



Agile in Automotive and Automotive SPICE: Status Quo

Gate4SPICE

Christophe Debou
6th of February 2025, Guyancourt

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**Automotive
Cybersecurity**

**Systems
Engineering**

**Autonomy Safety /
SOTIF**

Agile

Christophe Debou, Principal at Kugler Maag Cie by UL Solutions



Position

Principal, Director Central And Eastern Europe

Computer Science Engineer (Ecole Nationale Supérieure de Sciences Lannion), 1990

Languages

French, English, German, Polish and some korean

Credentials

- Automotive SPICE certified Competent Assessor including Cybersecurity PAM, Data Management, SPICE for IT Services
- CMMI Institute-authorized trainer for Introduction to CMMI Version 1.3 / 2.0 (DEV, SVC) and Supplement CMMI for Services
- SCRUM Master (SCRUM Alliance)
- SAFe® 4 Certified Agilist
- ITIL V3 Foundation

Experiences

- Hands-on experiences in managing and consulting process improvement programmes (CMMI® or Automotive-SPICE based) as well as Agile transformation initiatives in different cultural environments and business domains:
 - Automotive (OEMs, Tier X), Finance, IT, ...
 - Europe, Asia (South Korea), North America
 - Development and Service Management organizations

Experiences furthermore

- Long and diverse experience in assessments and gap analysis (Automotive SPICE, CMMI)
- Long-term experience in business Development across Central and Eastern Europe
- Active on the Korean Market since 2013, supporting Automotive SPICE deployment
- Many years of training and presentation experience: Project Management, Automotive-SPICE CMMI., ...
- Senior Management Experience:
 - P&L Responsibility for one business unit
- Regular speakers at international conferences
- Chairman of “Agile in Automotive” Conference

Previous Positions

- 2001 - 2006
ComArch SA, Cracow (Poland),
Vice-President, Telecommunication Business Unit
- 1997 – 2001
Q-Labs GmbH, Operating Manager
- 1990 – 1997 Alcatel Belgium, France, Austria
Manager of software process and technology

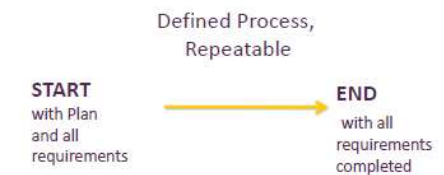
Agenda

- What is Agility? Definition and Scope
- Myths around Agility
- Agility and Automotive SPICE
- Current Status of Agility in the Automotive Industry



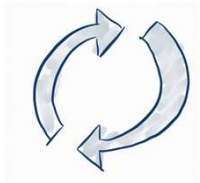
What does Agile mean?

- **Agility...** is the ability of an organization (for example a project, team, department, business unit, company or any other structure of people) to **timely adapt** to an **ever-changing environment** while **continuously delivering value** to their customers at sustainable pace.
- **Agile Project management...** is used as a term for a new mindset in Project management in contradiction to the traditional, forward planning oriented PM.



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What does Agile mean?



Agile is a
Mindset

Mindset



Described
within the
Agile Manifesto

Values



Acting based on the
12 Agile Principles

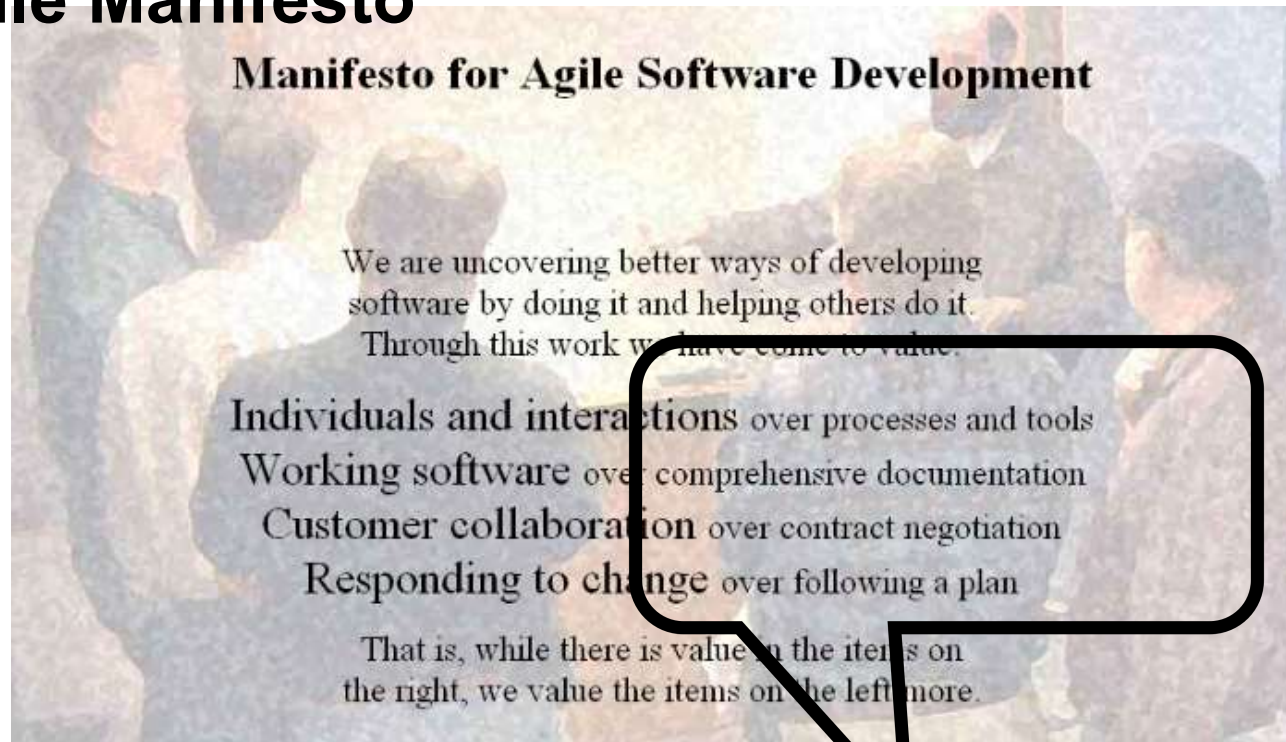
Principles



Implemented
by various
possible
practices

Practices

The Agile Manifesto



KENT BECK
MIKE BEEDLE
ARIE VAN GEMMEKUM
ALISTAIR COCKBURN
WARD CUNNINGHAM
MARTIN FOWLER

JAMES GRENING
JIM HIGHSMITH
ANDREW HUNT
RON JEFFRIES
JON KERN
BRIAN MARICK

ROBERT C. MARTIN
STEVE MELLOR
KEN SCHWABER
JEFF SUTHERLAND
DAVE THOMAS

**The Manifesto does NOT say
"Omit these"!**

12 Agile Principles



01 Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

02 Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.

