

Use the QA activities to estimate Capability Levels



Progresser dans un monde complexe

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Objective

To present an approach, that enables the estimation of Capability Levels based on process audits



About the presenter

Presentation



Frédérick Fradet

>20 years of working experience

Associate Partner at Capjaya

- Lead process improvement initiatives
- Define and deploy process frameworks (process descriptions, guidelines, templates...)
- Train and coach on Model Based Systems Engineering (MBSE)
- Facilitate workshops: needs analysis, functional analysis, problem solving...

Agenda

- Motivations
- Challenges
- Approach
- Feedbacks & improvement opportunities



Context

Though Intacs™ acknowledged Automotive SPICE® assessments are necessary to determine Capability Levels, they come along with constraints:

Costs

- hours spent by the assessment team
- costs for external assessors (if needed)
- hours spent by the interviewees
- ...



Certified resources

- at least:
- 1 Intacs™ Competent Assessor
 - 1 Intacs™ Provisional Assessor



Logistics

- 1 to 2 weeks interview period
- availability of assessors and interviewees: especially in the context of multisite and multicultural organizations
- ...



Problem statement

The constraints of Intacs™ acknowledged assessments



Lead projects to confirm their readiness, to avoid or mitigate the costs for a second assessment if the first one fails



Are an obstacle to confirm whether the Capability Levels are maintained from one release to the next



Value proposition

“

For Projects that need to confirm their readiness for an Intacs™ acknowledged assessment and/or need to have frequent estimates of the Capability Levels from one Release to the next.

The “QA-based ASPICE Gap-Analysis” is a technique that uses data collected by Quality Assurance activities (process audits, work product reviews) to estimate Capability Levels.

Unlike traditional internal assessments/gap-analysis, it does not require extra time from the project team for interviews and it can be scheduled at given project events to identify weaknesses right after they have been introduced, so that the improvements can occur faster.

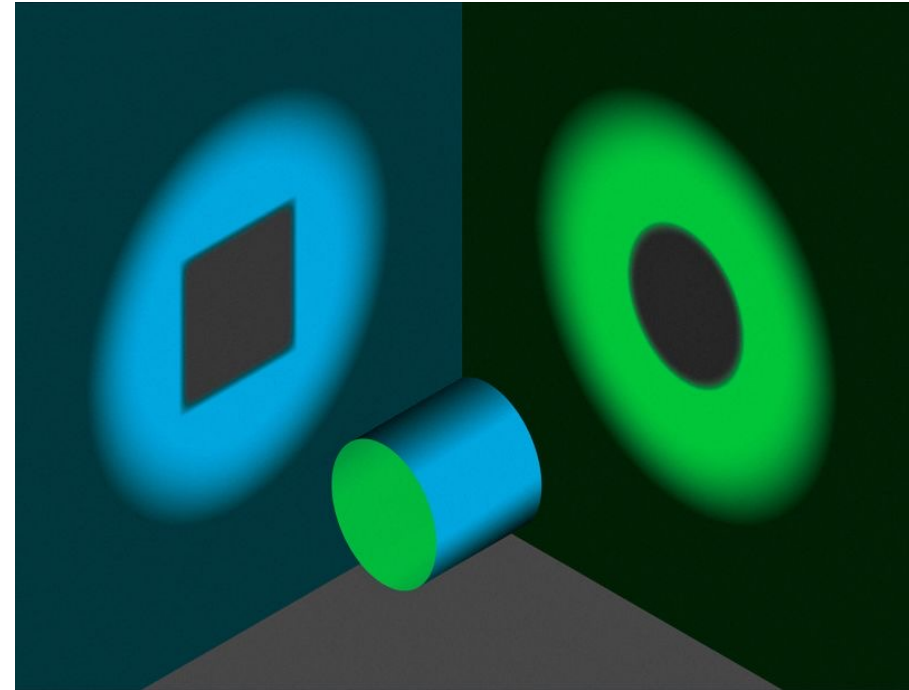
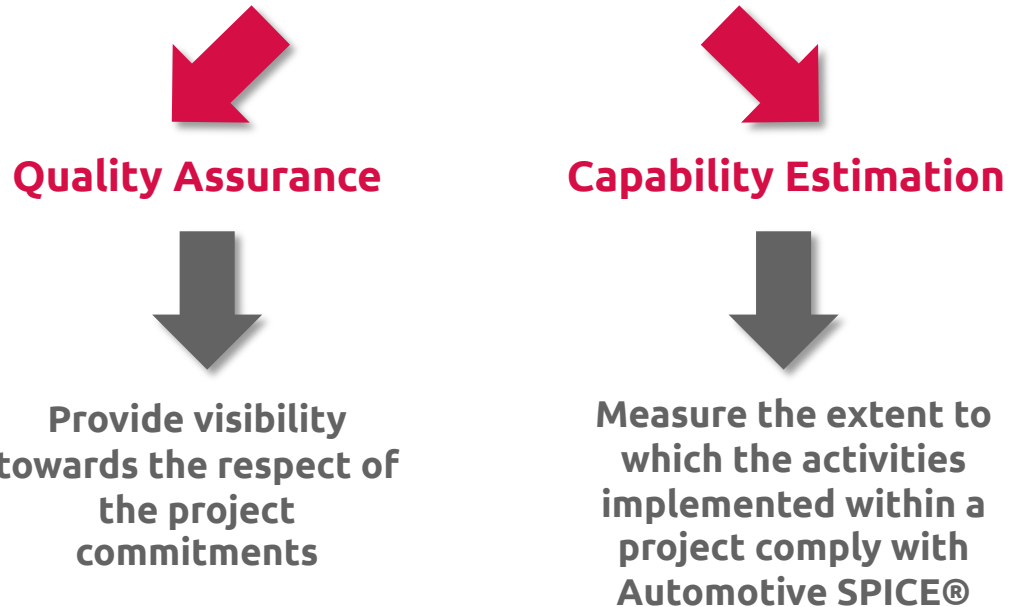
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- Motivations
- **Challenges**
- Approach
- Feedbacks & Improvement opportunities



