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Crossing the bridge between Automotive SPICE® Assessments and Functional Safety Audits

Working group
Functional
Safety

A systematic approach

Working Group Functional Safety

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Working Group Members

- 24 experts from industries and companies
- 5 working teams
- Global representation

Structure


Prologue – Motivation



5	There's so much overlap, why can't we Combine it?
6	There is no commonly agreed Solution
7	The Purpose of the Intacs® Working Group Functional Safety

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Part I – A practical comparison of the métiers



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Part II – Collaboration Models for Automotive SPICE and Functional Safety Audits



23	Automotive SPICE® meets ISO 26262 – Levels of Interaction
24	Isolated
25	Co-Existence
28	Fusion
30	Conclusion

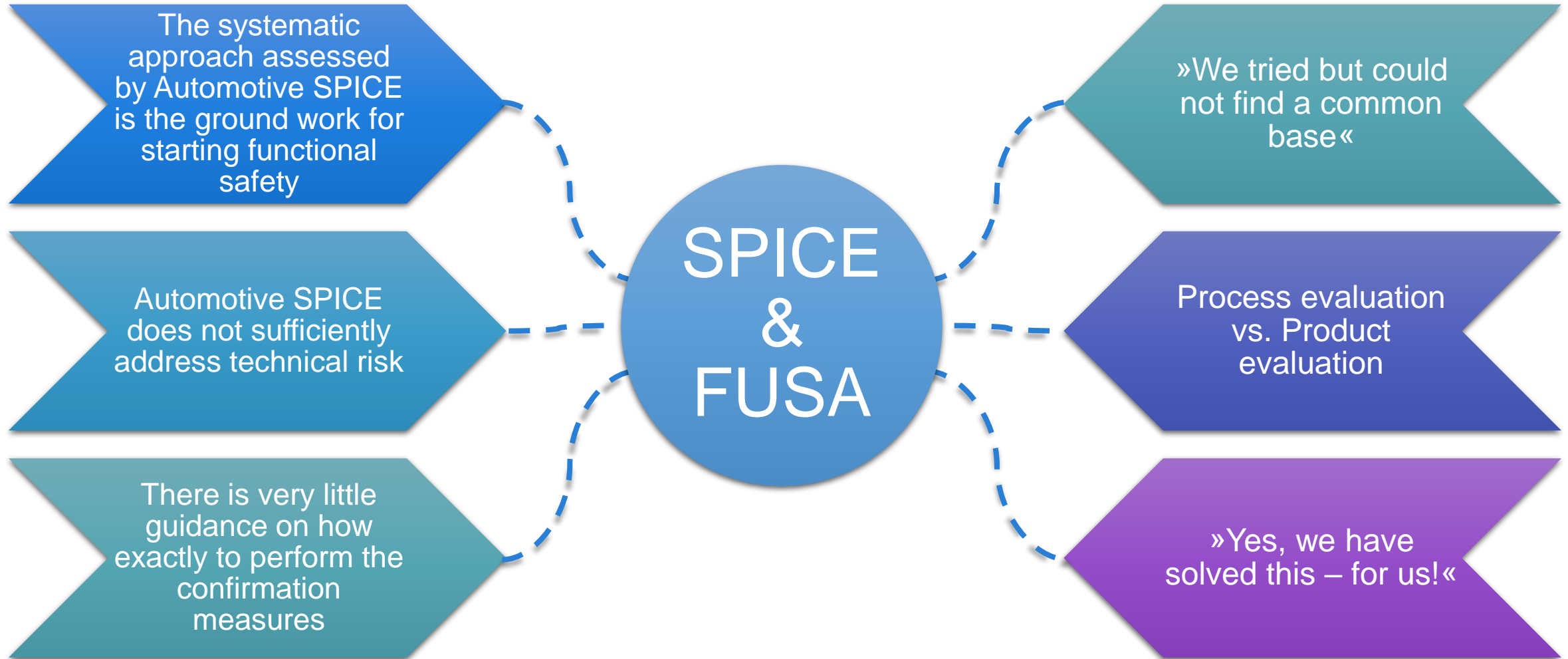
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Prologue – Motivation

