Joint Quality Management in the Supply Chain

Automotive SPICE®

Potential Analysis

Process Reference and Assessment Model
based on Automotive SPICE® and Automotive SPICE® for Cybersecurity

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供应链中的
共同质量管理

Automotive SPICE®
潜在分析

基于 Automotive SPICE®和 Automotive SPICE®网络安全的
过程参考模型和过程评估模型

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关于翻译

本文为 Automotive SPICE 潜在分析过程参考模型及过程评估模型的中文翻译版，是为了帮助读者更好理解英语版原文内容。本文仅限于参考，如果存在对中文翻译内容的疑问，须确认 www.automotivespice.com 所提供的英语版原文内容。

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Terms and glossary

Automotive SPICE® Potential Analysis consists of a subset of Automotive SPICE® 4.0 and Automotive SPICE® for Cybersecurity Rev.1. Terms and definitions are not repeated here and can be referred to in the respective volumes.

Please refer to [ISO33001] for a full glossary of the terms used in the ISO/IEC 330xx series.

术语和词汇表

Automotive SPICE® 潜在分析由 Automotive SPICE® 4.0 和 Automotive SPICE®网络安全 Rev.1 的过程子集组成。 术语和定义在此不再赘述，可参阅相关卷册。

如需 ISO/IEC 330xx 系列术语的完整词汇表，请参阅 [ISO33001]。

1 Introduction

1.1 Scope

The Automotive SPICE® Potential Analysis (ASPICE PoA) provides a standardized method to support the evaluation of the capability of a potential collaboration or partnership to realize and deliver a planned product or service. This is not limited to customer-supplier relations only.

The Automotive SPICE® Potential Analysis is intended to be used as a precondition to a customer awarding a contract for a specific product or service or to substitute a missing (Automotive SPICE®) Supplier Self Evaluation (SuSE).

For nominated or established partners, the application of Automotive SPICE® Potential Analysis can reduce risk by evaluating whether a partner is able to realize products within the established organization in the context of constraints or other limitations from the customer. Additionally Automotive SPICE® Potential Analysis can be used for process improvement, e.g. to support problem analysis efforts.

The Automotive SPICE® Potential Analysis is applicable to all types of software-based systems including Commercial of the shelf (COTS) and legacy content if suitable and appropriate.

Since an evaluation of partners with the Automotive SPICE® Potential Analysis is only based on an exemplary project, the result is only valid to a very limited extent. Use of the conclusions over a longer period, or changed conditions, should be avoided.

Results of Automotive SPICE® Potential Analysis are only representative for a limited period. The duration of the acceptance period must be agreed between the partners.

Compared to an Automotive SPICE® 4.0 Assessment, the Automotive SPICE® Potential Analysis has a reduced content. It focuses on capability level 1 and requires a smaller number of samples to be evaluated and therefore less time, the availability of which is often very limited in a nomination phase or in critical project situations.

An Automotive SPICE® Potential Analysis can be used as a first step to reach a defined Automotive SPICE level. It may follow a supplier self-evaluation or directly represent the first step towards to an agreed capability level. In any case, identified weaknesses can serve as input to an improvement program to prepare for a full Automotive SPICE® 4.0 Assessment without another prior Potential Analysis. As such, the Automotive SPICE® 4.0 Assessment also intends to increase the acceptance and application of Automotive SPICE®.

Automotive SPICE® Potential Analysis is based on the contents of Automotive SPICE® 4.0 and Automotive SPICE® for Cybersecurity 1.0, contains only a subset of these volumes and is not an extension to them. Evaluation has to be done in relation to this reduced content, therefore the assessors' understanding of completeness has to be aligned to it. The individual reasons and motivation of the reduction are described as "Rationales".

The evaluation considers the changed purpose of the Automotive SPICE® Potential Analysis. A different assessment rating scheme is also used to differentiate its results to Automotive SPICE® 4.0 Assessment results.

The Automotive SPICE® Potential Analysis follows the same principles of Automotive SPICE® with methodological freedom and individually assessable processes.

1 介绍

1.1 范围

Automotive SPICE® 潜在分析（ASPICE PoA）提供了一种标准化方法，用于支持对实现和交付计划的产品或服务的潜在协作或伙伴关系进行能力评估。这不仅限于客户与供应商之间的关系。

Automotive SPICE® 潜在分析旨在作为客户授予特定产品或服务合同的先决条件，或替代缺失的（Automotive SPICE®）供应商自我评估 (SuSE)。

对于已定点或已建立的合作伙伴，应用 Automotive SPICE® 潜在分析可通过评估合作伙伴是否有能力在客户的约束或其他限制条件下，在已建立的组织内实现产品，从而降低风险。此外，Automotive SPICE® 潜在分析还可用于过程改进，例如支持问题分析工作。

Automotive SPICE® 潜在分析适用于所有基于软件的系统，包括商业现货软件 (COTS) 和遗留内容（如果合适的话）。

由于使用 Automotive SPICE® 潜在分析对合作伙伴进行的评估仅基于一个示例项目，因此评估结果只在非常有限的范围内有效。应避免在较长时期内或条件发生变化时使用这些结论。

Automotive SPICE® 潜在分析的结果仅在有限时间内具有代表性。其可接受的期限必须由合作伙伴之间进行商定。

与 Automotive SPICE® 4.0 评估相比，Automotive SPICE® 潜在分析的内容有所减少。它侧重于能力等级 1 级，需要评估的样本数量较少，因此所需时间较短，而在项目提名阶段或项目紧要的情况下，可用于评估的时间往往非常有限。

Automotive SPICE® 潜在分析可作为达到规定的 Automotive SPICE 等级水平的第一步。它可以在供应商自我评估之后进行，也可以直接作为达到约定能力水平的第一步。在任何情况下，识别的弱点都可以作为改进计划的输入，为全面的 Automotive SPICE® 4.0 评估做好准备，而无需再另行实施潜在分析。因此，Automotive SPICE® 4.0 评估还旨在提高 Automotive SPICE® 的接受度和应用率。

Automotive SPICE® 潜在分析基于 Automotive SPICE® 4.0 和 Automotive SPICE® 网络安全 1.0 的内容，仅包含这些卷册的一个子集，而不是它们的扩展。评估必须根据这些缩减的内容进行，因此评估人员对完整性的理解必须与之保持一致。缩减内容的个别原因和初衷在 “理由 ”中描述。

考虑到评估目的的变化，Automotive SPICE® 潜在分析采用了不同的评估评级方案，以便将其结果与 Automotive SPICE® 4.0 的评估结果予以区分。

Automotive SPICE® 潜在分析遵循与 Automotive SPICE® 相同的原则，即具备方法的自由度以及可以单独评估的过程。

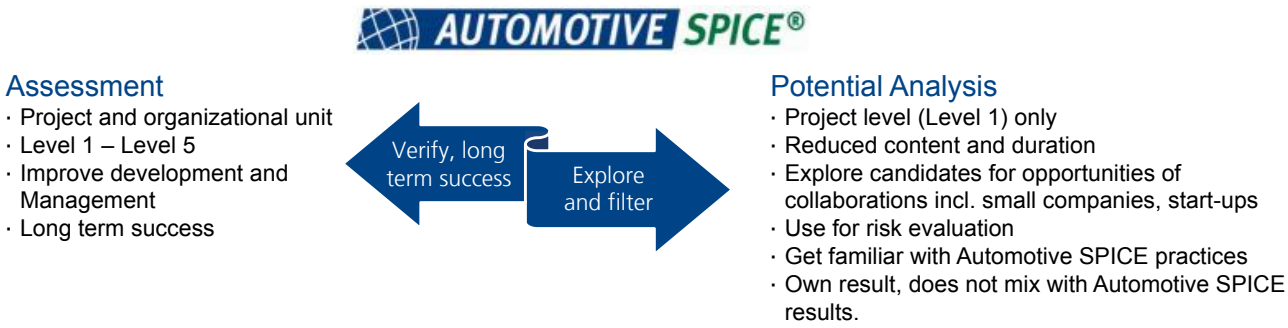

Figure 1 — Purpose of Automotive SPICE® 4.0 Assessment vs. Automotive SPICE® Potential Analysis

The purpose of the Automotive SPICE® Potential Analysis is comparable to the potential analysis in VDA QMC Volume 6 Part 3 (1), which is a subset of the standard questions. The VDA 6.3 potential analysis (module P1 of the questionnaire) is an established method for carrying out a risk assessment. It is used to quantify the risk for suppliers, new technologies, new locations, or new products.

While the VDA 6.3 potential analysis is an extract from the VDA 6.3 requirements catalog, the Automotive SPICE® Potential Analysis is exclusively focused on the development of software systems as an independent PAM/PRM, not including any hardware or mechanical aspects.

1.2 Statement of Compliance

The Automotive SPICE® Potential Analysis, and its process reference model conform with the requirements of ISO/IEC 33004:2015 and can be used as the basis for conducting an assessment of process performance capability under consideration of policies and assumptions. The Automotive SPICE® Potential Analysis Process measurement framework fulfills conformance to the requirements of ISO/IEC 33003:2015.

图 1 - Automotive SPICE® 4.0 评估与 Automotive SPICE® 潜在分析的目的对比

Automotive SPICE® 潜在分析的目的与 VDA 6.3(1) 中的潜在分析相当，后者是标准问题的子集。VDA 6.3 潜在分析（调查表模块 P1）是进行风险评估的既定方法。它用于量化供应商、新技术、新地点或新产品的风险。

VDA 6.3 潜在分析是从 VDA 6.3 要求目录中提取的，而 Automotive SPICE® 潜在分析作为独立 PAM/PRM 专门聚焦于软件系统的开发，不包括任何硬件或机械方面。

1.2 符合性声明

Automotive SPICE® 潜在分析及其过程参考模型符合 ISO/IEC 33004:2015 的要求，可用作在考虑政策和假设的情况下进行过程能力评估的基础。Automotive SPICE® 潜在分析过程度量框架符合 ISO/IEC 33003:2015 的要求。

1.3 Policies and Assumptions

> *(4.1.1) g) The measurement framework shall document the policies and assumptions underlying its use and application; (ISO/IEC 33003:2015)*

The Automotive SPICE® Potential Analysis is based on Automotive SPICE® 4.0 and Automotive SPICE® for Cybersecurity, with specific deviations. These deviations can be of following 2 types:

- **Rationales of generic character (RAG.X) reflecting specific circumstances for all processes.**
- **Rationales of process specific character (RAP.X), which affect one or a few processes only.**

Rationales provide justification for differences between Automotive SPICE® Potential Analysis and the combination of Automotive SPICE® 4.0 and Automotive SPICE® for Cybersecurity. They outline reasons for those limitations to improve the understanding of the PAM/PRM in general. For example, Rationales may outline systematic and logical dependencies as well as deviations that are motivated for only efficiency increase of the assessment process itself.

1.3.1 Generic Rationales

Rationale RAG.1 "***Resources***" of human capital and personnel in a project are not in the scope of the ASPICE PoA because the premise of the inspected projects will likely differ from those for the final customer. The evaluation of the estimation approach therefore concentrates on effort estimation, suitability and appropriateness rather than accuracy and prudence in resources allocation.

Rationale RAG.2 "***Scope of work***" documentation is not inspected in ASPICE PoA as the completeness of the full project work and its boundaries is not relevant for the purpose of the ASPICE PoA. Consequently, the main objective project reference is the project schedule.

Rationale RAG.3 "***Feasibility***" evaluation in ASPICE PoA is limited to the technical feasibility inspection of the project and the monitoring of the project schedule. The consistency between effort estimation and resource availability cannot be evaluated due to *RAG.1 "Resources"*. Furthermore, the qualification of resources is also not evaluated in ASPICE PoA (see also *RAG.4 "Responsibilities"*).

Rationale RAG.4 *"**Responsibilities**"* of roles and individuals in ASPICE PoA are only exemplary. Their availability and role fulfillment may change in following and other projects for a changed scope and qualification profile. Consequently, the qualification of roles is not evaluated systematically within the ASPICE PoA.

Rationale RAG.5 "***Communicate and agree***" Due to *RAG.1 "Resources"* and *RAG.4 "Responsibilities"*, effective communication between the project stakeholders itself is not an objective of the ASPICE PoA. Instead, the outcomes of stakeholder activities are to be evaluated independently of the communication. As a consequence, there cannot be a complete or consistent evaluation of agreements of stakeholders on such communication. In addition to these circumstances, reports as outcomes from processes are consequently removed from ASPICE PoA for efficiency reasons.

1.3.2 Process specific Rationales

Policies and assumptions result from context, purpose, and generic rationales for individual, process specific deviations. Those are consequently limited in general and consider also typical effort, elimination of redundancy and effectiveness for valid rationales for single or a small number of related processes. The process specific rationales are to be found in detail after the reference model to improve the readability of the document. They are listed within the chapter 2.1.1.

1.3 政策和假设

> *(4.1.1) g) 度量框架应记录其使用和应用所依据的政策和假设；（ISO/IEC 33003:2015）*

Automotive SPICE® 潜在分析基于 Automotive SPICE® 4.0 和 Automotive SPICE® 网络安全，并有特定偏差。这些偏差可分为以下两种类型：

- **通用性质的理由（RAG.X），反映所有过程的特定情况。**
- **过程特定性质的理由（RAP.X），只影响一个或几个过程。**

“理由”提供了 Automotive SPICE® 潜在分析与 Automotive SPICE® 4.0 和 Automotive SPICE® 网络安全的组合之间的差异。它们概述了造成这些限制的原因，以加深对过程评估模型/过程参考模型 （PAM/PRM） 的总体理解。例如，“理由 ”可概述系统性和逻辑性依赖关系，以及仅为提高评估过程本身效率而产生的偏差。

1.3.1 通用理由

RAG.1 理由： 项目中人力资本和人员的 **“资源”** 不在 ASPICE PoA 的检查范围内，因为被检查项目的前提很可能与最终客户的前提不同。因此，对估算方法的评估主要集中在工作量估算、适宜性和适当性上，而不是资源分配的准确性和审慎性上。

RAG.2 理由： **“工作范围”** 的记录不在 ASPICE PoA 的检查范围内，因为整个项目工作及其边界的完整性与 ASPICE PoA 的目的无关。因此，主要的目标项目参考是项目进度计划。

RAG.3 理由： **“可行性”** 的评估在 ASPICE PoA 中仅限于项目的技术可行性检查和项目进度的监控。由于 RAG.1 “资源 ”的原因，无法评估工作量估算与资源可用性之间的一致性。此外，ASPICE PoA 也不要求对人力资源的资质进行评估（另见 RAG.4 “责任”）。

RAG.4 理由：角色和个人的 **“职责”** 在 ASPICE PoA 中仅为示例。在后续项目和其他项目中，他们的可用性和角色履行情况可能会因范围和资格概况的改变而发生变化。因此，在 ASPICE PoA 中并不包括对角色的资质进行系统性的评估。

RAG.5 理由：**“沟通并达成一致”**由于 RAG.1 “资源 ”和 RAG.4 “责任”，项目利益相关方之间的有效沟通本身并不是 ASPICE PoA 的目标。相反，利益相关方活动的结果应独立于沟通进行评估。因此，不可能对利益相关方就此类沟通达成的协议进行完整或一致的评估。除了这些情况之外，出于效率的考虑，作为过程成果的报告也被从 ASPICE PoA 中删除。

1.3.2 过程特定理由

原则和假设产生于背景、目的以及单独过程特定偏差的通用理由。因此，这些原则和假设在总体上是有限的，而且还要考虑典型的工作量、消除冗余以及单个或少量相关过程的有效理由。为了提高文件的可读性，在参考模型之后详细介绍了过程特定理由。它们列在 2.1.1 章中。

2 Process capability determination

2.1 Process reference model

Processes defined in the Automotive SPICE® Potential Analysis model are independent from each other with no process group definition. It mandates the review of the BASIC scope, consisting all of its 4 BASIC scope processes, and at least one plugin. The BASIC scope forms the core element, the minimum scope of the Automotive SPICE® Potential Analysis.

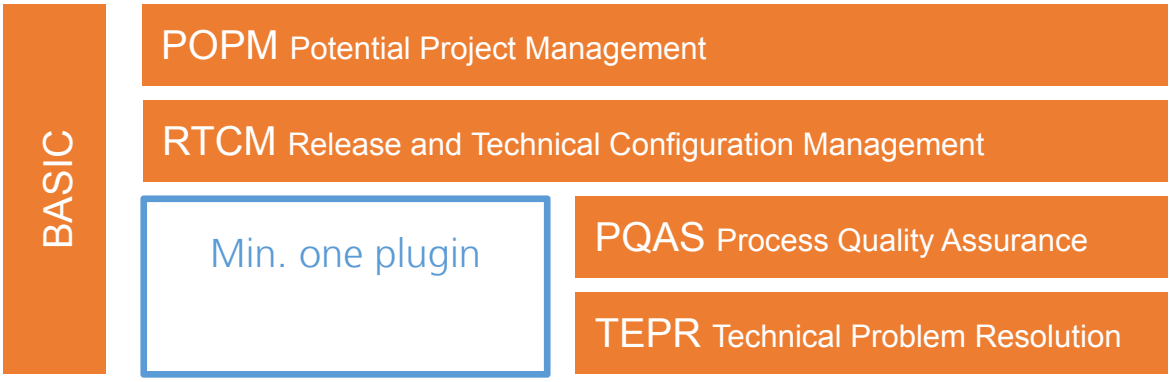

Figure 2 — Processes of the BASIC scope

The three Automotive SPICE® Potential Analysis plugins allow a suitable scope selection for either System Level, Software Level or Requirements Elicitation.

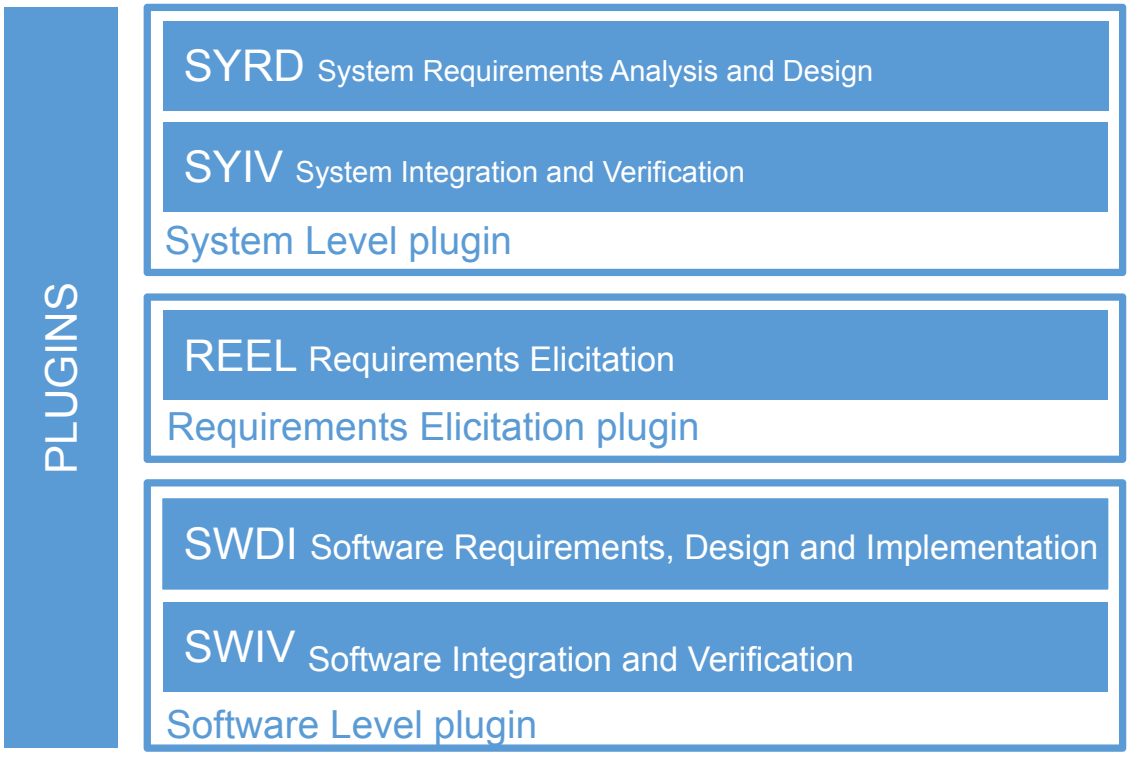

Figure 3 — The three plugins and their processes in the Automotive SPICE® Potential Analysis

2 能力确定

2.1 过程参考模型

Automotive SPICE®潜在分析模型中定义的过程是相互独立的，没有过程组的定义。它要求评审BASIC 范围（包括其全部四个过程）和至少一个插件。BASIC 范围构成了 Automotive SPICE®潜在分析的核心要素，即最小范围。

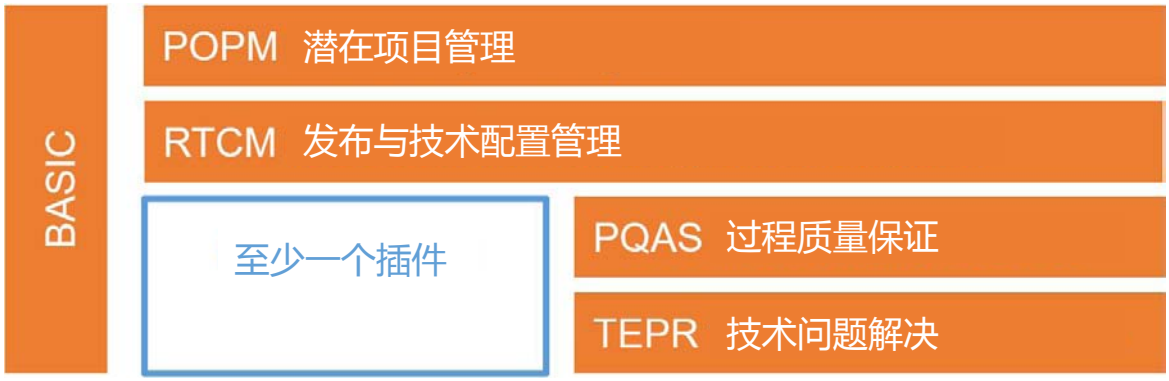

图 2 – BASIC 范围的过程

三个 Automotive SPICE®潜在分析插件允许在系统级别、软件级别或需求挖掘中选择合适的范围。

图 3— Automotive SPICE® 潜在分析的三个插件及其过程

Optional processes can be selected individually within the FLEX scope of the Automotive SPICE® Potential Analysis.

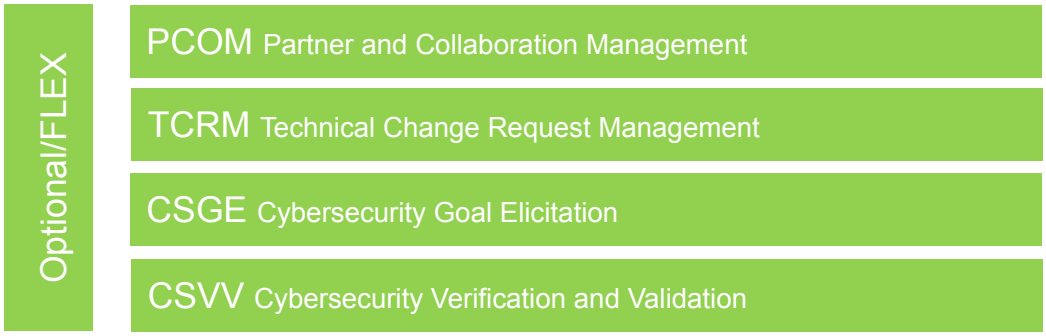

Figure 4 — Optional Processes for FLEX scope

2.1.1 Process specific rationales

Rationale RAP.1 "***Process assurance only***": The ASPICE PoA puts a focus on the technical evaluation and does not consider most organizational supporting aspects. Therefore, work products and other information items may not be sufficiently reviewable within its scope. The Process Quality Assurance (PQAS) process therefore is reduced to the verification of process assurance. The ASPICE PoA refers to this aspect within Process Quality Assurance (PQAS).

