Vehicle Data Model Project

Charter (Draft)

Revision History

<Track initial creation and revisions to the charter in this revision history table>

Version	Date	Author(s)	Reason for Revision
	11.07.2025	Paul Boyes	Initial skeleton of charter
	31.07.2025	Daniel Alvarez	Initial draft of the content
	02.08.2025	Chaitanya Podalakuru	Add benefits, success criteria and risks

Background

As data is critical for vehicle function, digital experience, connected vehicle, mobility, fleet management…, COVESA(previously GENIVI) has been at the forefront advancing and evolving initiatives to normalize vehicle signals and vehicle data from the start (for 16 years). COVESA Vehicle Signal Specification*VSS) is the result of that experience and learning. It is open source, well known, easy to adopt, actively maintained and supported.

As vehicle data has grown and evolved from the vehicle to becoming part of the “Enterprise” and connected ecosystem, there has been a desire and need to align with formal data modeling practices and leverage tools from the larger community. The Vehicle Data Model (VDM) project is a natural progression of this growth and evolution as seen from these proposals from the past few years.

IMPORTANT NOTE: VDM is a new incubating project, related to, but separate from VSS. The intent is to complement and work with VSS, covering areas not covered by VSS. Ultimately if proven successful, VSS may be generated from VDM.

Vision

The Vehicle Data Model (VDM) project aims to create a unified, interoperable vehicle data modeling framework based on Simplified Semantic Data Modeling (S2DM) methodology. By applying S2DM’s standardized, semantic, and human-machine readable approach, VDM bridges vehicles and adjacent domains to enable cross-industry innovation.

The project emphasizes ease of authoring, accessibility and practical implementation of vehicle data model through reusable patterns and supported tooling.

Benefits

Key benefits of VDM:

- Organizational and Market
    - Supports different **stakeholder views** (OEM engineers, suppliers, fleet operators etc) from the common data model.
    - Generates simple models (e.g. VSS) for in-vehicle domain focus.
    - Provides formal, **consistent data structures for analytics and AI teams**, reducing model retraining.
    - Offers **domain-specific views** for SMEs (e.g Body, Powertrain etc) to reduce onboarding effort.
- Flexibility and Extensibility
    - Adaptable hierarchies allow **new components** to be added without breaking existing models.
    - Enables **support for cross-domain links** (e.g vehicle State of Charge, EV Charging) for better extensibility.
- Open Source Advantages
    - Built on **proven open standards** (GraphQL, Semantic Web) with large global communities.
    - **Reduces vendor lock-in** through open specifications and reference implementations.
    - **Saves cost and time by reusing existing open-source tools** for parsing, validation, and queries.
    - Benefits from **continuous community-driven improvements** and integrations.
- Adoption
    - Leverages a larger community of GraphQL and Semantic Web using well known and supported tools **reducing the need for custom tool developmen**t and maintenance in COVESA.
    - User familiar/widely adopted format with well-supported tools to **shorten pilot-to-production workflow timing and adoption efforts**.

Type & Scope

Entity type: Project under COVESA's Data Expert Group - Data Models and Ontologies Pillar.

Scope:

The Vehicle Data Model (VDM) project focuses on two primary areas of work:

- Developing and evolving the Simplified Semantic Data Modeling (S2DM) approach, a modern, standards-based methodology for representing data.

- Modeling vehicle-related domains (e.g., passenger cars, commercial vehicles, trailers, motorcycles, etc.) and their relationships to adjacent domains (e.g., roads, traffic signals, EV chargers, etc.) in an interconnected manner using the above-mentioned S2DM approach.

Key goals:

- Establish a simple, consistent, and standards-based data modeling approach that meets stakeholder needs.
- Leverage widely adopted Semantic Web and GraphQL standards and open specifications to reduce complexity, lower costs, and increase interoperability.
- Maintain simplicity and usability so Subject Matter Experts (SMEs) can easily understand, contribute, and use models with minimal prior modeling experience.
- Build on the design principles, community, and lessons learned of the Vehicle Signal Specification (VSS) to ensure continuity and evolution. For example, maintain simplicity so that Subject Matter Experts (SMEs) can easily understand, contribute to, and use the models and tools with minimal data modeling experience.
- Collaborate on common use cases showing clear patterns of use, examples, and how-tos. This includes modeling the data of vehicle-related domains (e.g., passenger, commercial, trailers, motorcycles, etc.) in connection to adjacent aspects (e.g. road, traffic signals, ev chargers, etc.).

Responsibilities

The VDM project will:

- Develop and evolve the Simplified Semantic Data Modeling (S2DM) approach, including guidelines and best practices for modeling vehicle data using modern, standards-based methods.
- Model vehicle-related domains (e.g., passenger cars, commercial vehicles, trailers, motorcycles) and their connections to adjacent domains (e.g., roads, traffic signals, EV chargers) using the S2DM approach.
- Provide supporting artifacts and tooling to enable validation, transformation, and export of models to multiple formats (e.g., JSON Schema, SHACL, VSS).
- Publish reference examples, use cases, and documentation to guide adoption and demonstrate practical applications.

