



Why automotive suppliers and data-focused companies need a
Common Vehicle Interface Initiative

Automotive World Webinar, November 19, 2020



***Automotive industry
Where are we at?***

*Is it time to discuss the implication of having a common language to describe **data** and **function** interaction between all automotive technology companies ?*

*Is it time to commit to selected technologies, such as **open W3C protocols**, to build interoperable solutions for vehicle data and service invocation ?*

*Is it finally time to define the industry-wide
standard vehicle data model*

...and then do the same for **services / APIs** ?

After recognizing industry trends across many conferences, and after two OEM Roundtable discussions, W3C project activities, and great response at the GENIVI virtual conference, the prevailing answer to these questions is "YES".

Automotive OEMS support Common Vehicle Interface Initiative (CVII)



(Quotes from CVII OEM Panel discussion at GENIVI Virtual Member Meeting 2020 -- links are on last slide)

“There is [currently] no sensible way of sharing data between vehicles. Even between different car models within a brand.”

“There are large opportunities to extend existing APIs and associated data”
(referring to Smart Cities, Mobility and others)

“This all boils down to an incredible immense waste of resources.”

“It’s obvious that to succeed in this arena you need to collaborate. That is what GENIVI and W3C is all about.”

“Is there a World-Wide-Web like impact awaiting? I think that is completely certain. I see no way there could not be that kind of impact awaiting”

**OEMs see the potential benefit...
but what about the rest of the industry?**



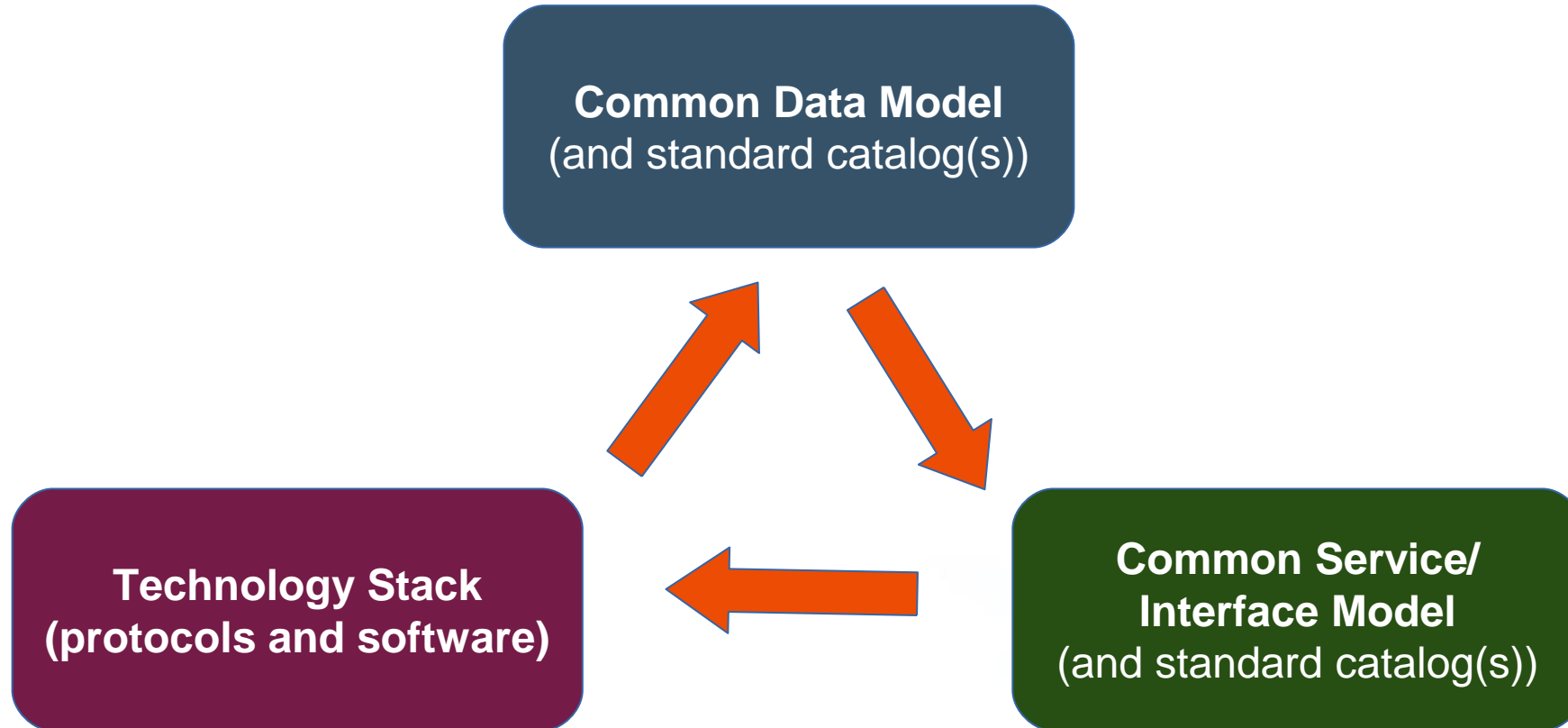
**Today's main focus:
Impact of CVII on the technology supplier ecosystem.**

