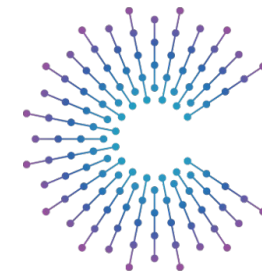
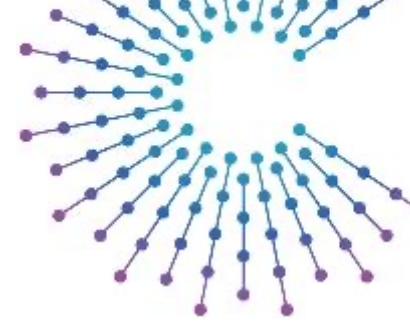




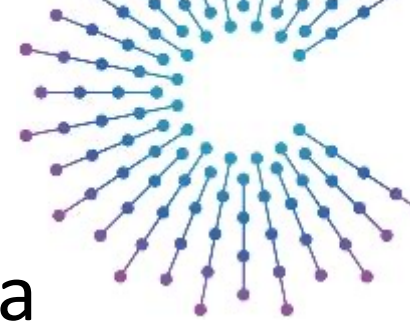
Data centric vehicle with zonal architecture and cloud integration.



COVESA

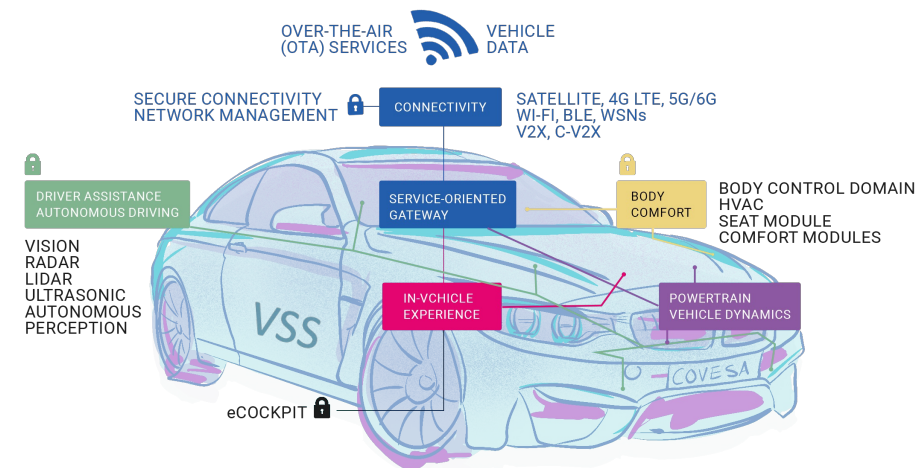
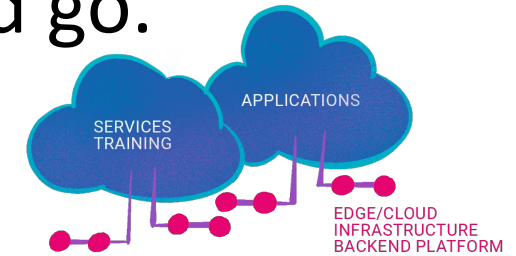


What is Data Centric, Data Centricity?

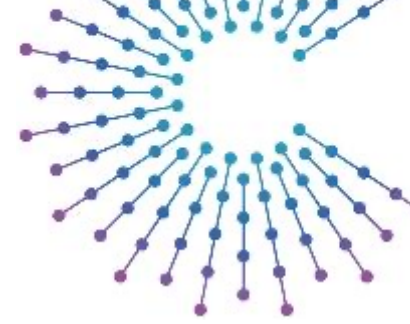


A good data-centric architecture is designed with data sharing in mind. The Data Model is permanent and enduring, and applications can come and go.

It is not something you can buy. It is something you must do!



¹SOURCE: The Data-Centric Revolution, Dave McComb



How to achieve goals?

Data centric architecture with a common rule set.

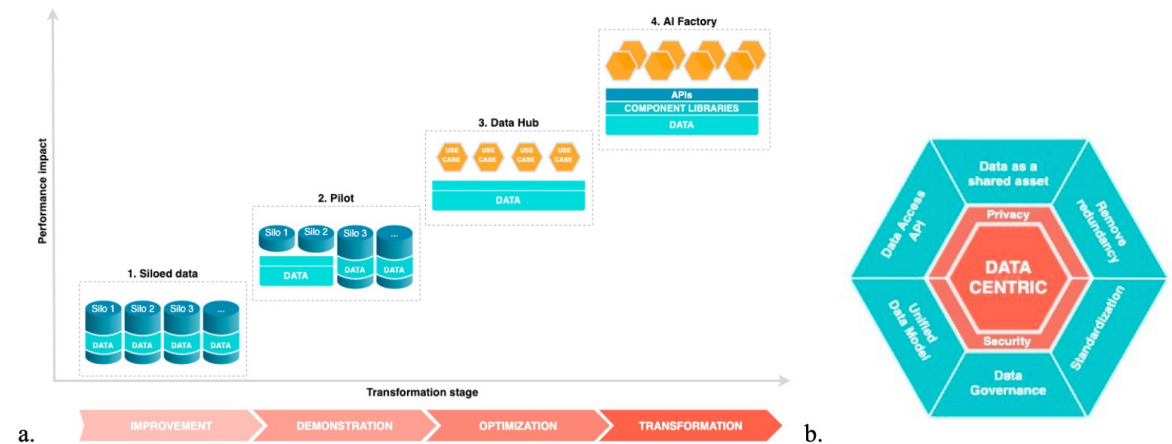
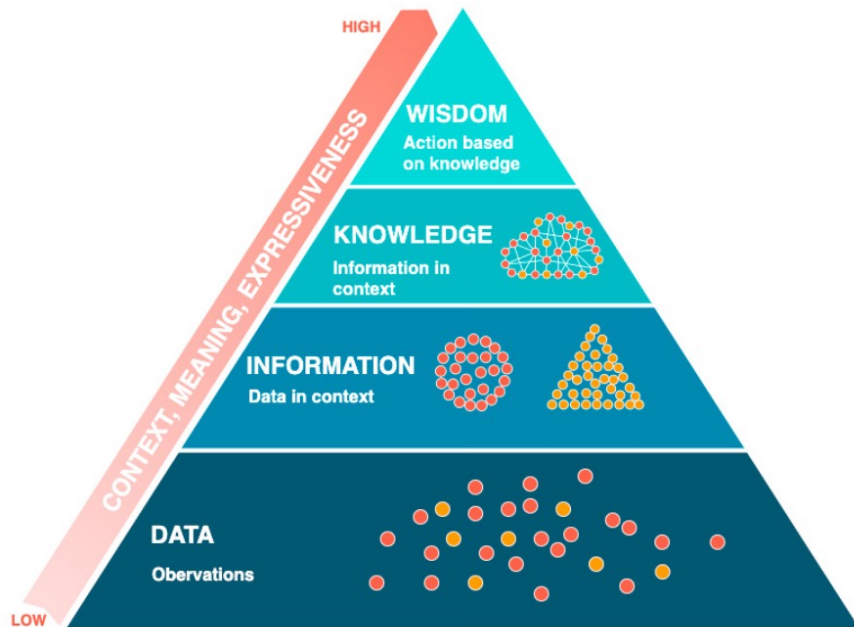
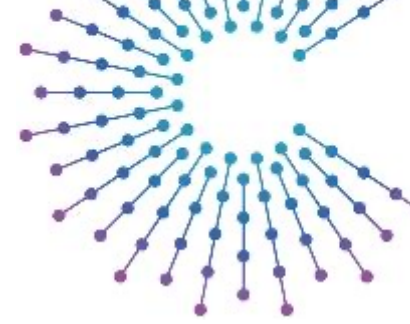


