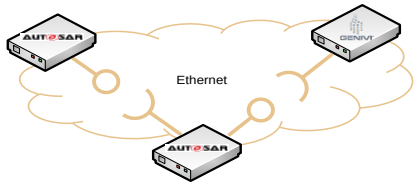
Application framework
- Support for run-time configuration
- Service-oriented communication
- Partial update

Formats for design data
- Planning of dynamic behavior (e.g. constraints for scheduling and communication)
- Consider automotive specific cooperation scenarios
- Support integration with existing systems (Classic Platform)

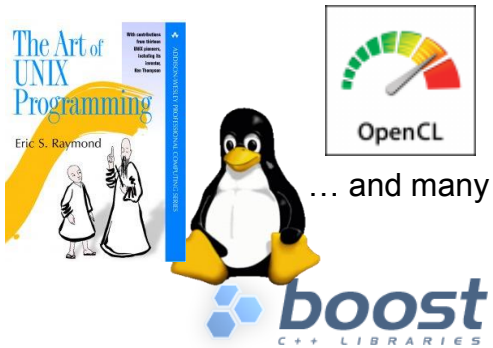
Reference architecture
- Reuse existing (non-automotive) standards
- Ease software development
- Support automotive use-cases and protocols



Support of different scheduling strategies



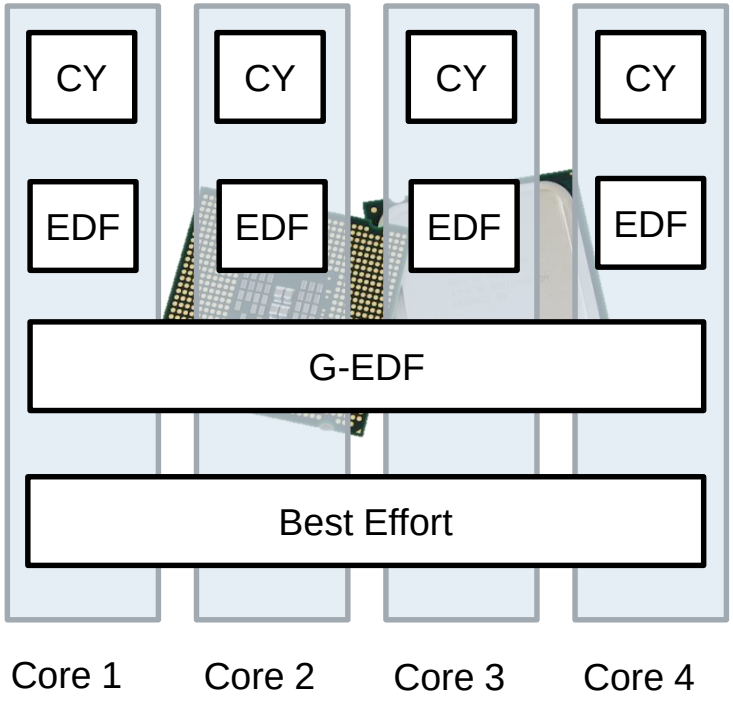
Planning of dynamic communication



… and many more

Planned dynamics - scheduling

Scheduling architecture for mixed-criticality task systems on multicore platforms



Highest-criticality tasks (as today)

