Instrument Cluster EG
Software Architecture Overview

IC-EG Japan development team
29.June.2020

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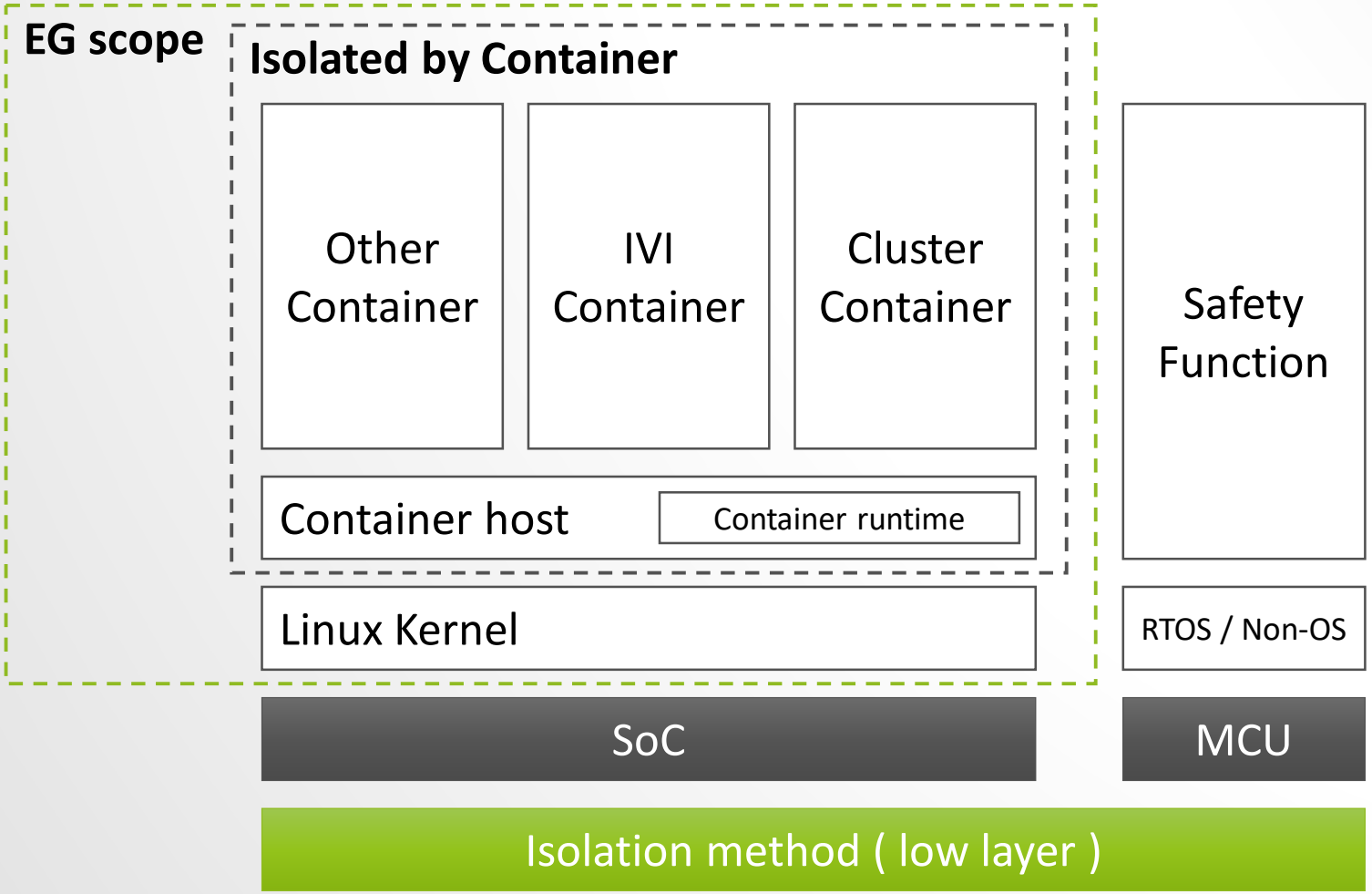
    3. Window Manager
    4. Sound Manager

Container Architecture – Overview

Cluster Function and IVI Function shall be separated by Linux Container Technology in order to achieve QM isolation.



