



## EXTENDED VEHICLE ExVe

# Safe & Secure Connectivity

## The Extended Vehicle Concept and Standards

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Jean-François Huère  
ISO/TC22/SC31

## SUMMARY

### ■ Context

- Connected vehicle
- Safety & Security
- Responsibility
- Need for standardization

### ■ The Extended Vehicle

- ISO working structure
- ExVe Principle
- The ExVe interfaces for fully connectivity

### ■ ISO ExVe Standards

- ISO 20077 series
- ISO 20078 series
- ISO 20080
- ISO 23132

### ■ Conclusion

## CONNECTED VEHICLES



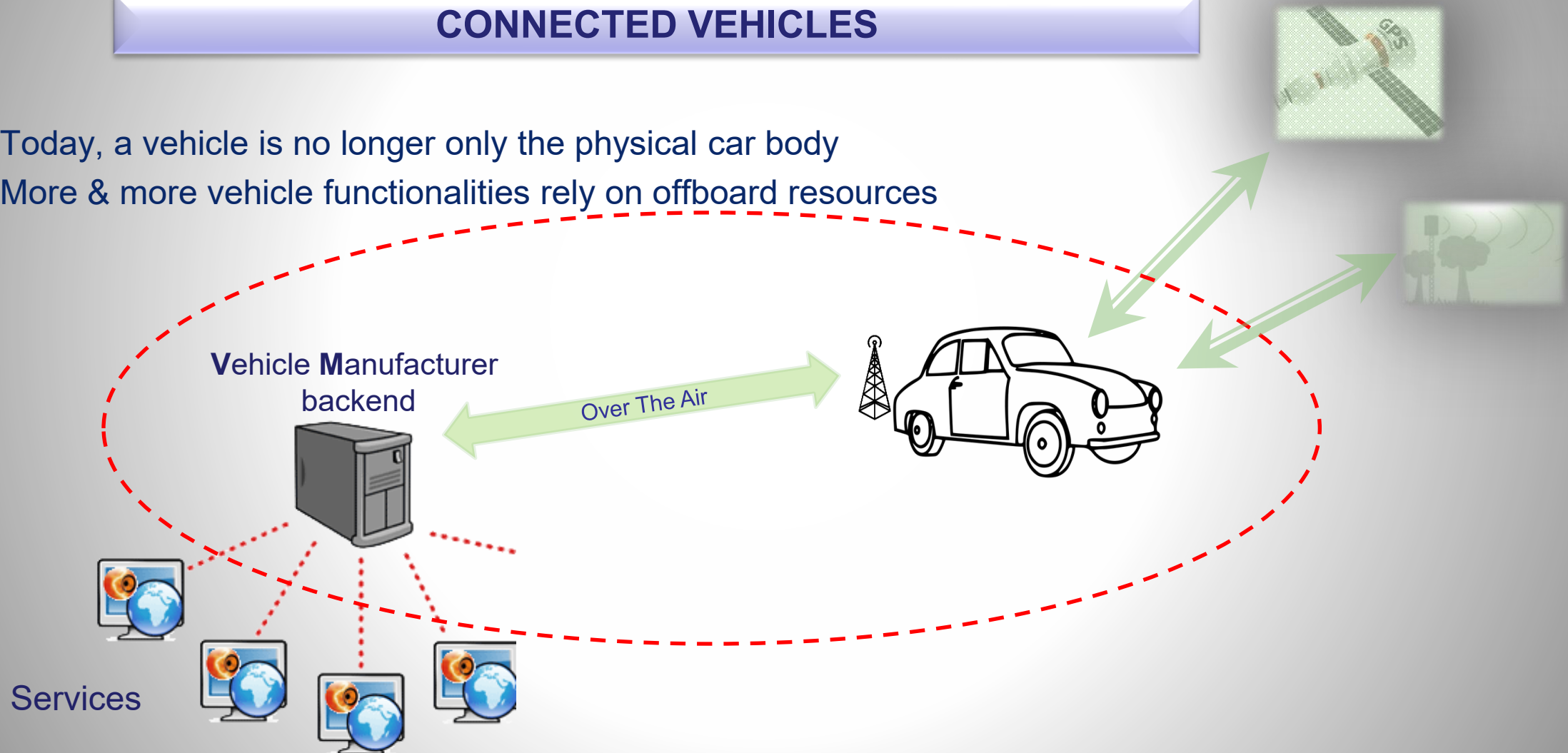
**Traffic information**  
**Electrification**  
**Mobility services**  
**Insurances**  
**Remote Repair & Maintenance**  
**Automated driving**

...



