

Process Assessment & Improvement in Automotive

The logo for PISA (Process Improvement Scheme for Automotive) features the letters 'PISA' in a bold, blue, serif font, with a small '4' as a subscript under the 'A', followed by a larger 'A' in the same font.

Process Improvement Scheme
for Automotive

SYSTEM & SOFTWARE EVALUATION CENTER

ISTITUTO DI SCIENZA E TECNOLOGIE DELL'INFORMAZIONE

NATIONAL COUNCIL OF RESEARCHES OF ITALY

PISA, ITALY



SSEC - Introduction

- CNR-ISTI (Pisa, Italy)
- **System and Software Evaluation Center (SSEC)** performs research and technology transfer towards industry:
special focus on automotive industry



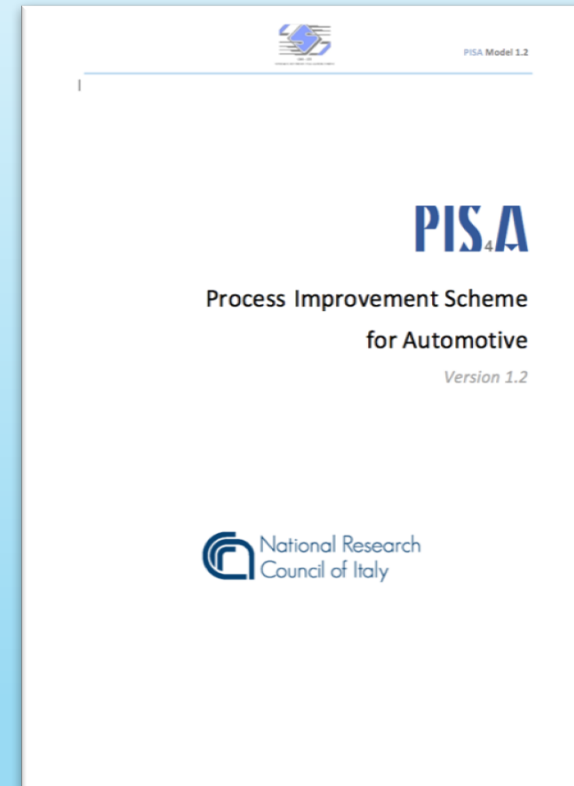
SSEC assessment experience:

80+ SPICE/Automotive SPICE Software Process Assessments performed since 2001 in automotive worldwide.



PISA (Process Improvement Scheme for Automotive) Model

- 22 Processes (grouped into 5 process segments)
- 132 high priority Requirements (+ 27 low priority Requirements for improvement)
- Improvements Tips and Notes giving guidance for deployment and improvement
- 93 Output Work Products defined
- Adequacy evaluated according to a 4-values scale
- Rating mechanism compliant with ISO/IEC 33003



Motivation of the PISA Model

The overall impact of Automotive SPICE has been positive, but

Need for a 100% native automotive standard

- Automotive SPICE is originally defined from the ISO/IEC 15504, and it misses some relevant characteristics of automotive projects
- Balanced approach including electronics, mechanics and other engineering domains

Focus on key and higher added-value attributes

- Automotive SPICE required practices, are not all at the same importance level, but they are not weighed according to importance/relevance.

Flat assessment outcome (one-value vs. capability profile) is beneficial

- Capability profile doesn't fit easily with qualification mechanisms. Flat rating fits better.



Ultimate Goals

1. To offer an **additional** and **automotive-specific** way for improvement initiatives (with respect to Automotive SPICE and CMMI)

Process Improvement Tips

2. To consolidate the PISA Model with the **support of an open community**

OPEN

3. To be **acknowledged by OEMs** in the context of supplier governance

Supplier
Governance



Key Aspects of the PISA Model

Explicitly addressing technological aspects in the rating

- Automotive projects are strongly dependent of technological infrastructures and support (e.g. model-driven sw dev, CAD and CAE in HW engineering, ...).
- Built-in guidance for deployment and improvement
- Balance between generality of requirements and rules/guidance for deployment.