- **How does a common model for data and interfaces help?**
- **What are the already started activities where technology suppliers can join today?**
- **Geotab, industry-leader in vehicle data explains how a common data/services model will benefit their business**

What is the Common Vehicle Interface Initiative?



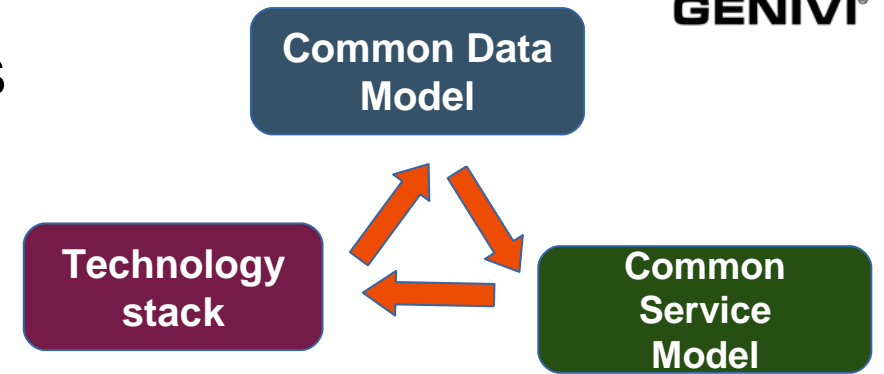
Deliverables:



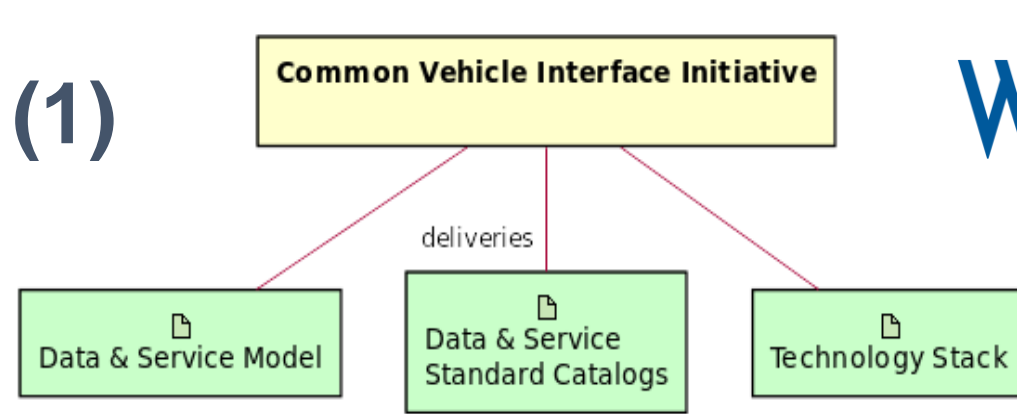
What is the Common Vehicle Interface Initiative?



- An *invitation* to the automotive industry to discuss fundamental standards-related issues that will accelerate development and business value
- A *continuation* of the existing movement towards “**A common data model**”, where **Vehicle Signal Specification (VSS)** is a driving example
- An *extension* to define a standard model also for services & interfaces
- A *collaboration* to define associated protocols (e.g. **W3C VISS v2.0**) and interfacing technologies to *make use of* the data/service model in real systems
- A *discussion* on *where* **standard interfaces** are most useful for *vehicle and cloud*
- A *movement* towards unification of **fragmented ecosystems** that inadequately address only *part of* the vehicle-data and services problem, and not in concert.