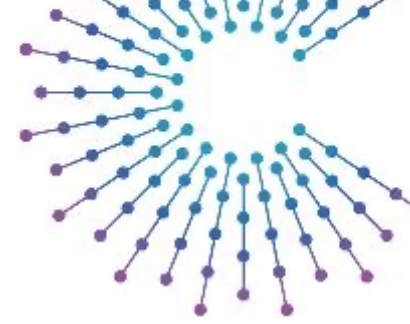
Fig. 1. (a) Stages of transformation to move from an architecture with siloed data towards a state-of-the-art architecture that supports AI and analytics [9]. (b) Some of the aspects involved in a data-centric architecture, where data is the center and most important piece [11].

IN A GOOD DATA CENTRIC ARCHITECTURE



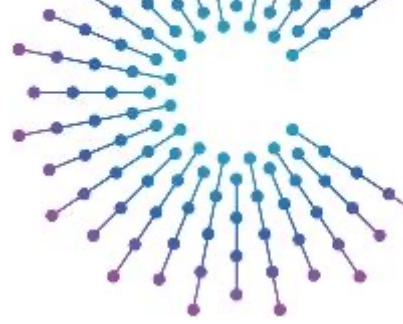
- 1 Data is a key asset of an organization.

IN A GOOD DATA CENTRIC ARCHITECTURE



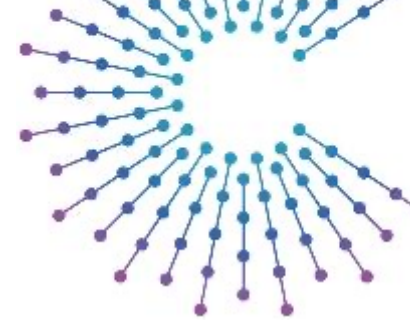
- 2 Data is self-describing and does not rely on an application for interpretation and meaning.

IN A GOOD DATA CENTRIC ARCHITECTURE



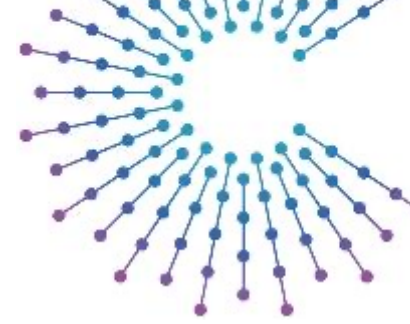
- 3 Access to and security of the data is a responsibility of the data layer, and not managed by applications.

IN A GOOD DATA CENTRIC ARCHITECTURE



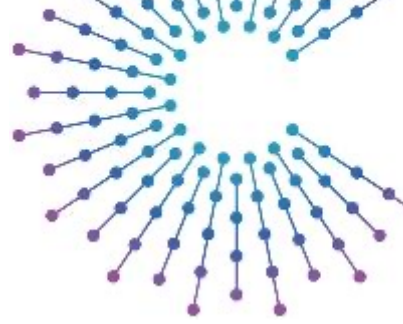
- 4 Applications are allowed to visit the data, perform their magic and express the results of their process back into the data layer for all to share.

IN A GOOD DATA CENTRIC ARCHITECTURE

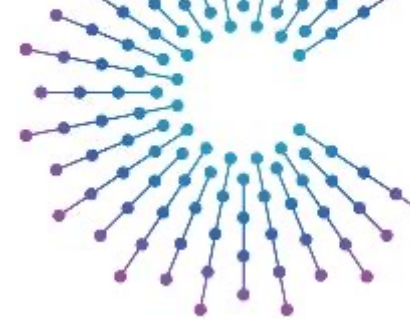


- 5 Data is expressed in open, non-proprietary formats.

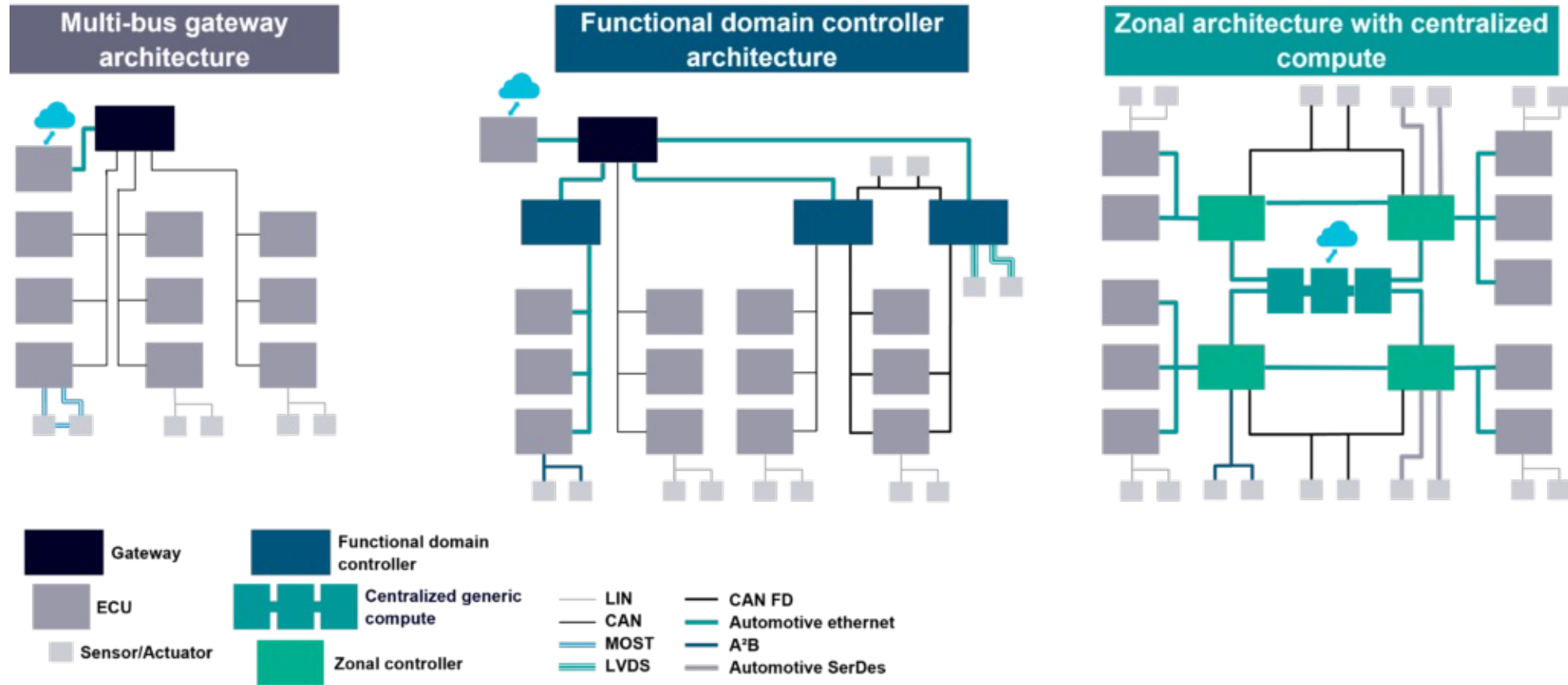
BUT that is not ALL!



