# GENIVI Cloud & Connected Services Project

**Gerald Spreitz** – Open Source Software Strategy Officer, Robert Bosch Car Multimedia GmbH

GENIVI Virtual Technical Summit | May 12, 2020

# GENIVI Alliance

*Why is GENIVI Alliance working on a reference architecture for vehicle-data?*

GENIVI has promoted Open shared software and standards and created business opportunitites in the automotive industry for over 10 years

- **2009-2015 –** Linux acceptance in automotive. Infotainment platform software and standards.
- **2016-2017 –** Cross-Domain Interaction, adapting to Multi-OS reality, safety demands
- **2018-...   –** Multi-OS, Connected Cockpit, Virtualization,

  = Integration technologies for diverse, distributed and cloud-connected EE architectures.
- **2020-…   –** Big-picture, end-to-end integration, adapt to latest industry trends

Example: The Cloud & Connected Services Project

# Cloud & Connected Services – Project Charter

- In just a few years, connected cars will become a predominant form of automotive transportation

- A number of actors now working at <u>breaking down the barriers for mobility services based on vehicle data to create new value</u>

- We are currently seeing a <u>fragmented ecosystem</u> where different actors are using different solutions to access the data of connected cars

- In GENIVI we believe there is a <u>need to join forces and harmonize activities</u> when designing and implementing the full data-oriented connected vehicle architecture in order to:

  - Enable easy interoperability of building blocks, flexibility and choice

  - Develop common solutions and software

  - Enable access to all data we want to exchange

  - Control access to data

  - Enable user privacy and data security

  - Clarify actors, roles and responsibilities

  - Facilitate business opportunities and contractual agreements

# Different types of vehicle data & services & data needs

- **Personalized vehicle data**

- **Pseudonymized vehicle data**

- **Anonymized vehicle data**

- **Personalized services**
  - Retrieval of the latest cached vehicle data from the OEM server
  - Retrieval of historical vehicle states, e.g. the data of the last 12 hours, etc.

- **Big Data services**
  - Retrieval of bulk historical data
  - Analytics and histograms

# Data Model

# Common Data Model

- Everyone we speak to say – **Yes, the industry needs this!**

- Potential for a shared data catalog, for a substantial subset of the vehicle data
- Shared formats, methods, and tools to manipulate the entire data set, including shared data catalog *and* future (some *proprietary*) additions
- Previous projects have come to similar conclusions – so far limited effect
- **Common data model** could enable all data-oriented use cases from **end-to-end**
- **End-to-end** could mean from *vehicle sensor* to *third-party consumer in the cloud*
- Some legacy parts will however not change – requires some translation code.

- Promote the common data model = minimize instances of data translation!

# Common Data Model – prior analysis

**GENIVI Cloud & Connected** services has produced a **Gap-analysis document**

Includes previous major initiatives, some active, and some stopped

- **CVIM** (Automat project, completed)
- **SENSORiS**
- **ISO 20078 Extended Vehicle**
- **Android Automotive** vehicle properties
- <u>**Vehicle Signal Specification**</u> **(VSS)**

Based on the conclusion, a potential plan forward to use VSS happens in several projects:

- → **GENIVI Android Automotive SIG**
- → **GENIVI Cloud & Connected services**, reference architecture
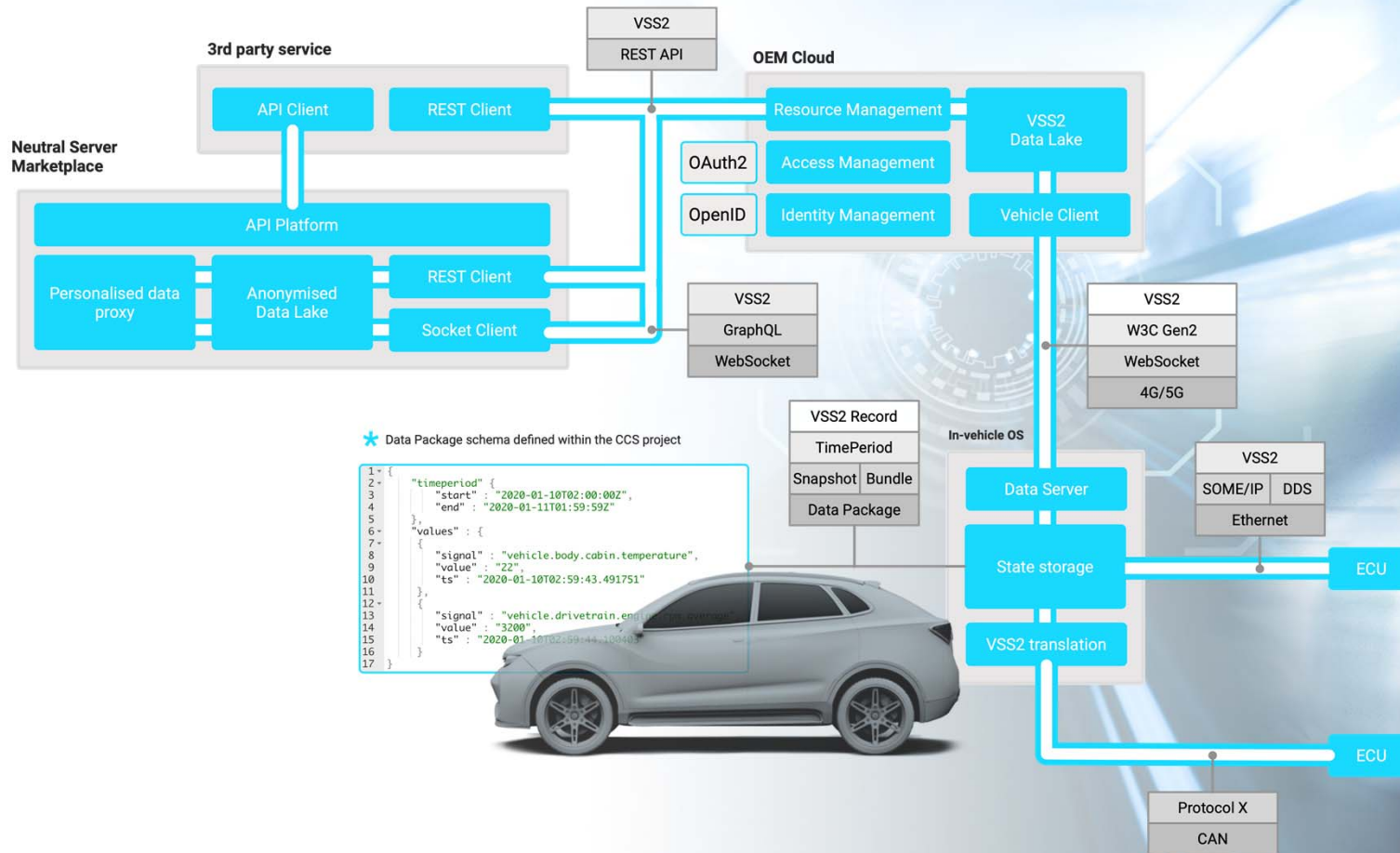- → Continued **collaboration with W3C Automotive & Transportation group**

# Communication
# Framework & Architecture

# Communication Framework & Architecture – Big Picture

# Zoom on Neutral Servers & Data Marketplaces

- ISO 20078 Extended Vehicle principles taken into account

- VSS2 data delivery from the OEM Cloud to:
  - Neutral Servers
  - Data Marketplaces