Rationale RAP.2 "***Organizational aspects***" in the ASPICE PoA are very limited for the prioritization of technical, engineering aspects and Capability Level 1 as the highest achievable level. The ASPICE PoA aims to reduce the evaluation of interfaces that are not directly related to technical efforts also for efficiency reasons. Thus, one may exclude interfaces to stakeholders such as marketing, human resources management, competency management and others that often are in shared groups within organizations. The ASPICE PoA refers to organizational aspects for related problems in Potential Project Management (POPM), but only technical problems within Technical Problem Management (TEPR) and technical related change requests within the Technical Change Request Management (TCRM).

Rationale RAP.3 "**Risk identification**" is not included within the Potential Project Management (POPM) process for efficiency reasons, as a consequence of *RAG.1 "Resources"* and *RAP.2 "Organizational aspects"*. The number of sources, interfaces and stakeholders may be different in other project configurations. Therefore, only the capability to manage already identified and available risks is in the focus of the Potential Project Management (POPM) process. Completeness of these inputs is consequently also out of scope.
The ASPICE PoA refers to this aspect in Potential Project Management (POPM).

Rationale RAP.4 "**Identification of problems**" is not evaluated within the ASPICE PoA, analogous to the Rationale *RAP.3 "Risk identification"*. The evaluation of capabilities to document and manage available technical problems is of higher interest than the identification process. The ASPICE PoA refers to this aspect within Technical Problem Resolution (TEPR).

在 Automotive SPICE®潜在分析的 FLEX 范围内，可以单独选择可选过程。

图 4 — FLEX 范围的可选过程

2.1.1 过程特定理由

理由 RAP.1 **“仅过程保证”**： ASPICE PoA 将重点放在技术评估上，并不考虑大多数组织支持方面。由于在其范围内，工作产品和其他信息项可能不具备足够的可评审性。因此，将过程质量保证（PQAS）过程简化为过程保证的验证。

ASPICE PoA 在过程质量保证（PQAS）中提到了这方面内容。

理由 RAP.2 ASPICE PoA 中的**“组织方面”**，对于技术、工程方面和能力等级 1 级（作为最高可达到的等级）的优先级来说是非常有限的。ASPICE PoA 旨在减少评估与技术工作不直接相关的接口，这也是出于效率原因的考虑。因此，可以排除与利益相关方的接口，如市场营销、人力资源管理、能力管理等，这些接口通常在组织中的共享组内考虑。ASPICE PoA 在潜在项目管理（POPM）中提到了组织方面的问题，但仅限于在技术问题解决（TEPR）中的技术问题，以及在技术变更请求管理（TCRM）中的与技术相关的变更请求。

理由 RAP.3 **“风险识别”**由于 RAG.1 “资源”和 RAP.2 “组织方面”的结果，出于效率原因，并未包含在潜在项目管理（POPM）过程中。在其他项目配置中，来源、接口和利益相关方的数量可能不同。因此，潜在项目管理（POPM）过程的重点仅在于管理已识别的和现有风险的能力。这些输入的完整性也因此不在范围内。

ASPICE PoA 在潜在项目管理（POPM）中提到了这方面内容。

理由 RAP.4 **“问题识别”**在 ASPICE PoA 中不进行评估，类似于理由 RAP.3 “风险识别”。记录和管理现有技术问题的能力比识别过程更受到关注。

ASPICE PoA 在技术问题解决（TEPR）中提到了这方面内容。

Rationale RAP.5 “**Urgent resolution and alert**” are omitted in ASPICE PoA due to efficiency reasons. The identification and handling of such technical problems can be very time consuming and may also require inspection of separate organization structures. With the restricted scope of the ASPICE PoA this cannot be consistently evaluated.

The ASPICE PoA refers to this aspect within Technical Problem Resolution (TEPR).

Rationale RAP.6 “***Tracking problems to change requests***” is not evaluated in the ASPICE PoA due to the difficulty to identify and observe sufficient evidence to demonstrate the relationships and scenarios in the context of an ASPICE PoA.

The ASPICE PoA refers to this aspect within Technical Problem Resolution (TEPR).

Rationale RAP.7 “**Technical changes only**”**:** There can be two different kinds of change requests: technical changes and organizational changes. Technical changes address the intended product directly. They typically influence the requirement set and originate in changed or specified stakeholder needs. Like Technical Problem Resolution (TEPR), Technical Change Request Management (TCRM) focusses on technically relevant items for efficiency reasons and as a consequence of *RAG.1 “Resources”* and *RAG.4 “Responsibilities”*.

The ASPICE PoA refers to this aspect within Technical Change Request Management (TCRM).

Rationale RAP.8 “**Review of implementation**” and “**Approval before implementation**” of change request is omitted within Technical Change Request Management (TCRM) for efficiency reasons. Tracking to closure is part of the ASPICE PoA which evaluates how well is the change actually implemented and checked respectively.

The aspect of an in-depth change request analysis as basis for the approval is of a higher priority than the approval itself in the ASPICE PoA.

The ASPICE PoA refers to this aspect within Technical Change Request Management (TCRM).

Rationale RAP.9 “***Configuration items***”: Engineering related configuration items shall be evaluated in Release and Technical Configuration Management (RTCM) for processes in the chosen scope only (see Figure 3 and Figure 5). Other non-technical related configuration items are not considered in the Release and Technical Configuration Management (RTCM) process because the scope reduction of the ASPICE PoA renders them insufficiently assessable within the exemplary project.

The ASPICE PoA refers to this aspect within Release and Technical Configuration Management (RTCM).

Rationale RAP.10 “**Baseline completeness and consistency**”: In the Release and Technical Configuration Management (RTCM) process only the technical and engineering specific configuration items are considered. See also Rationale *RAP.2 “Organizational Aspects”*. Consequently, the completeness and consistency of the baselines cannot be verified in the ASPICE PoA as other configuration items may be required for a complete evaluation.

The ASPICE PoA refers to this aspect within Release and Technical Configuration Management (RTCM).

Rationale RAP.11 “***Delivery***”: The ASPICE PoA Release and Technical Configuration Management (RTCM) does not differentiate between internal or external deliveries, as both types of deliveries require the same level of detail in the case of distributed and interconnected development.

The ASPICE PoA refers to this aspect within Release and Technical Configuration Management (RTCM) and Partner and Collaboration Management (PCOM).

理由 RAP.5 **“紧急解决和警报”**由于效率原因在 ASPICE PoA 中被省略。识别和处理这类技术问题可能非常耗时，并且可能还需要检查独立的组织架构。由于 ASPICE PoA 的范围受限，这方面内容不能一致性地得到评估。

ASPICE PoA 在技术问题解决（TEPR）中提到了这方面内容。

理由 RAP.6 **“跟踪问题到变更请求”**由于在 ASPICE PoA 背景下难以识别和观察充分证据来展示其关系和场景，因此在 ASPICE PoA 中不进行评估。

ASPICE PoA 在技术问题解决（TEPR）中提到了这方面内容。

理由 RAP.7 **“仅技术变更”**：变更请求可以有两种不同类型：技术变更和组织变更。技术变更直接针对预期产品。它们通常影响需求集，并源于变化的或指定的利益相关方需要。与技术问题解决（TEPR）类似，技术变更请求管理（TCRM）出于效率原因以及 RAG.1 “资源”和 RAG.4 “责任”的结果，专注于技术相关的变更项。

ASPICE PoA 在技术变更请求管理（TCRM）中提到了这方面内容。

理由 RAP.8 **“实施评审”**和**“实施前批准”**出于效率原因在技术变更请求管理（TCRM）中被省略。跟踪直至关闭是 ASPICE PoA 的一部分，它评估变更实际上实施和检查的效果如何。

在 ASPICE PoA 中，深入的变更请求分析作为批准的基础，比批准本身优先级更高。

ASPICE PoA 在技术变更请求管理（TCRM）中提到了这方面内容。

理由 RAP.9 **“配置项”**：与工程相关的配置项应仅在所选过程范围的发布与技术配置管理（RTCM）中进行评估（见图 3 和图 4）。由于 ASPICE PoA 的范围缩减使得它们在示例项目中不能得到充分评估，因此其他非技术相关的配置项不在发布与技术配置管理（RTCM）过程中考虑。

ASPICE PoA 在发布与技术配置管理（RTCM）中提到了这方面内容。

理由 RAP.10 **“基线完整性和一致性”**：在发布与技术配置管理（RTCM）过程中，只考虑技术和工程特定的配置项。另见理由 RAP.2 “组织方面”。由于可能需要其他配置项才能进行完整评估，因此基线的完整性和一致性不能在 ASPICE PoA 中得到验证。

ASPICE PoA 在发布与技术配置管理（RTCM）中提到了这方面内容。

理由 RAP.11 **“交付”**：ASPICE PoA 的发布与技术配置管理（RTCM）不区分内部或外部交付，因为在分布式和互联开发的情况下，这两种类型的交付都需要相同的细节水平。

ASPICE PoA 在发布与技术配置管理（RTCM）以及合作伙伴与协作管理（PCOM）中提到了这方面内容。

Rationale RAP.12 "***Access rights***" control is nowadays highly dependent on IT infrastructure, policies, personal data regulation (e.g., GDPR in European legislation). The Release and Technical Configuration Management (RTCM) in ASPICE PoA does not consider this topic due to the large amount of project independent indicators and sensitive data needed to be reviewed. The ASPICE PoA refers to this aspect within Release and Technical Configuration Management (RTCM).

Rationale RAP.13 "***Partner and Collaborations***": The ASPICE PoA reflects these terms as they are used in publications to describe more complex collaboration scenarios, in which the traditional customer-supplier relationship is only one of the many scenarios. Partnership and collaborations may include the role of providing and receiving services at different phases in accordance with any type or form of written agreements.

The ASPICE PoA refers to this aspect within Partner and Collaboration Management (PCOM).

Rationale RAP.14 "***Quotation and contracts***": In ASPICE PoA contracts and commercial agreements for quotation must not be considered. The information in such documents may lead to a risk of compliance violations and other legal problems for assessors, participants, and the assessment team. The evaluation should instead refer to the quotation and selection process to reach an agreement with a potential partner and for a potential collaboration.

The ASPICE PoA refers to this aspect within Partner and Collaboration Management (PCOM).

Rationale RAP.15 "***Scope of cybersecurity***": Analogous to *RAG.2 "Scope of work"*, the activities of cybersecurity management are only exemplary. The scope including the assets, cybersecurity properties, stakeholders, product phases and impact categories may be different in other project configurations. Therefore, the boundaries and completeness of such a scope definition are not to be evaluated and such an evaluation is not an objective of the ASPICE PoA.The ASPICE PoA refers to this aspect within Cybersecurity Goal Elicitation (CSGE) and Cybersecurity Verification and Validation (CSVV).

Rationale RAP.16 "***Prioritization of threats"*** before their evaluation is not relevant for the Cybersecurity Goal Elicitation (CSGE) process as a consequence of *RAP.15 "Scope of cybersecurity"*. A consistent evaluation would not be possible due to the missing context in this case.

The ASPICE PoA refers to this aspect within Cybersecurity Goal Elicitation (CSGE).

Rationale RAP.17 "**Monitoring changes of cybersecurity**": A systematic review of cybersecurity related monitoring and control is beyond the scope of the Automotive SPICE® Potential Analysis. It would require inspection of project and organizational interfaces for current and historic evaluations on a selection of trigger and event criteria. A partial inspection would be inappropriate and result in a high risk of vague and incomplete indicators for a rating. Therefore, ASPICE PoA does not inspect the reiteration and control cycle for related changes impacting cybersecurity during the conduct of an exemplary project.

The ASPICE PoA refers to this aspect within Cybersecurity Goal Elicitation (CSGE) and Cybersecurity Verification and Validation (CSVV).

Rationale RAP.18 "***Vulnerability Analysis"*** requires an interaction and transparency at project and organizational level. This would include prerequisites to Cybersecurity Management practices, for example as stated in ISO/SAE 21434. Since the possibility to inspect these within an ASPICE PoA is not always given, vulnerability analysis is not considered.
The ASPICE PoA refers to this aspect within Cybersecurity Verification and Validation (CSVV).

Rationale RAP.19 "***Cybersecurity Risk Treatment Implementation***" is not evaluated within the ASPICE PoA for efficiency reasons. The ASPICE PoA aims on a high level evaluation of cybersecurity and refers to this aspect within Cybersecurity Verification and Validation (CSVV).

理由 RAP.12 **“访问权限”**控制现在高度依赖于 IT 基础设施、政策和个人数据法规（例如，欧洲立法中的 GDPR）。由于需要评审大量项目独立的指标和敏感数据，ASPICE PoA 中的发布与技术配置管理（RTCM）不考虑这一主题。

ASPICE PoA 在发布与技术配置管理（RTCM）中提到了这方面内容。

理由 RAP.13 **“合作伙伴与协作”**：ASPICE PoA 反映了这些术语在出版物中的使用，用以描述更复杂的协作场景，其中传统的客户-供应商关系只是众多场景之一。合作伙伴与协作可能包括在不同阶段提供和接收服务的角色，符合任何类型或形式的书面协议。

ASPICE PoA 在合作伙伴与协作管理（PCOM）中提到了这方面内容。

理由 RAP.14 **“报价与合同”**：在 ASPICE PoA 中，报价的合同与商业协议不应被考虑。这些文件中的信息可能会导致评估师、参与者和评估团队面临违反合规和其他法律问题的风险。评估应该转而参考报价与选择过程，以与潜在合作伙伴达成协议和潜在合作。

ASPICE PoA 在合作伙伴与协作管理（PCOM）中提到了这方面内容。

理由 RAP.15 **“网络安全范围”**：类似于 RAG.2 “工作范围”，网络安全管理的活动只是示例性的。包括资产、网络安全属性、利益相关方、产品阶段和影响类别在内的范围在其他项目配置中可能有所不同。因此，范围定义的边界和完整性不应被评估，这类评估也不是 ASPICE PoA 的目标。

ASPICE PoA 在网络安全目标挖掘（CSGE）和网络安全验证与确认（CSVV）中提到了这方面内容。

理由 RAP.16 由于 RAP.15 “网络安全范围”的结果，在评估之前进行**“威胁优先级排序”**对于网络安全目标挖掘（CSGE）过程并不相关。在这种情况下，由于缺少上下文，无法进行一致的评估。

ASPICE PoA 在网络安全目标挖掘（CSGE）中提到了这方面内容。

理由 RAP.17 **“监控网络安全的变化”**：对网络安全相关的监控和控制的系统性评审超出了 Automotive SPICE®潜在分析的范围。这需要检查项目和组织接口，以对一系列触发和事件准则进行当前和历史评估。部分检查是不合适的，并将导致评级指标模糊和不完整，从而带来高风险。因此，ASPICE PoA 在示例项目执行期间，不检查影响网络安全的相关变化的迭代和控制周期。

ASPICE PoA 在网络安全目标挖掘（CSGE）和网络安全验证与确认（CSVV）中提到了这方面内容。

理由 RAP.18 **“漏洞分析”**需要在项目和组织层面进行互动并保持透明度。这将包括网络安全管理实践的先决条件，例如 ISO/SAE 21434 中所述的内容。由于在 ASPICE PoA 中并不总是存在检查这些条件的可能性，因此不考虑漏洞分析。

ASPICE PoA 在网络安全验证与确认（CSVV）中提到了这方面内容。

理由 RAP.19 **“网络安全风险处理实施”**出于效率原因在 ASPICE PoA 中不进行评估。ASPICE PoA 旨在对网络安全进行高层级的评估，且在网络安全验证与确认（CSVV）中提到这一方面。

Rationale RAP.20 “**Obtain stakeholder expectations and requests**”: Focus of the ASPICE PoA is on technical stakeholders and their direct input, see *RAP.2 “Organizational aspects”*, *RAP.4 “Identification of problems”* and *RAP.7 “Technical changes only”*.

Despite the fact that requirement elicitation typically focuses on customer needs, stakeholders encompass more than just the customers, as they include all other relevant sources of needs and requirements such as legal, regulatory, industrial standards as well as internal organizations. Within the flexible plugin model of the ASPICE PoA (i.e. Requirements Elicitation, System Level and Software Level plugins), "stakeholder" can be generally interpreted as input-relevant sources of needs and requirements for the corresponding level of engineering to be evaluated. E.g., the system discipline could also be a possible stakeholder for software engineering. The ASPICE PoA refers to this aspect within Requirements Elicitation (REEL).

Rationale RAP.21 “**Prioritization of requirements**”: is limited to the scope of the project schedule within the ASPICE PoA.

The ASPICE PoA refers to this aspect within Software Requirements, Design and Implementation (SWDI) and System Requirements Analysis and Design (SYRD).

Rationale RAP.22 “***Select verification measures***”: The selection of individual verification measures is a practice to be reviewed in more complex test setups, e.g., to control verification according to various configurations as well as target variants. The ASPICE PoA does not foresee to review complex variant configurations, but focuses instead on a specific release configuration.The ASPICE PoA refers to this aspect within Software Integration and Verification (SWIV) and System Integration and Verification (SYIV).

Rationale RAP.23 “***Cross relationships***” between following named processes shall not be considered for simplification reasons: Potential Project Management (POPM), Release and Technical Configuration Management (RTCM), Process Quality Assurance (PQAS), Technical Problem Resolution (TEPR), Technical Change Request Management (TCRM) and Partner and Collaboration Management (PCOM). This avoids or at least reduces the need to return to already assessed processes within the assessment and in general also improves the separation of processes and assessment indicators. Assessors must only choose and evaluate evidence for indicators such that their origin and end point are both affecting the same process.

The ASPICE PoA refers to this aspect within Potential Project Management (POPM), Release and Technical Configuration Management (RTCM), Process Quality Assurance (PQAS), Technical Problem Resolution (TEPR), Technical Change Request Management (TCRM), and Partner and Collaboration Management (PCOM).

理由 RAP.20 **“获取利益相关方的期望和要求”**：ASPICE PoA 的重点在于技术利益相关方及其直接输入，参见 RAP.2 “组织方面”，RAP.4 “问题识别”和 RAP.7 “仅技术变更”。

尽管需求挖掘通常聚焦于客户需要，但利益相关方不仅包括客户，还包括所有其他相关的需要和需求来源，如法律、法规、行业标准以及内部组织。在 ASPICE PoA 的灵活插件模型中（即需求挖掘、系统层级和软件层级插件），“利益相关方”可以被普遍解释为与待评估工程层级的输入相关的需要和需求来源。例如，系统学科也可以是软件工程可能的利益相关方。ASPICE PoA 在需求挖掘（REEL）中提到了这方面内容。

理由 RAP.21 **“需求优先级排序”**：在 ASPICE PoA 中，仅限于项目计划范围内。

ASPICE PoA 在软件需求、设计与实现（SWDI）和系统需求分析与设计（SYRD）中提到了这方面内容。

理由 RAP.22 **“选择验证措施”**：单个验证措施的选择是在更复杂的测试设置中需要评审的实践，例如，根据各种配置以及目标变体控制验证。ASPICE PoA 没有设想评审复杂的变体配置，而是专注于特定的发布配置。

ASPICE PoA 在软件集成与验证（SWIV）和系统集成与验证（SYIV）中提到了这方面内容。

理由 RAP.23 出于简化原因，以下过程之间的**“交叉关系”**不应被考虑：潜在项目管理（POPM）、发布与技术配置管理（RTCM）、过程质量保证（PQAS）、技术问题解决（TEPR）、技术变更请求管理（TCRM）以及合作伙伴与协作管理（PCOM）。这种做法避免了或至少减少了在评估中返回已评估过程的需要，总体上也改善了过程和评估指标的分离。评估人员应只选择和评估指标相关的证据，这样它们的起点和终点（该评估指标的证据链）只影响同一个过程。

ASPICE PoA 在潜在项目管理（POPM）、发布与技术配置管理（RTCM）、过程质量保证（PQAS）、技术问题解决（TEPR）、技术变更请求管理（TCRM）以及合作伙伴与协作管理（PCOM）中提到了这方面内容。

2.2 Measurement framework

The measurement framework provides the necessary requirements and rules for the capability dimension. It defines a scheme which enables an assessor to determine the Capability Level of a given process. These capability levels are defined as part of the measurement framework.

To enable the rating, the measurement framework provides process attributes defining a measurable property of process capability. Each process attribute is assigned to a specific capability level. The extent of achievement of a certain process attribute is represented by means of a rating based on the defined rating scale. The rules from which an assessor can derive the final capability level for a given process are represented by a process capability level model.

The Automotive SPICE® Potential Analysis defines its own measurement framework.

> *Note: ISO/IEC 33020:2019 process attribute definitions and attribute outcomes are duplicated from ISO/IEC 33020:2019 in italic font and marked with a left side bar.*

2.2.1 Process capability levels and process attributes

The definition of process capability indicators for each process attribute is an integral part of the measurement framework. Process capability indicators such as generic practices and information items are the means to support the judgement of the degree of achievement of the associated process attribute.
This chapter defines the generic practices and information items and their mapping to the process attributes for each capability level of the Automotive SPICE® for Potential Analysis' measurement framework.

Process capability level	**Process attribute ID** **Process attribute name** **Process attribute scope** **Process attribute achievements**	Each process attribute is identified with a unique identifier and name. A process attribute scope statement is provided, and process achievements are defined.
Process attribute achievement indicators	**Generic practices**	A set of generic practices for the process attribute providing a definition of the activities to be performed to accomplish the process attribute scope and fulfill the process attribute achievements. The generic practice headers are summarized at the end of a process to demonstrate their relationship to the process attribute achievements.
	Output information items	The output information items that are relevant to accomplish the process attribute scope and fulfill the process attribute achievements are summarized at the end of a process attribute section to demonstrate their relationship to the process attribute achievements. *Note: Refer to Annex B for the characteristics of each information item.*

2.2 度量框架

度量框架为能力维度提供了必要的需求和规则。它定义了一个可使评估师确定给定过程能力等级的模式。这些能力等级被定义为度量框架的一部分。

为了能够进行评定，度量框架提供了定义过程能力可度量特性的过程属性。每个过程属性被分配到特定的能力等级。某个特定过程属性达成的程度是基于已定义的评定尺度的评定方式来表示。评估师对给定过程的最终能力等级的导出规则是由过程能力等级模型来表示。

Automotive SPICE®潜在分析定义了自己的度量框架。

> *注：ISO/IEC 33020:2019 过程属性定义和属性成果复制于 ISO/IEC 33020:2019，以斜体字书写，并在左侧以竖线标记。*

2.2.1 过程能力等级与过程属性

为每个过程属性定义的过程能力指标，是度量框架不可或缺的一部分。过程能力指标，如通用实践和信息项，是支持判断相关过程属性达成程度的方式。

本章为Automotive SPICE®潜在分析度量框架中的各能力等级定义了通用实践和信息项，以及它们与过程属性的映射关系。

过程能力等级	过程属性 ID 过程属性名称 过程属性范围 过程属性成就	每个过程属性都标明了唯一标识符和名称，并提供了过程属性范围声明，定义了过程成就。
过程属性达成指标	通用实践	过程属性的一组通用实践提供了需执行活动的定义，以实现过程属性范围和过程成就。 通用实践标题信息在过程的最后进行了总结，以展示它们与过程属性成就之间的关系。
	输出信息项	与完成过程属性范围和实现过程成就相关的输出信息项总结在过程属性部分的末尾，以证明它们与过程成就的关系。 *注：每个信息项的特性见附录 B。*

2.2.1.1 Process capability Level 0: Incomplete process

> *The process is not implemented, or fails to achieve its process purpose. At this level there is little or no evidence of any systematic achievement of the process purpose.*

Due to lack of a defined process attribute for process capability level 0, no generic practices and information items are defined for it.

2.2.1.2 Process capability Level 1: Performed process

The Automotive SPICE® Potential Analysis' highest level is process attribute *Process Performance* for process capability Level 1: Performed process.

2.2.1.3 PA 1.1 Process performance process attribute

Process attribute ID	
PA 1.1	
Process attribute name	
Process performance	
Process attribute scope	
The process performance process attribute is a measure of the extent to which the process purpose is achieved.	
Process attribute achievements	
As a result of full achievement of this process attribute: The process achieves its defined outcomes.	
Generic practices	
GP 1.1.1 Achieve the process outcomes Achieve the intent of the base practices. Produce work products that evidence the process outcomes.	
PA 1.1 Process performance process attribute	Achievement a
Output Information Items	
Process specific information items, as described in chapter 3	X
Generic practices	
GP 1.1.1 Achieve the process outcomes	X

The process capability level to be achieved for Level 1 by a process shall be derived from the process attribute rating for that process according to the process capability level model defined in Table 1.