References to:

- IATF 16949 (in progress)
- ISO 26262
- APQP



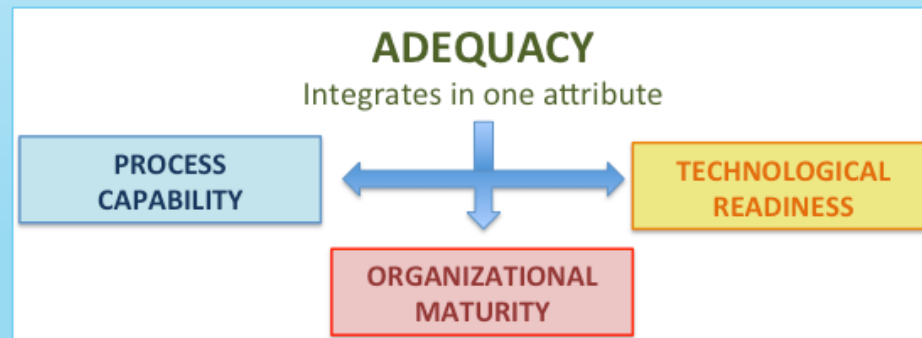
PISA Model

Adequacy Project Quality Attribute

Quality Characteristic: **ADEQUACY**

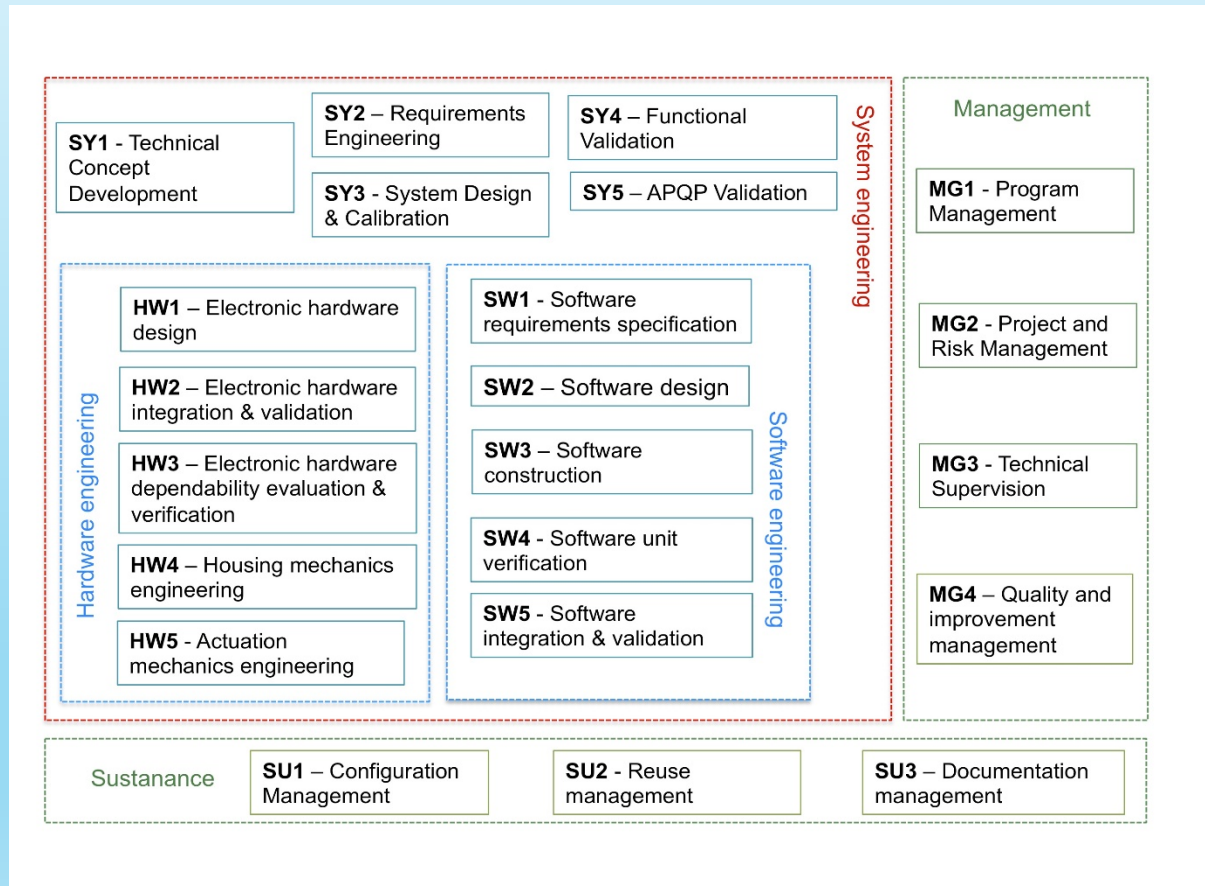
Adequacy is the degree of responsiveness of process deployed in development projects to automotive demands from technical and organizational perspectives.