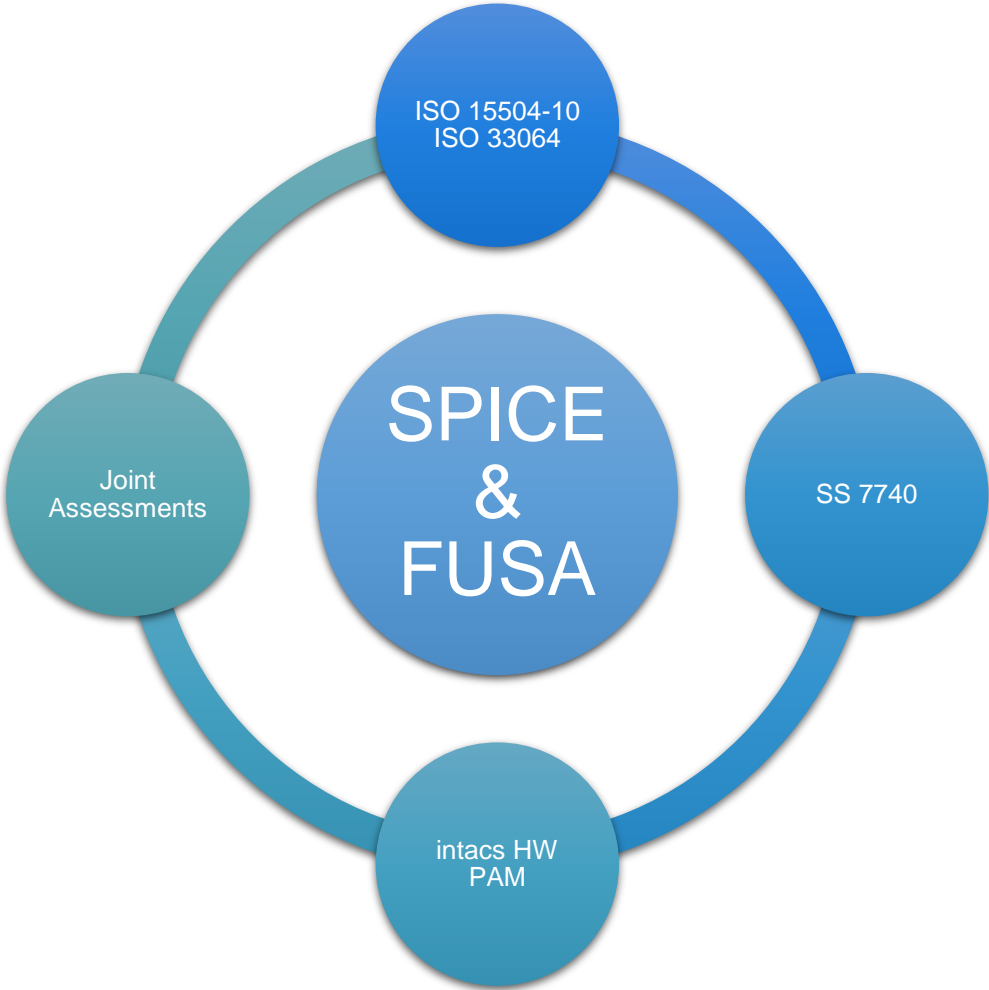


5	There's so much overlap, why can't we Combine it?
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7	The Purpose of the intacs® Working Group Functional Safety

There's so much overlap, why can't we Combine it?



There is no commonly agreed Solution



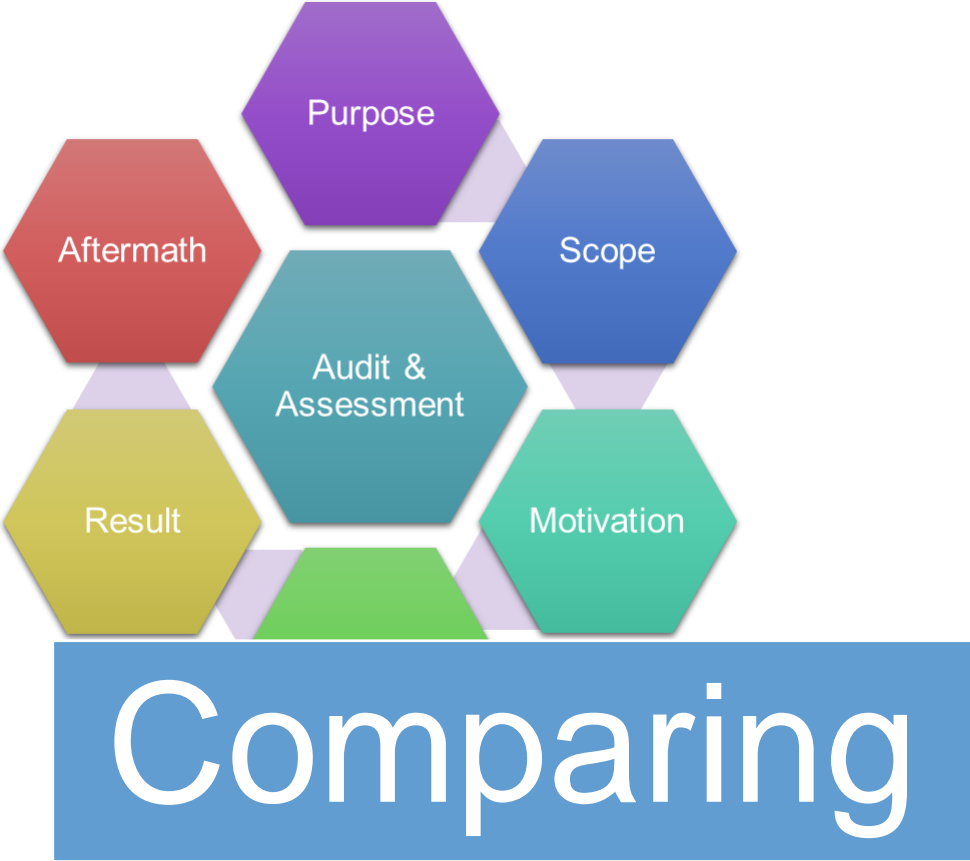
- ▶ The topic is as old as Automotive SPICE and ISO 26262
- ▶ Several approaches are available
- ▶ No commonly agreed approach

The Purpose of the intacs® Working Group Functional Safety



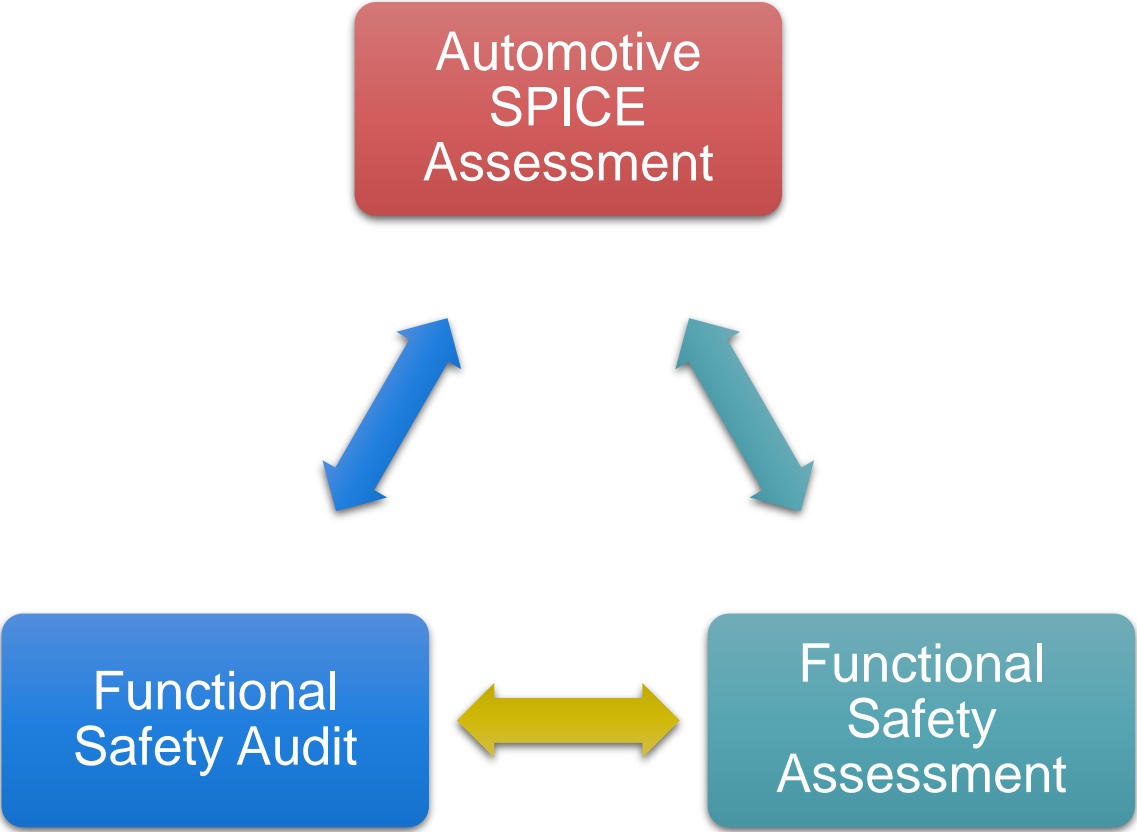
**We want to provide
project teams and assessors
with guidance for efficiently and effectively addressing
both functional safety and Automotive SPICE®
in development projects.**

