

# Agile in Automotive – State of Practice 2015

May 2015

Kugler Maag Cie

© KUGLER MAAG CIE GmbH

# Table of Contents

- Executive Summary
- About The Study
- Participant Demographics and Context of Agile Application in Practice
- Scope and Phase of Agile Implementation
- Agile – What and Why?
- Agile Methods and Practices
- Tools used
- Experiences and Lessons Learned
- Comparison with the previous year's results
- Summary and Conclusion
- Annex, Acknowledgements, and Disclaimer



# Executive Summary



# Executive Summary

## Agile Implementation

- Agile implementation has gained a foothold at all development organization levels
- Agile is typically first introduced in an internal project (e.g. platform development) and then within a customer project
- Experience with the use of Agile methods and practices ranges from 6 months to 10 years
- Agile is applied in all domains, not only in Multimedia series development, but in most cases applied only to software development
- Agile seems to be used mainly at the beginning of series development (A and B Sample); in later phases (C and D sample), more traditional development methods are equally applied
- Unanimous view of the respondents: Following Agile methods and principles “blindly” as described “by the book” would have led to failure; therefore, respondents do “cherry picking” and implement agile practices which are useful for them
- Major concerns regarding Agile: Inability to scale and lack of up-front planning

## Differences to the last study

- The “domination of Scrum” is not that obvious anymore; Kanban as an alternative/complement to Scrum is becoming more popular; Kanban is mainly used where there is a continuous flow of work, e.g. maintenance and support (bugs and change requests)
- Agile projects are increasingly covering mainly software development processes; unlike in last year’s study, Agile today seems to play a minor role in System Requirements Analysis and System Design
- There was a shift in the tooling landscape: Jenkins has taken over the leading role among build/integration/test and test automation tools; JIRA has prevailed its strong position among Project/CR/PR/Task Management tools
- Tools and infrastructure are still key for successful Agile implementation and often lead the agendas of Agile transformation programs

## Agile in combination with Automotive SPICE and Functional Safety/ISO 26262

- For most interviewees, ISO 26262 is not in contradiction with Agile; all levels of ASIL were mentioned to be within the scope
- Agile and Automotive SPICE are not in contradiction; both can go along with each other well if applied with professional rigor

## Next steps

- Next steps in the automotive world are to offer solutions to the scalability concern and improving in the field of automated testing



# About The Study



# About The Study (1)

## Background and General Information

- Automotive industry has been applying Agile methods and practices in embedded software development for several years; however, feedback on experiences seems very diverse
- Kugler Maag Cie performed 15 selected interviews and 27 online surveys with key representatives between November 2014 and February 2015. Topics of the study were:
  - Which methods/practices/tools are used in which context?
  - What are the lessons learned regarding their application?
  - What are the barriers for a successful introduction of Agile?
  - What are the concerns regarding Agile in the automotive context?
  - How applicable are Agile principles in the automotive industry?
  - Are Agile and development standards (Automotive SPICE<sup>®</sup>, ISO 26262) compatible or contradictory?
- Survey respondents were primarily leading automotive companies – both major OEMs and Tier-1 suppliers – from Germany, India, Italy, Mexico, Poland, Romania, Singapore, USA

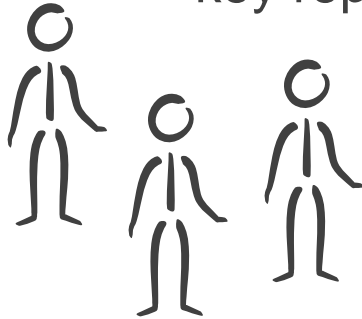


# About The Study (2)

## Survey Process

1

Selection of approx. 60  
key representatives



2

Interviews and  
Online surveys  
**Nov 2014 –  
Feb 2015**



3

Analysis of the data  
collected. Conclusions  
sent to participants  
in a detailed report



4

Study Report  
**April 2015**



# Participant Demographics and Context of Agile Application in Practice



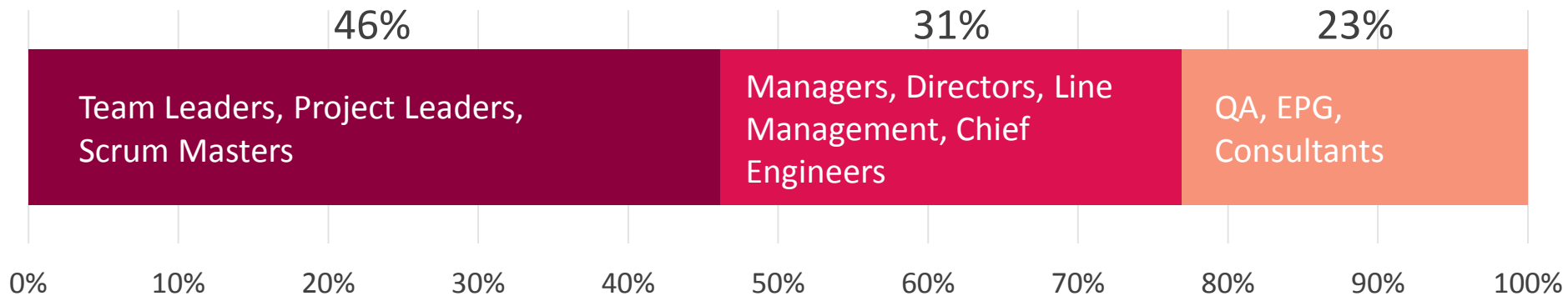


# Participant Demographics

## Study participants cover a large range of managerial and technical positions

- Study participants were chosen based on representativeness in order to ensure high data quality, e.g. representatives from different companies, business units with different observations and experiences
- Participants covered a large range of managerial and technical positions within their respective organizations, e.g. Project and Quality Management, High Level Management, Engineering Team

### Participants of this year's Agile in Automotive Study



- Surveyed Agile projects differed with respect to
  - managerial and team view
  - domain and types of project covered
  - scope of Agile implementation
  - number of teams involved and size of the teams
  - customer and platform development



# Context of Agile Application in Practice (1)

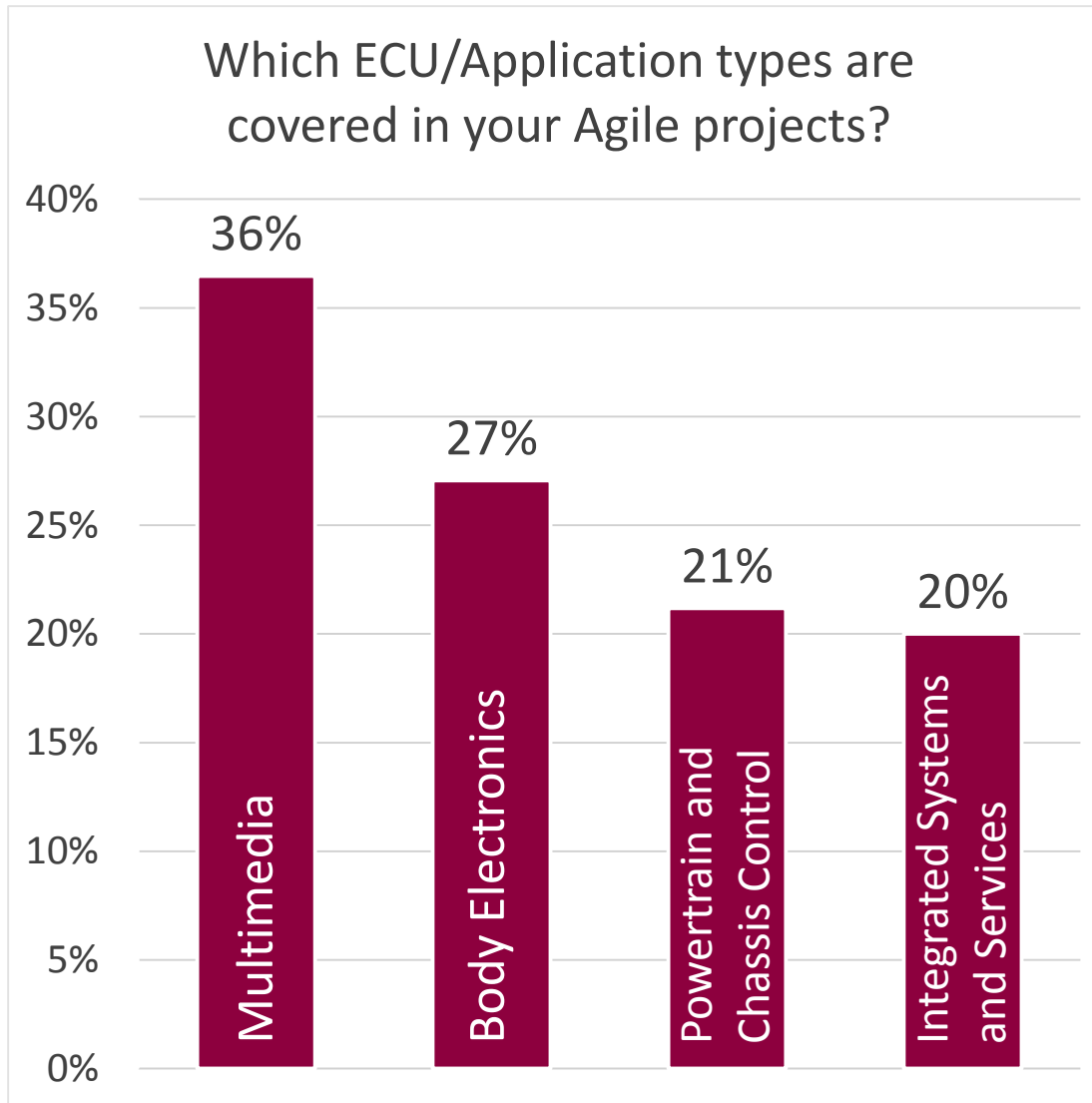
## Summary

- Agile is typically first introduced in an internal project (e.g. platform development) and then within a customer project
- Agile concepts can be misinterpreted; however, most of the respondents have a pragmatic understanding what Agile is all about
- The main reason for adopting Agile is that traditional software development methods are not flexible enough to address the emerging challenges in software development, e.g. increasing complexity, constantly changing requirements, etc.
- Agile is applied in all domains, not only in Multimedia series development. However, Agile seems to be used mainly at the beginning of series development
- The most common setting is that a team is working on one product and supporting one or more other projects. An Agile team is typically distributed over multiple locations and developers are assigned to only one team; on average, Kanban teams are 25 % larger than Scrum teams
- On average, organization apply Agile for three years; however, experience with the use of Agile methods and practices ranges from 6 months to 10 years



# Context of Agile Application in Practice (2)

Agile is used in all domains



## Multimedia Application Types

- Location-based Services Applications
- Telematics
- Radio Navigation

## Body Electronics Application Types

- Body Controller
- Sensors (Light, Battery,...)
- Instrument Cluster

## Powertrain and Chassis Control Application Types

- Braking Systems
- Engine Management

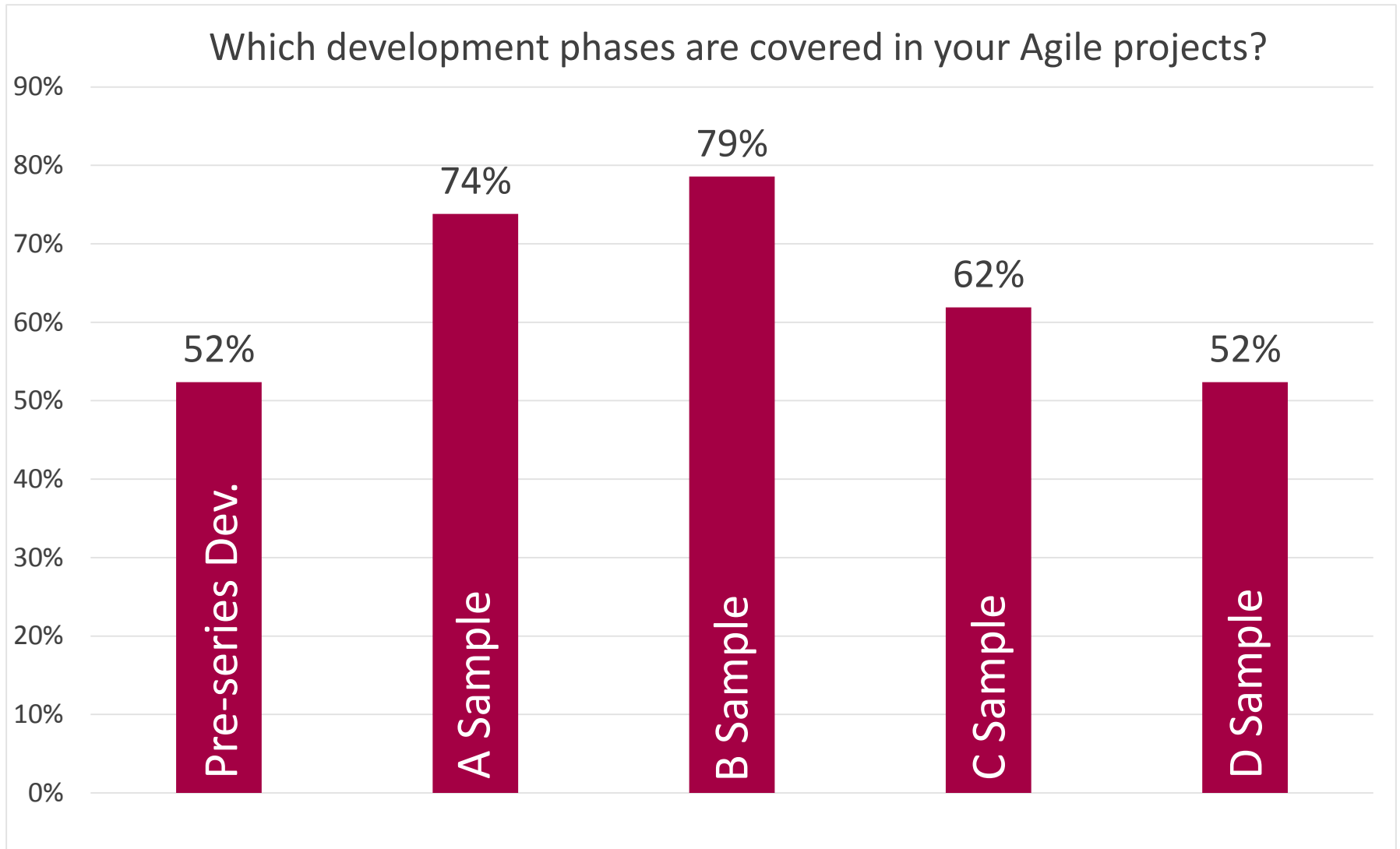
## Integrated Systems and Services Application Types