03 Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

04 Business people and developers must work together daily throughout the project.

05 Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

06 Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

07 Working software is the primary measure of progress.

08 The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

09 Continuous attention to technical excellence and good design enhances agility.

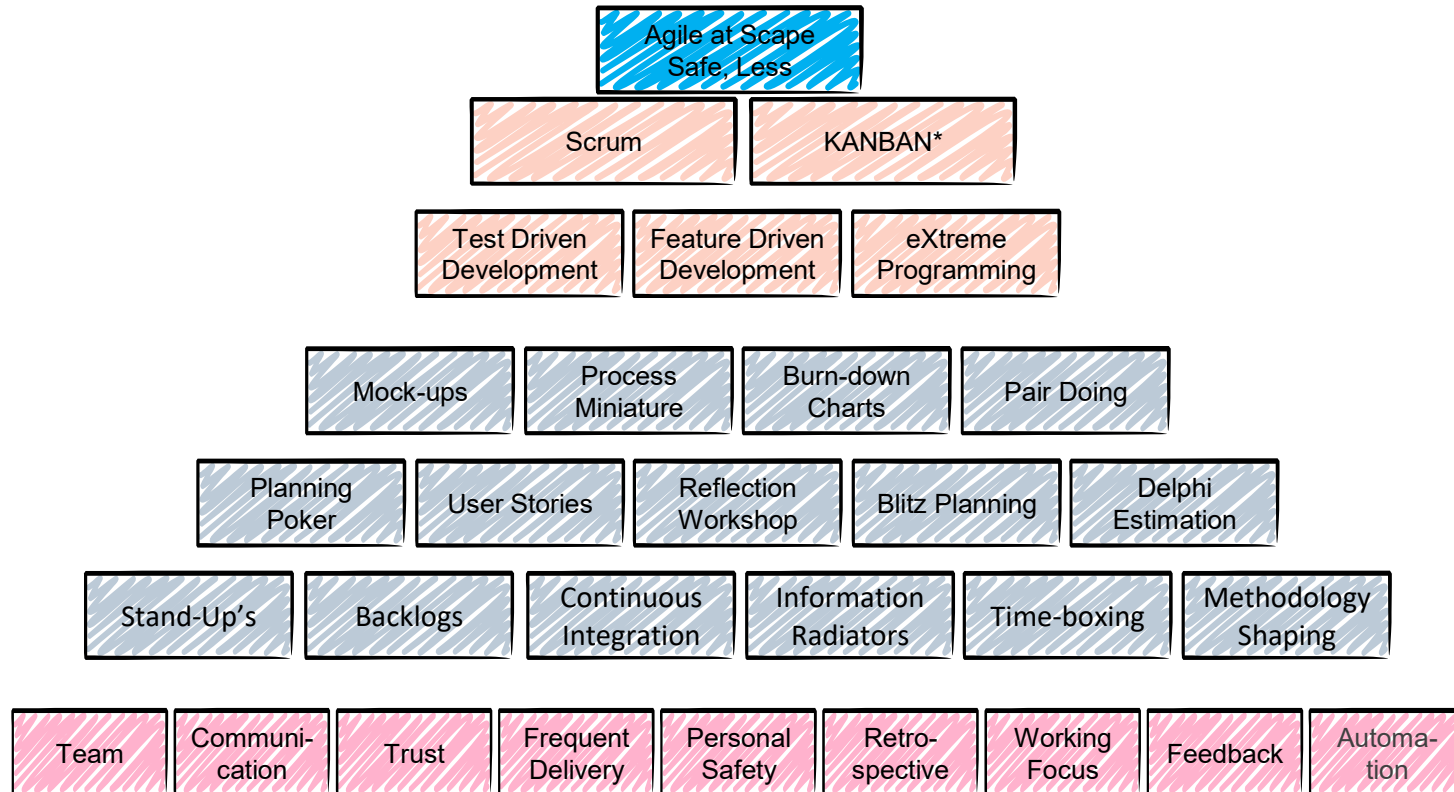
10 Simplicity—the art of maximizing the amount of work not done—is essential.

11 The best architectures, requirements, and designs emerge from self-organizing teams.

12 At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Overview Agile Terms

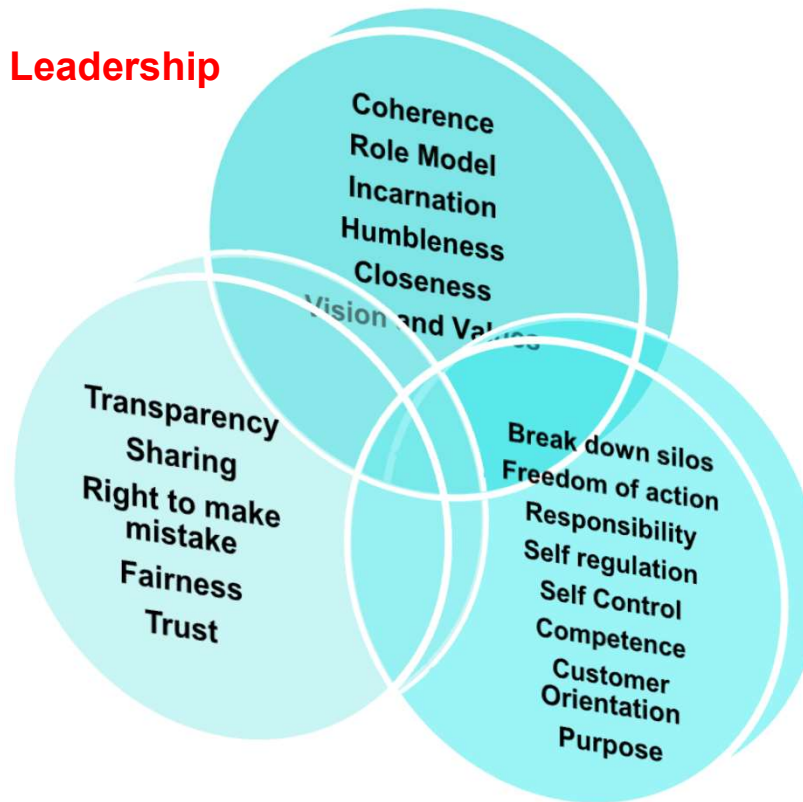
- Frameworks / Methods / Practices / Characteristics



Agile Organization – Common Features

Management Leadership

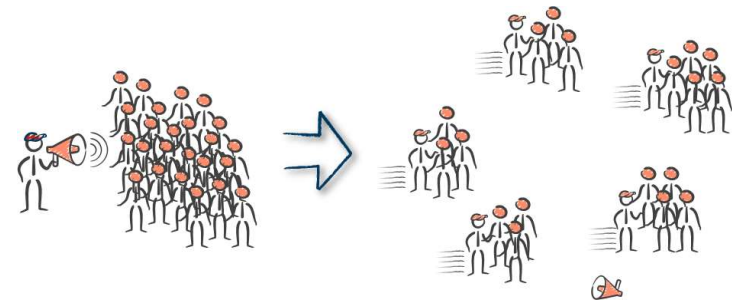
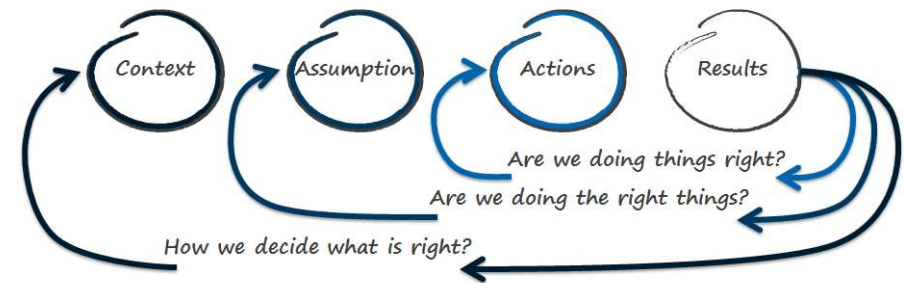
Culture – Value



**Organization
Autonomy**

The agile Culture

- Pull instead of Push
- Customer focus
- Short-cyclic learning as a team
- „Loopy Learning“ at all levels
- Transparency
- Give and take responsibility
- New management paradigm
 - Remove impediments instead of giving commands
 - Teams organize themselves
 - „Visionary leadership“
- Committed quality is the deliverable at all levels, typically ... „customer quality“



Myth 1 - Agile Methods Are Like Undisciplined Cowboy-Coding – Does not require documentation

