

# AVCDL Phase Requirement Product ISO/SAE 21434 Work Product Fulfillment Summary

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## Abstract

This document summarizes how **AVCDL** phase requirement products fulfill **ISO/SAE 21434** work products.

## Motivation

This document is motivated by the need to justify the sufficiency of the **AVCDL** as a tailoring of **ISO/SAE 21434**.

## Audience / Use of ISO/SAE 21434 Text

The audience for this document is the certifying organization. As such it is necessary to provide excerpts from **ISO/SAE 21434** itself in order to provide evidence of sufficiency.

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**Note:** This material is extracted from the ISO/SAE 21434 specification. It is included here for reference only.

# ISO/SAE 21434 AVCDL Coverage

The following clauses are within the scope of the **AVCDL**:

- Distributed Cybersecurity Activities (7)
- Continuous Cybersecurity Activities (8)
- Concept (9)
- Product Development (10)
- Cybersecurity Validation (11)
- Production (12)
- Operations and Maintenance (13)
- End of Cybersecurity Support and Decommissioning (14)
- Threat Analysis and Risk Assessments Methods (15)

The following clauses are outside the scope of the **AVCDL**:

- Cybersecurity Management
  - Organizational Cybersecurity Management (5)
  - Project Dependent Cybersecurity Management (6)

**Note:** Out-of-scope activities are addressed in organizational-level documentation.

# Organizational Cybersecurity Management (5)

## WP-05-01: Cybersecurity policy, rules and processes

**Note:** This work product is addressed in the organizational-level documentation.

- [RQ-05-01] cybersecurity policy
- [RQ-05-02] organization-specific rules and processes
- [RQ-05-03] roles and responsibilities
- [RQ-05-04] cybersecurity resources
- [RQ-05-05] communication channels
- [RQ-05-06] cybersecurity culture
- [RQ-05-07] ensure competency
- [RQ-05-08] continuous improvement process
- [RQ-05-09] information sharing criteria

## Discussion

Although the **AVCDL** does not directly address this work product, as it is an organization-level responsibility, there is discussion in the **AVCDL** primary document and **AVCDL** phase requirements which support the organization in fulfilling this work product.

- [Foundation-1] [Training Catalog \(Foundation-1.1\)](#)
- [Foundation-1] [System to Track Training Participation \(Foundation-1.2\)](#)
- [Foundation-2] [Roles and Responsibilities Document \(Foundation-2.1\)](#)

**Communication channels** are addressed in the **AVCDL** primary document section 3.3 – **Inter-group Communication**. **Continuous improvement** is addressed in the **AVCDL** primary document section 5 – **Continuous Improvement**. **Information sharing** is addressed in the **AVCDL** primary document section 3.2 – **Information Sharing**.

## WP-05-02: Evidence of competence management, awareness management and continuous improvement

**Note:** This work product is addressed in the organizational-level documentation.

[RQ-05-07] ensure competency

[RQ-05-08] continuous improvement process

### Discussion

Although the **AVCDL** does not directly address this work product, as it is an organization-level responsibility, there is discussion in the **AVCDL** primary document and **AVCDL** phase requirements which support the organization in fulfilling this work product.

[Foundation-1] [Training Catalog \(Foundation-1.1\)](#)

[Foundation-1] [System to Track Training Participation \(Foundation-1.2\)](#)

**Continuous improvement** is addressed in the **AVCDL** primary document section 5 – **Continuous Improvement**.

## WP-05-03: Evidence of the organization's management systems

**Note:** This work product is addressed in the organizational-level documentation.

[RQ-05-11] quality management system

[RQ-05-12] track product cybersecurity until end-of-life

## WP-05-04: Evidence of tool management

**Note:** This work product is addressed in the organizational-level documentation.

[RQ-05-14] tool management

### Discussion

Although the **AVCDL** does not directly address this work product, as it is an organization-level responsibility, there are **AVCDL** phase requirements which support the organization in fulfilling this work product.

