FEDERATE

Software-Defined Vehicle Support and Coordination Project

D4.1 Initial Recommendations for Building Block Realization

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The project has been accepted for funding within the Chips Joint Undertaking (CHIPS JU), a public-private partnership in collaboration with the Horizon Europe (HORIZON) Framework Programme under Grant Agreement No. **101139749**

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1 Executive Summary

This deliverable is an aligned recommendation, in which new or existing calls or funding schemes the prioritized modular building blocks backlog shall be implemented. This is the first iteration of this deliverable with no actual building blocks assigned to Projects but the methods to assign the building blocks in future iterations.

2 Introduction

2.1 Introduction - Purpose of this Document

The purpose of this document is to recommend which of the suggested building blocks are developed where. This is the final step of the Selection Process of building blocks. The first step is done in the work package 2 where the demands and potential Building Blocks are found. In work package 3 these are selected and refined and in this document from work package 4 these refined Building Blocks are assigned to new or existing projects and funding schemes. All of this happens in communication with the respective projects in case of the projects already existing.

2.2 Definitions

Table 1: Definitions, Acronyms, Abbreviations

Definitions, Acronyms, Abbreviations	Meaning
BB	Building Block
SDVoF	Software Defined Vehicle of the Future
HAL4SDV	Hardware Abstraction Layer for Software Defined Vehicle
CCAM	Cooperative, Connected and Automated Mobility
2ZERO	Towards Zero Emission Road Transport Partnership
SDV	Software Defined Vehicle
API	Application Programming Interface

2.3 Document Structure

This document is structured as follows:

- Section 1 describes the introduction with context for this document

- Section 2 as main body of the document identifies the related initiatives and projects in relation to SDV, proposes recommendations for Building Block in their allocation, and list remaining building block for future allocation.

3 European Programs and Projects

This is a brief overview about some key European funding programs:

- **Horizon Europe** is a European funding program for research and innovation. It has a budget of €95.5 billion[3] to spend over a seven-year period (2021-2027). The program aims to tackle climate change and boost the EU's competitiveness and growth. It facilitates collaboration and strengthens the impact of research and innovation in developing, supporting, and implementing EU policies while tackling global challenges.

  Topics supported by Horizon Europe include
  - Health
  - Culture, Creativity, and Inclusive Society
  - Civil Security for Society
  - Digital, Industry, and Space
  - Climate, Energy, and Mobility
  - Food, Bioeconomy, Natural Resources, Agriculture, and Environment

  SDV is mostly allocated to Cluster 4 Digital Industry and Space, and especially in Cluster 5 Climate, Energy and Mobility

  Link: Horizon Europe - European Commission (europa.eu)

- **Chips Joint Undertaking** (Chips-JU) is a European tri-partite partnership that boosts the development and adoption of advanced nano-electronic chip technologies and systems manufactured in Europe. It was established in 2023 and has a significant EU, national/regional, and private industry funding of nearly €11 billion.

  The program aims to reinforce the EU's strategic autonomy in electronic components and systems to support future needs of vertical industries and the economy at large. It also seeks to establish the EU's scientific excellence and innovation leadership in emerging components and systems technologies and promote the active involvement of SMEs.
  Topics supported by Chips Joint Undertaking include
  - Microelectronics
  - Embedded Software
  - Smart Systems
  - Photonics
  - Edge Computing
  - Risc-V
  - Software defined vehicle in the form of the SDVoF initiative
  Link: https://www.chips-ju.europa.eu

- **EUREKA** is a long-term intergovernmental initiative that supports strategically important thematic R&D&I communities in close cooperation with national public authorities. It is the world's biggest public network for international cooperation in R&D and innovation, present in over 45 countries. EUREKA provides access to public funding for R&D projects through the ministry or funding agency in each country. EUREKA Clusters are mid- to long-term R&D&I ecosystems of large industry, SMEs, RTOs, and academia that collaborate on specific technological areas to bring the next generation of new products and services to

the market. This long-term relationship between the R&D&I ecosystems and the public authorities is one of the assets of the EUREKA Clusters Program.

Topics supported by EUREKA include
- Digitalisation
- Green Deal including Hydrogen for Green Energy
- Circular Economy
- Health
Link: https://eurekanetwork.org

Two ITEA Cluster programs (ITEA and XECS) are described in the following but may be a bit less in scope for this project.

- **ITEA** (Information Technology for European Advancement) is a European strategic research program for the development of software-intensive systems and services. Established in 1998, ITEA is part of the Eureka R&D&I Cluster on software innovation. It enables a large international community of large industry, SMEs, start-ups, academia, and customer organizations to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth, and benefits for society. ITEA is industry-driven and covers a wide range of business opportunities facilitated by digitization. It pushes important technology fields like artificial intelligence, big data, simulation, and high-performance computing into concrete business applications.

  Topics supported by ITEA include
  - Smart Cities
  - Smart Communities
  - Smart Health
  - Smart Mobility
  - Smart Industry
  - Smart Energy
  - Smart Engineering
  - Safety and Security
  Link: https://itea4.org

- **XECS** is a Eureka Cluster specifically designed to accelerate the pace of sustainable industrial innovation in the Electronic Components and Systems (ECS) community. It is an industry-driven initiative designed to accelerate electronics RD&I by partnering with National Funding Bodies. XECS focuses on the critical area of sustainable digital transformation. XECS is open to all and is designed to help build a RD&I consortium, access funding, and manage collaborative projects. It provides exploitation and growth opportunities for all the partners involved. XECS runs calls on an annual basis, each call is guided by the ECS Strategic Research and Innovation Agenda and supported by countries across the Eureka network.

