ASPICE PAM 4.0

.. all changes in one view

Part I - III:

Full Analysis

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ASPICE PAM 4.0

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Part I:

SWE.1 - SWE.6

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SWE.1

ASPICE PAM 3.1

Outcomes

1) the software requirements to be allocated to the software elements of the system and their interfaces are defined; (BP.1)
2) software requirements are categorized and analyzed for correctness and verifiability; (BP.2, BP.3, BP.5)
3) the impact of software requirements on the operating environment is analyzed; (BP.4)
4) prioritization for implementing the software requirements is defined; (BP.2)
5) the software requirements are updated as needed; (BP.1)
6) consistency and bidirectional traceability are established between system requirements and software requirements; and consistency and bidirectional traceability are established between system architectural design and software requirements; (BP.6, BP.7)
7) the software requirements are evaluated for cost, schedule and technical impact; (BP.1; BP.3, BP.4, BP.5)
8) the software requirements are agreed and communicated to all affected parties. (BP.8)

ASPICE PAM 4.0

Outcomes

1) Software requirements are specified. (BP.1)
2) Software requirements are structured and prioritized. (BP.2)
3) Software requirements are analyzed for correctness and technical feasibility. (BP.3)
4) The impact of software requirements on the operating environment is analyzed. (BP.4)
5) Consistency and bidirectional traceability are established between software requirements and system requirements. (BP.5)
6) Consistency and bidirectional traceability are established between software requirements and system architecture. (BP.5)
7) The software requirements are agreed and communicated to all affected parties. (BP61)

1 Outcome 1 & 5 merges into Outcome 1

2 Outcome 2 & 4 merges into Outcome 2

3 Outcome 6 splits into Outcome 5 & 6

SWE.1

ASPICE PAM 3.1

Base Practices

- BP1: Specify software requirements.
- BP2: Structure software requirements.
- BP3: Analyze software requirements.
- BP4: Analyze the impact on the operating environment.
- BP5: Develop verification criteria.
- BP6: Establish bidirectional traceability.
- BP7: Ensure consistency.
- BP8: Communicate agreed software requirements.

ASPICE PAM 4.0

Base Practices

- **BP1: Specify software requirements.**
- BP2: Structure software requirements.
- BP3: Analyze software requirements.
- BP4: Analyze the impact on the operating environment.
- **BP5: Ensure consistency and establish bidirectional traceability.**
- BP6: Communicate agreed software requirements and impact on the operating environment.

1 ASPICE 4.0 points into public standards where requirements characteristics are well established. (i.e. IEEE29148, ISO 26262, etc.), rather than defining additional characteristics. Hence verification criteria are implicitly expected in specified software requirements. (SWE.1.BP.1. Note 1&2)

2 Ensure consistency and traceability is merged together in all process areas

SWE.2

ASPICE PAM 3.1

Outcomes

1) a software architectural design is defined that identifies the elements of the software; (BP.1, BP.6, BP.8)

2) the software requirements are allocated to the elements of the software; (BP.2, BP.6, BP.8)

3) the interfaces of each software element are defined; (BP.3, BP.6)

4) the dynamic behavior and resource consumption objectives of the software elements are defined; (BP.4, BP.5, BP.6)

5) consistency and bidirectional traceability are established between software requirements and software architectural design; (BP.6, BP.7, BP.8)

6) the software architectural design is agreed and communicated to all affected parties; (BP.8, BP.9)

ASPICE PAM 4.0

Outcomes

1) A software architecture is designed including static and dynamic aspects. (BP.1, BP2)

2) The software architecture is analyzed against defined criteria. (BP.3)

3) Consistency and bidirectional traceability are established between software architecture and software requirements. (BP.4)

4) The software architecture is agreed and communicated to all affected parties. (corresponding outcome). (BP.5)

1 SW architecture at a glance. ASPICE4.0 moves the architectural elements, interfaces, as well as static and dynamic behavior (*Outcome 1, 3 & 4*) into one outcome

2 Outcome 2 & 5 merges into Outcome 3. Consistency includes the relation to requirements

SWE.2

ASPICE PAM 3.1

Base Practices

- BP1: Develop software architectural design.
- BP2: Allocate software requirements.
- BP3: Define interfaces of software elements.
- BP4: Describe dynamic behavior.
- BP5: Define resource consumption objectives.
- BP6: Evaluate alternative software architectures.
- BP7: Establish bidirectional traceability.
- BP8: Ensure consistency.
- BP9: Communicate agreed software architectural design.

ASPICE PAM 4.0

Base Practices

- **BP1: Specify static aspects of the software architecture.**
- **BP2: Specify dynamic aspects of the software architecture.**
- **BP3: Analyze software architecture.**
- **BP4: Ensure consistency and establish bidirectional traceability.**
- BP5: Communicate agreed software architecture.

1. In ASPICE 4.0 common elements of static and dynamic design are not separated by individual BP's anymore. Hence the number of BP's has reduced.
2. Comparing AS.3.1 BP.6 with AS.4.0 BP.3 indicates a higher relevance of cooperation between design decisions and project management objectives. ***(see also VDA Guideline chapter 3.9.2.1)***
3. Consistent and transparent allocation of software requirements and architecture has merged into one base practice.

SWE.3

ASPICE PAM 3.1

Outcomes

1) a detailed design is developed that describes software units; (BP.1, BP.4)

2) interfaces of each software unit are defined; (BP.2, BP.4)

3) the dynamic behavior of the software units is defined; (BP.3, BP.4)

4) consistency and bidirectional traceability are established between software requirements and software units; and consistency and bidirectional traceability are established between software architectural design and software detailed design; and consistency and bidirectional traceability are established between software detailed design and software units; (BP.4, BP.5, BP.6)

5) the software detailed design and the relationship to the software architectural design is agreed and communicated to all affected parties; (BP.7)

6) software units defined by the software detailed design are produced. (BP.8)

ASPICE PAM 4.0

Outcomes

1) A detailed design is specified including static and dynamic aspects. (BP.1, BP2)

