



Implementing automotive software update management systems with ISO 24089

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Speakers



CheeKheong Lin

Principal Consultant
Mobility & Critical Systems
UL Solutions

- More than 20 years of experience in the domain of cybersecurity for automotive cybersecurity, smartcard, digital payment
- Provide advisory and consultation services to help organizations implement their CSMS (cybersecurity management system) and SUMS (software update management system) compliant with ISO/SAE 21434 and ISO 24089 respectively
- Together with Jako, developed the UL audit and certification program for ISO/SAE 21434



Jako Fritz

Principal Security Advisor
Identity Management and Security
UL Solutions

- Over a decade experience in the security field, working on topics such as developing cybersecurity defense techniques, mobile payment security, and automotive cybersecurity processes.
- Responsible for UL Solutions automotive cybersecurity certification program and UL Solutions' type approval services for UNECE R155 and UNECE R156.

Agenda

- Introduction
- UNECE WP.29 R156
- ISO 24089
- Summary

About this webinar

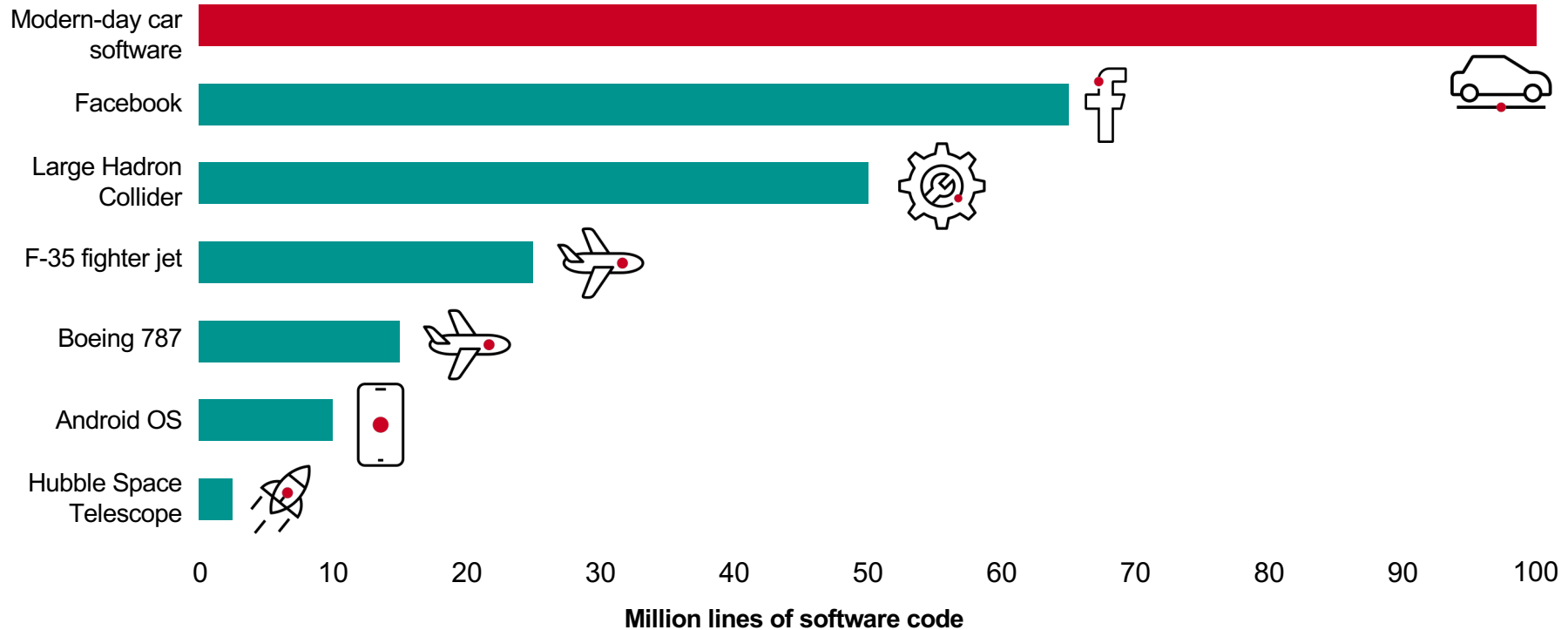
- Learn how the UNECE WP.29 R156 regulation impacts the automotive industry.
- Understand the requirements outlined in ISO 24089.
- Understand R156 and ISO 24089 compliance considerations for vehicle and component manufacturers.