2.2.1.1 过程能力等级 0 级：不完整的过程

过程未实施，或未能实现其过程目的。在这个等级只有很少或没有系统化实现过程目的的证据。
由于缺少过程能力等级0级定义的过程属性，因此也没有为它定义通用实践和信息项。

2.2.1.2 过程能力等级 1 级：已执行的过程

Automotive SPICE®潜在分析的最高等级是过程属性“过程实施”对应过程能力等级 1 级：已执行的过程。

2.2.1.3 PA 1.1 过程实施过程属性

过程属性 ID	
PA 1.1	
过程属性名称	
过程实施	
过程属性范围	
过程实施过程属性是衡量过程目的达成程度的一种度量。	
过程属性成就	
作为完全达成此过程属性的结果：过程达成其定义的成果。	
通用实践	
GP 1.1.1 达成过程成果 达成基本实践的意图。 生成证明过程成果的工作产品。	
PA 1.1 过程实施过程属性	成就 a
输出信息项	
过程特定信息项，如第 3 章所述	X
通用实践	
GP 1.1.1 达成过程成果	X

一个过程要达到过程能力等级 1 级，应根据表 1 定义的过程能力等级模型，从该过程的过程属性评定中导出。

2.2.2 Process attribute rating

To support the rating of process attributes, the measurement framework rating scale for the Automotive SPICE® Potential Analysis is defined in this chapter. For Automotive SPICE® Potential Analysis, the rating is restricted to Class 3 assessments only (see Annex A).

Process capability level 0 does not include any type of indicators, as it reflects a non-implemented process or a process which achieve only fragmentary process performance.

Scale	*Process attribute*	*Rating color*	*Rating*
Level 1	*PA 1.1: Process Performance*	*Yellow*	*Valid*

Table 1 — Level 1 Process performance process attribute minimum rating definition

2.2.2.1 Rating scale

> *Within this process measurement framework, a process attribute is a measurable property of process capability. A process attribute rating is a judgement of the degree of achievement of the process attribute for the assessed process.*

The rating scale of Automotive SPICE® Potential Analysis is shown in Table 2.

Characteristic judgement for degree of achievement	Rating color	Rating
There is little or no evidence of achievement of the process performance process attribute in the assessed process.	*Red*	*Fragmentary*
There is evidence of a significant achievement of the process performance process attribute. Some weaknesses may exist, but they do not interfere with a valid systematic approach in the assessed process. *Note: This includes documented and highlighted weaknesses that may become challenges for later phases of an intended collaboration and may require early improvement actions.*	*Yellow*	*Valid*
There is evidence of a satisfactory achievement of the process performance process attribute. There are no or only minor weaknesses without impact of achieving the purpose of the assessed process.	*Green*	*Satisfactory*

Table 2 — Rating scale and characteristics of the Automotive SPICE® Potential Analysis.

> *The ordinal scale defined above shall be understood in terms of percentage achievement of a process attribute.*

2.2.2 过程属性评定

为支持过程属性评定，本章定义了用于 Automotive SPICE®潜在分析的度量框架的评定尺度。对于 Automotive SPICE®潜在分析，评级仅限于第 3 类评估（参见附录 A）。

过程能力级别 0 级不包含任何类型的指标，因为它反映了未实施的过程或仅达到部分过程实施的过程。

级别	*过程属性*	*评定颜色*	*评定*
等级 1 级	*PA 1.1: 过程实施*	*黄色*	*有效*

表 1：等级 1 级过程实施过程属性的最低可接受评定的定义

2.2.2.1 评定尺度

> *在这个过程度量框架中，过程属性是过程能力的可度量特性。过程属性评定是对被评估过程的过程属性达成程度的判断。*

Automotive SPICE®潜在分析的评定尺度见**错误!未找到引用源。**

达成程度的特征判断	评定颜色	评定
在被评估的过程中，有很少或没有证据表明过程实施过程属性得到了达成。	*红色*	*不完整*
在被评估的过程中，有证据表明过程实施过程属性得到显著达成。可能存在一些弱点，但并不影响被评估过程中有效的系统方法。 *注：这包括记录和强调的弱点，这些弱点可能会成为预期合作后期阶段的挑战，并可能需要早期改进行动。*	*黄色*	*有效*
有证据表明过程实施过程属性已令人满意地实现。没有或只有轻微的弱点，且这些弱点不会影响评估过程的预期目的实现。	*绿色*	*满意*

表 2 — Automotive SPICE®潜在分析的评定尺度和特性

> *以上所定义的顺序尺度应以过程属性达成的百分比来理解。*

Percentage of achievement	*Rating color*	*Rating*
0 to ≤ 50% achievement	*Red*	*Fragmentary*
> 50% to ≤ 75% achievement	*Yellow*	*Valid*
> 75% to ≤ 100% achievement	*Green*	*Satisfactory*

Table 3 — Rating scale percentage values

2.2.3 Rating and aggregation method

Rating and aggregation method references are taken from [ISO33020], which provides the following definitions:

> *A process outcome is the observable result of successful achievement of the process purpose.*
>
> *A process attribute outcome is the observable result of achievement of a specified process attribute.*
>
> *Process outcomes and process attribute outcomes may be characterised as an intermediate step to providing a process attribute rating.*
>
> *When performing rating, the rating method employed shall be specified relevant to the class of assessment. The following rating methods are defined.*
>
> *The use of rating method may vary according to the class, scope and context of an assessment. The lead assessor shall decide which (if any) rating method to use. The selected rating method(s) shall be specified in the assessment input and referenced in the assessment report.*

The rating method in the Automotive SPICE® Potential Analysis is *Rating method R3.*

[ISO33020] provides references to 3 rating methods, provides the following definition for Rating method R3:

> ***….***
>
> ***Rating method R3***
>
> *Process attribute rating across assessed process instances shall be made without aggregation.*

过程属性达成的百分比	*评定颜色*	*评定*
0 ~ ≤ 50% 达成	*红色*	*不完整*
> 50% ~ ≤ 75%达成	*黄色*	*有效*
> 75% ~ ≤ 100%达成	*绿色*	*满意*

表 3 — 评定尺度的百分比值

2.2.3 评定和聚合方法

评定和聚合方法的参考采自于 ISO/IEC 33020:2019，其提供了如下定义：

> *过程成果是过程目的成功达成的可观测的结果。*
>
> *过程属性成果是特定的过程属性成功达成的可观测的结果。*
>
> *过程成果和过程属性成果可表示为中间步骤的特性以提供过程属性的评定。*
>
> *在执行评定时，采用的评定方法应明确与评估的类型相关联。评定方法定义如下。*
>
> *评定方法的使用可根据评估的类型、范围和环境的不同而不同。主评估师应决定使用哪种评定方法。选定的评定方法应定义在评估输入中，并在评估报告中提及。*

Automotive SPICE®潜在分析中的评级方法是*评级方法 R3：*

[ISO33020] 提供了对3种评定方法的参考，对评定方法R3提供了如下定

> *….*
> ***评定方法 R3***
> *跨（被评估的）过程实例的过程属性评定不应进行聚合。*

2.3 Process assessment model

The process assessment model offers indicators to identify whether the process outcomes and the process attribute outcomes (achievements) are present or absent in the instantiated processes of projects. These indicators provide guidance for assessors in accumulating the necessary objective evidence to support judgments of capability They are not intended to be regarded as a mandatory set of checklists to be followed.

2.3.1 Assessment indicators

According to [ISO33004], a process assessment model needs to define a set of assessment indicators:

> ***Assessment Indicators***
>
> *A process assessment model shall be based on a set of assessment indicators that:*
>
> *a) explicitly address the purpose and process outcomes, as defined in the selected process reference model, of each of the processes within the scope of the process assessment model;*
>
> *b) demonstrate the achievement of the process attributes within the scope of the process assessment model;*
>
> *c) demonstrate the achievement (where relevant) of the process quality levels within the scope of the process assessment model.*
>
> *The assessment indicators generally fall into three types:*
>
> *a) **practices** that support achievement of either the process purpose or the specific process attribute.*
>
> *b) **information items** and their characteristics that demonstrate the respective achievements.*
>
> *c) resources and infrastructure that support the respective achievements.*
>
> *[ISO/IEC 33004:2015, 6.3.1]*

In the Automotive SPICE® Potential Analysis assessment model, only ***practices*** and ***information items*** are used as assessment indicators.

Practices represent activity-oriented indicators, whereas information items represent result-oriented indicators. Both practices and information items are used for judging objective evidence to be collected and accumulated in the performance of an assessment.

As a first type of assessment indicator, practices are provided, which can be divided into two types:

1. **Base practices (BP), applying to capability level 1**

   They provide an indication of the extent of achievement of the process outcomes. Base practices relate to one or more process outcomes, thus being always process-specific and not generic.

2. **Generic practices (GP), applying to capability level 1**

   They provide an indication of the extent of process attribute achievement. Generic practices relate to one or more process attribute achievements, thus applying to any process.

As a second type of assessment indicators, **information items (II)** including their **characteristics (IIC)** are provided in Annex B. These are meant to offer a good practice and state-of-the-art knowledge guide for the assessor. Therefore, information items including their characteristics are designed to be a quickly accessible information source during an assessment.

Information item characteristics shall not be interpreted as a required structure of a corresponding work product, which is to be defined by the project and organization, respectively. Please refer to chapter 0 for understanding the difference between information items and work products.

2.3 过程评估模型

过程评估模型提供了指标，以识别过程成果和过程属性成果（成就）在项目的实例化过程中是存在还是缺失的。这些指标为评估师收集必要的客观证据提供了指导，以支持能力的判定。这些指标不应被视为必须遵循的检查单集。

2.3.1 评估指标

根据 [ISO/IEC 33004]，过程评估模型需要定义一套评估指标：

> ***评估指标***
>
> *过程评估模型须基于一组评估指标，这些指标：*
>
> *a) 在过程评估模型的范围内，明确阐明所选过程参考模型中各过程所定义的目的和过程成果；*
>
> *b) 在过程评估模型的范围内，证明过程属性的达成；*
>
> *c) 在过程评估模型的范围内，证明过程质量级别的达成（如相关）。*
>
> *评估指标一般分为三类：*
>
> *a) 支持过程目标或特定过程属性达成的**实践**。*
>
> *b) 能表明各自达成的**信息项**及其特性。*
>
> *c) 支持各自达成的资源和基础设施。*
>
> *[ISO/IEC 33004:2015, 6.3.1]*

在 Automotive SPICE®潜在分析评估模型中，只有**实践**和**信息项**被作为评估指标使用。

实践是指面向活动的指标，而信息项则是指面向结果的指标。实践和信息项都用于判断在评估执行过程中收集和积累的客观证据。

作为第一类评估指标，提供的实践可以分为两类：

1. **基本实践（BP）适用于能力等级 1 级**

   基本实践提供了关于过程成果的达成程度的指标。基本实践与一个或多个过程成果相关，因此总是特定于过程的，而不是通用的。

2. **通用实践（GP）适用于能力等级 1 级**

   通用实践提供了关于过程属性达成程度的指标。通用实践与一个或多个过程属性的实现相关，因此适用于任何过程。

作为第二类评估指标，**信息项（II）**及其**特性（IIC）**在附件 B 中得以展示。这些旨在为评估师提供良好的实践和最先进的知识指南。因此，信息项（包括其特性）旨在成为评估中可快速访问的信息源。

信息项特性不应被解释为相应工作产品的必需结构，工作产品是由项目和组织分别定义的。请参阅第 2.5 章节，了解信息项和工作产品之间的区别。

[ISO33004] requires the mapping of assessment indicators to process attributes as shown in Figure 6.

The capability of a process on level 1 is only characterized by the measure of the extent to which the process outcomes are achieved. According to ISO 33003:2015, a measurement framework requires each level to incorporate at least one process attribute. The process attribute PA1.1 is defined for capability level 1 as the only process attribute at this level, and this process attribute has a single generic practice (GP1.1.1) pointing as an editorial reference to the respective process performance indicators (see Figure 6 and examples in Figure 8 and Table 5).

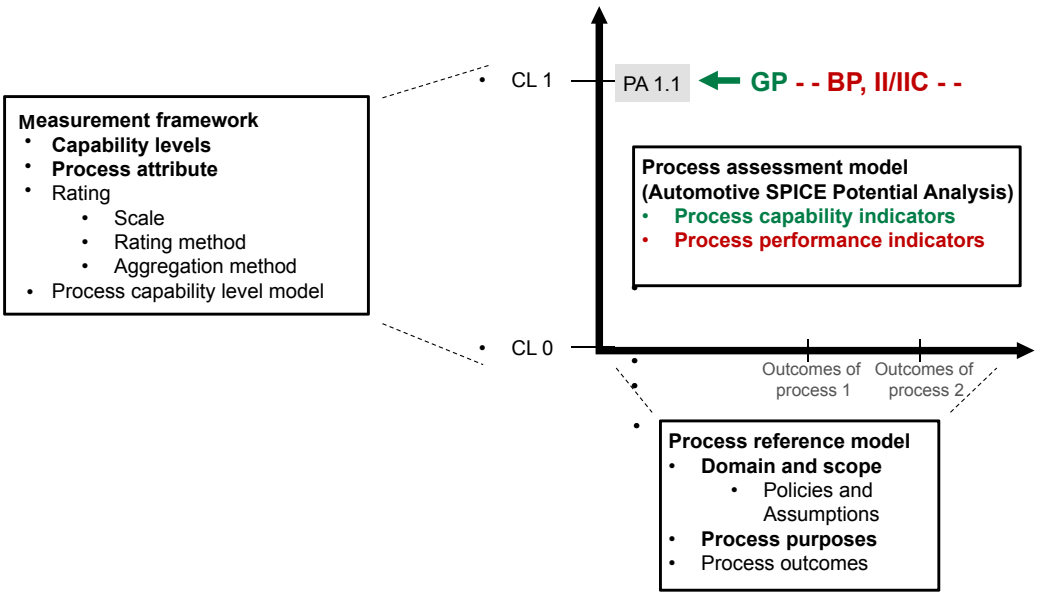

Figure 5 — Mapping model ASPICE PoA

[ISO 33004]要求将评估指标映射到过程属性，如图 5 所示。

过程的能力等级 1 级只是对过程成果达成程度的度量的特性。根据 ISO 33003:2015，度量框架要求每个级别至少要包含一个过程属性。过程属性 PA1.1 被定义为能力级别 1 级的唯一过程属性，并且该过程具有单一的通用实践（GP 1.1.1），作为编辑参考引用各个过程实施指标（见图 5 和图 6 与表 4 中的示例）。

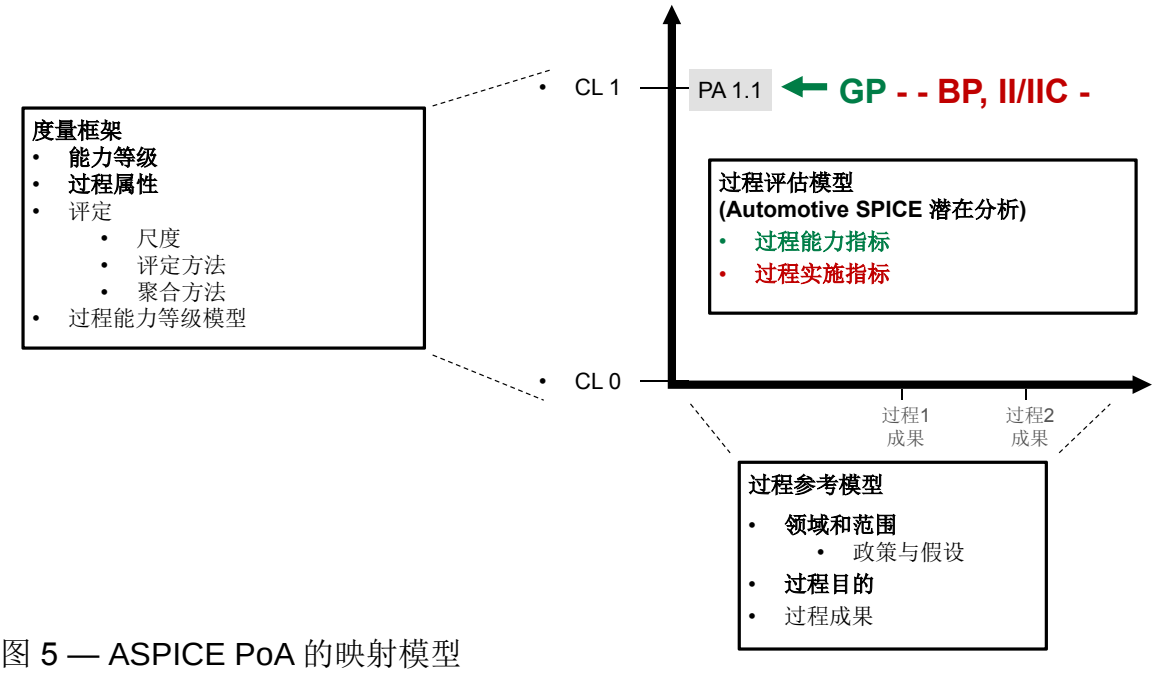

图 5 — ASPICE PoA 的映射模型

Figure 6 and Table 4 show an exemplary result of an Automotive SPICE® Potential Analysis in form of a graph and a table.

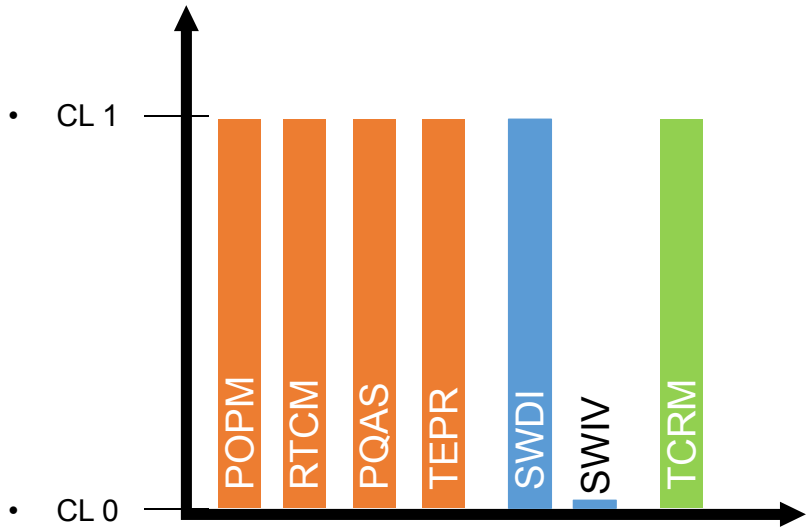

Figure 6 — Capability level per process (example)

Process ID	PA 1.1	CL1
POPM	Green	Yes
RTCM	Green	Yes
PQAS	Yellow	Yes
TEPR	Yellow	Yes
SWDI	Green	Yes
SWIV	Red	No
TCRM	Yellow	Yes

Table 4 — Process attribute rating and capability level achievement per process (example)

图 6 和表 4 以图表和表格形式呈现了一个 Automotive SPICE®潜在分析的示例结果。

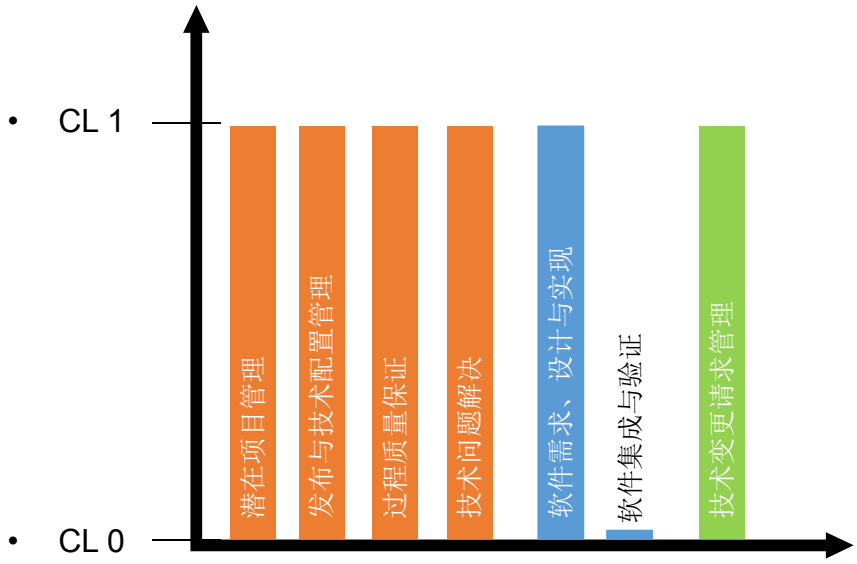

图 6— 各过程的能力等级（示例）

过程 ID	PA 1.1	CL1
潜在项目管理	绿色	达成
发布与技术配置管理	绿色	达成
过程质量保证	黄色	达成
技术问题解决	黄色	达成
软件需求、设计与实现	绿色	达成
软件集成与验证	红色	未达成
技术变更请求管理	黄色	达成

表4 — 各过程的过程属性与能力等级达成情况（示例）

2.4 Understanding the level of abstraction of a PAM

The term “process” can be understood at three levels of abstraction. Note that for the term “process” there are different abstraction levels, and that a PAM resides at the highest.

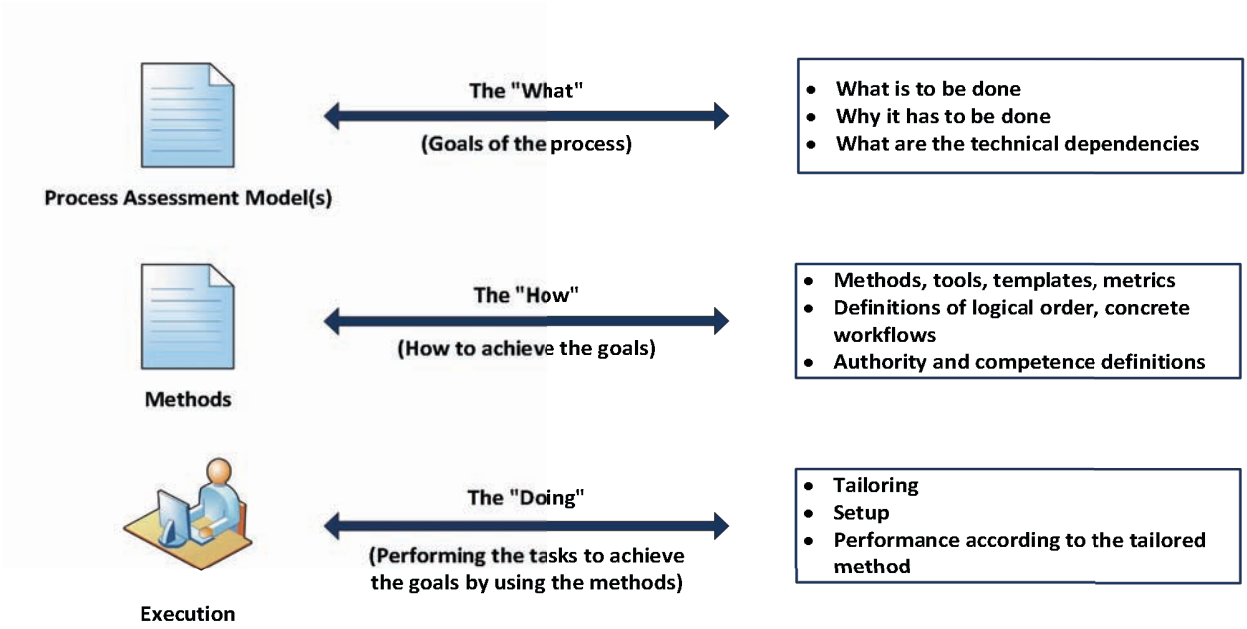

Figure 7 — Possible levels of abstraction for the term “process”

Capturing experience acquired during product development (the DOING level) in order to share this experience with others means creating a HOW level. The HOW is specific to the context of an exemplary project for the Automotive SPICE® Potential Analysis PAM.

