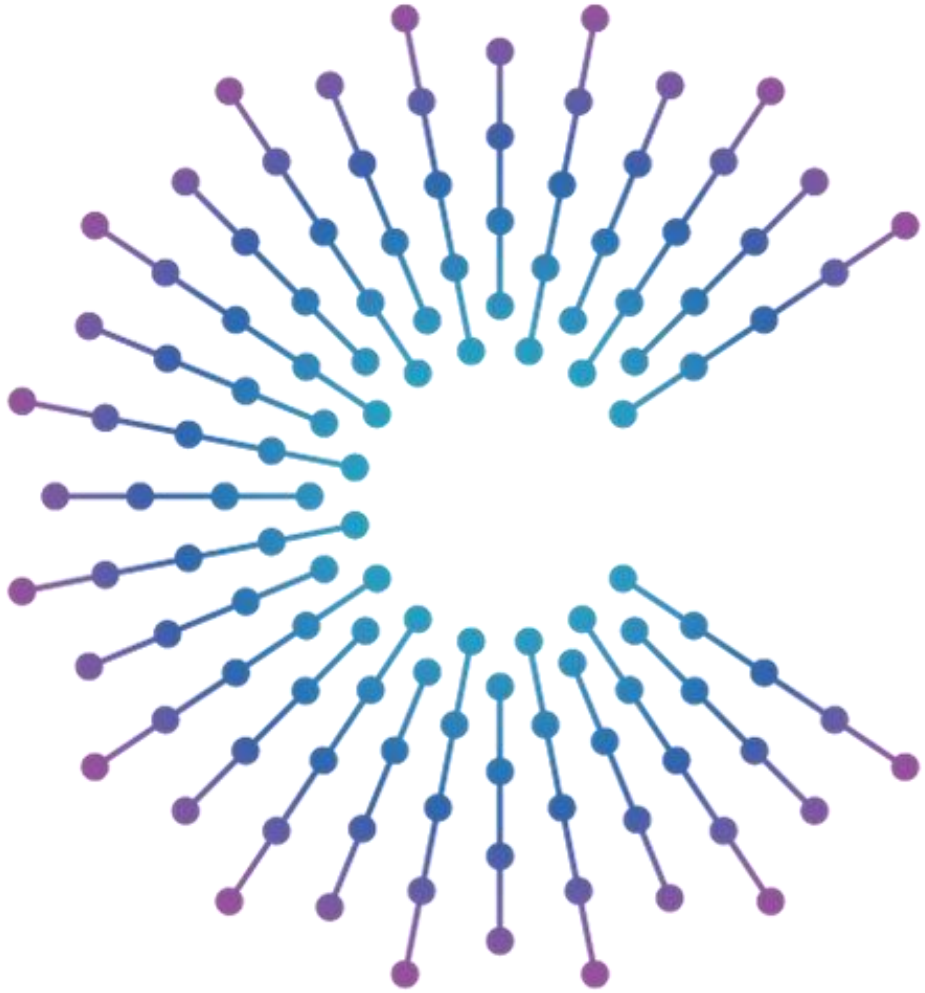
Accelerating the Future of **Connected Vehicles**

11 December 2025
@Eclipse SDV Community Meetup in Japan

Yasuhiro Morita, Bosch Corporation



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Technical Focus – esp. for VSS and VDM

Our Future

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COVESA is…

Open & Global

Strong 100-organization Collaborative Community

Addressing Business and Technical Challenges in the Connected Vehicle Ecosystem

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COVESA Members 2025

Accelerating the future of connected vehicles

OEMs

BMW Group, Ford, GM, HONDA The Power of Dreams, HYUNDAI MOTOR GROUP, KARMA, NISSAN MOTOR CORPORATION, VOLVO, VOLVO

First Tiers

ALPSALPINE ALPS ALPINE GROUP, APTIV, Astemo, BOSCH, CATL, Cummins, FORVIA faurecia, HARMAN A SAMSUNG COMPANY, JOYNEXT 均联智行, MOBIS, MICHELIN, VERRA MOBILITY

Silicon

arm, NXP, RENESAS

OSV, Middleware, Hardware, Service Suppliers and Others

Abalta, aicas, AIDEN, AirConsole, Appsfactory, AREAXO, AUTONOSTIX 360, BLINKAI AUTOMOTIVE, Capgemini, CATL 时代智能, cinemo, CLOUDERA, cognizant, COMPREDICT, COX AUTOMOTIVE, DIMO, DISTI, Driver, Elektrobit, EMERGENCY SAFETY SOLUTIONS, endava, Enterprise Mobility, epicnpoc, ETRI, GEOTAB, GitHub, Globant, gracenote a nielsen company, Green Hills SOFTWARE, HAAS ALERT, ICS, INSUREVISION, intellias, KPIT, L&T Technology Services, MACH49, MathWorks, mavi.io, mimik, MODERNIZE, MongoDB, MOTER, Qi, P3, PAIRPOINT, Profilence, publicis sapient, QNX, Qt Group, Quu, Red Hat, remotiveLabs, rinf.tech, rti, SCYTALES, SHEEVA, SIILI AUTO, SIMPLENIGHT, SMART, SONATUS, SASKEN, source.dev, starfish, TUXERA, viaduct, VicOne, VOUCH.iO, VxLabs, W3C, Warner, WirelessCar, Xouba DATA FOR SAFER ROADS