Why now?

- Software-defined vehicles (SDV)
- Dramatic increase in software components in connected vehicles
- Results in increased attack surfaces and a need to rapidly update software components
- Software updates need to be performed safely and securely

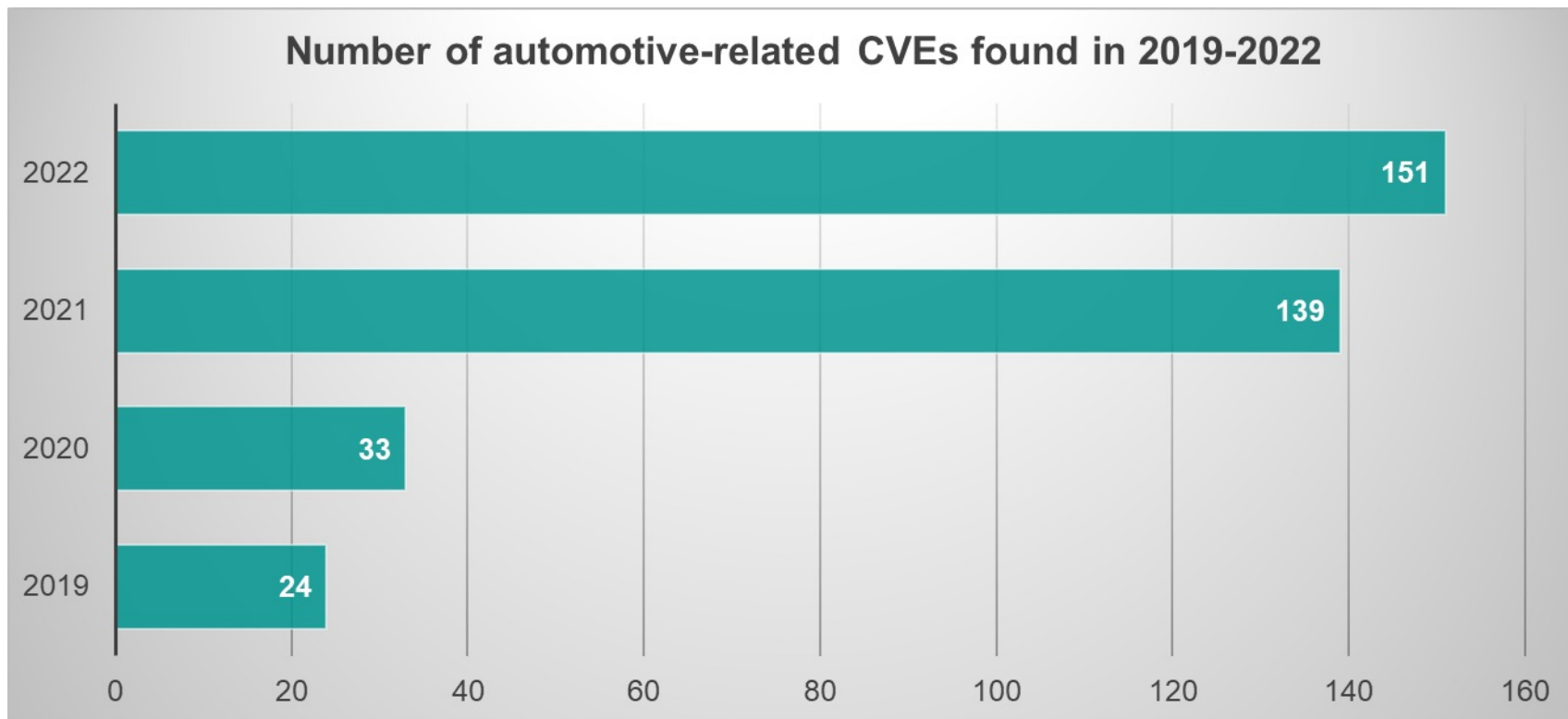


Why now?



Source: <http://www.informationisbeautiful.net>

Why now?



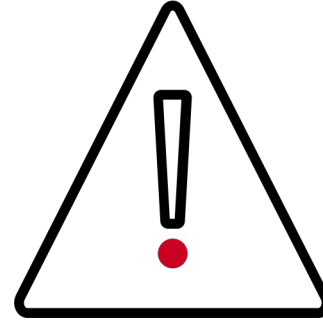
Software updates — benefits and challenges

Benefits



- New features in the vehicle
- Safety-related fixes
- Bug fixes
- Performance improvement
- Cybersecurity fixes and recovery
- Improved stability of the software

Challenges



- Long life span of vehicle (more than 10 years)