## CONNECTED VEHICLES

- Today, a vehicle is no longer only the physical car body
- More & more vehicle functionalities rely on offboard resources

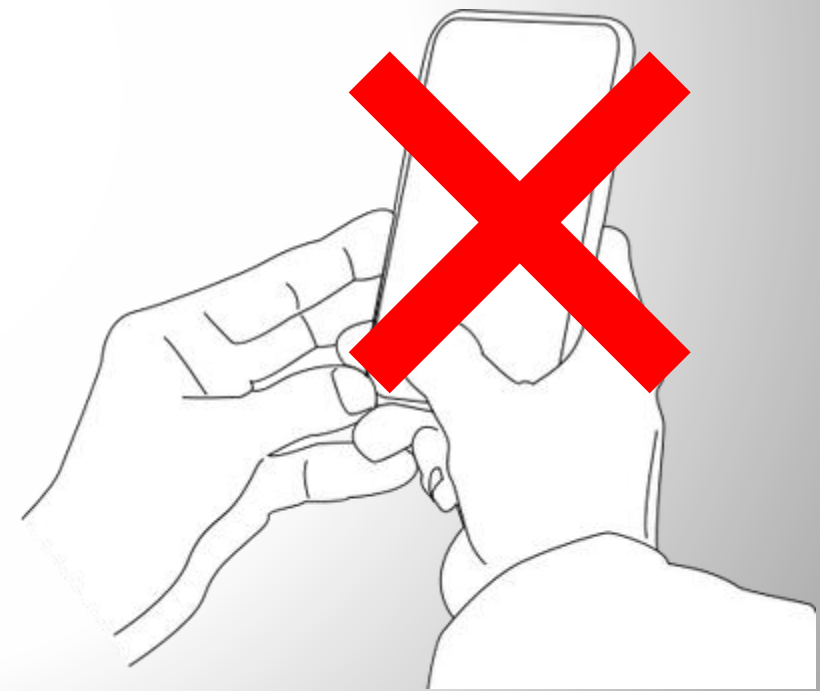


**SAFETY, SECURITY AND RESPONSIBILITY**



**A car is not a  
smartphone**

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



## ACTORS & RESPONSIBILITY

Connectivity involves several actors  
Identified Interfaces are necessary for :

- Defining design perimeter
- Interactions
- Distributed responsibilities



## THE EXTENDED VEHICLE VEHICLE MANUFACTURER'S RESPONSIBILITY

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** and the **data communication** between the road vehicle and the off-board systems »

Excerpt from ISO 20077 series: ExVe Methodology

**The ExVe entity remains under the full responsibility of the Vehicle Manufacturer**

## NEED FOR A STANDARD

In order to ensure that connectivity does not jeopardize:

- Safety (people and goods road safety)
- Security (data, privacy, cyber)
- Liability issues
- Compliance (vehicles approval)
- Keep approved specifications along the whole life cycle
- Fair and non-discriminatory competition

**An ISO standardization work program was launched in 2015**



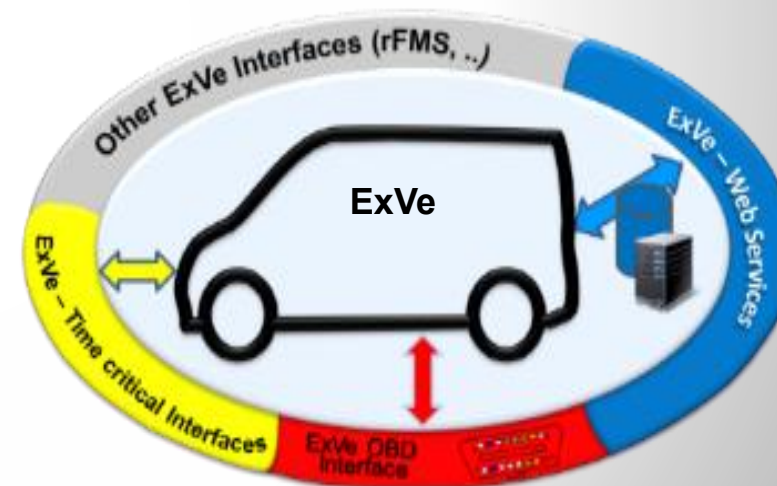
# ExVe PRINCIPLES

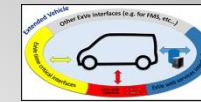
## Interface selected depending on use case type, safety and security