Primary Technical Activities

Vehicle Data

- Common Language for Data Definition and Exchange
- Common Interfaces for Accessing Data and Services

AOSP App Framework

- Reduced Fragmentation in the Automotive App Market
- Write-once, Deploy Across Brands

Commercial Vehicle & Fleet Management

- Leverage Common Data Definition for Fleet Management Use Cases

Open Source Code Projects

- 16-year History of Hosting Open Code Projects

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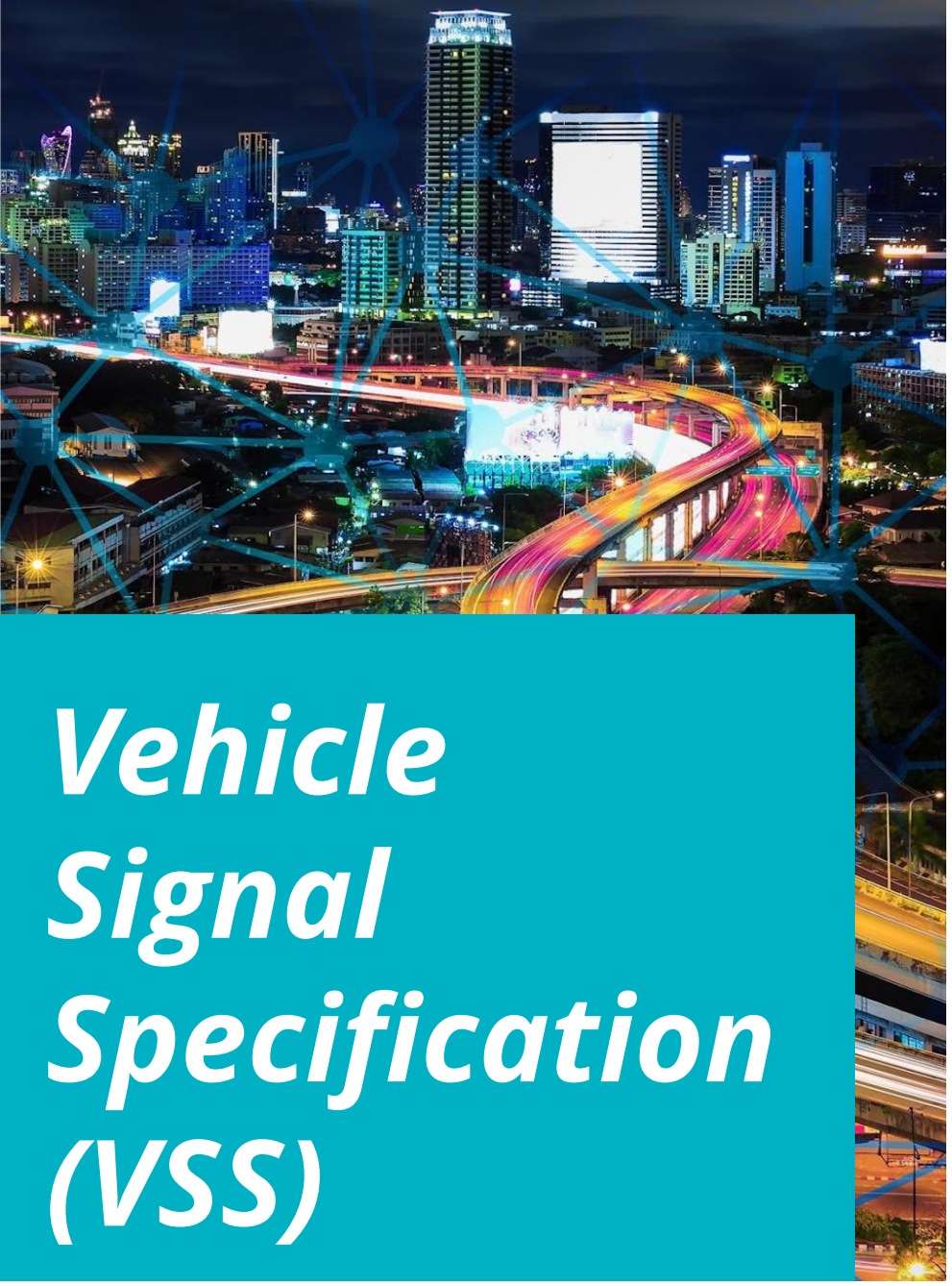
Technical Focus

VSS (Vehicle Signal Specification) and
VDM (Vehicle Data Model) project highlights



Vehicle Signal Specification (VSS)

