# EXTENDED VEHICLE ExVe

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# Extended Vehicle

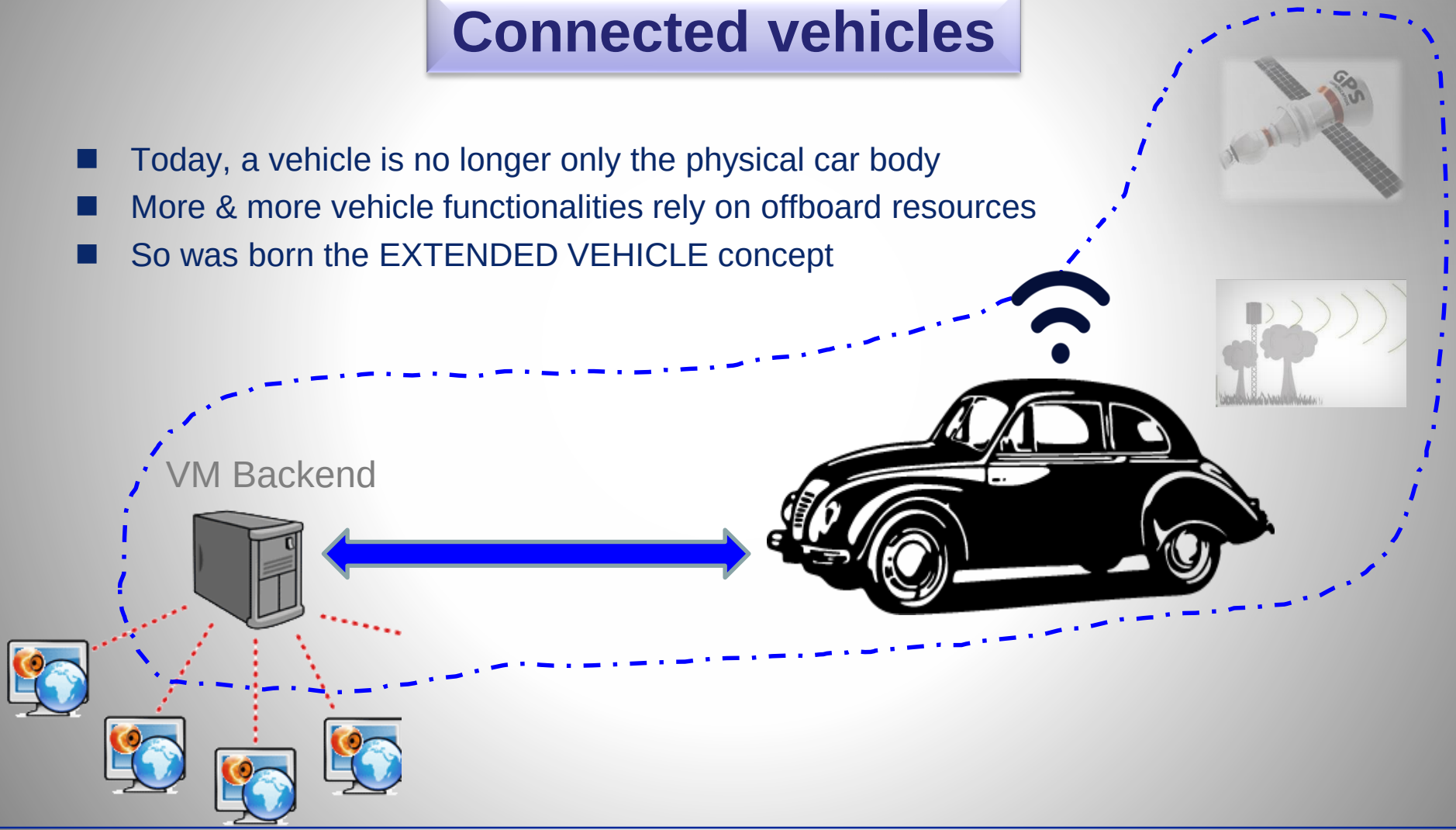
- **Context**
  - **Connectivity**
  - **Safety**
  - **New concept ➔ Standardization**
- **Definitions**
  - **Extended Vehicle**
- **ISO outcomes**
  - **ISO 20077 series**
  - **ISO 20078 series**
  - **ISO 20080 series**
  - **ISO Technical reports on risks analysis**
- **Conclusion**