HOW DO WE HANDLE ONBOARD
CHALLENGES OF E/E ARCHITECTURE?

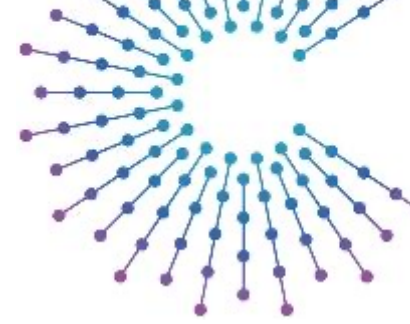


E/E Architecture evolution.

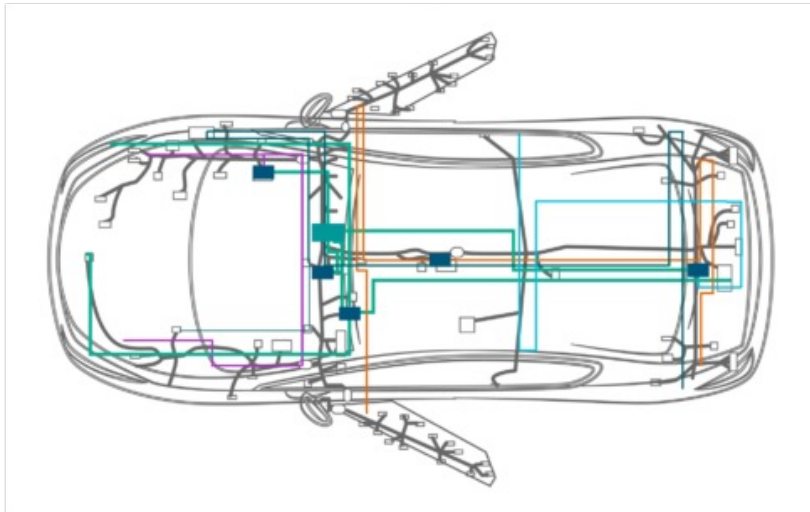


Source: <https://blogs.sw.siemens.com/ee-systems/2024/09/12/e-e-architecture-evolution-part-2-trends-to-watch/>

E/E Architecture layout

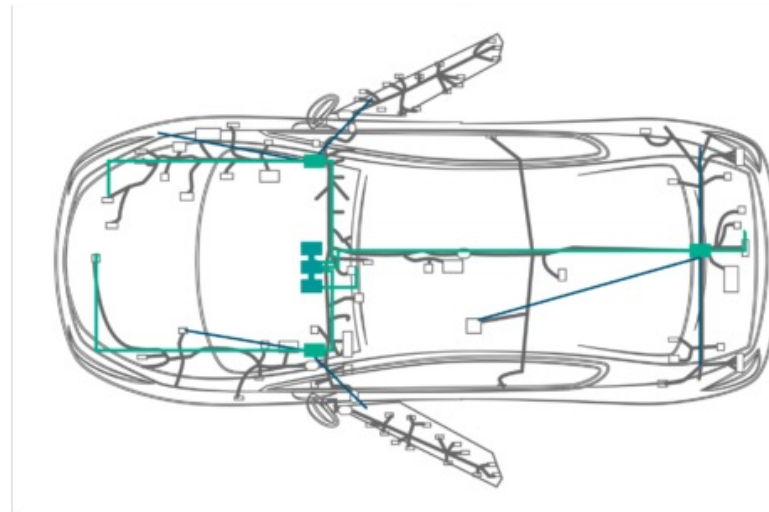


Functional domain controller architecture

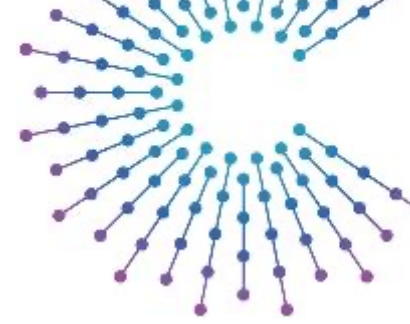


Functional orientation results in overlapping network routings round the vehicle

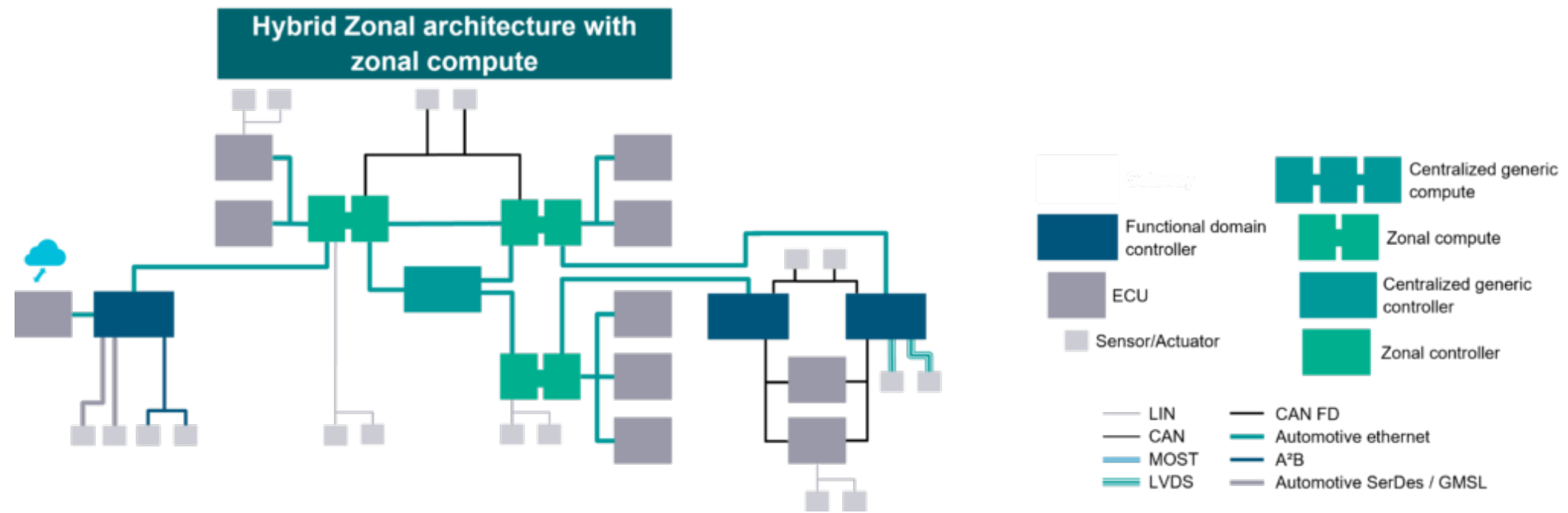
Zonal architecture with centralized compute



