자동차 사이버 보안 관련 법규 및 표준 관련 업체 대응 전략

Vector

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Why Vector Consulting Services?

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Vector Consulting Services
is supporting clients worldwide

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> Cost reduction

Trust
> Safety and Cybersecurity
> Test Methods, PenTest, Supplier Audits

Technology
> Architecture support, e.g., AUTOSAR
> Life-cycle methods, e.g., PREEvision

Training
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> Corporate Competence Programs

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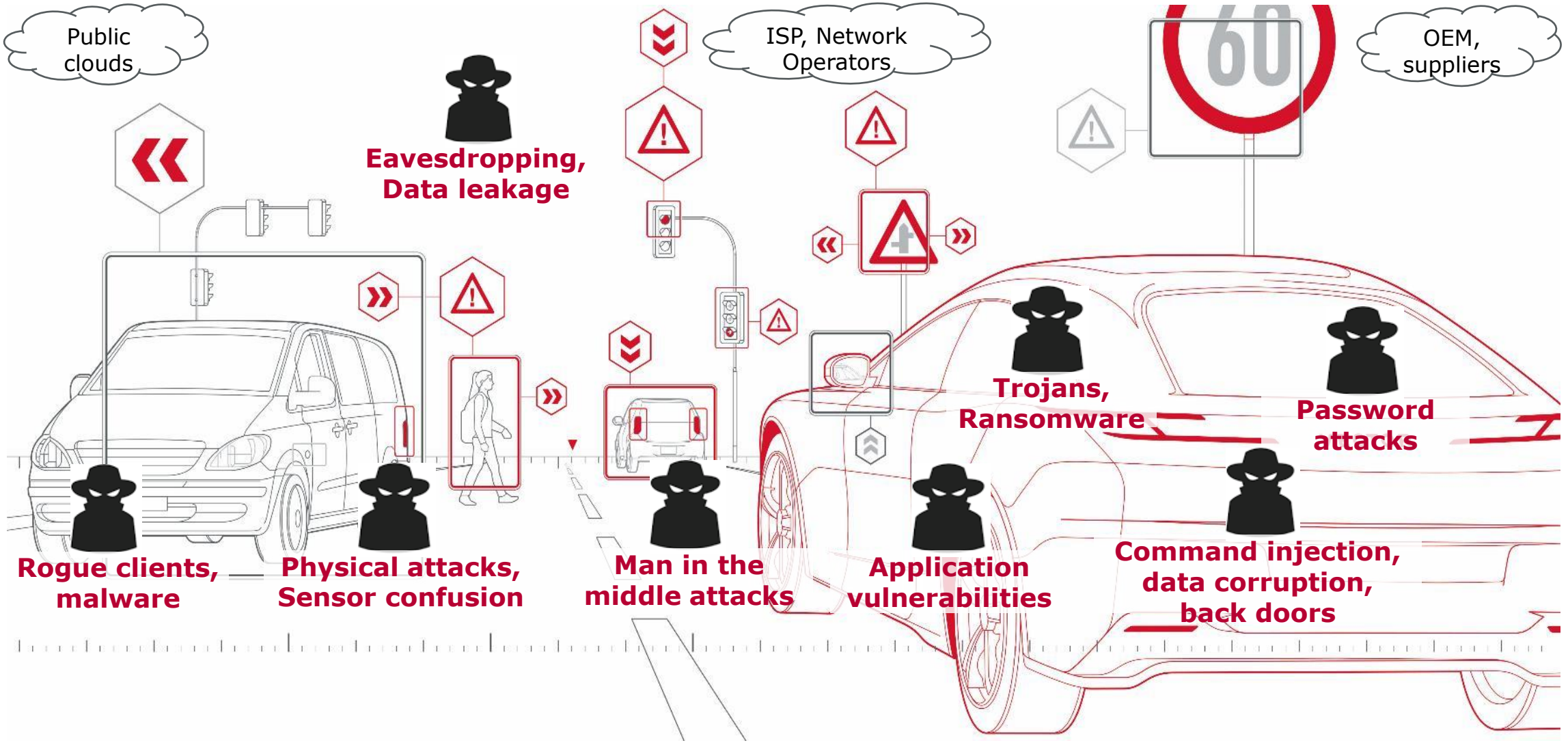