Part I – A practical comparison of the métiers



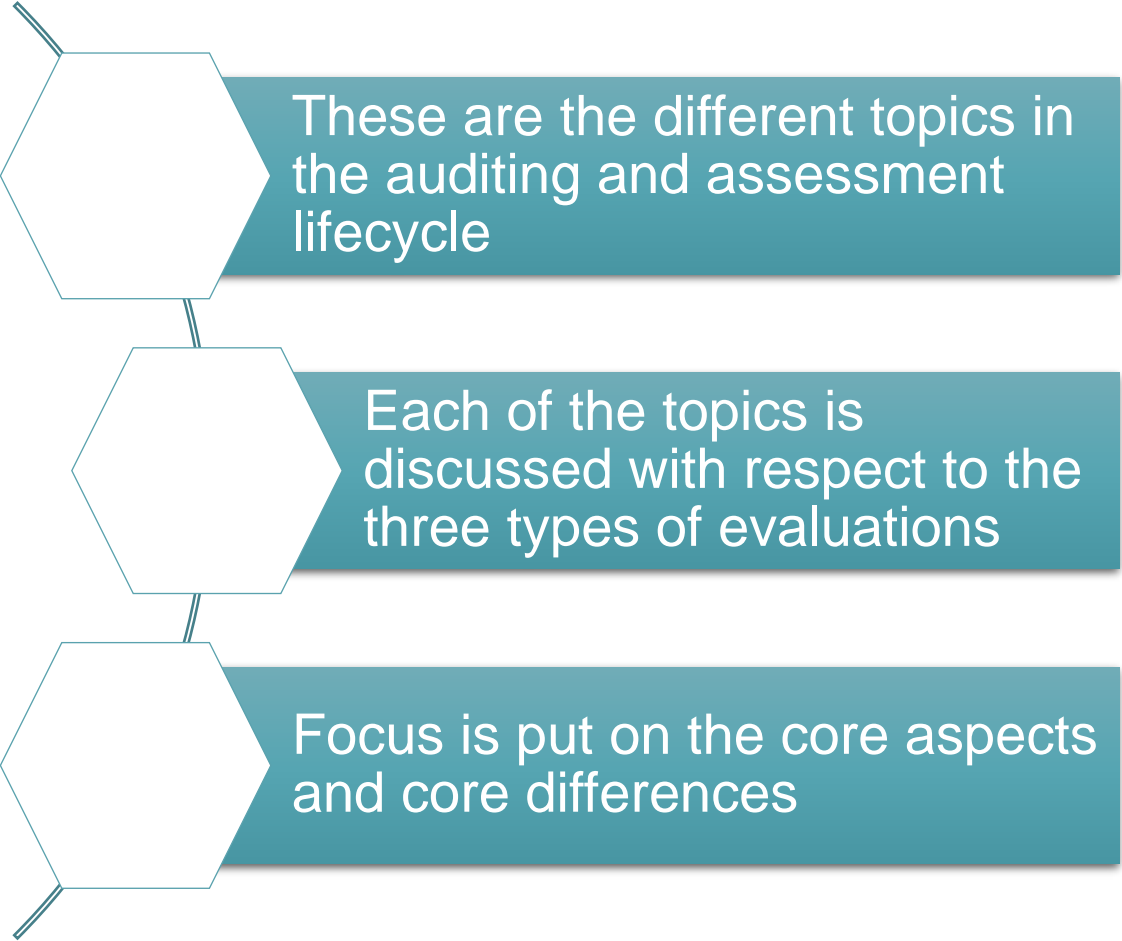
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Not two, but three to compare