2.4 理解 PAM 的抽象级别

术语“过程”可在三个抽象层面上理解。注意对术语“过程”来说，这个词有不同的抽象层面，并且PAM 属于最高层。

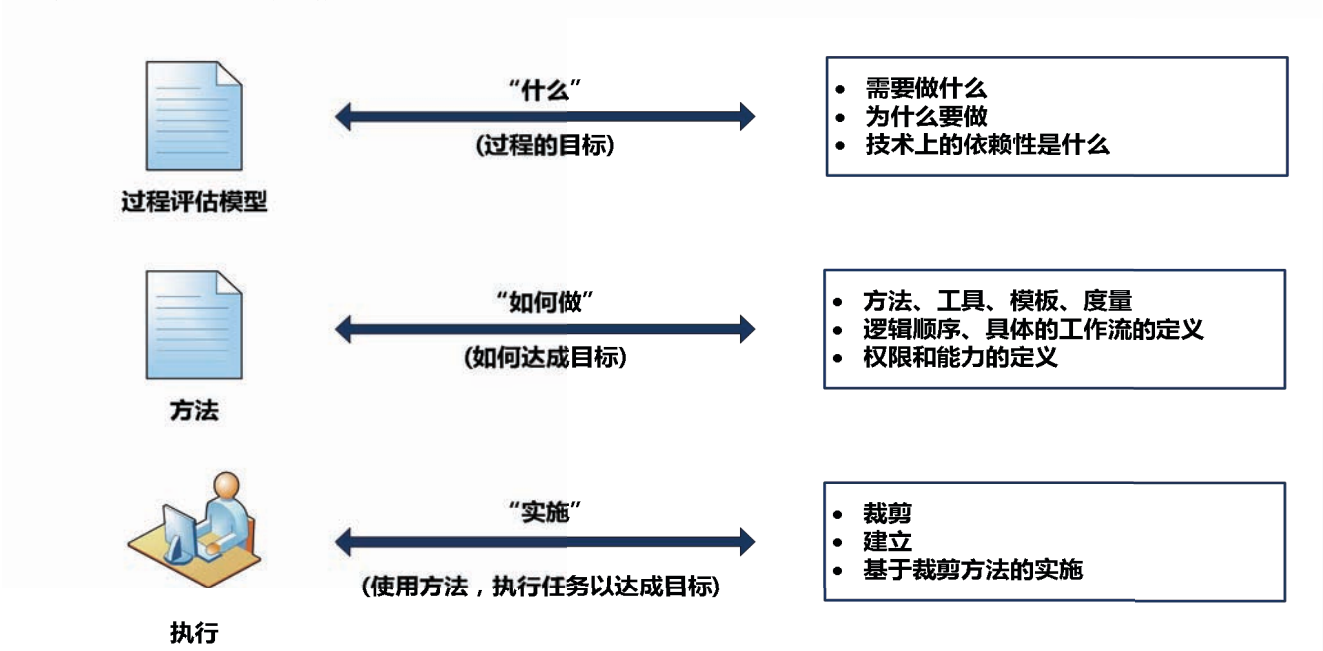

图7—关于术语“过程”的可能的抽象层面

获取在产品开发过程中获取的经验（在“实施”层面）以便与他人分享，这意味着创建一个“如何做”级别。在 Automotive SPICE®潜在分析 PAM 中，“如何做”是以一个示例项目作为特定背景的。

2.5 Why a PRM and PAM are not a lifecycle model and no blueprint for documentation

A lifecycle model defines phases and activities in a chronological order, possibly including cycles or loops, and parallelization. For example, some standards such as ISO 26262 or ISO/SAE 21434 are centered around a lifecycle model (neither of these standards in fact represents a PRM according to [ISO33004]). Companies, organizational units, or projects will interpret such general lifecycle models given in standards, and then derive roles, organizational interactions and interfaces, tools or tool chains, work instructions, and artifacts. Lifecycle models therefore are a concept at the HOW level (see chapter 0).

In contrast, a PRM/PAM according to [ISO33004] (formerly ISO/IEC 15504-2) is at the level of the WHAT by abstracting from any HOW level, see Figure 10 in chapter 0. A PRM/PAM groups a set of coherent and related characteristics of a particular technical topic and calls it ‘process’. In different terms, a process in a PRM represents a ‘distinct conceptual silo’. In this respect, a PRM/PAM

- neither predefines, nor discourages, any order in which PRM processes or Base Practices are to be performed.
- does not predefine any particular work product structure, or work product blueprints. Within ASPICE Potential Analysis there is no formal work product definition, whereas technical standards like [ISO21434] or [ISO26262] include such and provide detailed requirements for them.

As a consequence, it is the assessor’s responsibility to perform a mapping of elements in such a HOW level to the Assessment Indicators in the PAM, see Figure 11.

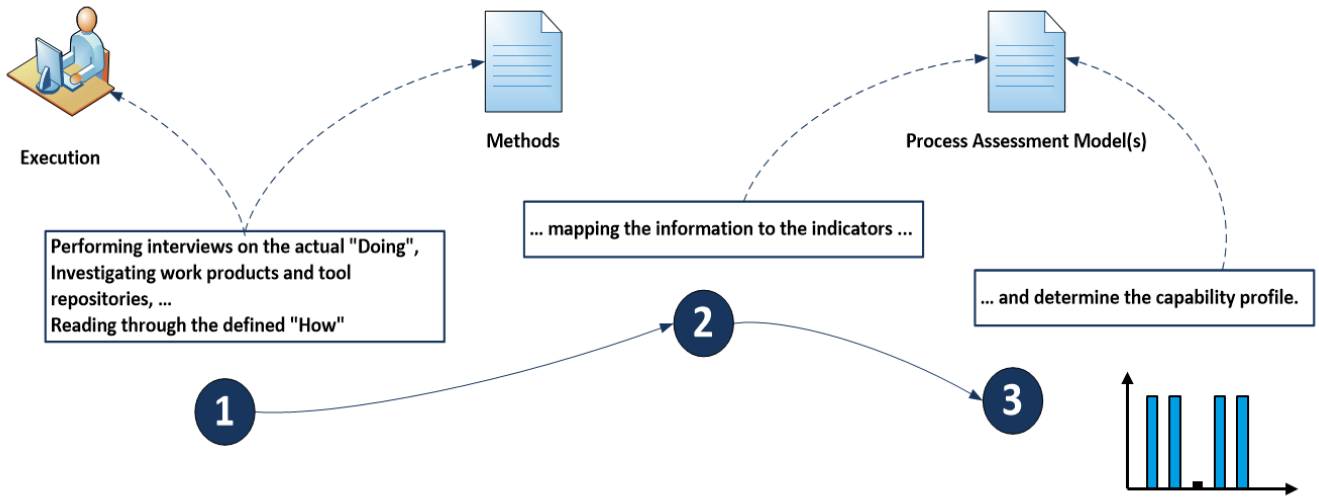

Figure 8 — Performing a process assessment for determining process capability profile

2.5 为什么 PRM 和 PAM 不是生命周期模型或开发过程蓝图

生命周期模型按时间顺序排列定义阶段和活动，可能包括周期或循环以及并行化。例如，某些标准（如 ISO 26262 或 ISO/SAE 21434）是以生命周期模型为中心的（事实上，这两个标准都不代表符合[ISO/IEC 33004]的 PRM）。公司、组织单位或项目将解释标准中给出的这种通用生命周期模型，然后导出角色、组织交互和接口、工具或工具链、工作指导和制品。因此，生命周期模型是一个“如何做”层面的概念（见 2.4 节）。

相反，符合[ISO/IEC 33004]（以前的 ISO/IEC 15504-2）的 PRM/PAM 通过从任何“如何做”层面进行抽象而处于“什么”层面，参见第 2.4 节中的图 7。PRM/PAM 将特定技术主题下的一组相关且连贯的特征组合在一起，并将其称为“过程”。用另一种表述方式，PRM 中的过程表示“不同的概念筒仓”。从这个方面讲，PRM/PAM 具备如下特点：

- 既不预先定义，也不阻碍 PRM 过程或基本实践的执行顺序。
- 不预定义任何特定的工作产品结构，或工作产品蓝图。在 Automotive SPICE®潜在分析中并没有正式的对工作产品的定义，而像[ISO 21434]或[ISO 26262]这样的技术标准中则包含这些内容，并给出了详细的要求。

因此，评估师有责任将这种“如何做”级别的要素映射到 PAM 中的评估指标，见图 8。

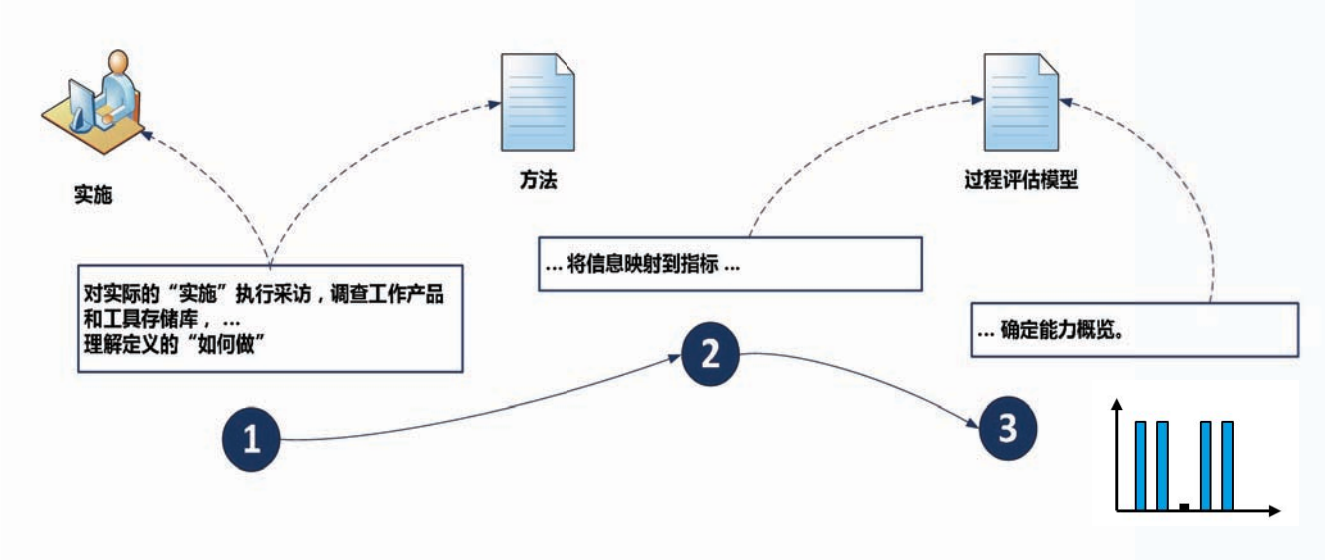

图 8 — 执行确定过程能力的过程评估

3 Process reference model and performance indicators

3.1 POPM Potential Project Management

Process ID
POPM
Process name
Potential Project Management
Process purpose
The purpose is to identify and manage activities of an exemplary project to develop a product, manage risks and monitor organizational problems related to the project.
Process outcomes
1) Activities are identified, sized, and estimated 2) Technical feasibility of the activities is evaluated 3) Interfaces of the project are identified and monitored 4) Schedule for execution of the project is developed and monitored 5) Progress of the activities is reviewed 6) Risks are managed continuously 7) Organizational problems related to the project are recorded, analyzed, and monitored
Base Practices
POPM.BP1: Identify, define, and estimate activities. Define estimates of effort for identified project activities and document dependencies **POPM.BP2: Ensure technical feasibility.** Evaluate technical feasibility of activities and goals within the project's constraints on time and estimates. **POPM.BP3: Identify and monitor project interfaces.** Identify and monitor interfaces of the project with internal or external stakeholders. *Note 1: Interfaces for partnerships and collaborations based on goods and work packages may be considered using Partner and Collaboration Management (PCOM).* **POPM.BP4: Define and monitor project schedule.** Schedule each activity of the project. Monitor the performance of activities with respect to the schedule. **POPM.BP5: Review progress of the activities.** Regularly review the status and the fulfillment of the project's activities against estimated effort and duration. *Note 2: Progress for partnerships and collaborations based on goods and work packages may be considered individually using Partner and Collaboration Management (PCOM).* **POPM.BP6: Manage risks.** Manage risks to technical and organizational activities of the project. Ensure the impact of risk treatment activities is monitored for the project. *Note 3: Activities may be affected by technical, economical, and schedule related risks.* *Note 4: Risk treatment options may include reduction, avoidance, transfer, or acceptance of risks.*

3 过程参考模型和实施指标

3.1 POPM 潜在项目管理

过程 ID
POPM
过程名称
潜在项目管理
过程目的
其目的是：为开发产品、管理风险并监控与项目相关的组织级问题，识别和管理示例项目的活动。
过程成果
1) 识别、规模化和估算了活动 2) 评估了活动的技术可行性 3) 识别和监控了项目的接口 4) 定义和监控了项目执行的进度计划 5) 评审了活动的进展 6) 持续管理了风险 7) 记录，分析和监控了项目相关的组织级问题
基本实践
POPM.BP1: 识别、定义和估算活动。定义已识别项目活动工作量的估算并记录依赖性。 **POPM.BP2: 确保技术可行性。**在项目时间和估算约束下，评估活动和目标的技术可行性。 **POPM.BP3: 识别和监控项目接口。**识别和监控项目与内部或者外部受影响方的接口。 *注 1:基于商品和工作包的合作伙伴与协作接口可考虑使用合作伙伴与协作管理（PCOM）。* **POPM.BP4: 定义和监控项目进度。**为项目的每一个活动排进度计划。基于进度计划监控活动的实施。 **POPM.BP5: 评审活动进展。**依据估算的工作量和工期，定期评审项目活动的状态和完成情况。 *注 2:基于商品和工作包的合作伙伴与协作进度可考虑使用合作伙伴与协作管理（PCOM）。* **POPM.BP6: 管理风险。**管理项目技术和组织活动的风险，确保项目风险处理活动的影响被监控。 *注 3: 活动可受到技术、经济和进度计划的影响。* *注 4: 风险处理方案可包括降低，避免，转移和接受风险。*

POPM.BP7: Analyze and monitor organizational problems related to the project. Record, analyze and monitor the impact of organizational problems related to the project.

Note 5: Organizational problems, as a type of non-technical problems, may be related to groups inside and outside the exemplary project, such as shared resources, internal service providers, central functions, etc. Examples of organizational problems are communication issues, lack of stakeholder involvement, insufficient skills identified at interfaces, etc.

Note 6: Resolution of organizational problems may be supported by Process Quality Assurance (PQAS), process improvement (e.g., as ISO/IEC TR 33014), or established management practices (e.g., lessons learned, inspect and adapt, retrospectives).

Potential Project Management	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6	Outcome 7
Output Information Items							
08-56 Schedule				X	X		
14-10 Work package	X	X			X		
15-06 Project status				X	X	X	X
15-08 Risk analysis						X	
15-09 Risk status						X	
08-55 Risk measure						X	
13-07 Problem							X
15-12 Problem status							X
14-02 Corrective action				X	X		
14-50 Stakeholder groups list			X				
Base Practices							
BP1: Identify, define, and estimate activities	X						
BP2: Ensure technical feasibility	X	X					
BP3: Identify and monitor project interfaces			X				
BP4: Define and monitor project schedule				X			
BP5: Review progress of the activities			X	X	X		
BP6: Manage risks						X	
BP7: Analyze and monitor organizational problems to the project							X

POPM.BP7: 分析和监控项目相关的组织级问题。记录、分析和监控项目相关的组织级问题的影响。

注 5: 组织级问题是一种非技术问题，可与示例项目内部和外部的群体有关，如共享资源、内部服务提供商、中央职能等。组织级问题的示例包括沟通问题、缺乏利益相关方参与、接口识别的技能不足等。

注 6: 组织级问题的解决可得到过程质量保证 (PQAS)、过程改进（例如，ISO/IEC TR 33014）或既定的管理实践（例如，经验教训、检查和调整、回顾）的支持。

潜在项目管理	成果 1	成果 2	成果 3	成果 4	成果 5	成果 6	成果 7
输出信息项							
08-56 进度计划				X	X		
14-10 工作包	X	X			X		
15-06 项目状态				X	X	X	X
15-08 风险分析						X	
15-09 风险状态						X	
08-55 风险措施						X	
13-07 问题							X
15-12 问题状态							X
14-02 纠正行动				X	X		
14-50 利益相关方群组清单			X				
基本实践							
BP1: 识别、定义和估算活动	X						
BP2: 确保技术可行性	X	X					
BP3: 识别和监控项目接口			X				
BP4: 定义和监控项目进度				X			
BP5: 评审活动进展			X	X	X		
BP6: 管理风险						X	
BP7: 分析和监控项目相关的组织级问题							X

3.2 RTCM Release and Technical Configuration Management

Process ID
RTCM
Process name
Release and Technical Configuration Management
Process purpose
The purpose is to establish and maintain the integrity of engineering and product related work products of a process, to make them available to affected parties and to control the release of process outcomes.
Process outcomes
1) Engineering-related configuration items are identified 2) The content for the release is defined 3) The release is assembled from configured items 4) Modifications and releases are made available to affected parties 5) Baselines are regularly recorded and controlled for engineering-related configuration items 6) The release documentation is defined and produced 7) The product release is made available to the intended customer
Base Practices
RTCM.BP1: Identify engineering-related configuration items. Identify and document engineering-related configuration items. **RTCM.BP2: Control modifications and releases.** Establish mechanisms to control the configuration items, and control modifications and releases using these mechanisms. *Note 1: Branch management may be used to manage complex software code.* **RTCM.BP3: Establish baselines**. Establish baselines for physical and logical integrity of the release, related configuration items and for the delivery. **RTCM.BP4: Define, assemble, and deliver the release**. Identify the functionality to be included in each release according to the project schedule. Define the products associated with the release and build the release from configured items. Ensure that all documentation to support the release is produced, reviewed, approved and available. Deliver the release package to the intended customer.

3.2 RTCM 发布与技术配置管理

过程 ID
RTCM
过程名称
发布与技术配置管理
过程目的
其目的是：建立和维护过程的工程和产品相关工作产品的完整性，使其可供受影响方使用，并控制过程成果的发布。
过程成果
1) 识别了工程相关的配置项 2) 定义了发布的内容 3) 发布由被配置的项构建 4) 提供了修改和发布给受影响方 5) 定期记录和控制了工程相关的配置项基线 6) 定义和生成了发布文档 7) 提供了产品发布给目标客户
基本实践
RTCM.BP1: 识别工程相关的配置项。识别和记录工程相关的配置项。 **RTCM.BP2: 控制修改和发布。**建立控制配置项的机制。使用这些机制控制修改和发布 *注 1:分支管理可用于管理复杂的软件代码。* **RTCM.BP3: 建立基线。**建立用于发布、相关配置项和交付的物理和逻辑完整性的基线 **RTCM.BP4: 定义、构建和交付发布。**根据项目进度计划识别各发布所包含的功能。定义与发布相关的产品并且从被配置的项构建发布。确保生成、评审、批准和提供所有支持发布的文件。交付发布包给目标客户。

Release and Technical configuration management	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5	Outcome 6	Outcome 7
Output Information Items							
01-52 Configuration item list	X						
11-04 Product release package		X	X			X	
13-06 Delivery evidence							X
13-08 Baseline					X		
14-01 Change history					X		
16-03 Configuration management system				X			
Base Practices							
BP1: Identify engineering-related configuration items	X	X		X		X	
BP2: Control modifications and releases		X		X	X		
BP3: Establish baselines					X		X
BP4: Define, assemble, and deliver the release		X	X			X	X

发布与技术配置管理	成果 1	成果 2	成果 3	成果 4	成果 5	成果 6	成果 7
输出信息项							
01-52 配置项清单	X						
11-04 产品发布包		X	X			X	
13-06 交付证据							X
13-08 基线					X		
14-01 变更历史					X		
16-03 配置管理系统				X			
基本实践							
BP1: 识别工程相关的配置项	X	X		X		X	
BP2: 控制修改和发布		X		X	X		
BP3: 建立基线					X		X
BP4: 定义、构建和交付发布		X	X			X	X

3.3 PQAS Process Quality Assurance

Process ID
PQAS
Process name
Process Quality Assurance
Process purpose
The purpose is to provide independent and objective assurance that processes comply with predefined provisions and that non-conformances are resolved.
Process outcomes
1) Process quality assurance is performed independently and objectively without conflicts of interest 2) Criteria for process quality assurance are defined 3) Conformance of process activities is verified, documented, and summarized 4) Non-conformances of process activities are recorded, analyzed, and managed until closure 5) Independent escalation mechanism is implemented
Base Practices
PQAS.BP1: Establish independency and objectivity for process quality assurance. Ensure process quality can be assured objectively without conflict of interests resulting from dependencies within organizational structures. *Note 1: Organizational structures may be influenced by hierarchy or standardized process frameworks.* **PQAS.BP2: Implement an escalation mechanism.** Ensure that quality assurance can escalate problems independently to appropriate levels of the organization for resolution. **PQAS.BP3: Define criteria to assure quality of process activities.** Define quality criteria for process activities and assure that the processes meet their defined goals according to the project schedule. Collect and analyze data of process quality assurance and initiate project-related actions. **PQAS.BP4: Ensure resolution of non-conformances**. Deviations or non-conformances found in process quality assurance activities are recorded, analyzed, and managed until closure. **PQAS.BP5: Summarize process quality assurance activities and results.** Summarize activities, deviations, and trends of process quality assurance.

3.3 PQAS 过程质量保证

过程 ID
PQAS
过程名称
过程质量保证
过程目的
其目的是：提供独立且客观的保证，使过程符合已定义的准则，并使不符合项得到解决。
过程成果
1) 独立且客观地执行了过程质量保证，没有利益冲突； 2) 定义了过程质量保证准则； 3) 验证、记录并总结了过程活动的符合性； 4) 记录、分析、管理了过程活动的不符合项； 5) 实施了独立的升级机制。
基本实践
PQAS.BP1：建立独立且客观的过程质量保证。 确保过程质量能够客观地得到保证，不会因组织架构中的依赖关系而产生利益冲突。 *注 1：组织架构可能受到等级制度或标准化过程框架的影响。* **PQAS.BP2：实施升级机制。**确保质量保证可以独立地将问题升级到组织的适当级别以解决问题。 **PQAS.BP3：定义准则以确保过程活动的质量。**为过程活动定义质量准则，并根据项目进度计划确保过程满足其定义的目标。收集和分析过程质量保证数据，并发起项目相关行动。 **PQAS.BP4：确保不符合项的解决**。记录、分析和管理过程质量保证活动中所发现的偏差或不符合项直至关闭。 **PQAS.BP5：总结过程质量保证活动和结果。**总结过程质量保证的活动、偏差和趋势。

Process Quality Assurance	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
Output Information Items					
13-19 Review evidence			X	X	
14-02 Corrective action				X	
16-50 Organizational structure	X				X
18-07 Quality criteria		X		X	
18-52 Escalation path					X
Base Practices					
BP1: Establish independency and objectivity for process quality assurance	X				
BP2: Implement an escalation mechanism					X
BP3: Define criteria to assure quality of process activities		X			
BP4: Ensure resolution of non-conformances			X	X	
BP5: Summarize process quality assurance activities and results			X		

过程质量保证	成果 1	成果 2	成果 3	成果 4	成果 4
输出信息项					
13-19 评审证据			X	X	
14-02 纠正行动				X	
16-50 组织架构	X				X
18-07 质量准则		X		X	
18-52 升级路径					X
基本实践					
BP1：建立独立且客观的过程质量保证	X				
BP2：实施升级机制					X
BP3：定义准则以确保过程活动的质量		X			
BP4：确保不符合项的解决			X	X	
BP5：总结过程质量保证活动和结果			X		

3.4 TEPR Technical Problem Resolution

Process ID
TEPR
Process name
Technical Problem Resolution
Process purpose
The purpose is to ensure that technical problems are recorded, analyzed, and tracked to closure.
Process outcomes
1) Technical problems are recorded, analyzed, categorized, and assessed to identify an appropriate solution 2) Technical problem resolution is initiated 3) Technical problems are consistently tracked to closure 4) The status of problems and their trend are known
Base Practices
TEPR.BP1: Record technical problem, determine its cause and impact. Investigate the technical problem and determine its cause and impact to categorize the technical problem and to determine appropriate actions. *Note 1: Problem categorization may be based on severity, criticality (e.g., high, mid, low), or other criteria.* **TEPR.BP2: Initiate technical problem resolution.** Initiate appropriate actions to technically resolve the problem and include review of those actions. **TEPR.BP3: Track problems consistently to closure.** Ensure the solution by tracking the status of problems to closure. *Note 2: The controlled resolution of problems may involve authorization of action(s), relationships, and dependencies (parent/child) and the adherence to schedule.* **TEPR.BP4: Analyze problem trends.** Collect and analyze technical problem resolution management data and identify trends.