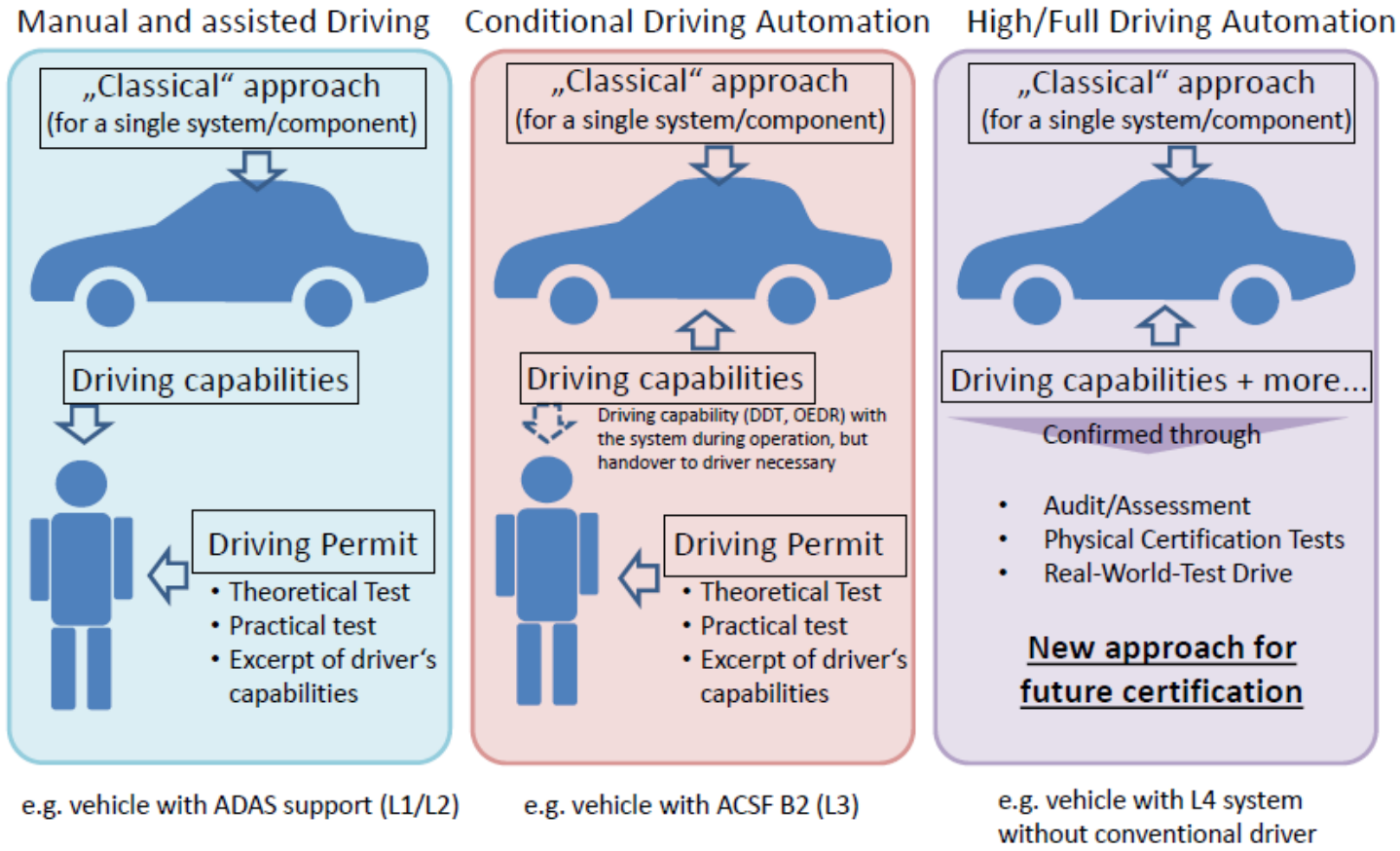
ACES(Autonomy, Connectivity, Electrification, Services) ▶ **Cyberattacks** ▶ **Hazards**



Who needs a license for autonomous driving vehicle?

- Driving license will be needed for the vehicle
  - Need new approach for future certifications



Source: Informal documentGRVA-02-09 2nd GRVA, 28 January–1 February2019 Agendaitem5(a)

UNECE WP29 GRVA

- **UNECE (UN- Economic Commission for Europe)**
  - Initially was set up in 1947
  - Major aim is to promote pan-European economic integration
  - UNECE includes 56 member States in Europe, North America and Asia.