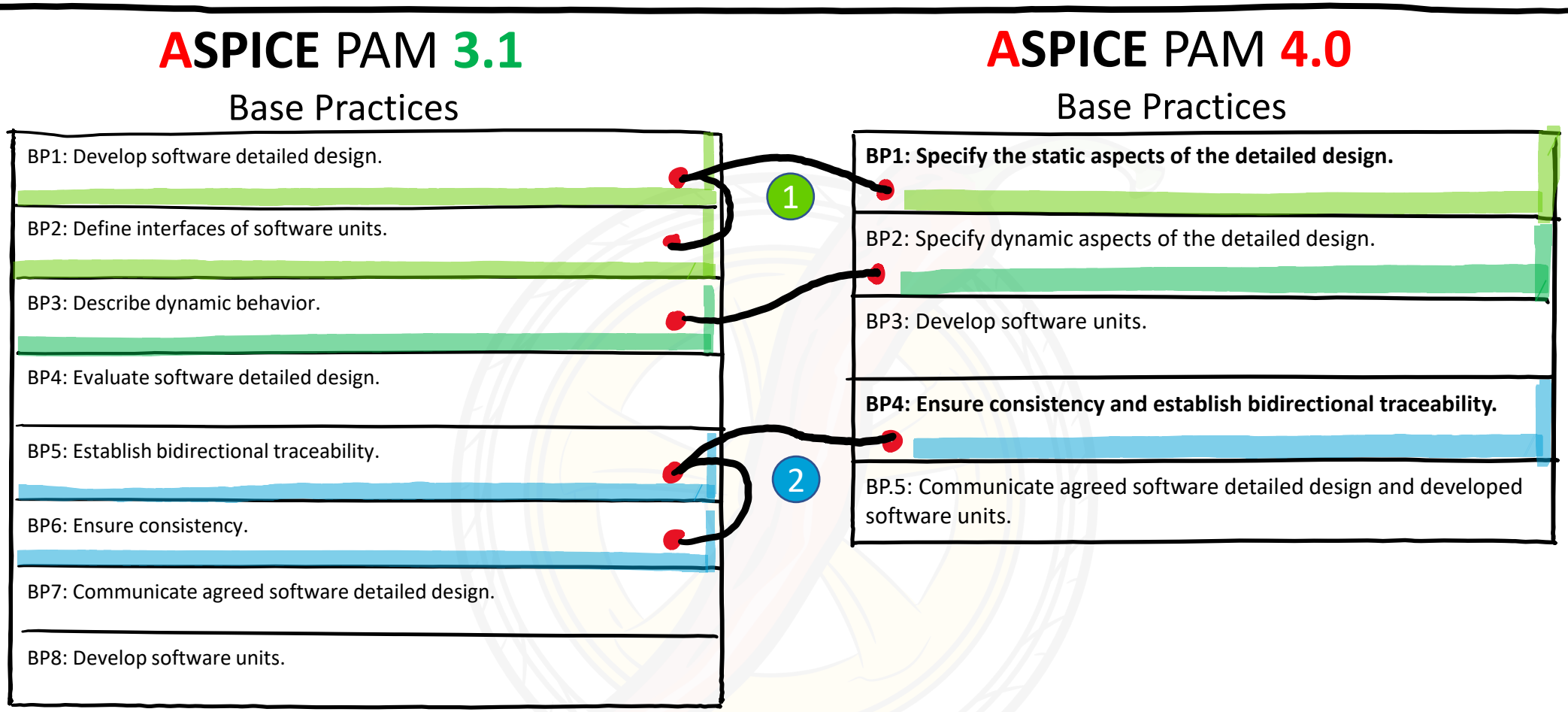
2) Software units as specified in the software detailed design are produced. (BP.3)

3) Consistency and bidirectional traceability are established between software detailed design and software architecture; and consistency and bidirectional traceability are established between source code and software detailed design; and consistency and bidirectional traceability are established between the software detailed design and the software requirements. (BP.4)

4) The source code and the agreed software detailed design are communicated to all affected parties. (BP.5)

1 SW detailed design at a glance. ASPICE4.0 moves the detailed design, interfaces, as well as all static and dynamic behavior (*Outcome 1, 2 & 3*) into one outcome

SWE.3



1 Base practices BP.1 and BP.2 are defined consistent to SWE.2. Hence the number of base practices has been removed.

2 Consistency and transparency are merged into one base practice systematically.

SWE.4

ASPICE PAM 3.1

Outcomes

1) a software unit verification strategy including regression strategy is developed to verify the software units; (BP.1)

2) criteria for software unit verification are developed according to the software unit verification strategy that are suitable to provide evidence for compliance of the software units with the software detailed design and with the non-functional software requirements; (BP.2)

3) software units are verified according to the software unit verification strategy and the defined criteria for software unit verification and the results are recorded; (BP.3, BP.4)

4) consistency and bidirectional traceability are established between software units, criteria for verification and verification results; (BP.5, BP.6)

5) results of the unit verification are summarized and communicated to all affected parties; (BP.5)

ASPICE PAM 4.0

Outcomes

1) Verification measures for software unit verification are specified. (BP.1)

2) Software unit verification measures are selected according to the release scope, including criteria for regression verification. (BP.2)

3) Software units are verified using the selected verification measures, and results are recorded. (BP.3)