Initial definition of terms (1)



- **Model rules** = Agree on rules and format of a data or service definition. The model behind data defines the syntax/format of expressions and their meaning (expected behavior).
- **Catalog** = An actual instance – a collection of definitions. It names and specifies the data items and Service APIs. The definition must follow the rules of the Model rules.
- **Standard Catalog** = A specific common and industry-shared catalog of items expected to be provided by all implementations

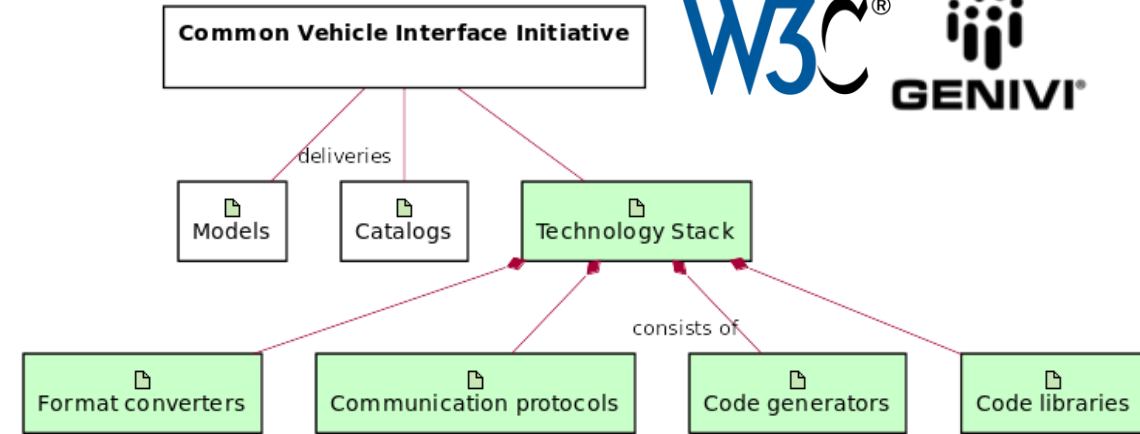
Initial definition of terms (2)



By “Technology Stack”, we mean:

Any technology items involved in processing the agreed common data and interface models.

- This contains primarily software definitions. Hardware is not explicitly excluded, but likely not the primary focus.
- It includes: **translators, bindings, tools, protocols, components, code-libraries** etc.



By defining the CVII Technology Stack we mean:

To agree on chosen technologies, and/or to develop those technologies.

The deliverables that define the Technology Stack are either **specifications** or **implementations**

Challenges



Let's discuss some of the challenges that companies have

- A. The **definition and acquisition** of technology parts is inherently challenging. **How will common models help** if system complexity is the problem?

- B. While standard data model in the **cloud makes sense** – **in-vehicle standardization** of data and interfaces is **too difficult to succeed**

- C. Our main challenge is **not the definition of shared models** or interfaces, but **writing the software code** of a complete **stable, secure** and **cost-effective** platform.

How do common data/service models really help?



Example of OEM challenge:

- A) The definition and acquisition of technology parts is **inherently challenging**.
How will common models help, if system complexity is the problem?

Behavior of any subsystem can be almost exclusively defined by:

- 1) Data that is exchanged (consumed and provided)
- 2) Functions that are invoked by a subsystem, and provided by the subsystem.

A view of the common model for data and services as a common language

The common language helps buyers and suppliers of technology:

- Familiar definition language = understanding each other
- Help suppliers evaluate the true development costs
- Help suppliers provide more accurate quotations and delivery plans

How do common data/service models really help?



Example of OEM challenge:

- B)** A standard model in the **cloud makes sense** but **in-vehicle standardization** of data and interfaces is **too difficult to succeed**.

Remember the separate but synergistic effects of the common model (rules) vs. the standard catalog!

A single defined way of modelling data & functions enables by itself:

- A common-language can be applicable also to proprietary “catalogs” and custom situations
- The communication advantage of the common language can remain between stakeholders
- The ability to develop technology stack collaboratively and apply it still remains

Shared catalog(s) are not an all-or-nothing proposition:

- You may still gain advantage in *some parts* of the system
- You may implement “translations” in the boundaries to legacy subsystems, and over time move towards standards everywhere.

How do common data/service models really help?



Example of OEM challenge:

- C) Our main challenge is **not the definition of shared models** and interfaces but **writing the software code** of a complete **stable, secure** and **cost-effective** platform.

The scope of automotive development (and consequently the scope of CVII) is huge!