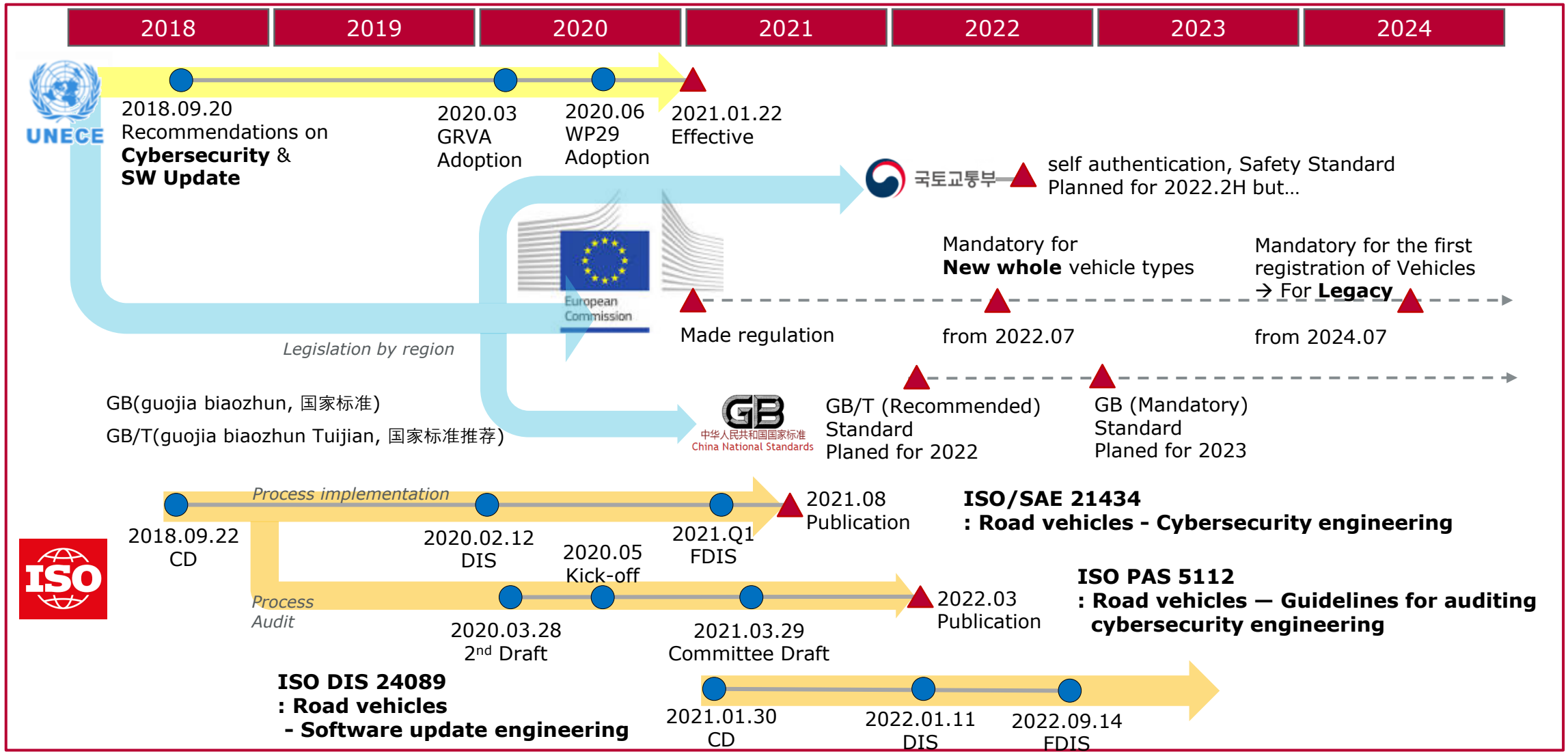
- **UNECE WP29 (World Forum for Harmonization of Vehicle Regulations)**
  - A unique worldwide regulatory forum within the institutional framework of the UNECE Inland Transport Committee.

- **UNECE WP29.GRVA(Working Party on Automated/Autonomous and Connected Vehicles)**
  - To focus on automation, established it in 2018.
  - Created a global scheme to develop requirements and guidelines for automated and connected vehicles

- **UN Regulations**
  - Contain provisions (for vehicles, their systems, parts and equipment) related to safety and environmental aspects.
  - Include performance-oriented test requirements, as well as administrative procedures.
  - Requires
    - The type approval (of vehicle systems, parts and equipment)
    - The conformity of production and the mutual recognition of the type approvals granted by Contracting Parties.