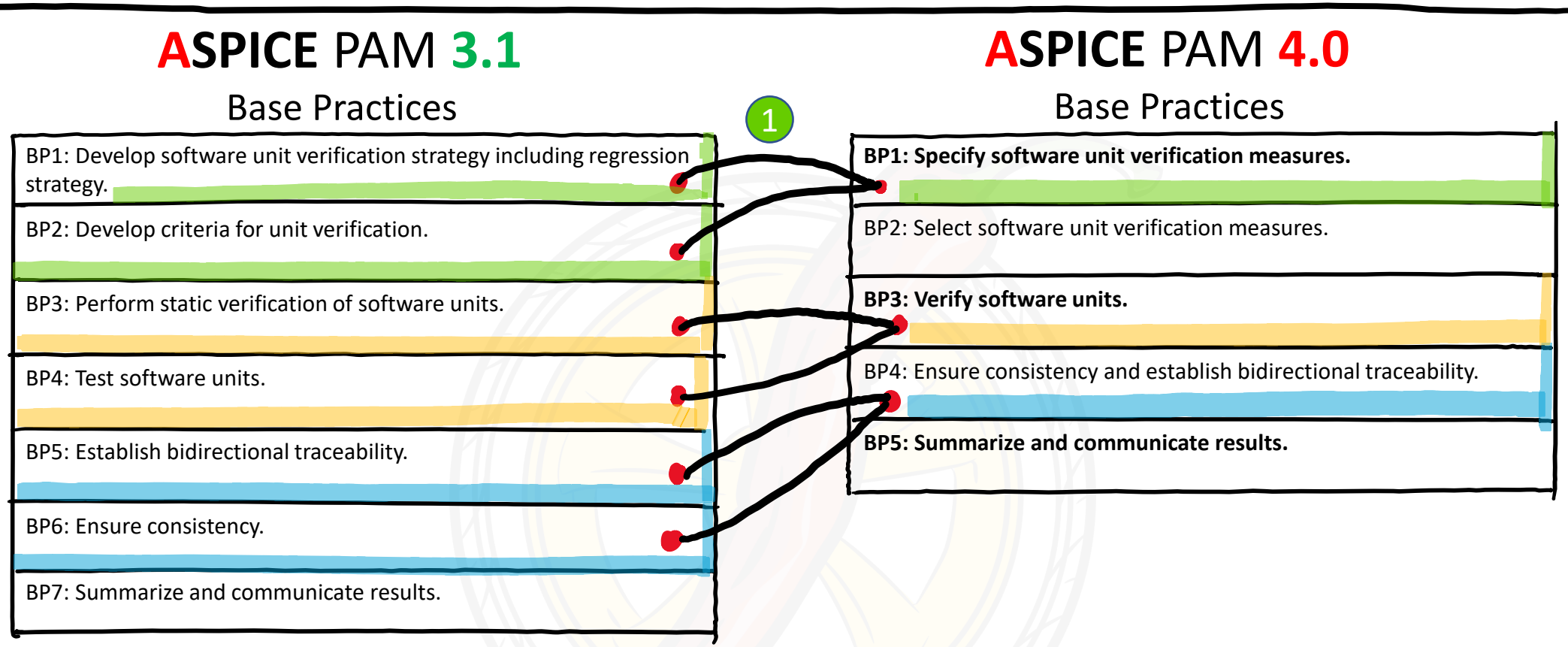
4) Consistency and bidirectional traceability are established between verification measures and software units; and bidirectional traceability is established between verification results and verification measures. (BP.4)

5) Results of the software unit verification are summarized and communicated to all affected parties. (BP.5)

1

1 The structure looks very similar between PAM 3.1 and 4.0, **but** on level 1, ASPICE4.0 does not explicitly mention the term "**strategy**" for the right side of the V-model anymore. A deeper look into the notes shows, that "**specify measures**" still requires a kind of "**verification-tactic**" to ensure meaningful verification measures and characteristics for a release.

SWE.4



1 ASPICE4.0 does not explicitly mention the term "**strategy**" on the right side of the V-model anymore. A deeper look into the notes shows, that "**specify measures**" still requires a kind of documented "**verification-tactic**" to ensure meaningful verification measures and characteristics for a release.

1 The term "**regression**" did not disappear but is an implicit criteria for the selection of the appropriate verification measures.

SWE.5

ASPICE PAM 3.1

Outcomes

1) a software integration strategy consistent with the project plan, release plan and the software architectural design is developed to integrate the software items; (BP.1)

2) a software integration test strategy including the regression test strategy is developed to test the software unit and software item interactions; (BP.2)

3) a specification for software integration test according to the software integration test strategy is developed that is suitable to provide evidence for compliance of the integrated software items with the software architectural design, including the interfaces between the software units and between the software items; (BP.3)

4) software units and software items are integrated up to a complete integrated software according to the integration strategy; (BP.4)

5) Test cases included in the software integration test specification are selected according to the software integration test strategy, and the release plan; (BP.5)

6) integrated software items are tested using the selected test cases and the results of software integration test are recorded; (BP.6)

7) consistency and bidirectional traceability are established between the elements of the software architectural design and the test cases included in the software integration test specification and between test cases and test results; (BP.7, BP.8)

8) results of the software integration test are summarized and communicated to all affected parties. (BP.9)

ASPICE PAM 4.0

Outcomes

1) Verification measures are specified for software integration verification of the integrated software elements based on the software architecture and detailed design, including the interfaces of, and interactions between, the software components. (BP.1)

2) Verification measures for software components are specified to provide evidence for compliance of the software components with the software components' behavior and interfaces. (BP.2)

3) Software elements are integrated up to a complete integrated software. (BP.4)

4) Verification measures are selected according to the release scope considering criteria, including criteria for regression verification. (BP.3)

5) Software components are verified using the selected verification measures, and the results of the integration verification are recorded. (BP.5)

6) Integrated software elements are verified using the selected verification measures, and the results of the integration verification are recorded. (BP.4)

7) Consistency and bidirectional traceability are established between verification measures and the software architecture and detailed design; and bidirectional traceability is established between verification results and verification measures. (BP.6)

8) The results of software component verification and software elements integration verification are summarized and communicated to all affected parties. (BP.7)

1 Same as in SWE.4, the term "**strategy**" disappeared. Anyhow, a certain "**verification-tactic**" is still useful to ensure meaningful verification measures and characteristics according to ASPICE PAM 4.0.

2 Introduction of the term "Software Components", in order to enable a more context driven rating of the integration procedure.
(***recommendation to read VDA Guideline chapter 2.4***)

SWE.5

ASPICE PAM 3.1

Base Practices

BP1: Develop software integration strategy.

BP2: Develop software integration test strategy including regression test strategy.

BP3: Develop specification for software integration test.

BP4: Integrate software units and software items.

BP5: Select test cases.

BP6: Perform software integration test.

BP7: Establish bidirectional traceability.

BP8: Ensure consistency.

BP9: Summarize and communicate results.

ASPICE PAM 4.0

Base Practices

BP1: Specify software integration verification measures.

BP2: Specify verification measures for verifying software component behavior.

BP3: Select verification measures.

BP4: Integrate software elements and perform integration verification.

BP5: Perform software component verification.

BP6: Ensure consistency and establish bidirectional traceability.

BP7: Summarize and communicate results.

1 The circumstance that the term "**strategy**" disappeared from the level 1 terminology shall not be misunderstood in the way to skip any kind of strategy. Same as in SWE.4, meaningful verification measures and characteristics are still required.

A **tactic** of how to achieve these measures and characteristics must still be documented.