Widely Adopted Open Data Model for Consistent and Usable Vehicle Data

- Enables Scalability
- Faster Time-to-Market
- Supports Future Business
- Drives Innovation

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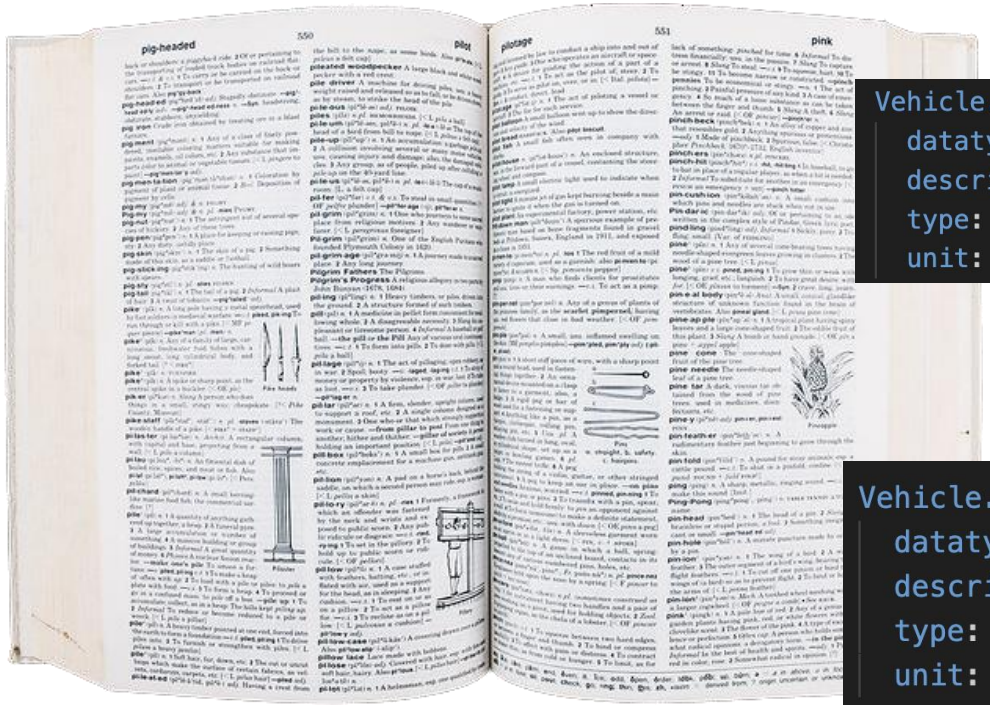
What VSS is: A dictionary for Automotive data



```
Vehicle.Chassis.Axle.Row1.Wheel.Left.Tire.Pressure:
  datatype: uint16
  description: Tire pressure in kilo-Pascal.
  type: sensor
  unit: kPa
```

```
Vehicle.Powertrain.TractionBattery.Charging.ChargeCurrent.DC:
  datatype: float
  description: Current DC charging current at inlet. Negative if returning energy to grid.
  type: sensor
  unit: A
```

VSS is like a ***vocabulary*** describing signals and data that is generic to vehicles

https://www.flickr.com/photos/stockcatalog/42339681295/ picture by http://www.quotecatalog.com/

Sebastian Schildt (ETAS), "VSS – Dive into VSS", CVOVESA AMM, May 2025

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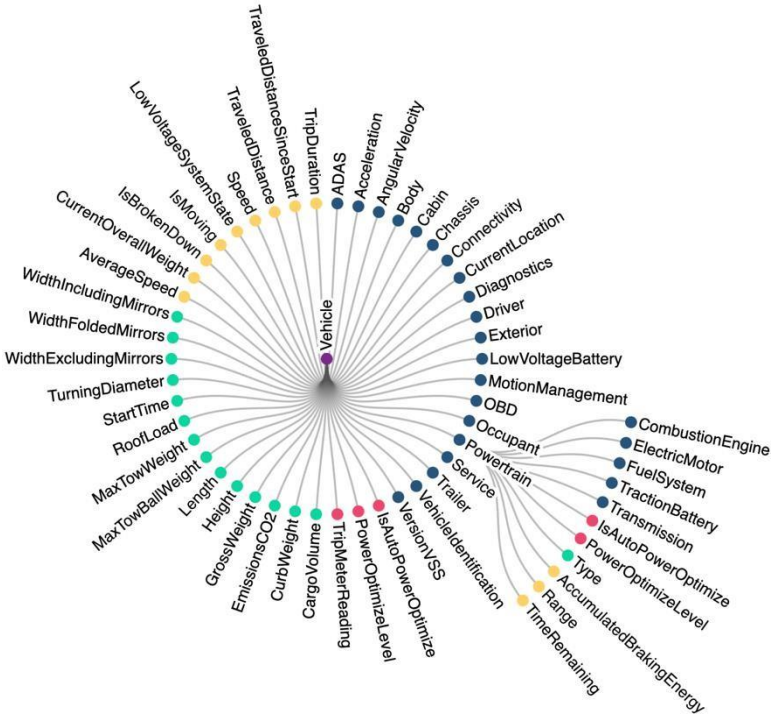
The VSS automotive dictionary is..