Way of Working (WoW)

The Vehicle Data Model (VDM) Project will operate as an **open, collaborative, and iterative initiative** under the COVESA Data Expert Group, following principles inspired by **Agile development and open-source best practices**. The approach emphasizes transparency, community involvement, and incremental delivery.

Governance Model:

Key aspects of the operational model include:

- **Project Management:**
  - A **project backlog and roadmap** will be maintained in the VDM GitHub project to track priorities and progress.
  - Work will be organized in **short, iterative cycles**, delivering incremental updates to guidelines, tools, and models rather than a single large release.
  - Monthly steering review will handle strategic roadmap, KPIs, and alignment.
- **Repositories and Artifacts:**
  - Vehicle Data Models will be hosted in the VDM GitHub repository.
  - The modeling approach (guidelines and tooling) will be hosted in the S2DM GitHub repository.
  - Both repositories will follow **semantic versioning**; every approved change to the main branch will trigger an updated release version.
- **Collaboration and Contribution:**
  - Weekly 1-hour working session open to all contributors for backlog review, PR discussions, and immediate decisions.
  - Contributions will adhere to COVESA Contribution Guidelines, including applicable license and copyright requirements.
  - GitHub features such as **issues, pull requests, and discussions** will serve as the primary mechanisms for community input, reviews, and change proposals.
  - Project-specific contribution processes will be documented in the root of each repository.
- **Documentation:**
  - Meeting notes will be documented in a dedicated space in COVESA's wiki for transparency and easy reference.
- **Release Cadence:**
  - Formal milestone releases will occur **at least twice per year**, aligned with COVESA All Member Meetings (spring and fall).

    - Additional incremental releases will be issued as updates are merged, following semantic versioning rules.
- **Reporting:**
    - Progress will be reported **quarterly to the COVESA Board of Directors** and to the community during **All Member Meetings**, by project leads and maintainers.

Planned Output

As described above, in the Way of Working section, deliverables and road maps will be maintained in the corresponding repositories. In terms of the artifacts that are planned as output, we have:

- S2DM will contain the data modeling guideline and the tooling that supports its application. Including, but not limited to: documentation, examples, interfaces, predefined elements, and tests.
- VDM will contain domain data models that are created by following S2DM.

The current (as of 31.07.2025) primary milestones include:

- 30.11.2025 ⟶ Release the v.1.0 of S2DM
- 15.10.2025 ⟶ Mirror the VSS data catalog with the S2DM and host it in the VDM repository.

Success Criteria

Key performance indicators (KPIs) will include -

- Adoption by at least 2 OEMs and 3 ecosystem partners by the end of 2026.
- Availability of at least 5 high-quality reference domain models.

Risks & Mitigations

- Low adoption due to missing key features required by early adopters.
- Insufficient active contributions from community members leading to slow progress.
- Scope creep driven by requests from adopters that dilute the standardized approach.

Processes & Procedures

Contribution Procedure:

Contributions to the **main branch** are welcome and follow this process:

1. **Start a Discussion:** Open a GitHub **Discussion** or **Issue** to raise your idea, concern, or question.
2. **Socialize:** Discuss the proposal with project leads and contributors to gather feedback.
3. **Agree on Action:** Define the solution and action points to address the issue.

4. **Assign Ownership:** Decide who will implement the change and create the Pull Request (PR).
5. **Submit PR:** Create a PR referencing the related Issue or Discussion, and ensure it follows project guidelines.
6. **Review and Merge:** PRs require at least two approvals (including one project lead) before merging into **main**.
7. **Release:** Every merged PR updates the **semantic version** and triggers a new release entry.

Participants

Initial participants include BMW Group, Ford, Bosch, Renesas, and GeoTab. Known interested member organizations will be engaged as soon as possible. That said, it is a public project as such members may join as desired.

Chairs & Vice-Chairs

- Daniel Alvarez, BMW Group – Lead
- Chaitanya Podalakuru, Ford – Co-Lead

Lifecycle and End of Life

The Vehicle Data Model (VDM) Project is an **ongoing initiative** with no fixed end date, as it provides continuously evolving data modeling guidelines, tools, and controlled vocabularies that adapt to industry needs.

Lifecycle governance includes:

- **Initial Charter Approval** by the COVESA Board of Directors.
- **Annual or bi-annual reviews** to ensure alignment with COVESA strategy and community needs.
- **Re-charter** if major scope adjustments are required.
- **Status reporting** at regular intervals (quarterly) and during COVESA All Member Meetings.

The project will remain active as long as there is industry demand for updates to vehicle data models and the S2DM approach. End-of-life would occur only if the work is fully superseded by another approach or reaches a mature state and transitions to a pure maintenance mode under a different governance structure.