Technical Problem Resolution	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Output Information Items				
13-07 Problem	X	X	X	
15-12 Problem status			X	X
15-55 Problem analysis evidence	X			
Base Practices				
BP1: Record technical problem, determine its cause and impact	X			
BP2: Initiate technical problem resolution		X		
BP3: Track problems consistently to closure			X	
BP4: Analyze problem trends				X

3.4 TEPR 技术问题解决

过程 ID
TEPR
过程名称
技术问题解决
过程目的
其目的是：确保技术问题被记录、分析并跟踪直至关闭。
过程成果
1) 记录、分析、分类和评估了技术问题以识别适当的解决方案； 2) 启动了技术问题解决； 3) 持续跟踪了问题直至关闭； 4) 已知问题的状态和趋势。
基本实践
TEPR.BP1：记录技术问题，确定其原因和影响。调查技术问题，确定其原因和影响以对技术问题进行分类，并确定适当的行动。 *注 1：问题分类可以基于严重度、关键性（例如，高、中、低）或其他准则。* **TEPR.BP2：启动技术问题解决。**启动适当的行动，从技术上解决问题，并包括对这些行动的评审。 **TEPR.BP3：持续跟踪问题直至关闭。**通过跟踪问题的状态来确保问题的解决。 *注 2：问题的受控解决可能涉及对行动、关系和依赖（父/子）的授权以及对进度计划的遵循。* **TEPR.BP4：分析问题趋势。**收集和分析技术问题解决管理数据并识别趋势。

技术问题解决	成果 1	成果 2	成果 3	成果 4
输出信息项				
13-07 问题	X	X	X	
15-12 问题状态			X	X
15-55 问题分析证据	X			
基本实践				
BP1：记录技术问题，确定其原因和影响	X			
BP2：启动技术问题解决		X		
BP3：持续跟踪问题直至关闭			X	
BP4：分析问题趋势				X

3.5 SWDI Software Requirements, Design and Implementation

Process ID

SWDI

Process name

Software Requirements, Design and Implementation

Process purpose

The purpose is to have a structured and analyzed set of software requirements and a software architectural design available, that software detailed design exists, and software units are constructed based on the detailed design.

Process outcomes

1) The software requirements are specified, analyzed, structured and prioritized
2) A software architecture design is specified that identifies the components of the software and describes their interfaces and the dynamic interactions between the software components
3) A detailed design is specified for each software component
4) Software units are developed according to the software detailed design

Base Practices

SWDI.BP1: Specify, analyze, structure and prioritize software requirements.
Specify, analyze and structure functional and non-functional software requirements according to defined characteristics for requirements. Prioritize software requirements according to project schedule.

Note 1: Software requirements can be structured, e.g., by categorizing, grouping, sorting, and prioritizing according to the project context.

SWDI.BP2: Specify and analyze software architectural design. Specify and analyze the software architecture including components and their interfaces. Specify static and dynamic views of software architectural components. Determine and document resource consumption objectives.

SWDI.BP3: Specify software detailed design. Specify the static and the dynamic aspects of the detailed design for each software component, including their interfaces, relationships and interactions between relevant software units.

SWDI.BP4: Develop software units. Develop and document software units according to the software detailed design.

3.5 SWDI 软件需求、设计与实现

过程 ID

SWDI

过程名称

软件需求、设计与实现

过程目的

其目的是：获得一组已结构化和已分析的软件需求和软件架构设计，确保存在软件详细设计，并根据详细设计构建软件单元。

过程成果

1) 定义、分析和结构化了软件需求，并进行优先排序
2) 定义了软件架构设计，识别了软件的组件并描述它们的接口以及软件组件之间的动态交互
3) 定义了每个软件组件的详细设计
4) 根据软件详细设计，开发了软件单元

基本实践

SWDI.BP1: 定义、分析和结构化软件需求并进行优先级排序。

根据定义的需求特性，定义、分析和结构化软件的功能性和非功能性需求。根据项目进度计划，对软件需求进行优先级排序。

注 1：软件需求可以根据项目环境来进行结构化，例如按类别、分组、排序和优先级。

SWDI.BP2: 定义和分析软件架构设计。定义和分析软件架构，包括组件及其接口。定义软件架构组件的静态和动态视图。确定并记录资源消耗目标。

SWDI.BP3: 定义软件详细设计。定义各个软件组件的详细设计的静态和动态视图，包括它们的接口、关联以及相关软件单元之间的交互。

SWDI.BP4: 开发软件单元。根据软件详细设计，开发并记录软件单元。

Software Requirements, Design and Implementation	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Output Information Items				
17-00 Requirement	X			
17-54 Requirement Attribute	X			
04-04 Software Architecture		X		
15-51 Analysis results	X	X		
04-05 Software Detailed Design			X	
11-05 Software Unit				X
Base Practices				
BP1: Specify, analyze, structure and prioritize software requirements	X			
BP2: Specify and analyze software architectural design		X		
BP3: Specify software detailed design			X	
BP4: Develop software units				X

软件需求、设计与实现	成果 1	成果 2	成果 3	成果 4
输出信息项				
17-00 需求	X			
17-54 需求属性	X			
04-04 软件架构		X		
15-51 分析结果	X	X		
04-05 软件详细设计			X	
11-05 软件单元				X
基本实践				
BP1: 定义、分析和结构化软件需求并进行优先级排序	X			
BP2: 定义和分析软件架构设计		X		
BP3: 定义软件详细设计			X	
BP4: 开发软件单元				X

3.6 SWIV Software Integration and Verification

Process ID

SWIV

Process name

Software Integration and Verification

Process purpose

The purpose is to verify software units, integrate software and to ensure that the integrated software is consistent with its provisions and compliant with the software requirements.

Process outcomes

1) Verification measures for software units, for software component integration and for software verification are specified
2) Software units are verified with specified verification measures, and the verification results are recorded
3) Software components are integrated up to a complete integrated software, the integration is verified with specified verification measures, and the verification results are recorded
4) Integrated software is verified with specified verification measures and the results of software verification are recorded
5) Horizontal traceability is established on all levels

Base Practices

SWIV.BP1 Specify and perform unit verification measures. Specify and perform software unit verification measures and record the verification results including pass/fail status.

Note 1: Examples for unit verification measures are static and dynamic analysis and code reviews.

SWIV.BP2 Specify and perform the verification measures for integration. Specify and perform the verification measures for the integration and record the verification results including pass/fail status. Perform integration of the software elements until the software is fully integrated.

Note 2: Examples for preconditions for starting integration can be successful software element verification or qualification of pre-existing software elements

SWIV.BP3 Specify and perform the verification measures for software. Specify and perform the verification measures suitable to provide evidence of compliance of the integrated software with the software requirements. Record the verification results including pass/fail status.

SWIV.BP4 Establish horizontal traceability. Ensure horizontal traceability from software requirements, software architecture and detailed design to corresponding verification measures and results.

Note 3: Horizontal traceability supports consistency, impact analysis and verification coverage demonstration for a respective V-model level.

3.6 SWIV 软件集成与验证

过程 ID

SWIV

过程名称

软件集成与验证

过程目的

其目的是：验证软件单元，集成软件，并确保集成后的软件符合其规定且与软件需求保持一致。

过程成果

1) 定义了软件单元、软件组件集成和软件验证的验证措施
2) 基于已定义的验证措施验证了软件单元，并记录了验证结果
3) 将软件组件集成为完整的集成软件，基于已定义的验证措施验证了集成，并记录了验证结果
4) 基于已定义的验证措施验证了集成软件，并记录了软件验证结果
5) 建立了所有层级的横向可追溯性

基本实践

SWIV.BP1 定义并执行单元验证措施。定义并执行软件单元验证措施，并记录包含通过/失败状态的验证结果。

注 1：单元验证措施的示例包括静态分析、动态分析及代码审查。

SWIV.BP2 定义并执行集成验证措施。定义并执行集成验证措施，并记录包含通过/失败状态的验证结果。集成软件要素，直至软件完整集成。

注 2：启动集成的前提条件示例可包含软件要素验证成功或对既存软件要素的合格性确认。

SWIV.BP3 定义并执行软件验证措施。定义并执行适当的验证措施，以证明集成软件符合软件需求，并记录包含通过/失败状态的验证结果。

SWIV.BP4 建立横向可追溯性。确保从软件需求、软件架构及详细设计到对应验证措施与结果的横向可追溯性。

注 3：横向可追溯性支持特定 V 模型层级的一致性维护、影响分析及验证覆盖度证明。

Software Integration and Verification	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
Output Information Items					
08-60 Verification Measure	X				
08-58 Verification Measure Selection Set			X	X	
15-52 Verification Results		X	X	X	
01-03 Software Component			X		
01-50 Integrated Software				X	
13-51 Consistency Evidence					X
Base Practices					
BP1: Specify and perform unit verification measures	X	X			
BP2: Specify and perform the verification measures for integration	X		X		
BP3: Specify and perform the verification measures for software	X			X	
BP4: Establish horizontal traceability					X

软件集成与验证	成果 1	成果 2	成果 3	成果 4	成果 5
输出信息项					
08-60 验证措施	X				
08-58 验证措施选择集			X	X	
15-52 验证结果		X	X	X	
01-03 软件组件			X		
01-50 集成软件				X	
13-51 一致性证据					X
基本实践					
BP1：定义并执行单元验证措施	X	X			
BP2：定义并执行集成验证措施	X		X		
BP3：定义并执行软件验证措施	X			X	
BP4：建立横向可追溯性					X

3.7 REEL Requirements Elicitation

Process ID

REEL

Process name

Requirements Elicitation

Process purpose

The purpose is to gather and process stakeholder needs and requirements of the exemplary product or service.

Process outcomes

1) Exchange of stakeholder expectations is established
2) Stakeholder requirements are agreed
3) Stakeholder needs are monitored continuously
4) Evolving stakeholder requirements are continuously evaluated

Base Practices

REEL.BP1: Obtain stakeholder expectations and requests. Obtain and define stakeholder expectations and requests through direct solicitation of stakeholder input and other sources containing inputs to stakeholder requirements, considering the target operating and hardware environment.

Note 1: Requirements elicitation may involve project partners up and downstream.

REEL.BP2: Agree on requirements. Formalize the stakeholder's expectations and requests into requirements. Reach a common understanding of the set of stakeholder requirements among affected parties by obtaining an explicit agreement from all affected parties.

Note 2: Reviewing the requirements and requests with the stakeholder supports a better understanding of stakeholder needs and expectations.

Note 3: The agreed stakeholder requirements may be influenced by feasibility studies, effort and schedule impact analysis.

REEL.BP3: Analyze changes on stakeholder requirements. Analyze all changes made to the agreed stakeholder requirements. Assess the impact and risks of the resulting modification.

Note 4: Accepted stakeholder change requests may be followed up by Technical Change Request Management (TCRM).

REEL Requirements Elicitation	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Output Information Items				
15-51 Analysis Results				X
17-00 Requirement	X	X		
17-54 Requirement Attribute		X	X	X
Base Practices				
BP1: Obtain stakeholder expectations and requests	X			
BP2: Agree on requirements		X		
BP3: Analyze changes on stakeholder requirements			X	X

3.7 REEL 需求挖掘

过程 ID
REEL
过程名称
需求挖掘
过程目的
其目的是：收集和处理利益相关方对示例产品或服务的需要和需求。
过程成果
1) 建立了利益相关方期望的交流 2) 约定了利益相关方需求 3) 持续地监控了利益相关方的需要 4) 持续地评估了不断变化的利益相关方需求
基本实践
REEL.BP1: 获取利益相关方期望和要求。考虑目标运行和硬件环境，通过直接征求利益相关方意见、以及其它包含利益相关方需求输入的来源，获得并定义利益相关方期望和要求。 *注 1：需求挖掘可涉及到上游和下游的项目合作伙伴。* **REEL.BP2: 达成需求共识。**将利益相关方期望和要求正式化，形成需求。通过获得所有受影响方的明确协议，在受影响方之间达成对利益相关方需求的共识。 *注 2：与利益相关方一起评审需求和要求有助于更好地理解利益相关方的需求和期望。* *注 3：约定的利益相关方需求可受到可行性研究，工作量和进度影响分析的影响。* **REEL.BP3: 分析利益相关方需求的变更。**分析利益相关方需求的所有变更。评估因修改而导致的影响和风险。 *注 4：已接受的利益相关方请求可由技术变更请求管理（TCRM）跟进。*

REEL 需求挖掘	成果 1	成果 2	成果 3	成果 4
输出信息项				
15-51 分析结果				X
17-00 需求	X	X		
17-54 需求属性		X	X	X
基本实践				
BP1: 获取利益相关方期望和要求	X			
BP2: 达成需求共识		X		
BP3: 分析利益相关方需求的变更			X	X

3.8 SYRD System Requirements and Design

Process ID

SYRD

Process name

System Requirements and Design

Process purpose

The purpose is to have a structured and analyzed set of system requirements and a system architectural design available.

Process outcomes

1) The system requirements are specified, analyzed, structured, and prioritized

2) A system architecture design is specified that identifies the elements of the system and describes their interfaces and the dynamic interactions of the system elements

Base Practices

SYRD.BP1: Specify, analyze, structure and prioritize system requirements.
Specify, analyze and structure functional and non-functional system requirements according to defined characteristics for requirements. Prioritize system requirements according to project schedule.

Note 1: System requirements can be structured, e.g., by categorizing, grouping, sorting, and prioritizing according to the project context.

Note 2: For changes to the stakeholder's requirements Technical Change Request Management (TCRM) may apply.

Note 3: The analysis of impact on effort and schedule supports the adjustment of project estimates. Refer to Potential Project Management (POPM).

SYRD.BP2: Specify and analyze system architectural design. Specify and analyze the system architecture including system elements and their interfaces. Specify static and dynamic views of system elements.

SYRD System Requirements Analysis and Design	Outcome 1	Outcome 2
Output Information Items		
17-00 Requirement	X	
17-54 Requirement Attribute	X	
04-06 System Architecture		X
15-51 Analysis Results	X	X
Base Practices		
BP1: System requirements are analyzed, specified, structured, and prioritized	X	
BP2: System architectural design is analyzed and specified		X

3.8 SYRD 系统需求与设计

过程 ID
SYRD
过程名称
系统需求与设计
过程目的
其目的是：获得一组已结构化和已分析的系统需求，以及可用的系统架构设计。
过程成果
1) 定义、分析和结构化了系统需求，并进行了优先级排序。 2) 定义了系统架构，其识别了系统要素并描述了要素接口和系统要素的动态交互。
基本实践
SYRD.BP1: 定义、分析和结构化系统需求并进行优先级排序。根据定义的需求特性，识别、分析和结构化系统的功能性和非功能性需求。根据项目进度计划，对系统需求进行优先级排序。 *注 1：系统需求可以根据项目环境来进行结构化，例如按类别、分组、排序和优先级。* *注 2：关于利益相关方的需求变更，可适用技术变更请求管理（TCRM）。* *注 3：对工作量和进度的影响分析支持项目估算的调整。参见潜在项目管理（POPM）。* **SYRD.BP2: 定义和分析系统架构设计。** 定义和分析系统架构，包括系统要素和其接口。定义系统要素的静态和动态视图。

SYRD 系统需求分析与设计	成果 1	成果 2
输出信息项		
17-00 需求	X	
17-54 需求属性	X	
04-06 系统架构		X
15-51 分析结果	X	X
基本实践		
BP1: 定义、分析和结构化系统需求并进行优先级排序	X	
BP2: 定义和分析系统架构设计		X

3.9 SYIV System Integration and Verification

Process ID

SYIV

Process name

System Integration and Verification

Process purpose

The purpose is to integrate the system and to ensure that the integrated system is consistent with its provisions and compliant with the system requirements.

Process outcomes

1) Verification measures for system integration and for system verification are specified
2) System elements are integrated up to a complete integrated system, the integration is verified with specified verification measures, and the verification results are recorded
3) The integrated system is verified with specified verification measures and the results of system verification are recorded
4) Horizontal traceability is established on all levels

Base Practices

SYIV.BP1: Specify and perform verification measures for integration. Specify and perform verification measures for the integration and record the verification results including pass/fail status. Perform integration of the system elements until the system is fully integrated.

Note 1: Examples for preconditions for starting integration can be successful system element verification or qualification of pre-existing system elements

SYIV.BP2: Specify and perform system verification measures for system. Specify and perform the verification measures suitable to provide evidence of compliance of the integrated system with the system requirements. Record the verification results including pass/fail status.

SYIV.BP3: Establish horizontal traceability. Ensure horizontal traceability from system requirements and system architecture to the corresponding verification measures and results.

Note 2: Horizontal traceability supports consistency, impact analysis and verification coverage demonstration for a respective V-model level.

SYIV System Integration and Verification	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Output Information Items				
08-60 Verification Measure	X			
08-58 Verification Measure Selection Set		X	X	
15-52 Verification Results		X	X	
13-51 Consistency Evidence				X
11-06 Integrated System		X		
Base Practices				
BP1: Specify and perform verification measures for integration	X	X		
BP2: Specify and perform system verification measures for system	X		X	
BP3: Establish horizontal traceability				X

3.9 SYIV 系统集成与验证

过程 ID
SYIV
过程名称
系统集成与验证
过程目的
其目的是：集成系统，并确保集成后的系统符合其规定且与系统需求保持一致。
过程成果
1) 定义了系统集成和系统验证的验证措施 2) 将系统要素集成为完整的集成系统，基于已定义的验证措施验证了集成，并记录了验证结果 3) 基于已定义的验证措施验证了集成系统，并记录了系统验证结果 4) 建立了所有层级的横向可追溯性
基本实践
SYIV.BP1：定义并执行集成验证措施 定义并执行集成验证措施，并记录包含通过/失败状态的验证结果。集成系统要素，直至系统完整集成。 *注 1：启动集成的前置条件示例可包含成功的系统要素验证或既存系统要素的鉴定。* **SYIV.BP2：定义并执行系统验证措施** 定义并执行适当的验证措施，以证明集成系统符合系统需求，并记录包含通过/失败状态的验证结果 **SYIV.BP3：建立横向可追溯性** 确保从系统需求及系统架构到对应验证措施与结果的横向可追溯性。 *注 2：横向可追溯性支持特定 V 模型层级的一致性维护、影响分析及验证覆盖度证明。*

系统集成与验证	成果 1	成果 2	成果 3	成果 4
输出信息项				
08-60 验证措施	X			
08-58 验证措施选择集		X	X	
15-52 验证结果		X	X	
13-51 一致性证据				X
11-06 集成系统		X		
基本实践				
BP1：定义并执行集成验证措施	X	X		
BP2：定义并执行系统验证措施	X		X	
BP3：建立横向可追溯性				X

3.10 PCOM Partner and Collaboration Management

Process ID

PCOM

Process name

Partner and Collaboration Management

Process purpose

The purpose is to select partners and collaborations according to relevant criteria and to monitor performance against agreed commitments.

Process outcomes

1) Evaluation criteria for partners and collaborations are established
2) Partners and collaborations are evaluated against the defined criteria
3) Joint activities are agreed
4) Performance of the partners and collaborations is monitored against the agreements

Base Practices

PCOM.BP1: Establish evaluation criteria. Analyze relevant requirements to define evaluation criteria for capabilities of partners and collaborations.

Note 1: Criteria may consider commercial constraints, quality requirements, technical evaluation and capabilities required for norm and standard conformance (such as conformance to norms of safety, cybersecurity, and other technical norms).

PCOM.BP2: Evaluate partners and collaborations against defined criteria. Collect information about the capabilities of partners and collaborations and evaluate it against the established evaluation criteria.

Note 2: The evaluation may be supported by audit and assessment results, certifications, policies, financial reports, technical demonstration, portfolio reviews, roadmap information, historical data, etc.

PCOM.BP3: Agree on joint activities. Establish an agreement on joint activities, type and frequency of joint activities and reviews.

Note 3: Agreements may include ownership of processes, type and frequency of joint activities, failure management and reviews.

PCOM.BP4: Review performance of the partners and collaborations. Review progress of the collaborations and partnerships regarding schedule, quality, and effort on the agreed regular basis. Agree on corrective actions accordingly.

3.10 PCOM 合作伙伴与协作管理

过程 ID
PCOM
过程名称
合作伙伴与协作管理
过程目的
其目的是：根据相关准则选择合作伙伴与协作，并根据约定的承诺监控实施。
过程成果
1) 建立了合作伙伴与协作的评估准则 2) 根据定义的准则评估了合作伙伴与协作 3) 约定了联合活动 4) 根据约定监控了合作伙伴与协作的实施
基本实践
PCOM.BP1：建立评估准则。分析相关需求，定义对合作伙伴能力和协作能力的评估准则。 *注 1：准则可以考虑商业约束、质量要求、技术评估及规范和标准符合性（如符合安全规范、网络安全规范和其他技术规范）所需的能力。* **PCOM.BP2：根据定义的准则评估合作伙伴与协作。收集有关合作伙伴能力和协作能力的信息，并根据既定的评估准则对其进行评估。** *注 2：评估可以由审计和评估结果、认证、政策、财务报告、技术论证、组合评审、路标信息、历史数据等支持。* **PCOM.BP3：约定联合活动。建立协议，包括联合活动以及联合活动和评审的类别和频率。** *注 3：约定可能包括过程的所有权、联合活动的类型和频率、失效管理和评审。* **PCOM.BP4：评审合作伙伴与协作的实施。按照约定定期评审协作和伙伴关系在进度、质量和工作量方面的进展。并约定相应的纠正行动。**

Partner and Collaboration Management	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Output Information Items				
18-50 Supplier evaluation criteria	X			
15-21 Supplier evaluation		X		
15-51 Analysis results		X		X
02-01 Commitment/agreement			X	X
02-50 Interface agreement		X	X	
13-14 Progress status				X
14-02 Corrective action				X
Base Practices				
BP1: Establish evaluation criteria	X			
BP2: Evaluate partners and collaborations against defined criteria		X		
BP3: Agree on joint activities			X	
BP4: Review performance of the partners and collaborations				X

合作伙伴与协作管理	成果 1	成果 2	成果 3	成果 4
输出信息项				
18-50 供应商评估准则	X			
15-21 供应商评估		X		
15-51 分析结果		X		X
02-01 承诺/协议			X	X
02-50 接口协议		X	X	
13-14 进展状态				X
14-02 纠正行动				X
基本实践				
BP1：建立评估准则	X			
BP2：根据定义的准则评估合作伙伴与协作		X		
BP3：约定联合活动			X	
BP4：评审合作伙伴与协作的实施				X

3.11 TCRM Technical Change Request Management

Process ID

TCRM

Process name

Technical Change Request Management

Process purpose

The purpose is to ensure that technical change requests are analyzed, tracked, and implemented.

Process outcomes

1) Technical change requests are analyzed, dependencies and relationships to other technical change requests are identified, and the impact is estimated
2) Implementation of technical change requests is confirmed
3) The status of all technical change requests is known, and technical change requests are tracked to closure

Base Practices

TCRM.BP1: Analyze and assess technical change requests. Technical change requests are analyzed by relevant parties according to analysis criteria. Work products affected by the change request and dependencies on other technical change requests are determined. The impact of the technical change requests is assessed.

