Real-Time Operating Systems in Automotive Architectures

Automotive Grade Linux
All Member Meeting Summer
July 13, 2023

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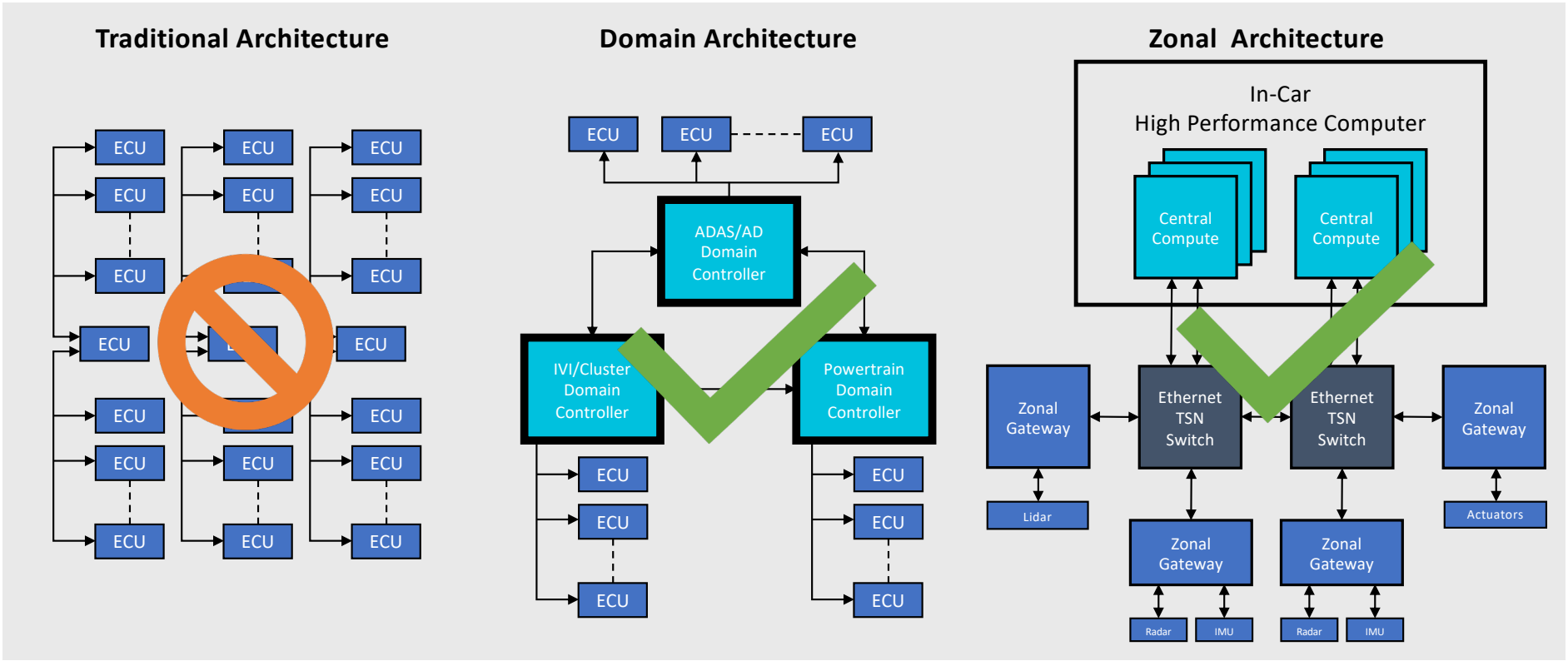
THE LINUX FOUNDATION

Agenda

- Why AGL architectures should consider RTOS
- Virtualization context
- Distributed context
- Heterogeneous multicore context
- Call to action