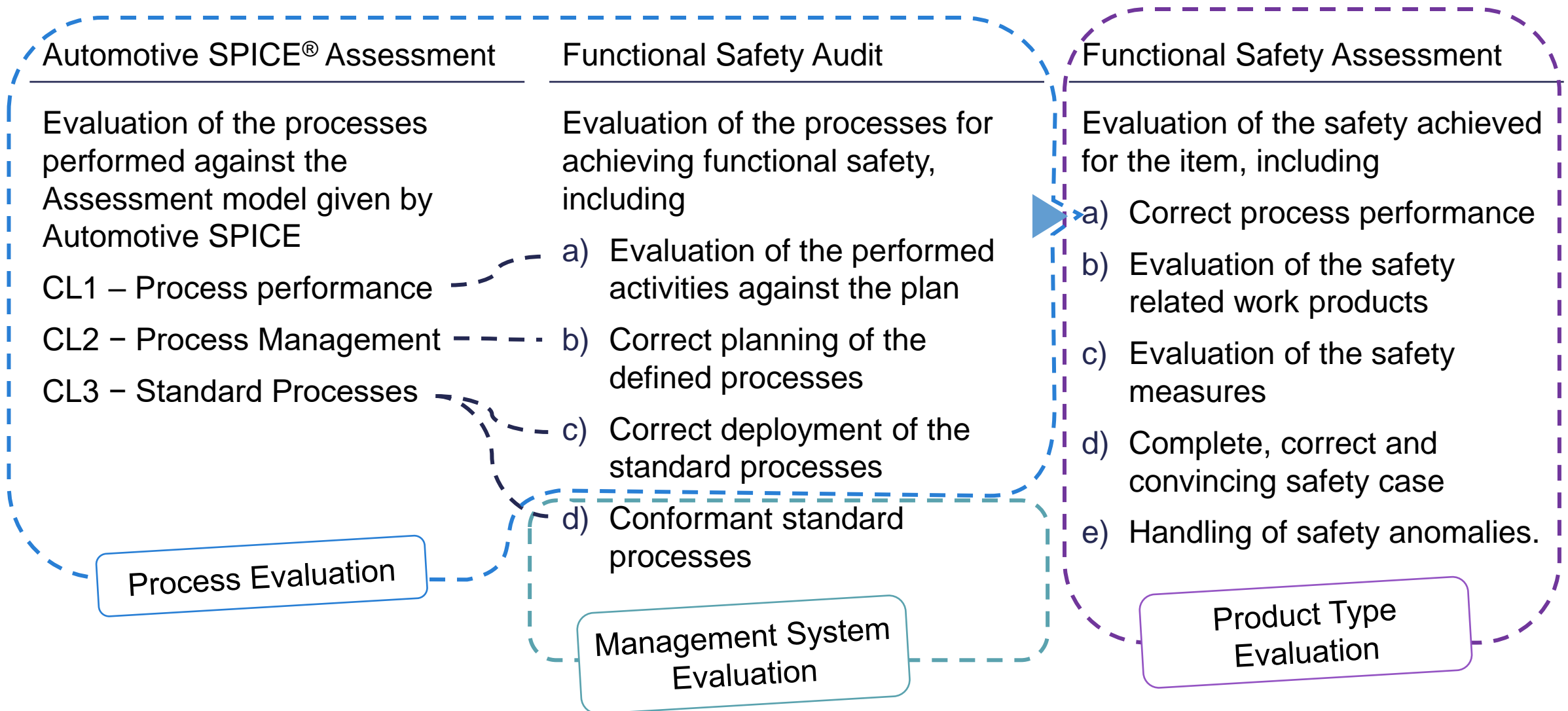


- ISO 26262 defines both functional safety audit and functional safety assessment
- Often the functional safety audit is merged into the functional safety assessment and thus disguised.
- For a clear and useful comparison, each activity must be viewed individually

Dimensions of comparison



Purpose



Scope

Automotive SPICE® Assessment

The Automotive SPICE® Assessment is conducted in accordance with the **scope set by the sponsor**:

- a) Sponsor may include all relevant processes
- b) Sponsor may exclude processes
- c) Sponsor may be bound to customer requirements
- d) Assessor is supporting the sponsor by advice

Assessment Class

Automotive SPICE® Assessments are Class 3 Assessments, i.e. evaluating only the project

Model Scope

The processes contained in the Automotive SPICE® PRM/PAM is a subset of the processes needed for functional safety

Functional Safety Audit

The functional **safety auditor is defining the audit scope**:

- a) The results of functional safety audit are input to the functional safety assessment. The scope should match the functional safety assessment.
- b) If the functional safety assessors are not directly performing the audit themselves, they rule over the acceptance of the functional safety audit for the functional safety assessment.
- c) A safety management system audit does not directly evaluate the safety achieved. It may be scoped by the sponsor to a subset of relevant processes.

Note: In the ideal case, the safety plan has been approved by the confirmation review and consequently the scope of the audit will exactly match the safety plan.

Functional Safety Assessment

The **functional safety assessment is conducted at the discretion of the functional safety assessor**.

- a) The assessment scope is therefore derived from the objective technical scope of the delivered element.
- b) The assessment scope may change throughout the assessment as new information is known by the assessors.

Motivation

Automotive SPICE® Assessment

Car manufacturers:

- a) Supplier selection
- b) Part of the risk management strategy**
- c) Ensure quality level of products delivered
- d) Reduce the number of field returns and recalls
- e) Compare the capability of suppliers
- f) Improve supplier quality

Suppliers:

- a) Customer request**
- b) Business enablement
- c) Process capability to enhance
 - i. effectiveness
 - ii. efficiency
- d) Managing project risks**

Functional Safety Audit

The Conformist & Self-Confident:

- a) The standard tells us to do this for ASIL C and D (shall)**
- b) The standard recommends us to this for ASIL B (should)

The Learner & Improver:

- a) Part of the organizational and technical risk management strategy
- b) Early feedback on the adequate approach
- c) Getting feedback on process effectiveness for achieving the safety objectives**