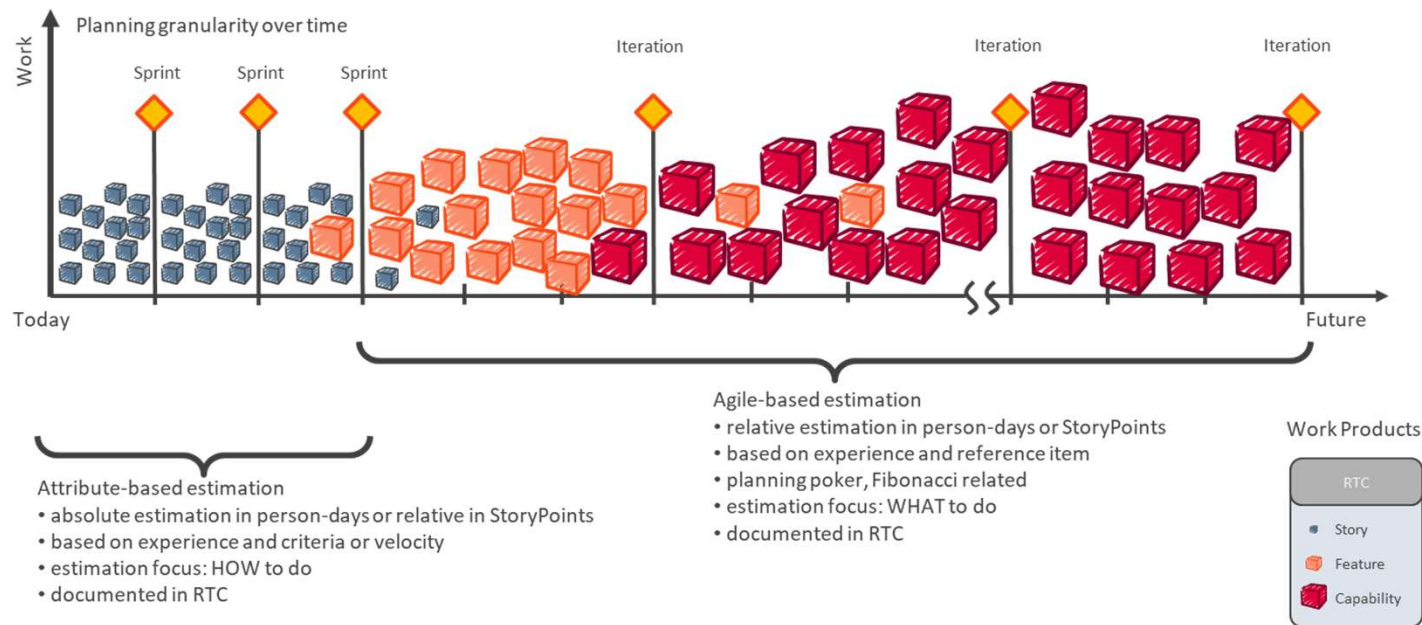


- Agile is a **highly disciplined approach**
 - A daily scrum takes place every day at the same time within 15 minutes
 - Short feedback immediately through Colleagues regarding your work
 - DoD to consider something as “Done” (includes also quality criteria)
 - DoR as preconditions to start working on a given requirement
 - CI as “quality” gate
 - ...
- Engineering excellence is also embedded in the Agile culture
- Regarding documentation, this is a misreading of the manifesto
 - The right documentation at an appropriate level is needed



Myth 2 - No Planning In Agile

- Nearly 20% of the time of a Scrum Team is spent on planning-related activities
- Only “predictable” aspects of the project are planned in detailed
- “Plans are nothing; planning is everything”, Dwight D. Eisenhower



Myth 3 – Agile and Automotive SPICE are incompatible

- Such myth remains due to the fact that Automotive SPICE is often associated with a „waterfall“ or V life cycle, although **Automotive SPICE does not actually mandate a given life cycle.**
 - **Automotive SPICE describes the “What”, not the “how”**
- Certain A-SPICE assessors are reluctant to Agility or not just understanding the concepts sufficiently, downrating Agile projects per definition.
 - Not able to think outside of the box
- There exists many Agile projects that have assessed up to Capability Level 3
 - However applying **solely** Agile methods would not be sufficient.
- There is an increase demand from OEM to run projects in an agile way, while still ensuring Automotive SPICE compliance
- Refer also to VDA guidelines



Agility and Automotive SPICE

ASPICE and Agile complement each other

- The 12 principle of the Agile Manifesto correspond to the purpose of process quality and therefore to ASPICE
- ASPICE defines **WHAT** needs to be done with the perspective of process and quality requirements in automotive product development, e. g., develop verification criteria, establish bidirectional traceability or ensure consistency
- An agile approach defines **HOW** things should be done, e. g., The Product Backlog [...] is the single source of work undertaken by the Scrum Team, duration and content of agile events is defined, etc.
- If suitably combined, ASPICE and Agility mutually support the achievement of high process quality and the reduction of product risks



Coverage of Automotive SPICE® by Agile - 1

- 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 must 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 VDA **Scope are covered entirely through Agile practices and methods on Level 1.**

Coverage of Automotive SPICE® by Agile - 2

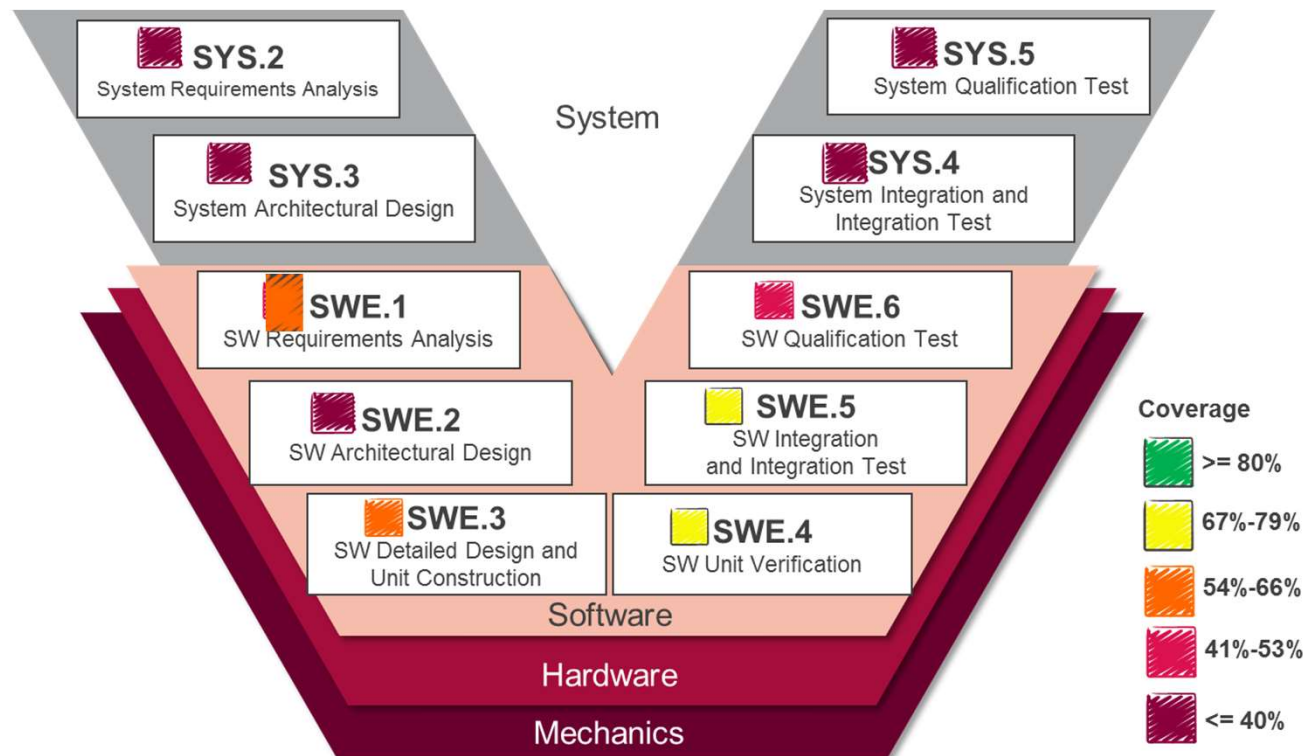
- Since the term "Agile" is not clearly outlined, we have defined in any process in the "methods / practices" column, which Agile elements, were considered in the subsequent coverage analysis.
- Although we used mainly SCRUM as an Agile method, many of the used practices and methods can be subsequently 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.