# Connected vehicles


Trafic information
Car 2 Car Communication
Electrification
Mobility services
Insurances
Remote Information
Remote Repair
Driving delegation

# Connected vehicles

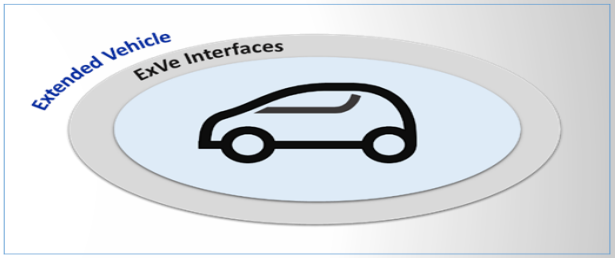
- Today, a vehicle is no longer only the physical car body
- More & more vehicle functionalities rely on offboard resources
- So was born the EXTENDED VEHICLE concept



# Definition

An entity, still in accordance with the specifications of the vehicle manufacturer, that **extends beyond the physical boundaries of the road vehicle** and consists of

- the road vehicle;
- off-board systems;
- external interfaces;
- the data communication between road-vehicle and the off-board systems




Off-board system definition
The software and hardware components off-board a road-vehicle that have been specified, designed, developed, and/or manufactured to address the requested [use-cases].

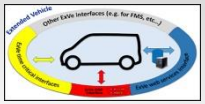
**And where the ExVe remains under the full responsibility and liability of the vehicle Manufacturer**

# Liability

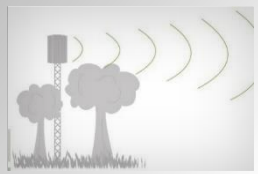
# Safety & Security

## A car is not a smartphone

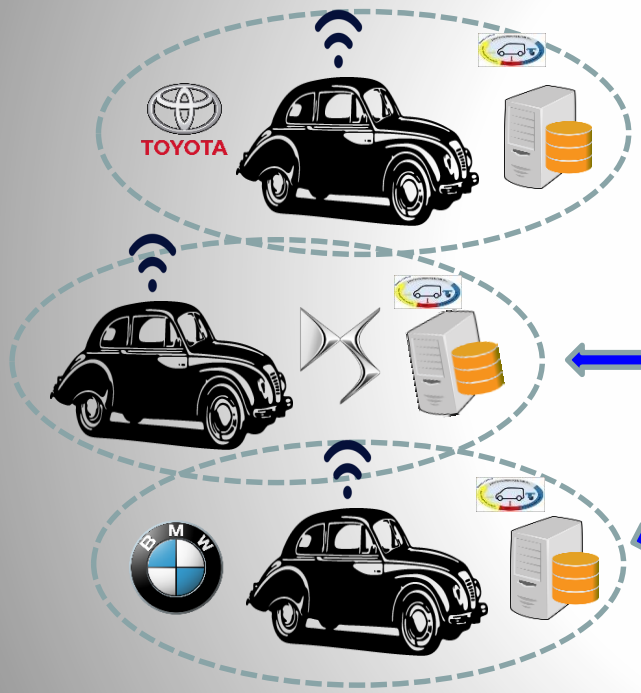
130 km/h and above
Average 1500 kg
Living Passengers
Outside road users