Zonal orientation with using virtual networks utilises fewer higher baud rate multi-purpose networks

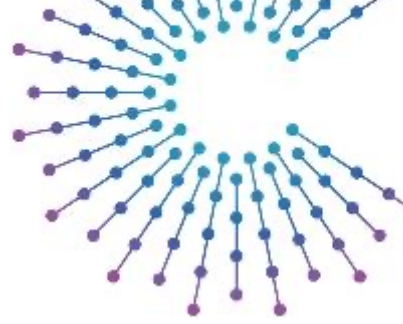


THERE could be as well hybrid E/E



Source: <https://blogs.sw.siemens.com/ee-systems/2024/09/12/e-e-architecture-evolution-part-2-trends-to-watch/>

Challenges?



- **Regardless of architecture style, we have the following open questions to consider:**

Data Handling:

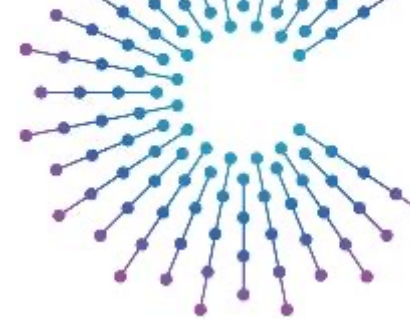
- **Onboard Processing:** How do we efficiently process and manage data within the vehicle?
- **Data Modeling:** What is the optimal data model for representing and analyzing vehicle data?
- **ECU Cycle Times:** How do we ensure data processing meets the timing requirements of various ECUs?
- **Safety Considerations:** What measures are necessary to protect sensitive vehicle data and prevent security breaches?

Data Exchange:

- **Cloud Integration:** How do we securely transmit data to and from the cloud for analysis and storage?
- **Smart Device Integration:** How can we integrate data from smart devices (e.g., smartphones, wearables) into the vehicle's systems?

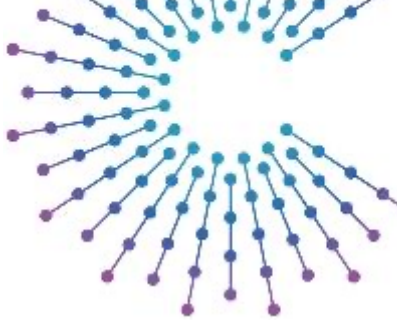
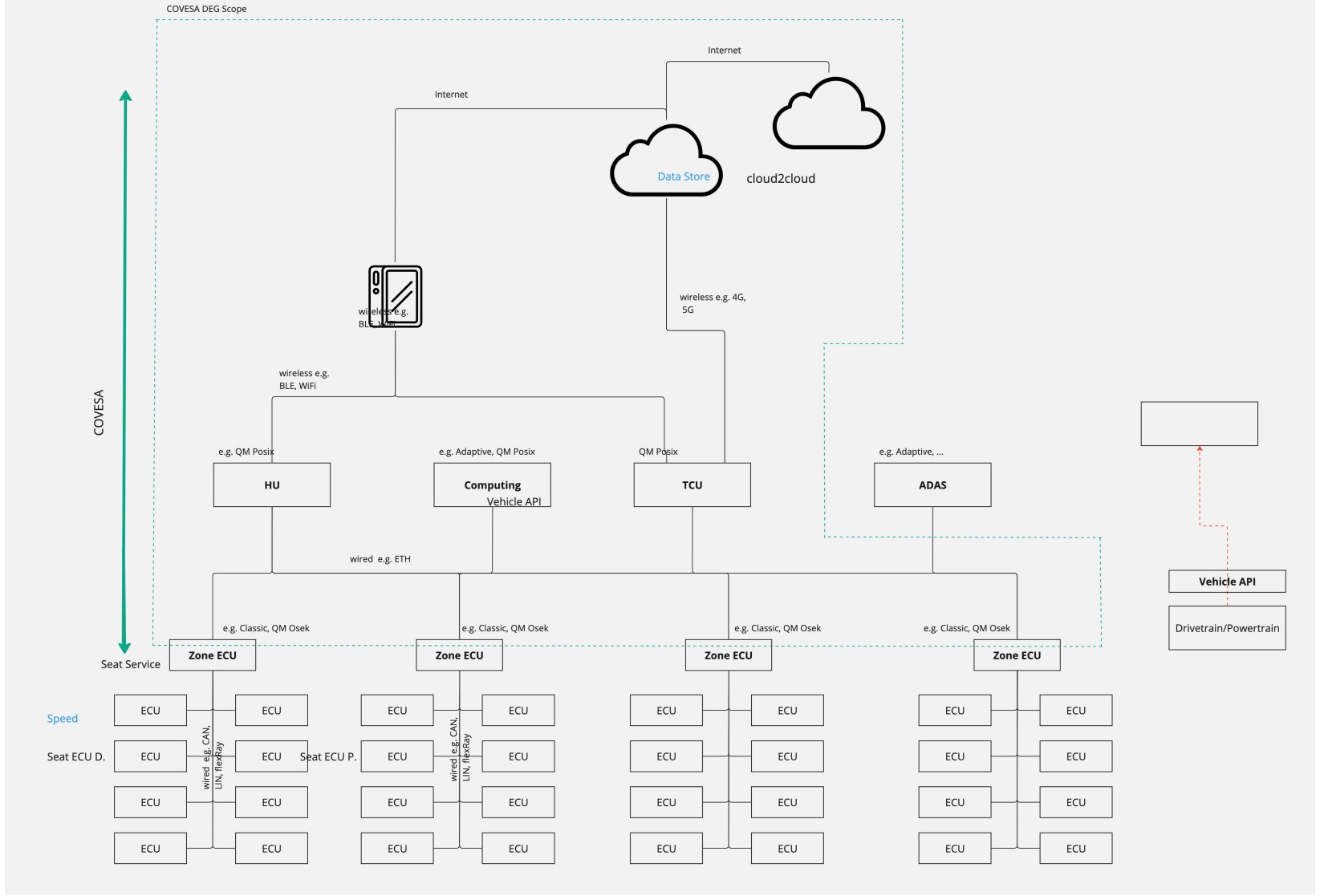
Data Linking:

- **Cross-Domain Data:** How do we effectively incorporate data from other domains (e.g., infrastructure, traffic management) for enhanced vehicle functionality?