Scope of architecture applicability

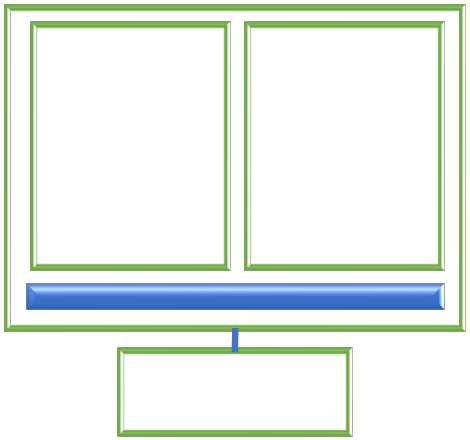


Why RTOS is important to AGL

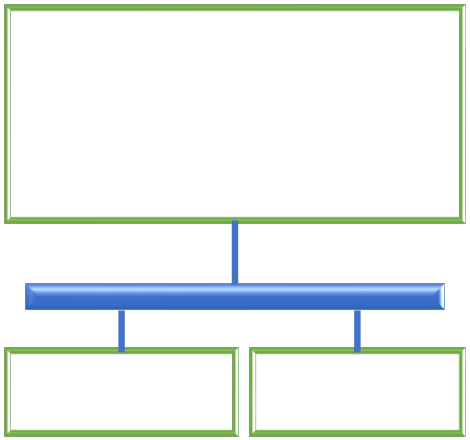
- RTOSes are pervasive in automotive architectures
- RTOSes can be open source or commercial
  - Open source: FreeRTOS, Zephyr, NuttX, …
  - Commercial: Classic/Adaptive AUTOSAR, VxWorks, …
- RTOSes no longer islands in domain and zonal automotive architectures
- Customers are looking for domain and zonal options:
  - How to keep RTOS applications up-to-date
  - How to more easily interoperate between DCs and ECUs
- Automotive Grade Linux is perfectly positioned as domain or zonal operational hub

Introduction to the charter

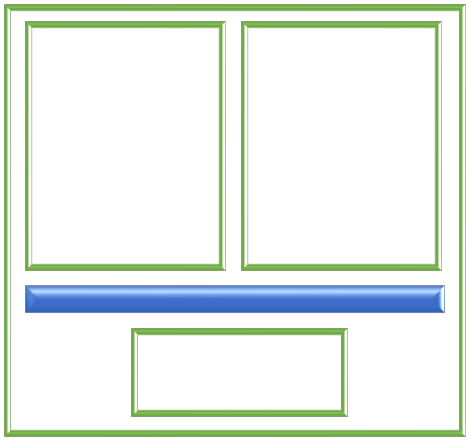
Goal: define three contextual reference architectures for operating RTOS workloads related to Automotive Grade Linux



Virtualized



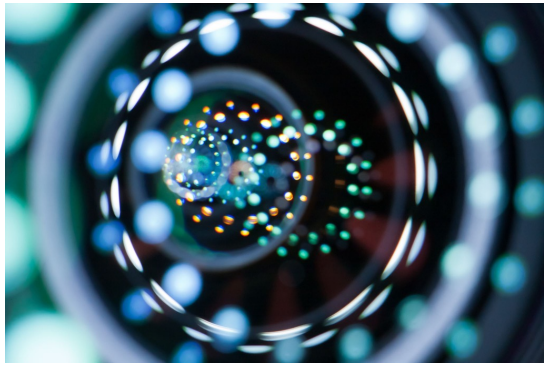
Distributed



Multicore

Introduction to core use cases

Instrument Cluster



ADAS

In-Vehicle Infotainment

Telematics (T-ECU)

