GENIVI Vehicle Domain Interaction Strategy

Technical Summit – Bangalore -10 October 2018

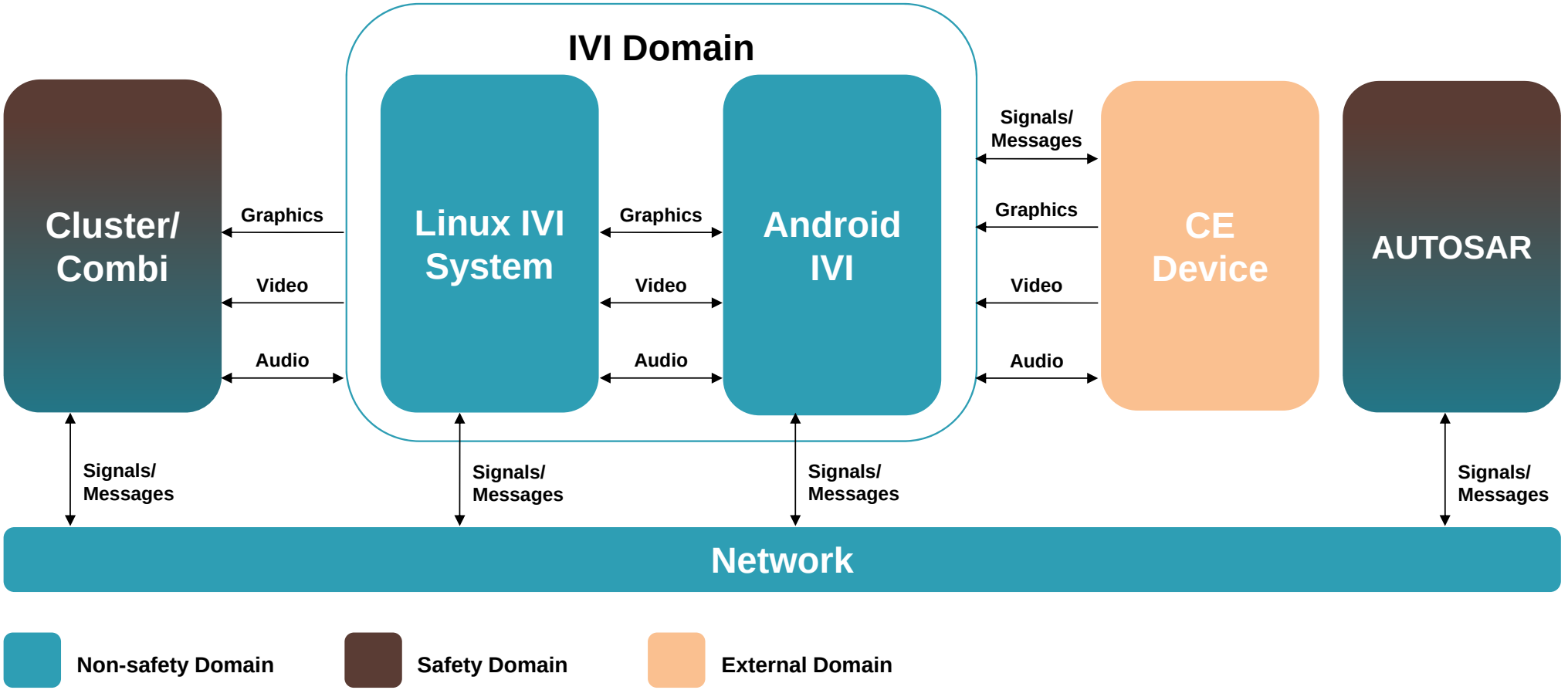
Philippe Robin
GENIVI Project Management Office Lead
Gunnar Andersson
GENIVI Development Lead