Functional Safety Assessment

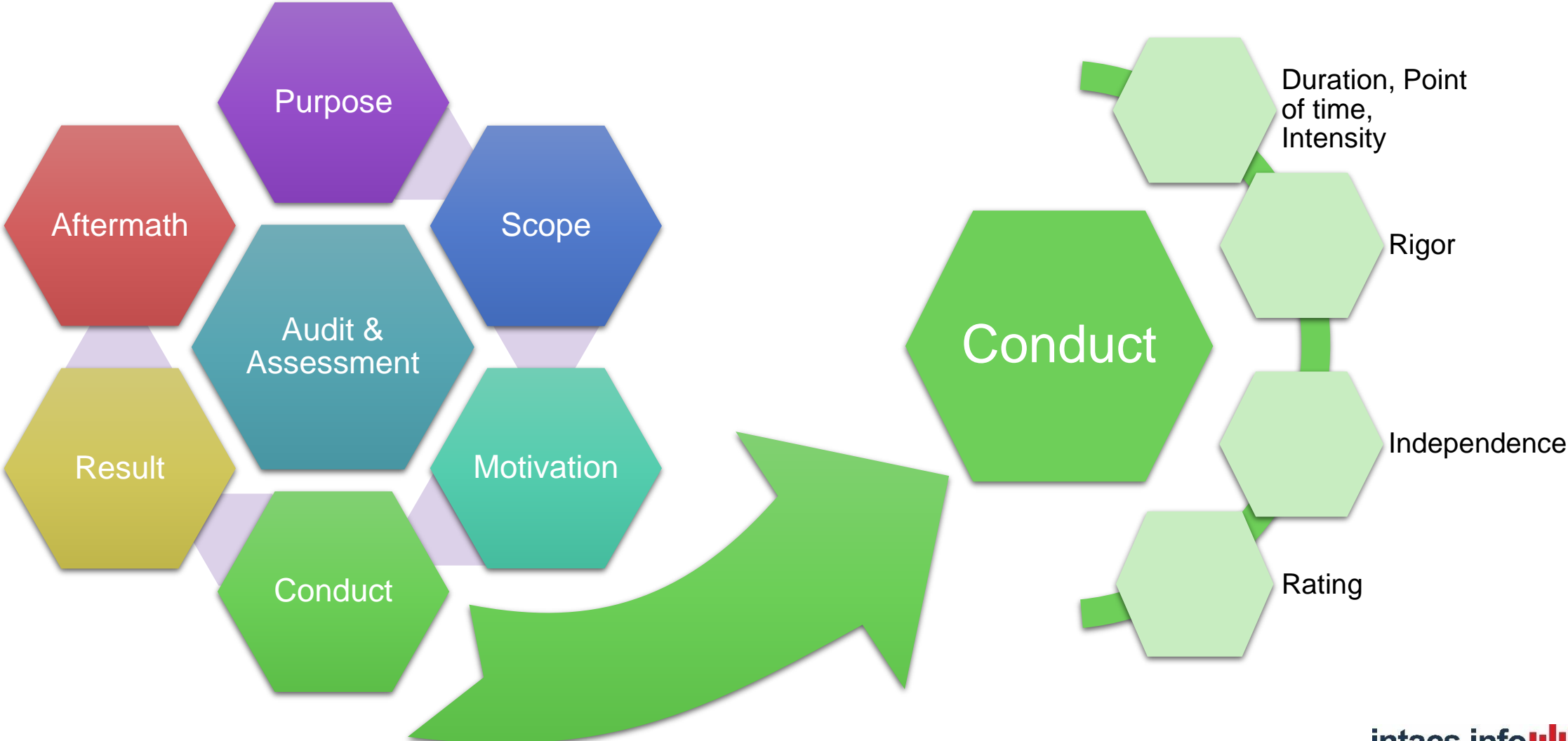
The Conformist & Self-Confident:

- a) The standard tells us to do this for ASIL C and D (shall)**
- b) The standard recommends us to this for ASIL B (should)

The Learner & Improver :

- a) Part of the technical risk management strategy**
- b) Support of the persons signing off the release

Conduct



Conduct - Duration, Point of time, Intensity

Automotive SPICE® Assessment

- a) Depending on the process scope defined by the sponsor, the **Automotive SPICE® Assessments usually takes around 3 to 7 consecutive days full-time.**
- b) Automotive SPICE® Assessments can be performed at any point of time in the project. However, there's two main motivations for the assessment:
 1. Early conduct is for the timely process improvement (Motivation d).
 2. Late conduct is for a final demonstration of process capability to this or future customers (Motivation e, f).
- c) The Automotive SPICE® itself is a singular activity performed with full-time dedication.

Functional Safety Audit

Functional safety audit

- a) sequence of activities between which the nonconformities found must be resolved by the project team.
 - b) Iterative approach as planned in the audit program**
- Internal audits
- c) full access to the project documentation as well as familiarity with the processes.
 - d) shorter audit duration, ranging between a few days and three weeks.
- External audits
- e) Intensity is included in the functional safety assessment efforts not necessarily individually identifiable.

Functional Safety Assessment

- a) The functional safety assessment could take any time between 6 to 24 Months** or even longer. The duration greatly depends on the type of element, the competence of the project team and maturity of the organization.
- b) The functional safety assessment has times with more and times with less intensity.
- c) Interim releases are best accompanied by safety case and functional safety assessment report to determine the status for e.g. road releases.
- d) The functional safety assessment report is released prior to the release for production but after the safety case.

Conduct – Rigor

Automotive SPICE® Assessment

There is **no clear and formal differentiation in the technical rigor** in the Automotive SPICE® Assessment model itself. The guidelines to Automotive SPICE®, however, include rules that are expected to be followed.

Different auditing rigor can be applied depending on the assessment purpose.

The details to this topic is evaluated by the WG functional safety in the publication “ASIL Effects on Automotive SPICE® Assessments”

Functional Safety Audit

The functional safety audit and functional safety assessment are tightly intertwined and follow the same rigor approach.

Functional Safety Assessment

The automotive Safety Integrity Level is the assessment of the item’s risk to the health of people. The higher the **risk level, measured in ASIL**, the more things are expected from the project team in order to ensure that the product is meeting the expectations.

The assessment is performed at full rigor for the higher ASIL’s and can be reduce for the lower ASILs for which it is not highly recommended.

The minimum for any safety related project is the conduct of the confirmation reviews.

Conduct – Independence

Automotive SPICE® Assessment

Categories of independence (A through D) are defined and must be recorded for any assessment. However, there are **no requirements for a certain category of independence** for any particular assessment.

Requirements for independence usually come from customers who desire a respective objective evaluation.

Functional Safety Audit

The functional safety audit and assessment can be performed either internally or externally. The level of independence is not affected by this.

Consequently, only larger organizations are capable of ensuring an I2 or even I3 independence.

Functional Safety Assessment

Normative independence levels **I1 through I3 are defined based on ASIL.**

I1 means that another person than the author is performing the assessment, whereas I3 means that the assessor is independent with regard to management, resources and release authority.