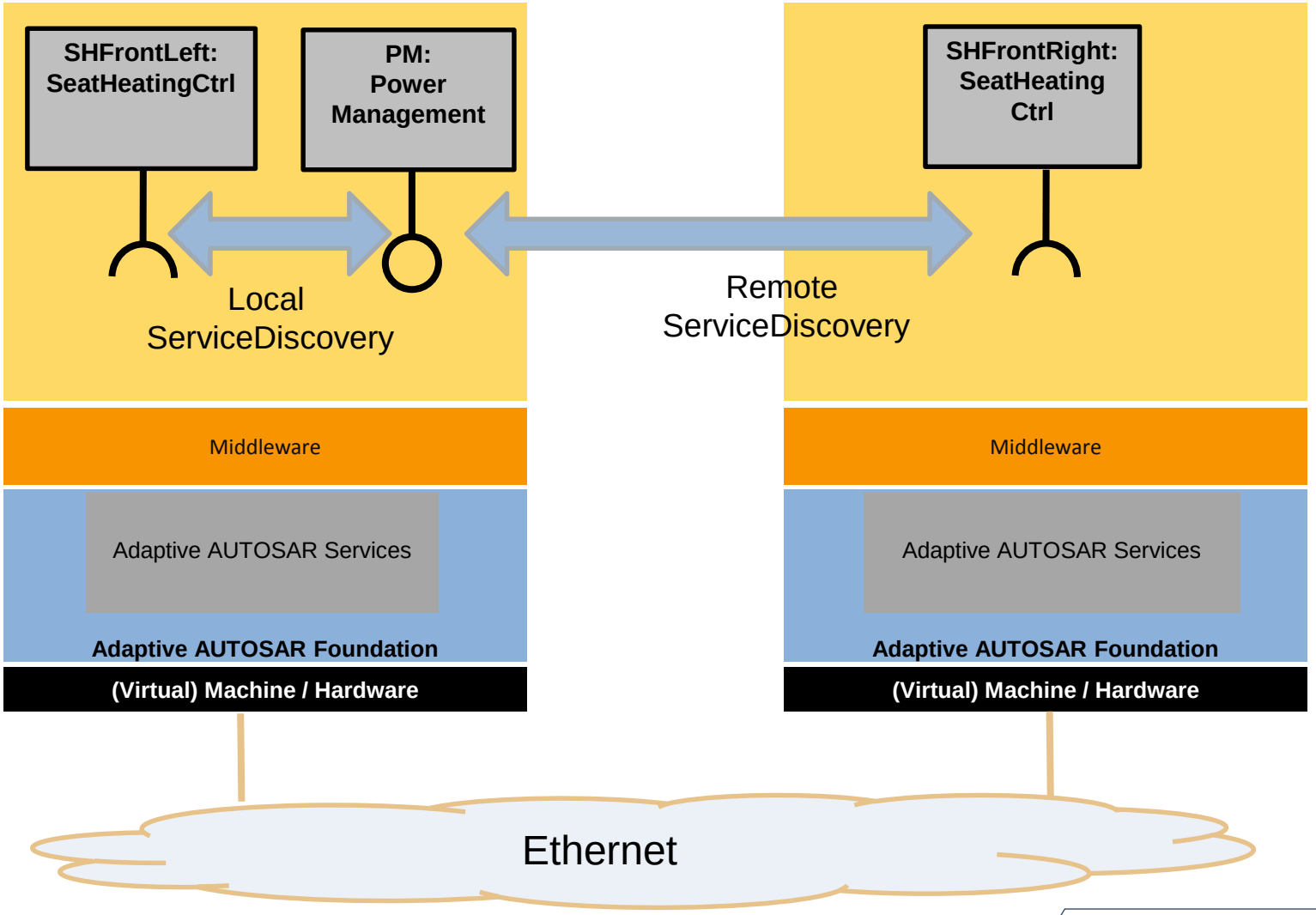
Partitioned EDF scheduling to eases software development.

Global EDF to share the workload between different cores.