- Machine readable (based on YAML)
- Maintained by and extended by the COVESA community (aka by YOU)
- Available under an Open Source License
  - Can be used royalty free
  - Can be used for product development/in-house tooling

```yaml
Vehicle.Chassis.Axle.Row1.Wheel.Left.Tire.Pressure:
  datatype: uint16
  description: Tire pressure in kilo-Pascal.
  type: sensor
  unit: kPa
```



https://github.com/covesa/vehicle_signal_specification

Sebastian Schildt (ETAS), "VSS – Dive into VSS", CVOVESA AMM, May 2025

VSS APIs and Serializations in the wild

While the COVESA VSS project is not defining an API many people built APIs

```kotlin
fun fetch() {
    lifecycleScope.launch {
        val request = FetchRequest("Vehicle.Speed", listOf(Field.FIELD_VALUE))
        val response = dataBrokerConnection?.kuksaValV1.fetch(request) ?: return@launch
        val entry = entriesList.first() // Don't forget to handle empty responses
        val value = entry.value
        val speed = value.float
    }
}
```

Kotlin

```rust
match v2_client.get_value("Vehicle.Speed".to_owned()).await {
        Ok(response) => {
            println!("Got value for Vehicle.Speed: {:?}", response);
        }
        Err(err) => {
            println!(
                "Getting value for signal {:?} failed: {:?}",
                "Vehicle.Speed", err
            );
        }
    }
```

```json
{
  "action": "get",
  "path": "Vehicle.Drivetrain.InternalCombustionEngine.RPM",
  "authorization": "eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJuYW1 ... Zw_KSsds"
  "requestId": "8657"
}
```

JSON

VISS

```
rpc Subscribe(SubscribeRequest) returns (stream SubscribeResponse);

message SubscribeRequest {
  repeated string signal_paths = 1;
  uint32 buffer_size = 2;
  Filter filter = 3;
}
```

gRPC

Users & Creators

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THE LINUX FOUNDATION

```python
client.set_target_values({
        'Vehicle.Body.Windshield.Front.Wiping.System.TargetPosition': Datapoint(45)
    })
```

python

```python
self.DriverSeatPosition = await self.Vehicle.Cabin.Seat.Row1.DriverSide.Position.get()
```

python

AUTOMOTIVE GRADE LINUX

SDV Eclipse Software Defined Vehicle

AUTOSAR

```cpp
subscribeDataPoints(velocitas::QueryBuilder::select(Vehicle.Speed).build())
        ->onItem([this](auto&& item) { onSpeedChanged(std::forward<decltype(item)>(item)); })
        ->onError([this](auto&& status) { onError(std::forward<decltype(status)>(status)); });
```

Sebastian Schildt (ETAS), "VSS – Dive into VSS", CVOVESA AMM, May 2025

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VSS: OEMs and Open Source Adopters

OEMS

BMW Group

MINI

Ford

VOLVO

OPEN SOURCE PROJECT ADOPTERS

AUTOMOTIVE GRADE LINUX

COVESA

digital.auto

ECLIPSE FOUNDATION

(Eclipse SDV Fleet Management Blueprint and Eclipse Service-to-Signal)

KUKSA

NSF National Science Foundation

(Pivot Project)

Leda

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VSS Adoption

COMPANIES, PRODUCTS AND SOLUTIONS

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What is VDM?

- VDM builds on proven deliverable structure, introducing a new modeling approach called Simple Semantic Data (S2DM) that builds on the principles of COVESA's VSS — simplicity, accessibility, and community ownership — while improving flexibility, governance, interoperability, and using open web-friendly standards and technologies needed for the next 10 years.

	VSS	VDM
Modeling Approach	VSS Rule Set (VSPEC = YAML + COVESA Extensions) and Tools (vss-tools) – for authoring, validating, and exporting models	Simple Semantic Data Modeling (S2DM) using widely adopted established language (GraphQL Schema Definition Language (SDL) and Simple Knowledge Organization System (SKOS))
Catalog (controlled vocabulary)	Specification of the VSS Tree authored using the VSS Rule Set	Specification of the VSS Tree authored using S2DM