- Driving Assistance/Automatic Driving
- Intelligent Mirror
- Active Safety



# Context of Agile Application in Practice (3)

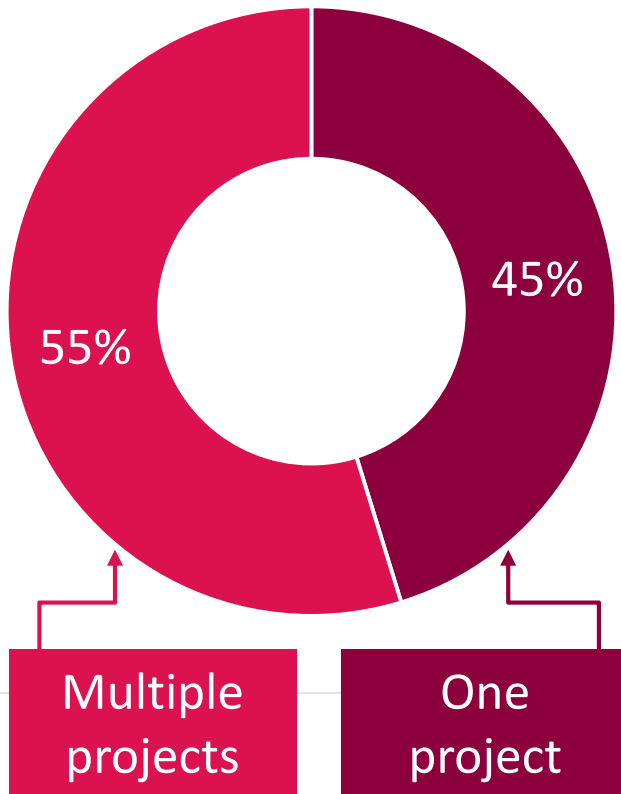
Agile is used mainly at the beginning of series development



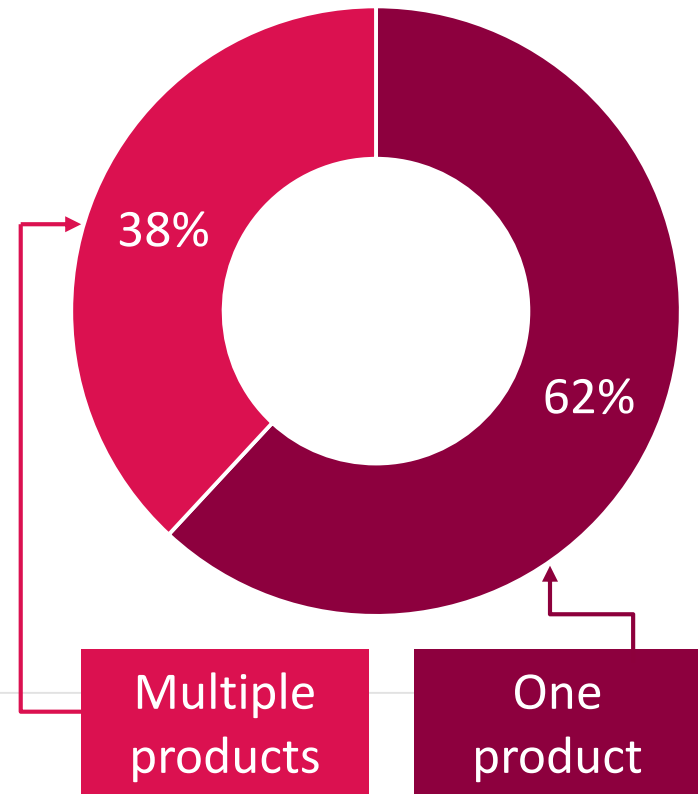
# Context of Agile Application in Practice (4)

An average team works on one product and supports one or more projects

An average team doing Agile supports one/multiple project(s) at the same time



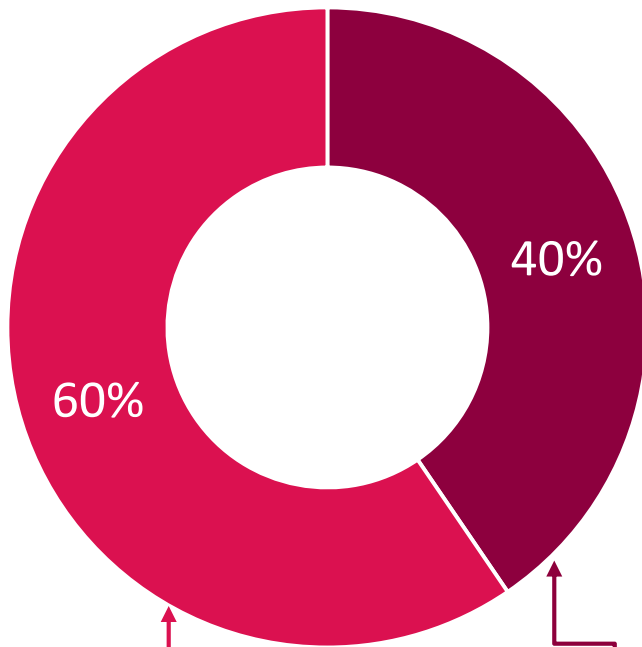
An average team doing Agile works on one/multiple product(s) at the same time



# Context of Agile Application in Practice (5)

An avg. team is distributed over multiple sites, developers are assigned to one team

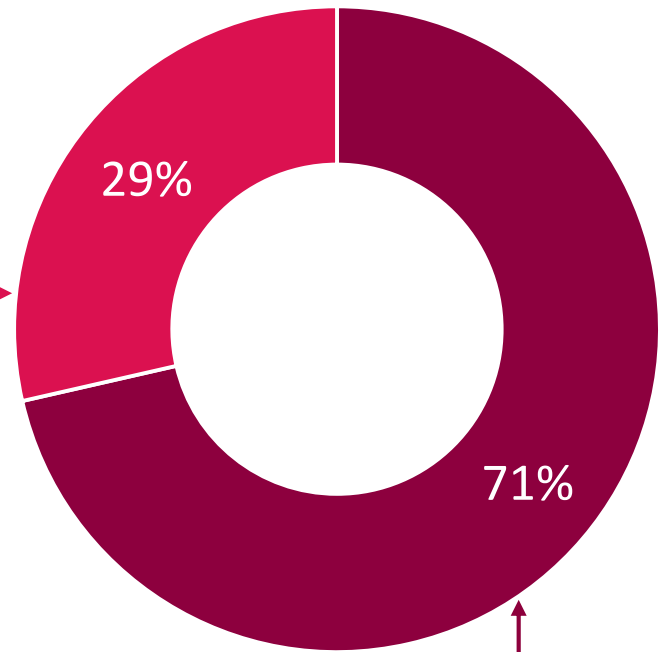
An average team doing Agile is located in one/distributed over multiple locations



Multiple sites

One site

Developers are typically assigned to one/multiple team(s)



Multiple teams

One team



# Context of Agile Application in Practice (6)

On average, Kanban teams are 25 % larger than Scrum teams

- An *average Scrum* team consists of 8 people



- An *average Kanban* team consists of 12 people



- A *median* sized Scrum team consists of 8 people



- A *median* sized Kanban team consists of 8 people



- The *largest* stated Scrum team has about 20 members, the *smallest* only 3 members

- The *largest* stated Kanban team has about 40 members, the *smallest* only 3 members



# Phase and Scope of Agile Implementation

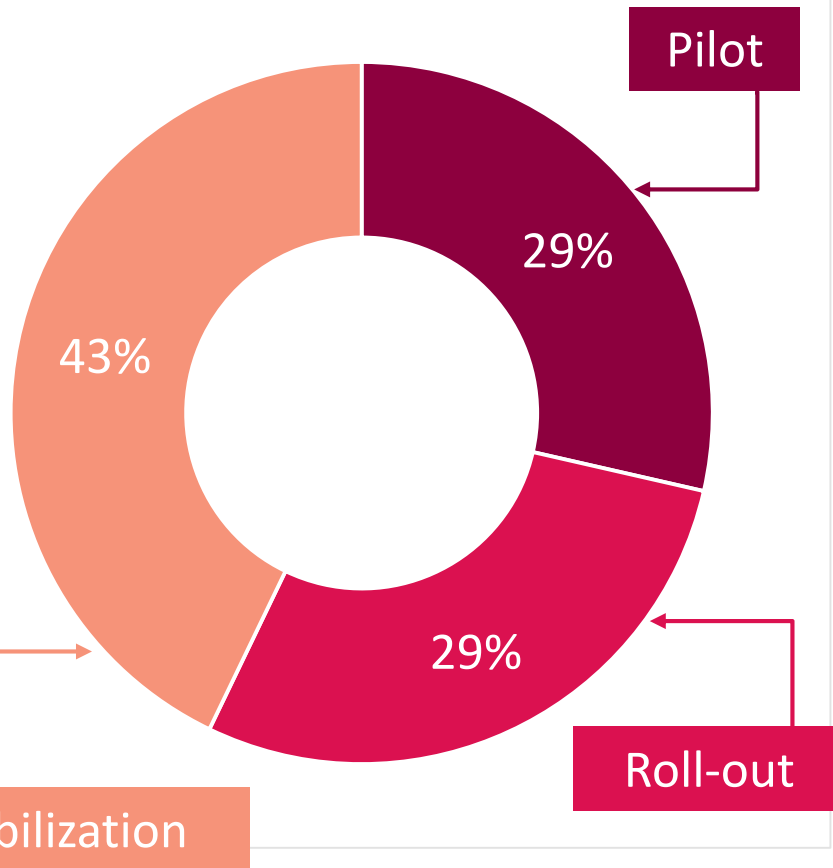




# Scope and Phase of Agile implementation (1)

In its own scope, the majority of organizations is in the stabilization phase

Which phase of the Agile implementation is your organization currently in?



