HOW DO AGILE PRACTICES SUPPORT AUTOMOTIVE SPICE COMPLIANCE?

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Motivation

- Agile development is common in SW development
  - focus on information systems
  - (not) or slowly reaching embedded systems, because of necessary compliance to common capability models (e.g. CMMI, SPICE, etc.)

- Capability models (“what”) and agile development (“how”) are **not** contradicting to each other

- Need of detailed guideline how to implement it with agile
ASPICE in a Nutshell

- **Automotive SPICE:**
  adaption of ISO 15504 to specific characteristics of automotive domain

- Latest version V3.0 from July 2015

- “Hersteller Initiative Software” containing Audi, BMW group, Daimler, Porsche and VW defines **HIS-Scope (green)**

- Most important processes for assessments
Automotive SPICE and Agile in a Nutshell

Structure of Automotive SPICE and agile development showing the level of detail of our mapping:

**ASPICE structure**
- Project Management (MAN.3)
- Requirements Elicitation (SYS.1)
- Configuration Management (SUP.9)
- Work Products

**Agile development**
- Practice
- Scrum
- XP

Mapping

supports
Related Work

- No new idea of combining capability models and agile

- Existing mappings …
  - are on different levels of abstraction, mainly process-level
  - Cover only parts of the complete models (e.g. only management)

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Necessity of In-depth Mapping

- Discussions and workshops with practitioners from automotive industry:
  "level of granularity and completeness of these existing results do not face the practitioners’ perspective and needs"

- Use-Cases:
  1. How to implement Automotive SPICE using agile
  2. What Automotive SPICE BPs and WPs are supported
  3. Possibilities and ideas for SPI initiatives by integrating agile development to get a better Automotive SPICE compliance
  4. Reasons for using specific agile practices
  5. Motivation where agile development could help
  6. Make assessment results more objective and comparable
Overall Mapping Approach

1. Set-up
- 155 Agile Practices
- 177 ASPICE requirements: (BPs + WPs)

2. Mapping based on literature
- 10 sources (literature + web)
- Direct mapping to BPs/WPs if possible
- Otherwise: Candidate list

3. Expert Mapping
- 1 expert
- Used candidates to map on BPs/WPs
- From both viewpoints: ASPICE, Agile

4. High-level Review
- 2 independent experts
- On process level
- Consolidation with new candidates

5. Detailed Review
- 2 experts successive
- On BP/WP level
- Consolidation by workshops
Mapping based on literature and experts

Legend:
- Our Work

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Agile Practice
- Based on Literature

Automotive SPICE Process
- Expert Judgement

Specific Base Practice

Legend:
- Our Work

Agile Practice
- Based on Literature

CMMI
- Transfer

Specific Base Practice

Agile Practice
- Based on Literature

Specific Base Practice

Agile Practice
- Expert Judgement

Specific Base Practice
Quality Assurance

- First coming up with all mapping steps for only two Automotive SPICE processes for collecting feedback regarding the usage of the mapping data and addressing the use-cases

- Two-folded

  - **Step 4**: Two domain experts performed independently a high-level review by checking whether the different agile practices make sense for the respective processes and/or work products

  - **Step 5**: Two experts reviewed processes in detail by checking each base practices and discussed them to come to a conclusion
Mapping Results

- **96%** Automotive SPICE base practices are supported*
- **86%** Automotive SPICE work products are supported*

- **173 of 185** Automotive SPICE requirements are supported*: **93%**

- **33 of the 38** Scrum and XP practices are used (87%)

- **97 of 155** agile practices are used: **63%**

* = does not specify the degree of support, e.g. how much it is contributing to the base practice (fulfillment)
Supporting of single base practices per Automotive SPICE processes

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<th>BP1</th>
<th>BP2</th>
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(darker blue = higher number of supporting agile practices)
# Usage of Scrum and XP Practices for supporting Automotive SPICE

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<thead>
<tr>
<th>Name</th>
<th>Agile Method</th>
<th>Processes (BP)</th>
<th>WP Total</th>
<th>BP &amp; WP Total</th>
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(darker blue = higher number of supporting agile practices)
Conclusion & Future Work

- In-depth mapping covering the full HIS-Scope of Automotive SPICE
- 760 mappings between Automotive SPICE requirements and agile practices
- Overall 93% of these requirements are supported (at least to some extent)

Only first steps for Roadmap to Agile Automotive Engineering

1. Identification of gaps in the support of agile practices
2. Creating ideas to fill these gaps
3. Define guideline or standard for agile development in automotive industry
4. Define a new automotive specific agile method
Current Study on collecting Evidence on the Experts Perception of the Impact of Agile Practices

Interested in:
- Participating (poster in coffee-place)
- Using the poster on different other events, e.g. conferences, met-ups, ...
- Spreading the poster and its idea
- Check the existing data (~1800): http://impact.iese.fhg.de/data.php

XP2017