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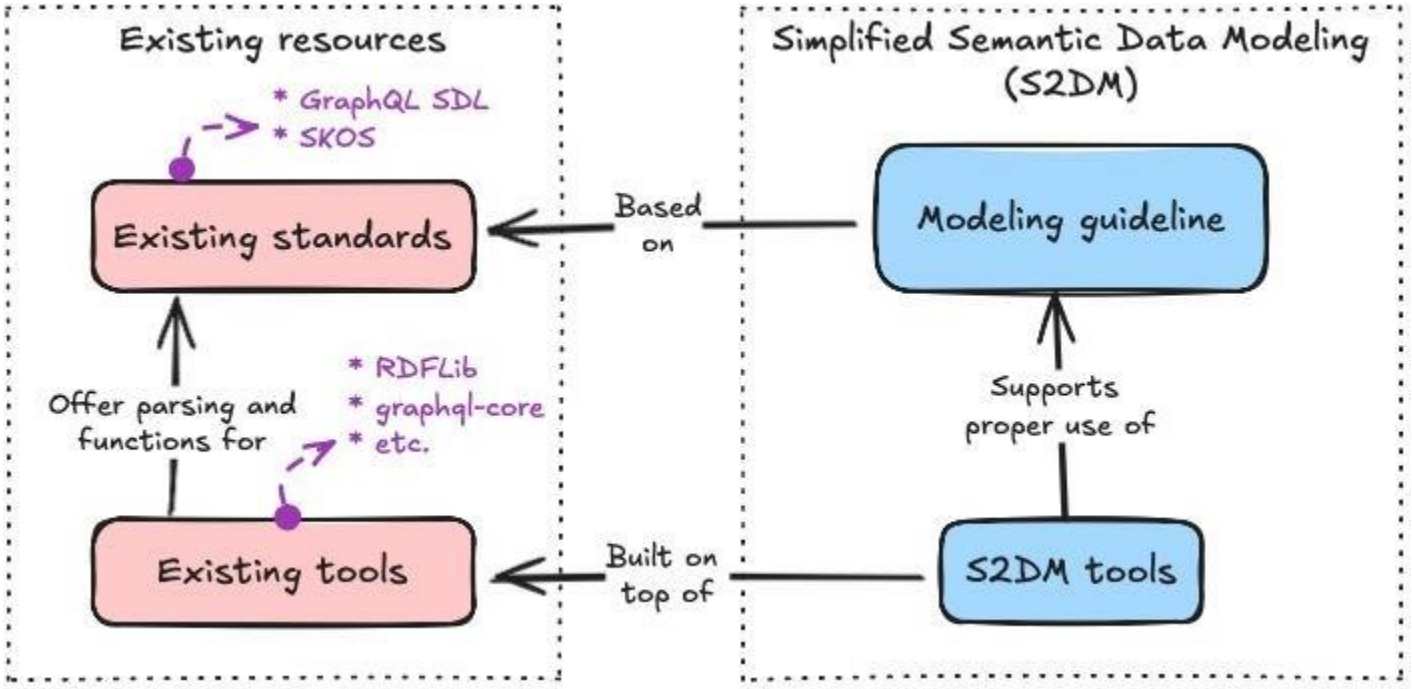
What is S2DM?



An ***approach for modeling data*** across multiple domains based on existing standards.

Designed to…

- …be simple and accessible for Subject Matter Experts (SMEs)
- …incorporate (some) good data modeling practices

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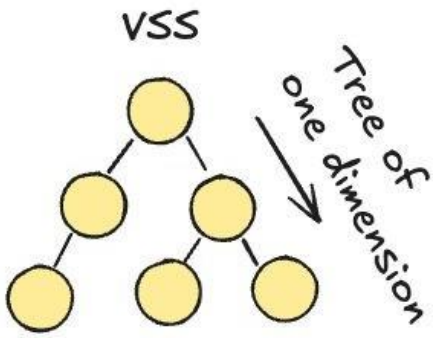
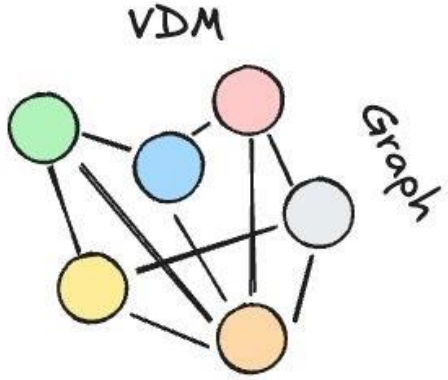
How does VDM differ from VSS? (1/2)

	VSS	VDM
STRUCTURE		
MODELING PERSPECTIVE	The "Vehicle" view	From anywhere
CORE MODELING LANGUAGE	Vspec * YAML-based + Custom constructs	GraphQL SDL * Schema Definition Language
SCOPE	In-vehicle data	Vehicle-related data (any sub-domain)