Conduct – Rating

Automotive SPICE® Assessment

- a) Assessment is only the Measurement of the individual processes
- b) Measurement result is the **capability profile**
- c) Evaluation scheme: **NPLF** (Not, Partly, Largely, Fully)

The consequences and decision whether this is good enough lies in the hands of the sponsor and other interested parties

Functional Safety Audit

- a) A judgement is required.
- b) The **form of the judgement is undefined.**

The auditor should provide sufficient information for later processing in the functional safety assessment.

If the functional safety audit is performed by the functional safety assessment team, there may not be an independent rating of the functional safety audit

Functional Safety Assessment

Recommendation for the functional safety of the item:

- a) **acceptance** (with or without conditions)
- b) **rejection**

The assessor must take a clear pass/fail decision for the assessment subject.

Results

Automotive SPICE® Assessment

The Automotive SPICE® Assessment is a **measurement at a single point in time** sample that results in the capability profile.

Fast feedback of the provisional results

Assessment report for the final results including more detailed feedback

(Optionally) List of recommendations (e.g. assessment improvements in a processable format)

One Assessment, one measurement, one report.

Functional Safety Audit

Audit records, including

- a) Findings, including conformities, nonconformities as well as improvement recommendations

Note: these are supporting the project team to converge and maintain conformity in the course of their work

Functional Safety Audit Report, including:

- a) **Evaluation of the processes for achieving functional safety**
- b) Consolidates the audit records

No guidance whether continuous activity or singular activity at specific point in time.

Functional Safety Assessment

The functional safety Assessment is an **activity over a longer period of time that culminates in the functional safety assessment report.**

Report of the functional safety achieved, including a recommendation of acceptance or rejection of the functional safety of the item or element.

Provided after the safety case and before the release for production report.

Aftermath

Automotive SPICE® Assessment

Improvement program may follow the assessment, including

- a) Conceiving, planning, implementing defined improvements
- b) Additional Automotive SPICE® Assessments for verifying effectiveness of the improvements and/or determining progress

Functional Safety Audit

- a) The **Functional Safety Audit results are consumed by the Functional Safety Assessment**, leading to a final recommendation of the functional safety achieved.
- b) Closing the nonconformities & improvements is mandatory. This can be done either
 - i. as part of the audit program, or
 - ii. in the functional safety assessment.

Functional Safety Assessment

- a) Interim results or a recommendation for rejection in the assessment report require continuation or repetition of the assessment.
- b) A conditional acceptance includes the conditions that must be addressed by the organization. Those conditions are not severe enough that a repetition of the assessment activities is necessary.
- c) A recommendation for acceptance will lead to the **release for production**. At least so long the component remains unchanged.

Conclusion – Comparing

Automotive SPICE® Assessment

- **Doing the things right:**
 - Base Practices
 - Generic Practices
 - Expectations for the process execution, planning and standardization
 - Does not cover all topics relevant, only those selected

Functional Safety Audit

- Doing **all the right** things right
- +additional Rigor (ASIL, Methods)
- +additional Processes
- All the relevant processes are evaluated

Functional Safety Assessment

- **Delivering the right thing**
- **Having done** all the right things right and **completely**
- +Confirmation reviews
- +Technical evaluations

Part II – Collaboration Models for Automotive SPICE and Functional Safety Audits



23	Automotive SPICE® meets ISO 26262 – Levels of Interaction
24	Isolated
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Automotive SPICE® meets ISO 26262 – Levels of Interaction

Isolated

- Both Automotive SPICE® and ISO 26262 are kept completely isolated from each other.
- Assessments are performed independently, and results are not accepted by the other side.

Co-Existence

- Automotive SPICE® and ISO 26262 guidance are both applied, and in the project work approach both are aligned, yet the process models are still apart.
- Assessment Results from the Automotive SPICE Assessment is reused in the Functional Safety Audit, reducing the audit workload and project team interruptions.

Fusion

- There is one integrated process assessment model that fulfils the requirements from Automotive SPICE® and ISO 26262
- There is a single assessment approach that is providing evidence for both Automotive SPICE® and ISO 26262.