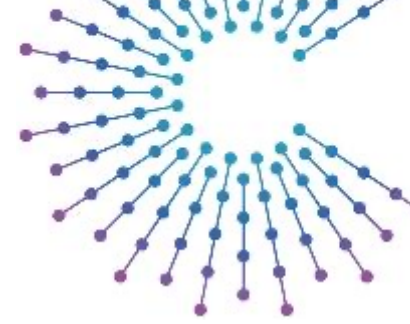


WHAT WE DID in Q1 2023 COVESA workshop?

Overview. Logical Architecture.



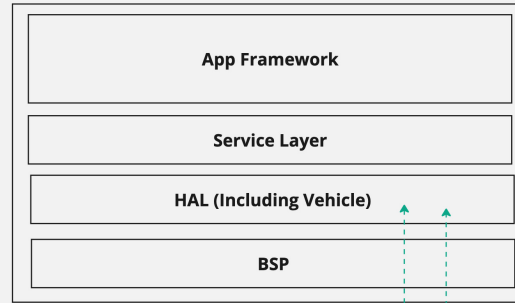
1. IVI, TCU, computing and similar platforms



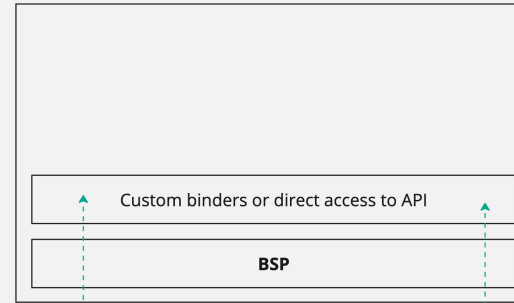
Requirements.

- 1. Low Latency from vehicle API <10ms overhead.
- 2. Automatically generated mappings for Android HAL based on VSS and function description.

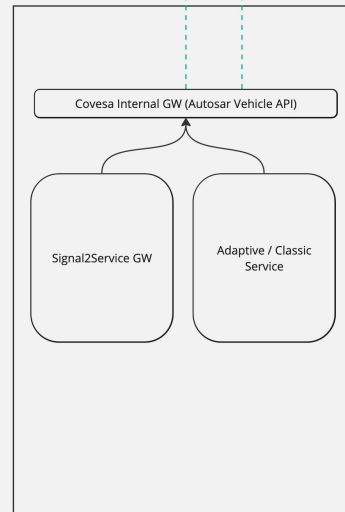
e.g. Android OS



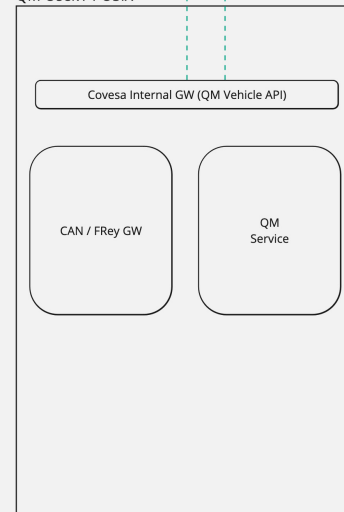
Connectivity



AUTOSAR CLASIC / Adaptiv



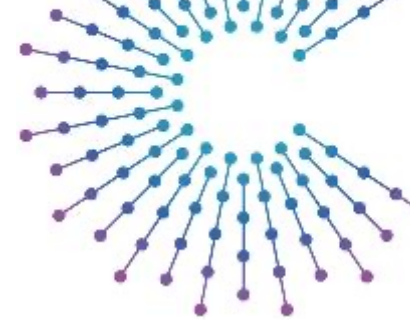
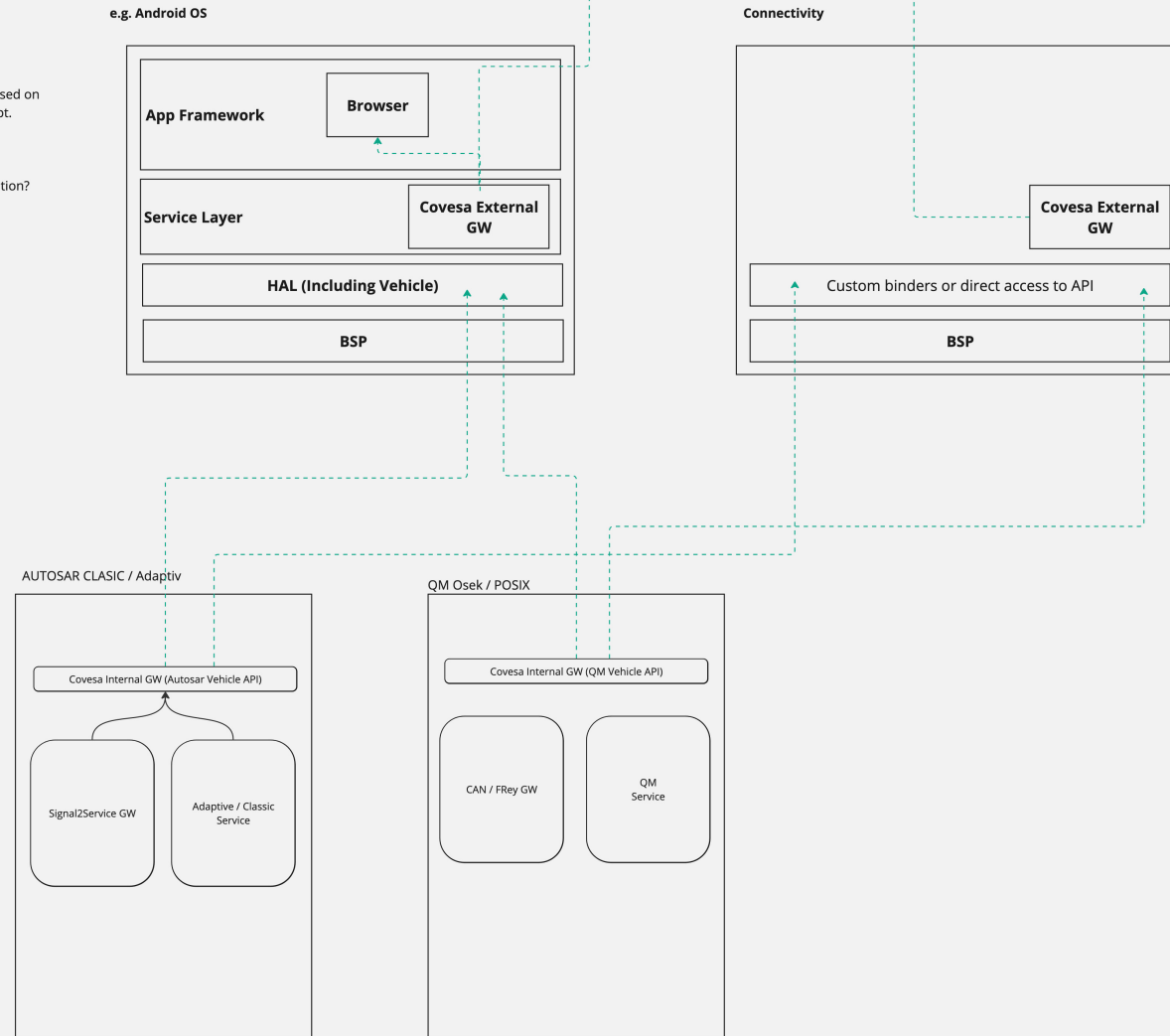
QM Osek / POSIX