- No standard software update mechanism
- Safety and security risks
- Keeping accurate and current configuration information

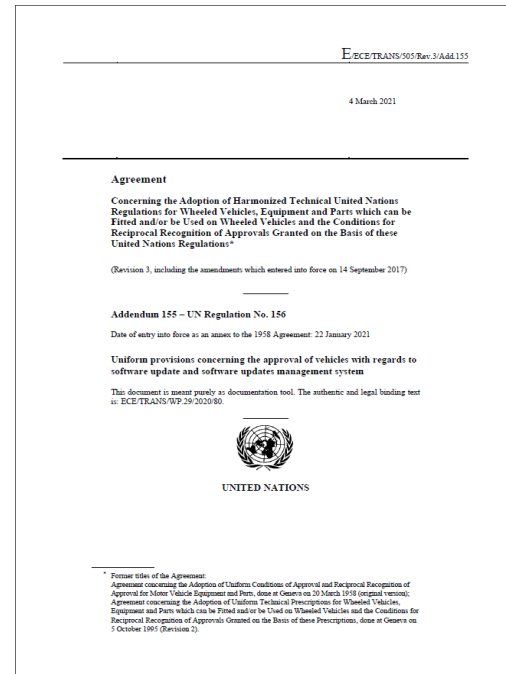
UNECE WP.29 R156, Software Update and Software Update Management System

Objectives

- Passenger and commercial vehicles
- Requirements for software updates
- Requirements for over-the-air (OTA) software updates

Approach

- Requirements for certification of software update management systems
- Method for approval of software updates
- Recommendations for safer execution of software updates in vehicles



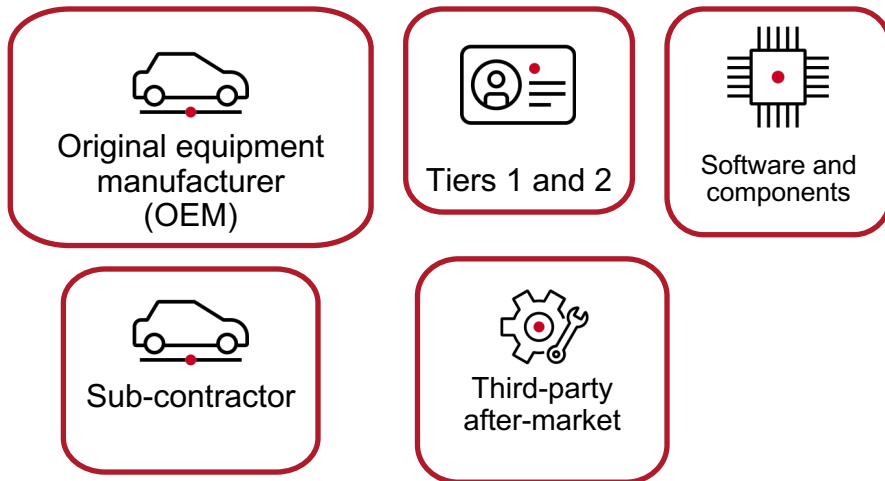
UNECE WP.29 R156, Software Update and Software Update Management System