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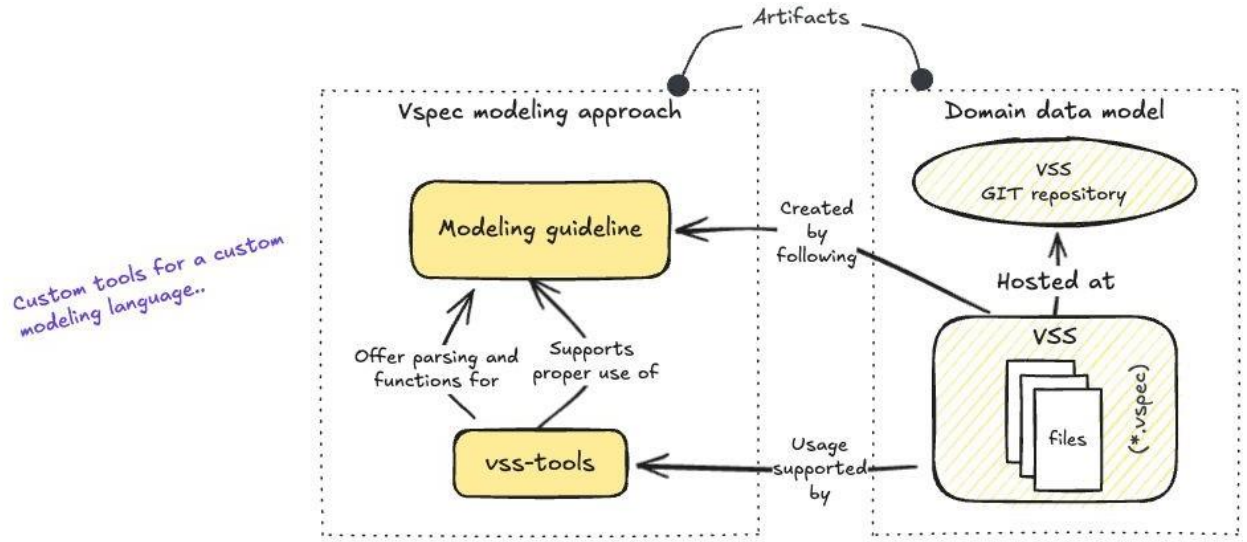
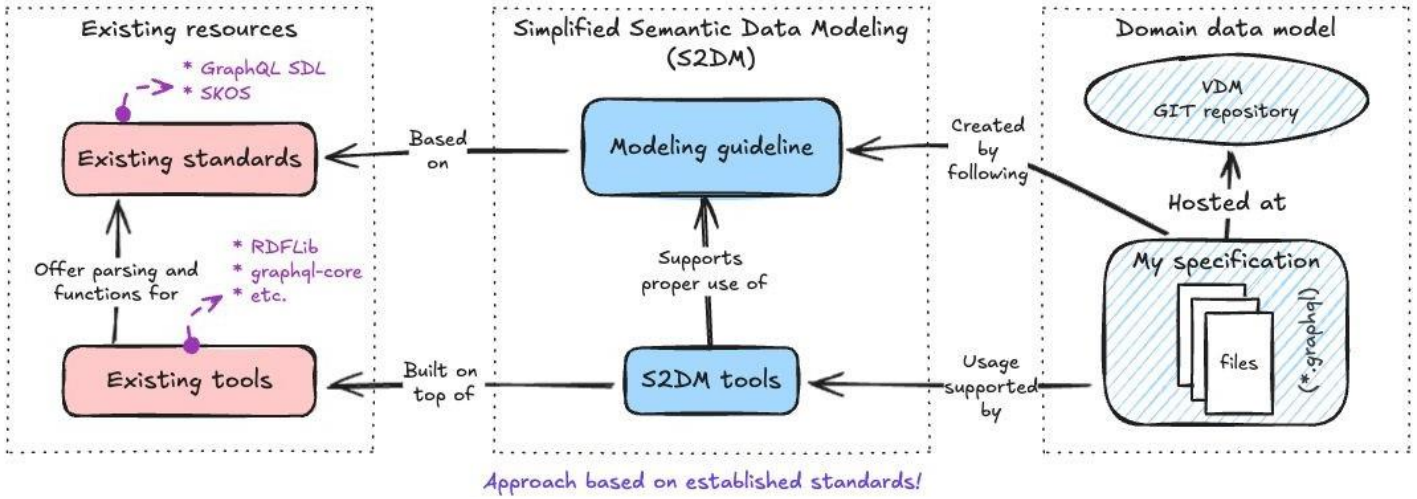
How does VDM differ from VSS? (2/2)