Adequacy targets a **project** evaluation by integrating several process and project attributes



PISA Model

Process Reference Model



PISA Model: some examples

SY1-PR1	Develop technical concept of the system.
Clause	As the project or pre-project activities start, a technical concept shall be developed to provide a documented technical, economic and strategic view of the system to be developed.
Elaboration(s)	<p>Technical concept is high-level design with strong focus on architectural and functional aspects of the system. It addresses also initial technological and cost evaluations. This activity supports also feasibility evaluations.</p> <p>Market analysis is also an important element of this requirement.</p> <p>Particular attention shall be paid to functional safety and cyber-security aspects of the system, if any.</p> <p>LINKS TO APQP Requirement(s): Team Feasibility Commitment and Management Support, Design Goals, Preliminary Bill of Material</p> <p>LINKS TO ISO 26262 Requirement(s): ISO 26262-3:2011, clause 5.5; ISO 26262-4:2011, clause 7.4</p>
Improvement Tip(s)	<ol style="list-style-type: none"> 1. Focus on functional aspects and key system elements. 2. Pictorial approach is usable in this context as no formal methodology is strictly necessary. 3. Joint work with customer or internal stakeholder, if needed.
Tailoring Criteria	<p>Reuse of technical concept as appropriate in case of:</p> <ul style="list-style-type: none"> - Carry over projects - Development within a consolidated product family
Notes	The results of this activity shall be refined by the system design process.



PISA Model: some examples

	SY3-PR4	Conduct DFMA.
Clause		DFMA (Design for Manufacturing and Assembly) principles shall be applied during the development of the system design.
Elaboration(s)		<p>The DFMA objectives are to develop a product that meets all the functional needs and it is convenient for manufacturing and assembly.</p> <p>Applying DFMA principles and methods allows to optimize both the manufacturing and the assembly phase at production time.</p> <hr/> <p>LINKS TO ISO 26262 Requirement(s): ISO 26262-4:2018, clause 6.4.3 LINKS TO APQP Requirement(s): DFMA</p>
Improvement Tip(s)		<ol style="list-style-type: none"> 1. Typical criteria to adopt DFMA are to reduce part count and types. 2. Set-up dedicated checklist to make sure the topic is addressed at design and review time. 3. Make sure cross-functional team is involved in system design.
Tailoring Criteria		Reduce scope to DFA or DFM as appropriate.
Notes		DFMA is a set of methods of design for ease of manufacturing and the assembly of the collection of parts that will form the product.

HW3-OWP3	Electronic HW Simulation Report(s)
Expected Contents	<p>Its content includes:</p> <ul style="list-style-type: none"> - Summary results - List of the performed simulations - Link Log data.
Notes	HW3-PR3, HW3-TR1