- *In vehicle*: Deeply embedded sensor systems
- *In vehicle*: Function-specific ECUs (Engine control, Instrument cluster, ...)
- *In vehicle*: Large central “core-compute” ECUs
- *Boundary*: Interfaces to shared infrastructure, V2X, and from car to OEM cloud
- *Cloud*: Infrastructure to collect and distribute data and services to the right partners, with control and security.

Developing the entire software stack is a major industry challenge!

- Almost no single player can realistically do it on their own
- Collaborative development is definitely needed, but can be difficult on larger projects
- The industry is forced to look to a single “big player” that can provide a significant chunk of technology (Android Automotive).
 - Loss of control and autonomy?
- Even a large code base like Android still covers only part of the scope described above

How do common data/service models really help?



C) Our main challenge is **not the definition of shared models** or interfaces but **building the software code** of a complete **stable, secure and cost-effective** platform.

...continued...

The conclusion is inevitable:

- The entire software system *will* continue to be made up of **diversely sourced parts** for a foreseeable future.
- Flexibility and choice is promoted by balancing (open) standards that are applied “everywhere”, with the ability to still choose and develop some technologies therein.
- Well chosen standards in reality create a level playing field in which choice and flexibility can thrive, without the chaos of extreme fragmentation.
- Standard models for data and interfaces still support **innovation** on the **features** that are carried by those generic standards.
- The common models and catalogs for data and interfaces are key to make diversely sourced part fit together, and to have an efficient definition and procurement of those parts (“common language”)

Subprojects and deliverables



Solutions that may form the basis for the common models have been under development for a while.

All of them are open proposals to CVII, available for additional input from the industry.

VSS (Vehicle Signal Specification)

- common **data modelling format**, and **standard catalog** of data

Model / Std.
Catalog (Data)

VSC (Vehicle Service Catalog)

- common **modelling format**, and **standard catalog** for services/APIs - mirroring the approach of VSS

Model / Std.
Catalog
(Services)

VISS (Vehicle Information Service Specification)

- **Standard web protocol** for **VSS data** access

Technology
stack

“RPC” (working name)

- Upcoming W3C Automotive **standard web protocol** for **remote service invocation**

Technology
stack

VSSo (VSS Ontology)

- **extended VSS model** with ontology features

Model / Std.
Catalog (Data)

From fragmentation to alignment...



AUTOSAR, SENSORiS, VDA, JasPar, eSync Alliance, OmniAir, ISO TC 204 Intelligent Transport Systems, ISO TC 22 / SC 31 Data Communication (Extended Vehicle), Smart Cities, Digital Twin, Edge and IoT initiatives. (...and others)

CVII is the initiative to bring all relevant and potentially overlapping activities together in search of the common goal:

A consistent modelling standard, a common exchange language, and agreed-upon specification of exchanged data and interfaces!

We need **YOU** to join to make the **necessary connections between organizations!**

What is W3C?



- World Wide Web Consortium
- Standards body for the Web
- Founded by inventor of Web - Tim Berners-Lee
- Hosts: MIT, Beihang, Keio, ERCIM
- ~450 members

Common Architecture with Partners



Why W3C is doing Auto Standards

- Need for a robust, *common* application ecosystem
- Reduce fragmentation by competing proprietary approaches
- Future of transportation will require interoperability
- More developers for the Web than any other platform
- Web has proven itself and transformed industries
- Connected vehicles will be relying on Web services
- W3C has a long history of providing higher level interfaces to developers

In-Vehicle Application Best Practices



What next?

- Common APIs great start but alone not enough to address concerns
- Common sense and controlled inclusion
- Signal read/write access control, polling frequency
- Govern IVI/TCU computing resources, outside connectivity, bandwidth
- Third party signal handling
- Call for Participation
- Ensure use cases/needs met

VSSo



- Ontology - human (engineer) and machine readable
- Built on top of our current data model - GENIVI VSS
- Combining disparaging datasets readily - Knowledge Graph
- Artificial Intelligence / Machine Learning
- Bringing telematics data to the cloud
- Enables Big Data/Analytics
- W3C Web of Things (WoT)

IoT / W3C Web of Things (WoT)



- IoT Fragmented worse than Auto, W3C WoT provides bridge
- VSSo and W3C WoT allow for vehicle to be any arbitrary thing on IoT
- BMW has presented proof of concept demo
- Can provide mapping to OEMs existing service APIs

Common Automotive Platform Benefits



We learned a few things building the Web

- More willing partners
- Less engineering resources needed to integrate
- Wider cybersecurity peer review
- More vendors/providers able to create supportive products/services
- Avoid vendor lock-in
- Net lower cost
- Larger market with faster growth

Common Adoption Path



Where in the stack are we talking about?