The Challenge

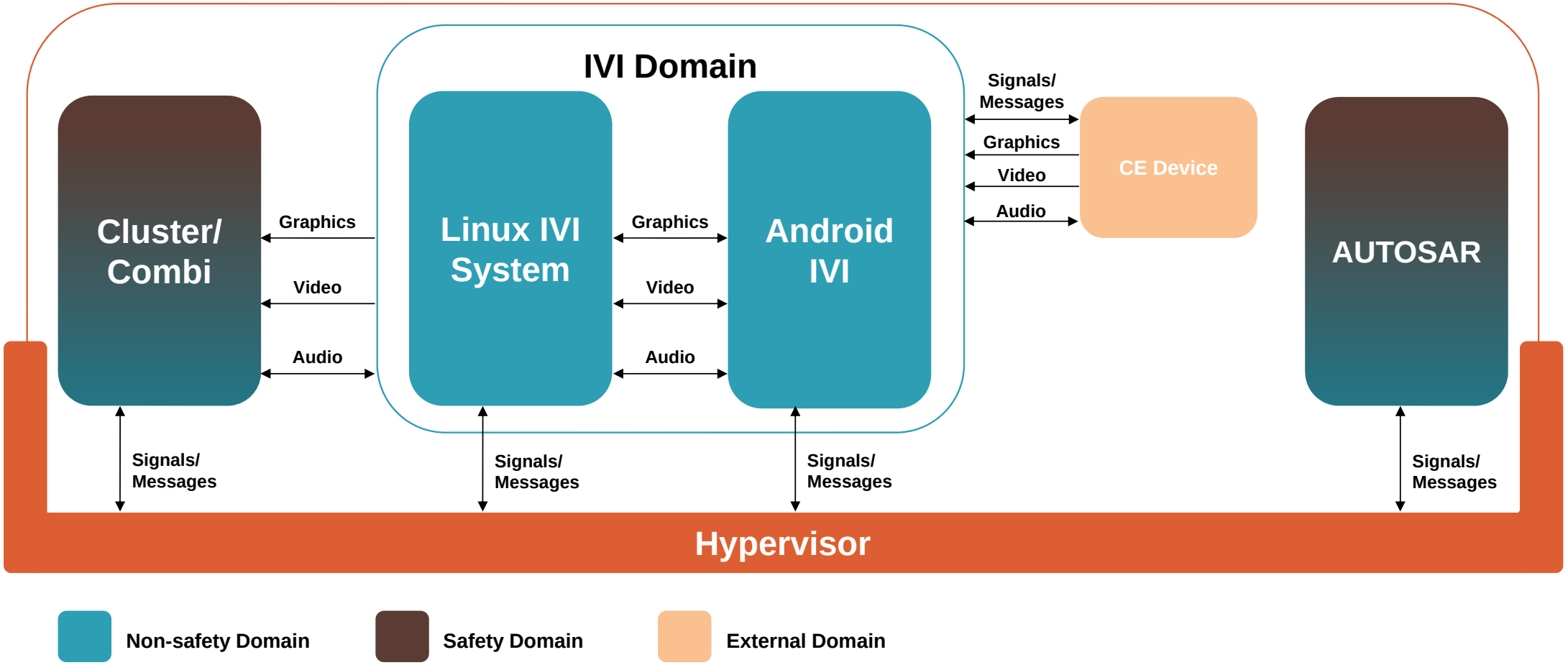
- A unified, in-car experience now requires interaction between multiple car software domains (e.g., safety, IVI, consumer electronics)
- Multi-domain product complexity increases proportionally to the number of cross-connected domain's interfaces
  - Many suppliers building one product using many APIs
  - OEMs pushing suppliers to standardize internal interfaces
  - Dynamic API changes – 4-5 times per year for 2 to 4-year lifecycle -> big development impact
  - Because of that – low SW reuse, maturity and efficiency