Scope

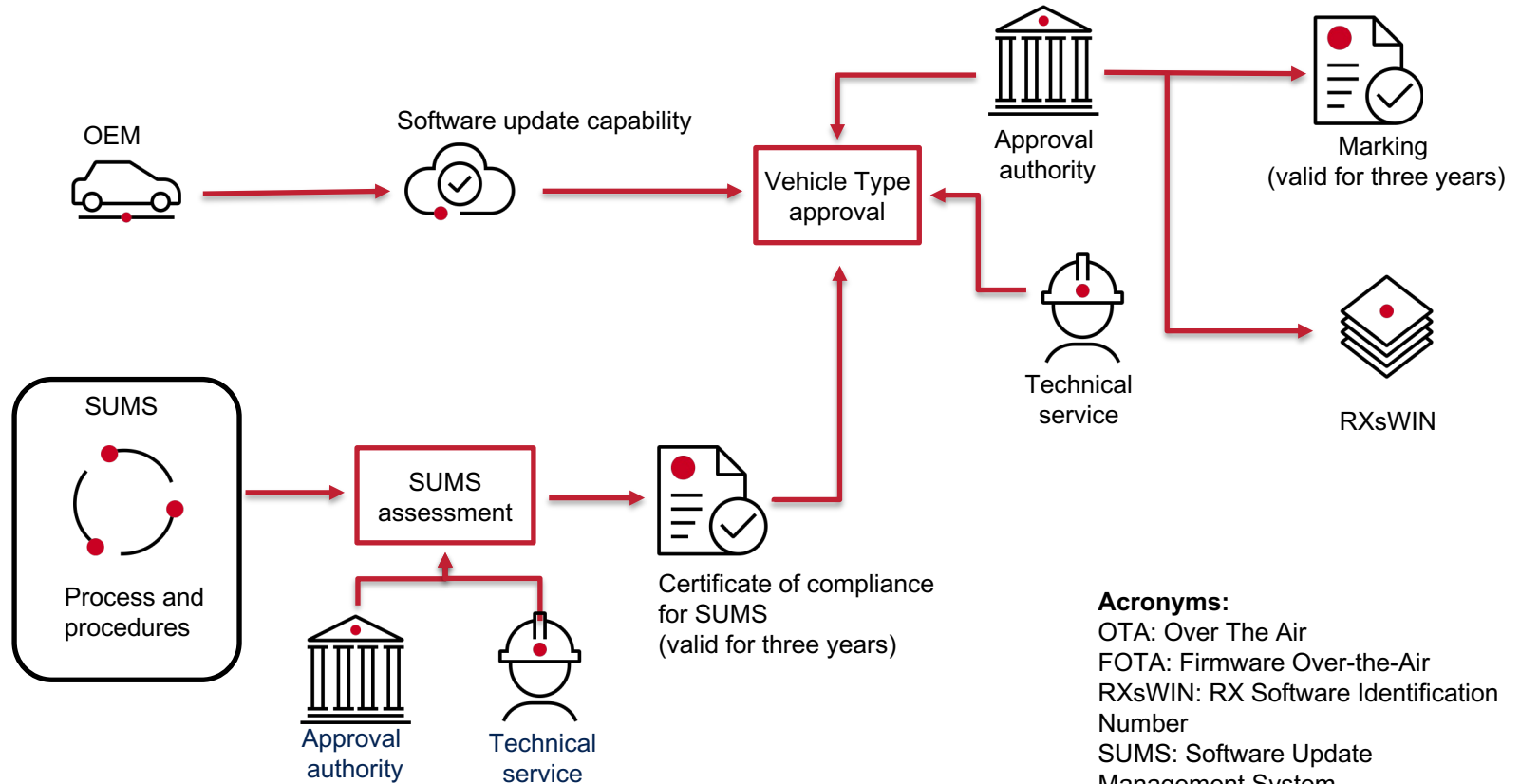
- Requirements for adaptation of vehicle software updates
- Requirements for software updates
- Requirements for over-the-air (OTA) software updates