Existing standards are used, whenever possible, when compliant with Safety, Security and Responsibility

- OBD (wired)
- Time-critical
- Multimedia, others,
- Web interface

Red  
Yellow  
Grey  
Blue





## ExVe INTERFACES FOR CONNECTED VEHICLES

### ExVe TIME CRITICAL INTERFACE

Real time near field over the air communication between :

- Car 2 X ( cars, infrastructures)
- For traffic safety/efficiency use cases

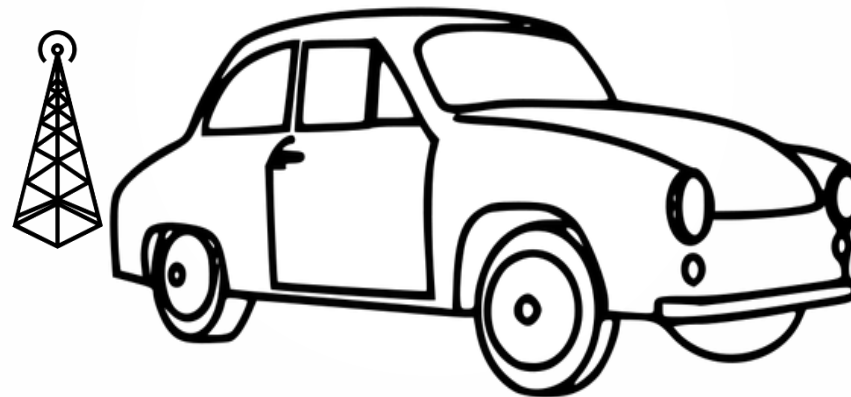
### ExVe ON BOARD DIAGNOSTIC INTERFACE (OBD)

Wired communication with test/inspection equipment

- Used by trained technicians
- For inspection, controls and maintenance

### ExVe WEB SERVER INTERFACE

Standardized server communication used to enable 3rd parties and neutral servers to access vehicle generated data and predefined in vehicle routines in a SECURE manner



### EXVE OTHER INTERFACES

**ExVe interface for emergency call systems (e.g., UN144)**

Far field over the air communication used to send eCall data from an accident involved vehicle to roadside rescue services

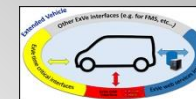
**ExVe interface for EV charging**

Electric vehicles communication to the charging stations

**ExVe interface for infotainment**

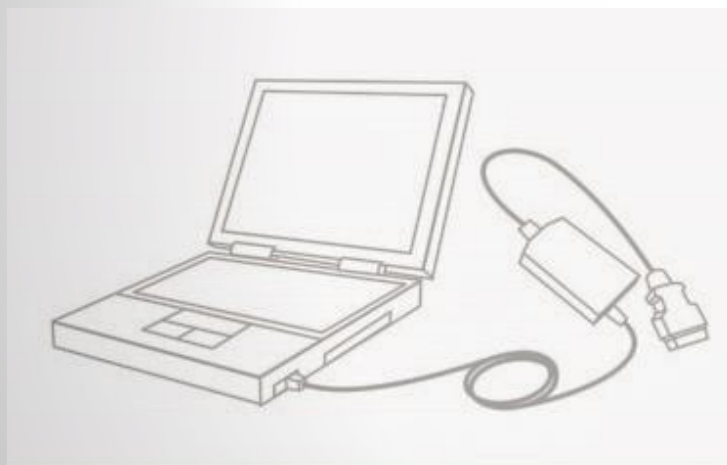
Near field over the air communication between user mobile device and the infotainment vehicle system, i.e terminal mode to vehicle HMIs, hands free access.

...