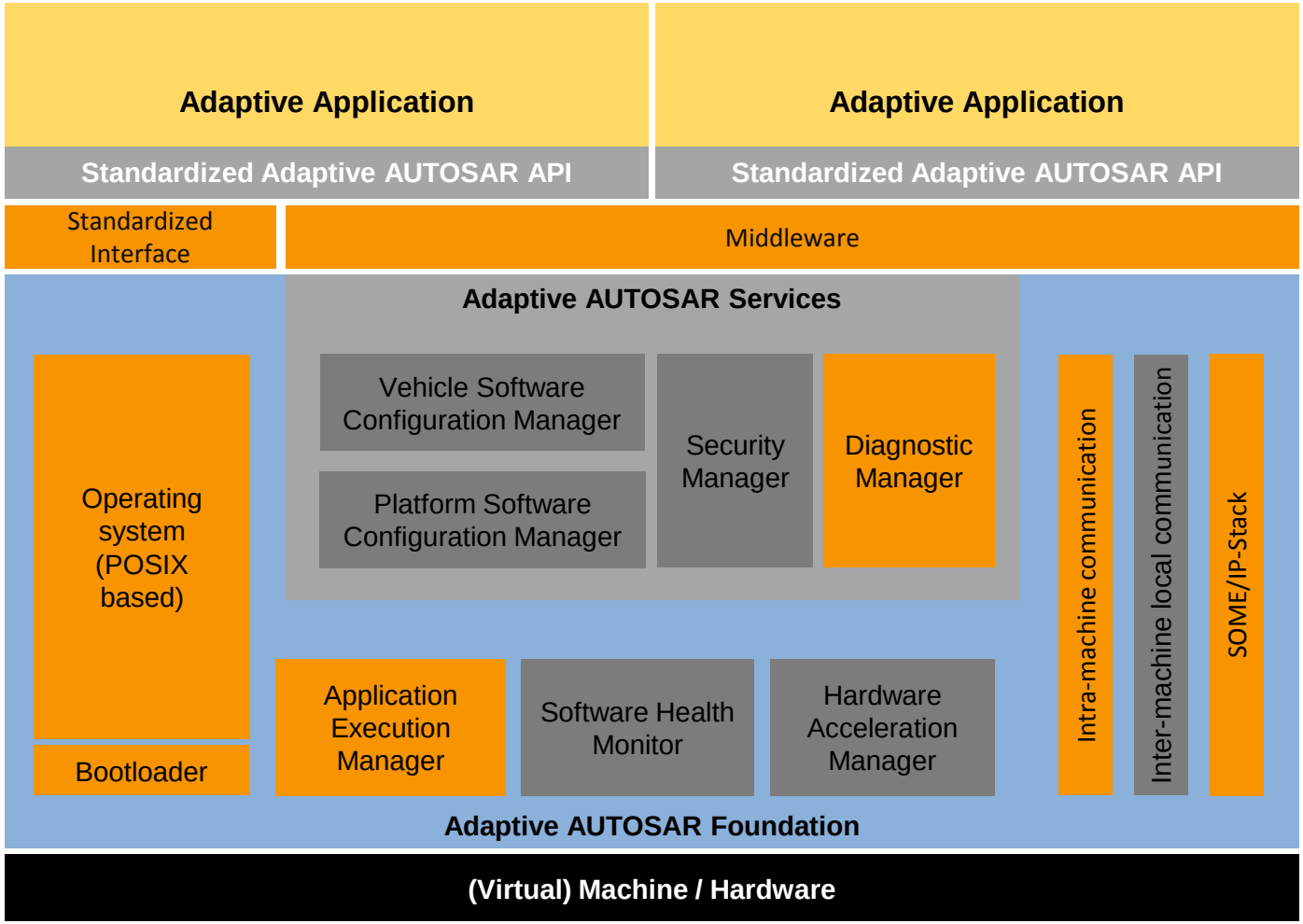
Lowest criticality

Malcolm S. Mollison, Jeremy P. Erickson, James H. Anderson, Sanjoy K. Baruah, and John A. Scoredos. 2010. Mixed-Criticality Real-Time Scheduling for Multicore Systems. In *Proceedings of the 2010 10th IEEE International Conference on Computer and Information Technology* (CIT '10). IEEE Computer Society, Washington, DC, USA, 1864-1871. DOI=10.1109/CIT.2010.320 http://dx.doi.org/10.1109/CIT.2010.320

