

---

---

**Road vehicles — Software update  
engineering**

*Véhicules routiers — Ingénierie de mise à jour du logiciel*



This document is a preview generated by EUS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
3.1 General terminology.....	1
3.2 Terms related to the software update operation.....	5
<b>4 Organizational level</b> .....	<b>5</b>
4.1 Objectives.....	5
4.2 General.....	5
4.3 Requirements and recommendations.....	6
4.3.1 Governance.....	6
4.3.2 Continuous improvement.....	6
4.3.3 Information sharing.....	6
4.3.4 Supporting processes.....	7
4.3.5 Auditing.....	8
4.4 Work products.....	8
<b>5 Project level</b> .....	<b>8</b>
5.1 Objectives.....	8
5.2 General.....	8
5.3 Requirements and recommendations.....	9
5.3.1 Project management.....	9
5.3.2 Tailoring and rationale.....	9
5.3.3 Interoperability.....	9
5.3.4 Integrity.....	10
5.4 Work products.....	10
<b>6 Infrastructure level</b> .....	<b>10</b>
6.1 Objectives.....	10
6.2 General.....	10
6.3 Requirements and recommendations.....	11
6.3.1 Managing risk.....	11
6.3.2 Managing vehicle configuration information.....	11
6.3.3 Communicating software update campaign information.....	11
6.3.4 Processing software update packages.....	12
6.4 Work products.....	12
<b>7 Vehicle and vehicle systems level</b> .....	<b>13</b>
7.1 Objectives.....	13
7.2 General.....	13
7.3 Requirements and recommendations.....	13
7.3.1 Managing risks.....	13
7.3.2 Managing vehicle configuration information.....	14
7.3.3 Communicating software update campaign information.....	14
7.3.4 Processing software update packages.....	14
7.4 Work products.....	16
<b>8 Software update package</b> .....	<b>16</b>
8.1 Objectives.....	16
8.2 General.....	17
8.3 Requirements and recommendations.....	17
8.3.1 Identification of targets and the contents for the software update package.....	17
8.3.2 Assembly of the software update package.....	18
8.3.3 Verification and validation of the software update package.....	18

8.3.4	Approval for release of the software update package .....	18
8.4	Work products .....	19
<b>9</b>	<b>Software update campaign .....</b>	<b>19</b>
9.1	Objectives .....	19
9.2	General .....	19
9.3	Requirements and recommendations .....	19
9.3.1	Software update campaign preparation .....	19
9.3.2	Software update campaign execution .....	21
9.3.3	Software update campaign completion .....	23
9.4	Work products .....	23
	<b>Bibliography .....</b>	<b>24</b>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 22, *Road Vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Electronic control units and software of increasing complexity have become essential to the operation of road vehicles in recent years. This software is often updated to increase functionality and maintain the safety and cybersecurity of road vehicles.

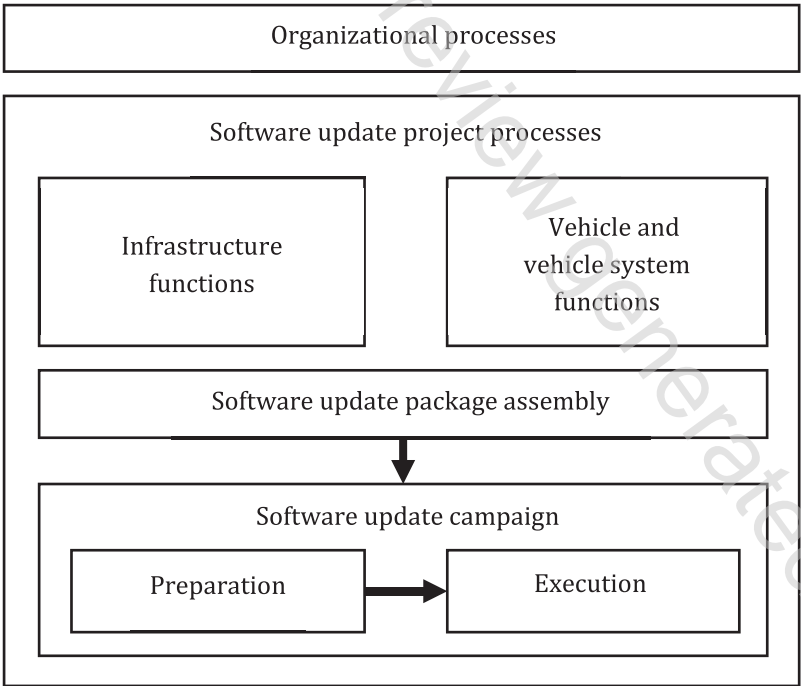
Today, in-vehicle software is updated in a workshop by a skilled person or automatically over-the-air by the vehicle user. With the increased frequency of software update campaigns, it is important to have individual vehicle configuration information. Therefore, the establishment and application of software update engineering is important to ensure software quality, cybersecurity, and safety.

Software update engineering activities occur throughout the life cycle of vehicles.

This document provides terminology, objectives, requirements, and guidelines related to software update engineering as a foundation for common understanding throughout the supply chain. By applying requirements and recommendations in this document, the following benefits can be achieved for software update engineering:

- safety and cybersecurity are addressed in software update operations in road vehicles;
- establishment of processes, including goal setting, planning, auditing, process monitoring, process measurement, and process improvement;
- shared awareness of safety and cybersecurity among related parties.

[Figure 1](#) shows the overview of this document.



**Figure 1 — Overview of this document**

In this document, clauses are structured using the following approach:

- each process is defined and implemented before it is executed;
- each process is established, documented and maintained.

This document describes the following activities:

- implementation of organizational level processes for software update engineering;
- implementation of software update project level processes for each software update project;
- definitions of functions for the vehicle and infrastructure to support the activities and processes of this document;
- assembly of software update packages using functions in the infrastructure;
- preparation and execution of software update campaigns using functions in the vehicle and infrastructure.





# Road vehicles — Software update engineering

## 1 Scope

This document specifies requirements and recommendations for software update engineering for road vehicles on both the organizational and the project level.

This document is applicable to road vehicles whose software can be updated.

The requirements and recommendations in this document apply to vehicles, vehicle systems, ECUs, infrastructure, and the assembly and deployment of software update packages after the initial development.

This document is applicable to organizations involved in software update engineering for road vehicles. Such organizations can include vehicle manufacturers, suppliers, and their subsidiaries or partners.

This document establishes a common understanding for communicating and managing activities and responsibilities among organizations and related parties.

The development of software for vehicle functions, except for software update engineering, is outside the scope of this document.

Finally, this document does not prescribe specific technologies or solutions for software update engineering.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 26262-6, *Road vehicles — Functional safety — Part 6: Product development at the software level*

ISO 26262-8, *Road vehicles — Functional safety — Part 8: Supporting processes*

ISO/SAE 21434, *Road vehicles — Cybersecurity engineering*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1 General terminology

#### 3.1.1

##### **compatibility**

capability of *software* (3.1.15) to be executable on *vehicle systems* (3.1.25) without conflicts

Note 1 to entry: Compatibility can be checked by *vehicle configuration information* (3.1.24).