What is ASPICE in Automotive?

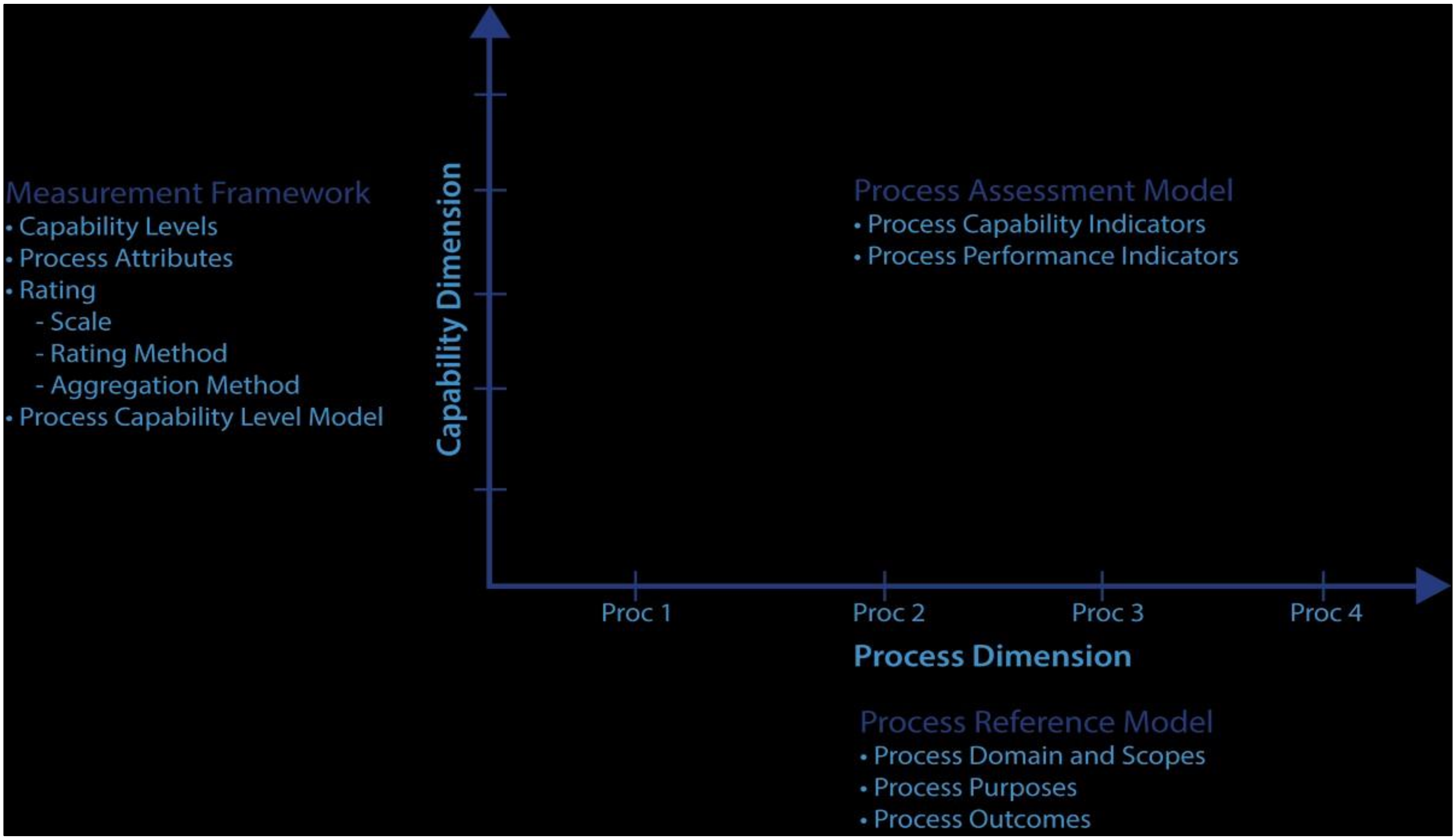
Product innovation in the automotive industry has been steadily increasing. As of 2019, 80 percent of product innovation now occurs through software development.

Automotive Software Performance Improvement and Capability dEtermination (ASPICE) as a standard provides the framework for defining, implementing, and evaluating the process required for system development focused on software and system parts in the automotive industry. This framework can be extended to include processes from other domains like hardware and mechanical engineering using the “Plug-in” concept explained in the standard.