- Re-architecting vehicles costly, production timeline
- Choose common data in the cloud first
- Consider pain points with suppliers
- Long term in-vehicle benefits and proven adoption at cloud level will show industry trend

Adoption Path Strategy



Develop standards, connect vehicles... profit

- Map your data to VSS in cloud for 'an easy win' - John Schmotzer, Ford
- Choose platform[s] based on your & customer needs
- Build products and services on top - real value
- In-vehicle abstraction layer (OEM, supplier, solution provider)
- Go further down the stack into control units, streamline industry and dramatically reduce cost

Telematics Data Marketplace



- Enable additional revenue streams: > \$140B by 2030
- Need common data format to have mass market appeal
- Clear demand for telematics data
- Interest in W3C Auto standards from prominent data consumers (government regulators, insurance commissioners, mixed fleet managers)
- Task force exploring data quality topics - add value to your data!

GEOTAB[®]

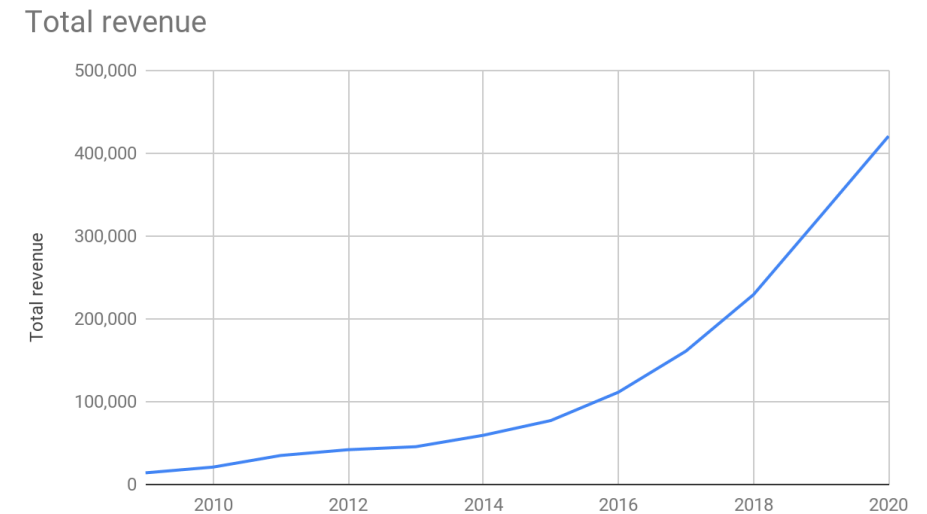
CVII - Positive Business Impacts

Abhinav Vasu - Europe lead Solutions Engineering



A world leader in Connected Vehicle

- Engineering company building analytics, fleet management & IoT solutions
- Started in North America in 2000 now has:
 - More than 400 partners and a flourishing ecosystem
 - Over 1200 Employees and offices in Oakville, Kitchener, Las Vegas, Mexico City, London, Madrid, Paris, Rome, Munich, Aachen, Shenzhen & Adelaide
 - Largest penetration in Fortune 500 companies
 - 2.1 million connected vehicles
- Financially Strong



Unique open platform

- Seamless access to your own data
- Build and automate with our powerful Software Development Kit and APIs. Integration matters
- Pushing OPEN standards for Connected Vehicle
 - Member of W3C with BMW, Volvo, Toyota & VW to standardise signal data
 - Member of GENIVI
 - ISO & IEEE Standards Committees
 - Customer wins through choice



Why Geotab. Product and Roadmap



Interoperability, 100's of vehicle manufacturers connected to provide Commercial Fleet Management (for past 20 years)