# Extended Vehicle



## A new concept


End customer

Service provider

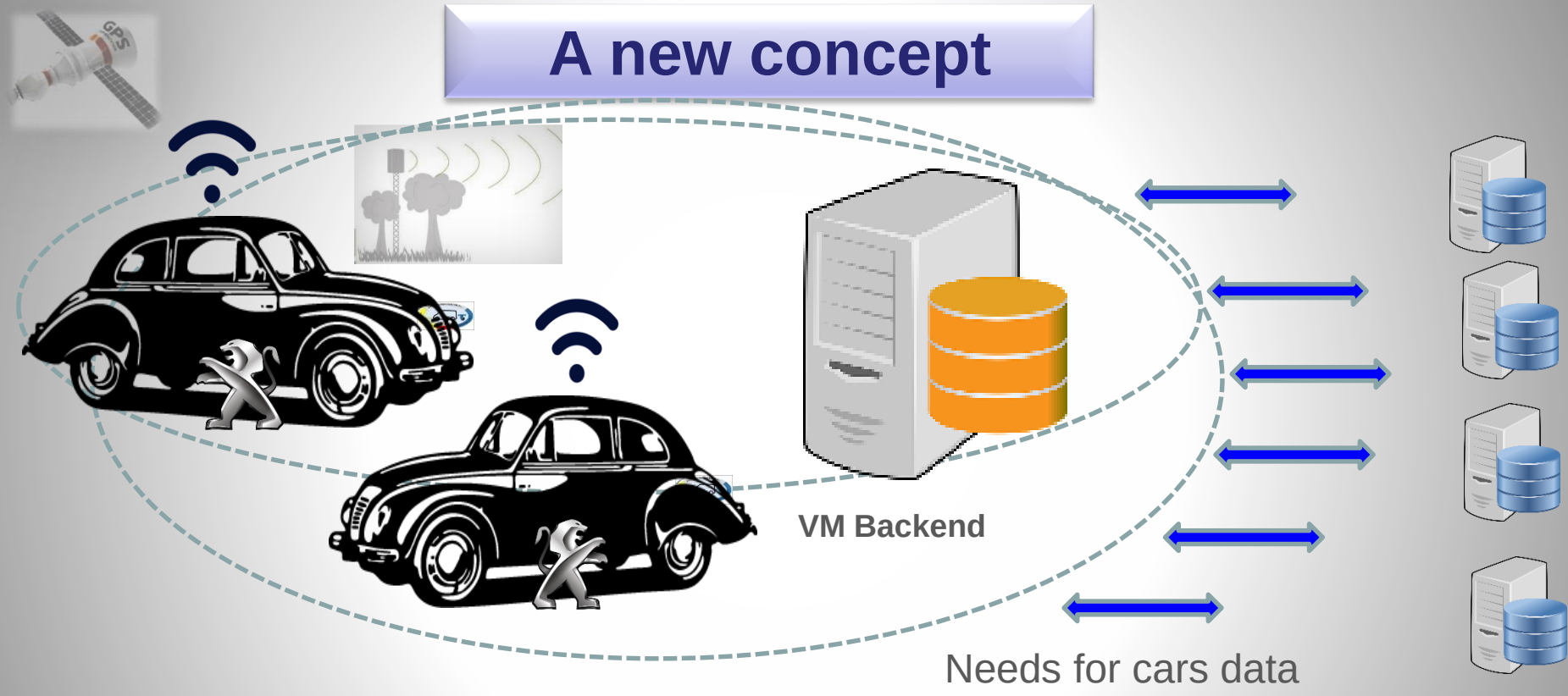
Remote operator

FRAND

Access to the vehicle must be granted safely to avoid hazards Security incl Cyber

European Single Market Fair, Reasonable And Non-Discriminatory

# A new concept




Allowing third parties competitors to create services from connected vehicle information, including Vehicle Manufacturers, while guaranteeing Safety, security and vehicle characteristics having been type approved

