AGILE IN AUTOMOTIVE

AGILE AND AUTOMOTIVE SPICE® POCKET GUIDE
ENGLISH VERSION

CHAPTER 2
EXTRACT

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besser mit uns
Coverage of Automotive SPICE® by Agile
General Explanation

- The statement "we develop Agile" is used and with vastly different interpretations by many companies. "Cherry picking" and implementing few Agile practices, yet omitting others is commonly made without adapting/internalizing and living the Agile mindset.

- Agile development is often used as an argument to omit the required planning and documentation phase for the software development. This has nothing to do with Agile development.

- For matching Agile and Automotive SPICE® some Agile practices are available which support and fulfill Automotive SPICE® requirements (see following chart covering further details).

- Other elements and aspects exist in Automotive SPICE® which are not explicitly covered by Agile, yet are typical for development in the Automotive sector. To meet the Automotive SPICE® requirements completely additional practices besides Agile practices have to be applied.

- Agile methods and practices do not cover configuration management and supplier management adequately. Additionally, these appropriate processes shall also be implemented.

- There is also evidence described in the following overview that none of the Automotive SPICE® processes of the HIS Scope are covered entirely through Agile practices and methods on Level 1.
Since the term "Agile" is not clearly outlined, we have defined in any process in the "methods / practices" column, which Agile elements, were considered in the subsequent coverage analysis.

Although we used mainly SCRUM as an Agile method, many of the used practices and methods can be subsequently implemented in an environment that uses Kanban instead. However this is not always stated explicitly in the following slides.

“The Outcome View”

In modern Agile development processes using adaptive planning, Continuous Integration, Continuous Verification and Continuous Deployment, some practices and procedures differ from the practices described in Automotive SPICE®.

As long as these "alternative" practices fulfill the process purpose and process outcomes of Automotive SPICE®, an organization can be Agile and still fulfill Automotive SPICE® requirements.

Therefore, following Agile elements are compared with the process outcomes of Automotive SPICE® since this allows a better allocation to the base practices. If Automotive SPICE® is stated in this document it refers to the HIS Scope of Automotive SPICE® Version 3.0, Capability Level 1 and additionally to some general links of Capability Levels 2 & 3.
Overview Capability Level 1

- **SYS.2** System Requirements Analysis
- **SYS.3** System Architectural Design
- **SYS.4** System Integration and Integration Test
- **SYS.5** System Qualification Test

- **SWE.1** SW Requirements Analysis
- **SWE.2** SW Architectural Design
- **SWE.3** SW Detailed Design and Unit Construction
- **SWE.4** SW Unit Verification
- **SWE.5** SW Integration and Integration Test
- **SWE.6** SW Qualification Test

- **MAN.3** Project Management
- **SUP.1** Quality Assurance
- **SUP.8** Configuration Management
- **SUP.9** Problem Resolution Management
- **SUP.10** Change Request Management
- **ACQ.4** Supplier Monitoring

Coverage:
- >= 80%
- 67%-79%
- 54%-66%
- 41%-53%
- <= 40%
The coverage analysis was performed covering following questions:

- Which Agile elements support the achievement of the related Automotive SPICE® requirements?

  These Agile elements are marked dark blue.

- What needs to be done in addition?

  The light blue color indicates additional elements and aspects that are not explicitly addressed by „Agile“ and yet are typical within Automotive development. Using these elements in addition to „Agile“ allows Agile methods to be applied without contradiction to Automotive SPICE® requirements.

- 1:1 mapping between Agile elements and Automotive SPICE® practices is often not possible. In addition, the application for the Agile elements can be evaluated differently depending on the context. Therefore, the following nomenclature for reference is used:

  - If no additional work is needed, the Agile elements support the achievement of the Automotive SPICE® practice to at least a large extent, e.g. „(Outcome 2,3,4)“.
  - Weak coverage of Automotive SPICE® by Agile elements is indicated by e.g. „(Outcome 5 weak)“.
MAN.3 Project Management – Agile Approach Compared

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Description</th>
<th>Coverage</th>
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<tbody>
<tr>
<td>1</td>
<td>Scope of work</td>
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</tr>
<tr>
<td>2</td>
<td>Feasibility study</td>
<td>medium</td>
</tr>
<tr>
<td>3</td>
<td>Estimations</td>
<td>medium</td>
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<tr>
<td>4</td>
<td>Project interfaces</td>
<td>low</td>
</tr>
<tr>
<td>5</td>
<td>Project plans</td>
<td>low</td>
</tr>
<tr>
<td>6</td>
<td>Progress of Project</td>
<td>medium</td>
</tr>
<tr>
<td>7</td>
<td>Corrective actions</td>
<td>medium</td>
</tr>
</tbody>
</table>

### Methods/Practices
- Scrum
- Kanban
- Continuous Integration
- Test Automation
- Refactoring
- Pair Programming
- Test Driven Development

### Events
- Release Planning
- Sprint Planning
- Daily Stand-Up
- Backlog Refinement
- Sprint Review
- Retrospective
- Scrum of Scrums
- Sprint

### Artifacts
- Product Backlog
- Sprint Backlog
- Agile Estimation (e.g. Planning Poker)
- Burndown Chart
- Velocity Chart
- Definition of Ready
- Definition of Done
- Impediment Backlog
- Taskboard
- Vision
- EPIC/User Story
- Product

### Roles
- Product Owner
- Quality Product Owner
- Scrum/Kanban Master
- Development Team

### Alternative Practices
Agile Adaptive Planning and Retrospective after each Sprint
Product Vision and Product Backlog incl. estimation, estimating methods as Planning Poker (Outcome 1, 3)

Scrum roles incl. responsibilities and skills, cross-functional teams (Outcome 2 weak)

Release Planning based on the Product Vision of Product Backlogs and the Velocity (Outcome 2 weak).