Sustainability, Electric vehicle unique proposition



Single User Interface, covers all connected vehicle and related IoT



Curve Logic, Alternative to time based sampling



Marketplace ecosystem



DNA, 40 billion data points per day

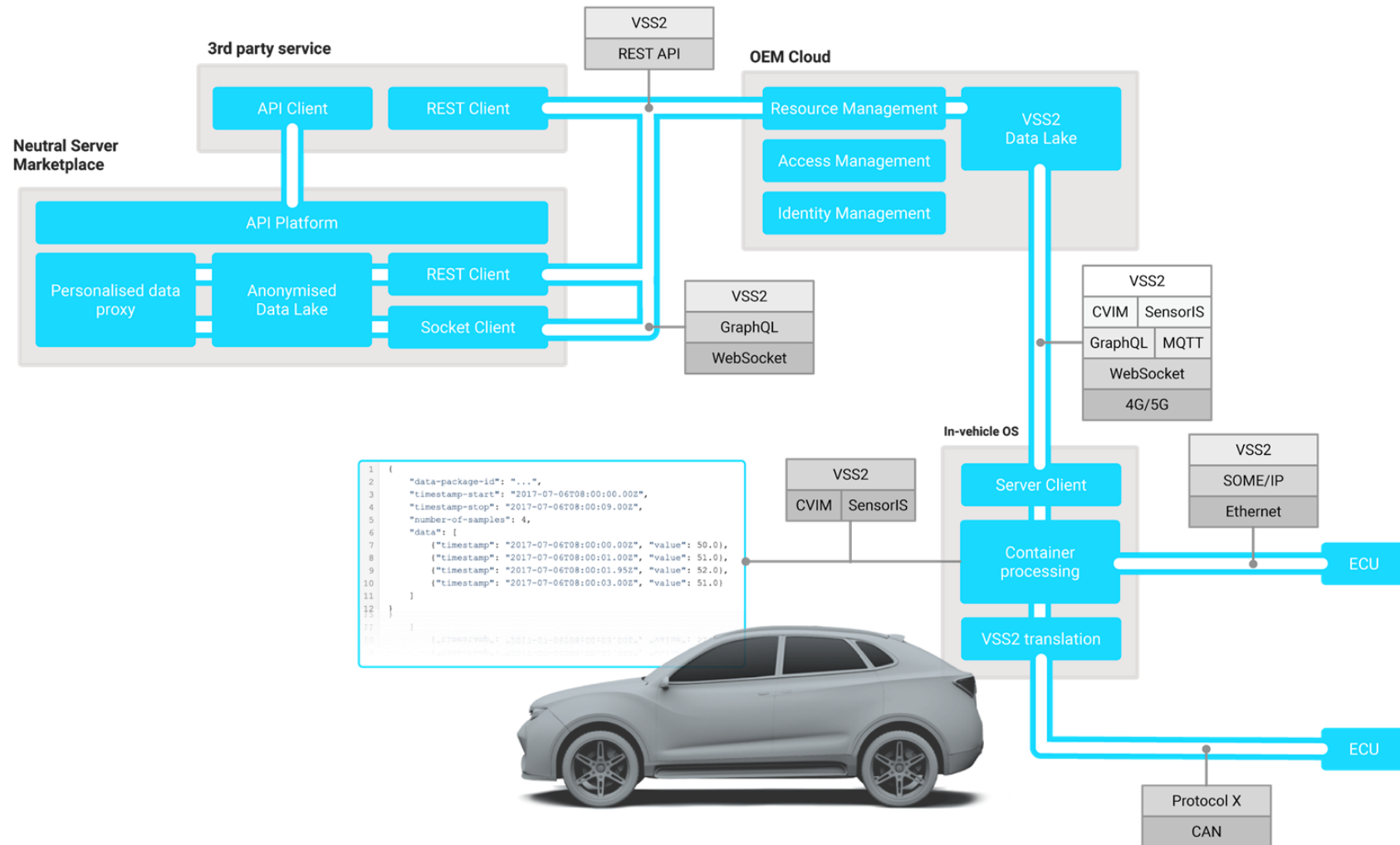


Security and privacy by design: Geotab Security Centre



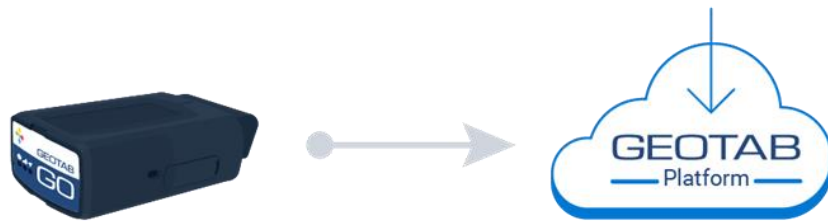