2. Smartdevice & web platform

Requirements.

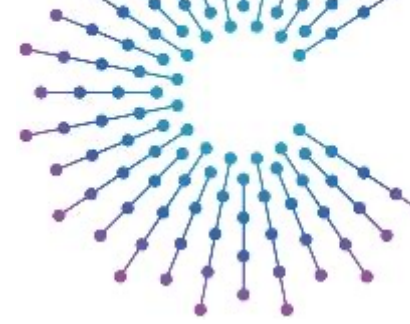
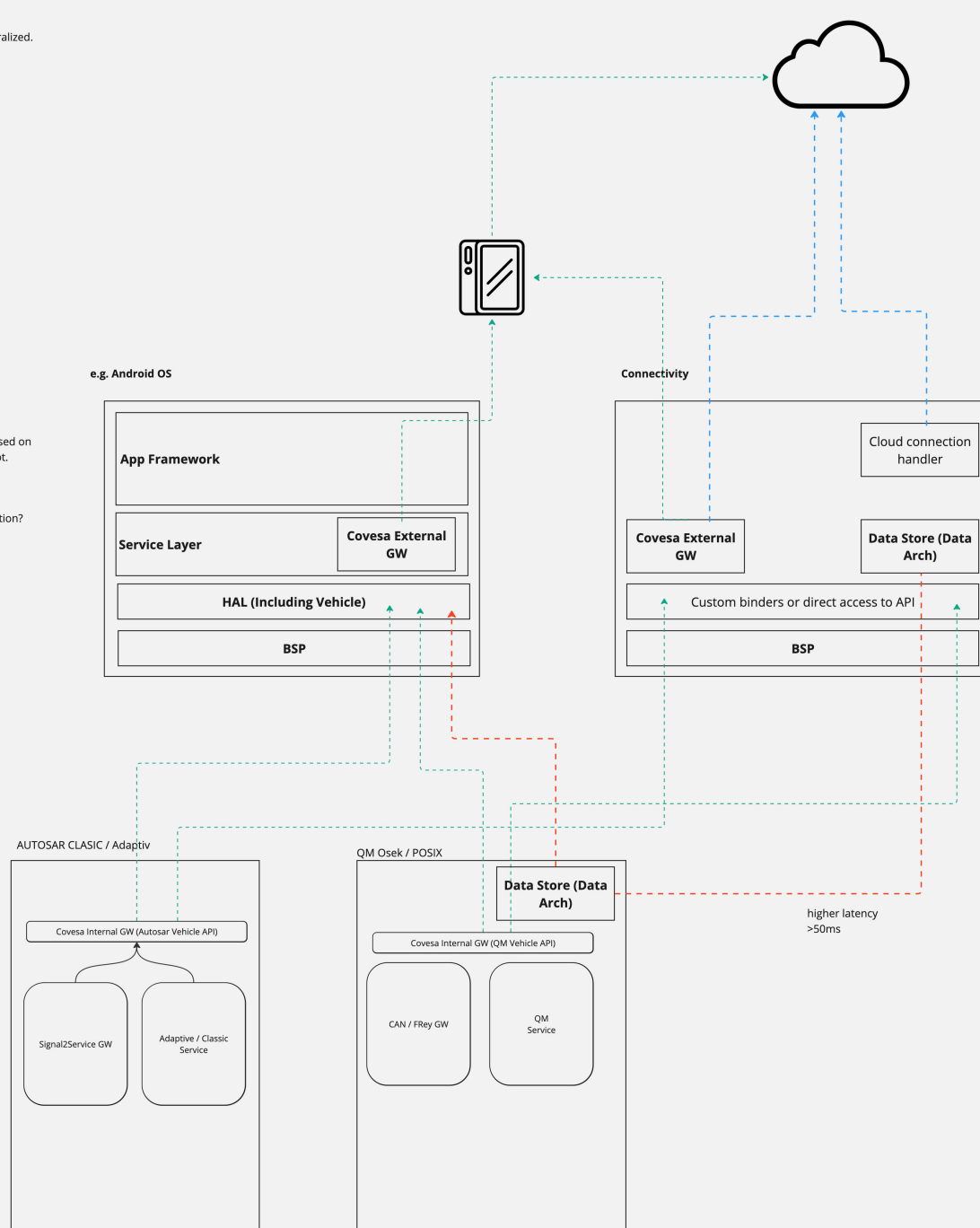
1. Description of API based on same payload concept.
2. Latency?
3. Integrity
4. Conflict resolution
5. Access and authorization?