  Topics supported by XECS include
  - Sustainable Digital Transformation
  - Electronic Components and Systems (ECS)
Link: https://eureka-xecs.com

3.1 Initiatives and Projects Implementing Building Blocks from FEDERATE

3.1.1 HAL4SDV

The HAL4SDV project is an EU-funded Research and Innovation Action (RIA) project from the Chip-JU 2023 call on a mission to advance European solutions in software-defined vehicles and next-generation vehicles. HAL4SDV will enable software configuration that abstracts from vehicle hardware, paving the way for a "software-defined vehicle" approach for both safety-critical and non-safety-critical applications in future vehicles. It aims to pioneer methods, technologies, and processes for series vehicle development beyond 2030, driven by anticipated advancements in microelectronics, communication technology, software engineering, and AI.

Table 2: Relation of Federate Building Blocks and HAL4SDV Topics (initial draft based on the HAL4SDV proposal):

Federate BB	HAL4SDV Topic
SecOS	TA-BB D Security Orchestration: D02 Security Gateway Service
MWLayer: Standard Android VHAL	BB-A – HW/SW Abstraction: A04 Defragmentation of HW interfaces
MWLayer: Smart Charging Communication	Use Case: Battery charging management
Configuration: • Local Update Manager • OTA Master	TA-BB D Security Orchestration: D03 Cloud Connectivity
Platform Health Management: Distributed Health Management	BB-F – Integration, Testing, Simulation, Tools
Security: Intrusion Detection	TA-BB D Security Orchestration: D02 Security Gateway Service
Time: Automotive Edge Runtime	BB-A – HW/SW Abstraction: A07 Container/isolation for complex applications (like HMI)
Virtualization: Digital Twin	BB-F – Integration, Testing, Simulation, Tools: Virtualisation for vehicle subsystems
AppLayer: Standardization of Vehicle API	BB-B – API & Interfaces: VSS – Vehicle Signal Specification
AppLayer--> Standardized Architectural Patterns for Cross Platform Data Service Infrastructure	BB-A – HW/SW Abstraction: A06 Data Architecture for Automotive
MWLayer --> SOA	BB-C – Mixed-Criticality Integration Platform: C02 SoA for On-board integration SW environemnt

For explanation these are the HAL4SDV Building Block Activities

1. BB-A – HW/SW Abstraction
2. BB-B – API & Interfaces
3. BB-C – Mixed-Criticality Integration Platform
4. BB-D – Cyber Security Orchestration
5. BB-E – Development Process Tools

6. BB-F – Integration, Testing, Simulation, Tools
7. EN-G – Software Maintenance and Updateability
8. EN-H – Open-source
9. DEF-I – Mindset and Eco System
10. DEF J – Governance
11. TA-K: Use Cases

3.2 Initiatives and Projects that Could Benefit from FEDERATE Building Blocks

3.2.1 SDVoF Initiatives

The SDVoF initiative is guided by the SDV Sherpa Governance Group (SDV-SGG) acting as a decision-making board, providing direction, vision and validating roadmaps. By fostering coordination among existing alliances and establishing close ties with EU initiatives related to an open automotive hardware and software platform, as well as initiatives on connected and automated vehicles or zero emission mobility, the SDVoF initiative aims to create a robust ecosystem. Additionally, where appropriate, open-source software initiatives will be seamlessly integrated.

3.2.2 SDV Middleware and API Framework for SDVoF

Software-define vehicle middleware and API framework for the vehicle of the future is a EU-funded Innovation Action (IA) call on a mission to advance European solutions in software-defined vehicles and next-generation vehicles.

3.2.3 High Performance RISC-V Automotive Processor Supporting the Vehicle of the Future

Is an EU-funded Innovation Action (IA) 2024 call and Project selected from this call will be connected to FEDERATE coordination action. Its goal is to develop Scalable automotive processors, spanning from cost-efficient, real-time control to high-performance super-scalar application processors and hardware accelerators shall be developed for the automotive market, based on the RISC-V family.

3.2.6 Shift2SDV

The open architectures and building blocks of the Software-define vehicle middleware and API framework developed under this project shall aim at exposing the vehicle's features and functionalities in the form of standard modular services and APIs, simplifying the development and certification of in-vehicle and edge-cloud applications, simplifying the access to vehicle data, functions and resources, making vehicle upgrades easier, simplifying the adoption of existing and new regulations, verification, validation and certification, and adding agility and speed to automotive engineering.

4 Conclusion

This deliverable (D4.1) gives an overview on new or existing calls, projects and funding schemes within the SDVoF initiative. The document showcases, in which projects building blocks identified by FEDERATE, will be implemented. Therefore, the structure and building block categories are described. Furthermore, the document highlights projects, where the implementation of a prioritized modular building block backlog is promising. This document reflects the first iteration of recommendations on building block implementation. More projects for the implementation of building blocks will be showcased in future iterations.

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