Note 1: Examples for analysis criteria are: resource requirements, scheduling issues, risks, benefits, etc.

TCRM.BP2: Confirm the implementation of technical change requests. The implementation of technical change requests is confirmed before closure by relevant stakeholders.

TCRM.BP3: Track technical change requests to closure. The status of technical change requests is known, and they are tracked to closure.

Technical Change Request Management	Outcome 1	Outcome 2	Outcome 3
Output Information Items			
13-16 Change request	X	X	X
18-57 Change analysis criteria	X		
Base Practices			
BP1: Analyze and assess technical change requests	X		
BP2: Confirm the implementation of technical change requests		X	
BP3: Track technical change requests to closure			X

3.11 TCRM 技术变更请求管理

过程 ID
TCRM
过程名称
技术变更请求管理
过程目的
其目的是：确保技术变更请求得到分析、跟踪和实施。
过程成果
1) 分析了技术变更请求，识别了与其他技术变更请求的之间依赖关系，并估计了影响 2) 确认了技术变更请求的实施 3) 已知所有技术变更请求的状态，并跟踪了技术变更请求直至关闭
基本实践
TCRM.BP1：分析并评估技术变更请求。相关方根据分析准则对技术变更请求进行分析。确定受变更请求影响的工作产品以及与其他技术变更请求的依赖关系。评估技术变更请求的影响。 *注 1：分析准则的示例如，资源需求、时间进度问题、风险、收益等。* **TCRM.BP2：确认技术变更请求的实施。在关闭前，由相关的利益相关方确认技术变更请求的实施。** **TCRM.BP3：跟踪技术变更请求直至关闭。知晓技术变更请求的状态，并跟踪它们直至关闭。**

技术变更请求管理	成果 1	成果 2	成果 3
输出信息项			
13-16 变更请求	X	X	X
18-57 变更分析准则	X		
基本实践			
BP1：分析并评估技术变更请求	X		
BP2：确认技术变更请求的实施		X	
BP3：跟踪技术变更请求直至关闭			X

3.12 CSGE Cybersecurity Goal Elicitation

Process ID
CSGE
Process name
Cybersecurity Goal Elicitation
Process purpose
The purpose is to derive cybersecurity goals and to ensure traceability between the cybersecurity risk assessment and the cybersecurity goals.
Process outcomes
1) Threats are analyzed and cybersecurity risks evaluated 2) Cybersecurity risk treatment options are determined 3) Cybersecurity goals are defined for risk reduction and avoidance 4) Traceability is established between the cybersecurity goals and the threat scenarios
Base Practices
CSGE.BP1: Analyze threats and evaluate cybersecurity risks. Analyze threats to determine attack paths that are relevant for the project. Evaluate relevant threat scenarios for their impact, severity and likelihood for respective project life cycle phases and stakeholders. *Note 1: Analysis may be for relevance to financial, safety, privacy, and operational terms.* **CSGE.BP2: Define cybersecurity risk treatment option.** For each cybersecurity risk define the selected treatment option to reduce, avoid, accept or transfer (share) the risks. *Note 2: Accepted and transferred (shared) risks can define cybersecurity claims that may require rationale and justification.* *Note 3: Risks may be handled individually or as a set of risks.* **CSGE.BP3: Derive and align cybersecurity goals for risk reduction and avoidance.** Derive cybersecurity goals for threat scenarios that were chosen for reduction and avoidance and align possible conflicts with established cybersecurity goals. **CSGE.BP4: Establish traceability between the cybersecurity goals and the threat scenarios.** *Note 4: Traceability supports consistency and facilitates impact analyses.*

3.12 CSGE 网络安全目标挖掘

过程 ID
CSGE
过程名称
网络安全目标挖掘
过程目的
其目的是：导出网络安全目标，并确保网络安全风险评估和网络安全目标之间的可追溯性。
过程成果
1) 分析了威胁并评估了网络安全风险 2) 确定了网络安全风险处理方案 3) 定义了网络安全目标以降低和避免风险 4) 建立了网络安全目标和威胁场景之间的可追溯性
基本实践
CSGE. BP1：分析威胁并评估网络安全风险。分析威胁以确定与项目相关的攻击路径。评估相关威胁场景对各项目生命周期阶段和利益相关方的影响、严重度和可能性。 *注 1：分析可能与财务、安全、隐私和运营条款相关。* **CSGE. BP2：定义网络安全风险处理方案。**对于每个网络安全风险，定义选定的处理方案，以减少、避免、接受或转移（分担）风险。 *注 2：已接受和转移（分担）的风险可能会产生网络安全声明，而这些声明可能需要有合理的依据和解释。* *注 3：风险可以单独处理，也可以作为一组风险处理。* **CSGE. BP3：导出并对齐网络安全目标以降低和规避风险。**针对选定要降低和规避风险的威胁场景，导出相应的网络安全目标，并对齐这些目标与已确立的网络安全目标之间可能存在的冲突。 **CSGE. BP4：建立网络安全目标与威胁场景之间的可追溯性。** *注 4：可追溯性有助于确保一致性，并便于开展影响分析。*

Cybersecurity Goal Elicitation	Outcome 1	Outcome 2	Outcome 3	Outcome 4
Output Information Items				
14-51 Cybersecurity scenario register	X			
15-08 Risk analysis	X	X		
08-55 Risk Measure		X	X	
13-20 Risk action request		X		
17-51 Cybersecurity goals			X	
13-51 Consistency Evidence				X
Base Practices				
BP1: Analyze threats and evaluate cybersecurity risks	X			
BP2: Define cybersecurity risk treatment option		X		
BP3: Derive and align cybersecurity goals for risk reduction and avoidance			X	
BP4: Establish traceability between the cybersecurity goals and the threat scenarios				X

网络安全目标挖掘	成果 1	成果 2	成果 3	成果 4
输出信息项				
14-51 网络安全情景登记册	X			
15-08 风险分析	X	X		
08-55 风险措施		X	X	
13-20 风险行动请求		X		
17-51 网络安全目标			X	
13-51 网络安全证据				X
基本实践				
BP1:分析威胁并评估网络安全风险。	X			
BP2:定义网络安全风险处理方案。		X		
BP3:导出并对齐网络安全目标以降低和规避风险。			X	
BP4:建立网络安全目标与威胁场景之间的可追溯性。				X

3.13 CSVV Cybersecurity Verification and Validation

Process ID

CSVV

Process name

Cybersecurity Verification and Validation

Process purpose

The purpose is to specify and verify the cybersecurity requirements, and to validate the cybersecurity goals.

Process outcomes

1) Cybersecurity requirements are derived from cybersecurity goals
2) Risk treatment verification is specified and performed
3) Activities are identified and documented to validate cybersecurity goals and validation results are recorded
4) Traceability is established between the cybersecurity goals and validation results
5) Traceability is established between cybersecurity requirements and goals, and between the cybersecurity requirements and risk treatment verification specification

Base Practices

CSVV.BP1: Specify cybersecurity requirements for the cybersecurity goals. Specify functional cybersecurity requirements for the cybersecurity goals, including criteria for the achievement of the cybersecurity goals.

Note 1: This may include requirements for post-development phases such as preproduction, production, operation, maintenance, and decommissioning.

CSVV.BP2: Cybersecurity verification measures are specified and performed. Specify and perform the verification measures suitable to provide evidence for compliance of the integrated system with the cybersecurity requirements. Record the verification results including pass/fail status.

Note 2: Depending on the context the system might be a pure software system.

CSVV.BP3: Cybersecurity validation activities are identified and documented. Cybersecurity validation activities are identified and documented to validate cybersecurity goals.

CSVV.BP4: Results of cybersecurity validation activities are recorded.

CSVV.BP5: Traceability is established. Ensure traceability between the cybersecurity requirements and goals and between the cybersecurity requirements and risk treatment verification specification. Ensure traceability between the cybersecurity goals and validation results.

Note 3: Traceability supports consistency, verification, and validation coverage demonstration.

3.13 CSVV 网络安全验证与确认

过程 ID
CSVV
过程名称
网络安全验证与确认
过程成果
其目的是：定义和验证网络安全需求，并确认网络安全目标。
过程成果
1) 由网络安全目标导出了网络安全需求 2) 定义并执行了风险处理验证方案 3) 识别并记录了相关活动以确认网络安全目标，并记录了确认结果 4) 建立了网络安全目标与确认结果之间的可追溯关系 5) 建立了网络安全需求与目标之间、以及网络安全需求与风险处理验证方案之间的可追溯性
基本实践
CSVV.BP1：针对网络安全目标定义网络安全需求。定义实现网络安全目标所需的功能性网络安全需求，包括达成这些目标的评判准则。 *注 1：这可能涵盖开发后阶段的需求，如预生产、生产、运营、维护和退役阶段。* **CSVV.BP2：定义并执行网络安全验证措施。**定义并执行能够证明集成系统符合网络安全需求的验证措施，并记录验证结果，包括通过或不通过的状态。 *注释 2：根据实际情况，该系统可能是一个纯软件系统。* **CSVV.BP3：识别并记录网络安全确认活动。**识别并记录网络安全确认活动以确认网络安全目标。 **CSVV.BP4：记录网络安全确认活动的结果。** **CSVV.BP5：建立可追溯性。**确保网络安全需求与目标之间、网络安全需求与风险处理验证规范之间具备可追溯性，并确保网络安全目标与确认结果之间的可追溯性。 *注释 3：可追溯性有助于维持一致性，便于进行验证，并展示确认的覆盖范围。*

Cybersecurity Verification and Validation	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
Output Information Items					
17-00 Requirement	X				
08 60 Verification Measure		X			
08 58 Verification Measure Selection Set		X			
13-19 Review evidence					X
15-51 Analysis Results					X
13-25 Verification result		X			
13 24 Validation Results				X	
08-59 Validation Measure			X		
Base Practices					
BP1: Specify cybersecurity requirements for the cybersecurity goals	X				
BP2: Cybersecurity verification measures are specified and performed		X			
BP3: Cybersecurity validation activities are identified and documented			X		
BP4: Results of cybersecurity validation activities are recorded				X	
BP5: Traceability is established					X

网络安全验证与确认	成果 1	成果 2	成果 3	成果 4	成果 5
输出信息项					
17-00 需求	X				
08-60 验证措施		X			
08-58 验证措施选择集		X			
13-19 评审证据					X
15-51 分析结果					X
13-25 验证结果		X			
13-24 确认结果				X	
08-59 确认措施			X		
基本实践					
BP1：针对网络安全目标定义网络安全需求。	X				
BP2：定义并执行网络安全验证措施。		X			
BP3：识别并记录网络安全确认活动。			X		
BP4：记录网络安全确认活动的结果。				X	
BP5：建立可追溯性。					X

4 Consistency and traceability

The Automotive SPICE® Potential Analysis includes reduced requirements for consistency and traceability in favor of efficiency and more relevant aspects.

4.1 Consistency and traceability within System Level and Software Level plugins

The System Level and Software Level plugins include the processes Software Requirements, Design and Implementation (SWDI), Software Integration and Verification (SWIV), System Requirements Analysis and Design (SYRD) and System Integration and Verification (SYIV). Within the Automotive SPICE® Potential Analysis, the completeness of work break down is not checked, and therefore vertical traceability cannot be evaluated. Instead, the effective horizontal traceability is inspected for every single logical layer.

The difficulty to evaluate the completeness of vertical traceability during the ASPICE PoA is in no way an endorsement to dismiss the necessity of establishing vertical traceability as an effective means to ensure consistency between requirements and designs in any development. Any inconsistency identified within a coherent scope shall still be seen as a weakness in specifying and analyzing requirements and designs.

The direct horizontal traceability shown shall not be interpreted as a requirement for strictly direct and granular traceability, as consistency may also be established with a suitable chain of other elements if they are adequate and comparable for their purpose and intent.

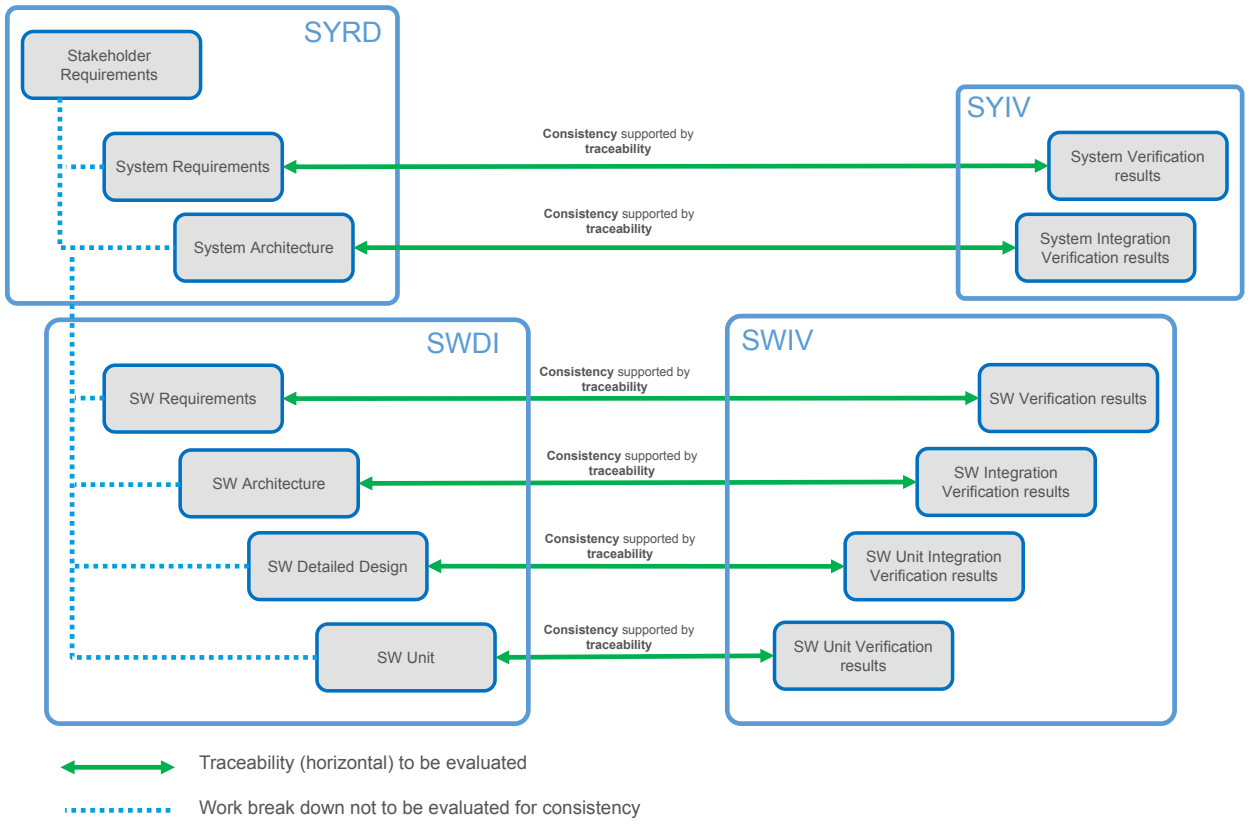

Figure 9— Traceability and consistency within System Level and Software Level plugins

4 一致性和追溯性

Automotive SPICE®潜在分析弱化了对一致性和追溯性的要求，以提升评估效率并聚焦关键维度。

4.1 系统级与软件级插件模块的内部一致性

系统级与软件级插件模块包含以下核心过程，软件需求、设计与实现（SWDI），软件集成与验证（SWIV），系统需求分析与设计（SYRD），系统集成与验证（SYIV）

在 Automotive SPICE®潜在分析中，不检查工作分解结构的完整性，因此无法评估纵向可追溯性。改为检查每个独立逻辑层之间有效的横向可追溯性。

在 Automotive SPICE®潜在分析期间，评估纵向可追溯性的完整性的困难绝不是否定建立纵向可追溯性的理由，因为它是作为确保需求和设计之间一致性的必要的有效手段。在一致范围内发现的任何不一致仍应视为定义与分析需求和设计的弱点。

所展示的直接横向可追溯性不应被解释为严格直接且原子化的可追溯性要求，当其他要素具有适当且可比较的用途和意图时，可通过合适的要素链建立一致性。

注：也就是说，横向追溯不强制要求严格的原子颗粒度进行映射，允许通过等效逻辑链建立关联。

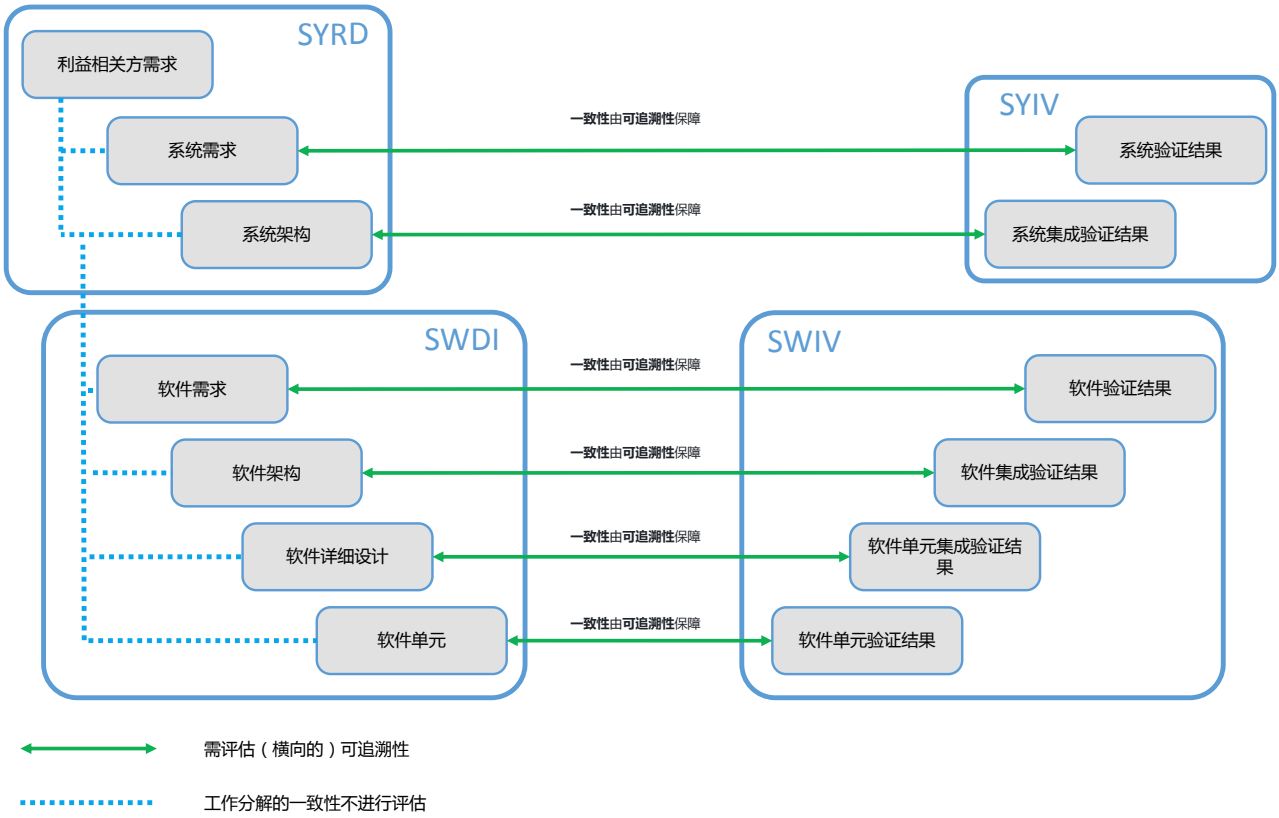

图 9 —系统级与软件级插件模块追溯关系示意图

4.2 Relationships and traceability of Cybersecurity

The processes Cybersecurity Goal Elicitation (CSGE) and Cybersecurity Verification and Validation (CSVV) add cybersecurity aspects to the Automotive SPICE® Potential Analysis. The following picture provides an overview for the major elements, work products and information items. It shows the addon character of Cybersecurity Verification and Validation (CSVV), which requires the performance of at least System Level or Software Level plugin illustrated exemplary as V-model in Figure 10.

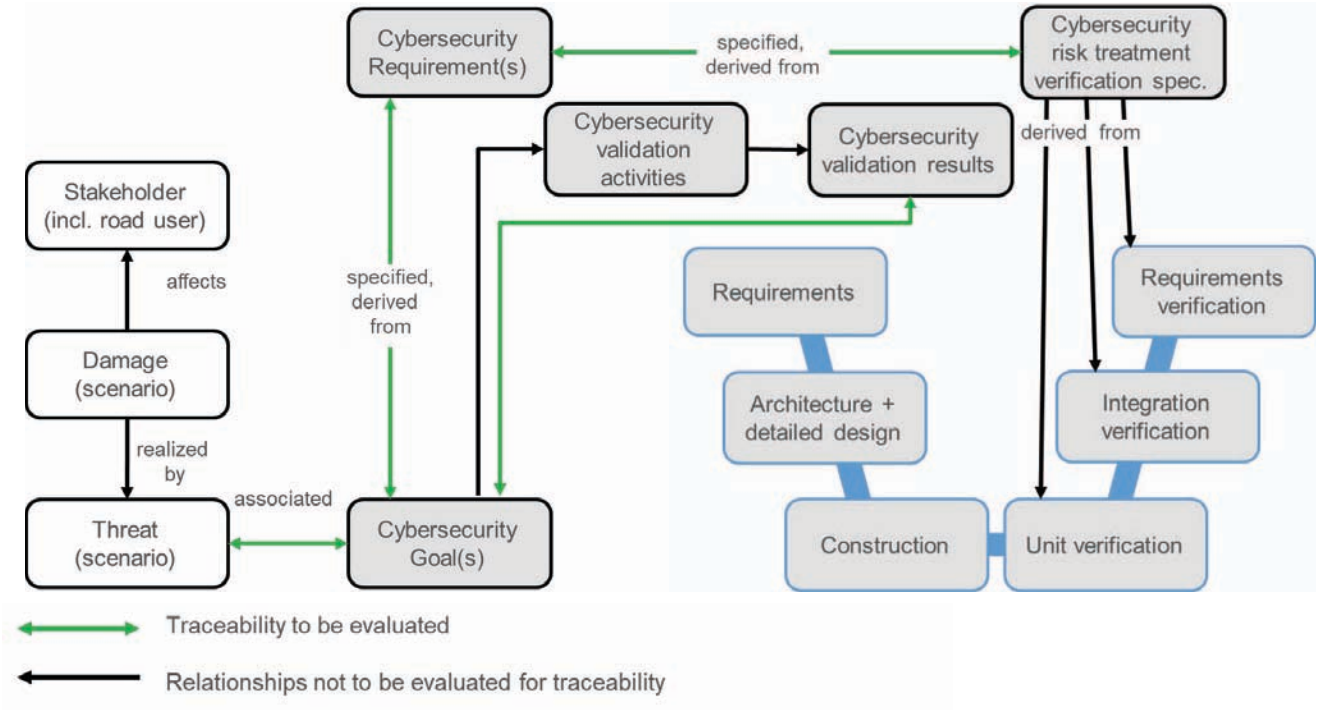

Figure 10 — Consistency and relationships of Cybersecurity

4.2 网络安全的关联性与可追溯性

网络安全目标挖掘（CSGE）和网络安全验证与确认（CSVV）过程为 Automotive SPICE®潜在分析增添网络安全维度。下图展示了主要要素、工作产物及信息项的关联框架。它展示了网络安全验证与确认（CSVV）的附加特性，这需要至少执行系统级或软件级插件，如图 10 中的 V 模型所示为例。

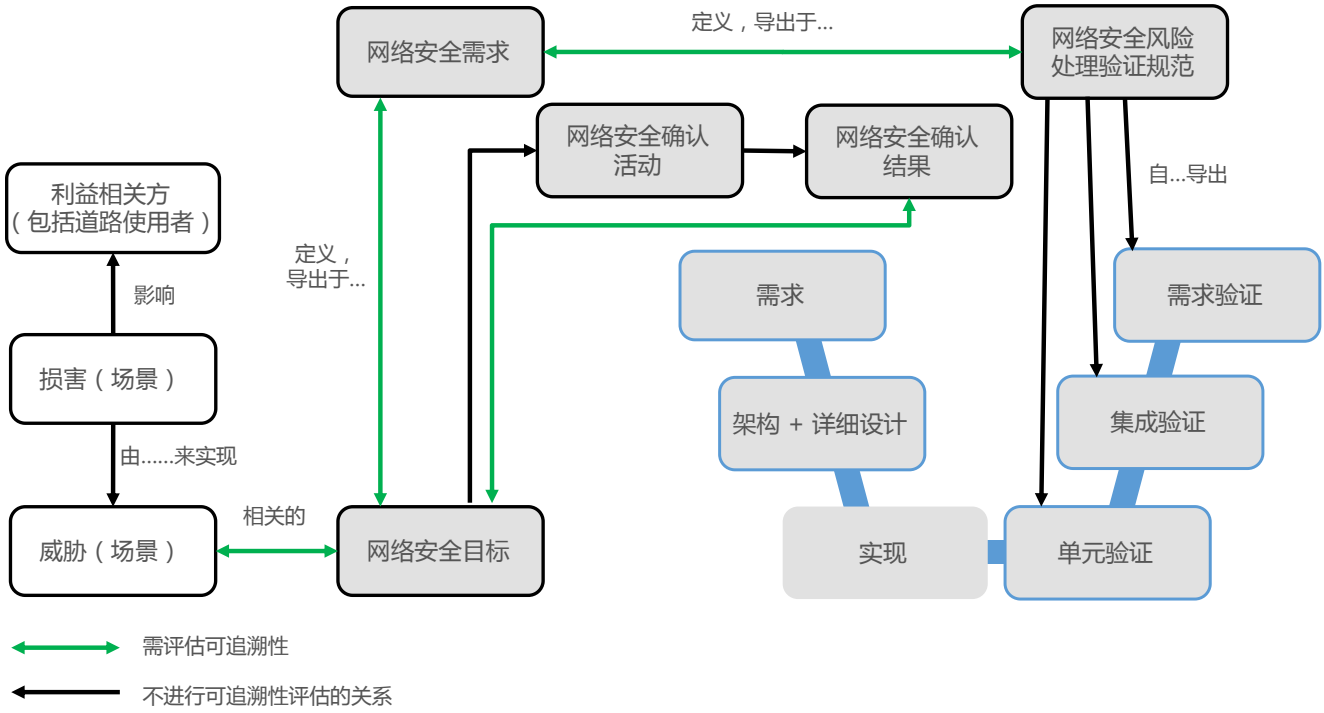

图 10 — 网络安全的一致性与关联性

Annex A Conformity of the process assessment and reference model

Introduction:

The Automotive SPICE® Potential Analysis process assessment and process reference model meet the requirements for conformance defined in [ISO33004].

