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Clarifying the Boundaries: Deep-Dive into PI and PRPR Assessments in ASPICE

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Abstract

Automotive SPICE (ASPICE) provides a standardized framework for assessing software development processes in the automotive industry. Automotive SPICE (ASPICE) assessments are critical in gauging both process maturity and product quality across the automotive software lifecycle. Two commonly referenced but often conflated assessment types are Process Improvement (PI) and Process-Related Product Requirements (PRPR). This paper presents a research-based, comprehensive comparison of PI and PRPR assessments, their methodological foundations, applications, overlap, challenges, and integration potential. This paper also explores the key differences between PI and PRPR assessments, their objectives, methodologies, and implications for organizations striving for ASPICE compliance and product quality assurance.By delineating their roles and interdependencies, we enable more effective ASPICE deployment strategies and better product and process alignment.

Keywords: ASPICE, PI Assessment, PRPR Assessment, Process Capability, Product Quality, ISO/IEC 33020, Work Products, Compliance Assessment

1. Introduction

Automotive SPICE (ASPICE) has evolved as a cornerstone framework for assessing the process capability of software and system development in the automotive sector. With increasing complexity in automotive software—from infotainment to safety-critical ADAS systems—organizations must not only build effective processes but also ensure their products reflect these standards in execution. ASPICE introduces two primary mechanisms for assessment: Process Improvement (PI) assessments and Process-Related Product Requirements (PRPR) assessments. While PI focuses on evaluating process maturity aligned with ISO/IEC 33020, PRPR focuses on whether those processes are delivering compliant, traceable, and quality work products.

2. PI Assessment: Evaluating Process Capability

A PI assessment aims to determine the maturity and capability of organizational processes using a formal method aligned with the ISO/IEC 330xx family. It addresses both base practices (specific to each process) and generic practices (common to capability levels).



- Methodological Basis: ASPICE Process Assessment Model (PAM), ISO/IEC 33020

- Process Scope: All ASPICE process categories (SYS, SWE, SUP, MAN, REU, ACQ) - Focus: Systematic process evaluation, process performance indicators, adherence to defined roles, artifacts, and traceability.

- Application: Used in supplier selection, process audits, internal improvement tracking, and capability level benchmarking.

- Evidence Base: Interview logs, process descriptions, organizational process documents, and indicators like checklists or toolchains.



ASPICE Capability Levels and Generic Practices Mapping

Figure 1.1: ASPICE Capability Levels and Generic Practices Mapping

3. PRPR Assessment: Evidence-Based Product Validation

The PRPR assessment is an evidence-driven review that focuses on how well the output artifacts conform to ASPICE expectations. It traces the instantiation of ASPICE-compliant processes into actual engineering work products.

- Methodological Basis: Work product-centric ASPICE criteria, often supported by internal engineering maturity models

- Assessment Objective: Identify gaps in work product coverage, content, consistency, and traceability

- Application: Milestone quality gates, project release reviews, functional safety pre-assessments

- Evidence Base: Requirements documents, test plans, bug reports, traceability matrices, review minutes, and safety cases



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Aspect	PI Assessment	PRPR Assessment
Purpose	Evaluate process capability and organizational maturity	Evaluate product readiness and process adherence
Assessment Trigger	Process improvement cycle or audit schedule	Product release milestone
Scope	Organization-wide or across multiple projects	Focused on a specific project or product
Assessor Role	IndependentcertifiedASPICE assessor	Project QA team or external auditor
Process Focus	Generic and base practices across process categories	Evidence-based compliance to defined project process
Result Application	Improvement planning and certification readiness	Go/No-Go release decision based on quality and compliance
Outcome	Process capability level rating	Process capability level rating andGo/No-Go decision

Table 1.1: Comparative Analysis of PI and PRPR Assessments

4. Interdependencies and Applicability

Although different in approach, PI and PRPR assessments are inherently interconnected. A mature process (high PI rating) should ideally produce high-quality artifacts. However, discrepancies are frequent:

- High PI, Low PRPR: Indicates good documentation of processes but poor execution.
- Low PI, High PRPR: Suggests ad hoc success or team heroics that are not reproducible.

Use Case Alignment:

- PI is strategic and often led by process improvement managers or external assessors. - PRPR is tactical, performed by product managers, quality engineers, technical reviewers or external assessors.



PI and PRPR Integration Across ASPICE-Compliant V-Model Lifecycle



Figure 1.2: PI and PRPR Integration Across ASPICE-compliant V-Model Development Lifecycle

5. Known Industry Challenges

- Terminology Confusion: Many stakeholders treat both assessments as interchangeable. - Toolchain Gaps: While PI uses tools like ASPICE PAM spreadsheets, PRPR relies on traceability and configuration tools (e.g., DOORS, JIRA).

- Siloed Execution: Lack of synchronization between process owners (for PI) and product teams (for PRPR).

- OEM Expectation Misalignment: Tier-1 suppliers are often overburdened by inconsistent expectations from OEMs regarding what counts as sufficient evidence.



Overlap Between PI and PRPR Assessments



Figure 1.3: Venn Diagram – Overlapping Challenges in PI and PRPR Domains

6. Best Practices for Integrated ASPICE Assessment Strategy

- Harmonize Planning: Align PI and PRPR schedules with product development milestones.

- Cross-Coaching: Train engineers to understand both process intent and product expectations.

- Tool Integration: Use traceability tools that can support both PI and PRPR evidence generation.

- Dual-Path Feedback Loops: Route PI findings to PRPR teams and vice versa to close the loop.

7. Conclusion

This paper clarified the distinct roles of PI and PRPR assessments under the ASPICE model. With visual and tabular comparison, we demonstrated how these assessments serve different but complementary purposes in automotive development. A strategic approach to applying both enhances organizational capability and product quality.

While PI and PRPR assessments differ in focus, their synergy determines the true success of ASPICE implementation. PI ensures the capability and repeatability of processes, while PRPR validates the quality and traceability of outputs. Ignoring one weakens the value of the other.

By embracing both assessment types in a coordinated strategy, organizations can elevate their process maturity while ensuring that their products meet both internal quality standards and external customer expectations. The fusion of PI and PRPR provides a comprehensive, evidence-backed approach to delivering safe, reliable, and compliant automotive software



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