SWE.6

ASPICE PAM 3.1

Outcomes

1) a software qualification test strategy including regression test strategy consistent with the project plan and release plan is developed to test the integrated software; (BP.1)

2) a specification for software qualification test of the integrated software according to the software qualification test strategy is developed that is suitable to provide evidence for compliance with the software requirements; (BP.2)

3) test cases included in the software qualification test specification are selected according to the software qualification test strategy and the release plan; (BP.3)

4) the integrated software is tested using the selected test cases and the results of software qualification test are recorded; (BP.4)

5) consistency and bidirectional traceability are established between software requirements and software qualification test specification including test cases and between test cases and test results; (BP.5, BP.6)

6) results of the software qualification test are summarized and communicated to all affected parties; (BP.7)

ASPICE PAM 4.0

Outcomes

1) Verification measures are specified for software verification of the software based on the software requirements. (BP.1)

2) Verification measures are selected according to the release scope considering criteria, including criteria for regression verification. (BP.2)

3) The integrated software is verified using the selected verification measures and the results of software verification are recorded. (BP.3)

4) Consistency and bidirectional traceability are established between verification measures and software requirements; and bidirectional traceability is established between verification results and verification measures. (BP.4)

5) Results of the software verification are summarized and communicated to all affected parties. (BP.5)

1 Same as in SWE.4 and SWE.5, the term “**strategy**” disappeared. Anyhow, a certain “**verification-tactic**” is still useful to ensure meaningful verification measures and characteristics according to ASPICE PAM 4.0.

SWE.6

ASPICE PAM 3.1

Base Practices

- BP1: Develop software qualification test strategy including regression test strategy.
- BP2: Develop specification for software qualification test.
- BP3: Select test cases.
- BP4: Test integrated software.
- BP5: Establish bidirectional traceability.
- BP6: Ensure consistency.
- BP7: Summarize and communicate results.

ASPICE PAM 4.0

Base Practices

- **BP1: Specify verification measures for software verification.**
- BP2: Select verification measures.
- BP3: Verify the integrated software.
- **BP4: Ensure consistency and establish bidirectional traceability.**
- BP5: Summarize and communicate results.

1 The circumstance that the term "**strategy**" disappeared from the level 1 terminology shall not be misunderstood in the way to skip any kind of strategy. Same as in SWE.4 and SWE.5 meaningful verification measures and characteristics are still required.

A **tactic** of how to achieve these measures and characteristics must still be documented.

Conclusion:

- A lot of simplifications and a novelty for SWE.5.
  - No more use of the term “strategy” on the right side of the V-model but the expectations towards the doing didn’t really change.
  - Less BP’s: Elements which are common because of other ISO norms and standards are not represented by individual BP’s anymore. (e.g. characteristics of requirements)
  - Better structure: almost 1:1 mapping of outcomes to BP’s.

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Part II:

SYS.1 - SYS.5

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SYS.1

ASPICE PAM 3.1

Outcomes

1) continuing communication with the stakeholder is established; (BP.1)
2) agreed stakeholder requirements are defined and baselined; (BP.2, BP.3, BP.4)
3) a change mechanism is established to evaluate and incorporate changes to stakeholder requirements into the baselined requirements based on changing stakeholder needs; (BP.4, BP.5, BP.6)
4) a mechanism is established for continuous monitoring of stakeholder needs; (BP.1)
5) a mechanism is established for ensuring that customers can easily determine the status and disposition of their requests; (BP.6)
6) changes arising from changing technology and stakeholder needs are identified, the associated risks assessed and their impact managed. (BP.5)

1

ASPICE PAM 4.0

Outcomes

1) Continuing communication with the stakeholder is established. (BP.1, BP4)
2) Stakeholder expectations are understood, and requirements are defined and agreed. (BP.2)
3) Stakeholder requirements changes arising from stakeholder needs are analyzed to enable associated risk assessment and impact management. (BP.3)
4) Determination of stakeholder requirements status is ensured for all affected parties. (BP.4)

1 The outcomes for changing requirements have been removed. In SYS.1 BP.3 the Note 4 & Note 5 refers to SUP.10 Change request management if required.

SYS.1

ASPICE PAM 3.1

Base Practices

BP1: Obtain stakeholder requirements and requests.

BP2: Understand stakeholder expectations.

BP3: Agree on requirements.

BP4: Establish stakeholder requirements baseline.

BP5: Manage stakeholder requirements changes.

BP6: Establish customer-supplier query communication mechanism.

ASPICE PAM 4.0

Base Practices

BP1: Obtain stakeholder expectations and requests.

BP2: Agree on requirements.

BP3: Analyze stakeholder requirements changes.

BP4: Communicate requirements status.

1

1 PAM 3.1 : BP.2, BP.3, BP.4 were pointing already to the same outcome. In ASPICE 4.0 common agreements (such as understanding of expectations or agreement on baselines) are not separated by individual BP's anymore. Hence the base practices are merged together and the number of BP's is reduced.

SYS.2

ASPICE PAM 3.1

Outcomes

1) a defined set of system requirements is established; (BP.1, BP.3)

2) system requirements are categorized and analyzed for correctness and verifiability; (BP.2, BP.3, BP.5)

3) the impact of system requirements on the operating environment is analyzed; (BP.4)

4) prioritization for implementing the system requirements is defined; (BP.2)

5) the system requirements are updated as needed; (BP.1)

6) consistency and bidirectional traceability are established between stakeholder requirements and system requirements; (BP.6, BP.7)

7) the system requirements are evaluated for cost, schedule and technical impact; (BP.1, BP.3, BP.4, BP.5)

8) the system requirements are agreed and communicated to all affected parties. (BP.8)

ASPICE PAM 4.0

Outcomes

1) System requirements are specified. (BP.1)

2) System requirements are structured and prioritized. (BP.2)

3) System requirements are analyzed for correctness and technical feasibility. (BP.3)

4) The impact of system requirements on the operating environment is analyzed. (BP.4)

5) Consistency and bidirectional traceability are established between system requirements and stakeholder requirements. (BP.5)

6) The system requirements are agreed and communicated to all affected parties. (BP.6

1 In AS3.1 the outcomes 1 & 5 belong already to BP.1. Consequently it is now merged into one outcome in AS 4.0.

2 Same as the outcomes 2 & 4. In AS3.1 both belong to BP.2. Consequently it is again now merged into one outcome in AS 4.0.

SYS.2

ASPICE PAM 3.1

Base Practices

- BP1: Specify system requirements.
- BP2: Structure system requirements.
- BP3: Analyze system requirements.
- BP4: Analyze the impact on the operating environment.
- BP5: Develop verification criteria.
- BP6: Establish bidirectional traceability.
- BP7: Ensure consistency.
- BP8: Communicate agreed system requirements.