3. Cloud integration Access
Focus on data. Data Store Centralized and Decentralized.

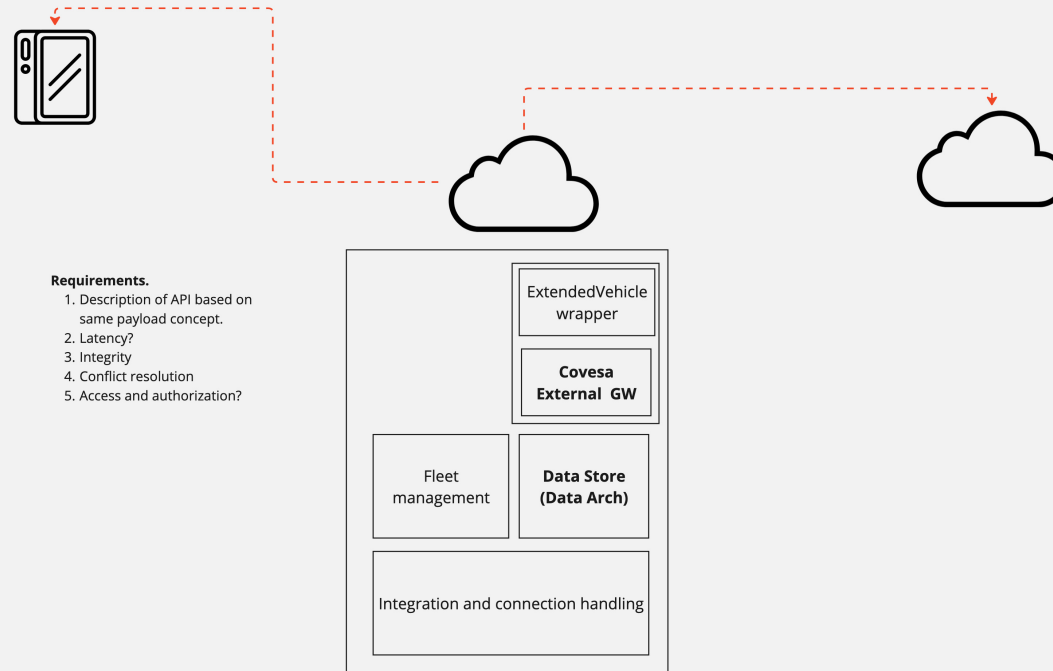
Requirements.

1. Description of API based on same payload concept.
2. Latency?
3. Integrity?
4. Conflict resolution
5. Access and authorization?



4. Cloud 2 Cloud, Cloud 2 Smartdevice

Focus on data. Data Store Centralized and Decentralized.

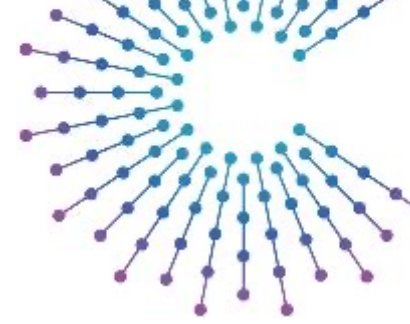


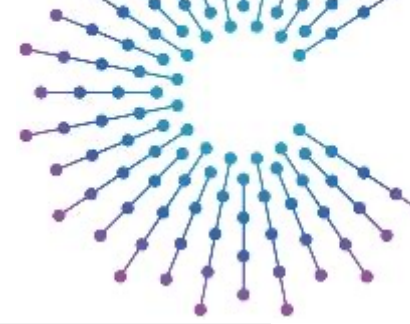
Requirements.

1. Description of API based on same payload concept.
2. Latency?
3. Integrity
4. Conflict resolution
5. Access and authorization?

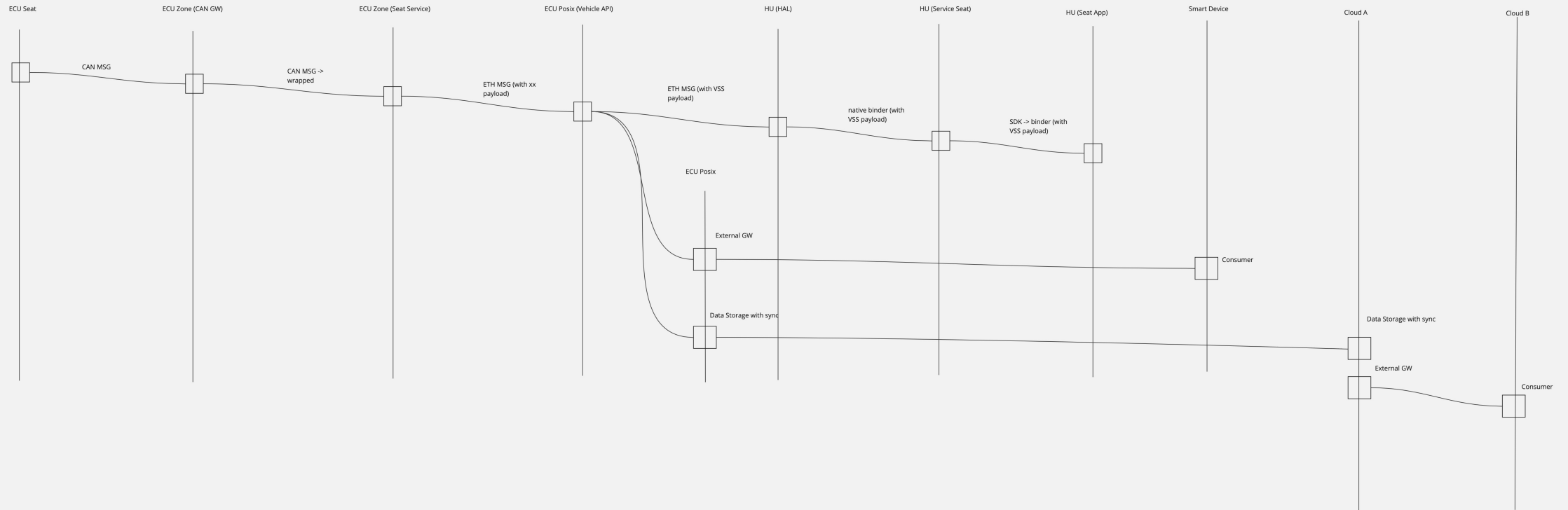
Let's collect requirements.

1. Integration paths?
2. Latency?
3. Resource requirements?
4. Up-time? startup, and wake-up
5. Scaling issues
6. Data-architecture, not only for VSS
7. Data-Architecture, centralized vs decentralized
8. What models do we use?