The study participants showed a wide range of Agile implementation phases; while some respondent's organizations had achieved stabilization at team level, others skipped the team level and piloted Agile right at project level

## Legend:

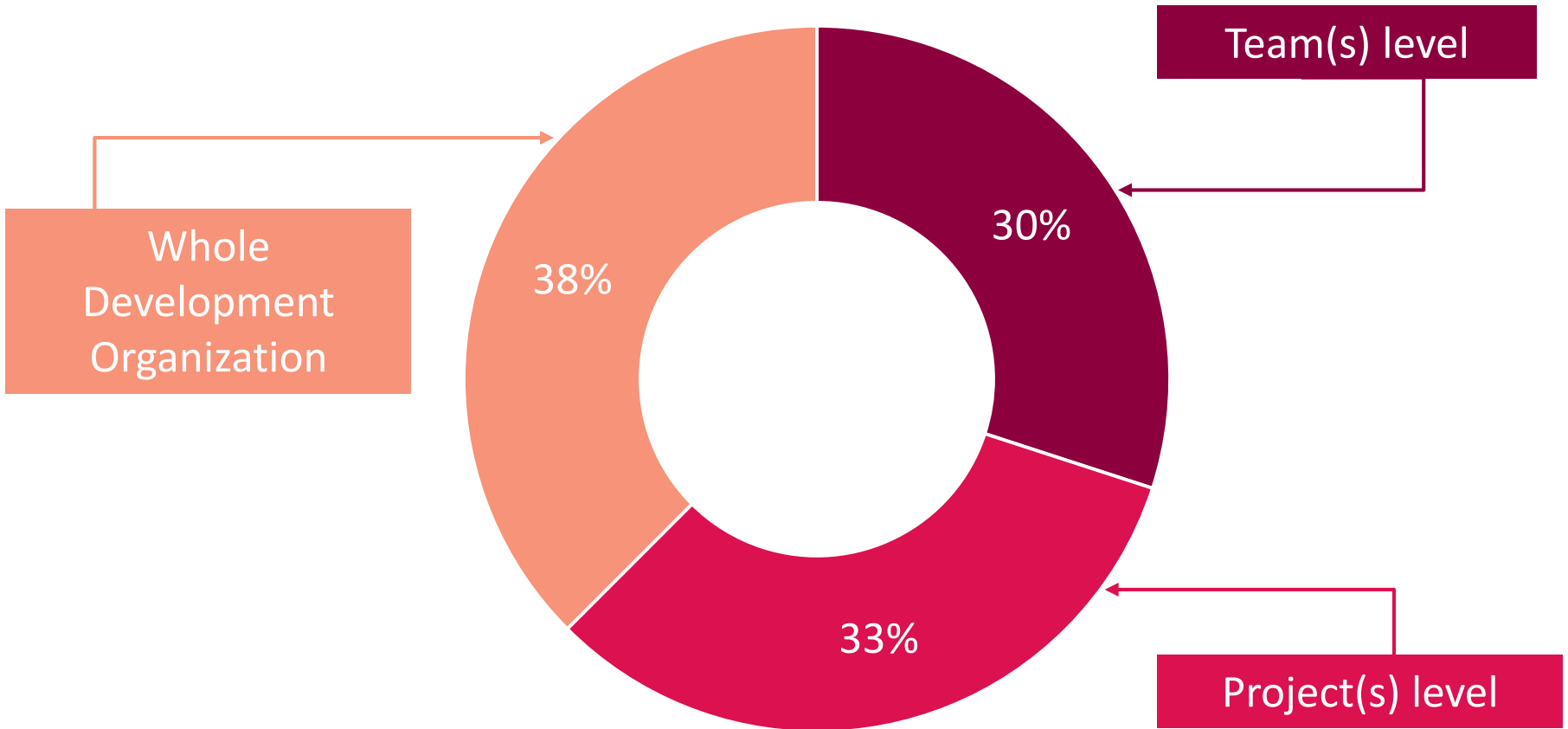
- Pilot is a small-scale attempt in order to evaluate the applicability of Agile
- Roll-out means deployment across the organization in scope after the piloting phase(s)
- Stabilization is achieved when agile roles, ceremonies and artefacts are in place and Agile has become part of the culture



## Scope and Phase of Agile Implementation (2)

Agile implementation gained a foothold at all development organization levels

What is the scope of Agile implementation in your organization?



# Agile – What and Why?



# Agile – What and Why Agile? (1)

## 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 respondents were convinced that Agile could also be applied in such areas like general management, product management and sales
- Agile can fit to different organizational levels – from team to enterprise level



*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.*



# Agile – What and Why Agile? (2)

Agile is used to address current challenges in business

Which problem areas/challenges drove the decision for the introduction of Agile methods?

- The participants mentioned the same challenges as in the previous study. The most frequent answer 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

”

*In several large projects, processes and procedures were no longer suited to ensure the desired quality.*

”

*The reason to implement Agile was rapidly evolving customer requirements.*

”

*I believe the reason to start using Agile was that the complexity of our products, and the geographically diverse setup of our teams make it necessary to have self-driven teams.*

”

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



# Agile Methods and Practices



# Agile Methods and Practices (1)

## Summary

### Agile methods and practices used

- Scrum and Kanban are the most popular Agile methods used in projects, Continuous Integration is the most used Agile practice
- The use of Kanban is increasing as an alternative or complement to Scrum, e.g. when Scrum is not suitable or does not address the main challenges
- Kanban is mainly used where there is a continuous flow of work, e.g. maintenance and support (bugs, change requests), where the work in fixed iteration does not make sense or resources cannot be committed
- Often, Scrum by the book (Scrum Guide) does not make sense in automotive. It must be adapted to the Automotive environment. Respondents do “cherry picking” and implement agile practices which are useful for them. The most popular Agile Ceremonies are Planning Meetings, Daily Stand-up, and Retrospectives



# Agile Methods and Practices (2)

## Summary

### Agile roles; how to feed Agile into the organization

- All possible combinations of new roles (Product Owner, Scrum Master) and existing roles (Project Leader, Team Lead, QA Engineer) can be found. The Product Owner and Scrum Master roles are rarely defined in the same way as they are described in the Scrum Guide. In most cases, the existing roles are kept, Product Owner/Scrum Master scope of work is added to the existing roles, which seems to work well
- Typically, the Product Owner role is handled by the Software Project Leader and Scrum Master roles, either by the Team Leader or a completely new person. Social skills of Scrum Masters are perceived as essentials for success
- Independent QA is established on the project level and the role of Quality Engineer is usually a role outside the Agile team
- No major organizational changes are needed to run Agile projects
- Co-location is the ideal case but not a must, the crucial aspect for building teams is the need for communication among its members





# Agile Methods and Practices (3)

## Summary

### Covered Processes; Agile in combination with other Standards

- For each iteration, working software is delivered at the end of integration. The optimal iteration time frame seems to be 3-4 weeks
- Mainly software processes are covered in a Sprint. In some cases also system processes are covered, however mainly as a separate sprint. System/Hardware and Software are of a too different nature to be handled in one single sprint
- Agile and Automotive SPICE as well as Agile and Functional Safety/ISO 26262 are perceived to be compatible

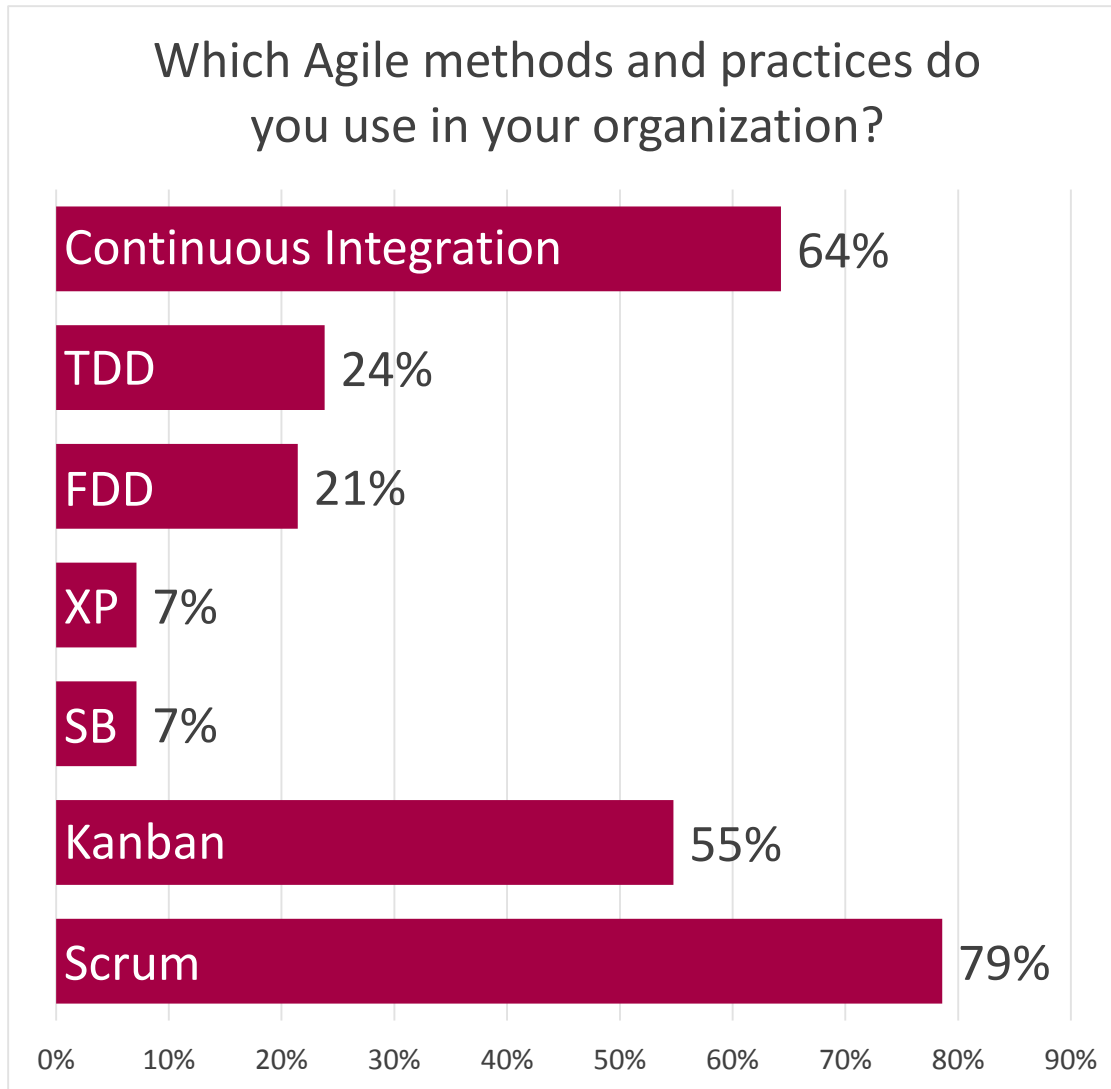
### Contradictions to our initial hypotheses

- There isn't a single case where the Product Owner comes from the customer organization. However, "internal" Product Owner seems to work well
- Contrary to our expectations, co-location (gathering the team in one location) is not perceived as an essential key success factor. Logically, physical boards are much less used. Distributed teams do work when the right communication means are in place.



# Agile Methods and Practices (4)

Kanban usage increased considerably as an alternative or complement to Scrum



- All combinations of using Scrum with any other method or practice can be found
- Compared to last year's study, Kanban usage increased significantly, especially as an alternative or complement to Scrum

## Abbreviations:

- TDD = Test Driven Development
- FDD = Feature Driven Development
- XP = Extreme Programming
- SB = Scrumban



# Agile Methods and Practices (5)

Scrum is nearly always tailored; whole scope of Kanban is increasingly being used

## Scrum

- Scrum is rarely used “by the book” (Scrum Guide); if at all, then it is used on team level; processes and roles are more or less tailored, depending on the project environment; usually a sub-set of agile ceremonies are in use
- Scrum is often used in combination with other Agile practices Continuous Integration, Test Driven Development, etc.

## Kanban

- Kanban is mainly used for a continuous work flow, e.g. Maintenance and Support (Bugs, Change Requests)
- Kanban is sometimes mentioned only as a visualization mechanism (Board); however, the real scope of Kanban goes beyond pure visualization
- Compared to last year’s study, more and more “full application of Kanban principles”, i.e. limit WIP, etc., are mentioned



## Agile Methods and Practices (6)

Stakeholder Feedback is rarely given; Action Items are not implemented at once

Does the team gather feedback from stakeholders/end users after every review?

- One third of the participants stated that their teams gathers feedback from stakeholders after every review

”

*Due to the variety of stakeholders, individual feedback is unsystematic, irregular.*

”

*Feedback is given by the Product Owner.*

Are Action Items from the Retrospective implemented before the next Retrospective?

- 31% of the participants stated that action items from a retrospective are implemented before the next retrospective
- 41% struggle with the implementation of the action items in time

”

*In general, improvements from retrospectives are implemented. But they are not always implemented before the next retrospective – it's not always possible.*

”

*It takes usually several iterations to implement actions.*



# Agile Methods and Practices (7)

Software increments are delivered regularly; Changes during sprints are common

Are you delivering a working software incrementally, e.g. every 4 weeks?