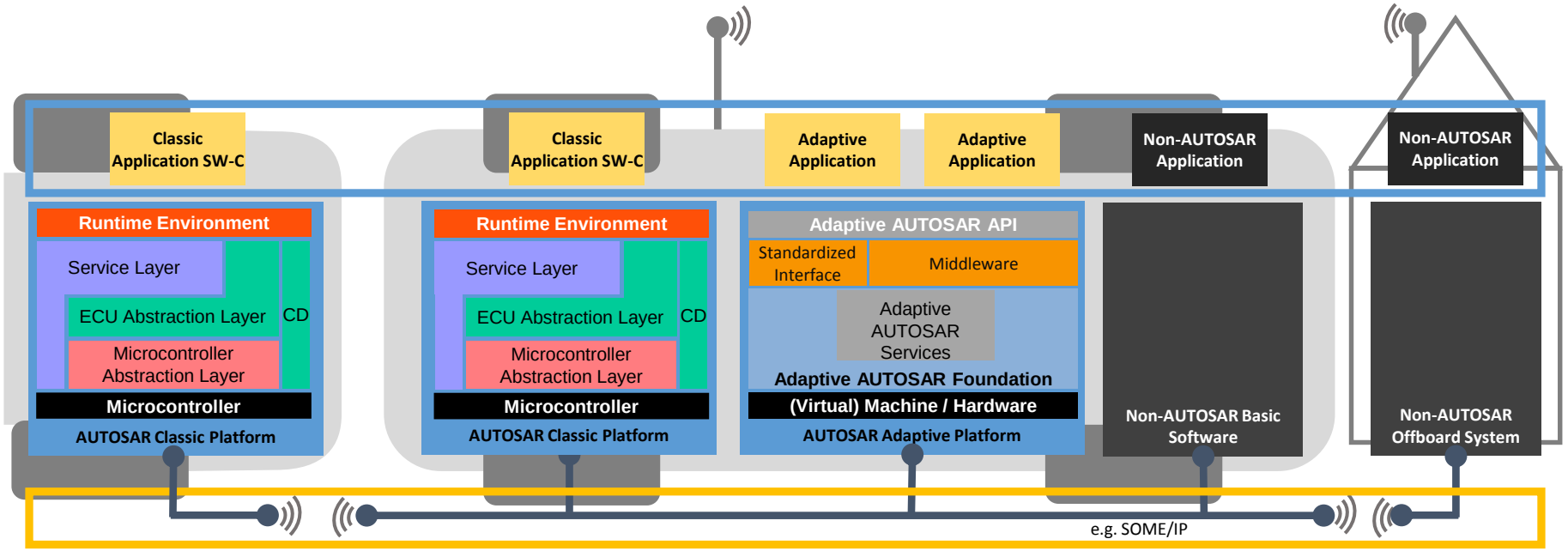
Planned dynamics - communication



Architecture of the AUTOSAR Adaptive Platform



The challenge: Integration of different platforms



Software Abstraction

Common Bus Interface Specification

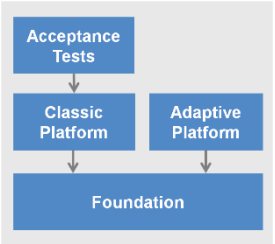
AUTOSAR Products

Acceptance Tests
R1.1.0

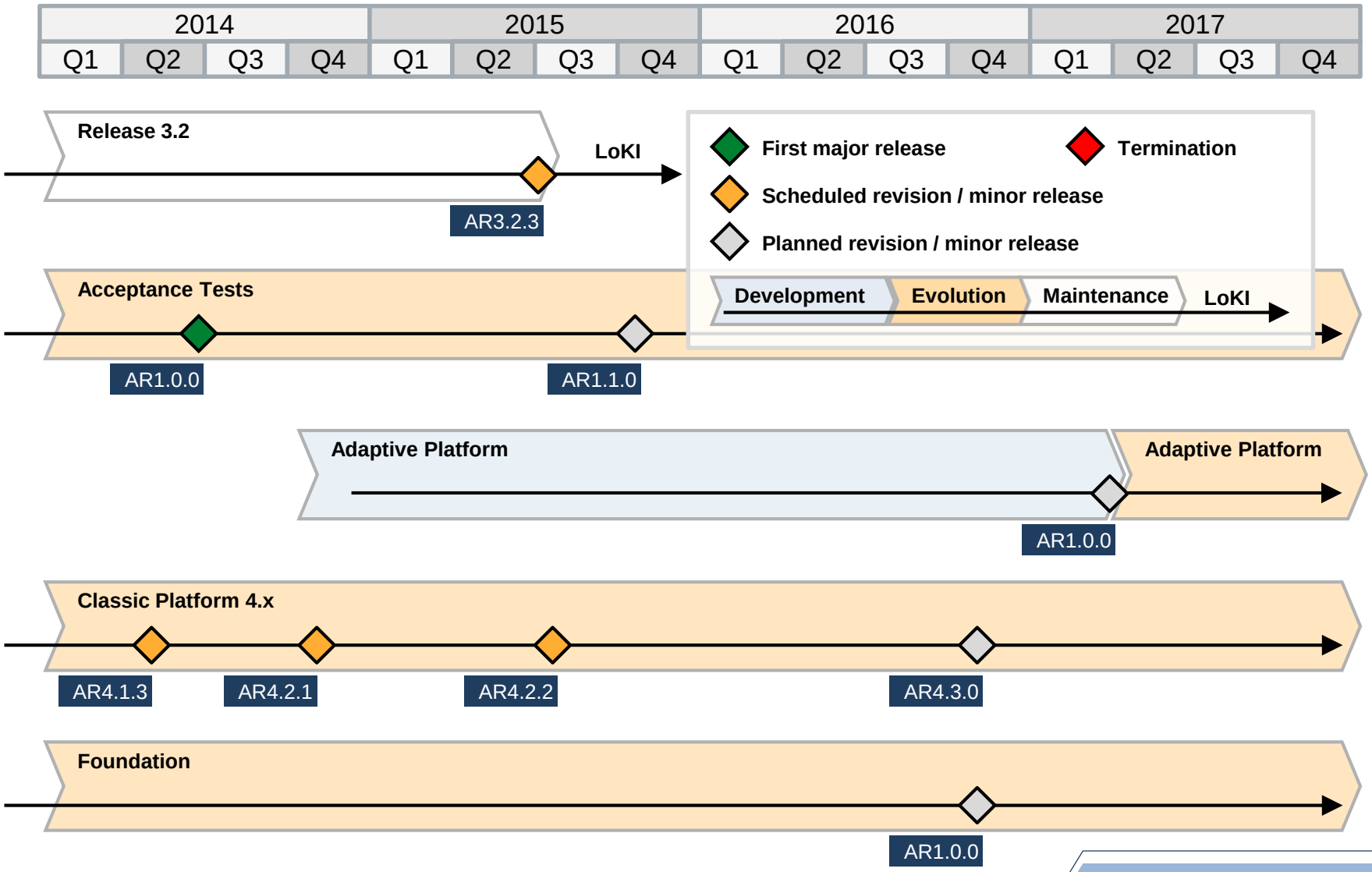
Classic Platform
R4.2.2
R4.3.0

Adaptive Platform
R1.0.0