Coverage of Automotive SPICE® by Agile

Overview Capability Level 1



■ 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

Summary of Comparison

How to use Agile methods and yet meet the requirements of Automotive SPICE®

- In the Automotive environment Agile methods can provide an additional benefit (e.g. by process acceleration) and can be applied **without contradiction** to Automotive SPICE® if well-established Automotive practices (for documentation, reviews,...) will be continued.
- Due to **the different philosophies and scopes**, a 1:1 mapping between Automotive SPICE® and the Agile methods is not easy
 - Automotive SPICE® focuses on **processes and projects**, while
 - Agile methods focus on the **team and the human factors**.
- An Agile implementation provides greater benefits when it is used in combination with **Continuous Integration (CI) and a high degree of process automation (Test, Task Management, CI,...)**.
- The specific requirements of Automotive SPICE®, e.g. with respect to **scheduling, linking information (traceability), independence of quality assurance**, make it necessary to adapt Agile working methods in order to satisfy these requirements. This may lead to **reduced agility**.

Major Topics to be considered which may cause Problems while implementing both (1)

- **Embedding the Agile team in a “non Agile” environment:** If the project level resp. outside world (customer, management, etc.) continues operating “classical” (as in past, not Agile), **the interfaces need to be coordinated!**
- Implementation of Automotive SPICE® output work products is necessary, especially...
 - **Engineering work products**
 - **Strategy and planning documents** (e.g. documentation of integration & verification strategies, etc.)
 - Level 2 und 3 work products and aspects.
- **Implicit practices for changes, problems and configuration management as well as supplier management** shall be applied and linked on a project level.
 - Handling of defects and changes, including prioritization
 - Classification of tickets as e.g. ‘defects’ to be able to create metrics for defects
- Agile adaptive planning: **The Product Backlog and Sprint planning shall be synchronized with the project plan / PDP.** OEMs typically demand a detailed 3-6 months planning (in addition to rough overall project planning) (MAN.3).
- **Resource management (people and infrastructure)** is actively required for the complete project.

Major Topics to be considered which may cause Problems while implementing both (2)

- **Definition of Done** is an important element to achieve ASPICE requirements, thus it should cover all necessary aspects
- Quality Assurance (SUP.1),
 - e.g. the role of an independent QA must be ensured, e.g. via the role **Quality Product Owner**.
 - A clear definition of “Potentially Shippable Product Increment” and **several levels of Definition of Done** is highly recommended.
- **The monitoring of process quality** needs to be planned and carried out additionally to monitoring of the quality of work products.
- **Requirements Management (SYS.2, SWE.1), e.g. traceability** between requirements specification and Product Backlog shall be implemented and maintained.
- **Traceability** in general (all SYS and SWE processes) must be established (e.g. via the **Definition of Done**)
- **Consistency** of information must be implemented as an integral part of the development process
- **Software architecture** (SWE.2) is very important. Make sure that you don't lose the big picture due to focus on functionality.
- **SW architecture and SW design need to have been defined before SW coding** and shall be consistent after end of coding (SWE.3)

Major Topics to be considered which may cause Problems while implementing both (3)

- **Continuous Integration and Test (SWE.4-6)**
 - E.g., Agile testing within a sprint shall cover **more than just module testing**. Test shall go along with Test Driven Development, Continuous Integration and a high degree of test automation.
In an ideal case, the test within a sprint covers besides SWE.4 also several SWE.5-6 aspects.
In addition, **a software release test as well as system testing by separate groups are required.**
 - Use of proven test methods such as white-box testing, grey-box testing, black-box testing, negative testing, etc. as well as testing of non-functional requirements shall be ensured.
- **Embed additional disciplines: HW, mechanical and system processes =>** if further disciplines develop Agile too, the different iteration cycles have to be synchronized.

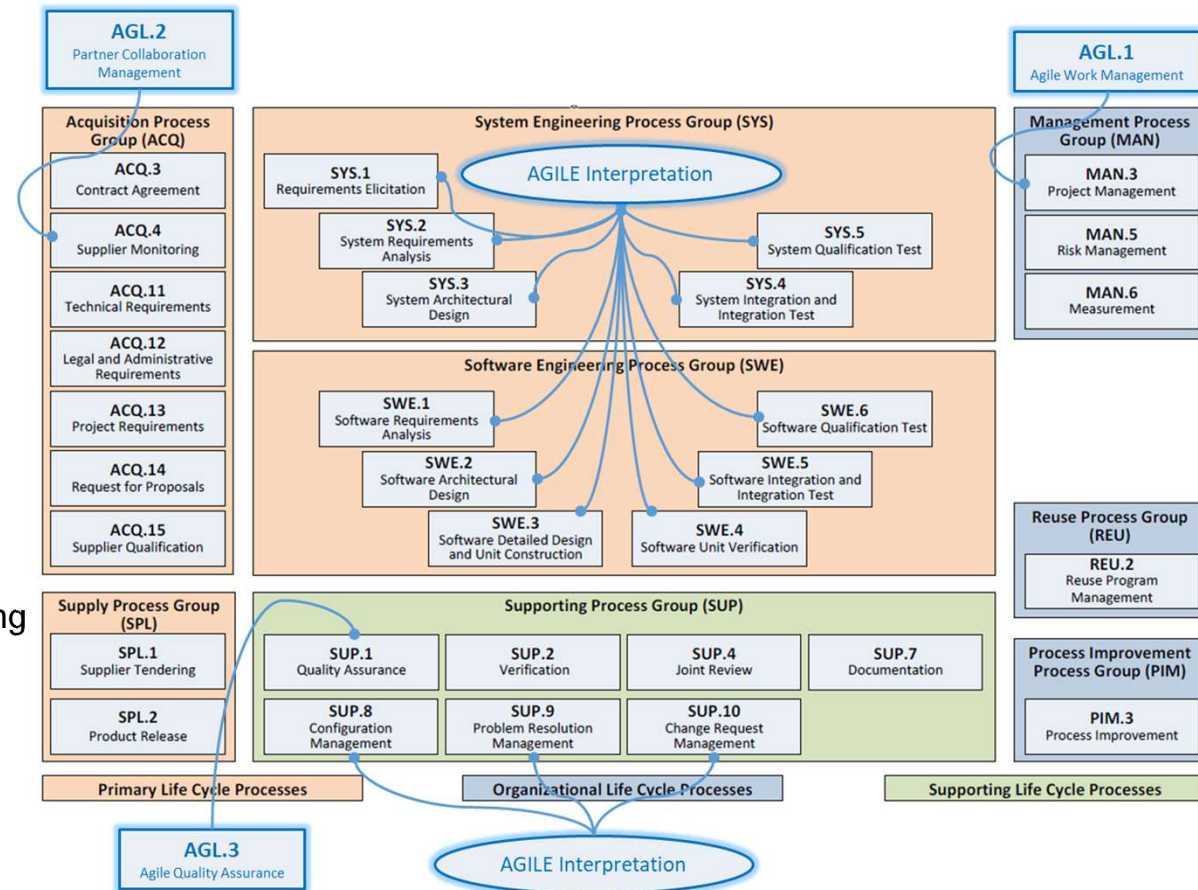
Guidelines 2.0 and Agile

- Just a few rules (5 compared to 11 in guidelines 1.0) covering
 - Planning
 - Architecture
 - Pair programming (In the context of review strategy)
- In addition, some guidelines regarding:
 - Project life Cycle
 - Management of Requirements
 - [AGE.RL.1]** If evidences from project planning (e.g., backlog, burn down chart and/or sprint planning) show gaps regarding the release planning and this aspect is significant, then the indicators MAN.3.BP4, MAN.3.BP9, and SPL.2.BP1 shall be downrated.
 - Risk management
 - [AGE.RL.2]** If remaining effort for features, which are to be delivered in the current or next release, is not estimated then MAN.3.BP5 shall be downrated.
 - Verification
 - [AGE.RL.3]** If the system architecture is modified incrementally including impact analysis then SYS.3.BP1 shall not be downrated.
 - Independent QA
 - [AGE.RL.4]** If the software architecture is modified incrementally including impact analysis then SWE.2.BP1 shall not be downrated.
- [AGE.RL.5]** If the way pair programming is actually technically performed is not in conflict with code review requirements in terms of formal reviews, inspections, walk-throughs then SUP.1.BP3 and SWE.4.BP3 shall not be downrated.