CVII, next interoperability advancement

GENIVI - communication architecture

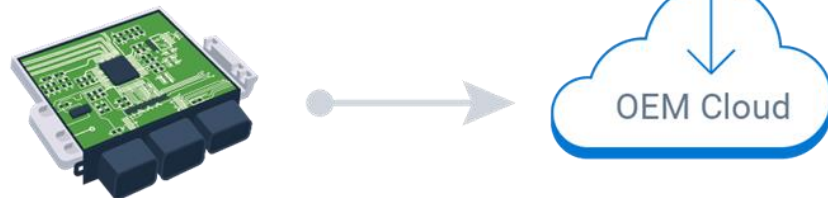


OEM Connected Architecture

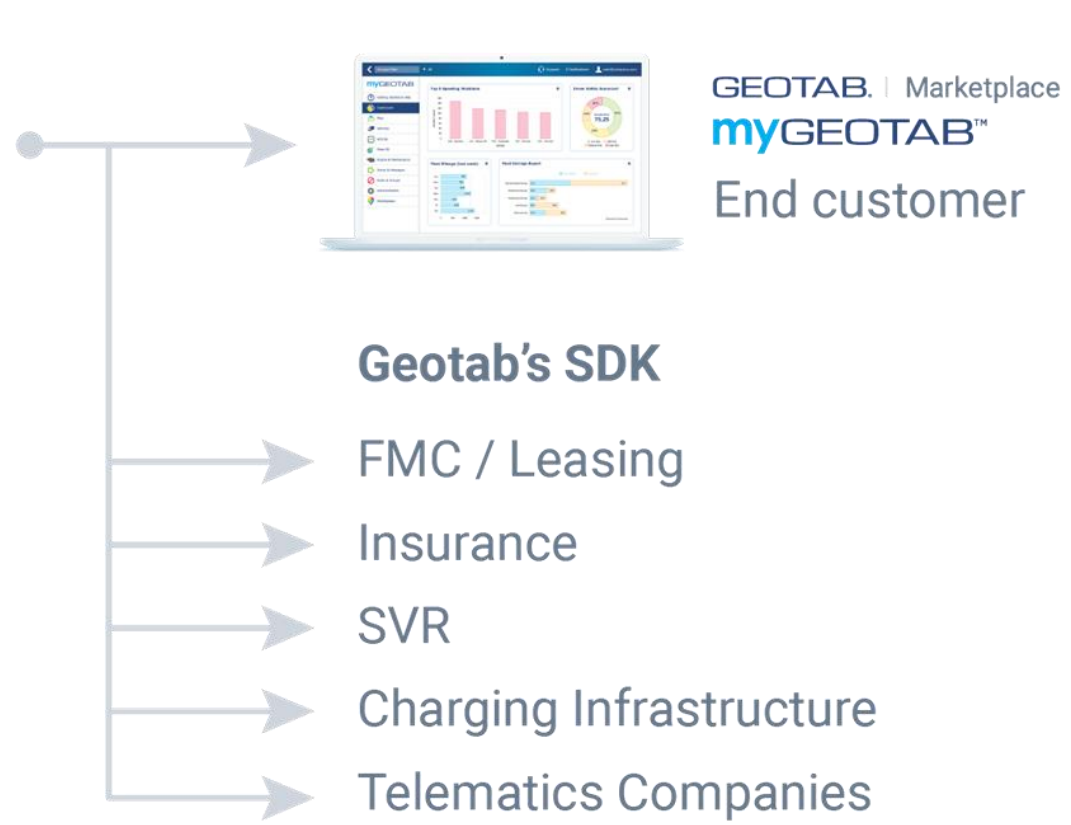
GO Device (No OEM TCU)



OEM TCU Data



Telematics
Control Unit

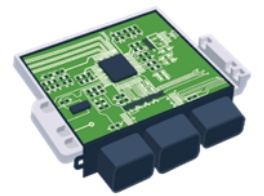


OEM utilising aftermarket

GO Device (No OEM TCU, multi make)