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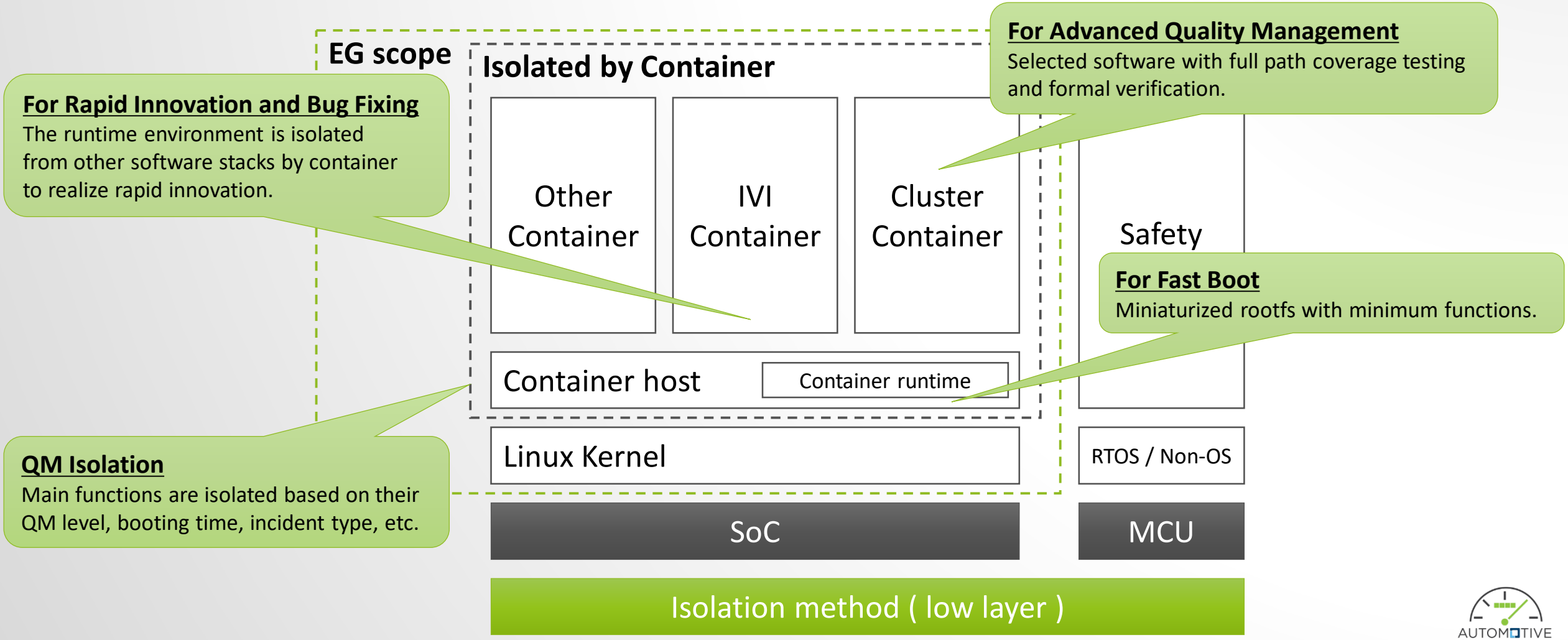
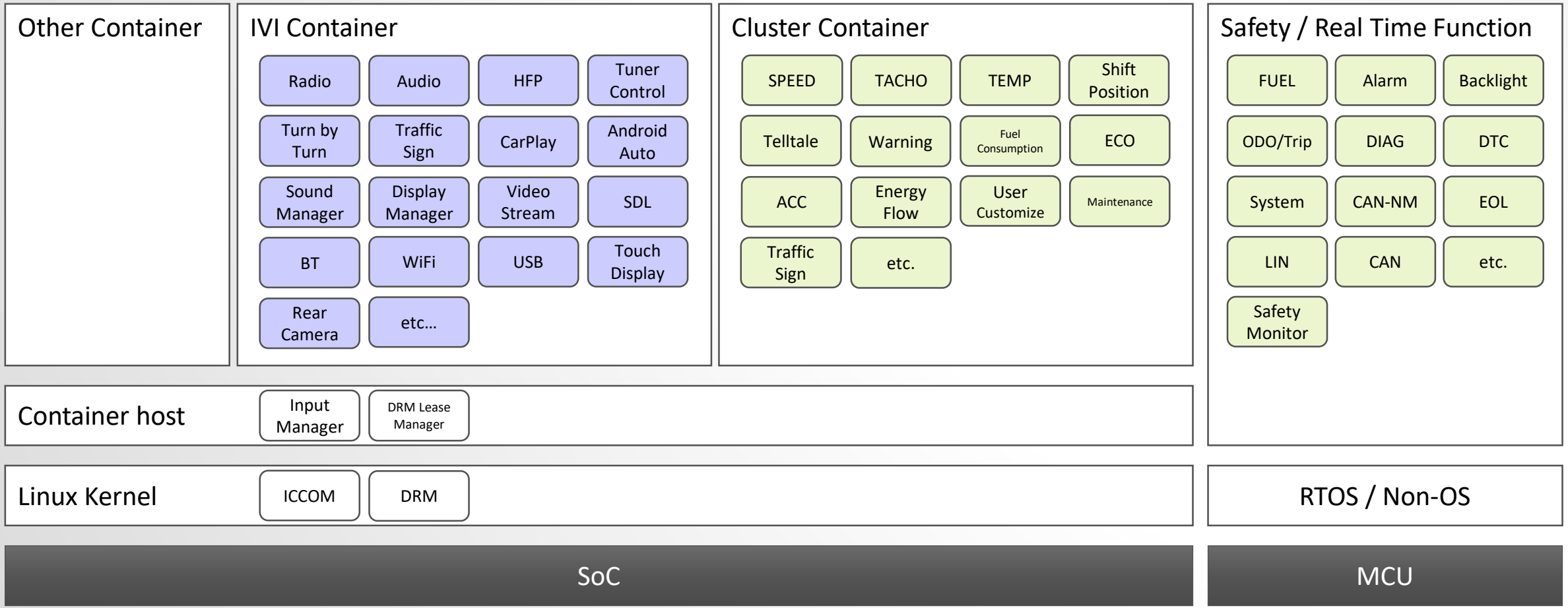


Function Block Assignment

Safety monitoring and real time function which includes device access shall be assigned outside of AGL.

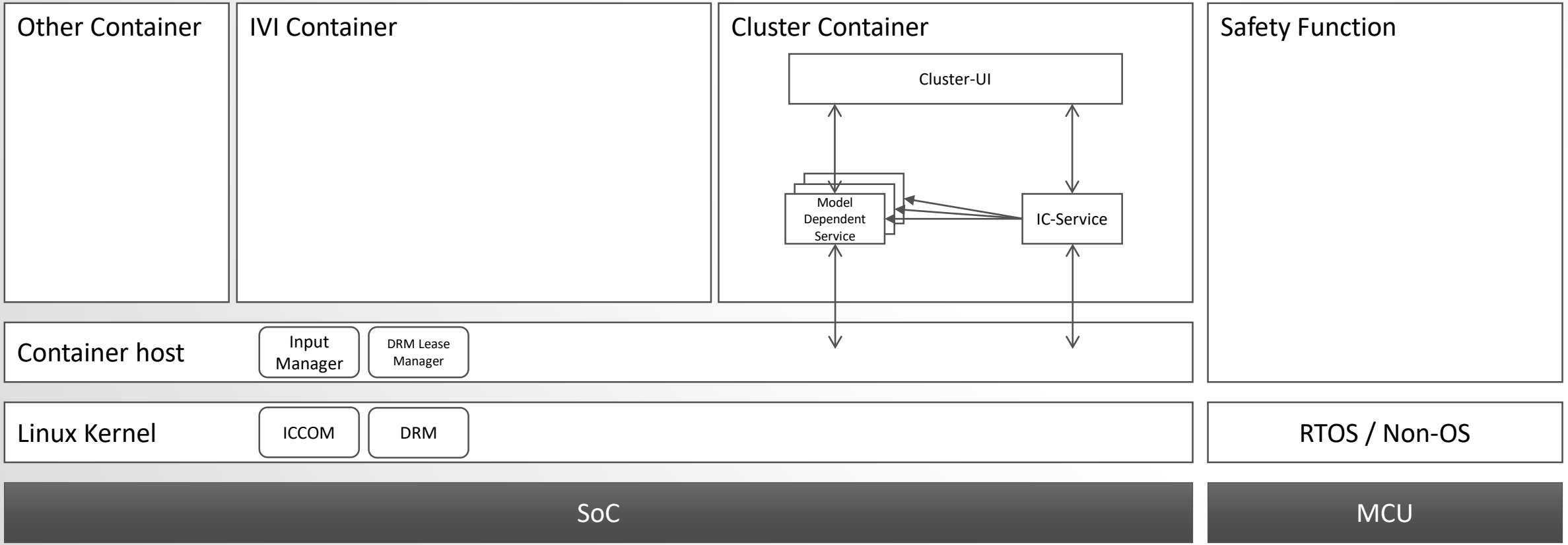
- All of the other cluster function shall be assigned onto the cluster container.