Agile SPICE

- 3 new processes
 - AGL.1: Agile Work Management
 - AGL.2: Agile Collaboration Management
 - AGL.3 Agile Quality Assurance
- Interpretation in an agile environment for all other processes
- Current deployment very limited.
 - Almost none assessments
 - Use for competency development and understanding on how ASPICE and Agile can be combined



...the Context for Leading Organizations within the Automotive Industry

V

Volatility

- Business models and organizations become more and more volatile
- A dramatic dynamic of change is encountering the Automotive industry

U

Uncertainty

- Business trends and innovations are not predictable, surprises to be handled on a daily basis

C

Complexity

- The complexity of products and collaboration models is exploding

A

Ambiguity

- Organizations are faced with confusion caused by ambiguous meanings of conditions



Agile in Automotive – What and why?

- Agile in Automotive is defined as the sum of agile practices

- Most of the respondents referred to most common agile practices: time boxing, communication, iterations, empowering the team, flexibility, and short feedback loops

- The most frequent answer on why agile was that the current development approach was not suitable any more to address current trends adequately:

- **High complexity increase**
- **Pace of changes**
- **Shorter time to market**



The reason to implement Agile was rapidly evolving customer requirements.



Approach for managing projects using short disciplined cycles to iteratively generate shippable increments.



In the company, the understanding of Agile is still too heterogeneous – dominated by content and politics, Agile is "hip", thereby some is referred to Agile that is actually not Agile at all.



Traditional planning approach is not maintainable anymore, predictability is almost not possible.

Results from the Agile in Automotive Survey 2021



What is a Software Defined Vehicle?

Flexible

Upgradeable

Consolidated
Hardware/Software

Data Driven

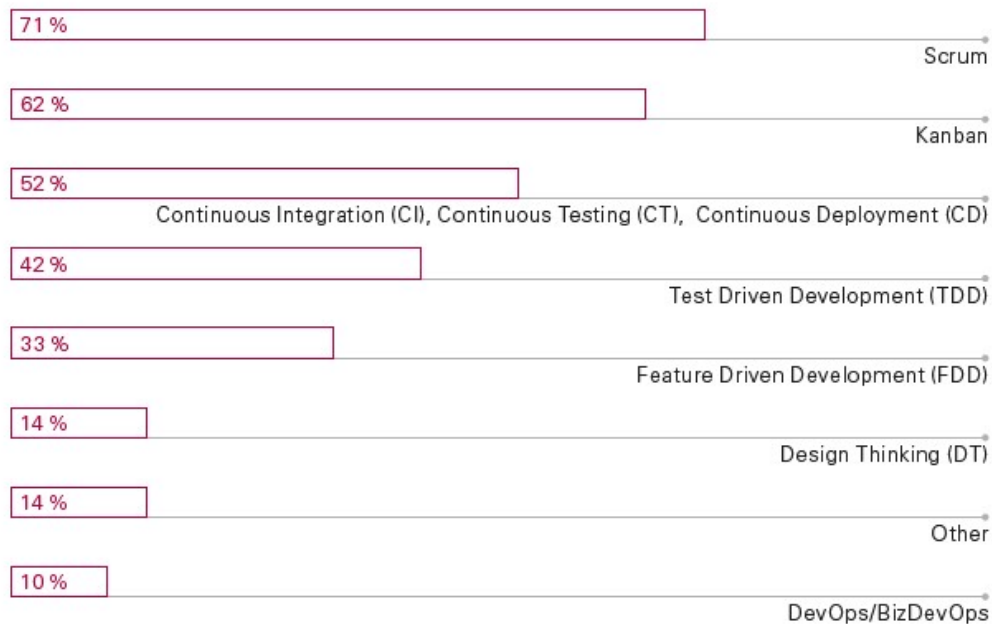
Connected

Agile in Automotive – Status Quo - 1

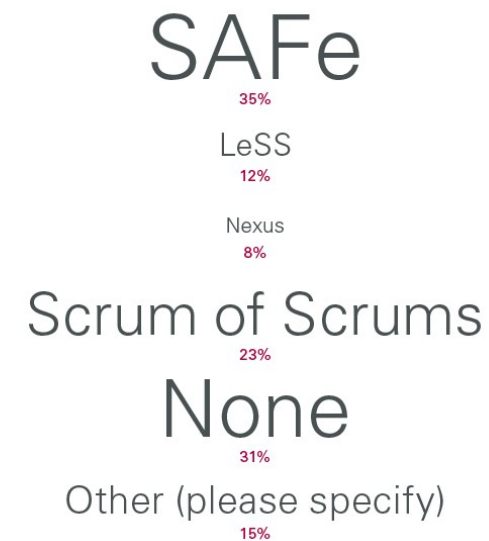
- First experiences with Agility in Automotive started **in the early 2010's**, solely in the software domain at Tier 1.
- It was extended towards **system** but also **hardware engineering**, taking into consideration the constraints and limitation
- Most used methods/Framework are **Scrum** and **SAFe** for Agile at scale.
 - Use of **LeSS** rather limited to BMW (But rather successful)
- Agility became mainstream to a large extend in the automotive industry
 - OEMs e.g. BMW, Mercedes, Renault, Volvo, Stellantis, VW Group, . are applying it with more or less success, both internally and together with their suppliers.
 - Tier X suppliers have been experimenting with Agile for many years with a wide diversity of implementation, depending on the product domain.
- However true Agile is still seldom

Which Agile Methods and Practices do you use in your Organization?

Results from the Agile in Automotive Survey 2021



Which scaling framework is used?