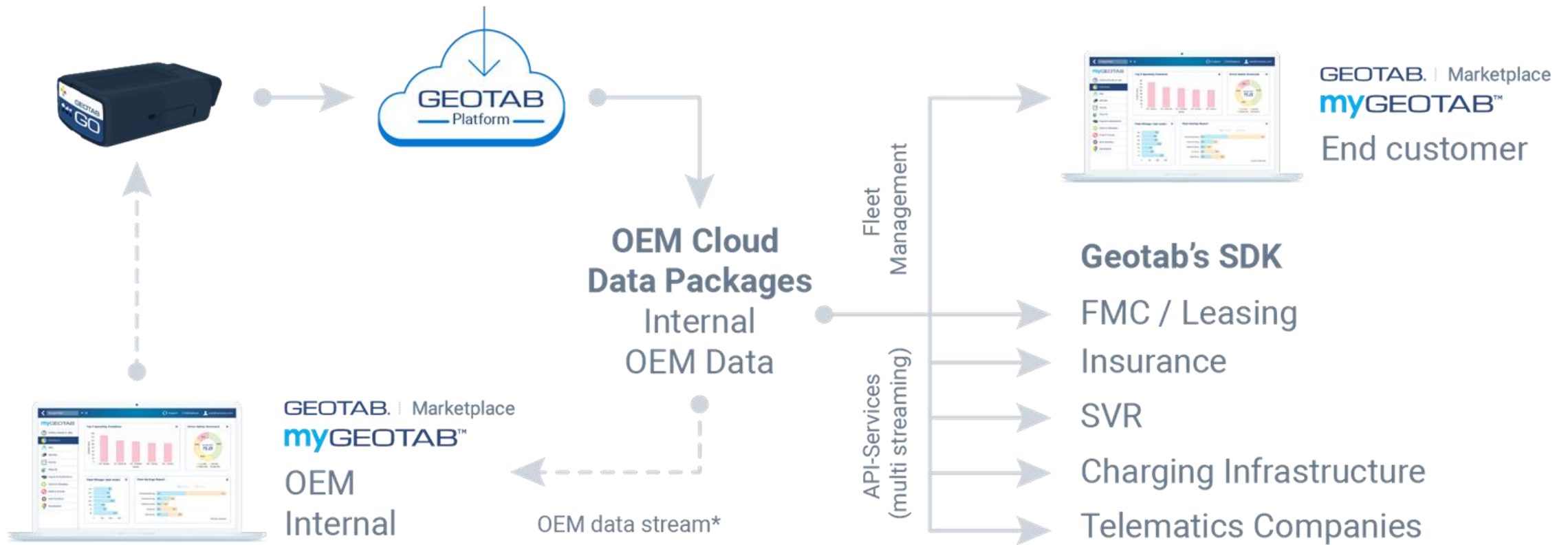
OEM TCU Data



Telematics Control Unit



CVaaS Architecture



*OEM data stream - Internal data stream to the OEM for R&D purposes using MyGeotab (white label option)

Q & A

Initiative organization – existing projects



- **Ongoing: New round of one-to-one preparation meetings with involved and new companies -- book yours!**
- **Next seminar / workshop in November / December time frame.**
- **These subprojects are already active, ready to join.
They can be (re)used as part of of future CVII project organization.**
- **If the Time Zone does not fit, the meeting time can be adjusted, or additional meeting added, or a rotating schedule set up.**
 - **W3C VISS v2 protocol (Data)** – contact: ted@w3.org, Tuesdays 2000 CET
 - **W3C “RPC” (services)** – contact: ted@w3.org, Biweekly Mondays 1900 CET / 1100 AM PST
 - **VSS data model & catalog project call**, Tuesdays 1930 CET
– contact daniel.dw.wilms@bmw.de and gandersson@genivi.org
 - **GENIVI Cloud & Connected Services (CCS) project**, Mondays 1600 and Wednesdays 1700 CET
– contact philippe.robin@technoveo.com and gandersson@genivi.org
- **New project-related meetings to be planned – e.g. CVII all-hands and specific development topics**

Do you want to create the common data & interface standard?

The road towards an automotive common model for data and services has been staked out. We *recommend* you delve into the following material for further details, and join the movement.

- Links to recordings of the OEM Panel discussion, CVII workshop and more can be fetched from this Wiki page:

<https://w3.org/auto/cvii>

(redirect to <https://at.projects.genivi.org/wiki/x/ZYHtAw>)

- Contact **W3C** and **GENIVI** for further information how to join the activities!
- Contact **Geotab** for more information on their industry-leading data platform
- Consider joining **GENIVI** and **W3C** membership to support this initiative and our outreach to fight fragmentation in the automotive industry.



Thank you!

Visit GENIVI:

<http://www.genivi.org>

<http://projects.genivi.org>

Visit W3C:

<https://w3.org/auto>

Visit Geotab:

<https://geotab.com>

Contact us:

CVII-related questions:

Gunnar Andersson and Ted Guild

GENIVI membership:

Steve Crumb

W3C membership and projects:

Ted Guild

Geotab speaker:

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