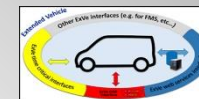


## OBD ExVe INTERFACE FOR IN-WORKSHOP REPAIR, CONTROL AND MAINTENANCE BY A TRAINED TECHNICIAN

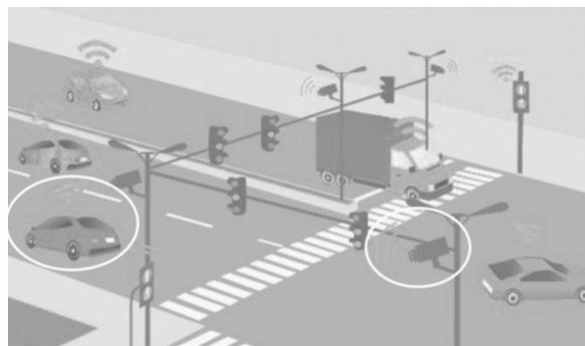
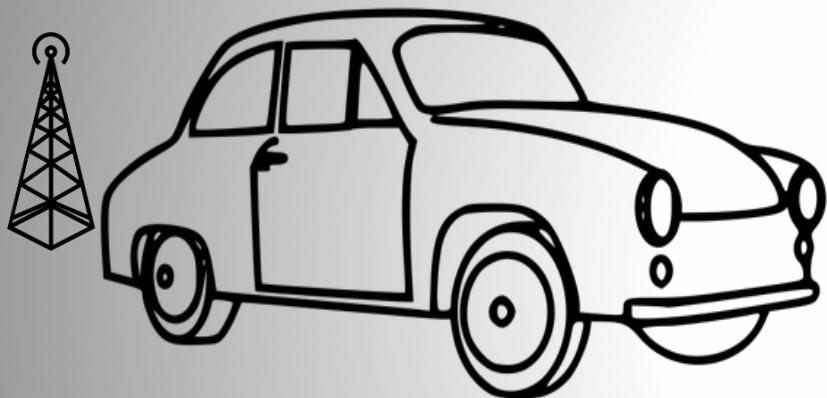
Workshop, stationary vehicle