VSS



VDM



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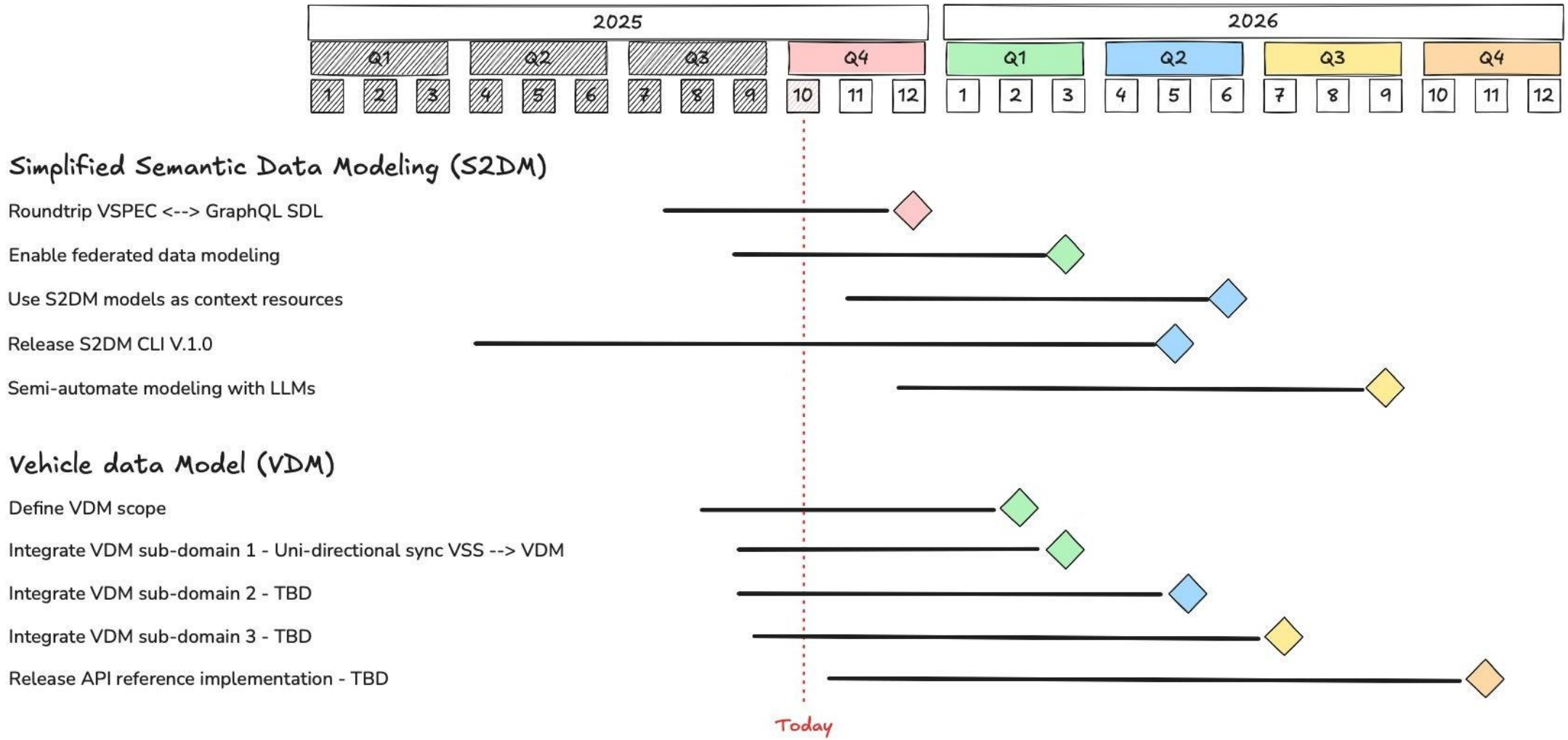
Roadmap



(as of October 2025)

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Resources

- Repositories
  - Simplified Semantic Data Modeling (S2DM) approach
  - Vehicle Data Model (VDM)
  - Project's wiki
- Modeling example
  - Modeling a charging session in VDM with (S2DM) approach
- GraphQL
  - Schema Definition Language (SDL) specification
  - SDL basics
  - Code using GraphQL (API-focused)
  - Other various tools
- RDF
  - Standard Resource Description Framework
  - Example tools (non-comprehensive)