Responsible parties

- Vehicle manufacturers
- Component manufacturers
- Contractual partners



UNECE WP.29 R156 — software update approval process



Regulation vs. standard

Regulation

- “What needs to be done”
- Mandates and outlines the approval process

UNECE WP.29 R156

- Requirements for adaptation of vehicle software update
- Requirements on how software changes should be managed
- Requirements for software update management system

Standard

- “How to do it”
- Guidance on how to meet requirements mentioned in the regulation

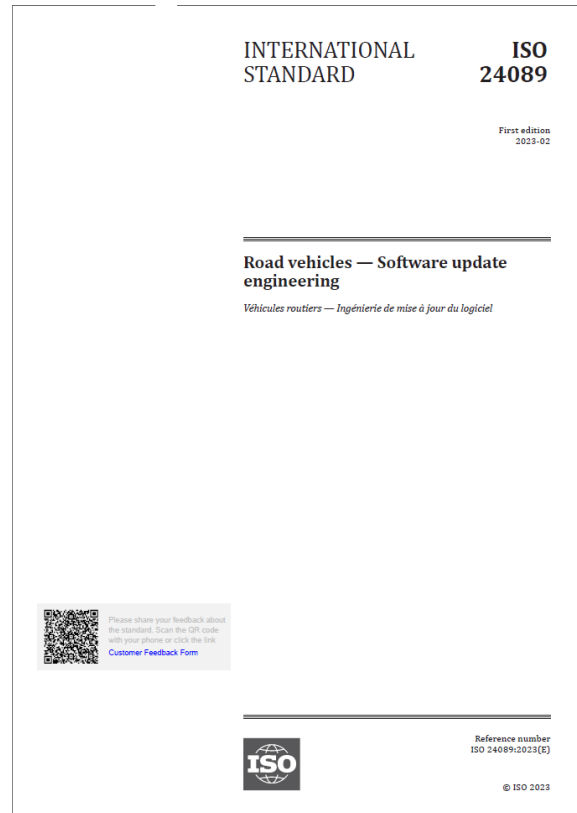
ISO 24089

- Ensures state-of-the-art for software update engineering
- Baseline for software update management system