Sprints and Sprint Planning incl. estimation (Outcome 3, 6, Outcome 5 weak)

Synchronization with other teams via Scrum of Scrums (Outcome 4 weak).

Transparent project progress via Sprint Backlog, Daily Stand-up, Task Board and Definition of Done (Outcome 6, 7)

Transparent project progress via Sprint Review, Backlog Refinement, metrics and reports like a Release/Sprint Burndown Chart, Velocity Chart (Outcome 6, 7)

If necessary, replanning by the team during Daily Stand-Up, Sprint Planning, Sprint Review and updating the release planning in agreement with the Product Owner (Outcome 7)

Retrospectives and listing of obstacles/impediments in the Impediment Backlog, planning adjustments in short cycles (for each Sprint) (Outcome 7)
MAN.3 Project Management – Additional Tasks

- Agile teams are embedded into the overall project organization. Interfaces to other projects are defined and met. (Outcome 4, 5)
- Sprint plans are synchronized with the overall project plan and the release plan. An adaptive planning is established. (Outcome 3, 5, 6)
- Additionally to a rough planning for the complete project time, OEMs usually expect a detailed planning for the coming 3-6 months. (Outcome 3, 5, 6)
- If the Product Backlog is used as the Project WBS, it must contain all the work packages of the project. Alignment with the OEMs specification shall be ensured. (Outcome 1)
- A feasibility check has to be performed for the whole project, not just for the Product/Sprint Backlog. (Outcome 2)
- Estimations should also include infrastructure. (e.g. HIL, car, …) (Outcome 3)
- Overall resource allocation and management is required, resource needs shall be identified, e.g. via Velocity tracking and adaptation (Outcome 5, 6)
- Joint release planning of teams considering dependencies between features/activities. Planning elements of the Backlog dependencies must be identified and considered (Outcome 3,5)

- If necessary breaking of commitments recognized on team level during monitoring of progress via Daily Stand-Ups and Sprint Reviews are communicated to project management level for reaction. (Outcome 6, 7)

- Cross-functional teams may necessitate organizational changes (Outcome 3); the project plan should, however, still reflect Agile principles, characteristics and rules. (Outcome 5)

- Team interfaces need to be defined, e.g. interfaces to quality assurance, production, project and line management, HW, OEM, and if needed, to car integration and testing, other projects, etc. (Outcome 4)

- Team progress reports are integrated into overall project progress reporting. (Outcome 6)

- Retrospectives focusing also on the prevention of recurrence of identified problems. (Outcome 7)
MAN.3 – Agile Practices for Project Management

Approach for Product Backlog With Different Planning Levels

Granularity of Planning

**Sprint Planning**
Assign Sprint tasks; clarify dependencies, utilization/availability and responsibilities with team, assure results

**Sprint Advance Planning**
Clarify dependencies, utilization/availability and responsibilities in different SW teams

**Release-Train-Definition**
Clarify dependencies and competences in different areas like SW, HW, Mechanics, Production

**Priority/Level of Detail**

**Sprint** (2-3 weeks)

**Short-Term Planning** (task level)
(2-3 Sprints ⇐ 4-9 weeks)
Target for accuracy: as accurately as possible, targeted > 95%

**Medium-Term Planning** (story level)
(1 Release ⇐ 4-6 Sprints)
Target for accuracy: > 90%
0/0,5/1/2/3/5/8/13 [story points]

**Long-Term Planning** (epic level)
(Project ⇐ multiple releases)
Target for accuracy: > 75%
8/13/20/40/100 story points]
Approach for Agile Adaptive Planning: Rolling Planning with Different Granularity

Property Estimation
- Absolute estimate in hours/person days
- Based on experience and criteria
- Focus of estimation: HOW something must be done
- Documented in JIRA

Agile Estimation
- Relative estimate in story points
- Based on experience and reference item
- Planning Poker, Fibonacci (e.g. Fibonacci numbers)
- Focus of estimation: WHAT needs to be done
- JIRA, MS Project, Feature Release Plan

The various planning and tracking levels shall be present in the project management tools. Examples:
- Short-term planning in JIRA; mid- to long-term planning in MS Project or MS Excel
- Coverage of all planning levels in JIRA using additional JIRA plugins for project management
- Estimation of effort and scope

Coverage of Automotive SPICE® by Agile, Page 21
MAN.3 – Agile Practices for Project Management

Example of an Agile PEP - Integration of Sprints (called Function Release Step)
MAN.3 – Agile Tracking Metrics

Progress tracking via Sprint Burndown

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
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<tr>
<td>Task 4</td>
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<td></td>
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</tbody>
</table>

Forecasting via Velocity

- Velocity is a measure of the teams rate of progress
- It is calculated by summing e.g. the number of story points assigned to each user story the team completes during the iteration
- On new teams or on new projects the velocity can take two to three sprints to stabilize

Remaining Effort

Team Velocity

![Remaining Effort Graph](image)

![Team Velocity Graph](image)
Feedback is a constructive element of the agile community.

Your response is very welcome in order to improve the next iteration.

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