Cluster Container – Overview

Cluster container shall consist of IC-Service and Cluster-UI component.

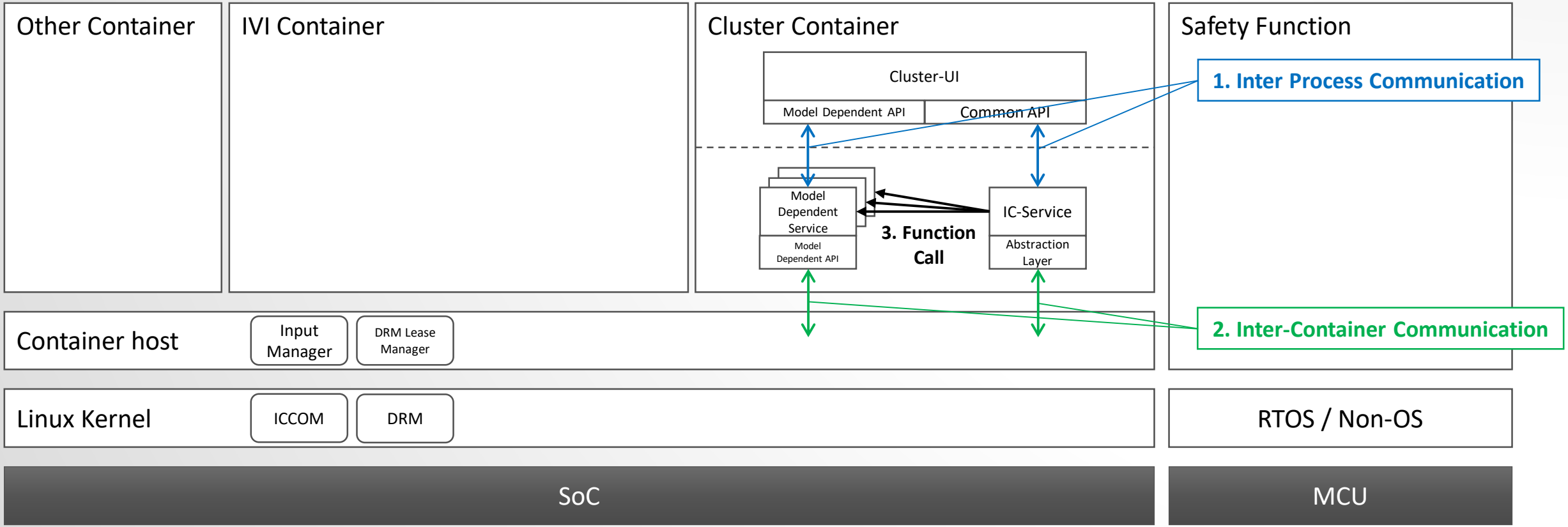
- IC-Service shall consist of a function logic.
- Cluster-UI shall consist of an UI state machine and assets.
- IC-Service shall be separated by a model dependency.



IC-Service Interface

IC-Service shall consist of the following three interface.

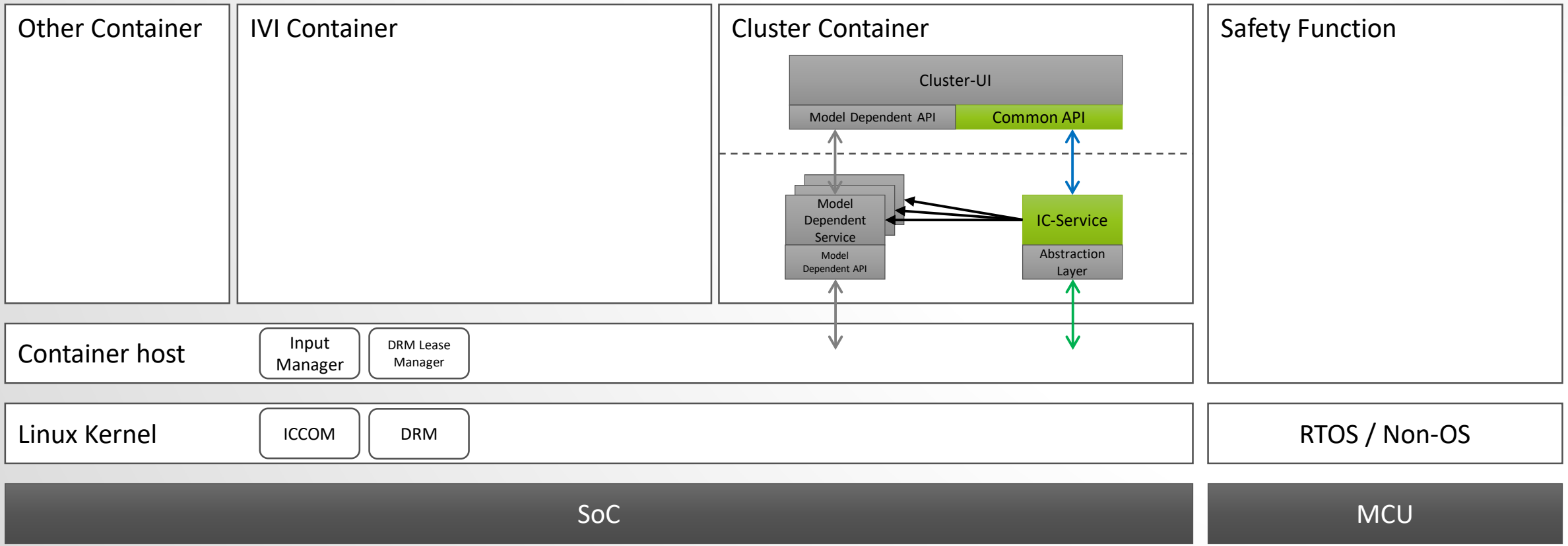
1. Cluster-UI shall be defined a separated process. → **Inter Process Communication**
2. Model dependent service shall be called from IC-Service as a common interface. → **Function Call**
3. IC-Service shall communicate with another container or container host. → **Inter Container Communication**



IC-EG Scope

IC-Service logic and common API shall be fully provided by IC-EG.