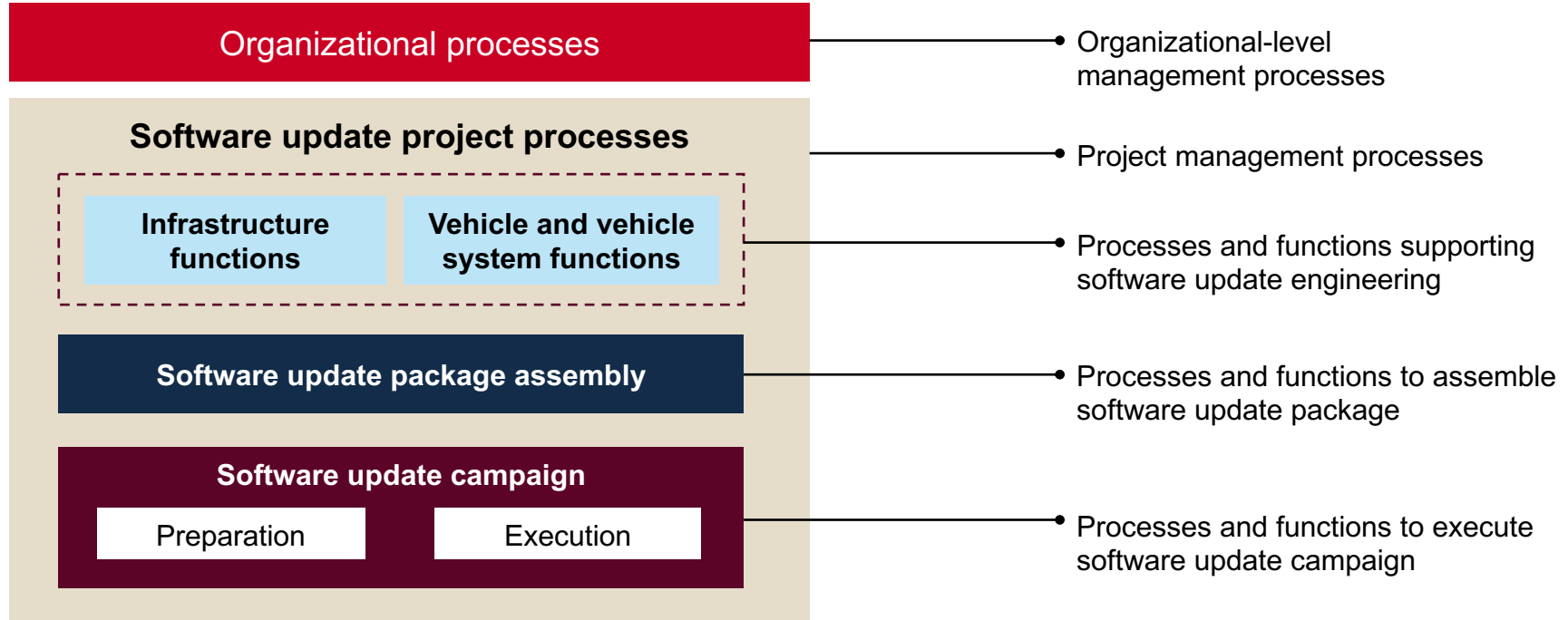
ISO 24089, Road Vehicles – Software Update Engineering (ECU)

Scope

- Software update engineering in road vehicles
- Deployment of software update packages to road vehicles
- ECUs with updatable software
- Applicable to vehicles, their systems and/or infrastructure



ISO 24089 – content



ISO 24089 – organizational processes

Objective:

Implementation of organizational policy, rules and processes for managing software updates.



Governance

- Rules
- Processes
- Guidelines



Continuous improvement

- Assessments
- Validations
- Adjustments



Information sharing

- What
- Who
- When
- How



Supporting processes

- Documents
- Requirements
- Privacy
- Configurations
- Changes



Auditing

- Systematic
- Internal and/or external

ISO 24089 – project processes

Objective: Ensures that project planning and management meet the rationale for having a software update without losing interoperability between infrastructure and vehicle capabilities.

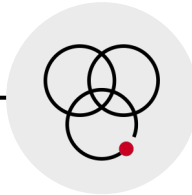
Project management

- Manage and store information
- Assign and document roles and responsibilities



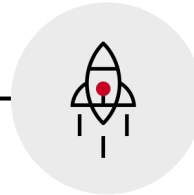
Tailoring and rationale

- A software update project may be tailored
- Rationale for tailoring



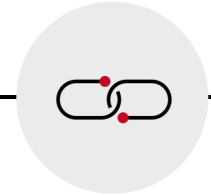
Interoperability

Maintenance of infrastructure for interoperability



Integrity

- Integrity of the software
- Integrity of the metadata or software update packages



ISO 24089 – infrastructure functions

Objective: Define the infrastructure requirements needed during development to support software update campaigns.