- Almost 60% of the participants stated that their Scrum teams deliver working software e.g. every 4 weeks; however, some 16% face problems to deliver software after every iteration



*Not possible for platform development*



*SW Development Teams deliver regular SW increments based on CI. SW Integration Teams deliver SW at each release.*

"No changes during the Sprint" is valid for most of your Sprints

- One third of respondents stated that changes are made during the sprints



*On a need basis, changes are permitted to alter the release content as an outcome of the weekly sprint backlog review with the customer.*

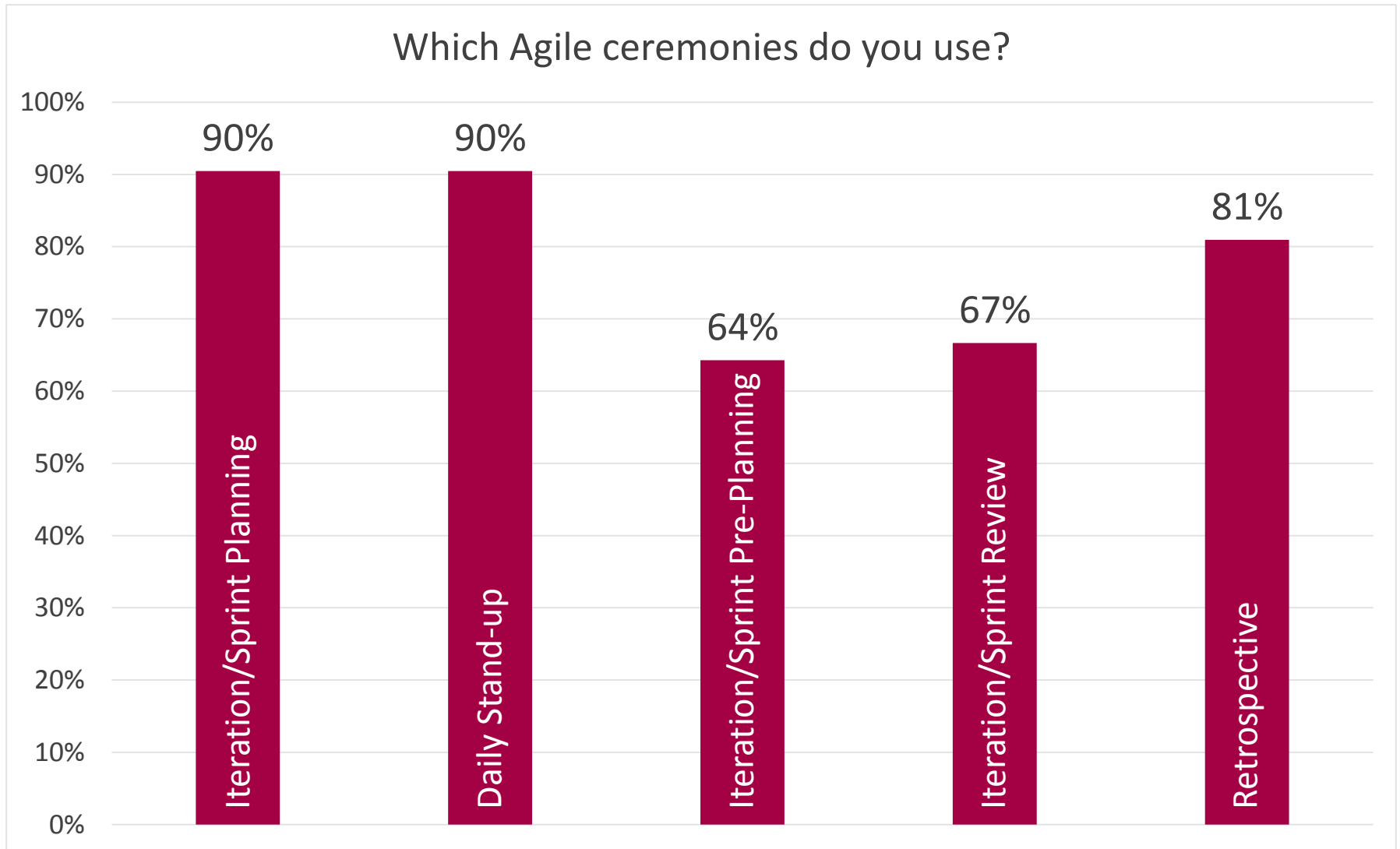


*Partly, too much dynamics at the moment*



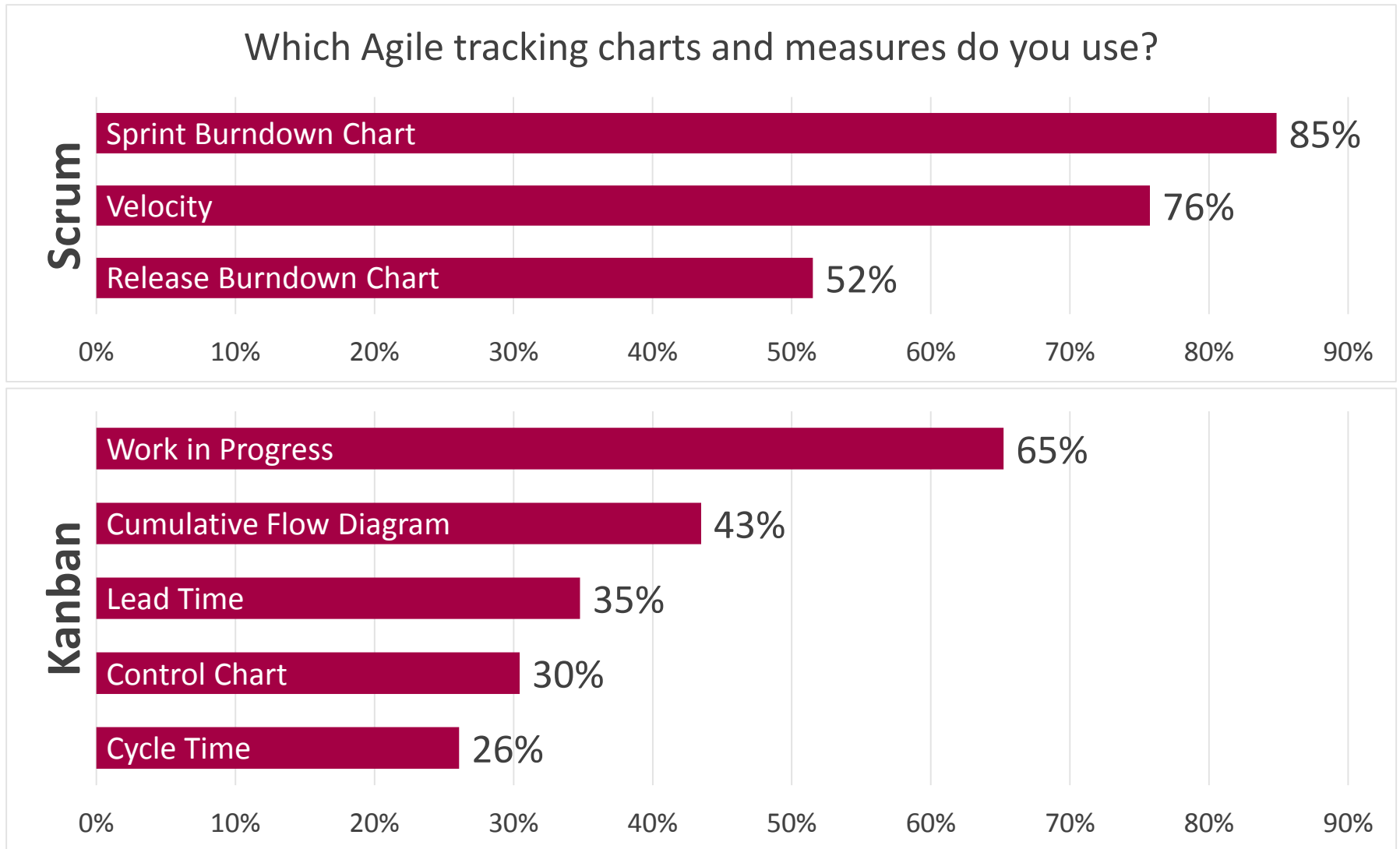
# Agile Methods and Practices (8)

The Pre-Planning Meeting is the least common agile ceremony



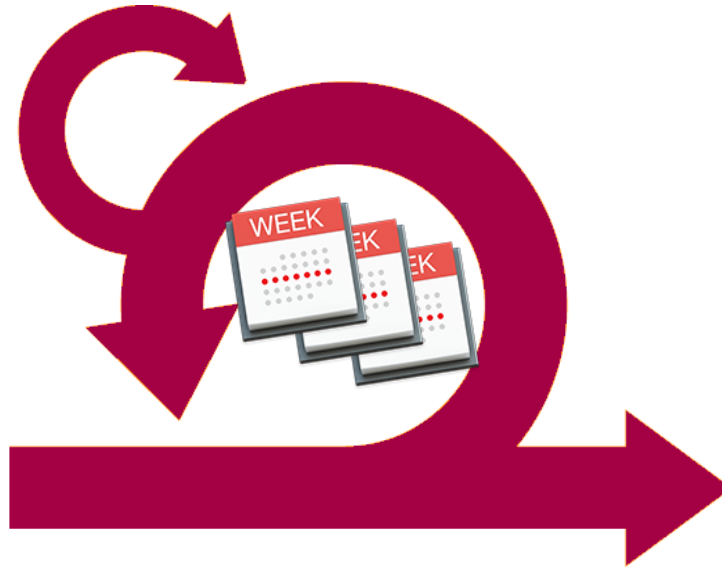
# Agile Methods and Practices (9)

Tracking charts and measures are more common in Scrum than in Kanban World



# Agile Methods and Practices (10)

## Three weeks is the most favored Sprint length



- The average length of a sprint used by Scrum teams is 3 weeks; the desirable sprint length in average is also 3 weeks
- No respondents stated a shorter sprint length than 2 weeks and a longer sprint length than 4 weeks; one participant, however, said that they have 8 weeks sprints