[Foundation-3] [List of Approved Tools and Components \(Foundation-3.1\)](#)

## WP-05-05: Organizational cybersecurity audit report

**Note:** This work product is addressed in the organizational-level documentation.

[RQ-05-17] cybersecurity audit

# Project Dependent Cybersecurity Management (6)

## WP-06-01: Cybersecurity plan

**Note:** This work product is addressed in the organizational-level documentation.

- [RQ-06-01] assign project responsibilities
- [RQ-06-02] identify cybersecurity-relevant components
- [RQ-06-03] cybersecurity plan content
- [RQ-06-04] assign project tracking responsibilities
- [RQ-06-05] cybersecurity plan style
- [RQ-06-06] include cybersecurity in project plan
- [RQ-06-07] keep cybersecurity plan updated
- [RQ-06-09] keep cybersecurity work products updated
- [RQ-06-10] cybersecurity supplier interface definition
- [RQ-06-11] cybersecurity plan in QMS
- [RQ-06-12] work products in QMS
- [RQ-06-14] tailored activity justification
- [RQ-06-15] reuse analysis
- [RQ-06-16] reuse analysis composition 1
- [RQ-06-17] reuse analysis composition 2
- [RQ-06-18] out-of-context tailored activities
- [RQ-06-19] out-of-context development
- [RQ-06-20] out-of-context integration
- [RQ-06-21] off-the-shelf component use
- [RQ-06-22] off-the-shelf component documentation deficiency

## Discussion

Although the **AVCDL** does not directly address this work product, as it is an organization-level responsibility, there is discussion in the **AVCDL** primary document and **AVCDL** phase requirements which support the organization in fulfilling this work product.

- [Foundation-2]      [Roles and Responsibilities Document \(Foundation-2.1\)](#)
- [Supplier-3]        [Cybersecurity Interface Agreement \(Supplier-3.1\)](#)

## WP-06-02: Cybersecurity case

**Note:** This work product is addressed in the organizational-level documentation.

- [RQ-06-23] cybersecurity case

## WP-06-03: Cybersecurity assessment report

**Note:** This work product is addressed in the organizational-level documentation.

- [RQ-06-24] per component assessment rationale
- [RQ-06-25] component assessment rationale review
- [RQ-06-26] component assessment sufficiency
- [RQ-06-27] assessor independence
- [RQ-06-28] assessment-necessary information access
- [RQ-06-30] assessment scope
- [RQ-06-31] assessment recommendations
- [RQ-06-32] conditional acceptance

### Discussion

Although the **AVCDL** does not directly address this work product, as it is an organization-level responsibility, there are **AVCDL** phase requirements which support the organization in fulfilling this work product.

[Design-2]                      [Security Design Review Report \(Design-2.1\)](#)

## WP-06-04: Release for post-development report

**Note:** This work product is addressed in the organizational-level documentation.

- [RQ-06-33] work products required before release
- [RQ-06-34] evidence required before release

### Discussion

Although the **AVCDL** does not directly address this work product, as it is an organization-level responsibility, there are **AVCDL** phase requirements which support the organization in fulfilling this work product.

[Release-1]                      [Final Security Review Report \(Release-1.1\)](#)

# Distributed Cybersecurity Activities (7)

**Note:** The following two (2) requirements are not attached to any work products

## WP-07-X1: Supplier Capability

[RQ-07-01] evaluate supplier cybersecurity capability

[Supplier-1] [AVCMDS \(Supplier-1.1\)](#)

[Supplier-2] [Supplier Self-reported Maturity \(Supplier-2.1\)](#)

## WP-07-X2: Supplier Cybersecurity Quote

[RQ-07-03] supplier cybersecurity quote

**Note:** The work products related to this requirement are addressed by organization-level processes.

## WP-07-01: Cybersecurity Interface Agreement

[RQ-07-04] supplier cybersecurity interface agreement

[RQ-07-06] supplier vulnerability activities

[RQ-07-07] extra-cybersecurity CIA conflict

[Supplier-3] [Cybersecurity Interface Agreement \(Supplier-3.1\)](#)

# Continual Cybersecurity Activities (8)

## Cybersecurity Monitoring (8.3)

WP-08-01: Sources for cybersecurity monitoring

[RQ-08-01] cybersecurity monitoring sources

[\[Foundation-7\] Cybersecurity Monitoring Plan \(Foundation-7.1\)](#)

WP-08-02: Triage triggers of cybersecurity information

[RQ-08-02] cybersecurity triage triggers

[\[Foundation-7\] Cybersecurity Monitoring Plan \(Foundation-7.1\)](#)

WP-08-03: Cybersecurity event triage

[RQ-08-03] cybersecurity event triage

[\[Foundation-7\] Incident Response Plan \(Foundation-7.2\)](#)

[\[Operation-1\] Cybersecurity Incident Report \(Operation-1.1\)](#)

## Cybersecurity Event Evaluation (8.4)

WP-08-04: Cybersecurity event assessment

[RQ-08-04] cybersecurity event assessment

[\[Foundation-7\] Incident Response Plan \(Foundation-7.2\)](#)