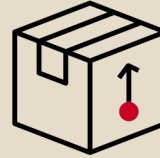
Manage risks



**Manage
configuration
information**



**Communicate
update campaign
information**



**Process
software update
packages**

ISO 24089 – vehicle and vehicle system functions



Risk management

- Safety risks
- Cybersecurity risks



Communication

- Provide information
- Obtain confirmation



Configuration information

- Identify components
- Collect information



Processing update packages

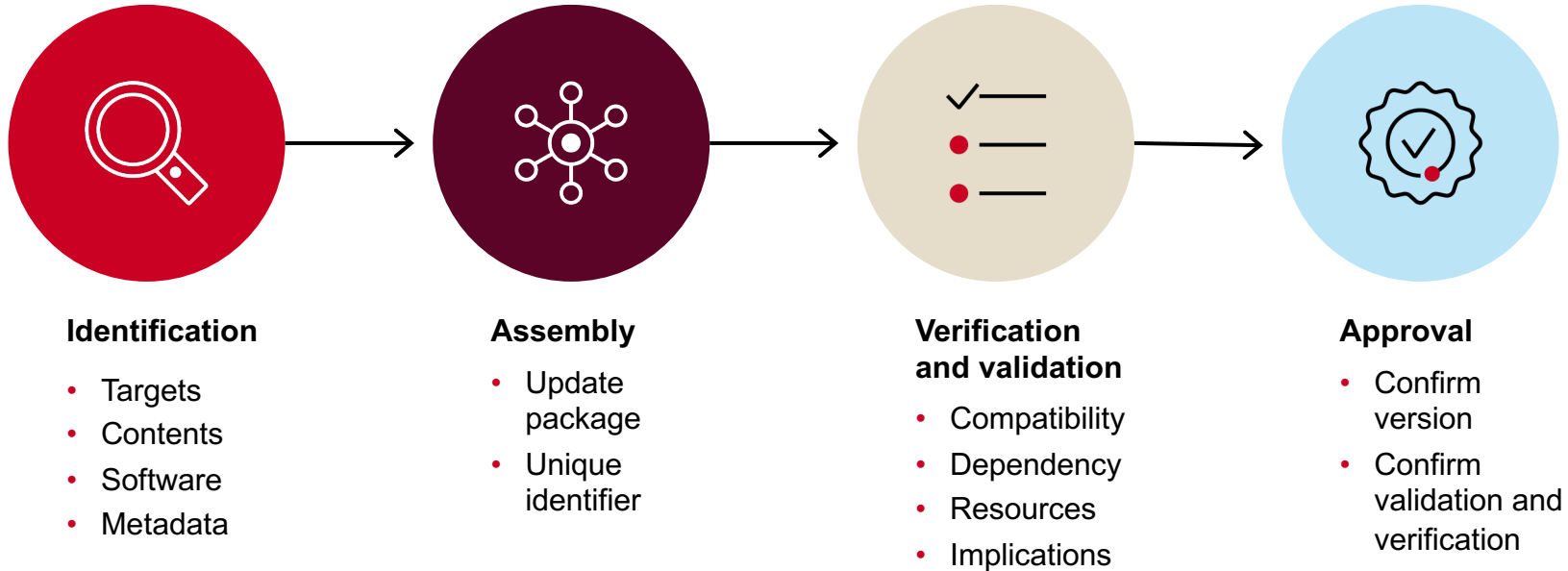
- Define preconditions
- Handle interruptions
- Verification
- Safe state use



Managing failure

- Safe state use
- Arbitrate simultaneous access

ISO 24089 – software update package



ISO 24089 – software update campaign

Preparation

- Define purpose
- Define roles and responsibilities
- Define approved packages
- Define target
- Define method, conditions, criteria

Execution

- Turn targets into recipients
- Deliver updates
- Verify package
- Inform user and obtain user confirmation
- Record execution status