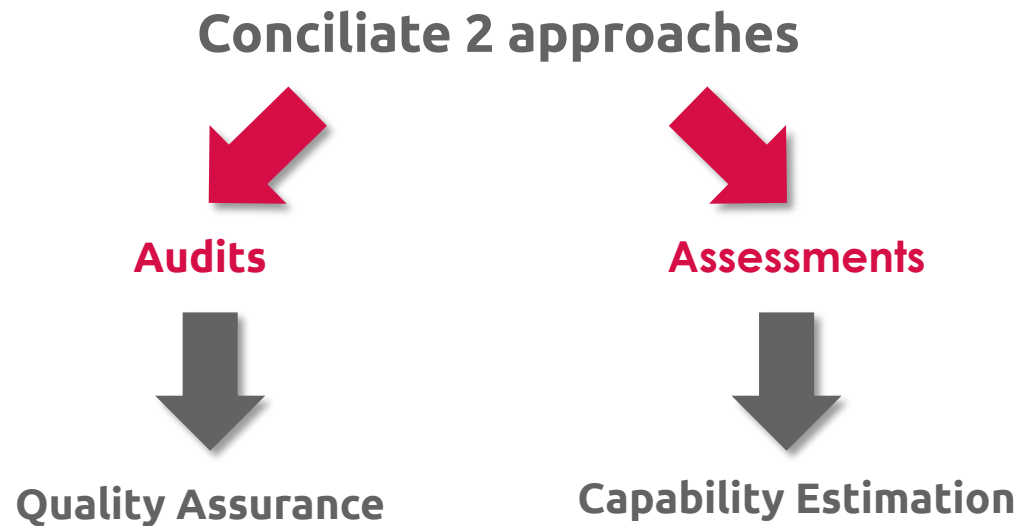
Challenge #1

Conciliate 2 purposes within 1 activity



Knowing that project commitments may sometimes conflict with ASPICE expectations

Challenge #2



	Audits	Assessments
Goal	Discover non-conformances	Provide strengths & weaknesses and suggest improvement
Approach	Seek for negative evidence	Seek for positive evidence
Style	Defensive	Open and constructive
Ultimate purpose	Adherence to rules	Improvement of business