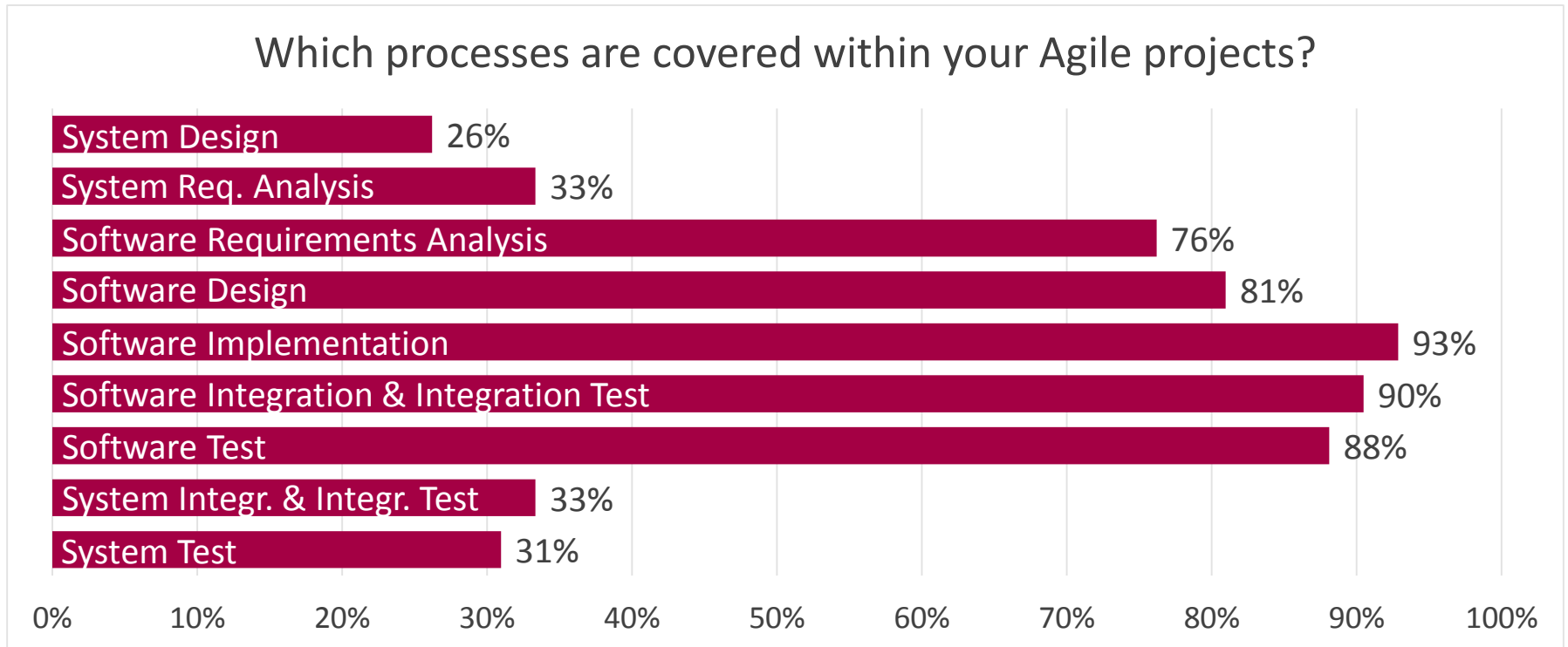




# Agile Methods and Practices (11)

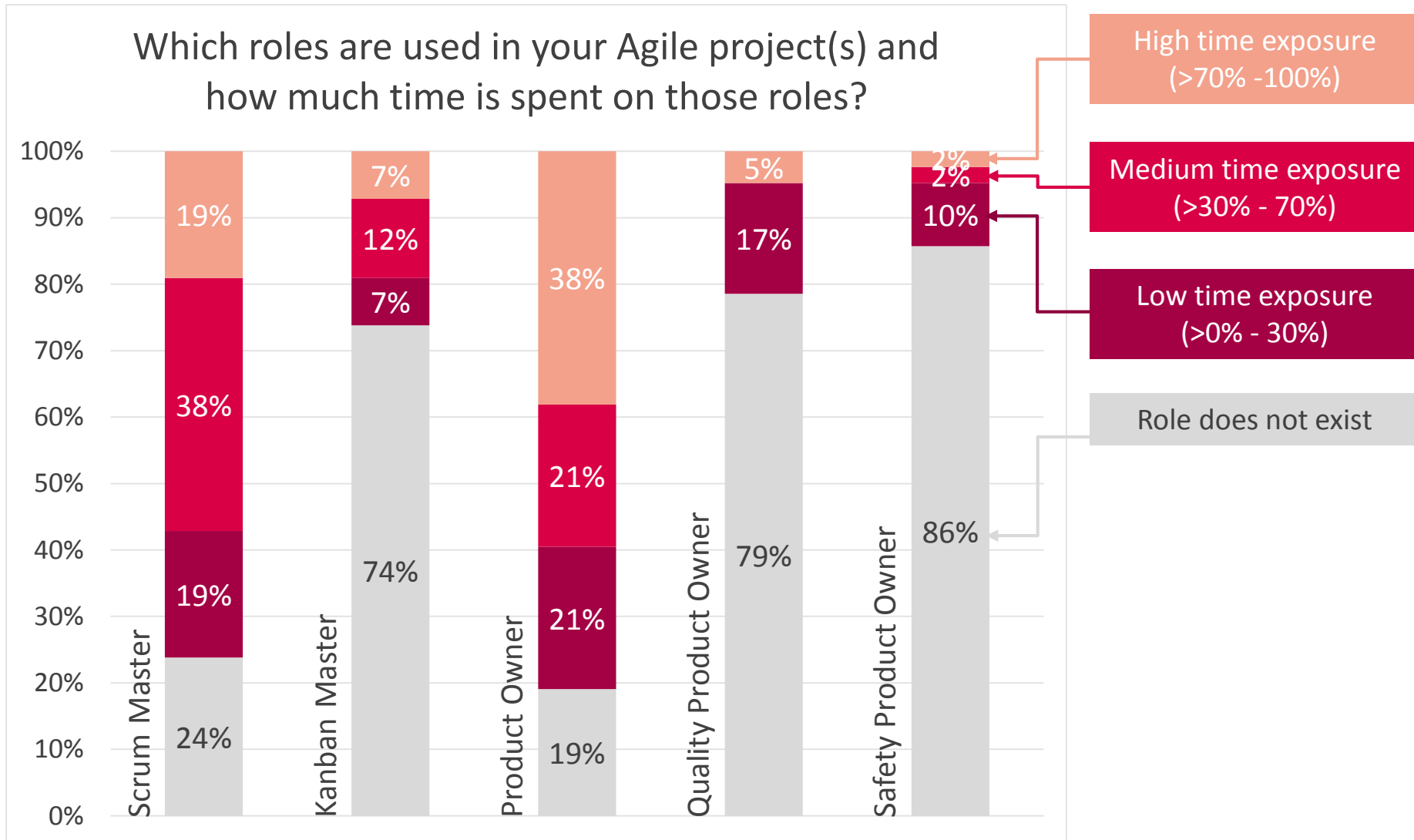
## In most cases a sprint covers software development processes

- System level processes were also covered in a few projects mainly as a separate “upfront” sprint in the waterfall fashion
- Respondent opinion is that it hardly makes sense to mix System/Hardware and Software within one single sprint due to their different natures. One pilot actually did fail
- In some cases, the scope of sprints depends on sprint goals and therefore may cover different processes (System, Software, V&V)



# Agile Methods and Practices (12)

High time exposure Agile roles are the exception rather than the rule



# Agile Methods and Practices (13)

## Scrum Master/Product Owner role is implemented in almost every Scrum team

- Scrum Master and Product Owner roles are implemented in almost every Scrum team
- Whereas the Product Owner role is often exposed to high time pressure, the Scrum Master role is stated to be less time-consuming and tends to be a part-time job; often Scrum Masters are part-time developers or responsible for two or more teams
- The role of Product Owner is either a specific role or typically assumed by Software Project Leaders
- Scrum Master is either a specific role or typically assumed by Team Leaders



*This is still one of the biggest struggles – but not recognized by people – in the case of Scrum Master. Just renaming is not sufficient (e.g. self-organization is not necessarily supported if the team leader becomes the Scrum Master). Less a problem for Product Owner – but still to be considered: Just renaming is not sufficient (don't forget competencies). So, individual social competencies do not necessarily match social competencies required by a role.*



# Agile Methods and Practices (14)

## Agile roles and existing roles can be found in a wide range of combinations

All possible combinations of new roles (Product Owner, Scrum Master) and existing roles (Project Leader, Team Lead) can be found:

- Single Product Owner versus hierarchy of Product Owners (led by Product Manager=Chief Product Owner), or Product Owner managing a “stakeholders” group
- Product Owner is sometimes Software Project Leader, Group Leader, Senior Management
- Scrum Master is sometimes Software Project Leader, Team Member not part of the development team
- It is difficult to assess whether the standard roles (e.g. Project Manager) mapped to agile roles (Scrum Master/Product Owner) are really working according to Scrum rules



# Agile Methods and Practices (15)

Product Owner is the interface to the customer and internal to the organization

## How is the interface to the customer set up?

- Customer interface is managed by the Product Owner or Chief Product Owner (if several sub-projects)
- Requirements Expert is the internal customer representative together with the program manager
- If a high degree of technical detail is needed, the Product Owner deals with the customer directly
- In all cases, Product Owners come from the internal organization



*Product Manager is talking with the customers, PO is talking with the customers only if it is about details*



*The Product Owner is the interface to the customer*



*The Requirements Expert is the internal customer representative together with the program manager*



*The Product Owner is always an internal role!*



# Agile Methods and Practices (16)

Interfaces with internal and external Non-Agile areas usually do not change

## Did interfaces with Non-Agile areas change?

- Agile projects are typically “encapsulated”, so no need for changes. Existing mechanisms like feature plan and integration schedule are handling those interfaces.
- Product Owner is addressing those dependencies



*No change as such. We kept the interfaces.*



*Response time had to be adapted to the sprint rhythm*



*There were problems with non-agile fields on the customer side; due to this, agile projects have also been discontinued*



*The interface is still difficult; often customers still follow old-school milestones*



# Agile Methods and Practices (17)

In general, Quality Assurance is external to an Agile team

## How did you implement the independent QA Role within the agile project?

- Only in very rare cases is the QA role part of the agile team, with all tasks taken into account during the sprint but still having an independent reporting channel. In most cases, QA is independent and organized traditionally



*QA tasks are taken into account in the sprint and included in planning*



*Independent Product QA group owns validation responsibilities. It does not follow an agile methodology*



*QA is outside the Kanban and Scrum Teams*



*There is an independent QA role outside the project, planned & traced inside the project, but monitored and coached from outside*



# Agile Methods and Practices (18)

Agile implementation does rarely need organizational changes – apart from roles

Were "organizational" or any other kind of changes necessary during the introduction of Agile?

- The only organizational changes relate to the definition of roles; e.g. PO, SM, which had been covered by existing roles. Also, some tailoring of processes as well as a re-definition of interfaces with suppliers was mentioned.
- The organizational structure as such was not changed.
- In one case, mid-management was let go, because the focus changed from management of teams to self-organization

”

*No changes needed, we just adapted existing roles and the existing process (existing leads = Kanban Master/Scrum Master/Product Owner)*

”

*There was no change necessary.*

”

*The whole department was re-engineered; in the past all engineers were project engineers; with the implementation: specialists were put around components, POs were found etc.*





# Agile Methods and Practices (19)

Agile in combination with Automotive SPICE is possible

To what extent could you integrate agile elements in your process landscape without compromising on the ASPICE level?

- The majority of respondents stated that there is no contradiction between Agile and Automotive SPICE.



*No impact. Agile helped to have a detailed updated plan. Now starting to document ASPICE processes (Level 3). Mandatory to have process documented to propagate ideas across the company.*



*ASPICE = Common sense. No influence. Agile Process is NOT in contradiction with ASPICE*



*Tasks from the ASPICE process are included in the backlog and planned accordingly.*



# Agile Methods and Practices (20)

Agile in combination with Functional Safety/ISO 26262 is possible

To what extent could you integrate agile elements in your process landscape without compromising on the requirements of ISO 26262?

- ISO 26262 is not perceived as being difficult to integrate with Agile.
- For most interviewees ISO 26262 is not in contradiction with Agile, or it was not applicable for them. All levels of ASIL were mentioned to be within the scope



*So far it is assumed that it can be done without compromising on Functional Safety*



*Our AUTOSAR project was developed as ASIL D, was also Agile and worked well.*



# Tools used



# Tools used (1)

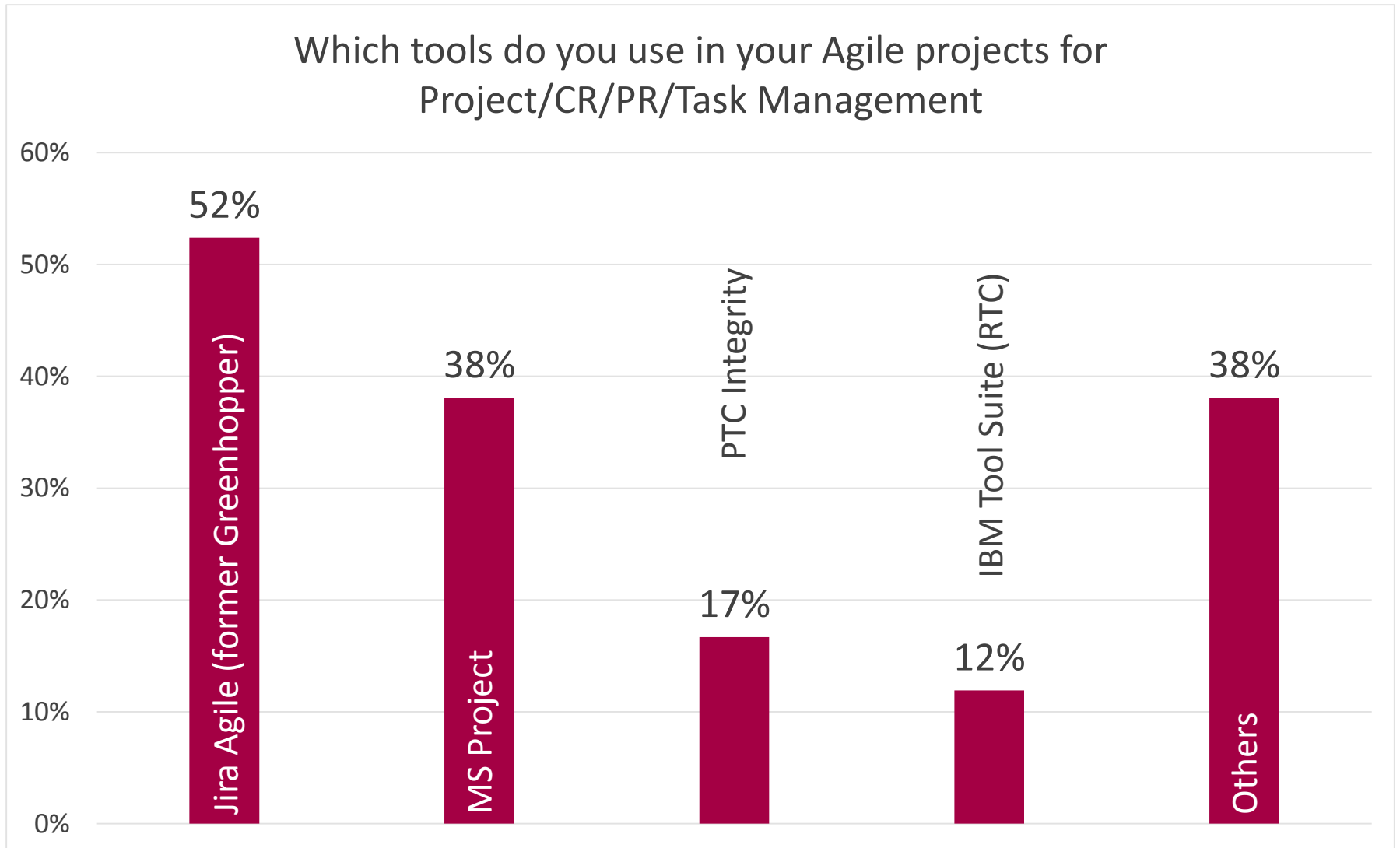
## Summary

- A big variety of tools can be found in Agile projects. Though it is difficult to identify the leaders for some areas, the management tool Jira seems to be the most popular one for Agile Projects. For integration it is the tool Jenkins
- Tools and infrastructure are one of the key preconditions for successful Agile implementation and are often on the top of the agenda of Agile transformation programmes