The process assessment model can be used in the performance of assessments that meet the requirements of [ISO33002] with the exclusion for:

class 1 Assessment [ISO/IEC 33002, 4.6.1.1]

class 2 Assessment [ISO/IEC 33002, 4.6.1.2]

This clause serves as the statement of conformance of the process assessment and process reference models to the requirements defined in [ISO33004].

> *[ISO/IEC 33004:2015, 5.5 and 6.4]*

Due to copyright reasons each requirement is only referred by its number. The full text of the requirements can be drawn from [ISO33004].

Conformance to the requirements for process reference models:

Clause 5.3, "Requirements for process reference models"

The following information is provided in chapter 1 and 2 of this document:

- the declaration of the domain of this process reference model
- the description of the relationship between this process reference model and its intended context of use
- the description of the relationship between the processes defined within this process reference model

The descriptions of the processes within the scope of this process reference model meeting the requirements of ISO/IEC 33004:2015 clause 5.3 are provided in chapter 3 of this document.

> *[ISO/IEC 33004:2015, 5.3.1]*

The relevant communities of interest and their mode of use and the consensus achieved for this process reference model are documented in the copyright notice and the scope of this document.

> *[ISO/IEC 33004:2015, 5.3.2]*

The process descriptions are unique. The identification is provided by unique names and by the identifier of each process of this document within chapter 3.

> *[ISO/IEC 33004:2015, 5.3.3]*

Clause 5.4, "Process descriptions"

The requirements for process descriptions are met by the descriptions of Process purpose and Process outcomes n chapter 3 of this document.

> *[ISO/IEC 33004:2015, 5.4]*

Annex A　　过程评估和参考模型符合性

介绍：

Automotive SPICE® 潜在分析过程评估和过程参考模型满足[ISO33004]定义的符合性需求。
过程评估模型可用于实施满足[ISO33002]要求的评估，但不包括：

类型 1 评估 [ISO/IEC 33002, 4.6.1.1]

类型 2 评估 [ISO/IEC 33002, 4.6.1.2]

本条款作为过程评估模型与过程参考模型对于 ISO/IEC33004:2015 中所定义的要求的符合性声明。

> *[ISO/IEC 33004:2015, 5.5 and 6.4]*

由于版权原因，每条要求仅通过其编号来引用。 具体要求的全文可参见 [ISO/IEC 33004]。

对于过程参考模型的要求的符合性：

条款 5.3，“过程参考模型的要求”

以下信息由本文的第 1 章和第 2 章提供：

- 本过程参考模型领域的声明。
- 本过程参考模型和其预期使用背景之间的关系的说明。
- 本过程参考模型内所定义的过程之间的关系的说明。

满足 ISO/IEC 33004:2015 条款 5.3 要求的过程参考模型范围内的过程描述在本文第 3 章中提供。

> *[ISO/IEC 33004:2015, 5.3.1]*

本过程参考模型的相关利益团体，使用方式以及达成的共识被记录在本文档的版权公告和文档范围中。

> *[ISO/IEC 33004:2015, 5.3.2]*

过程描述是唯一的。本文第 3 章中每个过程的标识是由唯一的名称和 ID 所提供。

> *[ISO/IEC 33004:2015, 5.3.3]*

条款 5.4，“过程描述”

在本文第 3 章节中对过程目的和过程成果的描述满足了过程描述的要求。

> *[ISO/IEC 33004:2015, 5.4]*

Conformance to the requirements for process assessment models:

Clause 6.1, "Introduction"

The purpose of this process assessment model is to support assessment of process performance capability for development and innovation in the automotive domain using the process measurement framework defined in chapter 2.2 within the scope specified in chapter 1.1.

[ISO/IEC 33004:2015, 6.1]

Clause 6.2, "Process assessment model scope"

The process scope of this process assessment model is defined in the process reference model included in chapter 2.1 of this document. The Automotive SPICE® Potential Analysis process reference model is satisfying the requirements of ISO/IEC 33004:2015, clause 5 as described in this Annex.

The process capability scope of this process assessment model is defined in the process measurement framework, which defines a process measurement framework for process capability satisfying the requirements of ISO/IEC 33003:2015.

[ISO/IEC 33004:2015, 6.2]

Clause 6.3, "Requirements for process assessment models"

The Automotive SPICE® Potential Analysis process assessment model is related to process capability.

[ISO/IEC 33004:2015, 6.3.1]

This process assessment model incorporates the process measurement framework, which satisfies the requirements of ISO/IEC 33003:2015.

[ISO/IEC 33004:2015, 6.3.2]

This process assessment model is based on the Automotive SPICE® Potential Analysis Reference Model included in this document.

This process assessment model is based on the defined measurement framework.

[ISO/IEC 33004:2015, 6.3.3]

The processes included in this process assessment model are identical to those specified in the Process Reference Model.

[ISO/IEC 33004:2015, 6.3.4]

For all processes in this process assessment model all levels defined in the process measurement framework are addressed.

对于过程评估模型的要求的符合性：

条款 6.1，“介绍”

本过程评估模型的目的是：使用在第 1.1 章节规定的范围内使用第 2.2 章节所定义的过程度量框架，以支持在汽车领域的过程能力的评估。

[ISO/IEC 33004:2015, 6.1]

条款 6.2，“过程评估模型范围”

本过程评估模型的过程范围是定义在本文第 2.1 章节所包含的过程参考模型中。Automotive SPICE®潜在分析过程参考模型满足 ISO/IEC 33004:2015 条款 5 的要求，如附录 A 所描述。

本过程评估模型的过程能力范围定义在过程度量框架内，定义了满足 ISO/IEC 33003:2015 要求的过程能力的度量框架。

[ISO/IEC 33004:2015, 6.2]

条款 6.3，“过程评估模型的要求”

Automotive SPICE®潜在分析过程评估模型与过程能力相关联。

[ISO/IEC 33004:2015, 6.3.1]

本过程评估模型满足 ISO/IEC 33003：2015 要求的过程度量框架。

[ISO/IEC 33004:2015, 6.3.2]

本过程评估模型是基于本文中的 Automotive SPICE®潜在分析参考模型。

本过程评估模型是基于定义的度量框架。

[ISO/IEC 33004:2015, 6.3.3]

本过程评估模型所包含的过程与过程参考模型所定义的过程一致。

[ISO/IEC 33004:2015, 6.3.4]

对于本过程评估模型中的所有过程，过程度量框架中所定义的所有级别都得到表述。

[ISO/IEC 33004:2015, 6.3.5]

This process assessment model defines

- the selected process quality characteristic in chapter 3
- the selected process measurement framework in chapter 2
- the selected process reference model(s) in chapter 2
- the selected processes from the process reference model in chapter 2 of this document.

[ISO/IEC 33004:2015, 6.3.5 a-d]

In the capability dimension, this process assessment model addresses the process attribute and Capability Level defined in the process measurement framework.

[ISO/IEC 33004:2015, 6.3.5 e]

Clause 6.3.1, "Assessment indicators"

Note: Due to an error in numbering in the published version of ISO/IEC 33004:2015 the following reference numbers are redundant to those stated above. To refer to the correct clauses from ISO/IEC 33004, the text of clause heading is additionally specified for the following three requirements.

The Automotive SPICE® Potential Analysis process assessment model provides a two-dimensional view of process capability for the processes in the process reference model, through the inclusion of assessment indicators as defined in chapter 2.3.1. The assessment indicators used are:

- Base practices and Output Information Items

[ISO/IEC 33004:2015, 6.3.1 a, "Assessment indicators"]

Clause 6.3.2, "Mapping process assessment models to process reference models"

The mapping of the assessment indicators to the purpose and process outcomes of the processes in the process reference model is included in the tables of each process in chapter 4.

The mapping of the assessment indicators to the process attributes in the process measurement framework including the process attribute achievement is included in chapter 2.

[ISO/IEC 33004:2015, 6.3.2, "Mapping process assessment models"]

Clause 6.3.3, "Expression of assessment results"

The process attributes and the process attribute ratings in this process assessment model are identical to those defined in the measurement framework. As a consequence, results of assessments based upon this process assessment model are expressed directly as a set of process attribute ratings for each process within the scope of the assessment. No form of translation or conversion is required.

[ISO/IEC 33004:2015, 6.3.3, "Expression of assessment results"]

本文中的过程评估模型定义：

- 第 3 章中选定的过程质量特性
- 第 2 章中选定的过程度量框架
- 第 2 章中选定的过程参考模型
- 第 2 章中从过程参考模型选定的过程

> *[ISO/IEC 33004:2015, 6.3.5 a-d]*

在能力维度，本过程评估模型表述了定义的过程度量框架中的所有的过程属性和能力等级。

> *[ISO/IEC 33004:2015, 6.3.5 e]*

条款 6.3.1，“评估指标”

> *注：由于 ISO/IEC 33004:2015 发布版本的编号错误，以下引用编号与上述重复。为了引用 ISO/IEC 33004:2015 中的正确条款，对以下的三条要求在条款标题中做了补充定义。*

Automotive SPICE®潜在分析过程评估模型通过包含定义在第 2.3.1 章节的评估指标， 为过程参考模型中的过程的过程能力提供了一个二维视图。使用的评估指标是：

- 基本实践和信息项

> *[ISO/IEC 33004:2015, 6.3.1 a, "Assessment indicators"]*

条款 6.3.2, “过程评估模型到过程参考模型的映射”

评估指标到过程参考模型中的过程目的及过程成果的映射是被包含在第 4 章的每个过程的表格中。

评估指标到过程度量框架（包含所有过程属性成就）中的过程属性的映射是被包含在第 2 章的每个过程属性的表格中。

> *[ISO/IEC 33004:2015, 6.3.2, "Mapping process assessment models"]*

条款 6.3.3，“评估结果的表示形式”

过程评估模型中的过程属性和过程属性评定与度量框架中所定义内容一致。作为结果，基于本过程评估模型的评估结果是直接被表示为评估范围内每个过程的一组过程属性的评定。不需要任何形式翻译或转换。

> *[ISO/IEC 33004:2015, 6.3.3, "Expression of assessment results"]*

Annex B Information items characteristics

The information items and characteristics in this Annex are listed for convenience and are replications of Automotive SPICE® 4.0 and Automotive SPICE® for Cybersecurity 1.0, deviating only for bugfixes and improved representation. The Automotive SPICE® Potential Analysis uses only a subset of those information item characteristics for its reduced scope in comparison to these two PAM and PRM. See chapter 2.4 and 2.5 on the definition and explanation on how to interpret information items and their characteristics.

Information items are defined using the scheme in Table B.1.

Information item identifier	An identifier number for the Information item which is used to reference the Information item.
Information item name	Provides an example of a typical name associated with the Information item characteristics. This name is provided as an identifier of the type of Information item the practice or process might produce. Organizations may call these Information items by different names. The name of the Information item in the organization is not significant. Similarly, organizations may have several equivalent Information items which contain the characteristics defined in one Information item type. The formats for the Information items can vary. It is up to the assessor and the organizational unit coordinator to map the actual Information items produced in their organization to the examples given here.
Information item characteristics	Provides examples of the potential characteristics associated with the Information item types. The assessor may look for these in the samples provided by the organizational unit.

Table B.1 — Structure of IIC tables

ID	Name	Characteristics
01-03	Software component	• Software element in the software architecture above the software unit level. • Represented by a design model element or executable code such as libs or scripts and a configuration description, if applicable.
01-50	Integrated software	• Software executable (e.g, simulator with stubbing, debug-able, object code) including: - application parameter files (being a technical implementation solution for configurability-oriented requirements) - all configured software elements
01-52	Configuration item list	• Items under configuration control • The name of work products and an associated reference (to file, to tool artifact) • Configuration item attributes and properties
02-01	Commitment agreement	• Signed off by all parties involved in the commitment/agreement • Establishes what the commitment is for • Establishes the resources required to fulfill the commitment, such as: - time - people - budget - equipment - facilities

Annex B 信息项特性

本附录中的信息项和特性是为了方便使用而列出的，是 Automotive SPICE® 4.0 和 Automotive SPICE®网络安全 1.0 的复制，差异仅在错误修复和改进表述方面。汽车 Automotive SPICE®潜在分析仅使用了这些信息项特性的一个子集，因为与这两个 PAM 和 PRM 相比，其范围缩小了。详见 2.4 章和 2.5 章节关于如何诠释信息项, 及其特性的定义和解释。

信息项特性使用表 B.1 模式进行定义。

信息项 ID	用于引用信息项的标识编号。
信息项名称	提供与信息项特性相关联的典型名称的示例，此名称是由实践或过程可产出的信息项的类型的标识。组织可使用其他名称来命名这些信息项，在组织中信息项的名称并不重要。同样，组织可有多个等效的信息项而包含一个信息项类型中所定义的特性。信息项的格式可多种多样，由评估师和组织单位协调员，将其组织所产出的实际信息项映射到这里给出的示例。
信息项特性	提供与信息项类型相关联的潜在特性的示例。评估师可在评估组织单位所提供的样例的过程中使用这些特性。

表 B.1- 信息项特性（IIC）表的结构

ID	名称	特性
01-03	软件组件	• 软件架构中，在软件单元层级之上的软件要素。 • 如适用，由设计模型要素，或可执行代码（例如库或脚本）以及配置描述所表示。
01-50	集成软件	• 软件可执行文件（例如，带有打桩、可调试的目标代码的模拟程序）包含： - 应用参数文件（作为面向可配置性需求的技术实施方案) - 所有已配置的软件要素
01-52	配置项清单	• 工作产品名称及关联的引用（文件，工具制品） • 配置项属性和特性
02-01	承诺/协议	• 承诺/协议的所有参与方签署 • 建立承诺的内容 • 建立为满足承诺所需的资源，例如： - 时间 - 人 - 预算 - 设备 - 设施

ID	Name	Characteristics
02-50	Interface agreement	• Interface agreement should include definitions regarding - customer and supplier stakeholder and contacts - tailoring agreements - customer/supplier responsibilities (e.g., roles, RASIC chart) for distributive activities, including required actions in development and post-development - share of information/work products in case of issues (e.g., vulnerabilities, findings, risks) - agreed customer/supplier milestones - duration of supplier's support and maintenance
04-04	Software architecture	• A justifying rationale for the chosen architecture. • Individual functional and non-functional behavior of the software component • Settings for application parameters (being a technical implementation solution for configurability-oriented requirements) • Technical characteristics of interfaces for relationships between software components such as: - Synchronization of Processes and tasks - Programming language call - APIs - Specifications of SW libraries - Method definitions in an object- oriented class definitions or UML/SysML interface classes - Callback functions, "hooks" • Dynamics of software components and software states such as: - Logical software operating modes (e.g, start-up, shutdown, normal mode, calibration, diagnosis, etc.) - intercommunication (processes, tasks, threads) and priority - time slices and cycle time - interrupts with their priorities - interactions between software components • Explanatory annotations, e.g, with natural language, for single elements or entire diagrams/models.
04-05	Software detailed design	• Elements of a software detailed design: - Control flow definition - Format of input/output data - Algorithms - Defined data structures - Justified global variables - Explanatory annotations, e.g, with natural language, for single elements or entire diagrams/models • Examples for expression languages, depending on the complexity or criticality of a software unit: - natural language or informal languages - semi-formal languages (e.g, UML, SysML) - formal languages (e.g, model-based approach)

ID	名称	特性
02-50	接口协议	• 接口协议应包括以下定义 - 客户与供应商利益相关方及联系人 - 裁剪协议 - 客户/供应商针对所分配的活动（包括开发和开发后所需的行动）的职责（例如，角色，RASIC 图表） - 在出现问题时（例如，漏洞，发现，风险）信息/工作产品的共享 - 约定的客户/供应商里程碑 - 供应商支持和维护的期限
04-04	软件架构	• 所选架构的合理依据 • 软件组件的单独功能性和非功能性行为 • 应用参数的设置（作为面向配置需求的技术实现方案） • 软件组件间关联接口的技术特性，例如： - 进程和任务的同步 - 编程语言调用 - API 函数 - 软件库的规范 - 面向对象类定义中的方法定义或者 UML/SysML 接口类 - 回调函数，“钩子函数（Hooks）” • 软件组件以及软件状态的动态，例如： - 逻辑软件运行模式（例如:启动、关机、正常模式、标定和诊断等） - 内部通信（进程，任务，线程）以及优先级 - 时间片和周期时间 - 中断及其优先级 - 软件组件间交互 • 解释性注释，例如，使用自然语言，用于单个要素或整个图表/模型。
04-05	软件详细设计	• 软件详细设计的要素： - 控制流定义 - 输入/输出数据格式 - 算法 - 定义的数据结构 - 合理的全局变量 - 解释性注释，例如，使用自然语言，用于单个要素或整个图表/模型。 • 表达式语言的示例，取决于软件单元的复杂性或关键性： - 自然语言或非正式语言 - 半形式语言（例如，UML、SysML） - 形式语言（例如，基于模型的方法）

ID	Name	Characteristics

04-06	System architecture	• A justifying rationale for the chosen architecture.
		• Individual behavior of system elements
		• Interrelationships between system elements
		  - Settings for system parameters (such as application parameters)
		  - Manual/human control actions, e.g., according to STPA
		• Interface Definitions:
		  - Technical characteristics of interfaces for relationships between two system elements
		• Interfaces between system elements e.g.:
		  - bus interfaces (CAN, MOST, LIN, Flexray etc.)
		  - thermal influences
		  - hardware-software-interfaces (HSI), see below
		  - electromagnetic interfaces
		  - optical interfaces
		  - hardware-mechanical-interfaces (e.g., a cable satisfying both mechanical and electrical requirements, housing interface to a PCB)
		  - hardware-mechanical interconnection technology such as connectors, pressfit
		  - creepage and clearance distances
		• Fixations such as adhesive joints, screw bolts/fitting, riveted bolts, welding
		• System interfaces related to EE Hardware e.g.:
		  - analogue or digital interfaces (PWM, I/O) and their pin configurations
		  - SPI bus, I2C bus, electrical interconnections
		  - placement, e.g., thermal interfaces between hardware elements (heat dissipation)
		  - soldering
		  - creepage and clearance distances
		• Interfaces for mechanical engineering e.g.:
		  - friction
		  - thermal influences
		  - tolerances
		  - clutches
		  - fixations such as adhesive joints, screw bolts/fitting, riveted bolts, welding
		  - forces (as a result of e.g., vibrations or friction)
		  - placement
		  - shape
		  - A hardware-software interface, e.g.:
		  - connector pin configurations and floating IOs for µCs/MOSFETs
		  - signal scaling & resolution to be reflected by the application software
		• Mechanical-hardware interfaces e.g.
		  - such as mechanical dimensioning
		  - positioning of connectors
		  - positioning of e.g., hall sensors in relation to the bus-bar
		  - tolerances

ID	名称	特性
04-06	系统架构	• 所选架构的合理依据 • 系统要素的单独行为 • 系统要素间的关联关系 - 系统参数的设置（例如应用参数） - 手动/人工控制操作，例如：按照 STPA • 接口定义 - 两个系统要素间关联接口的技术特性 • 系统要素间接口，例如： - 总线接口 (CAN, MOST, LIN, Flexray 等) - 热影响 - 软硬件接口(HSI), 见下文 - 电磁接口 - 光接口 - 硬件-机械接口（例如：同时满足机械和电气需求的线束, PCB 的外壳接口） - 硬件-机械互连技术，如接插件，无焊压接 - 爬电距离和电气间隙 • 固定装置，如粘接接头、螺钉螺栓/配件、铆接螺栓、焊接 • 电子电气硬件相关系统接口 ，例如： - 模拟或数字接口（PWM, I/O）及其引脚配置 - SPI 总线, I2C 总线, 电气互连 - 放置，例如：硬件要素间的热接口（散热） - 软焊 - 爬电距离和电气间隙 • 机械工程的接口，例如： - 摩擦 - 热影响 - 公差 - 离合器 - 固定装置，如粘接接头、螺钉螺栓/配件、铆接螺栓、焊接 - 力（例如振动或摩擦造成的力） - 放置 - 形状 - 软硬件接口，例如： - 用于 µCs/MOSFET 的连接器的引脚配置和浮接输入输出 - 由应用软件所反映的信号缩放和分辨率 • 机械-硬件接口，例如 - 如机械尺寸 - 接插件位置 - 位置，例如: 霍尔传感器相对于母线的定位 - 公差

ID	Name	Characteristics
		• Dynamics of system elements and system states: - Description of the system states and operation modes (startup, shutdown, sleep mode, diagnosis/calibration mode, production mode, degradation, emergency such as “limp-home”, etc.) - Description of the dependencies among the system components regarding the operation modes - Interactions between system elements such as inertia of mechanical components to be reflected by the ECU, signal propagation and processing time through the hardware and software and e.g., bus systems • Explanatory annotations, e.g., with natural language, for single elements or entire diagrams/models.
08-55	Risk measure	• Identifies - the risk to be mitigated, avoided, or shared (transferred) - the activities to mitigate, avoid, or share (transfer) the risk - the originator of the measure - criteria for successful implementation - criteria for cancellation of activities - frequency of monitoring • Risk treatment alternatives: - treatment option selected- avoid/reduce/transfer - alternative descriptions - recommended alternative(s) - justifications
08-56	Schedule	• Identifies the activities to be performed • Identifies the expected, and actual, start and completion date for required activities against progress/completion of activities • Identifies dependencies between activities and critical path • Has a mapping to scheduled resources and input data • Identifies resource allocation, resource workload, and critical resources *Note: A schedule is consistent with the defined work packages, see 14-10*
08-58	Verification Measure Selection Set	• Include criteria for re-verification in the case of changes (regression). • Identification of verification measures, also for regression testing
08-59	Validation Measure	• A validation measure can be a test case, a measurement, a simulation, an emulation, or an end user survey • The specification of a validation measure includes - pass/fail criteria for validation measures (completion and end criteria) - a definition of entry and exit criteria for the validation measures, and abort and re-start criteria • Techniques • Necessary validation environment & infrastructure - Necessary sequence or ordering