Challenge #3

Allow Quality Engineers without Intacs™ credentials

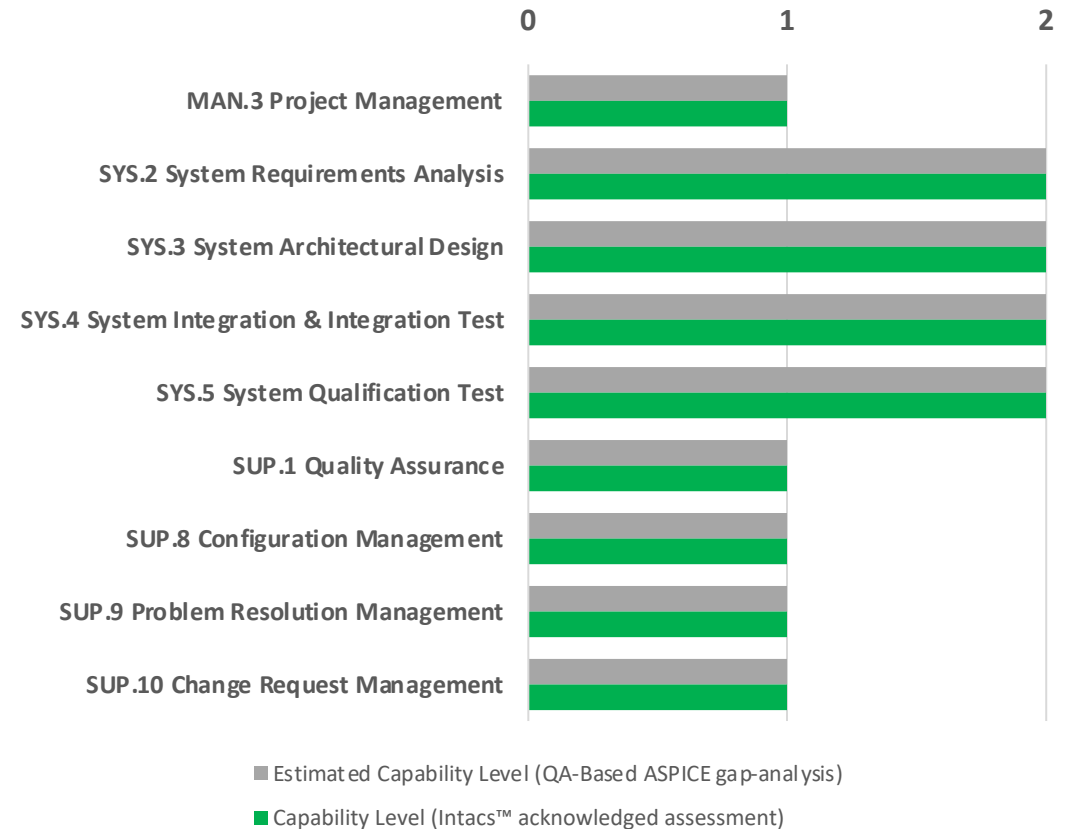


or even with poor knowledge about
Automotive SPICE®,
to collect data to support Capability
estimation



Challenge #4

Provide results sufficiently accurate to confirm the readiness of a project to demonstrate the achievement of the targeted Capability Levels