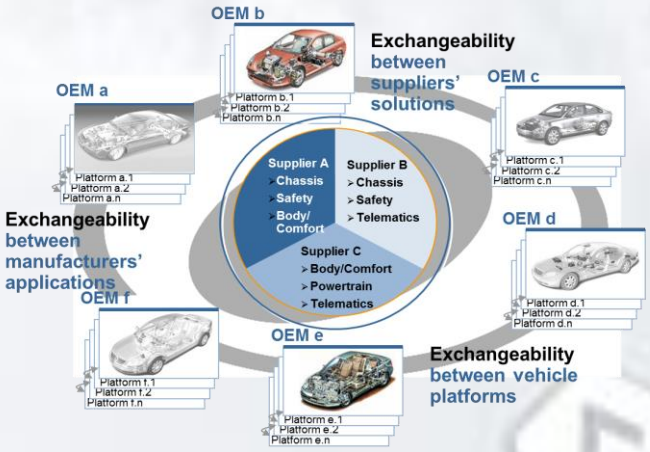
Foundation
R1.0.0



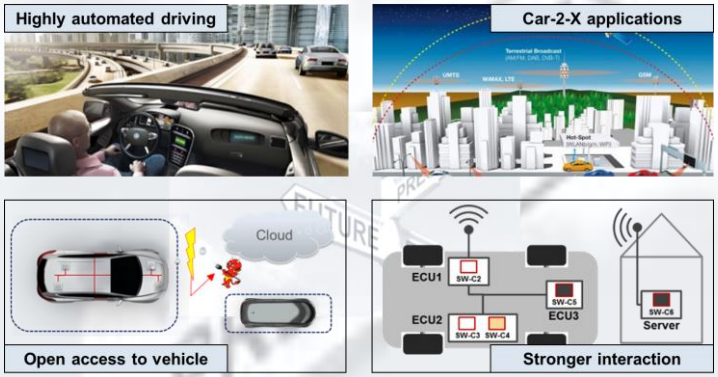
AUTOSAR products and timeline



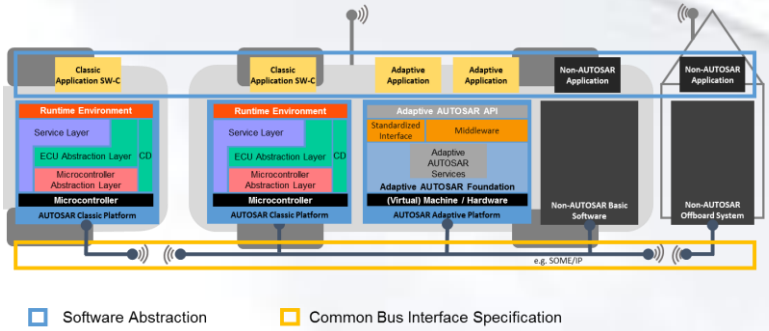
Summary



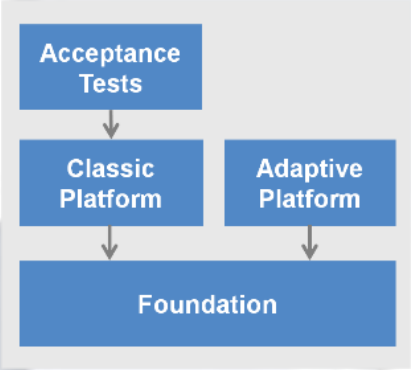
Our mission



New challenges and applications



Appropriate platforms

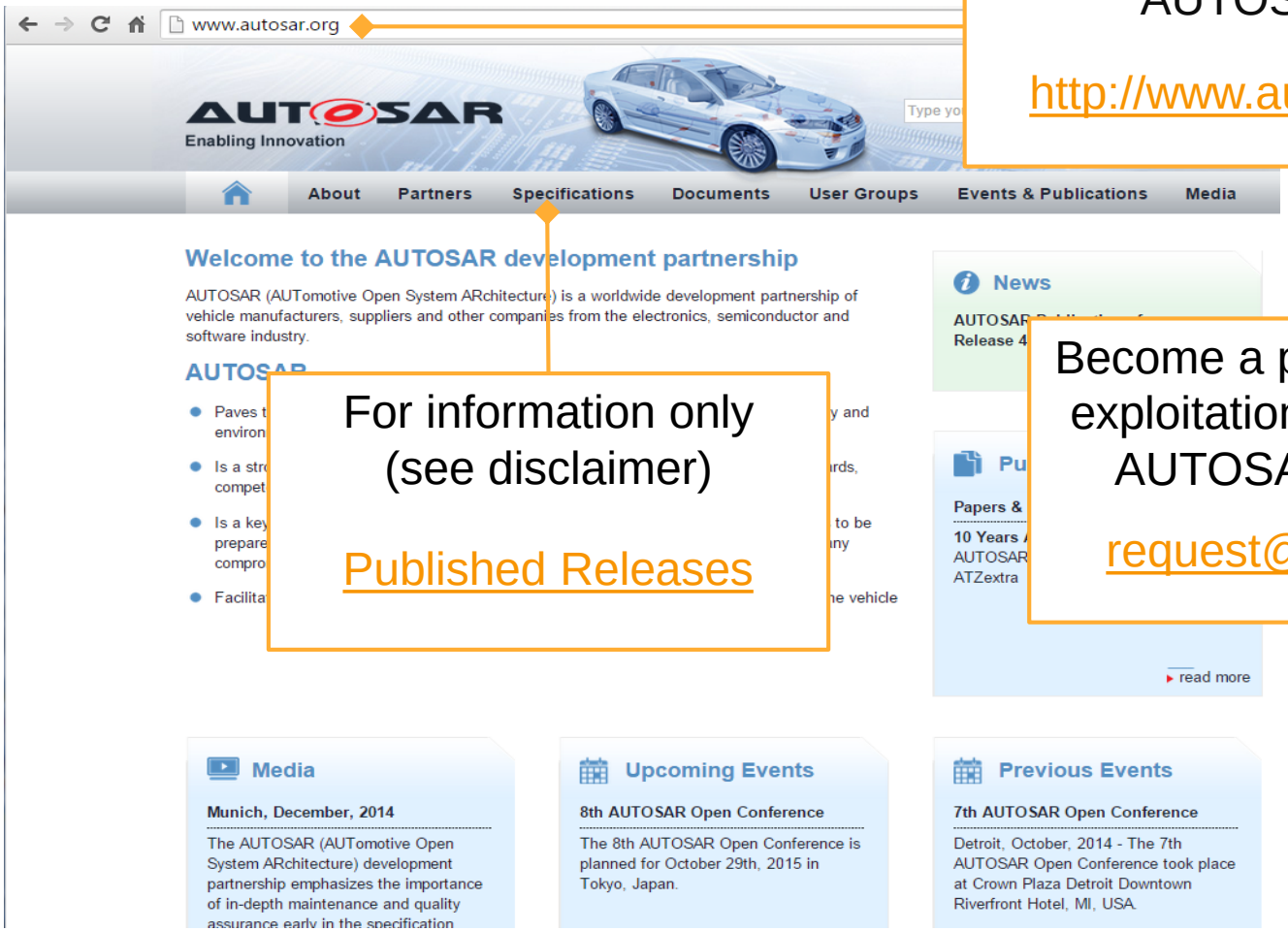


Provision of standard in time

More information available online

More Information about AUTOSAR:

http://www.autosar.org



For information only (see disclaimer)

Published Releases

Become a partner and get exploitation rights for the AUTOSAR standard

request@autosar.org

Future of AUTOSAR – objectives and challenges

Goals

- Maintain stability and compatibility of existing standard.
- Main directions of the Future of AUTOSAR:
  - Reflect new use cases of today's and future market needs.
  - Adapt to upcoming market needs.
  - Support new technologies.
- The proper support of the AUTOSAR Adaptive Platform requires
  - Transfer of concepts from research to industry
  - Adoption of these concepts to meet demands of the industry

Challenges

2015 — 2020

Anticipate the future – *identification of technological trends, key features and next challenges for AUTOSAR*

Stabilize the standard – *maintain the standard, reduce complexity and increase usability, improve job sharing*