Completion

- Store and manage records of the campaign
- Communicate end of update campaign

UNECE WP.29 R156 - Milestones

For the EU regulatory domain for software updates the following dates are driving compliance

- **2022** Mandatory for new vehicle types or extensions where type approval relevant software changes are performed.
- **2024** Mandatory for existing vehicle types where type approval relevant software changes are performed and for new vehicle types for any update capability.
- **2024** Mandatory for new vehicle types where with any update capability.
- **2026** Mandatory for existing vehicle type approvals with any kind of software update capability.
- **2029** mandatory for existing vehicles following a multistage build process.

Certification services

UN ECE R156

- Technical service for RDW

UNECE WP.29 R156

- Auditing of Software update management system (SUMS) according to R156
- Vehicle type approval according to the R156 regulation.
- Certification of SUMS process and vehicle type by road authority.

ISO 24089

- Process certification

ISO 24089

- Process audit verifying conformity with standard objectives
- UL Solution certificate of compliance

UNECE R156 SUMS & VTA

Software Update Management system

- Development and test requirements
- Deployment requirements
- OTA requirements
- Dependency on UN ECE R155

Vehicle type approval

- Documents how the updates will work
- Can be performed safely (functional safety)
- Describes how the user is informed
- Documenting RXSWIN

Takeaway

- Software updates are complex and critical operations affecting a vehicle's safety and security.
- UNECE WP.29 R156 – Regulation governing the handling of software updates of road vehicles
- ISO 24089 – Supports safer and more secure software update operations

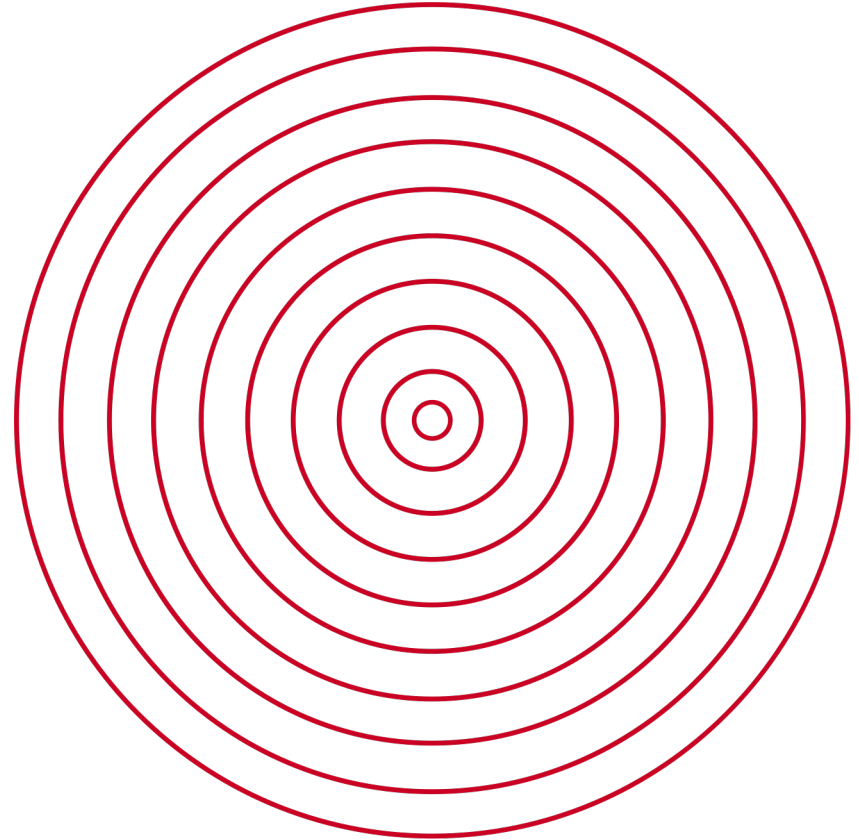


Questions?

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