- Car owner authentication with OpenID

- Car owner consent with OAuth2

- Both poll/push and filtered data request via common web technologies:
  - REST API
  - GraphQL
  - Socket feed
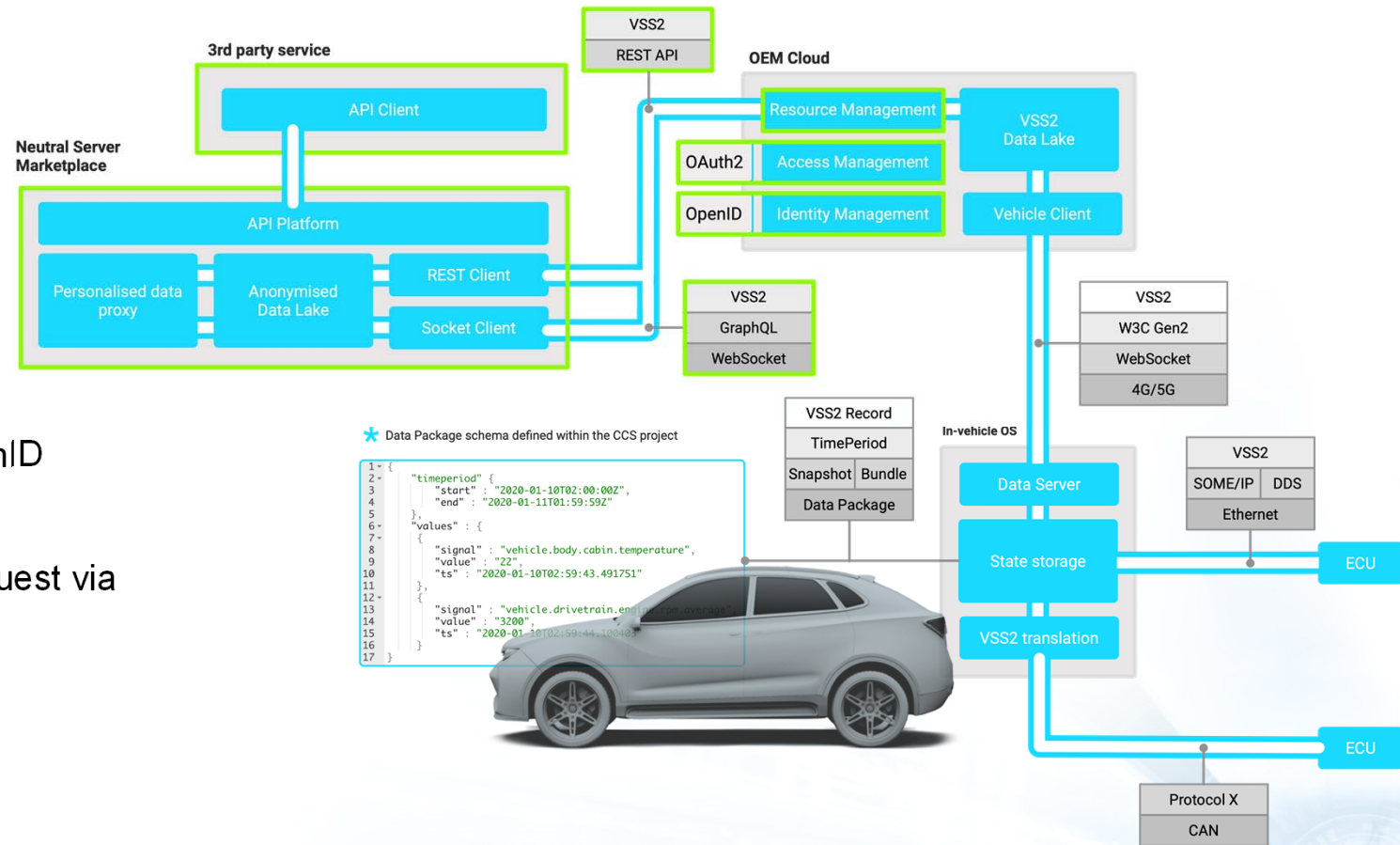
# Zoom on 3rd party data access

- Direct data access by 3rd parties in certain scenarios:
  - Framework flexibility
  - Safety critical
  - Business critical
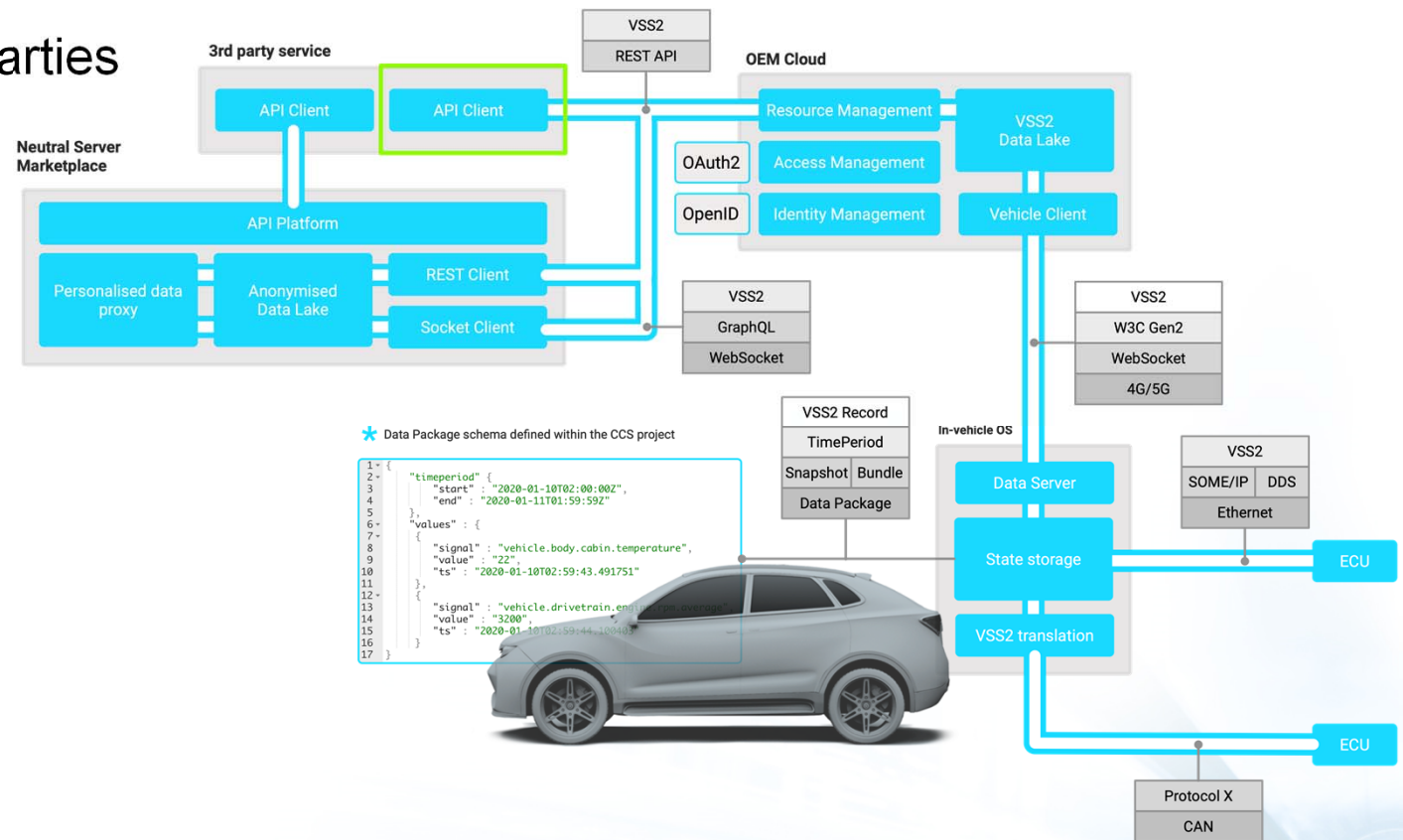
# Proof-of-Concept