XP = Extreme Programming - SB = Scrumban

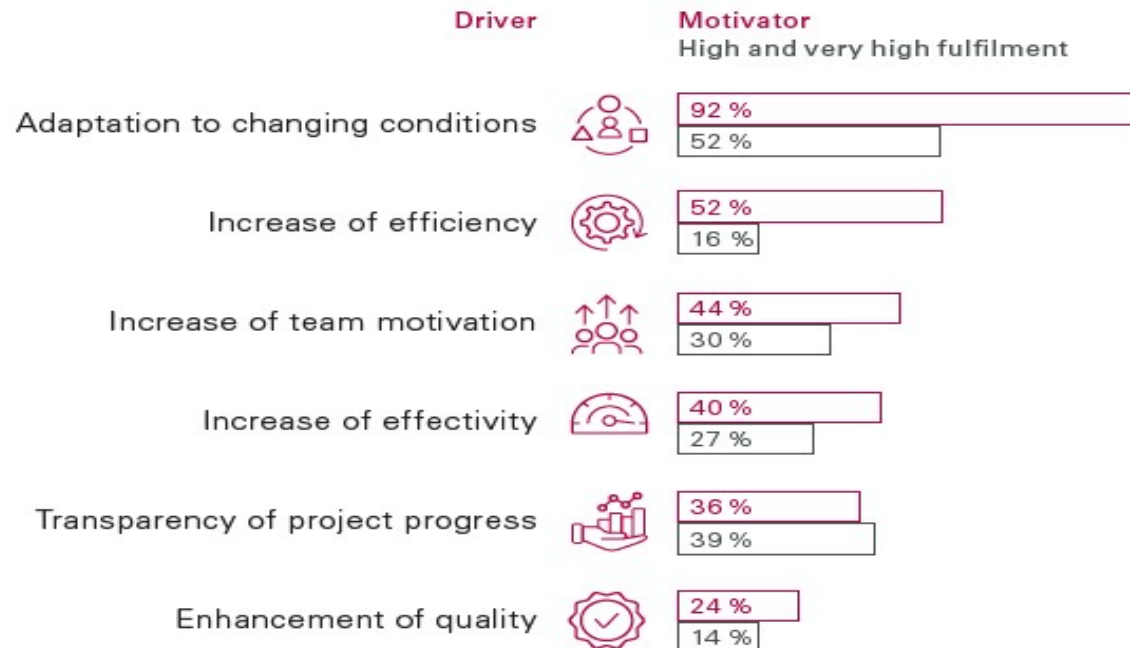
Solutions

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Why Agile? Expectations and Benefits of Agile in Automotive

What motivated companies to adopt an agile approach, and to what extent have these expectations been met?

Results from the Agile in Automotive 2021 Survey



Examples of quantified benefits of Agile development

- Elektrobit
45% more time to work on features (less effort for defect corrections)
- Bosch 4 TESLA
Reduction of development time by 50%
- John Deere
98% of the employees would go for an agile transition again



Observations During and After the Transition



If the decision were solely up to you, would your team continue using Scaled Agile?



Pro	Con
Transparency and Early Feedback	Many large Meetings at the beginning
Daily Stand-ups	Teams somehow compared by Story Points
Team Engagement	Distributed & overlapping responsibilities
Working Teams (Co-location wasn't an issue)	Large Vertical Slices

From: Microsoft to Agile and what we added | 10th November 2015

JOHN DEERE

The Tesla Project

Automotive development in half the time.

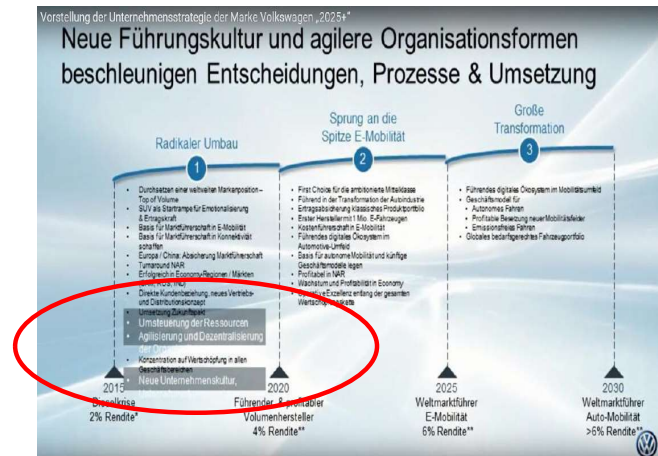
- Comprehensive driver assistance technologies supplied to Tesla by Bosch.
- Project started with HW delivery and basic SW.
- SW optimization and validation in collaboration with customer.
- Perfect conditions to apply agile engineering methods and to operate in sprint mode.

BOSCH

Agile Development is a major trend in and already arrived since several years...

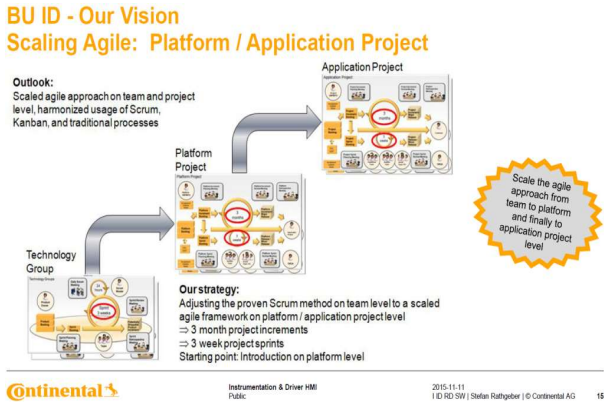


BMW ENGAGES ON THE DIGITAL CAR OF THE FUTURE IN FOUR CORE AREAS.



Several OEM's are in an Agile transformation...

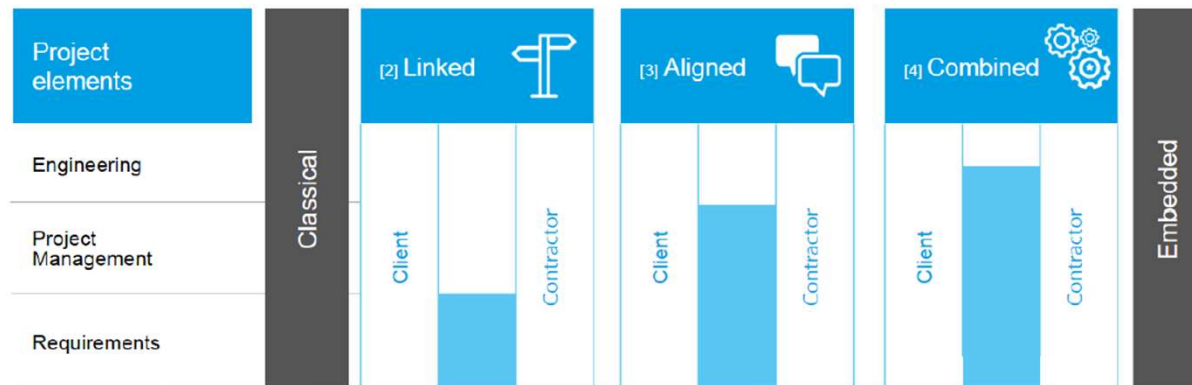
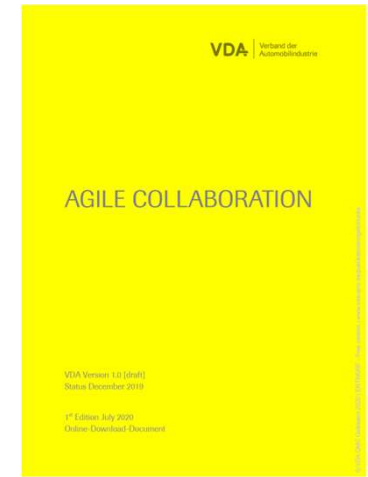
Agile Development is a major trend in and already arrived since several years...



Also Suppliers are Agile...

Agile Collaboration

- 5 levels of collaboration are proposed:
 - „Classical“
 - „linked“ -> Regular review / re-prioritization of requirements
 - „Aligned“ -> common backlog
 - „Combined“ -> Joined development, common CI-CD platform
 - „Embedded“





GT SIA – LES MÉTHODES AGILES ET LE MONDE AUTOMOBILE GUIDE

CE Fiabilité Qualité Sécurité

Synthèse

> Les acquis:

- Première version du guide publiée,
- **Compatibilité confirmée** entre les Approches Agiles et les objectifs qualités de notre domaine,
- **Retour d'expérience positif** sur l'intégration de technologies avancées et sans constat de dégradation de la qualité livrée,
- **Nécessité d'adapter et d'adosser les pratiques** Agiles aux particularité automobiles,
- **Approche flexible** et déployable au juste besoin (ex SAFe),
- **Changement de mode de contractualisation** initié entre Constructeur et Equipementier,

> Suite :

- Agile et Safety (Partie C): première réunion le 19 janvier 2024,
- Attente des commentaires et retours suite à la publication de décembre,
- Ouverture à d'autres Communautés d'Experts...