**Trained technician beside the vehicle to control that the effect of each action is Safe and Secure**

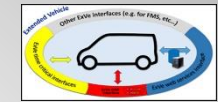


## ExVe TIME-CRITICAL INTERFACES FOR SAFETY-CRITICAL SITUATIONS

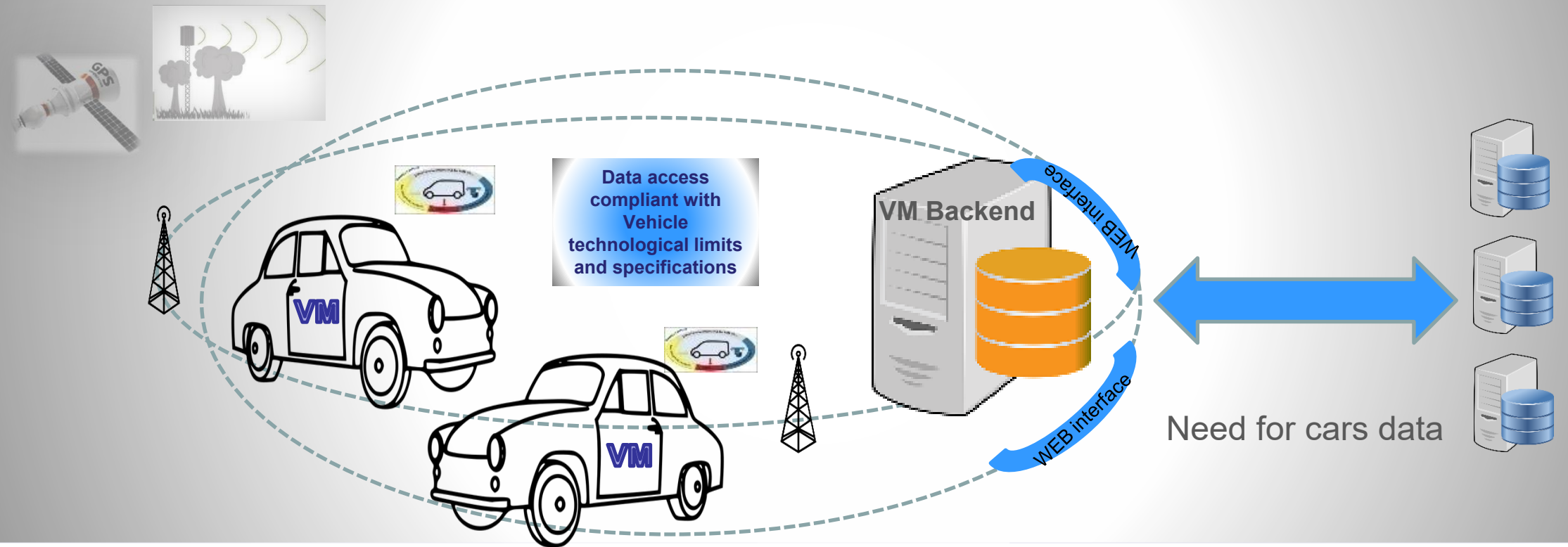


**ISO 23132: prioritization of road safety use cases**

**For safety-critical situations: data volume restricted to safety constraints, stringent authentication processes.**

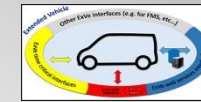


# ExVe WEB SERVICES INTERFACE

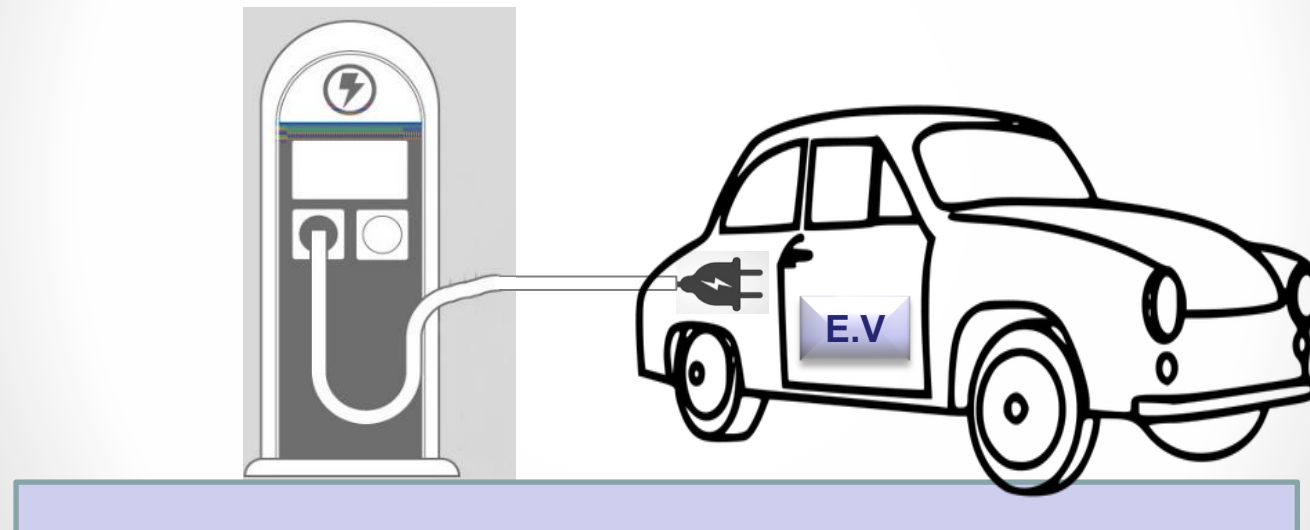


## ISO 20078 series: remote access to vehicle data

Communication via an OEM back-end server enables the OEM to endorse its full responsibility



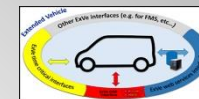
## ExVe OTHER INTERFACES



Data access  
compliant with  
Vehicle  
technological limits  
and specifications  
Stationary situation  
Wired

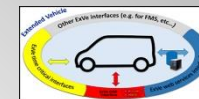
**ISO 15118: secure digital communication between EV and the charger**

**Safe: no data modification; Secure: authentication authorization**



## ISO & ExVe : TC22/SC31

- 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 : 2017 / 2018
  - ISO 20078-x : 2019
  - ISO 20080 : 2019
  