ASPICE PAM 4.0

Base Practices

- **BP1: Specify system requirements.**
- BP2: Structure system requirements.
- BP3: Analyze system requirements.
- BP4: Analyze the impact on the system context.
- BP5: Ensure consistency and establish bidirectional traceability.
- BP6: Communicate agreed system requirements and impact on the system context.

1 Consistent to SWE.1, ASPICE 4.0 points into public standards, where requirements characteristics are well defined. (i.e. IEEE29148, ISO 26262, etc.). Hence verification criteria are implicitly expected in specified system requirements. (SYS.2. Note 1&2)

2 Consistency and transparency are merged into one base practice systematically.

SYS.3

ASPICE PAM 3.1

Outcomes

1) a system architectural design is defined that identifies the elements of the system; (BP.1, BP.5, BP.7)

2) the system requirements are allocated to the elements of the system; (BP.2, BP.7)

3) the interfaces of each system element are defined; (BP.3)

4) the dynamic behavior of the system elements is defined; (BP.4)

5) consistency and bidirectional traceability are established between system requirements and system architectural design; (BP.6, BP.7)

6) the system architectural design is agreed and communicated to all affected parties.; (BP.7, BP.8)

ASPICE PAM 4.0

Outcomes

1) A system architecture is designed including a definition of the system elements with their behavior, their interfaces, their relationships, and their interactions. (BP.1, BP2)

2) The system architecture is analyzed against defined criteria, and special characteristics are identified. (BP.3)

3) Consistency and bidirectional traceability are established between system architecture and system requirements. (BP.4)

4) The agreed system architecture and the special characteristics are communicated to all affected parties. (BP.5)

1 SYS architecture at a glance. ASPICE4.0 moves the architectural elements, interfaces, as well as static and dynamic behavior into one outcome.

2 Outcome 2 & 5 merges into Outcome 3. Consistency includes the relation to requirements!

3 New is the outcome for BP.3 the system architecture analysis. In AS.3.1 this activity was addressed by B.5 “Evaluate alternative system architecture” but without a dedicated outcome.

SYS.3

ASPICE PAM 3.1

Base Practices

- BP1: Develop system architectural design.
- BP2: Allocate system requirements.
- BP3: Define interfaces of system elements.
- BP4: Describe dynamic behavior.
- BP5: Evaluate alternative system architectures.
- BP6: Establish bidirectional traceability.
- BP7: Ensure consistency.
- BP8: Communicate agreed system architectural design.

ASPICE PAM 4.0

Base Practices

- **BP1: Specify static aspects of the system architecture.**
- BP2: Specify dynamic aspects of the system architecture.
- **BP3: Analyze system architecture.**
- BP4: Ensure consistency and establish bidirectional traceability.
- BP5: Communicate agreed system architecture.

1 Consistent to the outcomes the common elements of static and dynamic architecture are not separated by individual BP's anymore. Hence the number of BP's is reduced.

2 Comparing AS.3.1 BP.5 with AS.4.0 BP.3 indicates a higher relevance of cooperation between design decisions and project management objectives. ***(see also VDA Guideline chapter 3.9.2.1)***

SYS.4

ASPICE PAM 3.1

Outcomes

1. a **system integration strategy** consistent with the project plan, the release plan and the system architectural design is developed to integrate the system items; (BP.1)
2. a **system integration test strategy** including the **regression test strategy** is developed to test the system item interactions; (BP.2)
3. a **specification for system integration test according to the system integration test strategy is developed** that is suitable to provide evidence for compliance of the integrated system items with the system architectural design, including the interfaces between system items; (BP.3)
4. system items are integrated up to a complete integrated system according to the integration strategy; (BP.4)
5. test cases included in the system integration test specification are selected according to the system integration test strategy and the release plan; (BP.5)
6. system item interactions are tested using the selected test cases and the results of system integration testing are recorded; (BP.6)
7. **consistency and bidirectional traceability between the elements of the system architectural design and test cases included in the system integration test specification and bidirectional traceability between test cases and test results is established; (BP.7, BP.8)**
8. results of the system integration test are summarized and communicated to all affected parties. (BP.9)

ASPICE PAM 4.0

Outcomes

1) **Verification measures are specified for system integration verification of the integrated system elements based on the system architecture, including the interfaces of, and interactions between, system elements. (BP.1)**
2) System elements are integrated up to a complete integrated system consistent with the release scope. (BP.3)
3) Verification measures are selected according to the release scope considering criteria, including criteria for regression verification. (BP.2)
4) Integrated system elements are verified using the selected verification measures, and the results of the system integration verification are recorded. (BP.3)
5) **Consistency and bidirectional traceability are established between verification measures and the elements of the system architecture. (BP.4)**
6) **Bidirectional traceability between verification results and verification measures is established. (BP.4)**
7) Results of the system integration and integration verification are summarized and communicated to all affected parties. (BP.5)

1 Same as in SWE.4 – SWE.6, the term “**strategy**” disappeared. Anyhow, a certain “**verification-tactic**” is still useful to ensure meaningful verification measures and characteristics according to ASPICE PAM 4.0.

2 “**Consistency**” and “**bilateral traceability**”, systematically has been merged in all process areas, **except for SYS.4 and SYS.5!**

SYS.4

ASPICE PAM 3.1

Base Practices

- **BP1: Develop system integration strategy.**
- **BP2: Develop system integration test strategy including regression test strategy.**
- **BP3: Develop specification for system integration test.**
- BP4: Integrate system items.
- BP5: Select test cases.
- BP6: Perform system integration test.
- BP7: Establish bidirectional traceability.
- BP8: Ensure consistency.
- BP9: Summarize and communicate results.

ASPICE PAM 4.0

Base Practices

- **BP1: Specify verification measures for system integration.**
- BP2: Select verification measures.
- BP3: Integrate system elements and perform integration verification.
- BP4: Ensure consistency and establish bidirectional traceability.
- BP5: Summarize and communicate results.

1 ASPICE4.0 does not explicitly mention the term “strategy” on the right side of the V-model anymore. A look into the notes shows, that “**specify measures**” still requires a kind of “**verification-tactic**” to ensure meaningful verification measures and characteristics for a product release.

2 The difference in merging consistency and traceability for the base practices but to split the single outcome into two new outcomes seems to be **inconsistent** and is different compared to SWE.4 – SWE.6!