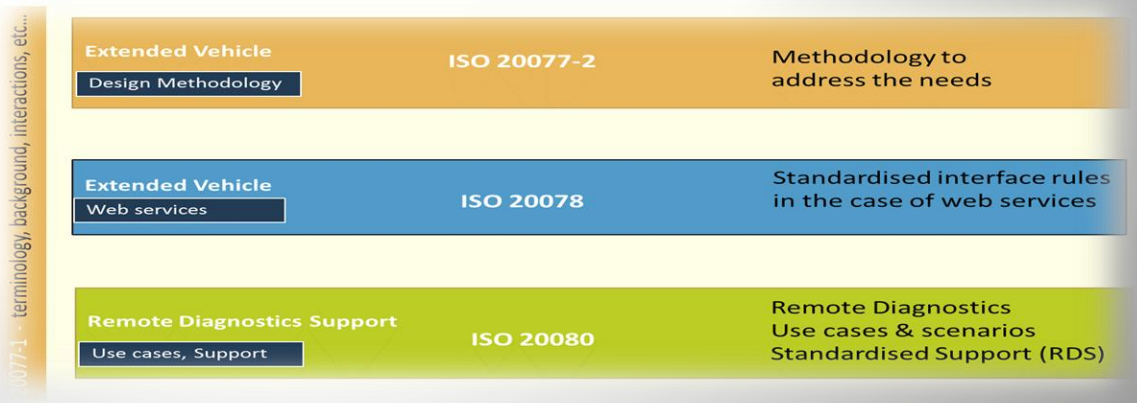
# A new concept

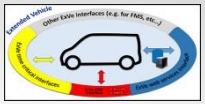
- In 2015, a standardization activity was launched at the ISO level, worldwide, to help getting to :
  - Connected
  - Safe
  - Secure
  - Flexible
  - Innovations protective
  - FRAND
  - …

# ISO & ExVe : TC22/SC31/WG6

- ISO International Organization for Standardization
- Technical Committee 22 : Road Vehicles
- Sub Committee 31 : Data Communication
- Working Group 6 : Extended vehicle/Remote diagnostics

- ISO 20077-x :
- ISO 20078-x :
- ISO 20080-x
- ISO 23786 :
- ISO 23791 :

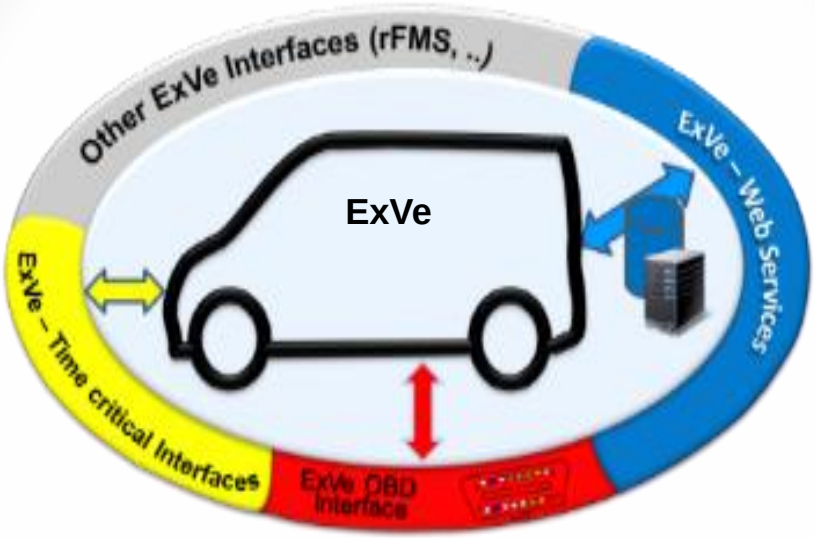




# Extended Vehicle

- Participants :
  - Sweden, Germany, USA, UK, Korea, Japan, Italy, Denmark, France…
  - Experts from :
    - Vehicle manufacturers
    - Suppliers
    - Independent Operators, repairers,…
    - Associations
    - …
- ISO Experts are strictly nominated on the basis of their individual expertise, never on behalf of a Company or Association..

# ISO & ExVe : TC22/SC31/WG6




**ExVe Interface for C-ITS (V2V,I2V, V2N2V…)**

**ExVe Web interface for Web Services**

**OBD ExVe interface**
**To connect a tool for emission control and repair & maintenance**

# Extended vehicle (ExVe) methodology

## IS 20077

- 20077 -1 : **General information**
  - **5.4 The areas where the extended vehicles are expected to be used**
    - **The extended vehicle is not a particular technical solution to solve a particular need …**
    - **It is a technology where the conventional road vehicle has been extended to include off-board systems.**
    - **It shall be used in all the areas where vehicle connectivity is applied.**
    - **Remote access shall not jeopardize the basic safety and security of the vehicle during all its life-phases**

- **20077 - 2 : Methodology for designing the extended vehicle**
  - Formalized rules and basic principles (bp)
  - Template for requesting cars data based on need description
  - Template to answer : what is feasible