Outline of ASPICE

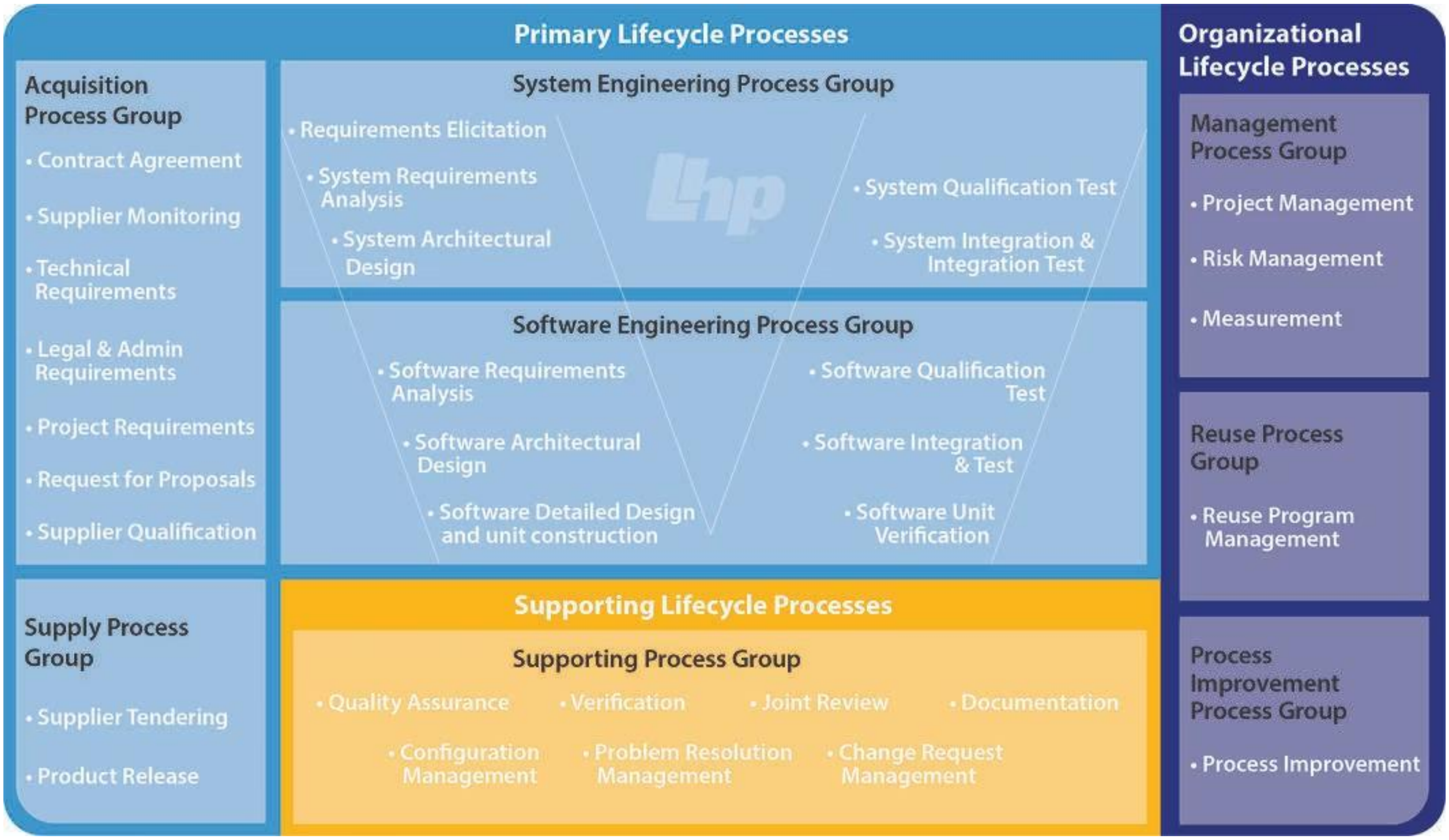
ASPICE has its own Process Reference Model (PRM) which is tailored considering the specific needs of the automotive industry. The ASPICE Process Assessment Model (PAM) uses the PRM when performing an assessment.

In ASPICE, capability determination is based on a two-dimensional framework: Process Dimension and Capability Dimension.