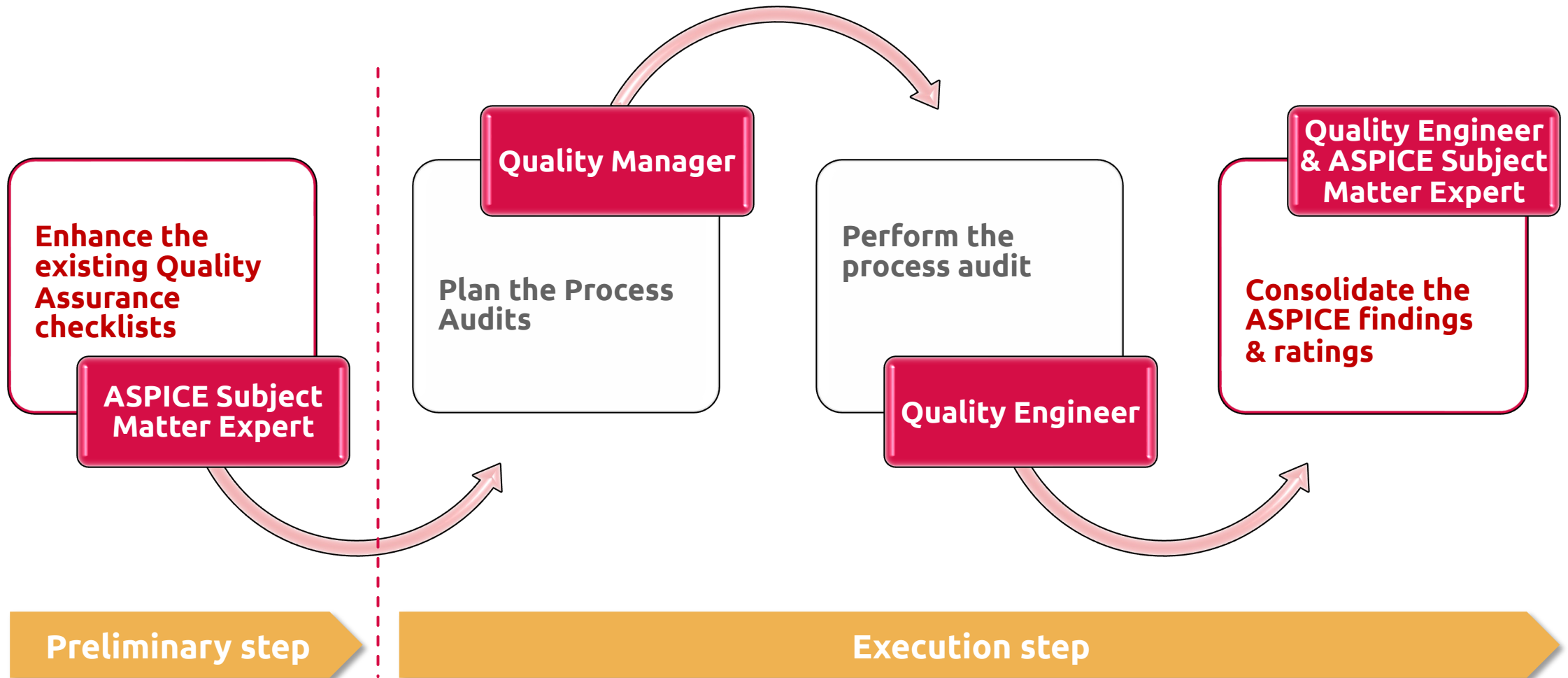


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Approach overview

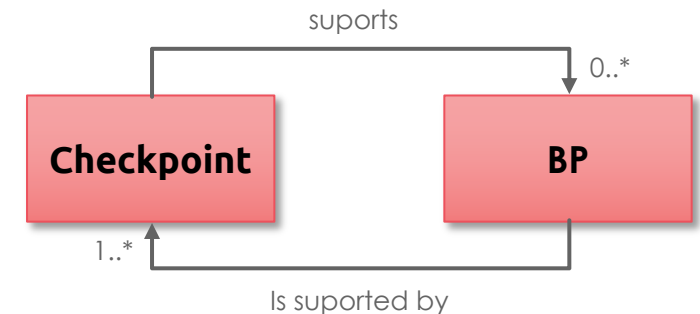


Enhance existing QA checklists

1/3

#	Process	Activity	What shall be checked on the project	Covered BPs
PA010	Sys_Architecture Design	Identify elementary functions of the system architecture	Each Technical Function is categorized based on their standard class	SYS.3-BP1
PA011	Sys_Architecture Design	Define functional interfaces	The functional flows (inputs/outputs) are described (Name, unit, range...) for all the Technical Functions	SYS.3-BP3
PA012	Sys_Architecture Design	Describe system dynamic behavior	The sequence/order in which the Functions are executed is described with: - Sequence diagrams - An activation table - Control flows	SYS.3-BP4
PA013	Sys_Architecture Design	Initialize the system architecture document	The platform that provides a basis to the System Architectural Design is identified: platform functions, requirements and other key characteristics selected for reuse in the project can be determined	SYS.3-BP1 SYS.3-BP5
PA014	Sys_Architecture Design	Define physical architecture alternatives	The potential alternatives of the Physical Architecture are described. The allocation of Technical Functions to the System Elements is documented for each alternative (the allocation of the functional flows to the physical interfaces should be documented when useful for choosing an alternative)	SYS.3-BP5