SYS.5

ASPICE PAM 3.1

Outcomes

1. a system qualification test strategy including regression test strategy consistent with the project plan and release plan is developed to test the integrated system; (BP.1)
2. a specification for system qualification test of the integrated system according to the system qualification test strategy is developed that is suitable to provide evidence for compliance with the system requirements; (BP.2)
3. test cases included in the system qualification test specification are selected according to the system qualification test strategy and the release plan; (BP.3)
4. the integrated system is tested using the selected test cases and the results of system qualification test are recorded; (BP.4)
5. consistency and bidirectional traceability are established between system requirements and test cases included in the system qualification test specification and between test cases and test results; (BP.5, BP.6)
6. results of the system qualification test are summarized and communicated to all affected parties. (BP.7)

ASPICE PAM 4.0

Outcomes

1) Verification measures are specified for system verification of the system based on the system requirements. (BP.1)

2) Verification measures are selected according to the release scope considering criteria, including criteria for regression verification. (BP.2)

3) The integrated system is verified using the selected verification measures and the results of system verification are recorded. (BP.3)

4) Consistency and bidirectional traceability are established between verification measures and system requirements. (BP.4)

5) Bidirectional traceability is established between verification results and verification measures. (BP.4)

6) Verification results are summarized and communicated to all affected parties. (BP.5)

1 Same as in SWE.4 - SWE.6 and SYS.4, the term "**strategy**" disappeared. Anyhow, a certain "**verification-tactic**" is still useful to ensure meaningful verification measures and characteristics according to ASPICE PAM 4.0.

2 "**Consistency**" and "**bilateral traceability**", systematically has been merged in all process areas, **except for SYS.4 and SYS.5!**

SYS.5

ASPICE PAM 3.1

Base Practices

- BP1: Develop system qualification test strategy including regression test strategy.
- BP2: Develop specification for system qualification test.
- BP3: Select test cases.
- BP4: Test integrated system.
- BP5: Establish bidirectional traceability.
- BP6: Ensure consistency.
- BP7: Summarize and communicate results.

ASPICE PAM 4.0

Base Practices

- **BP1: Specify verification measures for system verification.**
- **BP2: Select verification measures.**
- **BP3: Perform verification of the integrated system.**
- **BP4: Ensure consistency and establish bidirectional traceability.**
- BP5: Summarize and communicate results.

1 The circumstance that the term "**strategy**" disappeared from the level 1 terminology shall not be misunderstood in the way to skip any kind of strategy. Same as in SWE.4 and SWE.5 meaningful verification measures and characteristics are still required.

A **tactic** of how to achieve these measures and characteristics must still be documented.

2 The difference in merging consistency and traceability for the base practices but to split the single outcome into two new outcomes seems to be **inconsistent** and is different compared to SWE.4 – SWE.6!

Conclusion:

- A lot of simplifications and a surprising complication for SYS.4 and SYS.5:
  - No more use of the term “strategy” on the right side of the V-model but the expectations towards the doing didn’t really change.
  - Less BP’s: Elements which are common because of other ISO norms and standards are not represented by individual BP’s anymore. (e.g. characteristics of requirements)
  - Better structure: almost 1:1 mapping of outcomes to BP’s.
  - Inconsistency for handling of consistency and traceability in SYS.4 and SYS.5.

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.. all changes in one view

Part III:

MAN.3

ACQ.4

SUP.1, SUP.9 – SUP.10

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MAN.3

ASPICE PAM 3.1

Outcomes

1) the scope of the work for the project is defined; (BP.1)
2) the feasibility of achieving the goals of the project with available resources and constraints is evaluated; (BP.2, BP.3, BP.5)
3) the activities and resources necessary to complete the work are sized and estimated; (BP.4, BP.5, BP.6, BP.8, BP.9)
4) interfaces within the project, and with other projects and organizational units, are identified and monitored; (BP.7, BP.9)
5) plans for the execution of the project are developed, implemented and maintained; (BP.4, BP.8, BP.9)
6) progress of the project is monitored and reported; (BP.10)
7) corrective action is taken when project goals are not achieved, and recurrence of problems identified in the project is prevented; (BP.4, BP.5, BP.6, BP.7, BP.8, BP.9, BP.10)

ASPICE PAM 4.0

Outcomes

1	1) The scope of the work for the project is defined. (BP.1, BP2)
	2) The feasibility of achieving the goals of the project with available resources and constraints is evaluated. (BP.2, BP.3, BP.5)
	3) The activities and resources necessary to complete the work are sized and estimated. (BP.4, BP.5, BP.6, BP.7, BP.9)
⚡	4) Interfaces within the project, and with other projects and organizational units, are identified and monitored. (BP.4, BP.9)
⚡	5) Plans for the execution of the project are developed, implemented and maintained. (BP.4, BP.7, BP.9)
1	6) Progress of the project is monitored and reported. (BP.8, BP.10)
	7) Adjustment is performed when project goals are not achieved. (BP.4, BP.5, BP.6, BP.7, BP.8, BP.9, BP.10)

1 On the first view, there is almost no change to the content. But there are some hidden changes.
I.e. **opposite** to the evolution in SWE and SYS the mapping of **outcomes to BP's** became **more complex** (**i.e. outcome 1 & 6**).

⚡ It looks like a **mistake in ASPICE PAM 4.0** that there is **no link between BP.7** and its natural **outcome 4**. In addition, there is n**o link between BP.8** and its natural **outcome 5**. It's unclear to me if this is intended or a mistake in the AS4.0 standard. Maybe a representative from AG13 can comment this.

MAN.3

ASPICE PAM 3.1

Base Practices

- BP1: Define the scope of work.
- BP2: Define project life cycle.
- BP3: Evaluate feasibility of the project.
- BP4: Define, monitor and adjust project **activities**.
- BP5: Define, monitor and **adjust** project estimates and resources.
- BP6: Ensure required skills, knowledge, and experience.
- BP7: Identify, monitor and **adjust** project interfaces and agreed commitments.
- BP8: Define, monitor and **adjust** project schedule.
- BP9: Ensure consistency.
- BP10: Review and report progress of the project.

ASPICE PAM 4.0

Base Practices

- BP1: Define the scope of work.
- BP2: Define project life cycle.
- BP3: Evaluate feasibility of the project.
- BP4: Define and monitor **work packages**.
- BP5: Define and monitor project estimates and resources.
- BP6: Define and monitor required skills, knowledge, and experience.
- BP7: Define and monitor project interfaces and agreed commitments.
- BP8: Define and monitor project schedule.
- BP9: **Ensure consistency.**
- BP10: Review and report progress of the project.