Source: https://unece.org

UN Regulation for CSMS and SUMS



UN Regulation for CSMS and SUMS – Definitions

- **UN Regulation No. 155 - Uniform provisions concerning the approval of vehicles with regards to Cyber Security and Cyber Security Management System**
  - ***"Cyber security"*** means the condition in which road vehicles and their functions are protected from cyber threats to electrical or electronic components.
  - ***"Cyber Security Management System (CSMS)"*** means a **systematic risk-based approach** defining organizational processes, responsibilities and governance to treat risk associated with cyber threats to vehicles and protect them from cyber-attacks.
- **UN Regulation No. 156 - Uniform provisions concerning the approval of vehicles with regards to Software Update and Software Updates Management System**
  - "***Software update***" means a package used to upgrade software to a new version including a change of the configuration parameters.
  - "***Software Update Management System (SUMS)***" means a **systematic approach** defining organizational processes and procedures to comply with the requirements for delivery of software updates according to this Regulation.

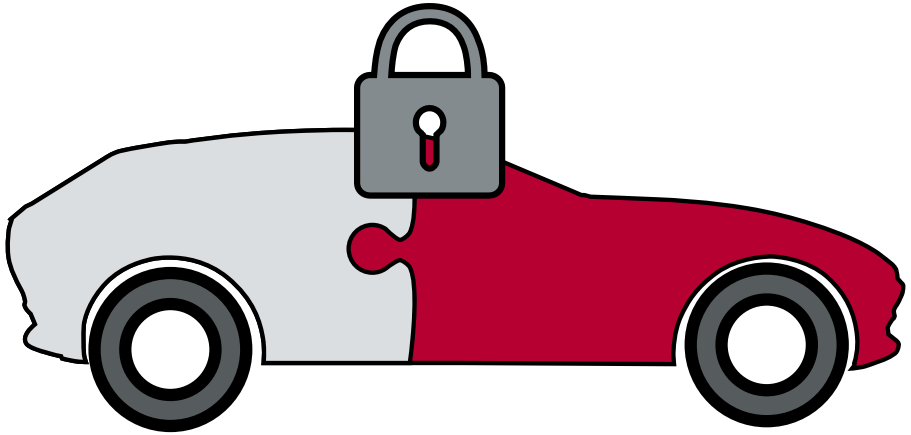
Source: ECE-TRANS-WP29-2020-080e

UNECE Regulation for CSMS and SUMS – General

- Scope
  - Vehicles permitting software updates
  - Passenger cars, vans, trucks and buses
- Framework for the automotive sector to put in place the necessary **Processes**
  - All of these will be **audited** by **national technical services or homologation authorities**.
  - CSMS is increasingly demanded by OEMs from their suppliers
- **Type Approval**
  - Manufacturers will need to demonstrate, prior to putting vehicles on the market
  - Applicable in July 2022 for new vehicles, and in July 2024 for legacy.

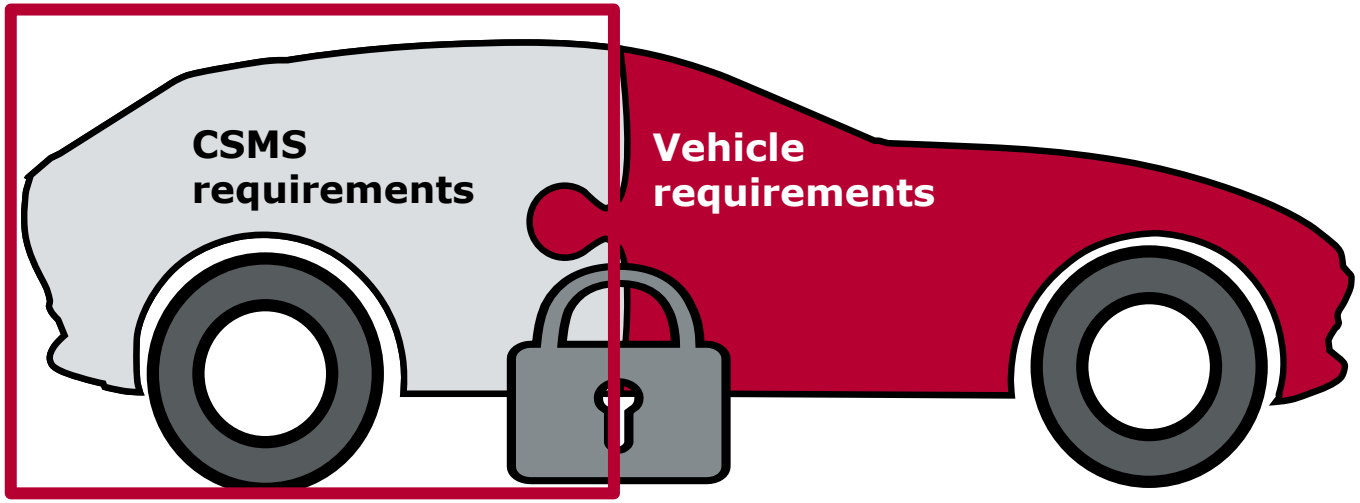
CSMS:
Cybersecurity Management System (R.155)