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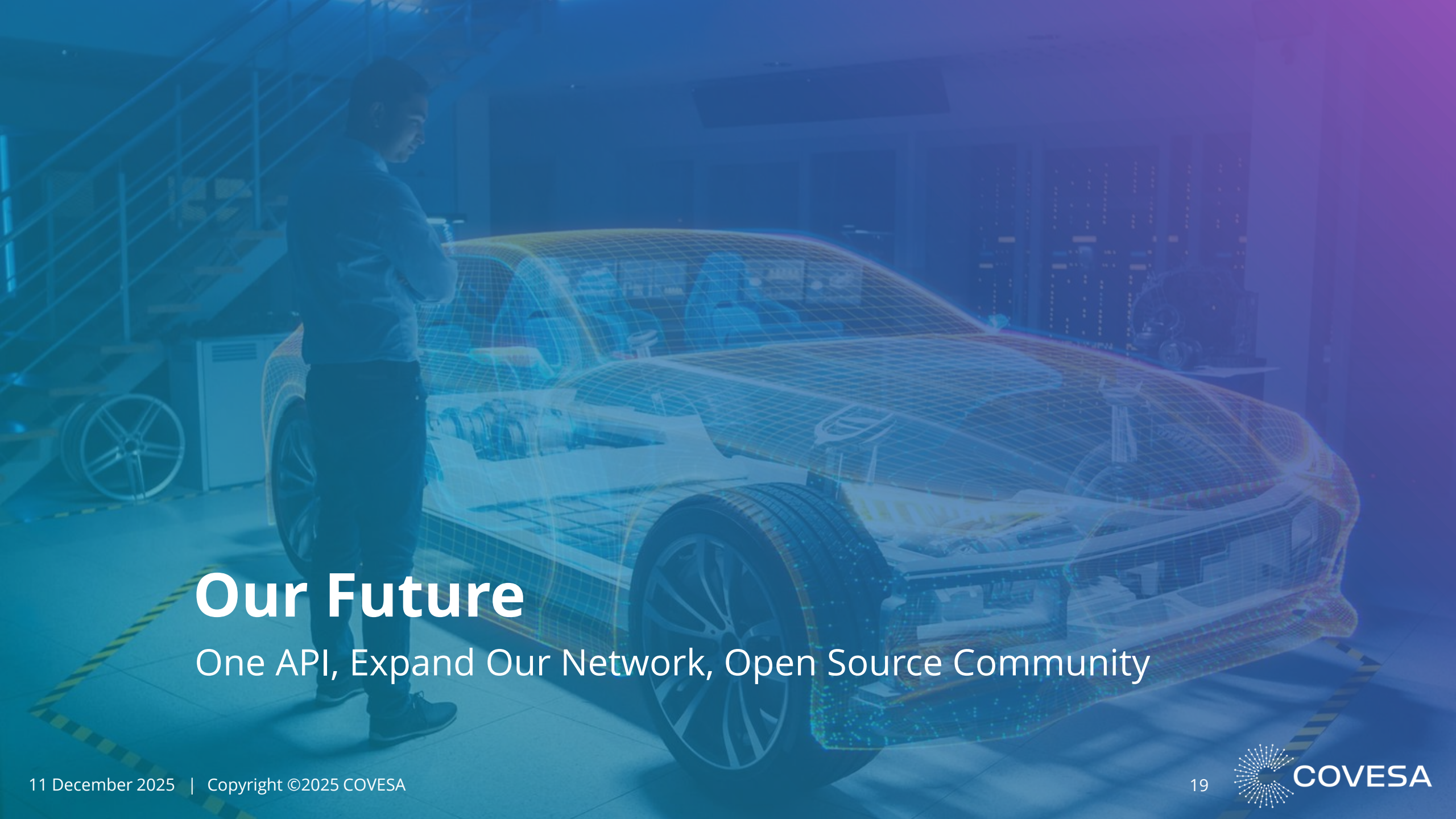

Our Future

One API, Expand Our Network, Open Source Community

Open Vehicle APIs are the glue of the future SDV

- Automotive industry strives for ease of development to enable fast time-to-market for new, customer-centric features for the SDV
- Open Vehicle APIs are a fundamental architectural element to avoid coordination overhead and enable economies of scale
- With a common approach of in-vehicle and offboard standardization we are able to more freely shift functions, e.g., for the purpose of centralization
- Open Vehicle APIs bring new cloud-enabled features to life, and overcome technical and operational barriers for an improved freedom of design

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COVESA is *the* nucleus for API development

COVESA is further expanding its **partner network** to address regional and domain specific needs and necessary technologies.

We need **YOU** to identify the right partners, connect, and establish joint setups of mutual interest. Be a COVESA advocate!

No partnership without purpose…

Discuss with your needs and ideas!

1. Strategies for Delivering an Up-to-Date, In-Vehicle Digital Experience
2. Embracing the Digital Life of Vehicle Occupants
3. Integrating Connected Vehicles for Enhanced Mobility
4. Enabling/Enriching Vehicle Data through Artificial Intelligence
5. Industry Approaches for Data Privacy
6. Simplifying Fleet Management

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Information

COVESA's latest MoU: Collaboration with ACEA to support truck and bus OEMs.

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Auto makers and COVESA sign memorandum of understanding to advance interoperability in commercial vehicles

European Auto Makers and COVESA ...derstanding to Advance Interoperability in...

Collaboration aims to develop standardized onboard APIs ...pplications, leveraging COVESA's Vehicle Signal Spec...

SAN RAMON, Calif. AND BRUSSELS – July 29, 2025 – The (COVESA) and the (ACEA), today announced the signing of a Memorandum of Understanding (MoU) aimed at achieving industry-wide interoperability for connected commercial vehicles.

The MoU establishes a cooperative framework between COVESA and ACEA to ensure interoperability across truck and bus OEMs through the joint development of a standardized onboard API, specifically designed to support fleet management applications. This collaboration will build upon and extend (VSS) by jointly defining an expanded data catalogue tailored to the needs of commercial vehicle manufacturers and fleet managers.

The onboard API is based on transport protocols already supported by COVESA's (VISS), which provides access to COVESA VSS data. By enabling consistent data exchange across different vehicle platforms, this initiative aims to enhance integration, efficiency, and scalability for commercial vehicle solutions across the industry.

Welcome ACEA, we are proud to be working with you!

COVESA, as an Open Source Community

VSS

VISS

VDM

Common API

vSomeIP

Open1722

IFEX

AOSP

DLT

and more…

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Thank You!

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