# Extended vehicle (ExVe) methodology

## IS 20077

- Safety related rule **R_001**
- Security related rule **R_002**
- The ExVe manufacturer is responsible for the design of the extended vehicle.**BP_001**
- The ExVe manufacturer is responsible for the design of all the interfaces of the extended vehicle that will permit communication with that extended vehicle. **BP_002**
- The ExVe manufacturer is responsible for deciding on the implementation of any extended vehicle functionality. **BP_003**
- The ExVe manufacturer is responsible for assessing the impacts of a new ExVe functionality during the life-cycle phases of the ExVe**. BP_004**
- The ExVe manufacturer is responsible for managing the additional risks within the ExVe that are attributed to an existing functionality when this functionality becomes remotely available. BP_005
- The ExVe manufacturer is responsible for managing the impacts of an additional remote functionality taking into account the existing design. **BP_006**
- The ExVe manufacturer is responsible for defining the priorities between all functionalities of the extended vehicle. **BP_007**

# Extended vehicle (ExVe) methodology

## IS 20077

- The ExVe manufacturer is responsible for securing that the additional functionality does not affect already designed and implemented functionalities of the extended vehicle, in particular by taking into consideration the available resources of that extended vehicle**.BP_008**
- The extended vehicle design methodology is applicable regardless of the type(s) of communication (wired or wireless) **BP_009**
- For a given use-case and use-case scenario, the ExVe manufacturer is responsible for defining the appropriate extended vehicle's interfaces for the considered functionality, and for designing them so that they can support defined requests in a non-discriminatory manner**.BP_010**
- The ExVe manufacturer is responsible for validating the design of the complete extended vehicle as a complete system **BP_011**
- The ExVe manufacturer is responsible for ensuring that the designed ExVe functionality _0respects that the correlation between the vehicle owner and the performed functions is not monitored for competition purposes**. BP12**
- The ExVe manufacturer is responsible for ensuring that the designed ExVe functionality respects that the correlation between the after-sales service provider and the performed functions is not monitored for competition purposes. **BP_013**

# Extended vehicle (ExVe)

## IS 20078 (ExVe) 'web services'

- 20078 SERIES describe the ExVe Blue Interface
  - It is often considered as THE Exve, but it is just one Interface to develop connected services

- 20078 -1 : **ExVe content**
- 20078 -2 : **ExVe access**
- 20078 -3 : **ExvE Safety**

- TR 20078-4 : **ExVe Control**

# IS 20078 (ExVe) 'web services

**-1 : ExVe Content**

How an Offering Party defines Resources
Data format : JSON, XML, Key-value

**-2 : ExVe Access**

How an Accessing Party can Access Resources via Web services of an Offering Party, using (HTTPS) for Transport Protocol

The REST is selected for using a common way to represent data, aggregated information, and functions