SUMS
SW Update Management System (R.156)



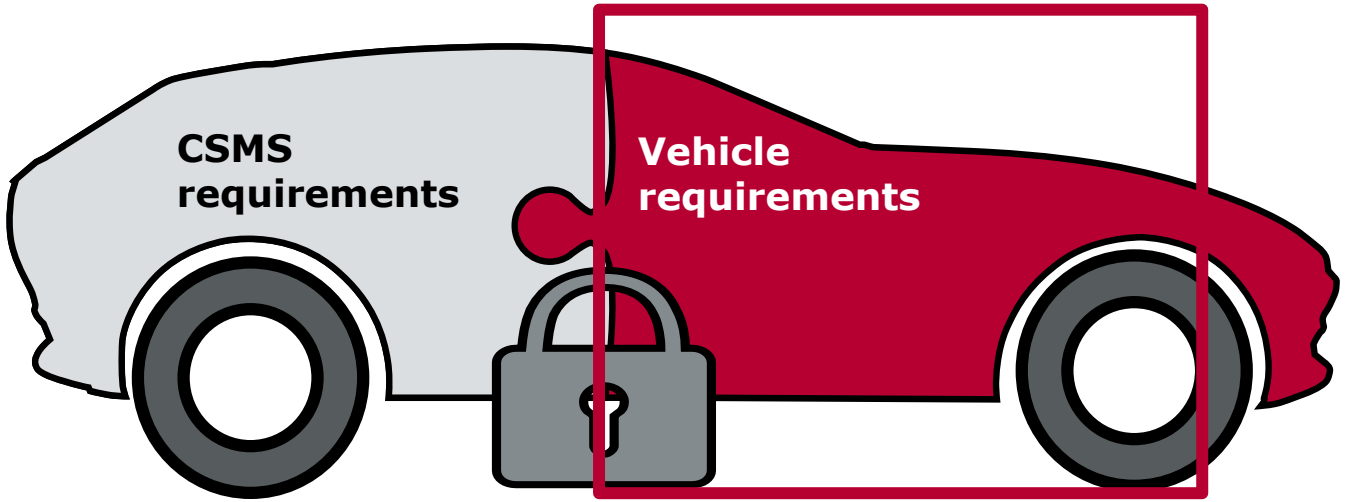
UNECE Regulation for CSMS (R.155) - Process Requirements

- **Identify** and manage cyber security risks **in vehicle design**
- **Verify** that the risks are managed, including testing
- **Ensure** that risk assessments are kept current
- **Monitor** cyber-attacks and effectively respond to them
- **Support** analysis of successful or attempted attacks
- **Assess** if cyber security measures remain effective in light of new threats and vulnerabilities