# Proof-of-Concept objectives

- To get fast results in evaluating and confirming the communication framework

- To identify the technologies for each component, and which APIs that need to be standardized

- To introduce changes in the framework based on real life experience

- To gather experience that can be used to build a reference architecture as a future step

- Important: software-based architecture only

- Objective is to show Electric Vehicle (EV) charging data points
  - Updated set of data points submitted to VSS and W3C Automotive WG for incorporation into the data tree:
    (Pull request: https://github.com/GENIVI/vehicle_signal_specification/pull/154)

# Timeline

- Milestone 1 – **GENIVI Virtual Technical Meeting** (12-14 May)

- Milestone 2 - Internal milestone (early Q3 - July)

- Milestone 3 - Fall All Member Meeting, Leipzig, Germany (last week of October)

- Milestone 4 - CES 2021, Las Vegas, USA (early January 2021)


- GENIVI Virtual Technical Meeting – CCS Session : Thursday 14 May – 15:00-18:00 CET

- Agenda:
  - CCS project overview & proof-of-concept demo
  - Topics for discussion
    - generation of vehicle data, technology options for bringing vehicle data into the system, interface between the datalake and the neutral server and the third parties app, privacy expectations, data exchange formats
  - CCS proof-of-concept versioning w.r.t. roadmap milestones
  - discussion on which APIs and components on the proposed architecture are candidates for standardization
  - discussion on the opportunity, and possible organization for defining a Common Vehicle Interface (if time allows)

# Cloud & Connected Services – Management Report

- Participants – very active participation
  - Geotab, High-Mobility, Bosch, LGE, Samsung, W3C

- Dissemination
  - CCS presentation delivered to W3C ABG virtual meeting (23-26 March)
    - Feedback from OEMs: "CCS work is right in the middle of what the industry needs !!"
  - Automotive World Webinar on CCS delivered on 4 May – very good attendance & questions
  - CCS update planned at the upcoming W3C Automotive Business Group virtual meeting (end of May)

- Vehicle Data Model - work in progress
  - Model augmentation
    - Geotab provided "EV Data Access" requirements
      - Electric Vehicle "minimum" Data will be added to VSS tree
    - Data exchange formats for measured values

- Communication Framework  - work in progress
  - Implementation in-progress,
  - Based on high-level architecture defined and proof-of-concept work breakdown structure
  - demo will be shown during the VTS CCS session

# Contributing

- **Weekly telcos**

  - Mondays - 11:30 CET (Asia friendly time) – Communication Framework

  - Mondays - 16:00 CET (US friendly time) - Vehicle Data, sprint & backlog review

  - Wednesdays - 17:00 CET (US friendly time) - Communication Framework

  - Mailing list: http://genivi.emwd.com/mailman/listinfo/ccs_lists.genivi.org

  - Cloud & Connected Services Project Wiki : https://at.projects.genivi.org/wiki/x/PIAVAg

  - Cloud & Connected Services Proof-of-Concept Work Breakdown: https://at.projects.genivi.org/wiki/x/84AkAw

# Thank you!

**Visit GENIVI:**

http://www.genivi.org

http://projects.genivi.org

**Contact us:**

help@genivi.org

**GENIVI®**