[\[Operation-2\] Cybersecurity Incident Report \(Operation-1.1\)](#)

## Vulnerability Analysis (8.5)

WP-08-05: Vulnerability analysis

[RQ-08-05] identified weaknesses analysis

[RQ-08-06] weakness rejection rationale

[\[Foundation-7\] Incident Response Plan \(Foundation-7.2\)](#)

[\[Operation-2\] Cybersecurity Incident Report \(Operation-1.1\)](#)



## Vulnerability Management (8.6)

WP-08-06: Evidence of managed vulnerabilities

[RQ-08-07] vulnerability management

[Foundation-7] Incident Response Plan (Foundation-7.2)

[Foundation-9] Threat Prioritization Plan (Foundation-9.1)

[Design-4] Ranked / Risked Threat Report (Design-4.2)

[Operation-3] Cybersecurity Incident Report (Operation-1.1)

### Unanchored Work Product (8.6.2)

**Note:** The following requirement is not attached to any work products

WP-08-X1: Apply incident response protocols

[RQ-08-08] apply incident response protocols

[Foundation-7] Incident Response Plan (Foundation-7.2)

[Operation-2] Cybersecurity Incident Report (Operation-1.1)

# Concept (9)

## Item Definition (9.3)

WP-09-01: Item definition

[RQ-09-01] item definition

[RQ-09-02] item operational information

[\[Requirements-1\] Product-level Security Goals \(Requirements-1.1\)](#)

[\[Requirements-1\] Product-level Security Requirements \(Requirements-1.2\)](#)

## Cybersecurity Goals (9.4)

WP-09-02: Threat analysis and risk assessment

[RQ-09-03] item analysis

[RQ-09-04] risk treatment

[\[Design-4\] Threat Modeling Report \(Design-4.1\)](#)

[\[Design-4\] Ranked / Risked Threat Report \(Design-4.2\)](#)

[\[Design-4\] Threat Report \(Design-4.3\)](#)

WP-09-03: Cybersecurity goals

[RQ-09-05] risk treatment to cybersecurity goal mapping

[\[Design-4\] Threat Report \(Design-4.3\)](#)

WP-09-04: Cybersecurity claims

[RQ-09-06] cybersecurity claims

[\[Design-4\] Threat Report \(Design-4.3\)](#)

WP-09-05: Verification report

[RQ-09-07] goals / claims verification report

[\[Design-4\] Threat Report \(Design-4.3\)](#)

## Cybersecurity Concept (9.5)

### WP-09-06: Cybersecurity concept

[RQ-09-08] cybersecurity requirements to goals mapping

[RQ-09-09] requirements operational information

[RQ-09-10] attach requirements to components

[Design-1] [Design Showing Security Considerations \(Design-1.1\)](#)

### WP-09-07: Verification report of cybersecurity concept

[RQ-09-11] requirements allocation verification report

[Design-2] [Security Design Review \(Design-2.1\)](#)

# Product Development (10)

## Design (10.4.1)

### WP-10-01: Refined cybersecurity specification

[RQ-10-01] refined cybersecurity requirements

[RQ-10-02] requirement component allocation

[Design-1] [Design Showing Security Considerations \(Design-1.1\)](#)

### WP-10-02: Cybersecurity requirements for post-development

[RQ-10-03] post-development cybersecurity consideration

[Requirements-2] [Product-level Security Requirements \(Requirements-2.1\)](#)

### WP-10-03: Documentation of the modeling, design, or programming languages and coding guidelines

[RQ-10-04] tool selection criteria

[RQ-10-05] tool insufficiency mitigation

[Foundation-3] [List of Approved Tools \(Foundation-3.1\)](#)

### WP-10-04: Verification report for the cybersecurity specifications

[RQ-10-08] cybersecurity specifications verification

[Verification-2] [Updated Threat Model \(Verification-2.1\)](#)

[Verification-3] [Updated Attack Surface Model \(Verification-3.1\)](#)

## Integration and Verification (10.4.2)

### WP-10-05: Vulnerability analysis report

- [RQ-10-07] cybersecurity requirement verification
- [RC-10-12] verification of weaknesses minimization
- [RQ-10-13] documented rationale for not testing

- [Verification-2] [Updated Threat Model \(Verification-2.1\)](#)
- [Verification-3] [Updated Attack Surface Model \(Verification-3.1\)](#)