Copyright © GENIVI Alliance 2018

Example Architecture – Combined IVI System

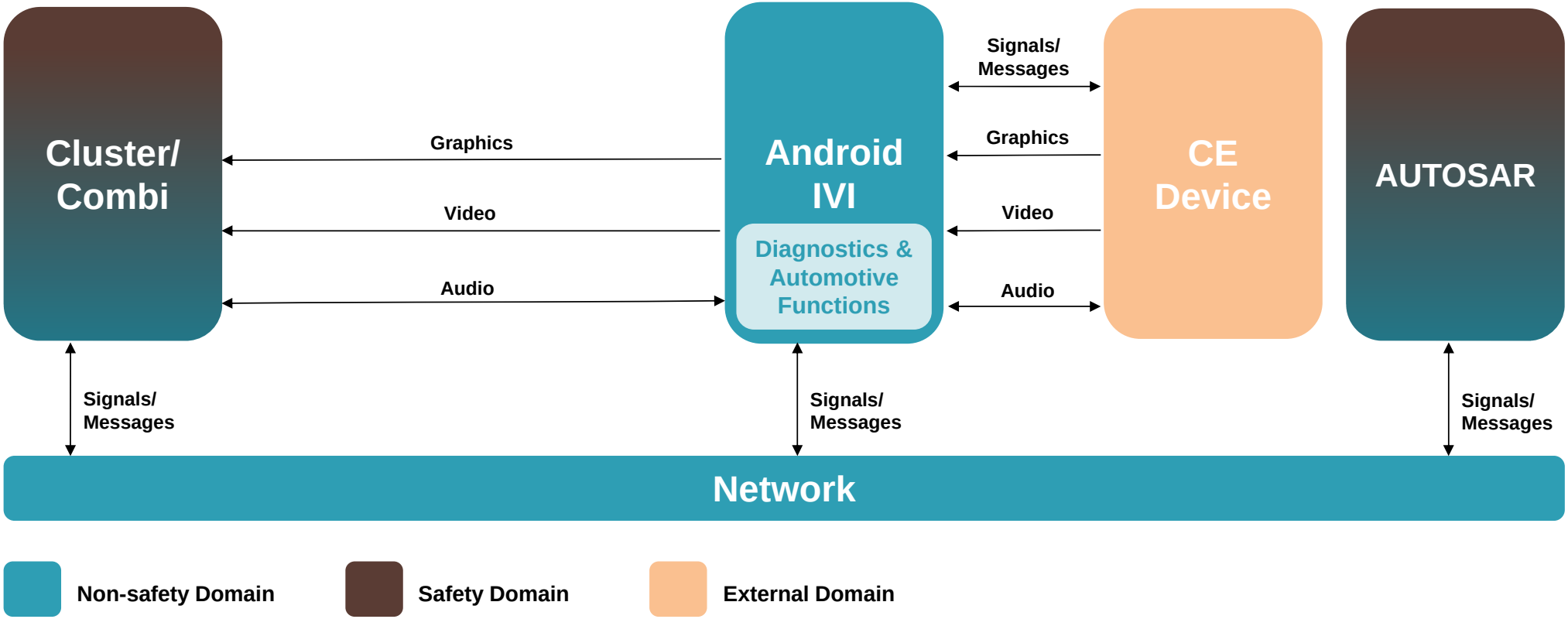


Example Architecture – Hypervisor Usage

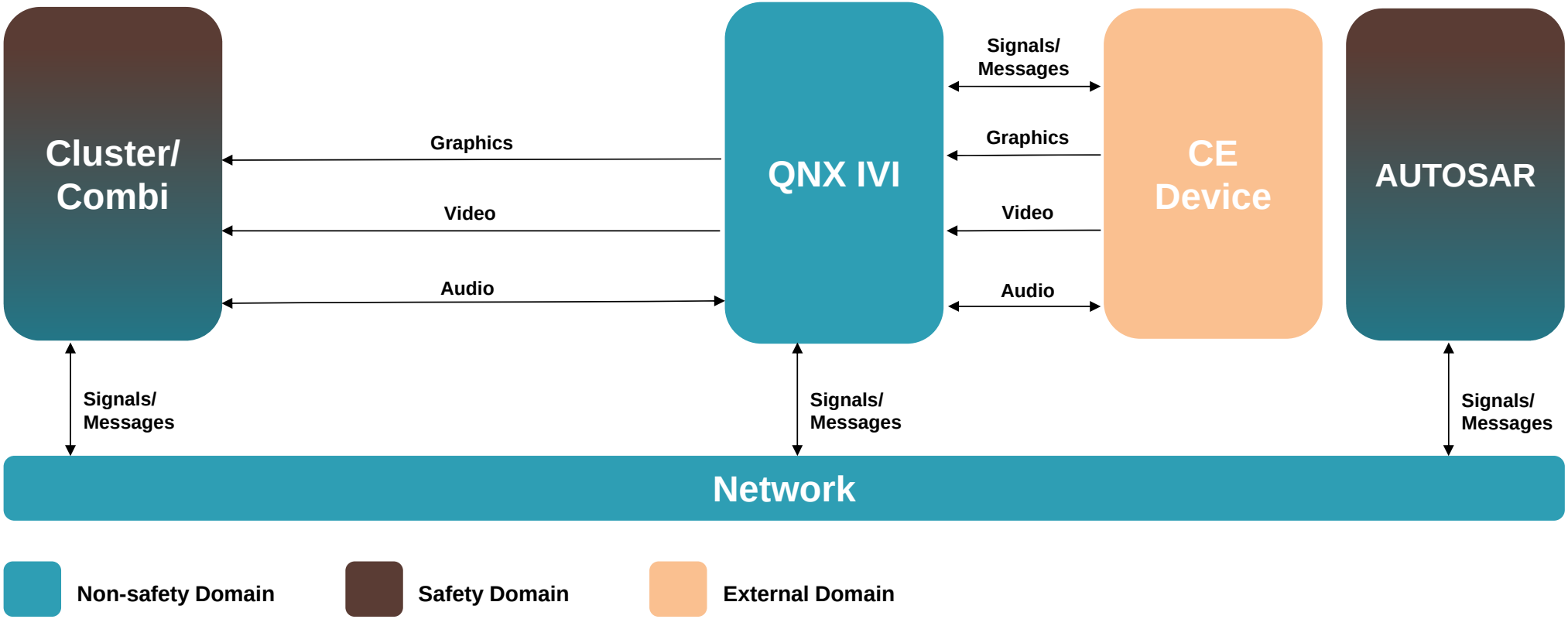


Copyright © GENIVI Alliance 2018

Example Architecture – Android IVI System

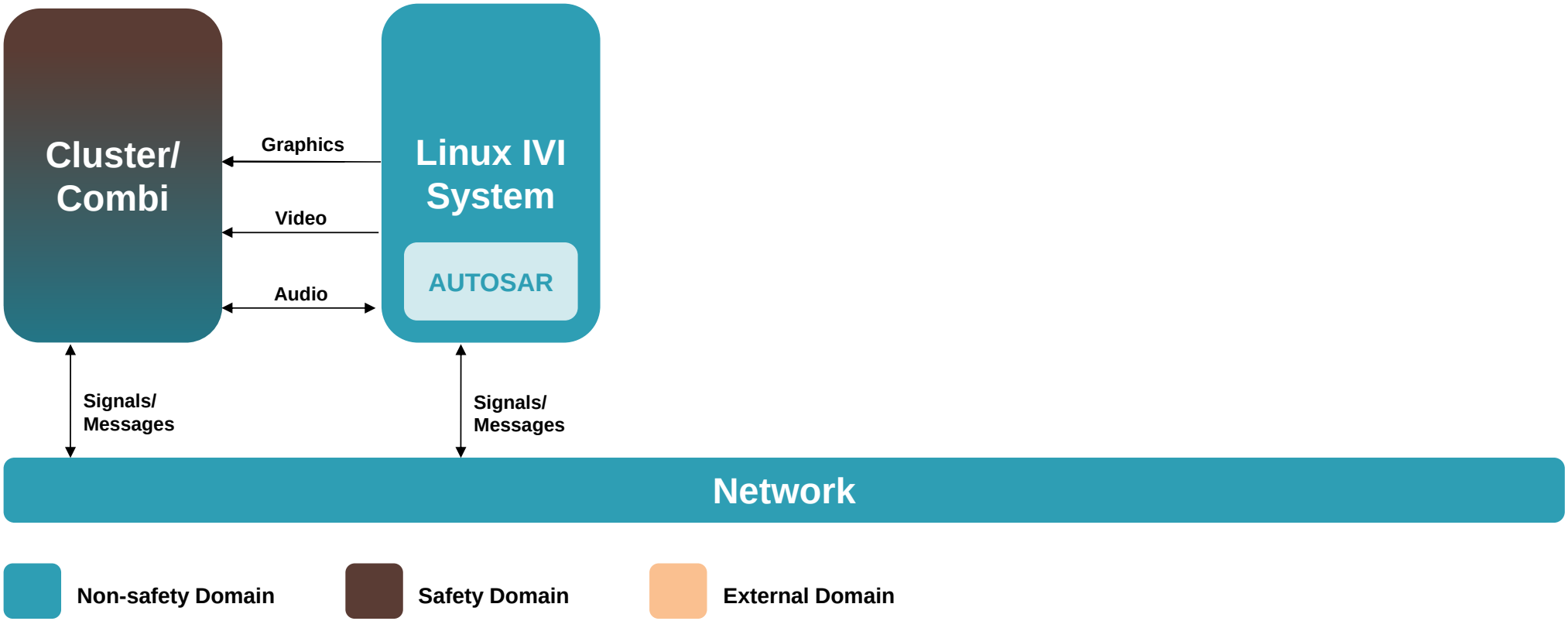


Example Architecture – QNX in IVI or Cluster

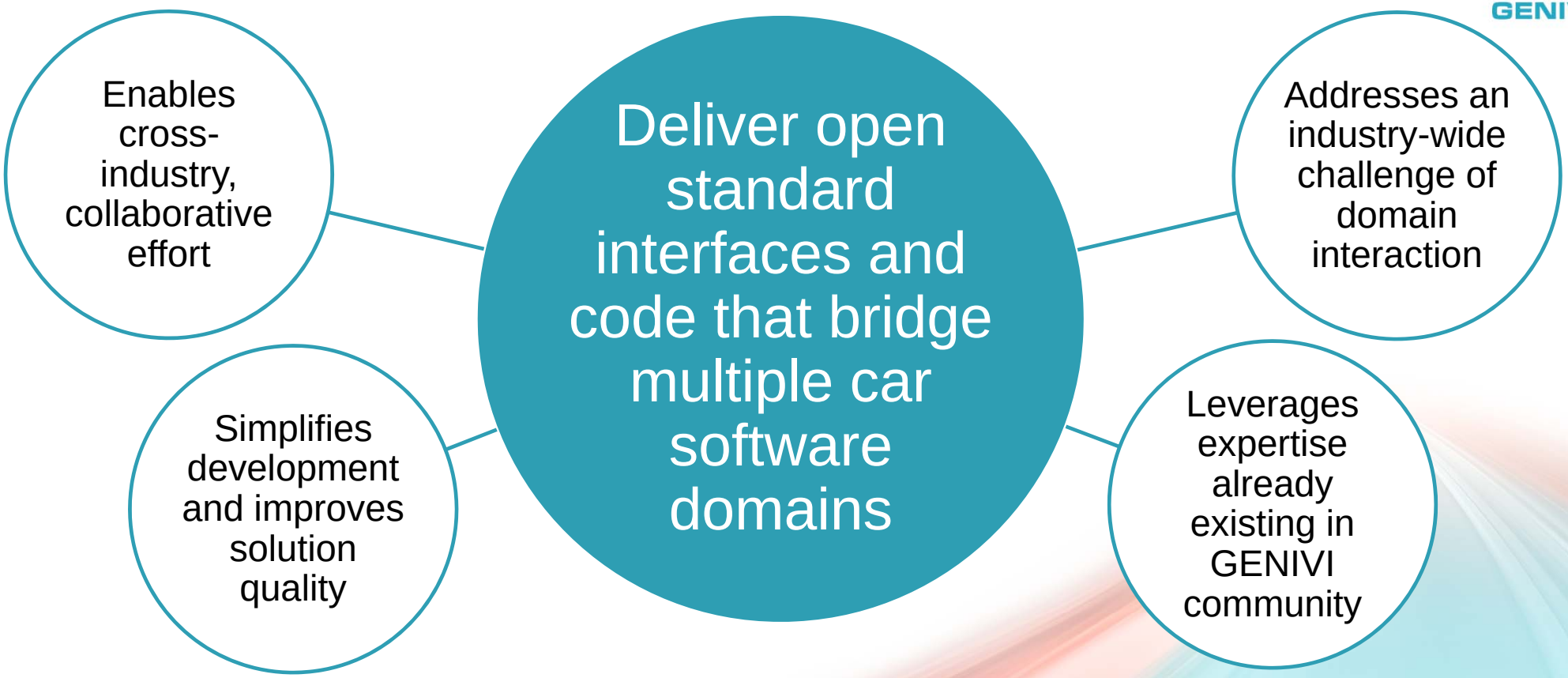


Copyright © GENIVI Alliance 2018

Example Architecture – Combined IVI System



GENIVI Vehicle Domain Interaction Strategy



Copyright © GENIVI Alliance 2018

Projects launched since AMM Seoul in October 2017

Graphics Sharing & Distributed Compositing

Developing or Extending Hypervisor APIs

Determining Preferred Generic Communication Protocols

Projects identified one year ago

1. Graphics Sharing & Distributed HMI
2. Determining Preferred Generic Communication Protocols
3. Developing or Extending Hypervisor APIs
4. System Health / Debugging / Analysis (incl. Log & Trace)
5. User Input Distribution and Coordination
6. Distributed System Lifecycle / Node State
7. Network Traffic routing & accounting (priority/bandwidth/payment…)