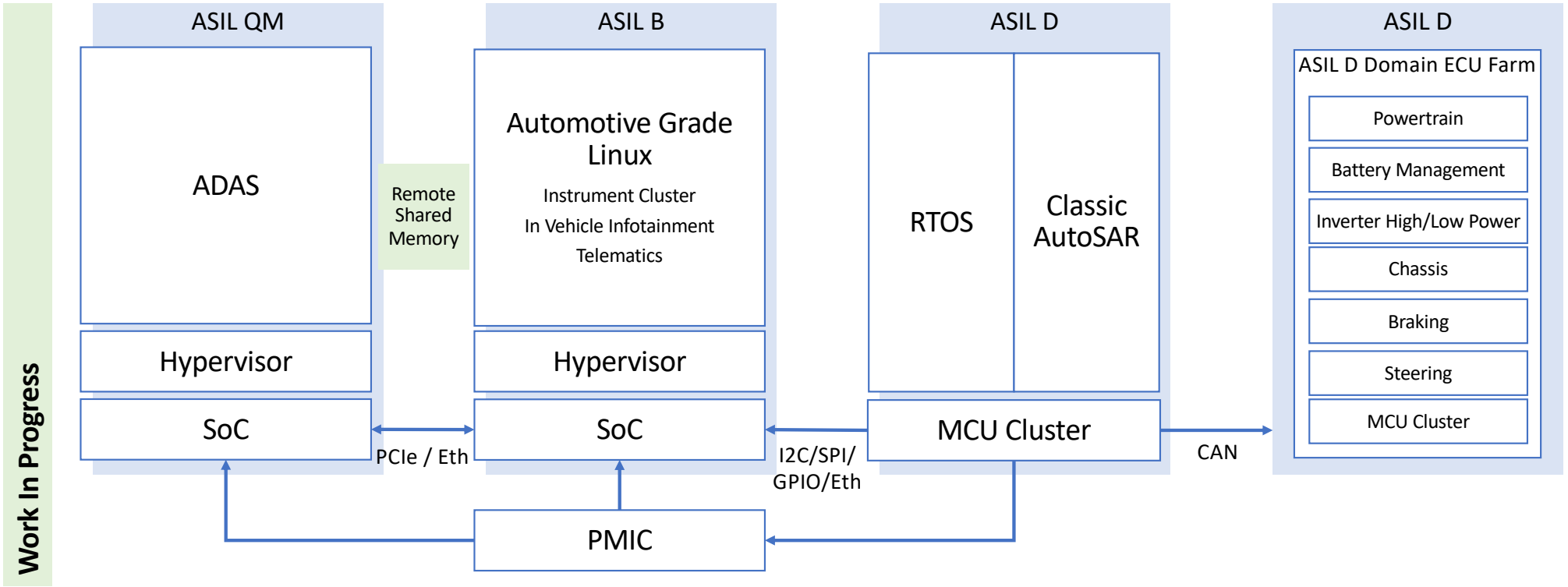
Key concerns

- System deployment
- System runtime operations
- System updates

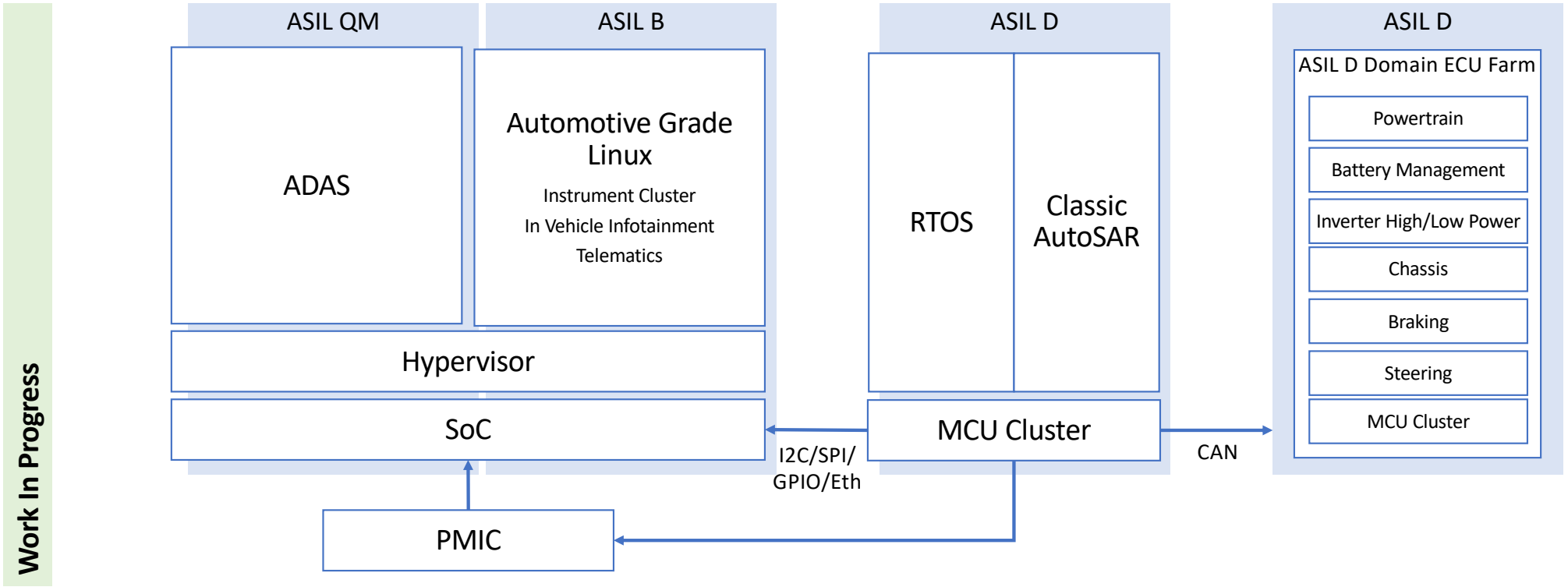