- The others shall be prepared as for a reference model by IC-EG.



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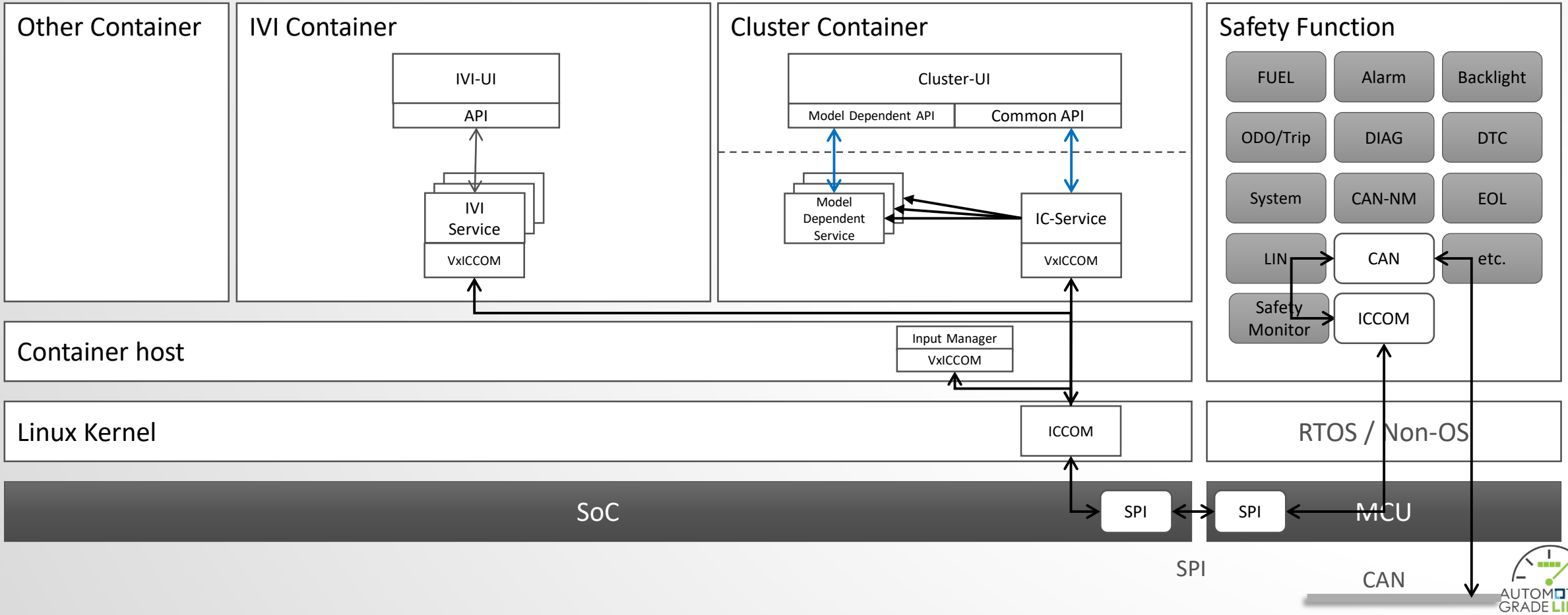
Data Flow – 1. ICCOM

ICCOM is responsible for vehicle signal handling which transferred from MCU. (i.e. CAN)

- ICCOM socket shall be directly opened in application container, and not in the container host.
- Keeping advantage of peer to peer communication shall reduce latency and complexity.



1. ICCOM – e.g. HMI Speed Meter

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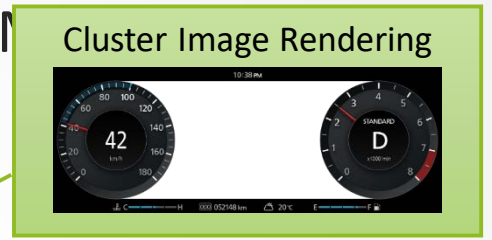


Other Container

IVI Container

Cluster Container

Cluster-UI

Model Dependent API

Common API

42km/h

IC-Service

VxICCOM

Safety Function

FUEL

Alarm

Backlight

ODO/Trip

DIAG

DTC

System

CAN-NM

EOL

LIN

CAN

etc.