Measurement Framework
• Capability Levels
• Process Attributes
• Rating
- Scale
- Rating Method
- Aggregation Method
• Process Capability Level Model
Capability Dimension
Process Assessment Model
• Process Capability Indicators
• Process Performance Indicators
Proc 1
Proc 2
Proc 3
Proc 4
Process Dimension
Process Reference Model
• Process Domain and Scopes
• Process Purposes
• Process Outcomes

Process Reference Model (Process Dimension)

Processes are grouped into categories according to the type of activity they address. Each process is described in terms of a purpose statement, with unique functional objectives of the process when performed in a particular environment.


Primary Lifecycle Processes
Acquisition Process Group
• Contract Agreement
• Supplier Monitoring
• Technical Requirements
• Legal & Admin Requirements
• Project Requirements
• Request for Proposals
• Supplier Qualification
System Engineering Process Group
• Requirements Elicitation
• System Requirements Analysis
• System Architectural Design
• System Qualification Test
• System Integration & Integration Test
Software Engineering Process Group
• Software Requirements Analysis
• Software Architectural Design
• Software Detailed Design and unit construction
• Software Qualification Test
• Software Integration & Test
• Software Unit Verification
Supply Process Group
• Supplier Tendering
• Product Release
Supporting Lifecycle Processes
Supporting Process Group
• Quality Assurance
• Verification
• Joint Review
• Documentation
• Configuration Management
• Problem Resolution Management
• Change Request Management
Organizational Lifecycle Processes
Management Process Group
• Project Management
• Risk Management
• Measurement
Reuse Process Group
• Reuse Program Management
Process Improvement Process Group
• Process Improvement

Process Measurement Framework (Capability Dimension)

Capability Dimension consists of Capability Levels
which are further subdivided into Process Attributes (PA). PAs provide the measurable characteristics to determine the process capability.


Level 0
• Incomplete Process
• Process is not implemented, or fails to achieve its process purpose
Level 1
• Performed Process
• The implemented process achieves its process purpose
Level 2
• Managed Process
• Performed process is implemented in a managed fashion (Planned, Monitored and Adjusted)
Level 3
• Established Process
• Managed Process is implemented using a defined capable process to achieve process outcomes
Level 4
• Predictable Process
• Established process operates predictively within defined limits to achieve process outcomes
Level 5
• Innovating Process
• Predictable process is continually improved to respond to organizational challenges

Process Capability levels are determined by rating the process attributes for each capability level.

ASPICE-1

N	Process attribute **not** achieved	0 to <= 15% achievement
P	Process attribute **partially** achieved	> 15% to <= 50% achievement
L	Process attribute **largely** achieved	> 50% to <= 85% achievement
F	Process attribute **fully** achieved	> 85% to <= 100% achievement

a sample of a Process Assessment Model (PAM).

ASPICE-3

		Level 1	Level 2	Level 3	Level 4	Level 5
PA 1.1	Process Performance	Largely	Fully	Fully	Fully	Fully
PA 2.1	Performance Management		Largely	Fully	Fully	Fully
PA 2.2	Work Product Management		Largely	Fully	Fully	Fully
PA 3.1	Process Definition			Largely	Fully	Fully
PA 3.2	Process Deployment			Largely	Fully	Fully
PA 4.1	Quantitative Analysis				Largely	Fully
PA 4.2	Quantitative Control				Largely	Fully
PA 5.1	Process Innovation					Largely
PA 5.2	Process Innovation Implementation					Largely

Software Architecture using Aspice.

What is the goal of the software architecture?

The Software Architectural Design process in Automotive SPICE (also known as SWE.2) helps your organization structure and document the internal logic of the software product.

The expectation is that you already have which describe what the software shall do. The purpose of the software architecture is to define how the functionality documented in the software requirements is going to be implemented

Three aspects of the Software Architecture
1.The appropriate view
2.interfaces
3.traceability

Architectural views:

Often, the architecture comprises of a physical view, a block diagram, of the software only.

Other views are

1.Dynamic views,
2.Specific functional views which show a break-down of a specific feature,
3.State-flow diagrams,
4.Interfaces and so on.

Interfaces.

A pitfall often encountered in assessments is the lack of detailed description of the interfaces.

Expected content of interface documentation is

Name
Type
Unit
Resolution
Range
Default-value
Etc.

Traceability

This process also requires that you ensure traceability between your Software architecture and the Software requirements.

The purpose of traceability is that it

supports consistency checks, i.e. checking the completeness and accuracy of the coverage of Software requirements.
supports the impact assessment in case of change requests or bugs.
supports the report of stakeholder expectations and identifies whether the requirements have been implemented in the architecture.

THANK YOU