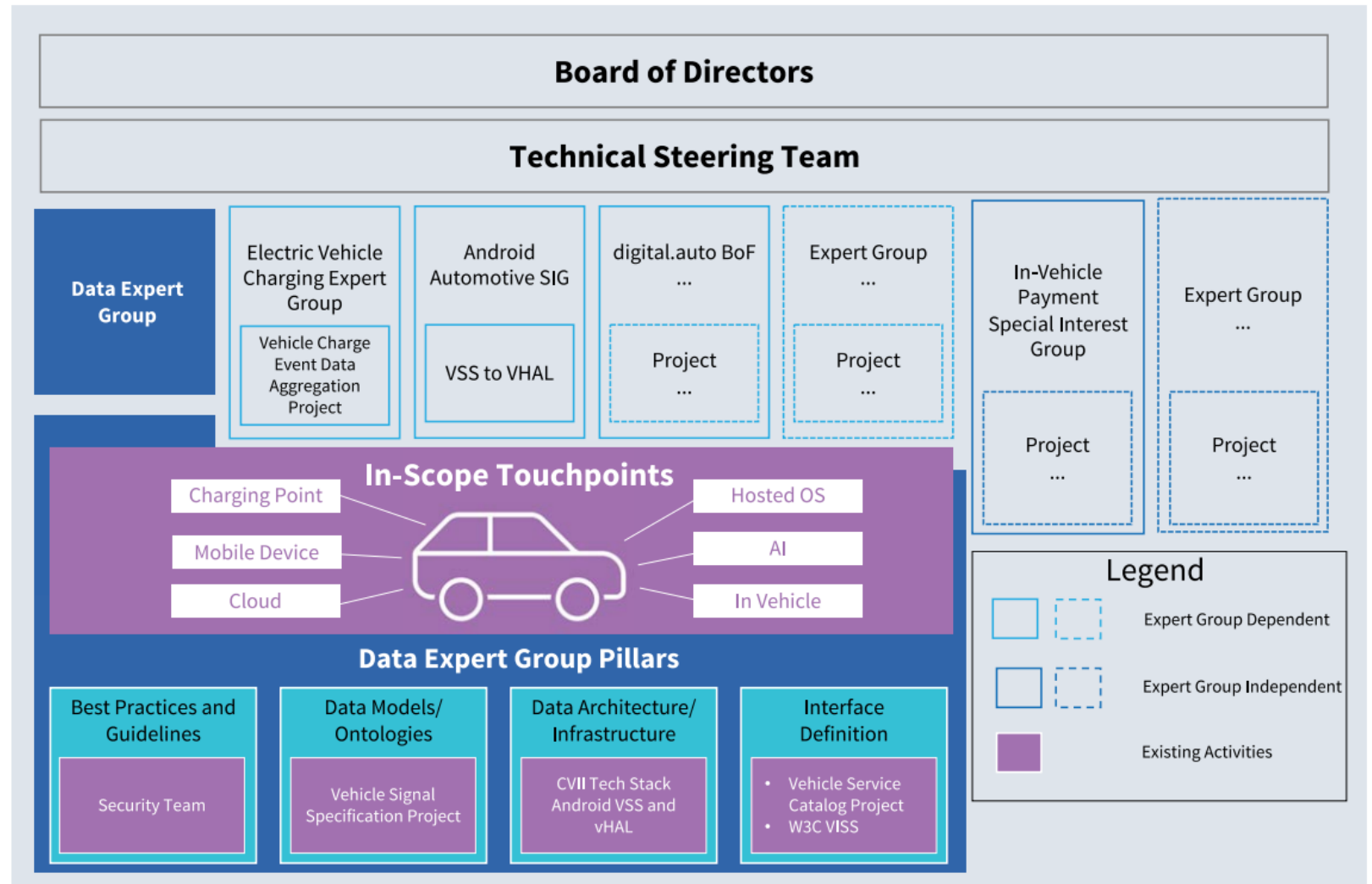


Scope of DEG, Activity of vehicle API and data architecture.

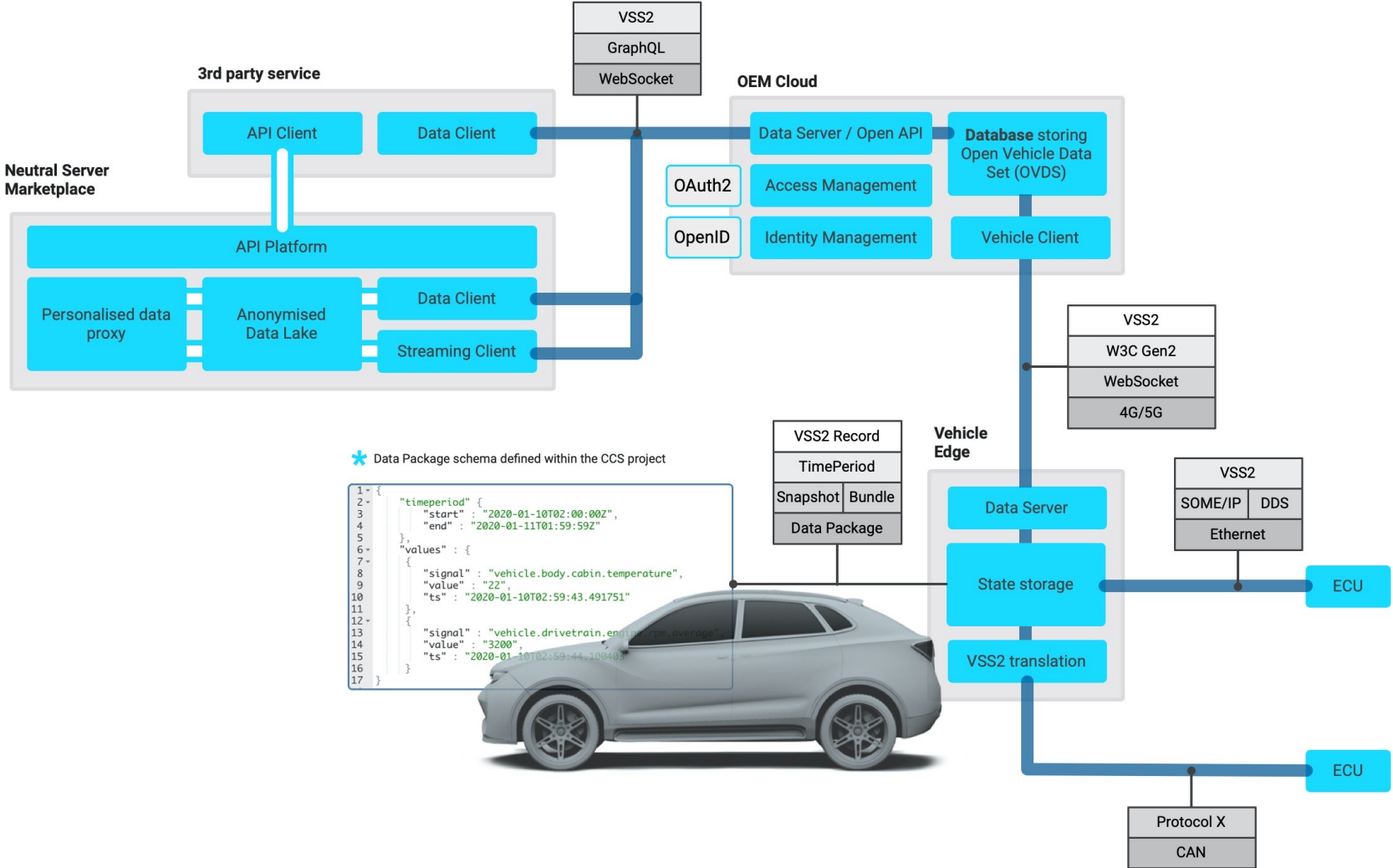


Data Expert Group (DEG)

- Best practices and common approaches for connected vehicle data and interfaces are discussed, documented, governed, and where appropriate, proved.
- DEG works and explores interactions with multiple data touchpoints (integration points) on its own and horizontally in support of other Expert Groups.
- Data touchpoints out-of-scope (like eCall) are tracked by the Technical Steering Team and may, from time-to-time, require analysis based on work done in other regulatory or standardization bodies.



How do we handle data? Data architecture.



HOW DO WE GO FURTHER?

Discussion...