42km/h

Safety Monitor

ICCOM

Container host

Port:123

Linux Kernel

ICCOM

RTOS / Non-OS

Port:123

SoC

SPI

SPI

MCU

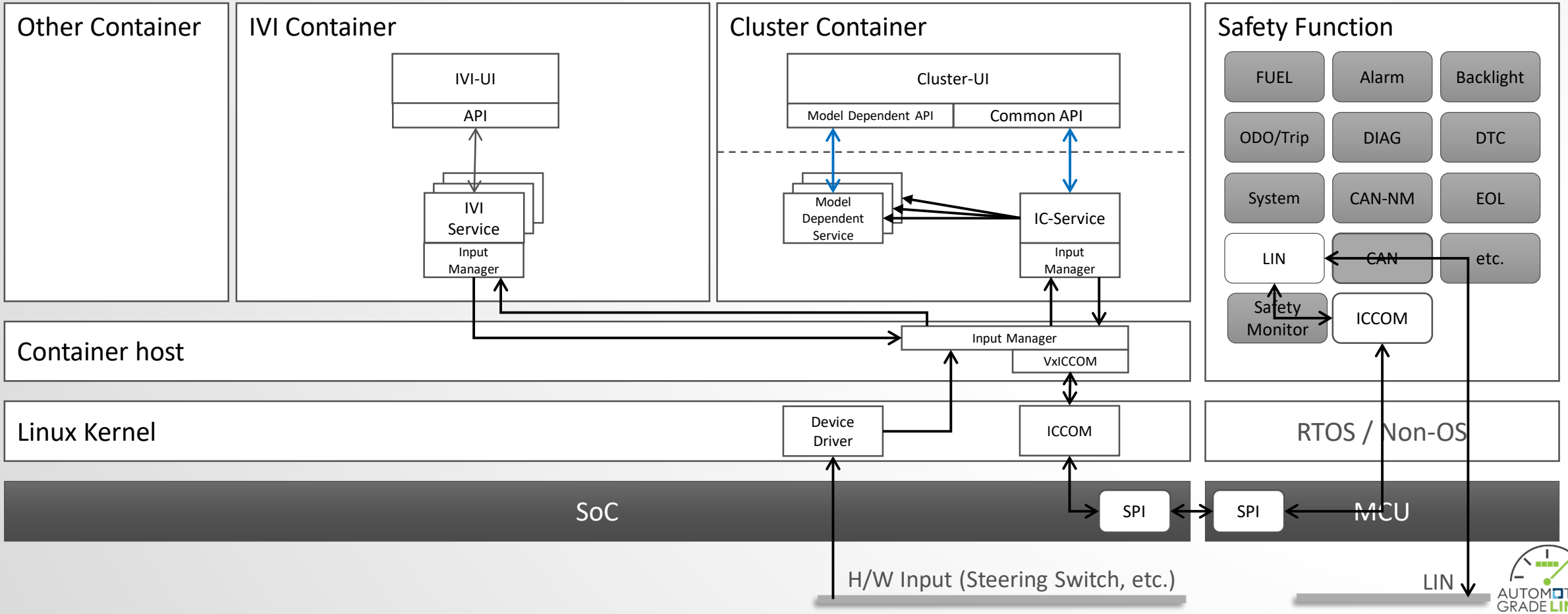
CAN

AUTOMOTIVE GRADE LINUX

Data Flow – 2. Input Manager

Input Manager is responsible for event data handling such as physical input device.

- Application container shall register to container host as a listener for specific event.
- Container host sends the event to the registered application container.
- Application container checks if it consumes the event, send back the result to the container host.
- In case of multiple container registered, the event shall be handled by pre-defined priority.



2. Input Manager – e.g. Steering Switch

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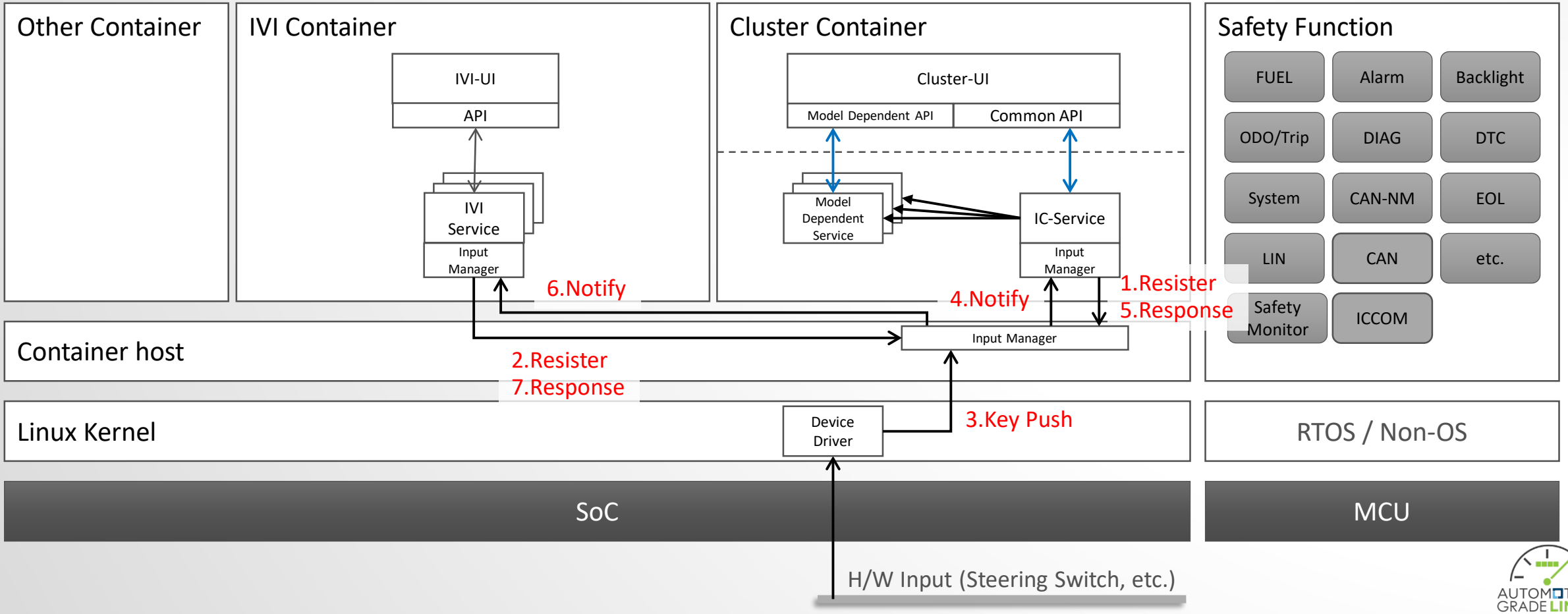