Initial architectures for RTOS

Automotive Grade Linux interoperability with RTOS

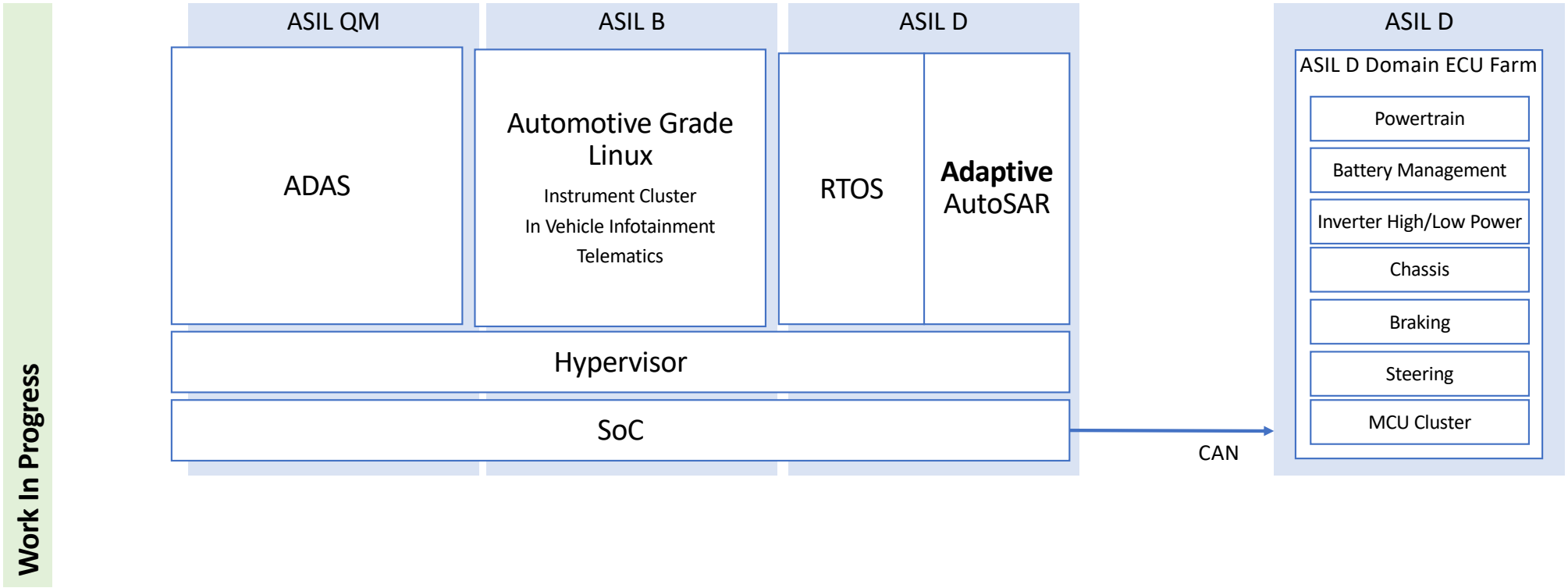