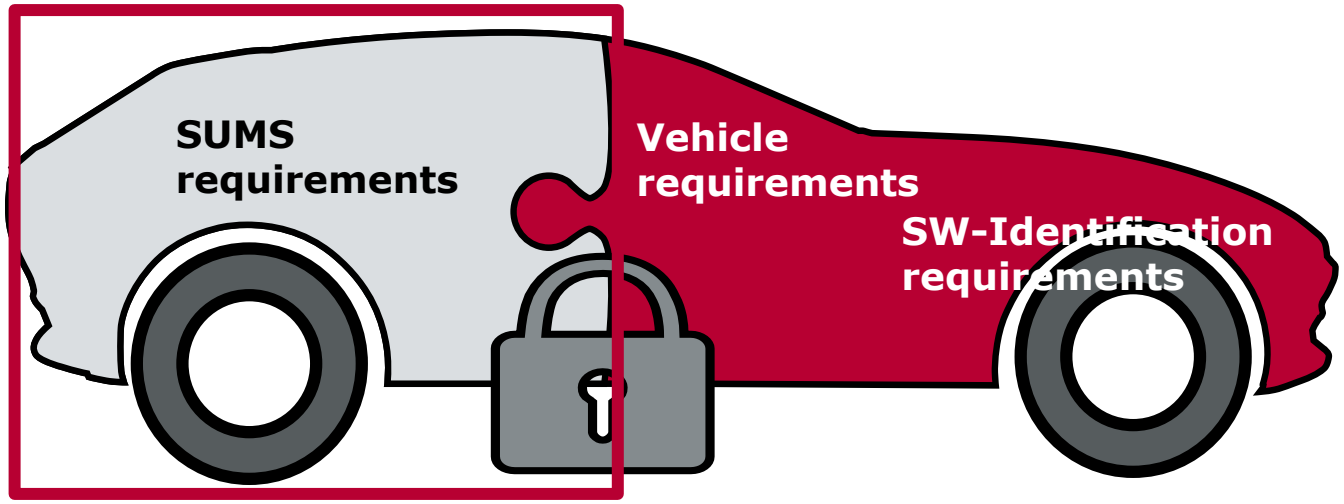
UNECE Regulation for CSMS (R.155) - Type Approval Requirements

- Cyber Security Management System is in place and its application to vehicles on the road is available
- Provide **risk assessment analysis**, identify what is critical
- **Mitigation measures** to reduce risks are identified
- Evidence, through testing, that **mitigation measures** work as intended
- Measures to **detect** and **prevent** cyber-attacks are in place
- Measures to support **data forensics** are in place
- **Monitor** activities specific for the vehicle type
- **Reports** of monitoring activities will be transmitted to the relevant homologation authority



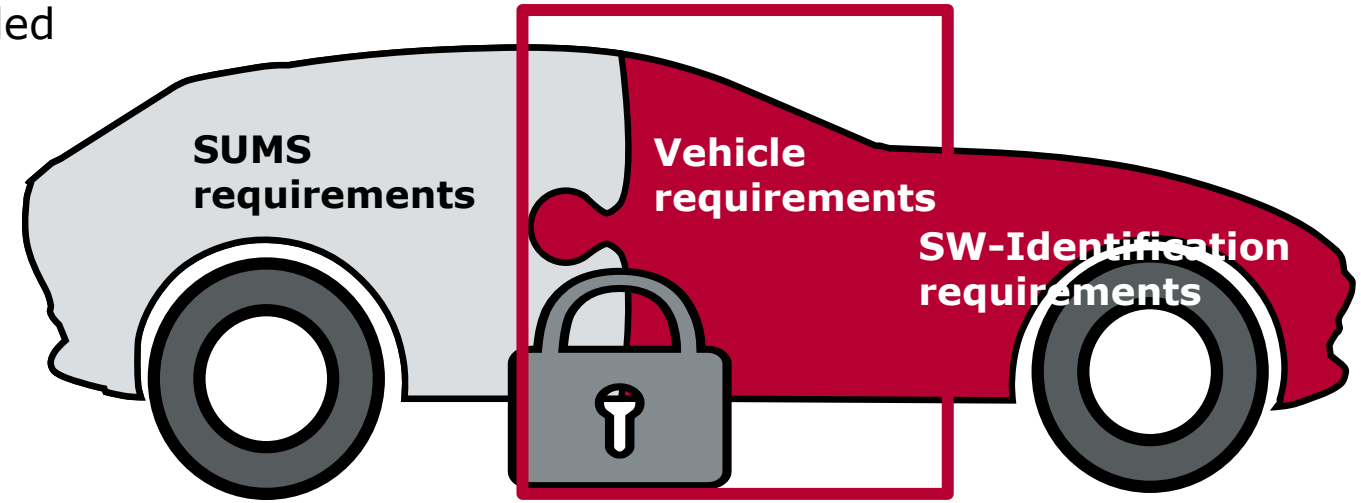
UNECE Regulation for SUMS (R.156) - Process Requirements