- Working Group 10 : ExVe Time-critical applications
  - ISO 23132 : 2020

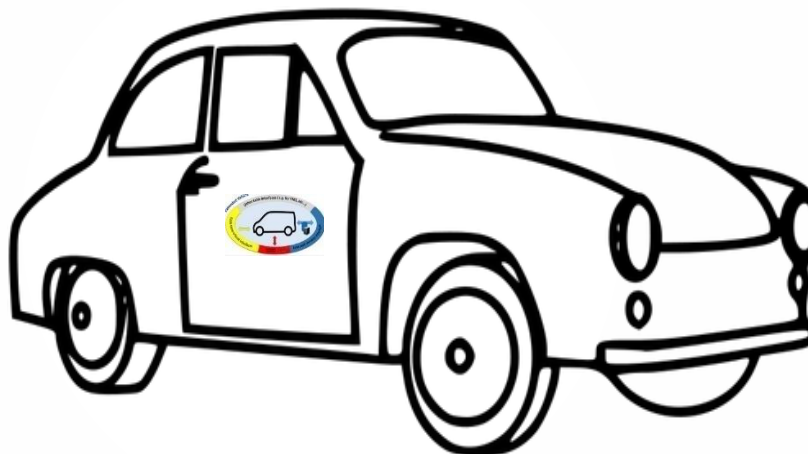
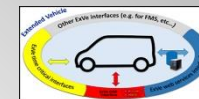


## CONCLUSION

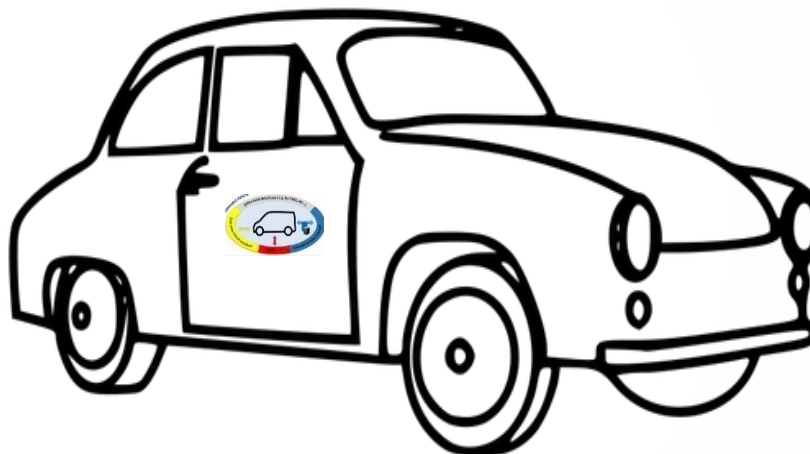
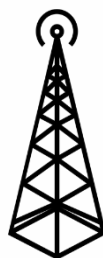
A set of automotive ISO standards has been developed

- To promote market fluidity for vehicle data access.
- To increase customers confidence that their connected cars remain safe, reliable and of high quality
- To allow all stakeholders to create services from connected vehicle information.
- To ensure for each usage **safety, security and OEM responsibility**

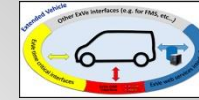




Thank You



**ANNEXES**



## EXTENDED VEHICLE (EXVE) METHODOLOGY

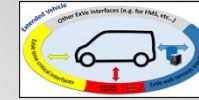
### ISO 20077

#### ■ 20077 - 1 : General information

- 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



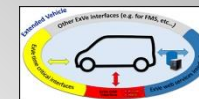
## EXTENDED VEHICLE (EXVE)

### ISO 20078 (ExVe) 'web services'

#### ■ 20078 SERIES describe the ExVe Blue Interface

- ISO 20078 - 1            ExVe content
- ISO 20078 - 2            ExVe access
- ISO 20078 - 3            Safety
- ISO TR 20078 - 4        ExVe Control
  
- ExVe Web interface often considered as THE ExVe

**It is one ExVe Interface dedicated to providing OTA data for development of connected services.**



## ISO 23132 TIME-CRITICAL COMMUNICATION

**(RExVeS) :**

General requirements, definitions and classification methodology of time-constrained situations related to Road and ExVe Safety

Defines the classification methodology of time-constrained situations and their requirements, that are to be addressed by the “ExVe time critical interfaces” described in ISO 20077-1

The methodology provides a classification, which determines application priorities for optimal vehicle resources allocation.