



# **Software-Defined Vehicle Support and Coordination Project**

## **D3.4 First orchestrated backlog report**

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## 1. Executive Summary

The FEDERATE project, aimed at advancing the development of software-defined vehicle (SDV) components, has made significant strides in its early stages, focusing on the collection, organization, and alignment of use cases and requirements inputs. WP2 and WP3 played an important role in several key areas, contributing to the project's success, and ensuring that foundational elements are effectively established.

A primary deliverable of the project was the creation of a comprehensive GitHub repository, which houses an elaborate folder structure as organizing principle for SDV software building blocks. GitHub was determined to be the most suitable option due to its superior user management capabilities compared to GitLab.

This document describes methodology and first results for the orchestration of blocks (BB) from the prioritized backlog, described in D3.1 (Prioritized backlog report). It includes links to existing implementations or projects, where available, or provides initial suggestions about potential hosting initiatives or projects.

An efficient workflow for creating and reviewing issues on the platform was established, ensuring smooth collaboration among project participants. WP2 and WP3 hosted discussions around the organizational structure of the SDV building blocks, providing feedback and insights that shaped the final framework. Furthermore, a first set of use case scenarios was collected, which were reviewed, adapted, and accepted into the project repository.

## 2. Introduction

The purpose of this report document is to provide an account of the contributions generated by of WP2 and WP3 within the scope of the FEDERATE project. It aims to outline the key contributions, methodologies, and outcomes, particularly focusing on the creation and organization of the SDV software building blocks repository. By providing a comprehensive overview of these activities, the report ensures transparency, facilitates knowledge sharing among project stakeholders, and supports ongoing and future work within the FEDERATE project by offering a clear reference point for the project's progress and achievements thus far.

### 2.1. Aims and Objectives of the Deliverable

The primary aim of the deliverable is to describe the comprehensive and well-organized repository of SDV software building blocks, which will serve as a foundational resource for the development of software-defined vehicle components that can be supported and collaboration-aligned by the FEDERATE project. This repository is designed to collect and organize use cases and requirements inputs, enabling the project team to systematically approach the development of SDV software components. The objective is to provide a robust framework that facilitates collaboration among project participants, supports the efficient creation and review of building blocks, and ensures that the SDV components developed can be in line with industry standards and best practices.

This document describes methodology and first results for the orchestration of blocks (BB) from the prioritized backlog, which is described in D3.1 (Prioritized backlog report). It includes links to existing implementations or projects, where available, or provides initial suggestions about potential hosting initiatives or projects.

### 2.2. Context and Fit within the Project

This deliverable fits into the broader context of the FEDERATE project by addressing one of its core goals: the systematic development of SDV software components that can be utilized in the automotive industry. The repository serves as a central hub for organizing the building blocks that will form the basis of these components, ensuring that all relevant use cases, scenarios, and requirements are documented and accessible to the entire project team, as well as to organizations that want to contribute to building block implementation. By providing a clear and structured framework, this deliverable ensures that subsequent development activities are grounded in well-defined and widely reviewed inputs.

### 2.3. Interdependencies and Integration with Other Tasks

The development of this deliverable is interdependent with earlier tasks and deliverables. For instance, the selection of GitHub as the project hosting platform and the establishment of a workflow for creating and reviewing issues were critical prerequisites for the successful creation of the repository. These earlier tasks provided the technical and procedural foundation necessary for organizing and managing the SDV building blocks.

Furthermore, the scenarios and use cases included in this repository are derived from initial discussions and inputs from various project stakeholders, ensuring that the repository reflects a wide range of perspectives

and requirements. As such, this deliverable is built on the collaborative efforts and contributions of the entire group of participants.

Going forward, this repository will serve as a key input for subsequent tasks within the FEDERATE project. It can be used by teams responsible for developing specific SDV software components, ensuring that their work is informed by the comprehensive use cases and scenarios documented in the repository. Additionally, the structure and organization principles established in this deliverable will guide future updates and expansions of the repository, as new requirements and building blocks are identified and integrated into the project.