- **Configuration control** for recording the hardware and software versions relevant to a vehicle type, including integrity validation data for the software
- **Identifying the software** and hardware on a vehicle relevant to a specific UNECE regulation and tracking if that software changes (the **RXSWIN** concept)
- **Verifying** the software on a vehicle component is what should be there
- **Identifying interdependencies** of systems, particularly with respect to software updates
- **Identifying target vehicles** and verifying their compatibility with an update
- **Assess** if a software update will **affect type approvals such as safety** or other legally defined parameters for a given target vehicle (including adding or removing functionality)
- **Inform** vehicle owners of updates
- **Document** all of the above and make it available for inspection at an audit
- Ensure the **cybersecurity** of software updates before they are sent to a vehicle



UNECE Regulation for SUMS (R.156) - Type Approval Requirements

- Software Update Management System is in place and its application to vehicles on the road is available
- **Protect** SW Update delivery mechanism and ensure **integrity** and **authenticity**
- Handling RxSWIN(Software identification numbers) in the vehicle
- For Over-The-Air software updates:
  - Restore function if update fails
  - Execute update only if sufficient power
  - Ensure safe execution
  - Inform users about each update and about their completion
  - Ensure vehicle is capable of conducting update
  - Inform user when a mechanic is needed



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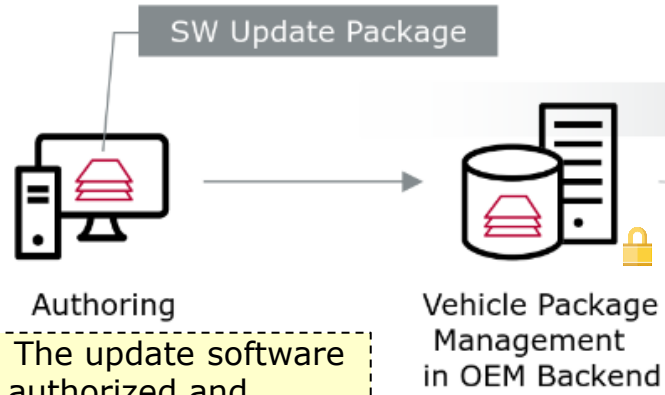
Scope of SUMS: from development to SW deployment in the vehicle

OEM Supplier

1. Assess if a software update will affect type approvals or other legally defined parameters for a given target vehicle (including adding or removing functionality)

OEM

2. Managing RXSWIN, SW/HW versions and VIN with its integrity information(e.g. Integrity validate data)



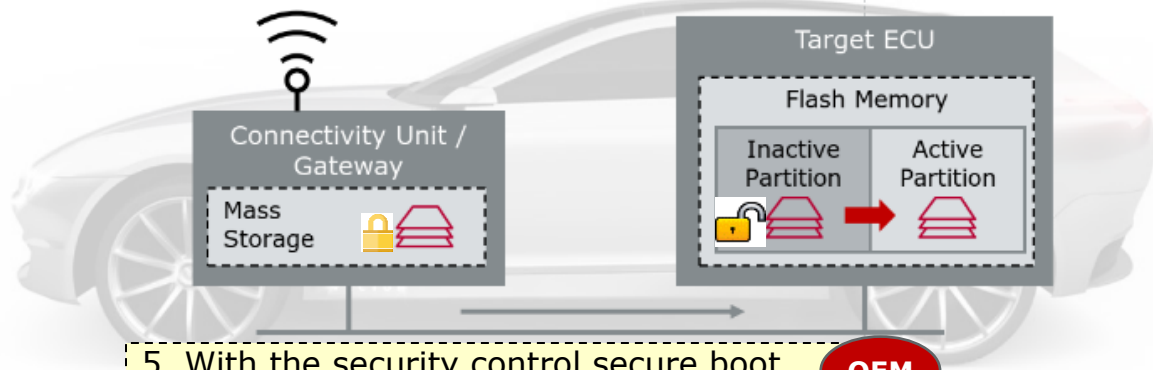
3. The update software is authorized and encrypted. A message authentication code (HMAC) guarantees the integrity while the encryption. (e.g. AES256 guarantees the confidentiality).