- Process audit checklists should cover all the Base Practices (BP) belonging to the ASPICE processes for which the Capability Level shall be estimated



Successful checklists are structured by Process > Activity > Checkpoint

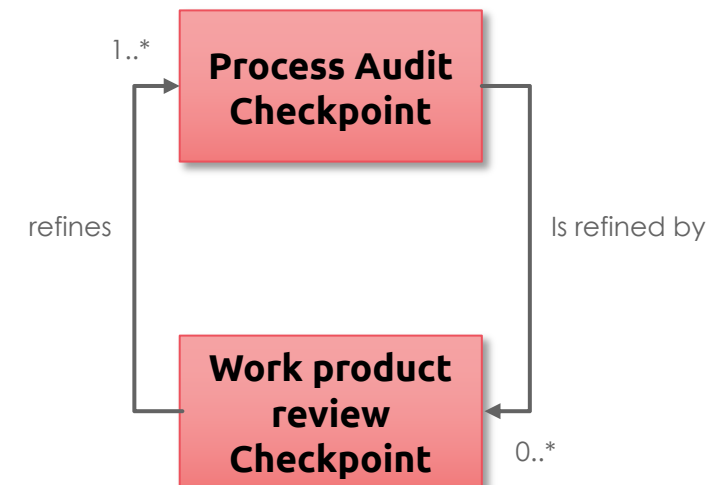
Enhance existing QA checklists

2/3

- Process Audits should rely on work product reviews to distribute the effort for evaluating the checkpoints

#	Process	Activity	What shall be checked on the project	Covered BPs
PA096	SWE Detailed Development	Release SW Unit and its Detailed Design	The Unit Design review checklist is complete and stored in GIT <u>Note:</u> The checklist verifies the SW unit in terms of criticality, technical complexity, interaction, testability. (SWE.3-BP4) The checklist verifies the consistency of SW Detailed Design with SW requirements and SW architecture with the traceability matrix. (SWE.3-BP6)	SWE.3-BP4 SWE.3-BP6

- Some aspects of BP or VDA guidelines may be covered by work product checklists

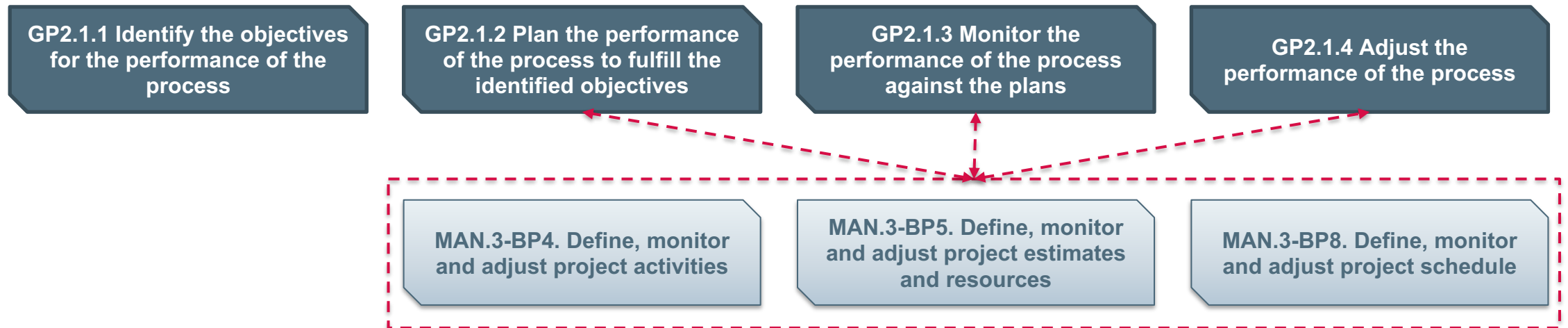


The number of checkpoints in a Process Audit should be kept “reasonable”