PISA Model: some examples

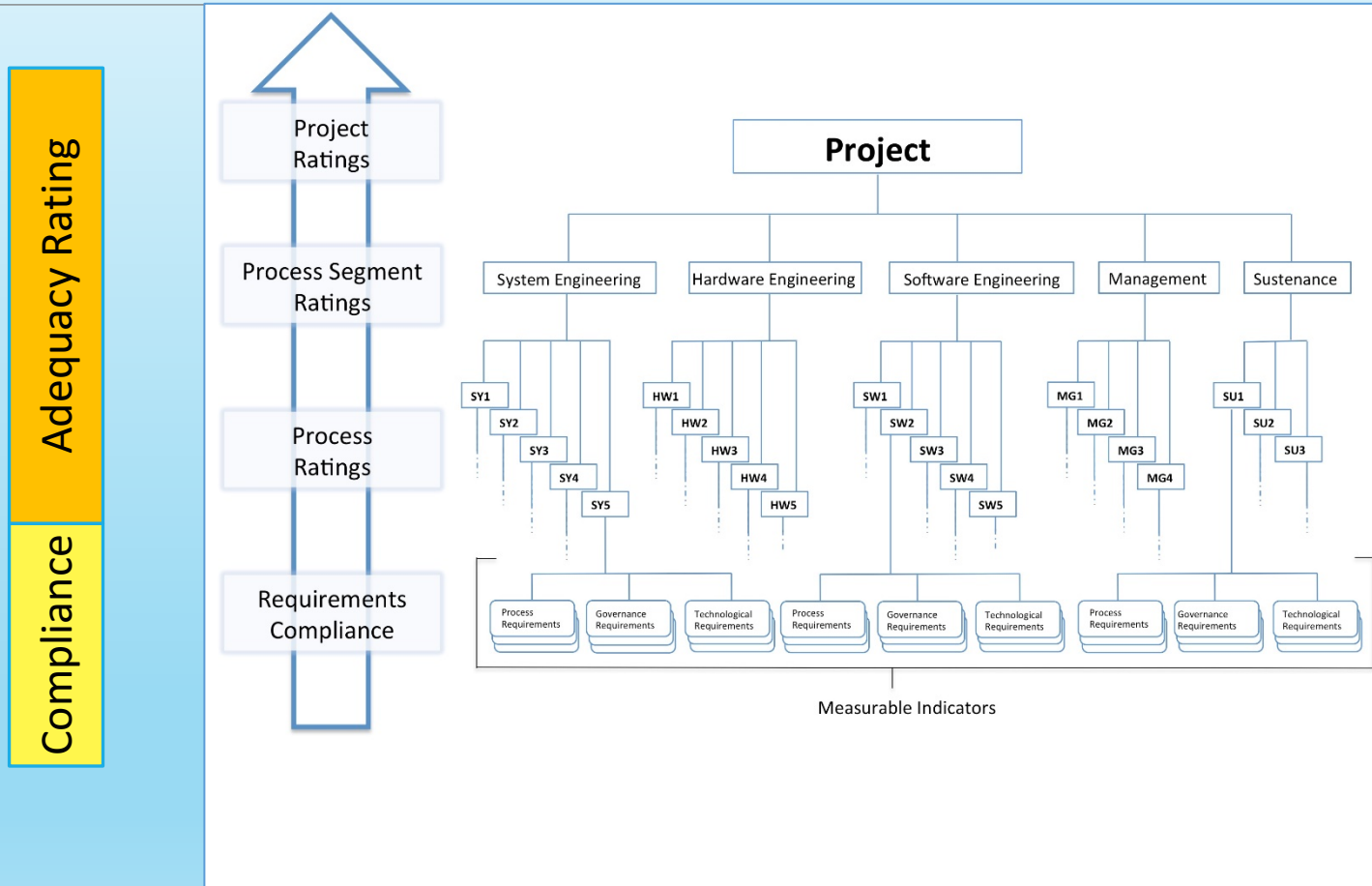
SW1-TR1	Software requirement management tool
Clause	Use an automatic tool supporting requirements management, documentation, storing, traceability, and classification.
Elaboration(s)	<p>The software requirement management tool shall be setup to make the software requirements available to the stakeholders.</p> <p>Software requirements management tool shall guarantee the versioning of requirements.</p> <p>The tool shall guarantee the backup of requirements.</p> <p>The tool shall guarantee the filtering by classes of software requirements (e.g. safety-related requirements, non-functional requirements, ...).</p> <p>Guidance on the use of the tool shall be available to stakeholders.</p>
Tip(s)	<p>In order to facilitate the exchange of software requirements use the same tool or a tool that is compatible with stakeholders' tools (customer(s) and supplier(s)).</p> <p>Using a unique tool for requirements management, issue and tasks management, change management, and task management is suggested.</p> <p>Consider the use of a unique tool for system requirements and software requirements management.</p>
Tailoring Criteria	Spread-sheets (e.g. MS Excel) are not acceptable software requirements management tools unless the number and complexity of software requirements is negligible. In case of a limited set of requirements (e.g. 100), standard office tools may be sufficient.
Notes	Open source technology is relatively lacking in this area of the development flow.