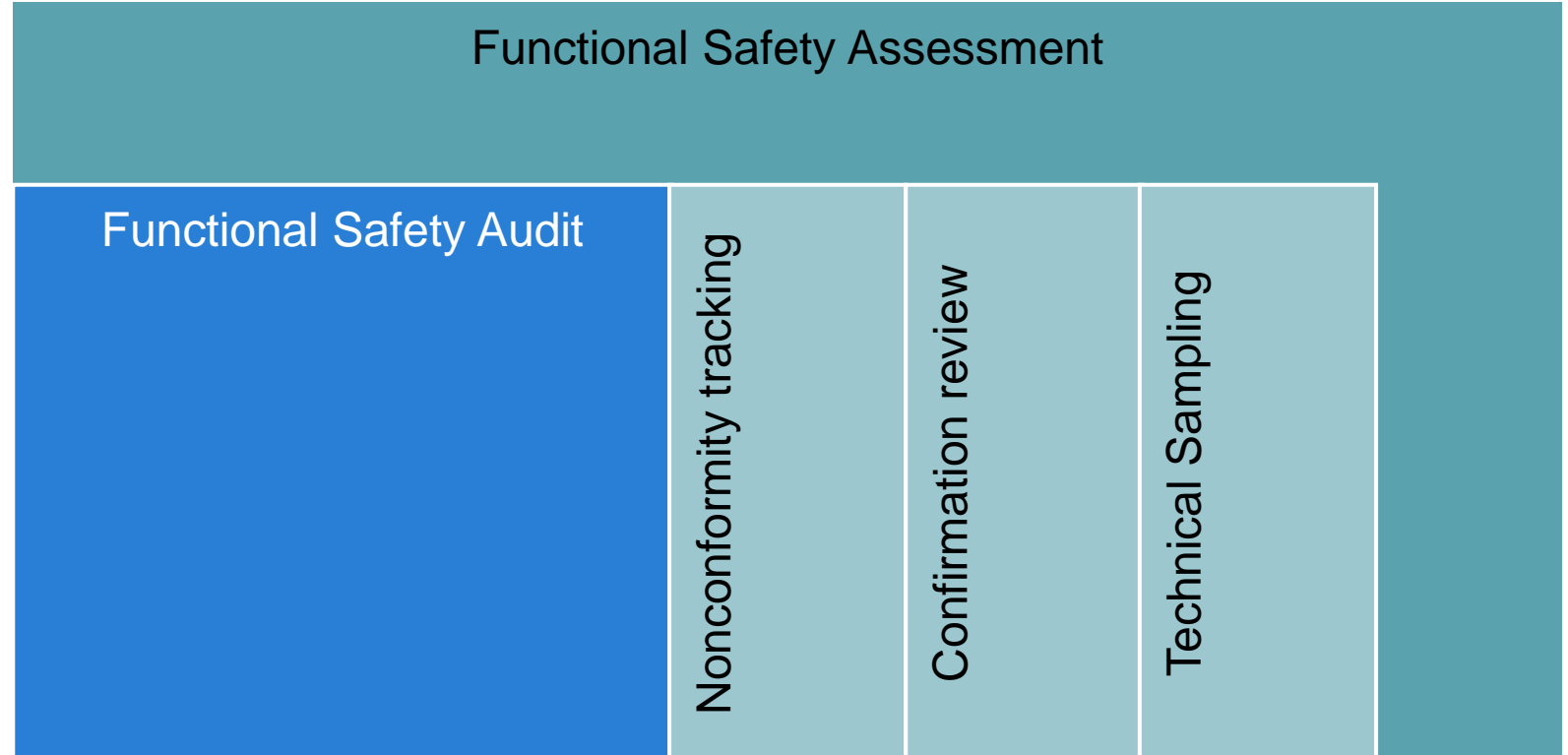
Isolated

Isolated

Joint Assessments

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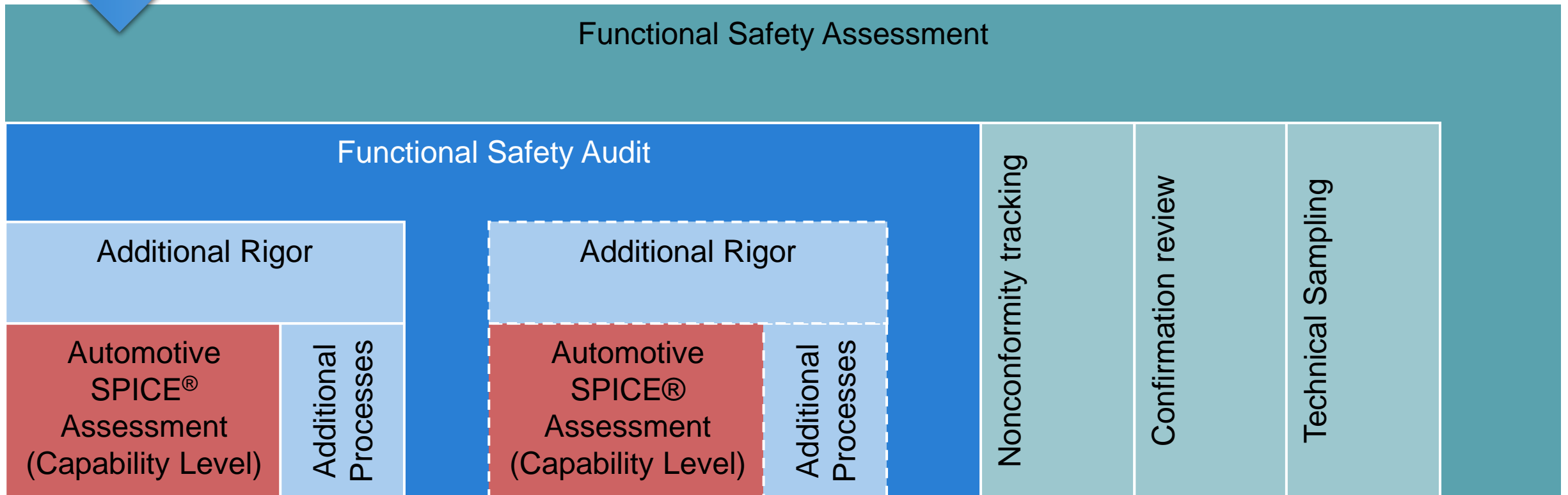
Automotive
SPICE®
Assessment
(Capability Level)



Co-Existence

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intacs HW
PAM

Functional Safety Assessment

Functional Safety Audit

Additional Rigor

Additional Rigor

Automotive
SPICE®
Assessment
(Capability Level)

Additional
Processes

Automotive
SPICE®
Assessment
(Capability Level)

Additional
Processes

Nonconformity tracking

Confirmation review

Technical Sampling

Co-Existence

Co-Existence

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ISO 15504-10
ISO 33064

Functional Safety Assessment

Functional Safety Audit

Additional Rigor

Additional Rigor

Automotive
SPICE®
Assessment
(Capability Level)

Additional
Processes

Automotive
SPICE®
Assessment
(Capability Level)

Additional
Processes

Nonconformity tracking

Confirmation review

Technical Sampling

Fusion based on integrated PAM

Fusion

- There is one integrated process assessment model that fulfils the requirements from Automotive SPICE® and ISO 26262
- There is a single assessment approach that is providing evidence for both Automotive SPICE® and ISO 26262.