Enhance existing QA checklists

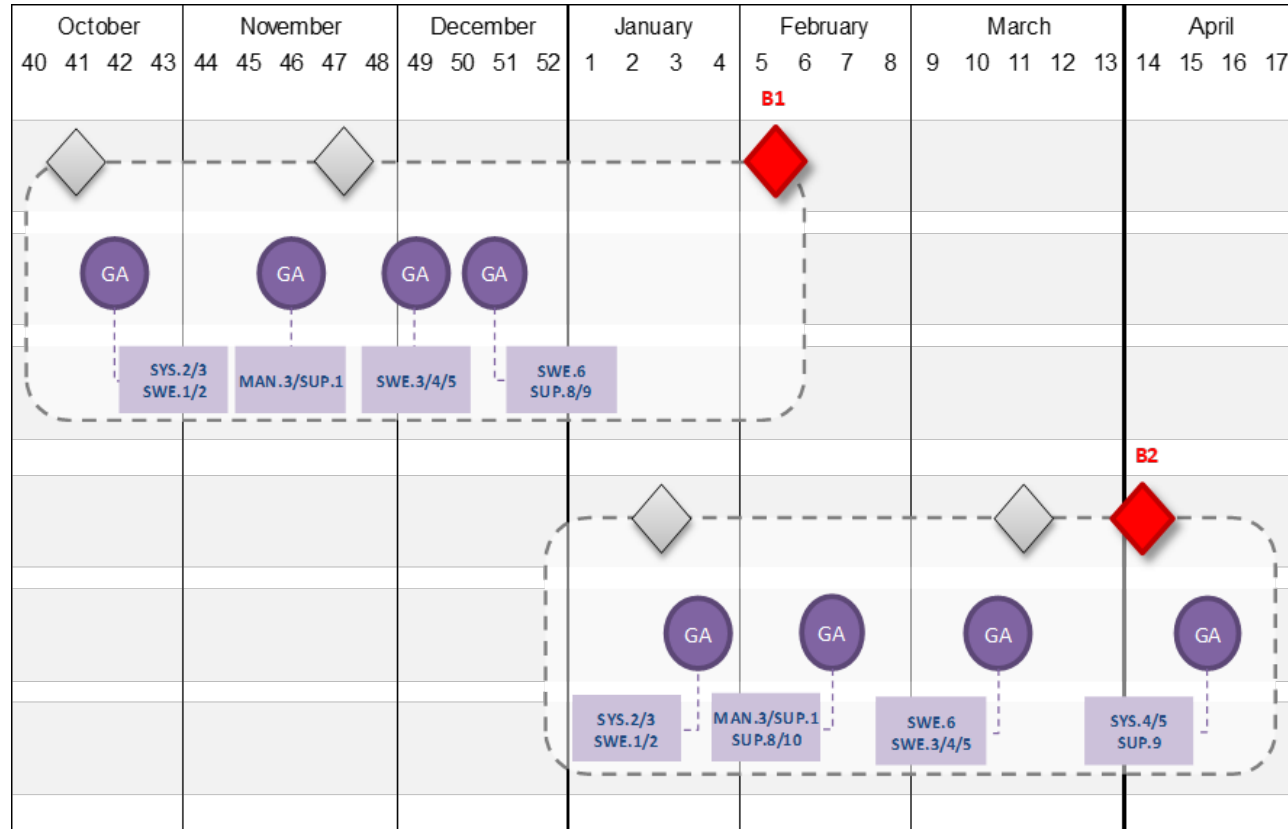
3/3

- The coverage of the Generic Practices can be ensured while keeping the number of checkpoints manageable by considering the relationships between the Base Practices and the Generic Practices
 - Only few Generic Practices may require dedicated checkpoints