8. (Distributed) Audio management
9. Distributed User / Login / Profile management

Copyright © GENIVI Alliance 2018

Parties involved : SW vendors, Tiers 1, OEMs

Graphics Sharing & Distributed Compositing
GSHA

Parties involved

1. The Qt Company
2. Mentor
3. ADIT
4. Bosch
5. Harman
6. Alpine
7. Allgo
8. Renesas
9. BMW

Developing or Extending Hypervisor APIs
HV

Parties involved

1. Opensynergy
2. EPAM
3. Green Hills
4. Perseus
5. Xen, Xvisor - open source
6. Elektrobit
7. ADIT
8. Bosch
9. KPIT
10. Alpine
11. ARM

Determining Preferred Generic Communication Protocols
GPRO

Parties involved

1. Itemis
2. Mentor
3. Visteon
4. Bosch
5. Renault

Copyright © GENIVI Alliance 2018

Domain Interaction - Generic Protocols Evaluation - short name: GPRO

Project Scope

- When designing the current generation of connected vehicles, the automotive industry has to cope with too many choices, too much diversity, too much boiler-plate code, adaption layers, and incompatibility.
- The initial objective of the Generic Protocol Evaluation is to survey and compare available protocols supporting in-vehicle communications and communications with the cloud and to identify industry preferred options.