SY2-GR3	Change Control Board (CCB)
Clause	The project is supported by dedicated board for change management related to system requirements.
Elaboration(s)	Composition, roles, and workflow shall be defined in the project plan.
Tip(s)	
Tailoring Criteria	In case of small project, the project leader can be main component of the board.
Notes	<p>The change control board is constituted of project stakeholders or their representatives.</p> <p>The authority of the change control board may vary from project to project, but decisions reached by the change control board are accepted as final and binding.</p>



PISA Model - ARS

(Adequacy Rating System)



PISA Model - ARS

(Adequacy Rating System)

ADEQUACY Attribute	
FULL OR ADEQUATE	Project is deployed adequately and project objectives are not at risk. Process improvement opportunities are limited in scope and criticality.
SUFFICIENT	Project is deployed satisfactorily and project objectives are largely not at risk. Process improvement opportunities are present.
INCOMPLETE	Project is deployed nearly satisfactorily and project objectives are exposed to some noteworthy risk. Significant Process improvement opportunities are present.
POOR	Project objectives are at risk. Process improvement opportunities are important and require immediate improvement action items.

PISA Model ARS is demonstrated being compliant with the ISO/IEC33003 standard (in Annex A)



Growing consensus

PISA Model acquired by CATARC (for exclusive use in PRC and Taiwan) in order to become a China National Standard.



On-going activities

Trials in progress

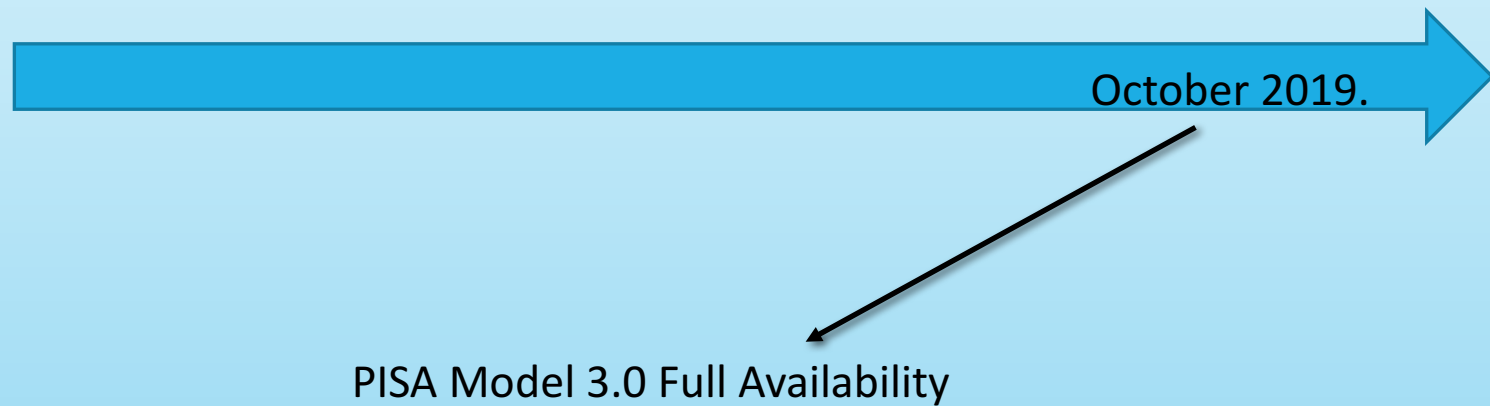
- PISA Model assessment are being deployed in parallel with Automotive SPICE assessment with validation purposes as well as comparative analysis of results.

Working Group for evolving the PISA Model

- The Working Group is structured into three layers according the relevance of participants:
 - A. OEMs
 - B. Tier 1
 - C. Engineering and Consultancy Companies
- Working Group members can use the PISA Model and give their contribution in the definition of the next release of the PISA Model



Roadmap



Thanks

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