CL2 Generic Practices are strongly linked with MAN.3, SUP.8 & SUP.1 Base Practices

Plan the Process Audits



- Quality Managers should account for the time for consolidating the ASPICE findings & ratings with a Subject Matter Expert

Scheduling process audits all along a Release enables to estimate CL on the fly

Execute the Process Audit

1/2

- The compliance to the checkpoint is rated with a “Red/Yellow/Green” rating scale
 - The N/P/L/F rating scale should not be used here to avoid confusion between Quality Assurance & Capability Improvement

Activity	What shall be checked on the project	Conformance	Non-Conformance
Define physical architecture alternatives	The potential alternatives of the Physical Architecture are described. The allocation of Technical Functions to the System Elements is documented for each alternative (the allocation of the functional flows to the physical interfaces should be documented when useful for choosing an alternative)	R	No alternative design identified. The choice of the System Architecture is not justified.

- A proper definition of the audit scope is a key success factor to provide visibility against the agreed commitments:
 - considered release,
 - Features/requirements,
 - components,
 - entities/teams
 - ...

Non-Conformances are set against the checkpoint, not against ASPICE

Execute the Process Audit

2/2

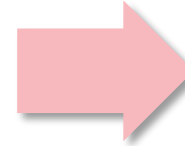
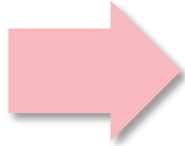
- The approach for considering Generic Practices is induced by the project setup and the way the company processes are structured

What shall be checked on the project	Conformance	CL2 Conformance Scope				Covered BPs
		S Y S	S W E	M G T	S U P	
The engineering team org-chart is documented. The people assigned to each needed role in the project are identified	G ▼	G ▼	G ▼	G ▼	G ▼	MAN.3-BP5

- Checkpoints contributing to Generic Practices (GP) are considered in the scope of several activities:
 - system engineering,
 - software engineering,
 - management and
 - support

Rating checkpoints related to GP may require more effort

Consolidate the ASPICE findings & ratings 1/2



Select the Non-Conformances that stand for weaknesses

- The ASPICE Subject Matter Expert confirms the consistency of the mapping between Base Practices and Non-Conformances

Agree on a rating for the Base Practices and Generic Practices

- The ASPICE Subject Matter Expert and the Quality Engineer(s) provide their judgment on the light of the retained Non-Conformances / weaknesses

Confirm the Process Attribute ratings

- An automatic rating derived from the Base Practice rating is proposed by the form
- It can be overridden to account for the project context

Generally, Quality Engineers struggle to manage both the QA & ASPICE perspectives

Consolidate the ASPICE findings & ratings 2/2

- A dedicated viewpoint, structured according to ASPICE enables to automatically retrieve the Non-Conformances (NC) that impact Base Practices (BP)
- The mapping between NC and BP is “manually” adjusted during the consolidation review

ASPICE PAM 3.1			BP Rating & weaknesses			Information for BP rating: checkpoints mapping with ASPICE BP		
Process	BP	Description	Rating	Rating rationale	Retained Non-Conformance	Green checkpoints	Checkpoints Not Green	Checkpoints Not rated
SYS.3								
SYS.3	BP1	Develop system architectural design. Develop and document the system architectural design that specifies the elements of the system with respect to functional and non-functional system requirements.	P	PA021	## PA021 : The Functional Breakdown is not documented in the System Architecture	- PA009 - PA010 - PA013 - PA017 - PA018	- PA021 - PA022	
SYS.3	BP2	Allocate system requirements. Allocate the system requirements to the elements of the system architectural design.	P	PA029	## PA029 : Traceability is not complete. Only 57% of items are covered		- PA029	
SYS.3	BP3	Define interfaces of system elements. Identify, develop and document the interfaces of each system element.	P	PA022	## PA022 : System interfaces are not documented as expected by the System Engineering process	- PA009 - PA011		
SYS.3	BP4	Describe dynamic behavior. Evaluate and document the dynamic behavior of the interaction between system elements.	F			- PA072 - PA012		