**-3 : ExVe Security**

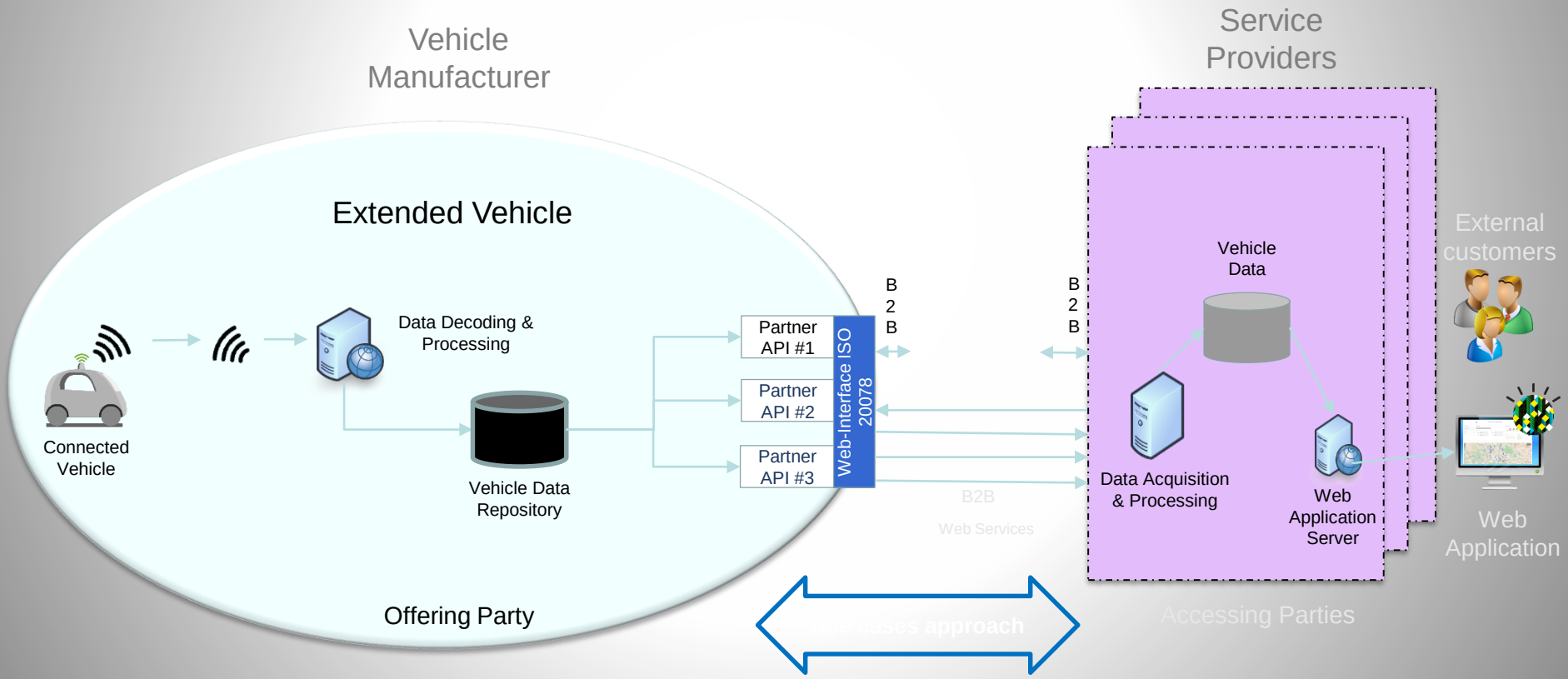
Security model of the web service, including different roles and entities involved in an Authorization Policy. Three roles are defined: Identity Provider, Authorization Provider and Resource Provider at the Offering Party

OAuth 2.0 for Authorization,
OpenID Connect for Authentification *(of requests,…)*

**-4 : ExVe Control**

Processes describing the interaction of all defined roles.
It Includes granting, denying and revoking access to Resources

# ExVe Web services



# Extended vehicle (ExVe) RDS

**ISO 20080 :**
**information for Remote Diagnostic Support**
**General requirements, definitions and use cases**

- " specifies general requirements and constraints applicable to a **remote diagnostic process**, the use cases and scenarios to support the implementation of a remote diagnostic process **using a standardized interface of the ExVe**"
- Use cases examples :
  - Use Case 02 — Identify ECUs installed in the vehicle
  - Use Case 03 — Read Diagnostic Trouble Codes (DTCs)
  - …
  - Use Case 11 — Activate a self-test routine

# Extended vehicle (ExVe)

# Technical Reports : Risk Analysis

- ISO TR 23786 : **Criteria for risks assessment**
  - 11 risks categories : Safety, cybersecurity, competition, responsibility, electronics overload, or data protection risks …
  - Competition, business monitoring,…

- ISO TR 23791 : **result of the risk assessment on ISO 20078 series**

  Most of the analysis conclude to no additional or specific risk.

  But in some cases, for instance, risks come from implementation of ExVe 20078 by multiple actors. Most of these risks can be addressed by B2B contractual conditions like monitoring risks

# Connected Services Domains (Extract from ISO20077-1)

- Road –Traffic management, Car 2 X
- Vehicle inspection, Remote PTI, RSI, …
- Transport management, Fleet management, multi-modal, …
- Manufacturing & sales management, car management
- Repair & maintenance, Remote diagnostics, prognostics, repair,…
- Other automotive, infotainment, driver's and driving monitoring

# CONCLUSION

- A car is no longer a single car body
- Access to car data is a legitimate need for the whole Automobile Eco System
- A car is a very specific Connected Object, therefore the access to data must be organized to ensure
  - **SAFETY**
  - SECURITY
  - LIABILITY
- A set of standards has been developed to allow connected services development in a fair way for all new business services and **not only for remote diagnostic**

# Thank You