### 3. FEDERATE in the larger Open Source context

Even if the overall scope and impact has been small so far, automotive Open Source communities have existed for many years or even decades. For example, the COVESA organization [7] (formerly GENIVI Alliance) has been doing open automotive specification and code projects for a long time. Similarly, the Linux Foundation AGL (Automotive Grade Linux) project [8] has been around for many years and is a staple in the automotive source community. There also have been some recently founded Open Source communities, reflecting a new level of interest of the automotive industry in collaborative development models. The primary example for this is the Eclipse Foundation SDV (Software Defined Vehicle) Working Group [9], which was founded in 2021 and has gained significant membership and contribution traction since then.

#### 3.1. Landscape of Relevant Open Source Communities

To ensure that the FEDERATE project is well-aligned with existing efforts in the SDV space, partners contributed their knowledge of the relevant open-source communities and projects. This task involved identifying and following various communities, assessing their relevance to the FEDERATE project, and determining potential areas for collaboration or integration. WP3 focused on communities that are actively engaged in SDV development or related fields, such as the Eclipse SDV Working Group. The findings are helping to inform strategic decisions and identify opportunities for leveraging existing resources and expertise.

#### 3.2. Introduction of the Eclipse SDV Working Group to FEDERATE

As part of the efforts to connect the FEDERATE project with relevant open-source communities, WP3 provided a detailed introduction and explanation of the Eclipse SDV Working Group. This included an overview of the working group's objectives, ongoing projects, and potential synergies with FEDERATE. WP3 also facilitated discussions on how the FEDERATE project could collaborate with the Eclipse SDV Working Group, leveraging its resources and network to enhance the development of SDV components. This task was crucial in positioning FEDERATE within a broader ecosystem, enabling the project to benefit from the collective knowledge and efforts of the open-source SDV community.

#### 3.3. Promoting FEDERATE Project at Open Source Events

In addition to technical contributions, WP3 partners have also been actively promoting the FEDERATE project within the broader automotive open-source community. Partners have actively participated in events such as Eclipse SDV community meetings, and presented the project's goals, progress, and opportunities for collaboration. These efforts have helped raise awareness of the FEDERATE project, attracting interest from potential contributors and partners, and positioning the project within the larger ecosystem of SDV-related initiatives.

### 4. Prioritized and orchestrated backlog

As has been illustrated in D3.1, the project team has put considerable effort into setting up and structuring the infrastructure that is used to store backlog items. In addition, by selecting GitHub as the hosting platform, the project has gained the use of readily available best-practice tools and processes for collaborative editing



and refinement of backlog items.

Building on that infrastructure, a considerable initial number of backlog items has been collected and allocated into the chosen structure (for a detailed snapshot at the time of this writing, please refer to Appendix 6). Some of these items include a valuation regarding their priority which have initially been assigned by the authors of the respective building blocks.

## 4.1. Continual backlog improvement

This collection of backlog items will continually be refined by the project team, and it will grow as more relevant components get identified and added to the repository. With this, the foundation has been laid for what will be the main tasks for the project team going forward:

1. Extend and especially refine the backlog of building blocks.
2. Identify the backlog items with the highest relevance (priority), ideally via input from the group of participating companies.
3. Initiate decisions within the membership companies that will allocate development resources to associated open source projects that are working on these items, with the goal of speeding up development and creating a path from open source project into commercial product supply chain.

## 4.2. Building Block orchestration and assignment

As the Building Block catalogue grows, the project team can contribute its part by working towards maintaining it in a coherent state, aiming to keep blocks on a similar level of abstraction and avoiding duplications. The goal of that work is to maintain the catalogue as a useful set of references and pointers to implementing projects that exist in the scope of Open Source Foundations or other related organizations.

Actual orchestration of implementation work can be done by participating companies identifying which Building Blocks are most important to them, and assigning development resources accordingly. FEDERATE supports that effort by working towards a globally comparable definition of Building Block priorities (compare section **Fehler! Verweisquelle konnte nicht gefunden werden.**). The developer resource allocation will determine which Building Blocks are going to be built, and when.

A major contribution that FEDERATE will perform for the SDV ecosystem is to keep the Building Block catalogue up to date with references to all known Building Block implementation projects, so that interested parties know where to obtain or contribute to existing implementations.