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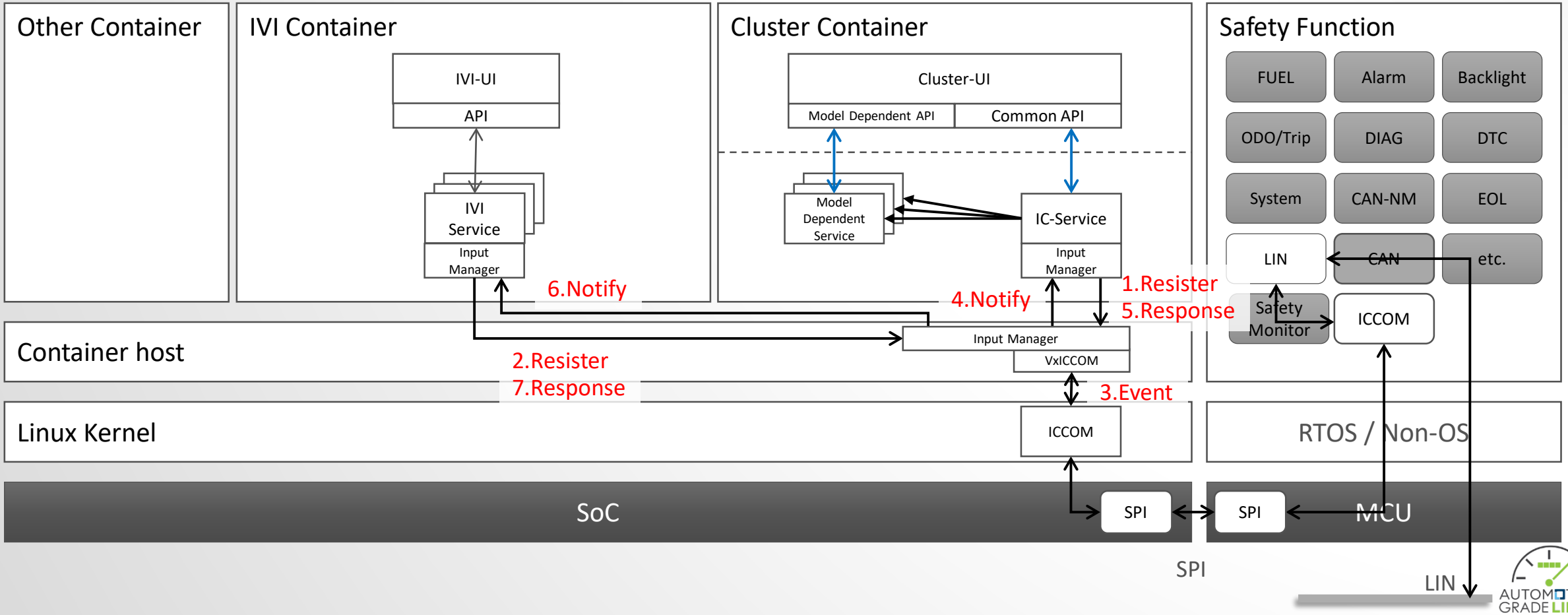
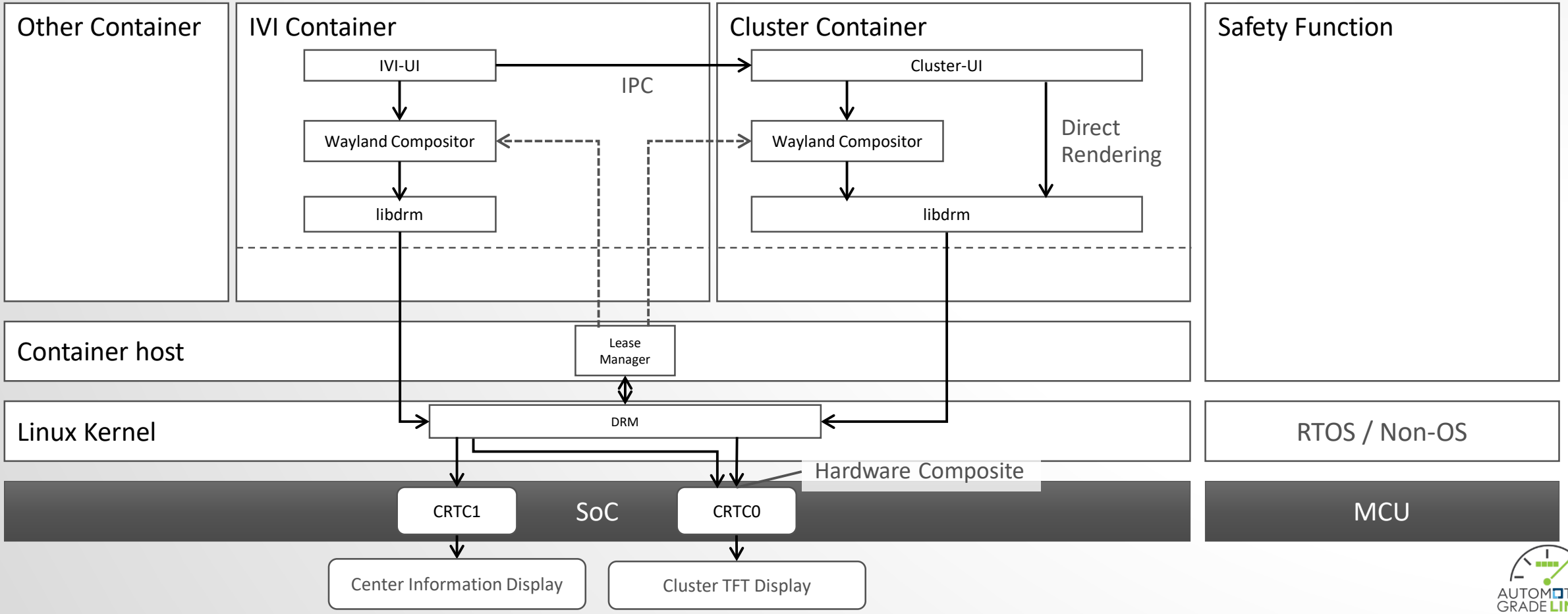


Data Flow – 3. Window Manager

Multiple container DRM sharing shall be done by introducing DRM Lease Manager.

- GPU rendering/composition shall be done in application container, not container host.
- It allows application container to render directory to the DRM device.
- It ensures other containers can still display their HMI via Weston.
- It allows both types of containers to render to the DRM device in parallel.