> Points à renforcer/surveiller :

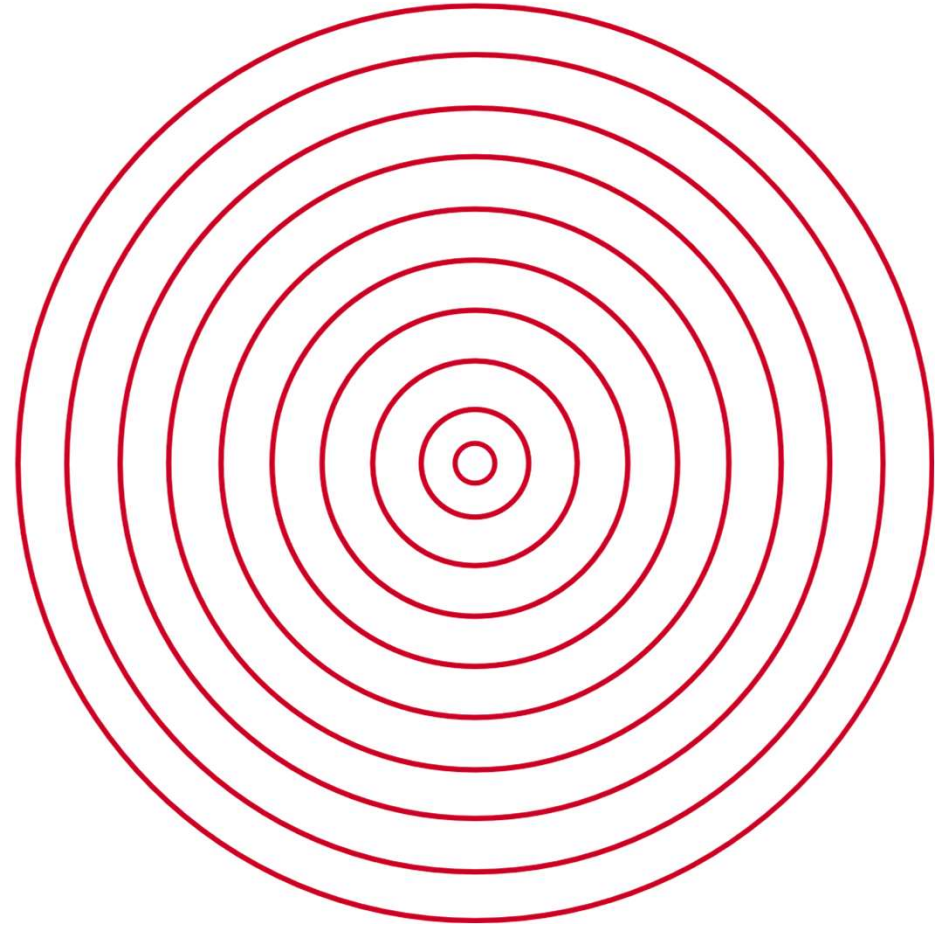
- **Piloter les conditions de réussites**
- **Sensibiliser à la culture Agile** l'ensemble des fonctions transverses de l'entreprise et les **auditeurs de certification**,
- Associer aux choix d'Approche une **analyse du contexte** et l'identification des risques ,
- **Maîtriser les mécanismes de priorisation**,
- **Mettre ne place de nouveaux modes de contractualisation** Client-Fournisseur,
- Investir dans les **compétences T Shape**,
- **Intégrer les principes Agiles dans les cursus académiques** pour préparer les futurs professionnels,
- Faire évoluer les canaux de **capitalisation**.
- **Evolution du cadre normatif (ISO, IATF ect...) souhaitable** (ex: Automotive SPICE (softs & systèmes),

Conclusion - Real Status of Agility in Automotive ?

- Have we really implemented Agility in its full flavor?
- Have we ever measured the benefits?
- My opinion:
 - Many agile implementation are restricted to the application of a few methods and technics
 - The agile culture is seldom visible
 - Most benefits have been on the **qualitative** dimension
- Agility and ASPICE can be combined successfully if
 - One does not take them too literally
 - “Inspect and Adapt”



Questions?



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Thank you

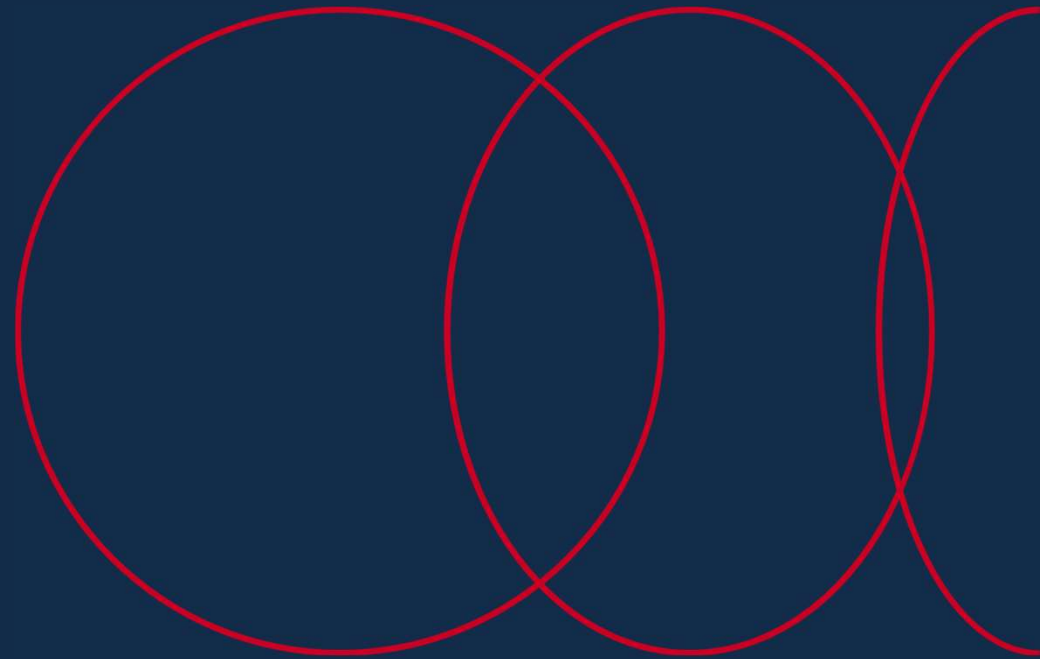
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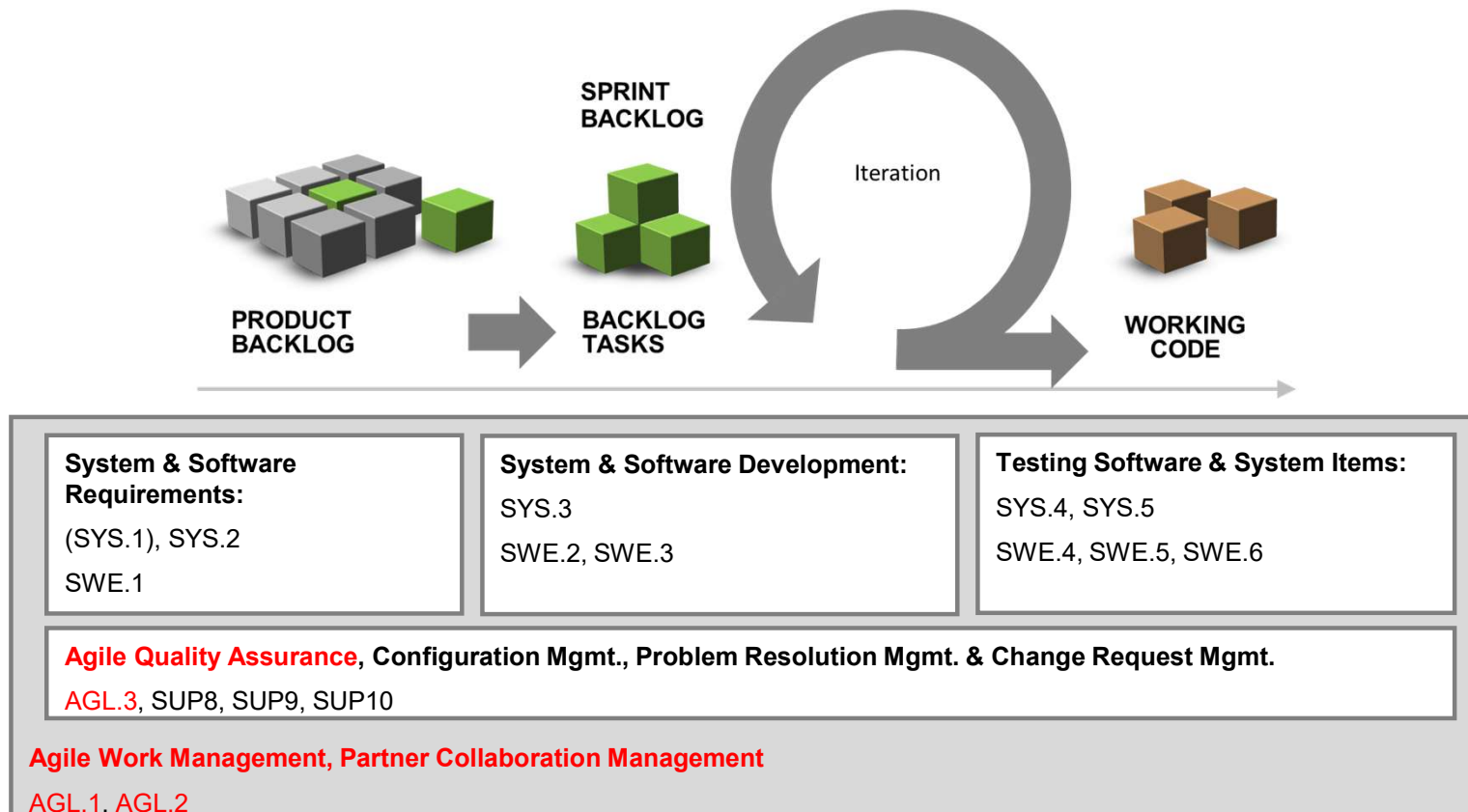
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Backup