Architecture for distributed



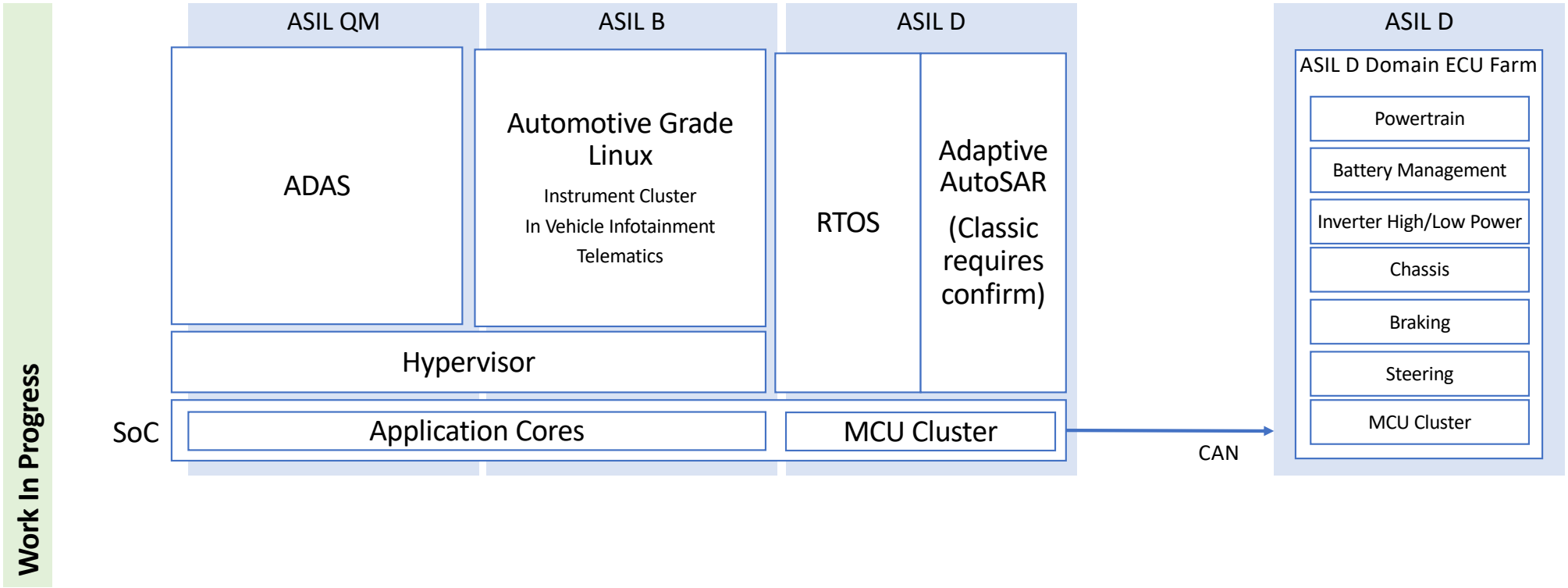
Architecture for virtualization (1)



Architecture for virtualization (2)