3. Window Manager – e.g. IPC

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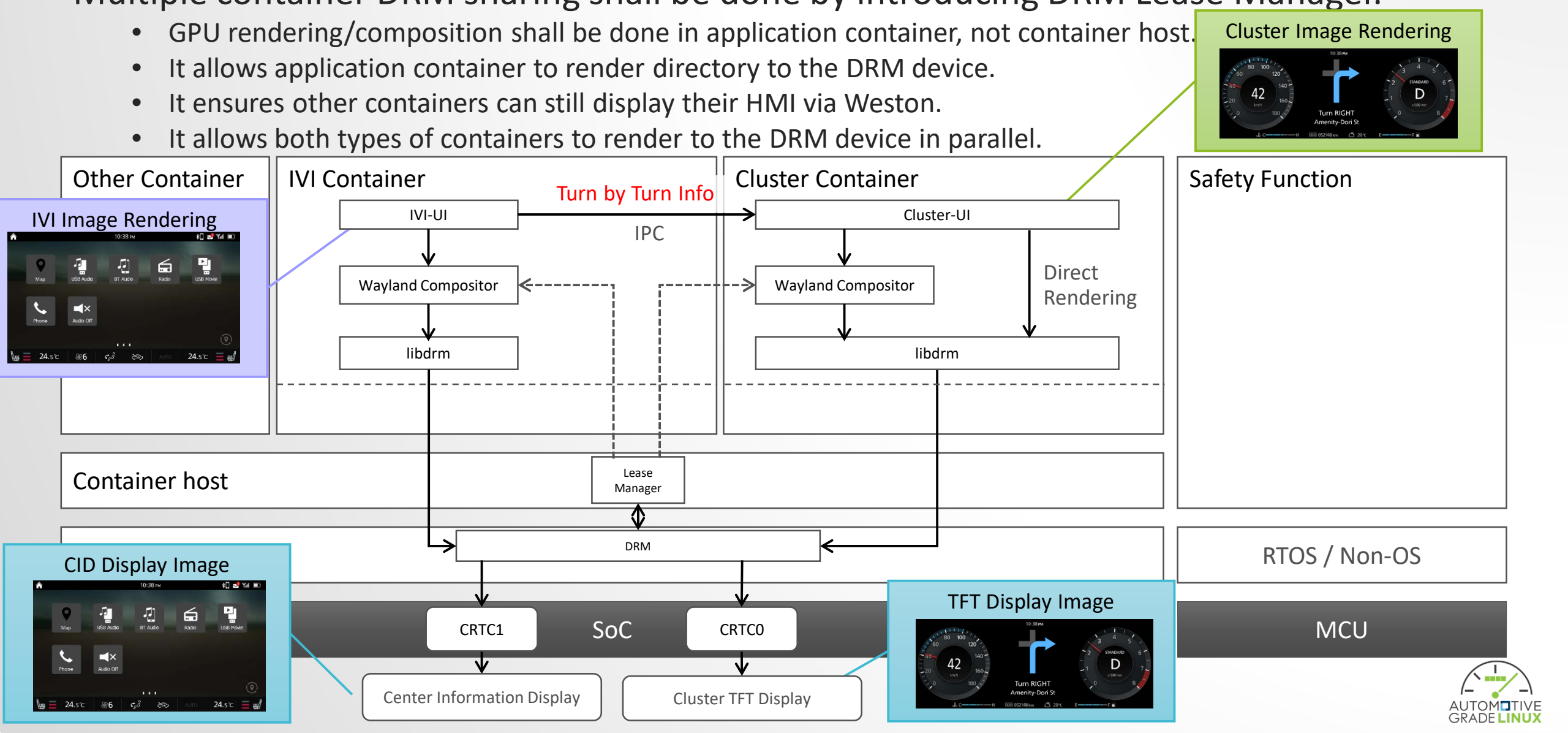

3. Window Manager – e.g. H/W Composite

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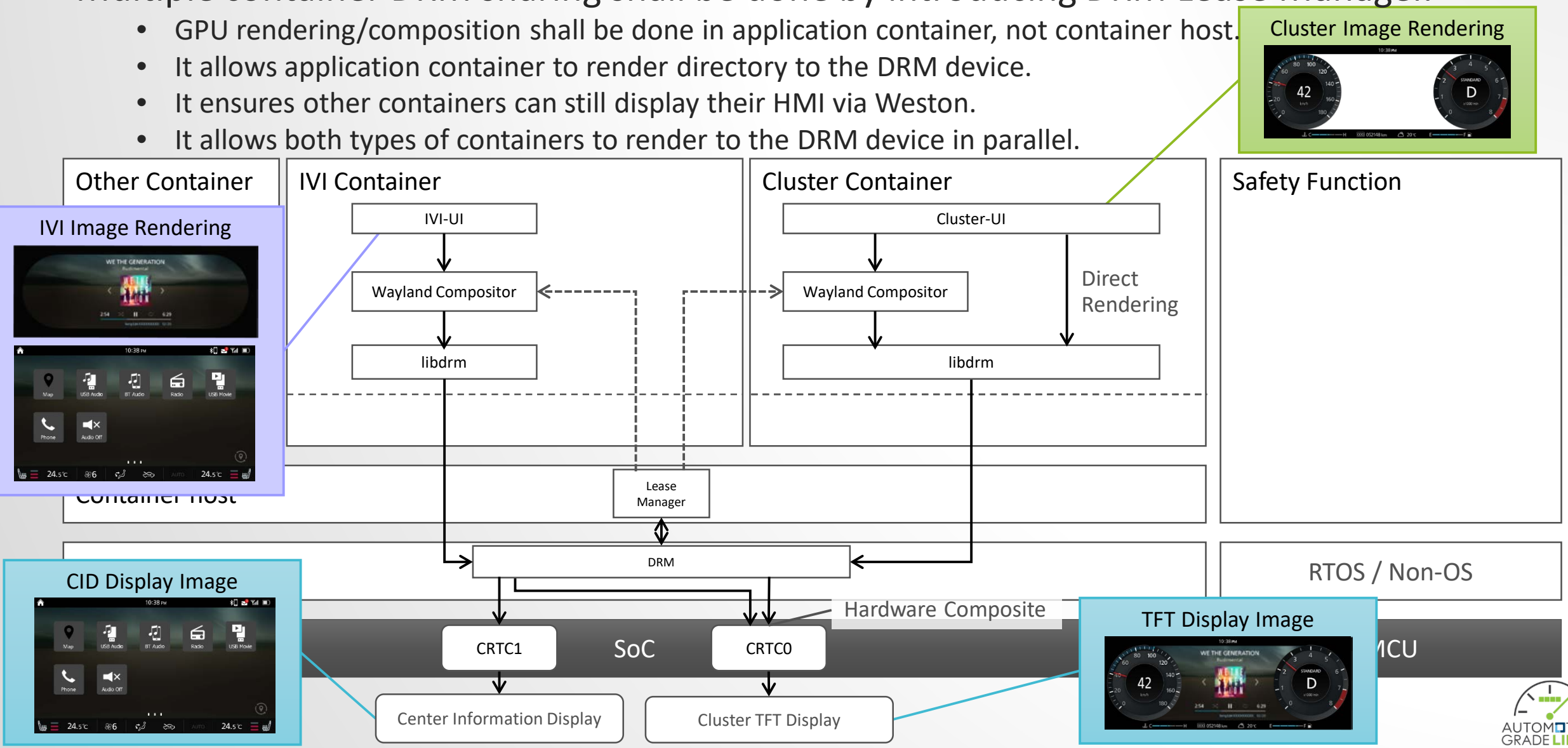
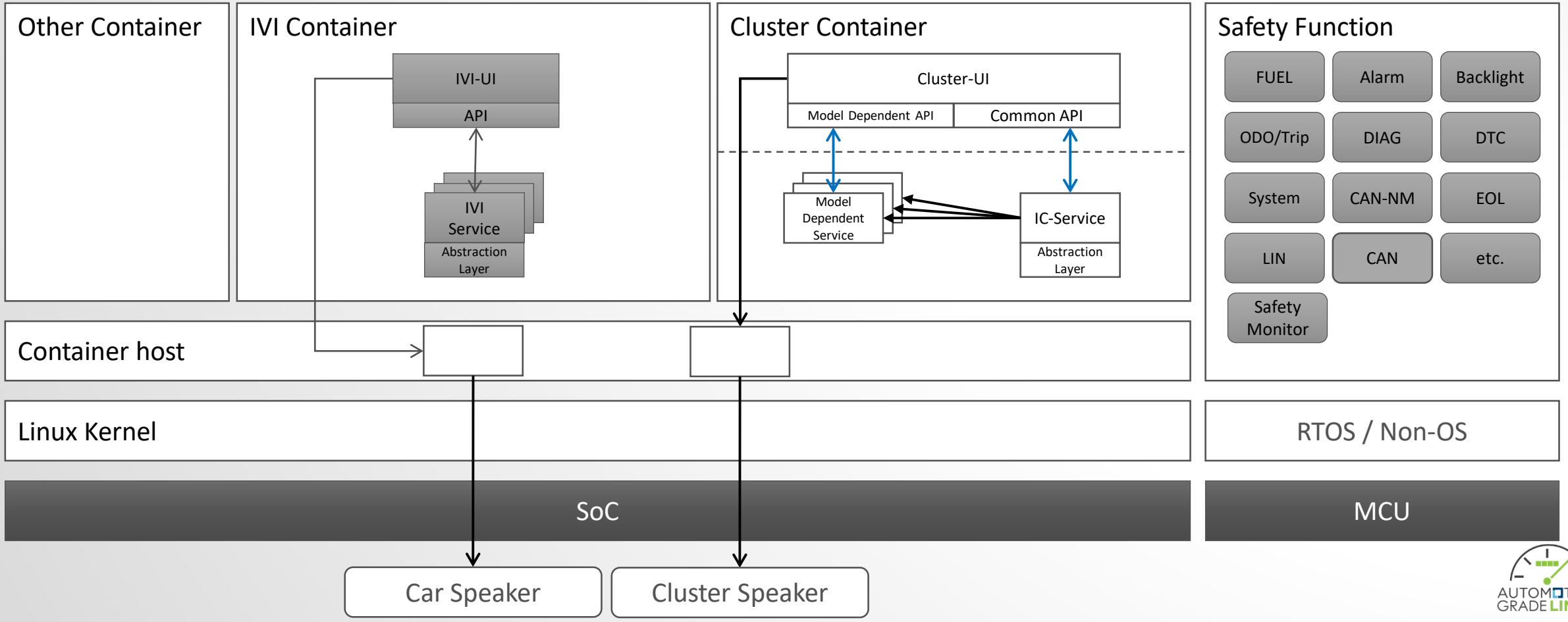