- Reducing the choices from over 15 to 3-5 preferred protocols reduces complexity and ultimately, saves time and money in development and validation
- Strong interest for AUTOSAR related topics (ARA::COM ⇔ GENIVI IDL and middleware techno CommonAPI)

Learning more…getting involved – Deliverables & Calls

1. Knowledge building – Presentations of Candidate Protocols – DONE (May 2018)
2. Poll on preferred protocols – DONE (June 2018)
3. Article published in GENIVI newsletter – DONE (June 2018)
4. Whitepaper on Generic Communication Protocols – WIP (EoY 2018)
5. ARA::COM ⇔ GENIVI IDL showcase demonstrator – WIP (CES 2019)
6. Weekly calls on Tuesdays at 11:00am CET (India/Asia friendly time)

Copyright © GENIVI Alliance 2018

Domain Interaction – Graphics Sharing & Distributed HMI Compositing - short name: GSHA

Project Scope

Graphics Sharing

- Graphics in the form of bitmap, scene graph or drawing commands generated on one ECU, transferred for display to another ECU (or between virtual machine instances)
- GPU sharing in a virtualized setup

Distributed HMI Compositing

- Methods and technologies to turn a multi-ECU system into what appears and acts as a single user-experience.

Very good momentum, graphics experts are talking together in the forum provided by GENIVI.

Learning more…getting involved

1. Today morning & afternoon – Graphics Sharing project readout
2. Tomorrow (all day) - Ramses (API remoting) hands on session
3. Tomorrow morning - Graphics Sharing project working session – meet the experts !
4. Later: weekly calls on Thursdays at 10:30am CET (India/Asia friendly time)

Copyright © GENIVI Alliance 2018

Domain Interaction – Hypervisors - short name: HV

Project Scope

- Investigate the *wide scope* of open-source and commercial hypervisor technologies
- Address OEM challenges in the use of virtualization
- Lower the barriers to successful product development
- ...through collaboration between all vendors, experts and adopters of virtualization technology

- Two parallel tracks of activity:

- 1. Requirements, Use-cases and Architecture

- Go through typical automotive functions
- … how they are implemented using software, hardware, network and virtualization
- … to derive new and better requirements for virtualization.