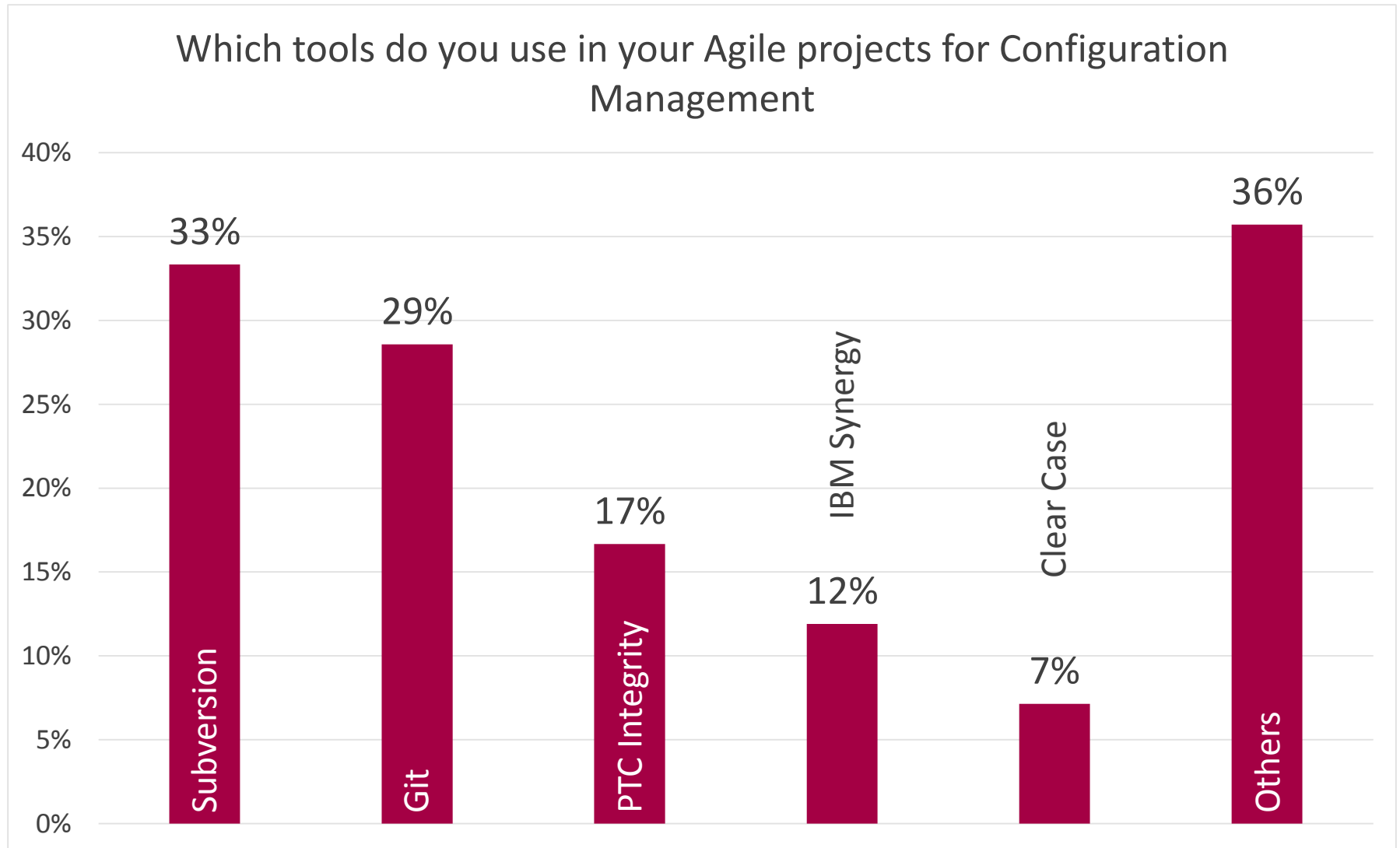
## Tools used (2)

Jira Agile is the most widely used tool for Project/CR/PR/Task Management



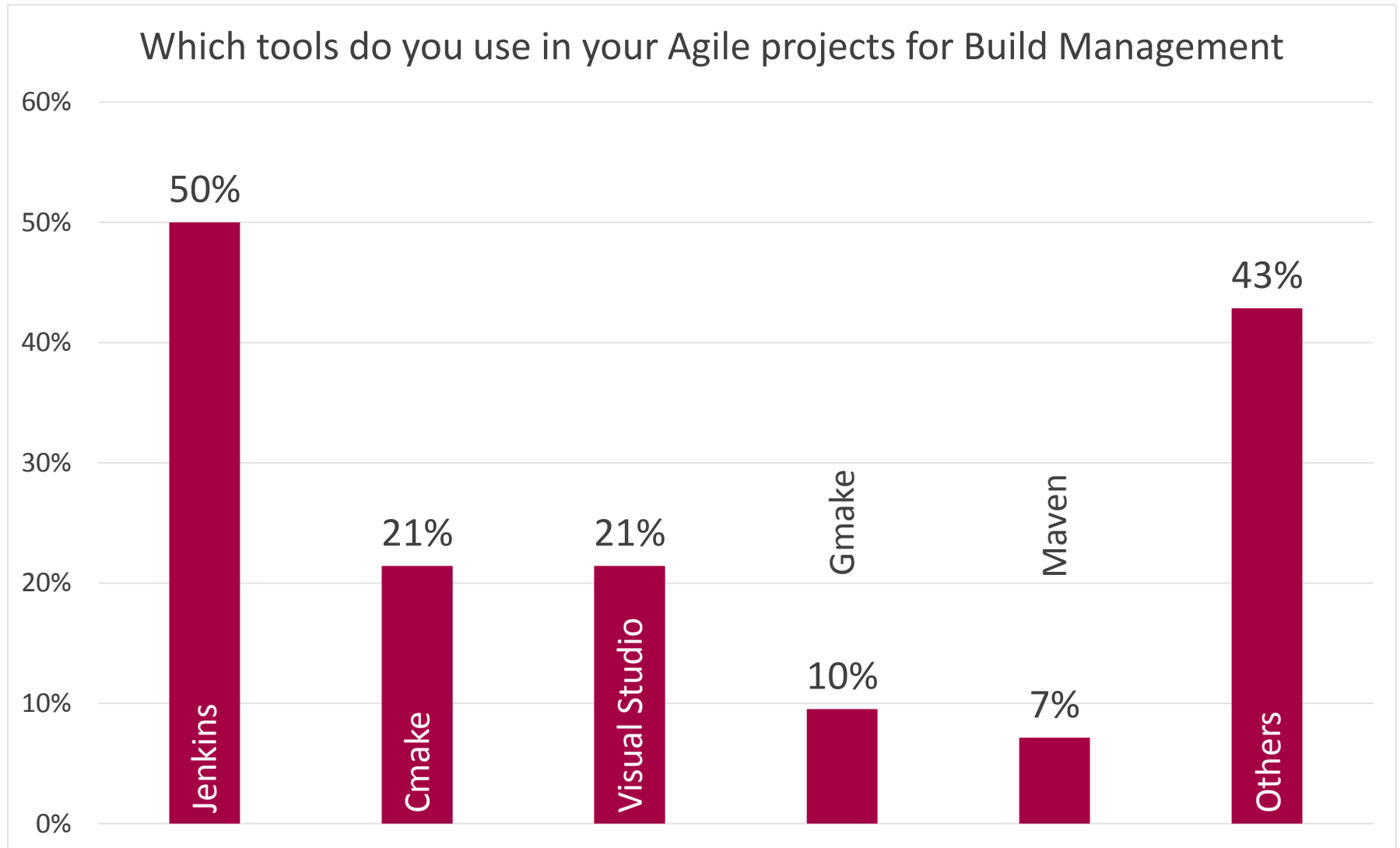
## Tools used (3)

Subversion and Git are the two most widely used tools for Config. Management



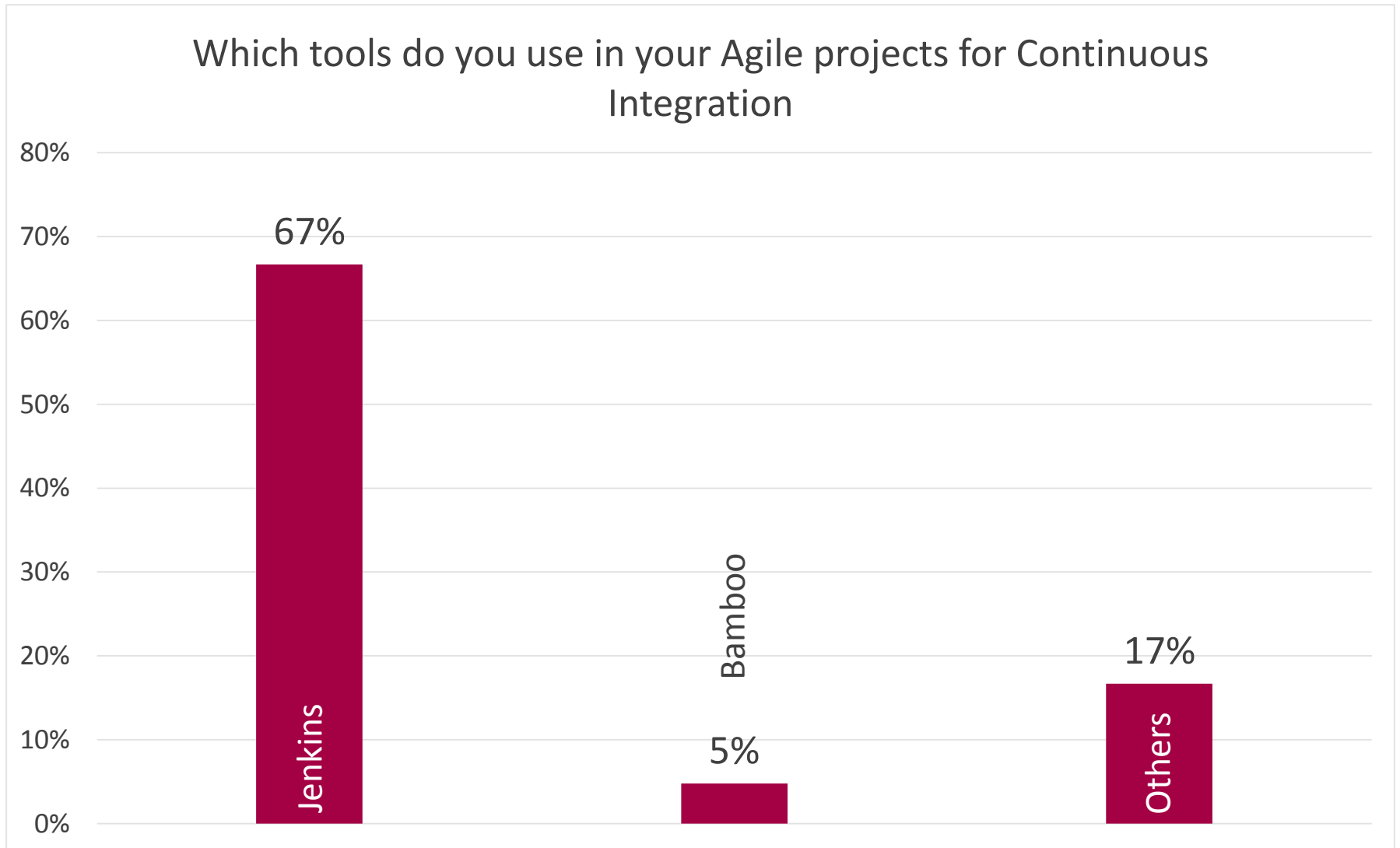
## Tools used (4)

Half of all participants stated that they use Jenkins to handle the software build