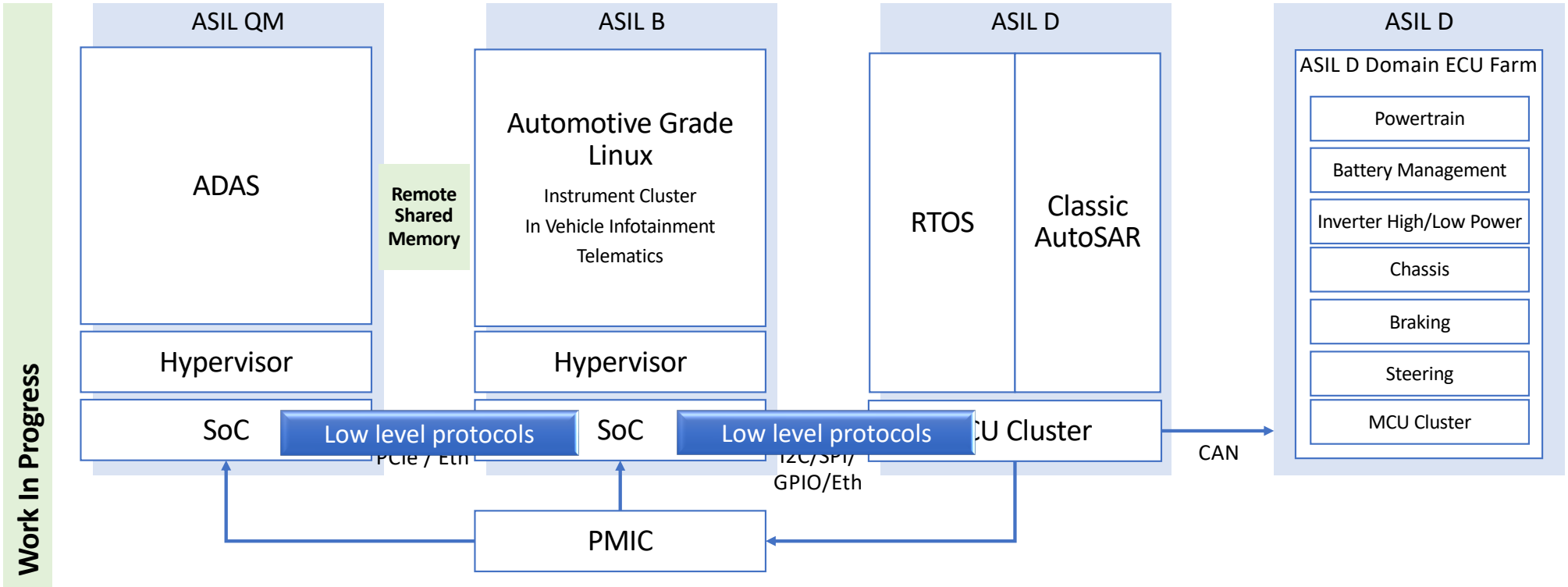
Architecture for heterogeneous multicore