OEM Supplier

OEM

4. The update is securely delivered to the vehicle by means of Transport Layer Security (TLS).

Activate software update via Flash Bootloader



OEM

5. With the security control secure boot, the update is verified and decrypted.

OEM

6. The update is distributed and installation sequence started. Roll-back if necessary.

"*Integrity validation data*" means a representation of digital data, against which comparisons can be made to detect errors or changes in the data. This may include checksums and hash values.(R156.2.11)

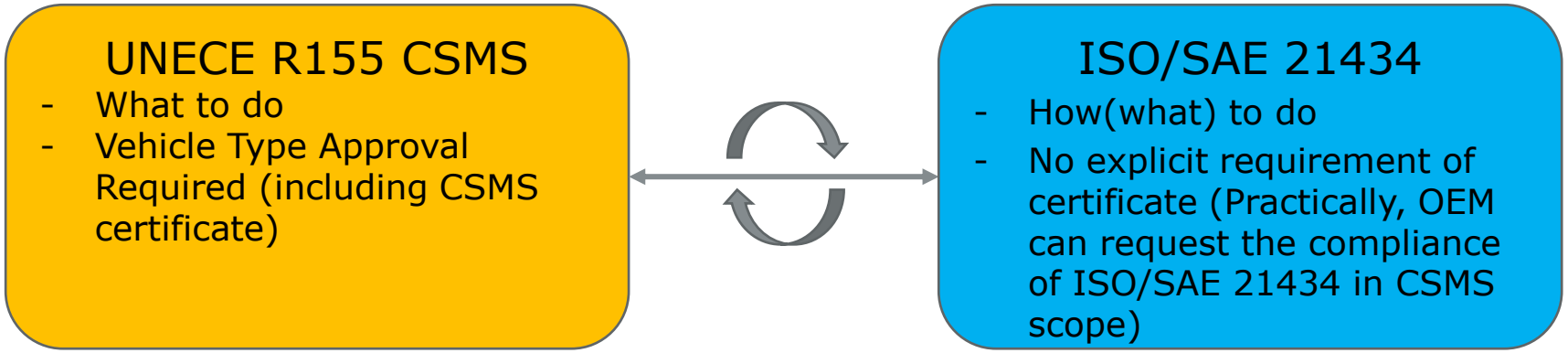
The scope of SUMS is not restricted by update method.

- e.g. via OTA, UDS and USB, which permit software updates after SOP

Type Approval, Certificate of Compliance for CSMS & SUMS

- **Type Approval**, **Certificate of Compliance** for CSMS & SUMS
  - An application shall be submitted by **the vehicle manufacturer** or by their duly accredited representative.
  - Carry out the assessment by the **Approval Authority** or its Technical Service
    - The example of the Approval Authority in EU
      - Netherlands - RDW (The Netherlands Vehicle Authority)
      - Germany - KBA (Kraftfahrt-Bundesamt, Federal Bureau of Motor Vehicles)
  - **Certificate of Compliance** for CSMS & SUMS
    - **An essential prerequisite** for the vehicle type approval
    - Shall remain valid for a maximum of three years from the date of deliverance of the certificate

- Relationship between regulation and standard(e.g. Cyber Security)



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How to achieve a liability of autonomous vehicle in practice

Product Liability:
A product, that is put in service,
must provide the level of safety which can be expected by general public.

Safety
- Automotive functional safety ISO 26262
- Coexistence of quality standards: ISO 26262 refers to shared methods across standards, e.g. TARA
- SOTIF: ISO 21448
- ISO PAS 8800 - Safety and artificial intelligence

Cybersecurity
- Product development: ISO 21434 / SAE 3061, (Cybersecurity process and lifecycle activities)
- Enterprise IT Security: ISO 27001 (Security mgmt), TISAX (Trusted Information Security Assessment Exchange)

Homologation (UNECE)
- R.155 CSMS
- R.156 SUMS
- R.157 ALKS (Automated Lane-Keeping Systems)
- R.160 EDR(Event Data Recorder)
- Will come more…

Process Maturity: ISO 330xx
Application of methodological Frameworks Automotive SPICE or CMMI

Product Development Process: ISO 9001, ISO/TS 16949

Grow Your Competences in Risk-Oriented Development

Engineering Trainings (https://academy.vector.com/kr/ko/courses-and-bookings)

- Cyber Security Workshop (2 Day, Seoul office,한국어)
- Functional Safety Workshop(3 Days, Seoul office,한국어)
- SUMS(UNECE R156) workshop (2 Day, Seoul office,한국어)
- Model Based Systems Engineering (1days, Seoul office,한국어)

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