## Tools used (5)

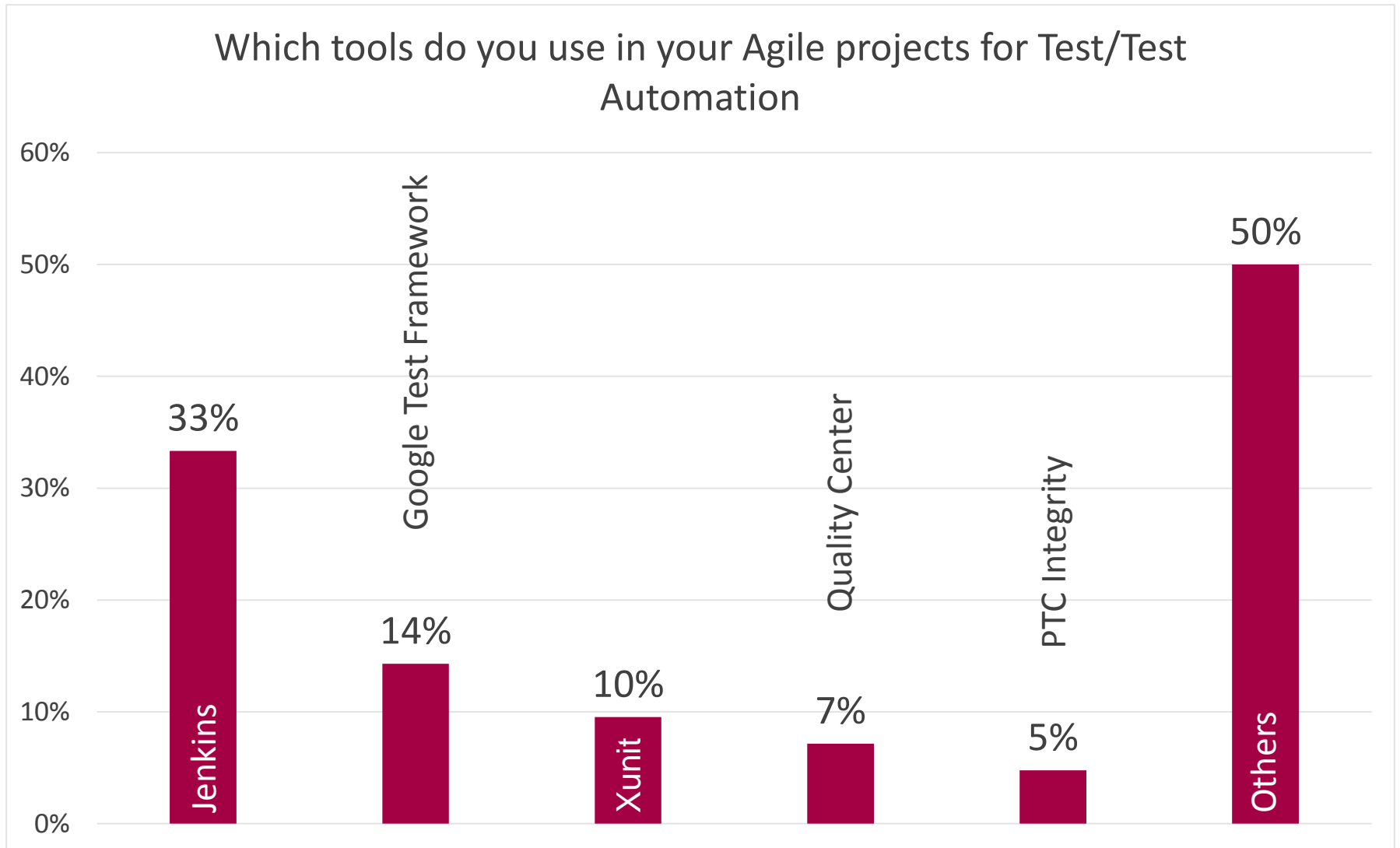
Two thirds of all respondents stated that Jenkins is used for CI





## Tools used (6)

One third of all respondents stated that Jenkins is used for Testing



# Experiences and Lessons Learned



# Experiences and Lessons Learned (1)

## Almost all Agile attempts are successful

- No project really failed so far except in one specific case (small team covering both HW and SW); a few respondents stated that they had some failures before
- The majority of respondents mentioned that following Agile methods/principles “blindly” as described “by the book” (Scrum Guide) would have led to failure
- The main perceived “risk” areas for failure are lack of understanding what Agile means, and appropriate “soft” skills
- The main pointed-out barriers were trying to fit agile elements into a non-agile environment, ability to change organizational culture, project complexity and customer collaboration



*Most of the attempts are successful, some failed. Reasons for failure: Fall back to non-agile management behavior in critical situations*



*Getting the tools right for the first pilot was hard. The first pilot failed because of that. Once the tools were right, adoption went through the roof.*



*Some teams did not accept Agile - because of the culture of the team leader, not because of the team. Team leader was afraid to provide visibility about what was going on...*



*Difficulty to build a team-based culture. Old management behavior still in place*



## Experiences and Lessons Learned (2)

### Agile improves project visibility and ability to manage changing priorities

#### Which actual benefits could you measure?

- One third of the interviewees stated that they perceived an improved project visibility as well as an improved ability to manage changing priorities. However, only a few organizations could prove quantitative improvements with KPIs
- Other common benefits which were mentioned:
  - Increased productivity
  - Reduced Risk
  - Increase in Team Morale

”

*Improvement of team morale has not been explicitly measured, but new staff quickly feels good. For other benefits, there is not enough evidence so far.*

”

*Significantly less escalations, improved on-time delivery and quality, reduction in staff turnover, greater transparency*

”

*You cannot really see if Agile is more efficient, we don't have hard KPIs*

”

*As of today, the satisfaction is assessed qualitatively. Quantitative / objectified measurements are not yet available.*

”

*Project visibility, simplified process, self-organizing team which does not need much control from headquarters*



## Experiences and Lessons Learned (3)

### Major concerns regarding Agile: Inability to scale and lack of up-front planning

#### What were/are still the main concerns regarding Agile?

- Inability to scale and lack of up-front planning; lack of predictability are big concerns
- Management Resistance is another issue



*Easy in one team, scaling to many locations is a concern; lack of knowledge how to do it on a global scale*



*Low and high performers have a problem in such projects - low performers with transparency, high performers lose the hero status*



*It is rarely discussed how to keep agility alive; paradigms of the past are often maintained while agile practices are rejected*



*Internal customers try to change requirements too often; it happens that sprints are aborted*



# Experiences and Lessons Learned (4)

Management commitment and openness to change are key factors

## What are the organizational preconditions for successful Agile transformation?

- Preconditions for success in Agile relate to typical success factors for a change initiative:
  - Management commitment, trust, support and freedom to innovate
  - Communication
  - Learning curve: More work at the beginning to achieve the expectations
  - Team readiness
  - Tools and infrastructure



*It must be clear that this needs to be a decent change program. It costs money, and sweat; you need a driver and it takes time and perseverance.*



*Establish a cross-functional team and let it evolve into a self-organizing team*



*Willingness to try Agile, investment in tools (in terms of effort), compelling reason to change (here it was quality)*



*Management support and understanding of the nature of Agile across all levels*



# Experiences and Lessons Learned (5)

## Next steps regarding Agile: Scaling and Automated Testing

### What are your next steps with regard to Agile?

- All respondents confirmed the continuation of their agile activities; e.g. pilot evaluation, next pilot, continuous roll-out, or continuous improvements of the current processes.
- Scaling and Automated Testing is getting more and more a crucial topic



*The only way to get a working tested software in three weeks is to have automated test. Goal: 90% of automation.*



*Stabilization of the process, expansion to other locations, multiple Scrum teams*



*Adopt additional agile principles, put more discipline into scrum, launch a metrics program, adopt better tools*



*Extend Agile to application projects and platform level; Kanban pilots in HW and mechanics*



*Extend or improve tooling*



# Comparison with the previous year's results





# Comparison with the previous year's results (1)

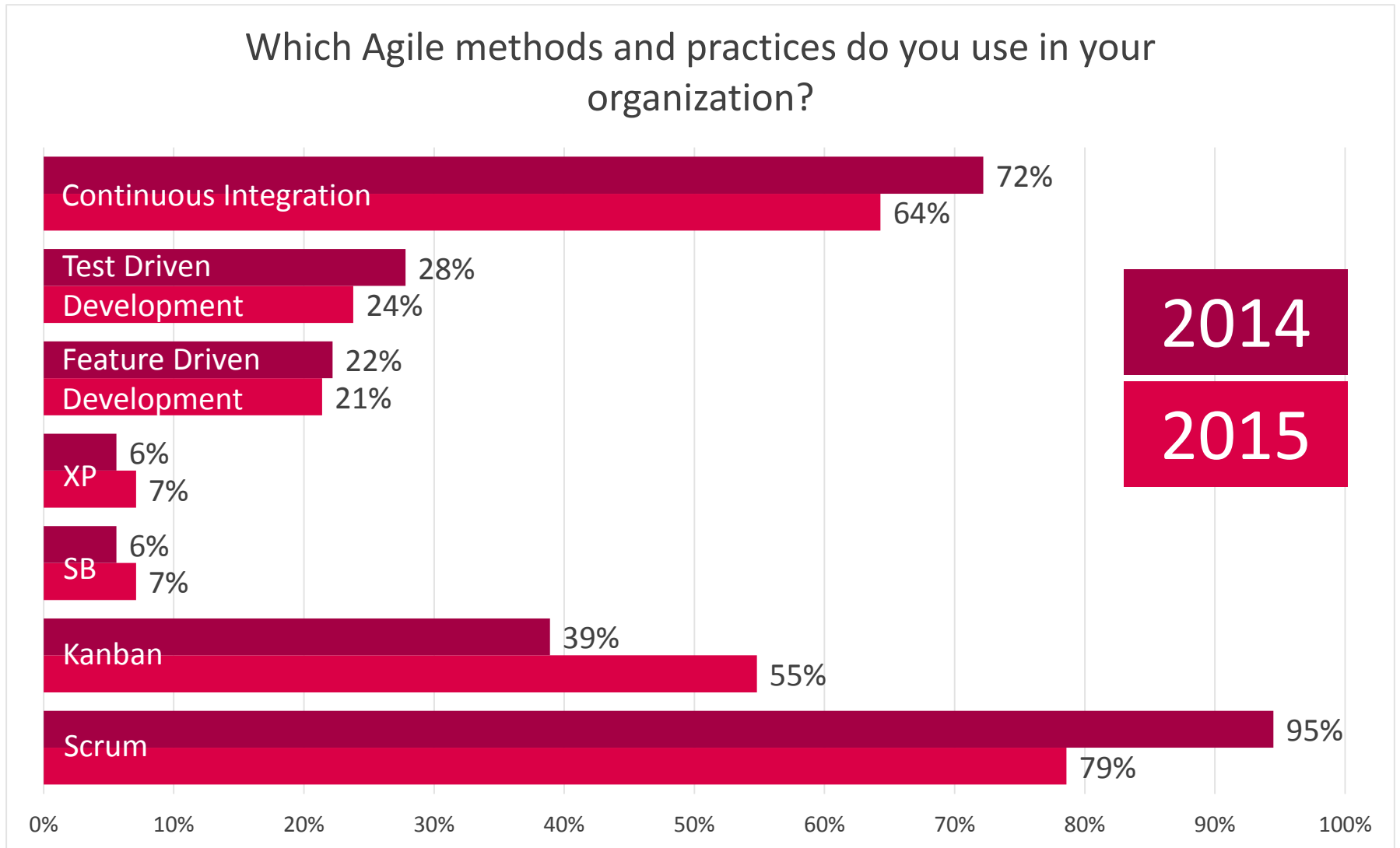
## Summary

- The “domination of Scrum” as shown in last year’s study is not that obvious anymore. The automotive industry is maturing in terms of choosing the most appropriate methods rather than the most fashionable one; Kanban is becoming more popular as well as lean principles
- Agile projects are increasingly covering mainly software development processes. Unlike in last year’s study, Agile today seems to play a minor role in System Requirements Analysis and System Design
- An increased number of Agile projects transit from the pilot and roll-out phase into the stabilization phase; Agile projects are rather rolled out or stabilized
- JIRA as a Project/CR/PR/Task Management tool and Jenkins as a Build tool have grown strongly in use; furthermore, Jenkins has taken over the leading role among test/test automation tools



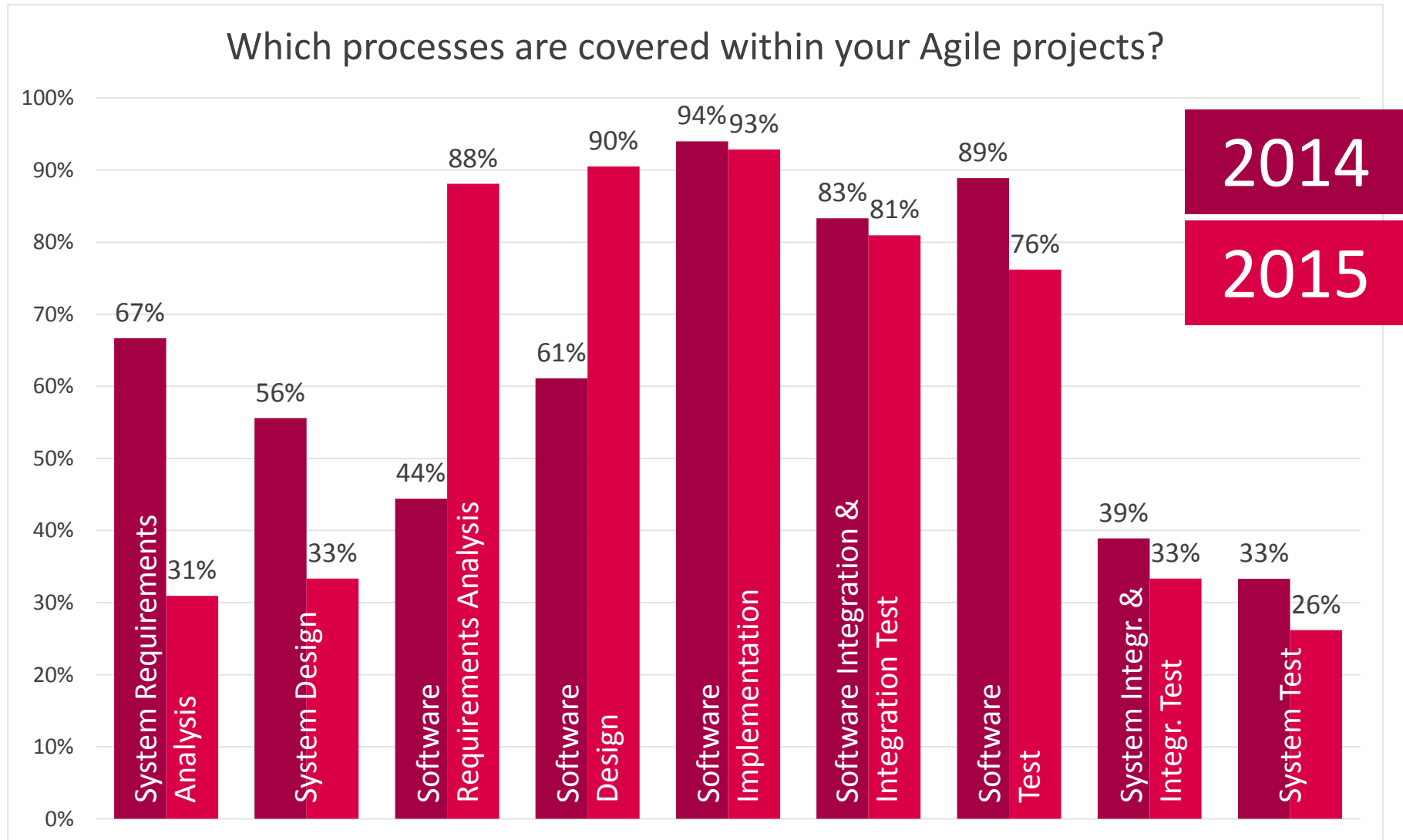
# Comparison with the previous year's results (2)