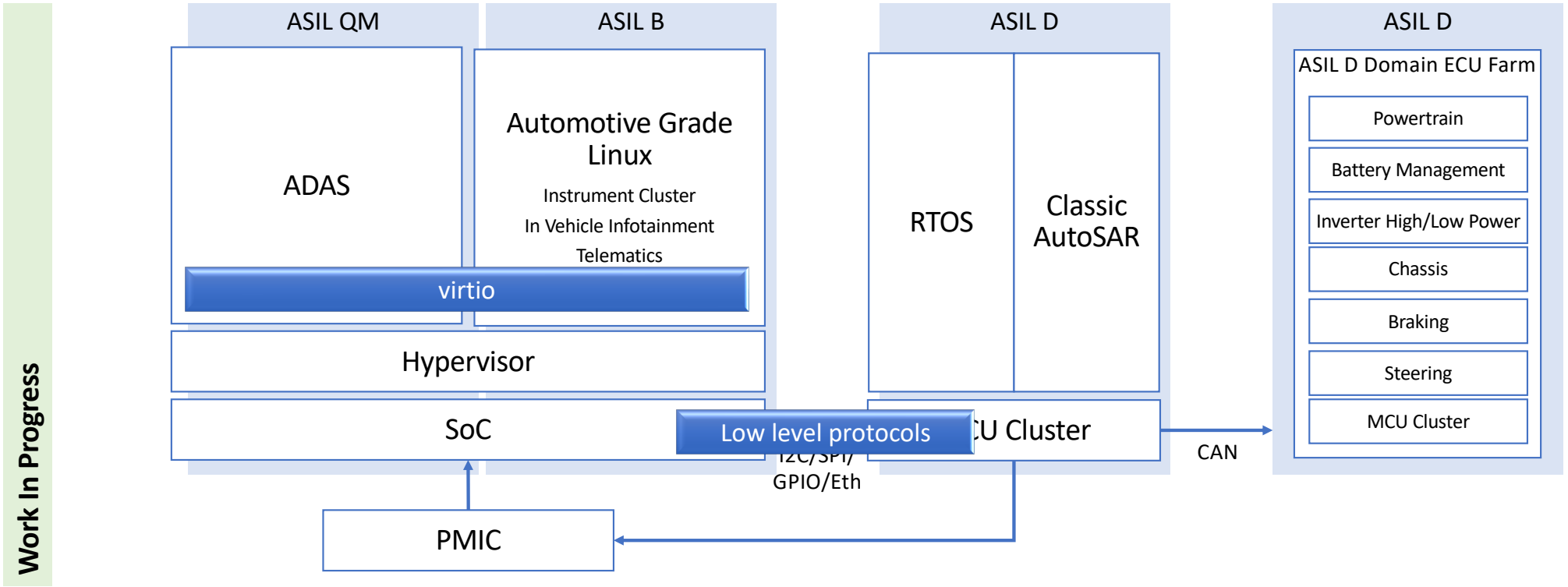
Architecture data flows

Automotive Grade Linux interoperability with RTOS data flows

Data flows for distributed



Architecture for virtualization



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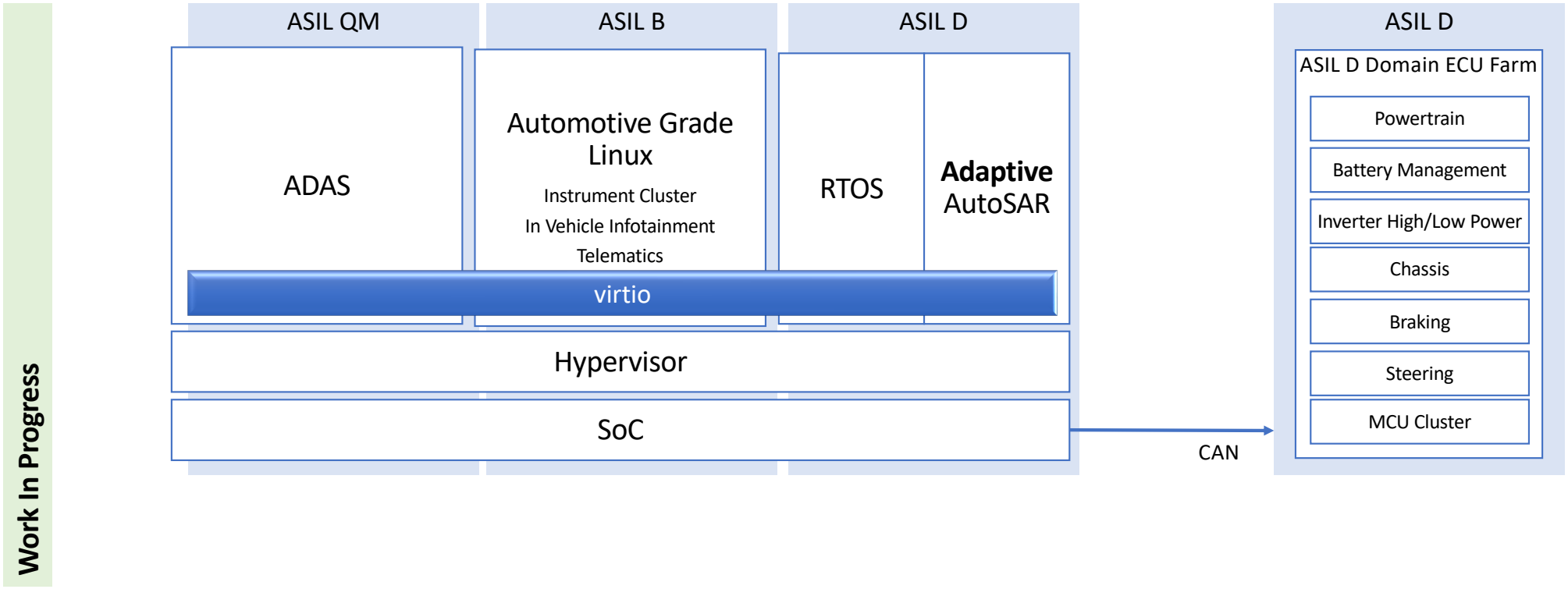