- 2. Define standard APIs and the Automotive Virtualization Platform

- Device driver APIs for all virtual hardware combine to create a full virtualization platform definition

Domain Interaction – Hypervisors - short name: HV

Standard Interfaces = Virtualization Platform definition

- The working group is progressing on **The Virtualization Platform definition for Automotive**

- The industry needs well specified interfaces between operating system kernels and Hypervisor technologies.
- … supporting all desired automotive operating systems and hypervisor choices.

- This work defines a shared virtual platform that allows portability, sharing APIs and code and reduces duplication of effort in both analysis and implementation of automotive hypervisor technologies

  - Community specifications like VIRTIO shows that common specifications are feasible and realistic
  - … but it's not yet tailored for automotive
  - … and it's not covering everything yet

It's time for the automotive industry to get together and solve this!

Copyright © GENIVI Alliance 2018

Domain Interaction – Hypervisors - short name: HV

Progress

- Very good momentum.
- Hypervisor vendors are talking together in the forum provided by GENIVI.
- We reuse and adapt to already existing work
- ...to move towards a single, comprehensive, and non-fragmented specification.

Learning more…getting involved

1. Today afternoon - Hypervisor project readout :
   Project Status & one case study: Open source hypervisor project **Xvisor**
2. Tomorrow afternoon - Hypervisor project working session – meet the experts !
3. Later: weekly calls on Tuesdays at 10:00am CET (India/Asia friendly time)

New projects identified since AMM in Munich (April 2018)

Streaming & Messaging APIs

Vehicle to Cloud Connectivity

Streaming & Messaging APIs

Media streaming services

- Media service through Internet
- Contents Providers: Spotify, Apple Music, Amazon Music, QQ Music, Melon

Messaging services

- IP based messaging service
- Contents Providers: Facebook Messenger, WhatsApp, WeChat, Line, KakoTalk

Most-wanted services in connected car environment

Similar service architecture (Client-Server, Multiple Content Providers)

Two ways

- Phone Connectivity: Android Auto / CarPlay / Mirrorlink / CarLife
- Native Application : Connected Car Service, GENIVI Standards

Vehicle to Cloud Connectivity

- V2X Solutions (called C2X in Europe) are the key elements for the Connected Car of the future.
- A wide variety of overlapping standards and application are under development.
  - safety related applications based on dedicated radio links on the other hand
  - Automotive IoT-style applications based on standard mobile radio links, IPv6 based data traffic and cloud data solutions.
- W3C together with GENIVI worked on defining signals and protocols for this
- GENIVI intends to define a reference SW architecture and middleware components to harmonize vehicle state and sensor information
- How to leverage this experience ?

Copyright © GENIVI Alliance 2018

Learning more…getting involved

- Today
  - Full readouts on Graphics Sharing & Hypervisors
  - W3C work readout – Connect the Vehicle to the World Wide Web
- Thursday
  - Working sessions
  - Hands on session (Ramses)
  - WATCH OUT: you cannot be everywhere !
- After this week
  - Engage member experts in domain interaction in ongoing teleconferences after the tech summit
  - Help establish active dialogs with AUTOSAR, Google/Android, SOC and hypervisor vendors
  - Help scoping & launching new projects
    - Streaming and messaging APIs
    - Vehicle to Cloud connectivity
- Organization of projects
  - GENIVI-driven with project management and technology facilitation resources
  - Open to members & non-members

Copyright © GENIVI Alliance 2018

Q&A

Frequently Asked Questions document for the most common questions

http://tinyurl.com/DIROFAQ

Thank you!

Visit GENIVI at http://www.genivi.org or http://projects.genivi.org

Subscribe to genivi-projects mailing list here

If member, subscribe to GENIVI newsletter by send an email to help@genivi.org

Contact GENIVI staff: gandersson@genivi.org or philippe.robin@technoveo.com

GENIVI is a registered trademark of the GENIVI Alliance in the USA and other countries.
Copyright © GENIVI Alliance 2018.