The alignment of Agility and ASPICE in general

How ASPICE process requirements fit into an agile life cycle

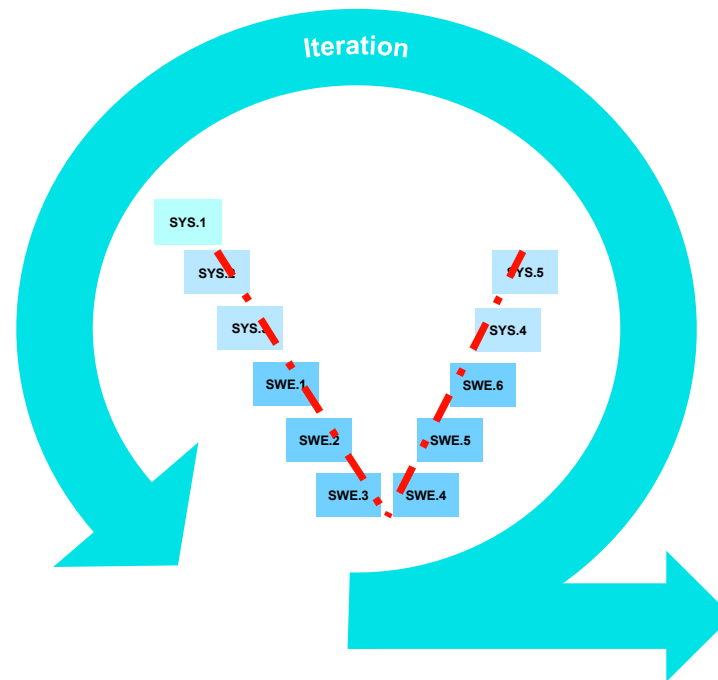


Agile SPICE implementation 1/2

Possible scenario 1 – full V-model integration

All engineering processes performed during each iteration

- Development activities are continuously performed and monitored
- Change Request Management and Problem Resolution Management are also handled as part of the iteration



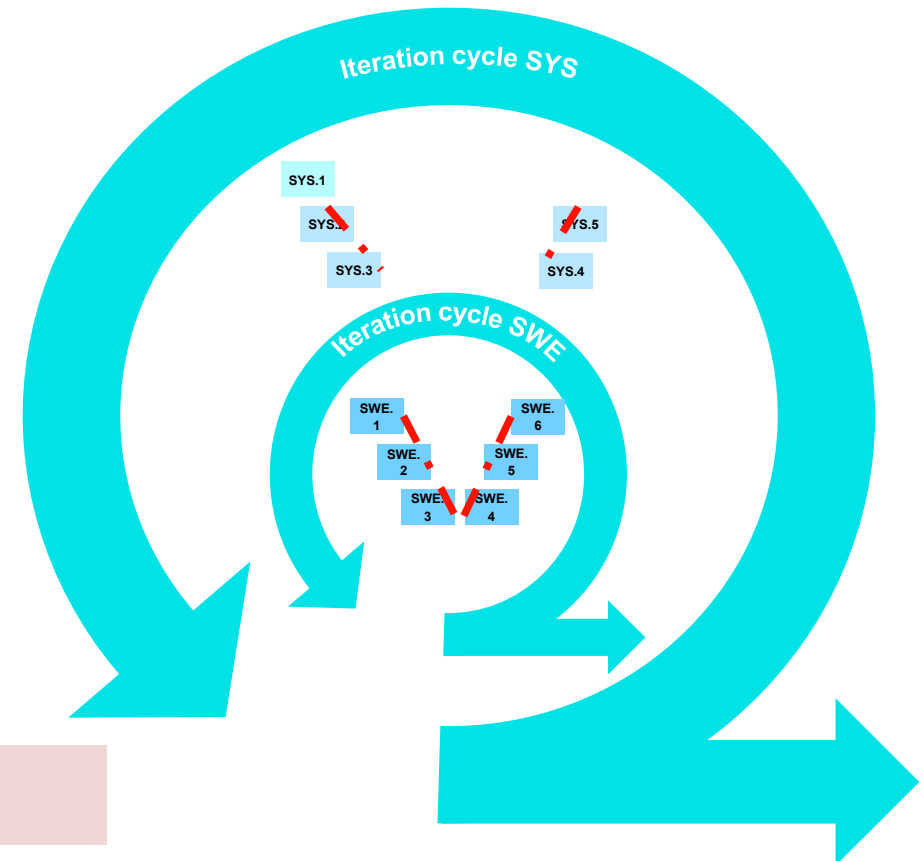
This shows only a selection of possible agile SPICE implementations. Other scenarios are also possible as well

Agile SPICE implementation 2/2

Possible scenario 2 – Software V-model integration only

Only SW engineering processes performed during each iteration

- Iteration cycle duration may be very short, different teams may work in parallel at different SW components
- SYS.2 and SYS.3 are also performed incrementally, with different iteration cycle duration (refer to all system components)
- SYS.4 and SYS.5 have to be performed after each integration (minor, major releases)
- Integration steps/strategy must be clearly defined
- More coordination required !



This shows only a selection of possible agile SPICE implementations. Other scenarios are also possible as well