ID	名称	特性
		• 系统要素以及系统状态的动态： - 描述系统状态和运行模式（启动、关机、休眠模式、诊断/标定模式、生产模式、降级、紧急如“跛行”等） - 描述关于运行模式的系统组件间依赖关系 - 系统要素间的交互，例如由 ECU 所反映的机械组件的惯性、信号传播以及通过硬件和软件（例如总线系统）的处理时间 • 解释性注释，例如，使用自然语言，用于单个要素或整个图表/模型。
08-55	风险措施	• 识别 - 需要缓解、避免或分担（转移）的风险 - 缓解、避免或分担（转移）风险的活动 - 措施的发起人 - 成功实施的准则 - 取消活动的准则 - 监测频率 • 风险处理备选方案: - 选择处理方案-避免/降低/转移 - 备选方案描述 - 推荐的备选方案 - 理由
08-56	进度计划	• 识别要执行的活动 • 依据活动的进度/完成，识别所需活动的预期和实际开始和完成日期 • 能识别活动间依赖关系和关键路径 • 具有对计划资源和输入数据的映射 • 识别资源分配、资源工作负荷以及关键资源 *注：进度计划与定义的工作包一致，见 14-10*
08-58	验证措施选择集	• 包括在发生变更（回归）情况下的重新验证的准则。 • 识别验证措施，也适用回归测试
08-59	确认措施	• 确认措施可以为测试用例、测量、仿真、模拟或最终用户调查 • 确认措施的规范包含 - 确认措施的通过/失败准则(完成和结束准则) - 确认措施的准入和准出准则，以及中止和重启的准则的定义 • 技术 • 必要的确认环境和基础设施 - 必要的顺序或排序

ID	Name	Characteristics
08-60	Verification Measure	• A verification measure can be a test case, a measurement, a calculation, a simulation, a review, an optical inspection, or an analysis • The specification of a verification measure includes - pass/fail criteria for verification measures (test completion and ending criteria) - a definition of entry and exit criteria for the verification measures, and abort and re-start criteria • Techniques (e.g., black-box and/or white-box-testing, equivalence classes and boundary values, fault injection for Functional Safety, penetration testing for Cybersecurity, back-to- back testing for model-based development, ICT) • Necessary verification environment & infrastructure • Necessary sequence or ordering
11-04	Product release package	• Includes the hardware/software/product • Includes and associated release elements such as: - system hardware/software/product elements - associated customer documentation - application parameter definitions defined - command language defined - installation instructions - release letter
11-05	Software Unit	Can be • a representation of a software element at the lowest level in a conceptual model, which is decided not to be further subdivided and that is a part of a software component, or • a representation of a software unit under verification such as commented source code, auto-code, an object file, a library, an executable, or an executable model as input to verification
11-06	Integrated System	• Integrated product • Application parameter files (being a technical implementation solution for configurability-oriented requirements) • All configured elements for the product release are included
13-06	Delivery evidence	• Evidence of items shipped/delivered electronically to customer • Identification of: - to whom it was sent - address, where delivered - delivery date • receipt of delivered product

ID	名称	特性
08-60	验证措施	• 验证措施可以为测试用例、测量、计算、仿真、评审、光学检测或分析 • 验证措施的规范包含 - 验证措施的通过/失败准则(完成和结束准则) - 验证措施的准入和准出准则，以及中止和重启的准则的定义 • 技术（例如黑盒 和/或 白盒测试、等价类和边界值、功能安全的故障注入，网络安全的渗透测试、基于模型开发的背靠背测试、ICT） • 必要的验证环境和基础设施 • 必要的顺序和排序
11-04	产品发布包	• 包括硬件/软件/产品 • 包含相关的发布要素，如： - 系统硬件/软件/产品要素 - 相关的客户文档 - 已定义的应用参数定义 - 已定义的指令语言 - 安装操作指导 - 发布信函
11-05	软件单元	可为： • 在概念模型中最低层级的软件要素的表示形式，该要素被决定不进一步细分，并且是软件组件的一部分。或， • 正在验证的软件单元的表示形式，例如注释的源代码、自动代码、目标文件、库、可执行文件或作为验证输入的可执行模型
11-06	集成系统	• 集成产品 • 应用参数文件（作为面向可配置性需求的技术实现解决方案） • 包含产品发布的所有配置的要素
13-06	交付证据	• 以电子方式向客户运送/递送交付物的证据 • 识别： - 发送给谁 - 交付到什么地址 - 交付日期 • 记录交付产品的凭据

ID	Name	Characteristics
13-07	Problem	• Identifies the submitter of the problem • Identifies the group/person(s) responsible for providing problem resolution • Includes a description of the problem • Identifies classification of the problem (criticality, urgency, relevance etc.) • Identifies the status of the problem - States such as “open”, “in review”, “in implementation”, “closed”, “rejected”, “cancelled”, … - Transitions between states with conditions and authorities • Identifies the expected closure date
13-08	Baseline	• Identifies a state of one or a set of work products and artifacts which are consistent and complete • Basis for next process steps or delivery • Is unique and may not be changed *Note: This should be established before a release to identify consistent and complete delivery*
13-14	Progress status	• Status of a plan(s) (actual against planned) such as: - status of actual activities/work packages against planned activities/work package - status of actual results against established objectives/goals - status of actual resources allocation against planned resources - status of actual cost against budget estimates - status of actual time against planned schedule - status of actual quality against planned quality • Record of any deviations from planned activities and reason why
13-16	Change request	• Identifies purpose of change • Identifies requester contact information • Impacted system(s) • Impact to operations of existing system(s) defined • Impact to associated documentation defined • Criticality of the request, due date • Information supporting the tracking of change requests to closure - progress status attribute (e.g., open, allocated, implemented, closed) - time stamp of status change - person who changed a status • Rationale for changing a status
13-19	Review evidence	• Provides the context information about the review: - what was reviewed - lists reviewers who attended and their area of responsibility - status of the review • Provides information about the scope of the review: - checklists - review criteria - requirements - compliance to standards

ID	名称	特性
13-07	问题	• 识别问题的提交者 • 识别负责提供问题解决措施的小组/人员 • 包含问题的描述 • 识别问题的分类（关键性、紧迫性、相关性等） • 识别问题的状态 - 状态如：“新建”、“评审中”、“实施中”、“关闭”、“拒绝”、“取消”等 - 状态间迁移条件以及批准者 • 识别预期的关闭日期
13-08	基线	• 识别一个或一组一致的和完整的工作产品和制品的状态 • 后续过程步骤 和/或 交付的基础 • 是唯一的和可能不变的 *注：这应该在发布之前建立，以识别一致和完整的交付*
13-14	进展状态	• 计划的状态（实际的对计划的），如： - 实际活动/工作包状态与计划活动/工作包的对比情况 - 实际结果状态与既定目的/目标的对比情况 - 实际资源分配状态与计划资源的对比情况 - 实际费用状态与预算估算的对比情况 - 实际时间状态与计划进度表的对比情况 - 实际质量状态与计划质量的对比情况 • 记录任何与几乎活动的偏差和原因所在
13-16	变更请求	• 识别变更的目的 • 识别请求者联系信息 • 受影响的系统 • 对定义的现有系统的操作的影响 • 对定义的相关文档的影响 • 请求的关键性，期限 • 支持跟踪变更请求至关闭的信息 - 进展状态属性（例如：新建、已分配、已实施、已关闭） - 状态变更的时间戳 - 状态变更者 • 状态变更依据
13-19	评审证据	• 提供有关评审的背景信息： - 评审什么 - 列出参加的评审人以及他们的职责范围 - 评审的状态 • 提供有关评审覆盖范围的信息： - 检查表 - 评审准则 - 需求 - 符合标准

ID	Name	Characteristics

		• Effort information about:
		  - preparation time spent for the review
		  - time spent in the review
		• Review findings:
		  - non-conformances
		  - improvement suggestions

13-20	Risk action request	• Date of initiation
		• Scope
		• Subject
		• Request originator
		• Risk management process context:
		  - this section may be provided once, and then referenced in subsequent action requests if no changes have occurred
		  - process scope
		  - stakeholder perspective
		  - risk categories
		  - risk thresholds
		  - project objectives
		  - project assumptions
		  - project constraints
		• Risks:
		  - this section may cover one risk or many, as the user chooses
		  - where all the information above applies to the whole set of risks, one action request may suffice
		  - where the information varies, each request may cover the risk or risks that share common information
		  - risk description(s)
		  - risk probability
		  - risk consequences
		  - expected timing of risk
		• Risk treatment alternatives:
		  - treatment option selected- avoid/reduce/transfer
		  - alternative descriptions
		  - recommended alternative(s)
		  - justifications
		• Risk action request disposition:
		  - each request should be annotated as to whether it is accepted, rejected, or modified, and the rationale provided for whichever decision is taken

13-24	Validation results	• Validation data, logs, feedback, or documentation • Validation measure passed • Validation measure not passed • Validation measure not executed, and a rationale • Information about the validation execution (date, participants etc.) • Abstraction or summary of validation results

ID	名称	特性
		• 工作量信息，关于: - 准备评审所花费的时间 - 评审所花费的时间 • 评审发现： - 不符合项 - 改进建议
13-20	风险行动请求	• 发起日期 • 范围 • 主题 • 请求发起人 • 风险管理过程背景： - 该部分可以提供一次，如果没有发生更改则在后续行动请求中引用 - 过程范围 - 利益相关方观点 - 风险类别 - 风险阈值 - 项目目标 - 项目假设 - 项目约束 • 风险： - 该部分可以覆盖一个或多个风险，用户自行选择 - 如果上述所有信息适用于整个风险集合，一个行动请求就足够了 - 在信息不同的情况下，每个请求可以覆盖共享共同信息的单个风险或多个风险 - 风险描述 - 风险概率 - 风险值 - 风险后果 - 预期的风险时机 • 风险处理备选方案： - 选择的处理方案-避免/减轻/转移 - 备选方案描述 - 推荐的备选方案 - 理由 • 风险行动请求处置： - 每个请求都应注明它是否被接受、拒绝或修改，以及作出任何决定的依据
13-24	确认结果	• 确认数据、日志、反馈或文档 • 通过的确认措施 • 未通过的确认措施 • 未执行的确认措施和依据 • 关于确认的执行信息（日期，参与者等） • 确认结果的摘要或总结

ID	Name	Characteristics
13-25	Verification results	• Verification data and logs • Verification measure passed • Verification measure not passed • Verification measure not executed, and a rationale • Information about the verification execution (date, “object-under-verification”, etc.) • Abstraction or summary of verification results
13-51	Consistency Evidence	• Demonstrates bidirectional traceability between artifacts or information in artifacts, throughout all phases of the life cycle, by e.g., - tool links - hyperlinks - editorial references - naming conventions • Evidence that the content of the referenced or mapped information coheres semantically along the traceability chain, e.g., by - performing pair working or group work - performing by peers, e.g., spot checks - maintaining revision histories in documents - providing change commenting (via e.g., meta-information) of database or repository entries *Note: This evidence can be accompanied by e.g., Definition of Done (DoD) approaches.*
14-01	Change history	• Historical records of all changes made to an object (document, file, software component, etc.): - description of change - version information about changed object - date of change - change requester information - change control record information
14-02	Corrective action	• Identifies the initial problem • Identifies the ownership for completion of defined action • Defines a solution (series of actions to fix problem) • Identifies the open date and target closure date • Contains a status indicator • Indicates follow up audit actions
14-10	Work package	• Defines activities to be performed • Documents ownership for activities e.g., by domains • Documents critical dependencies to other work packages • Documents input and output work products • Documents the critical dependencies between defined work products • Information needed to perform these activities • Estimates of effort, duration *Note: The work package descriptions may be integrated into the/be a part of a schedule, see 08-56*

ID	名称	特性
13-25	验证结果	• 验证数据和日志 • 通过的验证措施 • 未通过的验证措施 • 未执行的验证措施和依据 • 关于验证的执行信息（日期，“验证对象”等） • 验证结果的摘要或总结
13-51	一致性证据	• 在生命周期的所有阶段，通过以下方式展示制品或制品中信息之间的双向可追溯性 - 工具链接 - 超链接 - 编辑参考文献 - 命名规则 • 所引用或映射的信息内容在语义上与追溯链上的信息一致的证据，例如 - 执行分组工作或小组工作 - 由同行执行，例如抽查 - 维护文档中的修订历史 - 提供数据库或存储库条目的更改注释（例如，通过元信息） *注意：此证据可以伴随例如完成定义（DoD）方法。*
14-01	变更历史	• 对对象（文档、文件、软件组件等）所做的所有变更的历史记录： - 变更描述 - 变更对象的版本信息 - 变更日期 - 变更请求者信息 - 变更控制记录信息
14-02	纠正行动	• 识别初始问题 • 识别完成已定义行动的所有者 • 定义解决方案（解决问题的一系列行动） • 识别提出日期和目标关闭日期 • 包含状态指示器 • 指示后续审核行动
14-10	工作包	• 定义要执行的活动 • 记录活动的所有权，例如：按领域 • 记录对于其他活动的关键依赖关系 • 记录输入和输出工作产品 • 记录定义的工作产品之间的关键依赖关系 • 执行这些活动所需的信息 • 估算工作量和工期 *注：工作包的描述可以整合到进度表，或是进度表的一部分，见 08-56*

ID	Name	Characteristics
14-50	Stakeholder groups list	• Identifies: - involved parties - weight/importance of each stakeholder group - representative(s) for each stakeholder group - information needs of each stakeholder group
14-51	Cybersecurity scenario register	• Identifies: - damage scenarios - ID - title - description - impact category: - safety - financial - operational - privacy - quality • Threat scenarios - ID - asset concerned - security property: - confidentiality - integrity - availability - Attack feasibility (high/medium/low/very low)
15-06	Project status	• Status of in regards to progress and consistency of schedule, work item content, tasks, resources (human resources, infrastructure, hardware/materials, budget), skills and competence of human resources • planned progress and expenditure against dates/deadlines and actual expenditure • reasons for variance from planned progress • threats to continued progress • issues which may affect the ability of the project to achieve its goals • contingency actions
15-08	Risk analysis	• Identifies the risks analyzed • ID • Impact scenario (e.g., damage scenario) • Records the results of the analysis: - potential ways to mitigate the risk - selected risk treatment option (e.g., risk acceptance as cybersecurity claim or risk reduction) - assumptions made - probability of occurrence (e.g., attack feasibility) - risk value - constraints
15-09	Risk status	• Identifies the status, or the change, of an identified risk: - risk statement - risk source - risk impact and risk probability - categories and risk thresholds, e.g., for prioritization or setting a status • risk treatment activities in progress

ID	名称	特性
14-50	利益相关方群组清单	• 识别： - 参与方 - 各利益相关方群组的权重/重要性 - 各利益相关方群组的代表 - 各利益相关方群组的信息需要
14-51	网络安全场景登记表	• 识别： - 损害场景 - ID - 标题 - 描述 - 影响分类 - 安全（safety） - 财务 - 运营 - 隐私 - 质量 • 威胁场景 - ID - 资产相关的 - 安全（security）属性 - 机密性 - 完整性 - 可用性 - 攻击可行性（高/中/低/极低）
15-06	项目状态	• 关于进度计划、工作项内容、任务、资源（人力资源、基础设施、硬件/材料、预算）、人力资源的技能和能力的进展和一致性的状况 • 计划进展和计划支出与实际日期/期限和实际支出的对比 • 与计划进展不一致的原因 • 对持续进展的威胁 • 可能影响项目达成目标的能力的问题 • 应急行动
15-08	风险分析	• 识别已分析的风险 • ID • 影响场景（例如，损害场景） • 记录分析结果： - 减缓风险的潜在方法 - 选择的风险处理方案（例如，网络安全声明的风险接受或风险降低） - 作出的假设 - 发生的概率（例如，攻击可行性） - 风险值 - 约束
15-09	风险状态	• 识别已识别风险的状态或变化： - 风险陈述 - 风险来源 - 风险影响和风险概率 - 类别和风险阈值，例如，用于优先级排序或设置状态 • 正在进行的风险应对活动

ID	Name	Characteristics
15-12	Problem status	• Indicates progress of problem resolution • Status of problem e.g., - by problem categories/classification - by problem resolution stage
15-21	Supplier evaluation	• States the purpose of evaluation • Method and instrument (checklist, tool) used for evaluation • Requirements used for the evaluation • Assumptions and limitations • Identifies the context and scope information required (e.g., date of evaluation, parties involved) - Fulfillment of evaluation requirements
15-51	Analysis Results	• Identification of the object under analysis. • The analysis criteria used, e.g.: - selection criteria or prioritization scheme used - decision criteria - quality criteria • The analysis results, e.g.: - what was decided/selected - reason for the selection - assumptions made - potential negative impact • Aspects of the analysis may include - correctness - understandability - verifiability - feasibility - validity
15-52	Verification Results	• Verification data and logs • Verification measure passed • Verification measure not passed • Verification measure not executed • information about the test execution (date, tester name etc.) • Abstraction or summary of verification results
15-55	Problem analysis evidence	• Author and involved parties • Date of the analysis • Context and root cause of the problem • Analysis result may include - Impact - Potential negative impact - Affected parties • Potential solution (if known)
16-03	Configuration management system	• Supports the configuration management for the scope of the configuration item list contents • Correct configuration of products • Can recreate any release or test configuration • Ability to report configuration status - Has to cover all relevant tools

ID	名称	特性
15-12	问题状态	• 显示问题解决的进展 • 问题的状态，例如： - 按照问题类别/分类 - 按照问题解决阶段
15-21	供应商评估	• 陈述评估的目的 • 评估使用的方法和工具（检查表，工具） • 评估所使用的需求 • 假设和限制 • 识别所需的背景和范围信息（例如，评估的时间，涉及的相关方） - 满足评估需求
15-51	分析结果	• 识别分析对象。 • 使用的分析准则，例如： - 使用的选择准则或优先级排序方式 - 决策准则 - 质量准则 • 分析结果，例如： - 决定/选择的是什么 - 选择理由 - 所作的假设 - 潜在负面影响 • 分析方面可能包括 - 正确性 - 可理解性 - 可验证性 - 可行性 - 有效性
15-52	验证结果	• 验证数据和日志 • 通过的验证措施 • 未通过的验证措施 • 未执行的验证措施和理由 • 关于验证的执行信息（日期，测试人员姓名等） • 验证结果的概述或总结
15-55	问题分析证据	• 作者和参与方 • 分析日期 • 问题背景和根本原因 • 分析结果可能包含 - 影响 - 潜在负面影响 - 受影响方 • 潜在的解决方案（如已知）
16-03	配置管理系统	• 支持配置项清单内容范围的配置管理 • 产品的正确配置 • 能够重新创建任何发布或测试配置 • 能够报告配置状态 - 须覆盖所有相关工具

ID	Name	Characteristics
16-50	Organizational structure	• Disciplinary reporting line - Organizational units and sub-units, if applicable
17-00	Requirement	• An expectation of functions and capabilities (e.g., non-functional requirements), or one of its interfaces - from a black-box perspective - that is verifiable, does not imply a design or implementation decision, is unambiguous, and does not introduce contradictions to other requirements. - A requirements statement that implies, or represents, a design or implementation decision is called “Design Constraint”. • Examples for requirements aspects at the system level are thermal characteristics such as - heat dissipation - dimensions - weight - materials • Examples of aspects related to requirements about system interfaces are - connectors - cables - housing • Examples for requirements at the hardware level are - lifetime and mission profile, lifetime robustness - maximum price - storage and transportation requirements - functional behavior of analog or digital circuits and logic - quiescent current, voltage impulse responsiveness to crank, start-stop, drop-out, load dump - temperature, maximum hardware heat dissipation - power consumption depending on the operating state such as sleep-mode, start-up, reset conditions - frequencies, modulation, signal delays, filters, control loops - power-up and power-down sequences, accuracy and precision of signal acquisition or signal processing time - computing resources such as memory space and CPU clock tolerances - maximum abrasive wear and shearing forces for e.g., pins or soldering joints - requirements resulting from lessons learned - safety related requirements derived from the technical safety concept
17-51	Cybersecurity goals	• Describe a property of an asset, that is necessary to protect cybersecurity • Associated to one or more threat scenarios
17-54	Requirement Attribute	• Meta-attributes that support structuring and definition of release scopes of requirements. • Can be realized by means of tools. *Note: usage of requirements attributes may further support analysis of requirements.*

ID	名称	特性
16-50	组织架构	• 科室汇报线 – 组织单位和次级单位（如适用）
17-00	需求	• 对功能以及能力（例如：非功能性需求），或其接口之一的期待 • 从黑盒的视角 • 可被验证的，不暗示设计或实现决策的，无歧义的，并和其他需求无矛盾。 • 暗示或表示设计或实现决策的需求陈述称为“设计约束”。 • 系统层级需求方面的示例如热特性，如 - 散热 - 尺寸 - 重量 - 材料 • 关于系统接口方面的需求示例如 - 接插件 - 线束 - 外壳 • 硬件层级需求的示例 - 寿命和任务剖面，寿命可靠性 - 最高价格 - 存储和运输需求 - 模拟或数字电路和逻辑的功能行为 - 静态电流，电压脉冲对点火、启停、压差，负荷突降的响应 - 温度，最大硬件散热 - 依赖于工作状态的功耗，如睡眠模式、启动、复位条件 - 频率、调制、信号延迟、滤波器、控制环路 - 上电和断电时序、信号采集或信号处理时间的准确度和精度 - 计算资源，如内存空间和 CPU 时钟容差 - 最大磨料磨损和剪切力，例如引脚或焊点 - 从经验教训中得出的需求 - 从技术安全概念推导出的安全相关需求
17-51	网络安全目标	• 描述为保护网络安全的所必须的资产的属性 • 与一个或多个威胁场景相关联
17-54	需求属性	• 支持需求发布范围的结构化和定义的元属性（Meta-attributes）。 • 可以通过工具实现。 *注意：使用需求属性可以进一步支持需求分析。*

ID	Name	Characteristics
18-07	Quality criteria	• Defines the expectations for work products and process performance • Including thresholds/tolerance levels, required measurements, required checkpoints • Defines what is an adequate work product (required elements, completeness expected, accuracy, etc.) • Defines what constitutes the completeness of the defined tasks • Defines what constitutes the performance of the defined tasks • Establishes expected performance attributes
18-50	Supplier evaluation criteria	• Expectations for conformity, to be fulfilled by competent suppliers • Links from the expectations to national/international/domains-specific standards/laws/regulations • Requirements conformity evidence to be provided by the potential suppliers or assessed by the acquiring organization • Provisions for tailoring or exception to the requirements
18-52	Escalation path	• Defined mechanisms to report and confirm escalation relevant issues • Identifies stakeholders to be included in the escalation path • Identifies levels of escalation
18-57	Change analysis criteria	• Defines analysis criteria, such as - resource requirements - scheduling issues - risks - benefits

ID	名称	特性
18-07	质量准则	• 定义对工作产品和过程实施的期待 • 包括阈值/容忍级别，所需度量，所需检查点 • 定义什么是完整的工作产品（所需的要素、预期的完整性、准确性等） • 定义什么是构成了已定义任务的完整性 • 定义什么是构成了已定义任务的绩效 • 建立预期的绩效属性
18-50	供应商评估准则	• 合格供应商应满足的符合性期望 • 从期望到国家/国际/特定领域的标准/法律/法规的关联 • 由潜在供应商提供的或者由采购方评估获得的需求符合性证据 • 针对需求的裁剪或例外的规定
18-52	升级路径	• 定义汇报以及确认升级相关问题的机制 • 识别升级路径中需包含的利益相关方 • 识别升级的级别
18-57	变更分析准则	• 定义分析准则，如 - 资源需求 - 日程安排问题 - 风险 - 益处

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