1

1 Some changes are visible. For example the concept for “define & monitor” and “adjust” has changed. According to the ***VDA Guideline chapter 3.28.1.1*** define & monitor are about the setup and continuous re-evaluation of artefacts, while adjustment is a natural element of “ensuring consistency”!

It is also recommended to have a deeper look into the changes to all the notes in MAN.3 (e.g. BP.4, BP.5).

ACQ.4

ASPICE PAM 3.1

Outcomes

1) joint activities, as agreed between the customer and the supplier, are performed as needed; (BP.1, BP.2, BP.3, BP4)
2) all information, agreed upon for exchange, is communicated regularly between the supplier and customer; (BP.1, BP.2)
3) performance of the supplier is monitored against the agreements; (**BP.2, BP.3, BP.4**)
4) changes to the agreement, if needed, are negotiated between the customer and the supplier and documented in the agreement. (**BP.3, BP.4, BP.5**)

ASPICE PAM 4.0

Outcomes

	1) Joint activities, as agreed between the customer and the supplier, are performed. (BP.1, BP.2, BP.3, BP4)
	2) All information, agreed upon for exchange, is communicated regularly between the customer and the supplier. (BP.1, BP.2)
1	3) Performance of the supplier is monitored against the agreements. (**BP.2, BP.3, BP.4, BP.5**)
1	4) Changes to the agreement, if needed, are negotiated between the customer and the supplier and documented in the agreement. (**BP.1, BP.3, BP.4, BP.5**)

1 There is almost no change to ACQ.4 beside a different allocation of Outcome 3 & 4 to BP's.

ACQ.4

ASPICE PAM 3.1

Base Practices

BP1: Agree on and maintain joint processes, joint interfaces, and information to be exchanged.
BP2: Exchange all agreed information.
BP3: Review technical development with the supplier.
BP4: Review progress of the supplier.
BP5: Act to correct deviations.

ASPICE PAM 4.0

1

Base Practices

BP1: Agree on and maintain joint activities, joint interfaces, and information to be exchanged.
BP2: Exchange all agreed information.
BP3: Review development work products with the supplier.
BP4: Review progress of the supplier.
BP5: Act to correct deviations.

1 There is almost no change to ACQ.4. The rating rules changed slightly. The guideline introduced the term “contract-based supplier” and consequently removed the exception for open-source software (***VDA Guideline chapter 3.1.1.1***). Hence ACQ.4 focuses on software development on the base of customer requirements.

SUP.1

ASPICE PAM 3.1

Outcomes

1) A **strategy** for performing quality assurance is developed, implemented, and maintained. (BP.1)
2) Quality assurance is performed independently and objectively without conflicts of interest. (BP.1, BP.2, BP.3)
3) Non-conformances with relevant requirements are identified, recorded, communicated, tracked, resolved, and further prevented. (BP.2, BP.3, BP.4, BP.5)
4) conformance of work products, processes and activities with relevant requirements is verified, documented, and communicated to the relevant parties; (BP.2, BP.3, BP.4)
5) authority to escalate non-conformances to appropriate levels of management is established; (BP.6)
6) management ensures that escalated non-conformances are resolved. (BP.5, BP.6)

ASPICE PAM 4.0

Outcomes

1) Quality assurance is performed independently and objectively without conflicts of interest. (BP.1)
2) Criteria for the quality of work products and process performance are defined. (BP.2)
3) Conformance of work products and process performance with the defined criteria and targets is verified, documented and communicated to the relevant parties. (BP.3, BP.4, BP.5)
4) Non-conformances are tracked, resolved, and further prevented. (BP.3, BP.4, BP.5, BP.6)
5) Non-conformances are escalated to appropriate levels of management. (BP.5, BP.7)
6) Management ensures that escalated non-conformances are resolved. (BP.6, BP.7)

1

1 The term “**strategy**” disappeared for the support processes, same as for SWE and SYS. Anyhow, the new outcome 2 explicitly requires the criteria usually expected in the strategy. Hence the term “strategy” disappeared, but the content is still required and mandatory!

Example from the daily practice:

We usually expect a project handbook in MAN.3 even if it was never a defined work product (e.g. in AS3.1). Hence documented tactics on how to achieve the objectives of the support processes remains helpful.

SUP.1

ASPICE PAM 3.1

Base Practices

- BP1: Develop a project quality assurance **strategy**.
- BP2: Assure quality of work products.
- BP3: Assure quality of process activities.
- BP4: Summarize and communicate quality assurance activities and results.
- BP5: Ensure resolution of non-conformances.
- BP6: Implement an escalation mechanism.

ASPICE PAM 4.0

Base Practices

- BP1: Ensure independence of quality assurance.
- BP2: Define criteria for quality assurance.
- BP3: Assure quality of work products.
- BP4: Assure quality of process activities.
- BP5: Summarize and communicate quality assurance activities and results.
- BP6: Ensure resolution of non-conformances.
- BP7: Escalate non-conformances.

1 As a consequence of the removal of the term "**strategy**" from the outcome's as well as from the base practices, BP.1 is now splitted into two new BP's, in order to **ensure meaningful criteria** for quality assurance **and independency** are well considered.

SUP.8

ASPICE PAM 3.1

Outcomes

1) a configuration management **strategy** is developed; (BP.1, BP.3, BP.4)

2) all configuration items generated by a process or project are identified, (BP.2, BP.3, BP.6)

3) modifications and releases of the configuration items are controlled; (BP.3, BP.4, BP.5)

4) modifications and releases are made available to affected parties; (BP.3, BP.5, BP.9)

5) the status of the configuration items and modifications is recorded and reported; (BP.5, BP.7, BP.9)

6) the completeness and consistency of the baselines is ensured; (BP.3, BP.4, BP.8. BP.9)

7) storage of the configuration items is controlled. (BP.3, BP.4, BP.9)

ASPICE PAM 4.0

Outcomes

1) Selection criteria for configuration items are defined and applied. (BP.1)

2) Configuration item properties are defined. (BP.2)

3) Configuration management is established. (BP.3) (1)

4) Modifications are controlled. (BP.3, BP.4) (2)

5) Baselining is applied. (BP.5) (1)

6) The status of the configuration items is recorded and reported. (BP.6)

7) The completeness and consistency of the baselines is ensured. (BP.7)

8) The availability of backup and recovery mechanisms is verified. (BP.8)

1 There is no fundamental evolution for the outcomes of SUP.8. But there is a more systematic correlation between outcomes and base practices.
I.e. in AS3.1 the BP's BP.3 and BP.6 did not have explicit outcomes. They were pointing to their natural work products through a list of outcomes. ASPICE4.0 provides a more direct allocation of BP.3 to outcome 3 and BP.5 to outcome 5.