SS 7740

Functional Safety Assessment

Functional Safety Audit

Automotive Functional Safety PAM

Automotive Functional Safety PAM

Nonconformity tracking

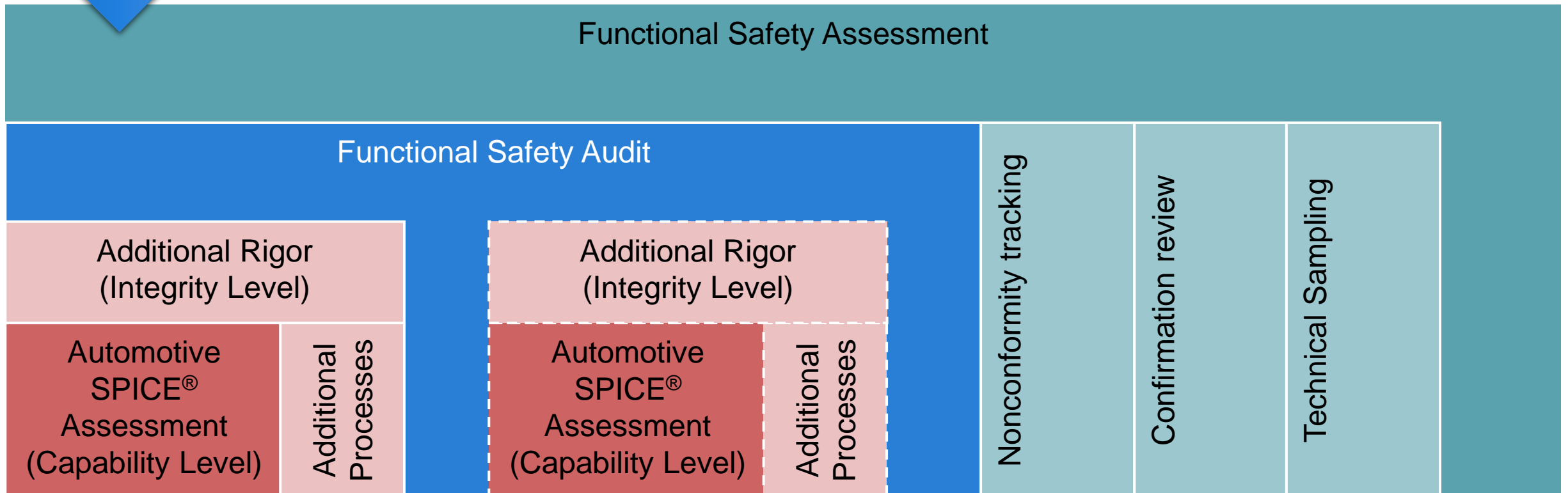
Confirmation review

Technical Sampling

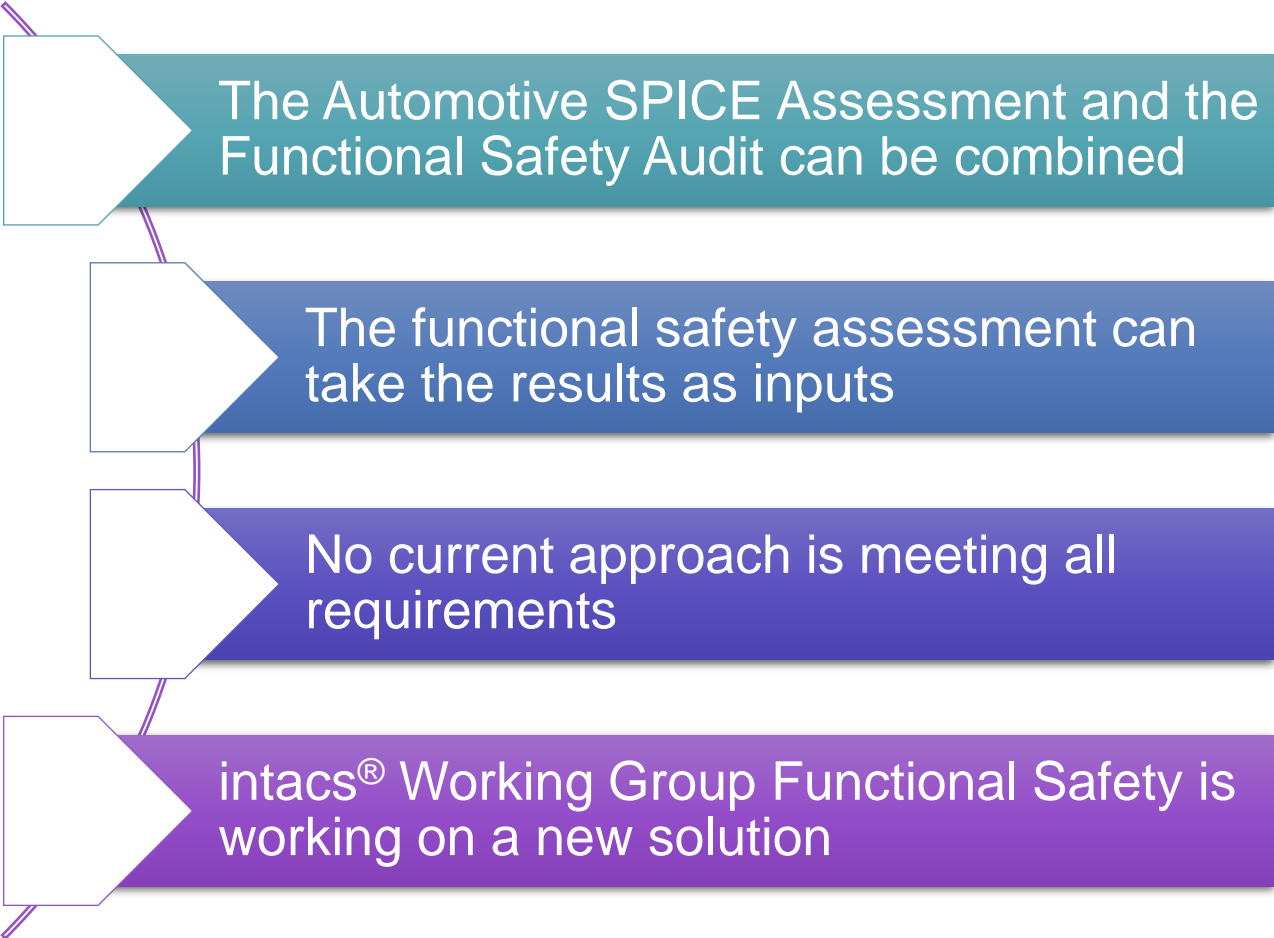
Fusion based on Plug-in-Concept

Fusion

- The Automotive SPICE® PAM is augmented by a Functional Safety Plugin PAM. This plugin adds the integrity level to the measurement framework and new processes.
- There is a single assessment approach that is providing evidence for both Automotive SPICE® and ISO 26262 functional safety audit.



Conclusion - Collaboration



The End

This was

Crossing the bridge between Automotive SPICE® Assessments and Functional safety audits

Released by

Working Group Functional Safety

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