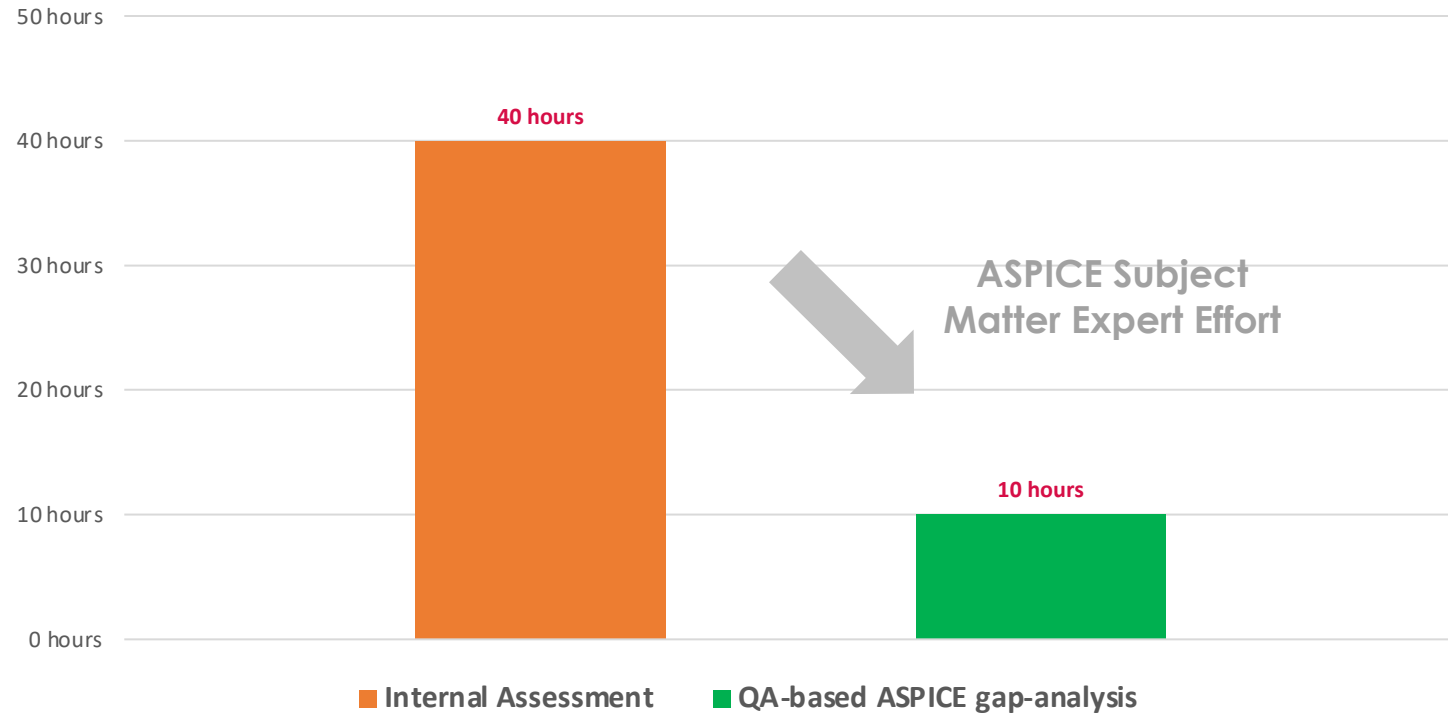
Retained NC are selected upon a human judgement to avoid “robot-like” ratings

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Increased efficiency



○ Assuming 15 processes

No extra time from the project team is required for interviews

Feedbacks & improvement opportunities



- Quality Engineers should be certified as Intacs™ Provisional Assessor to ease the consolidation of ASPICE findings & ratings
- “Young” Quality Engineers should be mentored to raise non-conformances that can support the ratings of Capability Levels
- As for many “measurement systems” a calibration period shall be considered
- The trade-off between # checkpoints / effort and rating accuracy for PA2.1 and PA2.2 still needs to be fine tuned

**Refrain from automated ratings: they do not enable to consider the context.
ASPICE assessment results are strongly context dependent**



*We help companies comply with Automotive SPICE®
by embracing a continuous improvement mindset*