## 5. Conclusions

The contributions of WP3 have been instrumental in laying the groundwork for the successful development of software-defined vehicle (SDV) components. Through evaluating the project hosting platform, proposing and testing workflows, and shaping the organizational structure for SDV building blocks, WP3 has established a solid foundation that supports collaborative and systematic development within the project.

The active involvement in creating and refining use case scenarios has ensured that it aligns with the project's strategic goals and is responsive to the evolving needs of the project. Additionally, the efforts to promote the

FEDERATE project at open-source events and to connect it with relevant communities, such as the Eclipse SDV Working Group, has expanded the project's reach and fostered valuable connections that will benefit future development.

In conclusion, the BB collection on GitHub sets the stage for continued progress and innovation in the development of SDV components.

Going forward, it is essential for the FEDERATE project team to enter a mode of operation where FEDERATE becomes an alignment and reference point for parties and partners who are interested in actually contributing to the development of Building Blocks and are pointed to relevant existing Open Source project by the FEDERATE catalogue and member organizations. In cases where no Open Source implementation exists for a Building Block, FEDERATE aims to support as alignment hub for member organizations to jointly prepare and initiate the founding of such projects, in case there is sufficient interest and commitment from these members.

## 6. Snapshot of Building Blocks

*Table 1 - Snapshot of Building Blocks*

Building Block type	Building Block name	Orchestration (exemplary)	Priorisation (exemplary)
BB-CEST/_Not_Clustered	BB_Car_Simulator	Eclipse OpenDUT	
BB-SC-TC/Testing	BB_Shadowing		
BB-SC-TC/Virtualization	BB_Digital_Twin	Eclipse Ditto	High
BB-SC/AppLayer/Communication	BB_AOSP_Push_Notification_Service	<a href="https://novu.co">https://novu.co</a>	until 30.6.2025
BB-SC/MWLayer/Communication	BB_Communication_Server_S2S		Low
BB-SC/MWLayer/Communication	BB_Constraint_DDS_embeddedRTPS	<a href="https://github.com/embedded-software-laboratory/embeddedRTPS">https://github.com/embedded-software-laboratory/embeddedRTPS</a>	
BB-SC/MWLayer/Communication	BB_Gateway_Mirroring		Low
BB-SC/MWLayer/Communication	BB_Network_Management		High
BB-SC/MWLayer/Communication	BB_SecOS		Low
BB-SC/MWLayer/Communication	BB_Smart_Charging_Communication	<a href="https://lfenergy.org/projects/everest/">https://lfenergy.org/projects/everest/</a>	Low
BB-	BB_Standard_Android_VHAL		

SC/MWLayer/Communication			
BB-SC/MWLayer/Configuration	BB_Local_Update_Manager	AUTOSAR: UCS - but not OSS-usable higher-level: Eclipse Ankaios, Eclipse Kanto, Eclipse Symphony, Eclipse BlueChi	High
BB-SC/MWLayer/Configuration	BB_OTA_Master	AUTOSAR: UCS - but not OSS-usable higher-level: Eclipse Ankaios, Eclipse Kanto, Eclipse Symphony, Eclipse BlueChi	High
BB-SC/MWLayer/Diagnostics	BB_Policy_Manager		Low
BB-SC/MWLayer/Platform-Health-Management	BB_Distributed_Health_Management	<a href="https://opentelemetry.io">https://opentelemetry.io</a>	Low
BB-SC/MWLayer/Platform-Health-Management	BB_Watchdog		Low
BB-SC/MWLayer/Power-Management	BB_Power_Management_Coordination		High
BB-SC/MWLayer/Runtime	BB_Diagnostic_Services_Applications		Medium
BB-SC/MWLayer/Runtime	BB_State_Management		High
BB-SC/MWLayer/Security	BB_Crypto_Service_Manager		High
BB-SC/MWLayer/Security	BB_Internet_Protocol_Security		Low
BB-SC/MWLayer/Security	BB_Intrusion_Detection		Low
BB-SC/MWLayer/Security	BB_Secure_Onboard_Communication		High
BB-SC/MWLayer/Security	BB_Security_Event_Manager		High
BB-SC/MWLayer/Security	BB_Security_Transport_Layer		Low
BB-	BB_Vehicle_Data_Collector	<a href="https://github.c">https://github.c</a>	High