### WP-10-06: Integration and verification specification

- [RQ-10-10] integration and verification specification

- [Verification-1] [Penetration Testing Report \(Verification-1.1\)](#)
- [Verification-2] [Threat Model Review \(Verification-2.1\)](#)
- [Verification-3] [Attack Surface Analysis Review \(Verification-3.1\)](#)

### WP-10-07: Integration and verification reports

- [RQ-10-09] verification of requirements fulfillment
- [RQ-10-11] test coverage metrics
- [RC-10-12] verification of weaknesses minimization
- [RQ-10-13] documented rationale for not testing

- [Implementation-11] [Implementation Phase Gate \(Implementation-11.1\)](#)
- [Verification-4] [Verification Phase Gate \(Verification-4.1\)](#)

# Cybersecurity Validation (11)

## Cybersecurity Validation of the Item at Vehicle Level (11.0)

WP-11-01: Validation report

[RQ-11-01] validation activities

[RQ-11-02] validation activities rationale

[\[Verification-4\] Verification Phase Gate \(Verification-4.1\)](#)

# Production (12)

## Production (12.0)

WP-12-01: Production control plan

[RQ-12-01] production control plan

[RQ-12-02] production control plan specification

[\[Foundation-6\] Release Integrity Plan \(Foundation-6.1\)](#)

[\[Foundation-10\] Deployment Plan \(Foundation-10.1\)](#)

**Note:** The following requirement is not attached to any work products

WP-12-X1: Production control plan implementation

[RQ-12-03] production control plan implementation

[\[Operation-4\] Software Deployment Report \(Operation-4.1\)](#)

## Operations and Maintenance (13)

### Cybersecurity Incident Response (13.3)

WP-13-01: Cybersecurity incident response plan

[RQ-13-01] incident response plan

[\[Foundation-7\] Incident Response Plan \(Foundation-7.2\)](#)

WP-13-X1: Cybersecurity incident response plan implementation

[RQ-13-02] incident response plan implementation

[\[Operation-1\] Cybersecurity Incident Report \(Operation-1.1\)](#)

### Updates (13.4)

**Note:** The following requirement is not attached to any work products

WP-13-X2: Update implementation

[RQ-13-03] update plan

[\[Foundation-10\] Deployment Plan \(Foundation-10.1\)](#)



## End of Cybersecurity Support/Decommissioning (14)

### WP-14-01 Procedures to communicate end of cybersecurity support

[RQ-14-01] procedures to communicate cybersecurity end-of-support

[\[Foundation-8\] Decommissioning Plan \(Foundation-8.1\)](#)

**Note:** The following requirement is not attached to any work products

### WP-14-X1 Decommissioning requirements

[RQ-14-02] decommissioning cybersecurity requirements

[\[Foundation-8\] Decommissioning Plan \(Foundation-8.1\)](#)

# Threat Analysis and Risk Assessment Methods (15)

**Note:** Further elaboration on this topic is provided in **Understanding TARA in an AVCDL Context** AVCDL elaboration document.

## WP-15-01: Damage scenarios

[RQ-15-01] damage scenarios

[Design-4] [Ranked / Risked Threat Report \(Design-4.2\)](#)

## WP-15-02: Identified assets and cybersecurity properties

[RQ-15-02] asset identification

[Design-1] [Design Showing Security Considerations \(Design-1.1\)](#)

## WP-15-03: Threat scenarios

[RQ-15-03] threat scenarios identification

[Design-4] [Threat Modeling Report \(Design-4.1\)](#)

## WP-15-04: Impact rating

[RQ-15-04] damage scenarios impact analysis

[RQ-15-05] damage scenario impact severity

[RQ-15-06] safety impact ratings

[Design-4] [Ranked / Risked Threat Report \(Design-4.2\)](#)

## WP-15-05: Attack paths

[RQ-15-08] attack paths identification

[RQ-15-09] attack path mapped to threat scenario

[Design-4] [Ranked / Risked Threat Report \(Design-4.2\)](#)

## WP-15-06: Attack feasibility rating

[RQ-15-10] attack feasibility rating

[Design-4] [Ranked / Risked Threat Report \(Design-4.2\)](#)

## WP-15-07: Risk values

[RQ-15-15] risk value determination

[RQ-15-16] risk value scale

[Design-4] [Ranked / Risked Threat Report \(Design-4.2\)](#)

## WP-15-08: Risk treatment decision per threat scenario

[RQ-15-17] risk treatment considerations

[Design-4] [Threat Report \(Design-4.3\)](#)