Data Flow – 4. Sound Manager

Will be updated later…



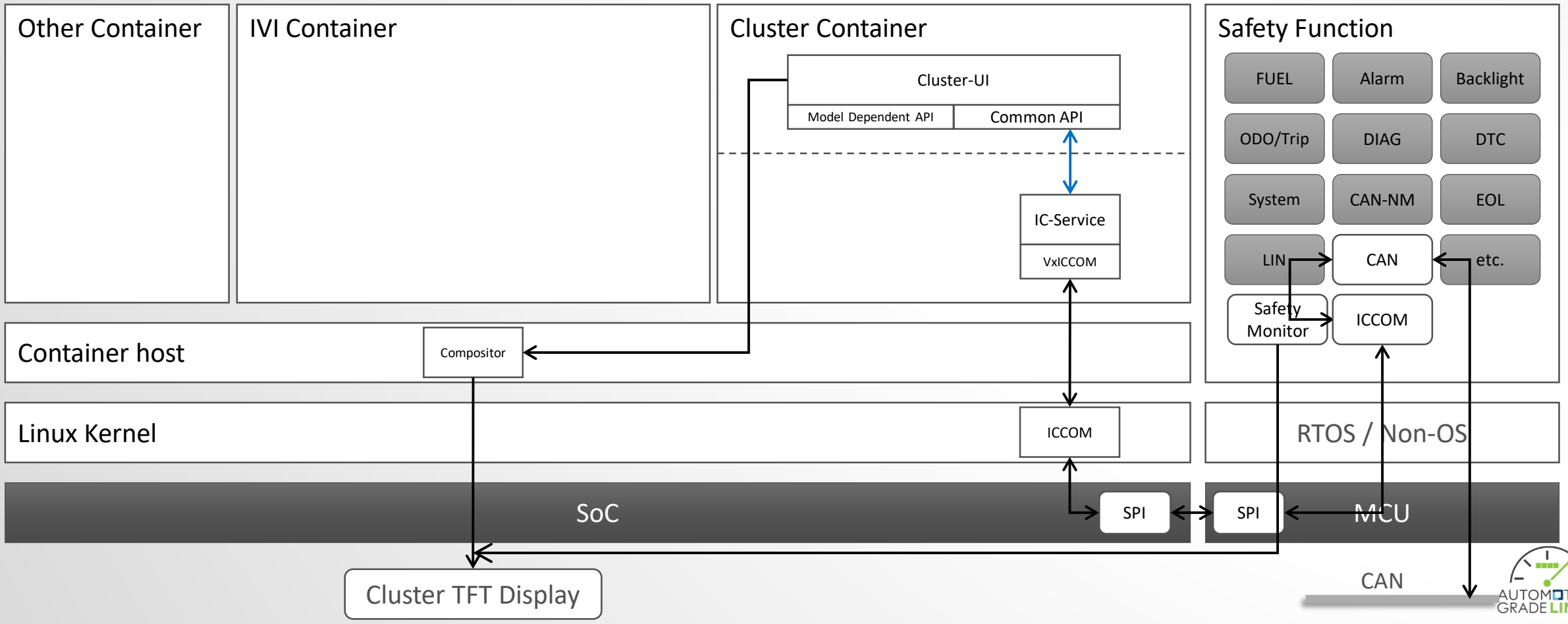
Thank you!

Appendix

IC-Service – Common Function

Data flow example for OEM/Tier-1 common function.

- e.g. SPEED | TACHO | TEMP | Shift Position | Telltale



IC-Service – OEM/Tier-1 Dependent

Data flow example for common function partially includes OEM/Tier logic.

- e.g. Fuel Consumption | ACC | Energy Flow | ECO | Warning | Traffic Sign | Turn by Turn | User Customize | Maintenance