2 Outcome 3 & 4 are merged into one single outcome 4.

SUP.8

ASPICE PAM 3.1

Base Practices

BP1: Develop a configuration management **strategy**.
BP2: Identify configuration items.
BP3: Establish a configuration management system.
BP4: Establish branch management.
BP5: Control modifications and releases.
BP6: Establish baselines.
BP7: Report configuration status.
BP8: Verify the information about configured items.
BP9: Manage the storage of configuration items and baselines.

ASPICE PAM 4.0

Base Practices

BP1: Identify configuration items.
BP2: Define configuration item properties.
BP3: Establish configuration management.
BP4: Control modifications.
BP5: Establish baselines.
BP6: Summarize and communicate configuration status.
BP7: Ensure completeness and consistency.
BP8: Verify backup and recovery mechanisms availability.

1 As in other process areas, the term “**strategy**” disappeared. Still, it does not mean, it’s purpose has disappeared.

2 More obvious, the BP.4 “branch management” has been removed. Be careful: looking into the ASPICE guideline, inappropriate branch and merge activities are explicitly considered in MAN.5 (***VDA Guideline chapter 3.29.2.1 Sources of risks***).

SUP.9

ASPICE PAM 3.1

Outcomes

1) a problem resolution management **strategy** is developed; (BP.1)
2) problems are recorded, uniquely identified and classified; (BP.2, BP.4)
3) problems are analyzed and assessed to identify an appropriate solution; (BP.4)
4) problem resolution is initiated; (BP.5, BP.6, BP.7)
5) problems are tracked to closure; (BP.8)
6) the status of problems and their trend are known. (BP.3, BP.8, BP.9)

1

ASPICE PAM 4.0

Outcomes

1) Problems are uniquely identified, recorded, and classified. (BP.1, BP2)
2) Problems are analyzed and assessed to determine an appropriate solution. (BP.2)
3) Problem resolution is initiated. (BP.3, BP.4, BP.5)
4) Problems are tracked to closure. (BP.1, BP.6)
5) The status of problems, including trends identified, are reported to stakeholders. (BP.6, BP.7)

1 ASPICE4.0 does not explicitly mention the term "**strategy**" for the support processes anymore. It does not mean, it's purpose has disappeared. Aspects, such as criteria when problem identification starts or urgent resolution action require are still required according to the guideline (***VDA Guideline chapter 3.25.2.1 or 3.25.2.3***). Typically a project specific and documented approach is required.

SUP.9

ASPICE PAM 3.1

Base Practices

- BP1: Develop a problem resolution management **strategy**. (1)
- BP2: Identify and record the problem.
- BP3: Record the status of problems.
- BP4: Diagnose the cause and determine the impact of the problem.
- BP5: Authorize urgent resolution action.
- BP6: Raise alert notifications.
- BP7: Initiate problem resolution.
- BP8: Track problems to closure.
- BP9: Analyze problem trends. (1)

ASPICE PAM 4.0

Base Practices

- BP1: Identify and record the problem.
- BP2: Determine the cause and the impact of the problem.
- BP3: Authorize urgent resolution action.
- BP4: Raise alert notifications.
- BP5: Initiate problem resolution.
- BP6: Track problems to closure.
- BP7: Report the status of problem resolution activities. (1)

(1) As in other process areas, the term "**strategy**" disappeared. Further, the base practice to identify problem trends has been removed. In both cases, its purposes have not disappeared at all. The problem trend analysis e.g. has been merged into AS4.0 SUP.9.BP7

SUP.10

ASPICE PAM 3.1

Outcomes

1) a change request management **strategy** is developed; (BP.1)
2) requests for changes are recorded and identified; (BP.2)
3) dependencies and relationships to other change requests are identified; (BP.2, BP.4)
4) criteria for confirming implementation of change requests are defined; (BP.4)
5) requests for change are analyzed, and resource requirements are estimated; (BP.4)
6) changes are approved and prioritized on the basis of analysis results and availability of resources; (BP.5)
7) approved changes are implemented and tracked to closure; (BP.7, BP.8)
8) the status of all change requests is known; (BP.3, BP.6, BP.7)
9) bi-directional traceability is established between change requests and affected work products. (BP.4, BP.8)

ASPICE PAM 4.0

Outcomes

1) Requests for changes are recorded and identified. (BP.1)
2) Change requests are analyzed, dependencies and relationships to other change requests are identified, and the impact is estimated. (BP.2)
3) Change requests are approved before implementation and prioritized accordingly. (BP.3)
4) Bidirectional traceability is established between change requests and affected work products. (BP.4)
5) Implementation of change requests is confirmed. (BP.5)
6) Change requests are tracked to closure, and the status of change requests is communicated to affected parties. (BP.6)

1 Again the term “strategy” disappeared. Aspects, such as life-cycle, interfaces or criteria for the analysis of change requests (also relevant for SUP.1) are still required according to the guideline (***VDA Guideline chapter 3.26.2.2***).. Typically a project specific and documented approach is required.

2 Outcome 3, 4 & 5 are merged into one single outcome 2.

SUP.10

ASPICE PAM 3.1

Base Practices

- BP1: Develop a change request management **strategy**.
- BP2: Identify and record the change requests.
- BP3: Record the status of change requests.
- BP4: Analyze and assess change requests.
- BP5: Approve change requests before implementation.
- BP6: Review the implementation of change requests.
- BP7: Track change requests to closure.
- BP8: Establish bidirectional traceability.

ASPICE PAM 4.0

Base Practices

- BP1: Identify and record the change requests.
- BP2: Analyze and assess change requests.
- BP3: Approve change requests before implementation.
- BP4: Establish bidirectional traceability.
- BP5: Confirm the implementation of change requests.
- BP6: Track change requests to closure.

1

1 In AS 3.1 the status and the progress of the change request was refined in 3 base practices. In the spirit of SWE and SYS there is only one base practice left to ensure the consistency and integrity of a change to ensure the implementation can be confirmed by the process.

Conclusion:

- Mistake found for the mapping of outcomes to BP's in **MAN.3**
- The evolution of the support processes is much less ambiguous and less consequent than for the engineering processes, i.e. with regards to the unilateral **mapping of base practices to outcomes**.
- No more use of the term "strategy". As in SWE and SYS the expectations didn't really change.

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