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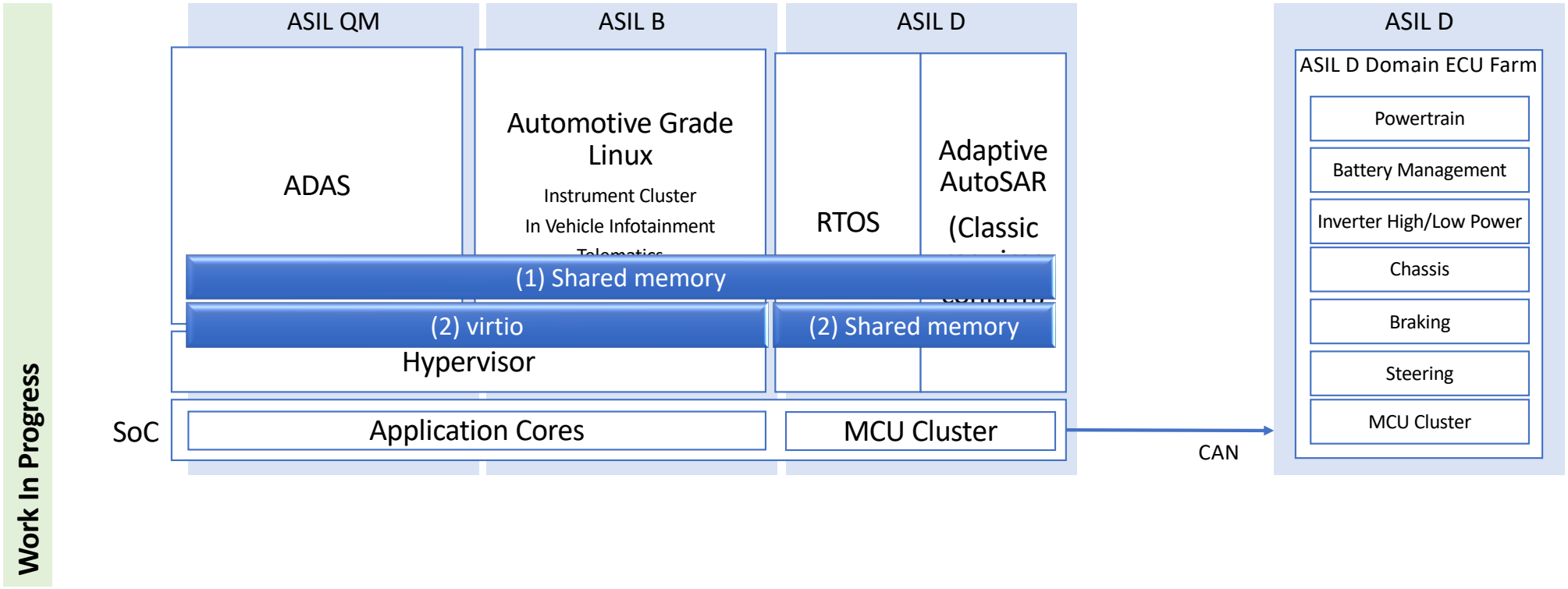

Call to action

We want your participation! Expert domain knowledge needed:

- Use case to execution context mapping
- System, deployment, execution, and data flow architectures
- Concrete implementation demonstrations

THANK YOU