SC/MWLayer/Storage		om/eclipse-sdv-blueprints/insurance <a href="https://github.com/eclipse-sdv-blueprints/fleet-management">https://github.com/eclipse-sdv-blueprints/fleet-management</a>	
BB-SC/MWLayer/Storage	BB_Vehicle_Data_Persistency		Medium
BB-SC/MWLayer/Storage	BB_Vehicle_Logging_and_Recording	OpenTelemetry	High
BB-SC/MWLayer/Time	BB_Time_Service		High
BB-SC/MWLayer/Tools-and-Methods	BB_Key_Management_System		Medium
BB-SC/OSLayer/Time	BB_Automotive_Edge_Runtime	Eclipse Leda AutoSD (RHIVOS)	High
S-BB/AppLayer	BB_Standardization_of_Vehicle_API		
S-BB/AppLayer	BB_Standardized_Architectural_Patterns_for_Cross_Platform		
S-BB/AppLayer	BB_Standardized_Description_of_Data_from_Related_Domains		
S-BB/AppLayer	BB_Standardized_Procedure_and_Tooling_for_Combining_Data_from_Different_Domains		
S-BB/AppLayer	BB_Standardized_Procedure_and_Tooling_for_Modeling_Data		
S-BB/MWLayer	BB_SOA	Eclipse uProtocol	High
S-BB/MWLayer	BB_Standardized_Data_Conversion_Tools_for_Info_Knowledge_Layers		
S-BB/MWLayer	BB_Standardized_Data_Description_for_Vehicle_Sensors_Attributes_Actuators		
S-BB/MWLayer	BB_Standardized_way_for_Reasoning_on_Data_Streams		
S-BB/MWLayer	BB_sSOA		Medium



## 7. References

- [1] Open Source – Eclipse SDV Community Event, Presentation on March 20: “Cross Organization Activities: EU Updates FEDERATE & HAL4SDV, SDV Alliance” - <https://sdv.eclipse.org/sdv-community-day-graz-2024/>
- [2] FEDERATE project repository: <https://github.com/CSA-FEDERATE/Proposed-BuildingBlocks>
- [3] example GitHub review process: <https://github.com/CSA-FEDERATE/Proposed-BuildingBlocks/pull/10>
- [4] use case scenario fleet data: [https://github.com/CSA-FEDERATE/Proposed-BuildingBlocks/blob/main/unsorted\\_BB/Daniel/BB\\_Template\\_filled\\_FleetData\\_WP3.md](https://github.com/CSA-FEDERATE/Proposed-BuildingBlocks/blob/main/unsorted_BB/Daniel/BB_Template_filled_FleetData_WP3.md)
- [5] use case scenario remote vehicle interaction: [https://github.com/CSA-FEDERATE/Proposed-BuildingBlocks/blob/main/unsorted\\_BB/Daniel/BB\\_Template\\_filled\\_RemoteVehicleInteraction\\_WP3.md](https://github.com/CSA-FEDERATE/Proposed-BuildingBlocks/blob/main/unsorted_BB/Daniel/BB_Template_filled_RemoteVehicleInteraction_WP3.md)
- [6] use case scenario universal service mesh: [https://github.com/CSA-FEDERATE/Proposed-BuildingBlocks/blob/main/unsorted\\_BB/Daniel/BB\\_Template\\_filled\\_ServiceMesh\\_WP3.md](https://github.com/CSA-FEDERATE/Proposed-BuildingBlocks/blob/main/unsorted_BB/Daniel/BB_Template_filled_ServiceMesh_WP3.md)
- [7] COVESA - The Connected Vehicle Systems Alliance: <https://covesa.global>
- [8] AGL – Automotive Grade Linux: <https://www.automotivelinux.org>
- [9] Eclipse SDV Working Group: <https://sdv.eclipse.org>