## Kanban is catching up



# Comparison with the previous year's results (3)

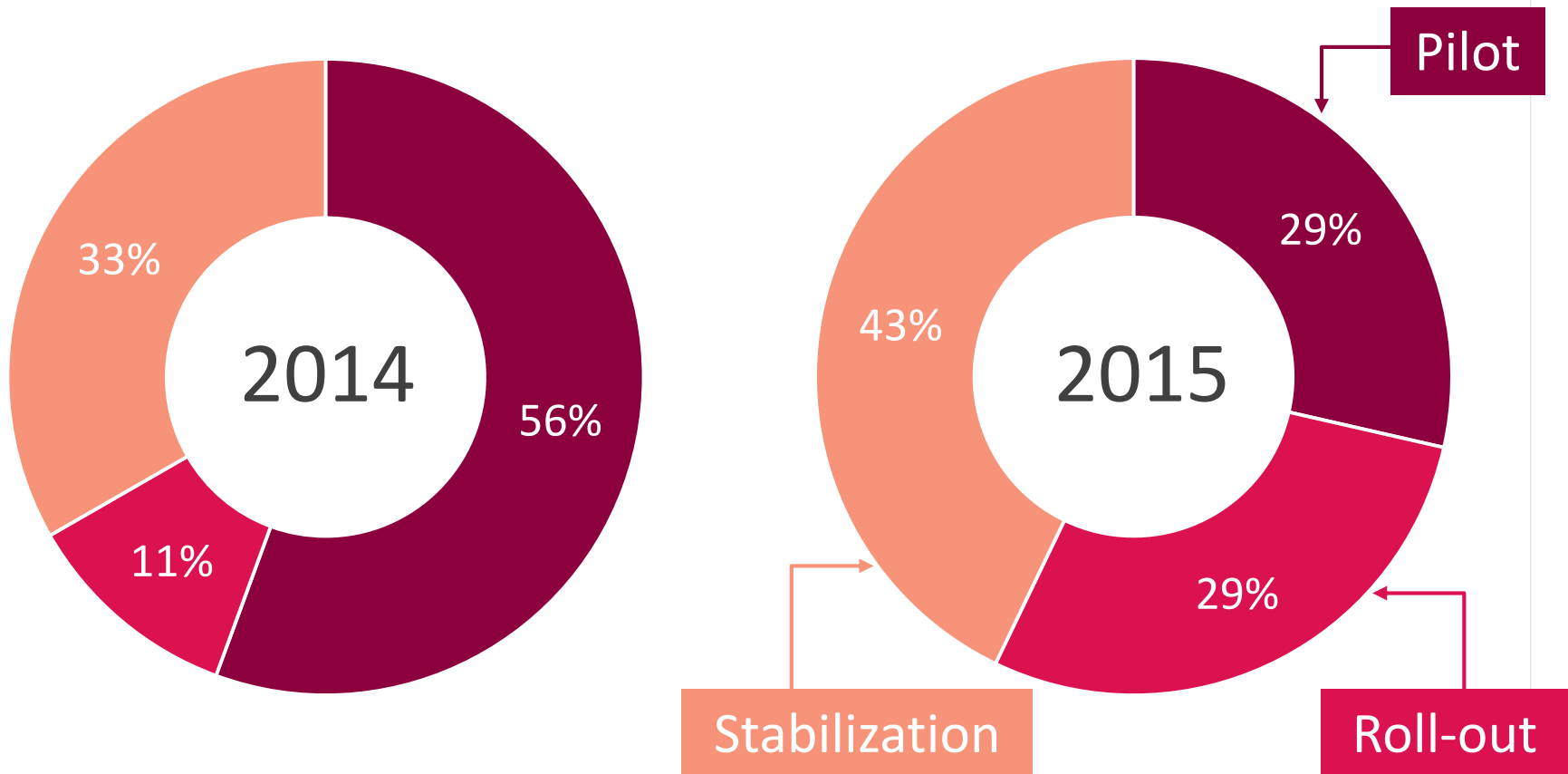
Prime focus of Agile projects is still on software development



# Comparison with the previous year's results (4)

An increased number of Agile projects transit into the stabilization phase

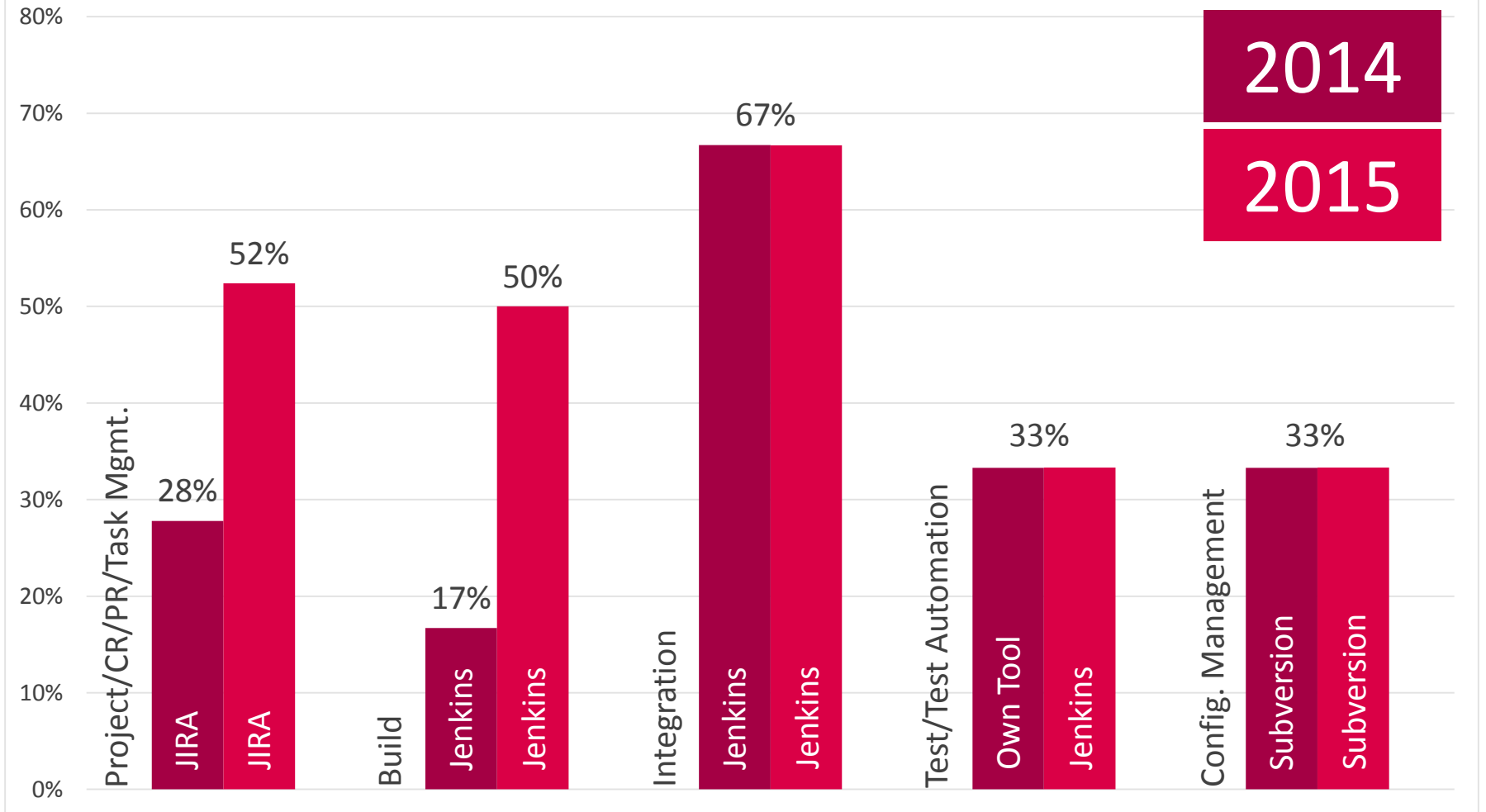
Which phase of the Agile implementation is your organization currently in?



# Comparison with the previous year's results (5)

JIRA and Jenkins are the big winners, significant tool change in Test Automation

### Comparison of the top Tools



# Summary and Conclusion



# Summary and Conclusion (1)

- Agile is a mindset supported by principles, methods and practices; i.e. time boxing, communication, iterations, empowering the team, flexibility, and short feedback loops
- The main reason for adopting Agile is that traditional software development methods are not flexible enough to address the emerging challenges in software development, e.g. high complexity increase, constantly changing requirements, and shorter time to market. The return on experience is very positive
- On average, organizations apply Agile for three years; however, experience with the use of Agile methods and practices ranges from 6 months to 10 years; Agile implementation has gained a foothold at all development organization levels
- Benefits (although rarely quantified) with regard to productivity increase, better project visibility and improved team morale are visible
- The “domination of Scrum” as shown in last year’s study is not that obvious anymore. Kanban as an alternative or a complement to Scrum is becoming more popular as well as Lean Software Development principles
- Often, Scrum “by the book” (Scrum Guide) does not make sense in automotive, it must be adapted to the Automotive environment; respondents do “cherry picking” and implement agile practices which are useful for them; the most popular Agile ceremonies are Planning Meetings, Daily Stand-up, and Retrospectives



## Summary and Conclusion (2)

- Kanban is mainly used where there is a continuous flow of work, e.g. maintenance and support (bugs, change requests), where work in fixed iterations does not make sense or resources cannot be committed
- Agile is applied in all domains, not only in Multimedia series development; however, Agile seems to be used mainly at the beginning of series development (A Sample and B Sample)
- Agile is typically first introduced in an internal project (e.g. platform development) and then within a customer project; there are no major organizational changes needed to run Agile projects – apart from roles
- In most cases, the existing roles are kept, Product Owner/Scrum Master scope of work is added to the existing roles, and it seems to work well. Product Owner and Scrum Master roles are rarely defined in the same way as they are described in the Scrum Guide
- Typically, the Product Owner role is handled by the Software Project Leader and Scrum Master role either by the Team Leader or a completely new person. Social skills of Scrum Masters are perceived as essentials for success
- The most common team setting is that one team is working on one product and supporting one or more projects. Agile teams are typically spread over multiple sites and developers are assigned to only one team. On average, Kanban teams are 25% larger than Scrum teams





## Summary and Conclusion (3)

- Co-location is not a must, the crucial aspect for building teams is the need for communication among its members
- Tools and Infrastructure are a key precondition for successful Agile implementation and are often on the top of the agenda of an Agile transformation programme
- A big variety of tools can be found in Agile projects. Though it is difficult to identify the leaders for some areas, the management tool Jira seems to be the most popular one; for integration it is Jenkins
- Automotive SPICE as well as Functional Safety/ISO 26262 are not perceived as difficult to combine with Agile
- Almost all Agile attempts are successful; management commitment and openness to change are key factors; a majority of respondents mentioned that following Agile methods / principles “blindly” as described “by the book” (Scrum Guide) would have led to failure. Major concerns regarding Agile: Inability to scale and lack of up-front planning
- The scope of the application of Agile practices and methods in the automotive industry is mainly limited to software development
- Full benefits of Agile may be achieved when applying it beyond software development and when applying it as a OEM/Supplier co-operation
- Next steps in the automotive world: Scaling and Automated Testing



# Summary and Conclusion (4)

## An alternative summary

### Agile Manifesto/Principles and Automotive

Reading the Agile Manifesto with Automotive eyes can create some controversy. Some principles are viewed quite negatively in terms of applicability to Automotive, specially when misread or misunderstood. The most consensual principles are iterative and incremental development with shorter feedback cycles, a team-centric approach (empowerment, self-organization, learning, communication, interactions, etc.), building quality from the start, and continuous improvement.

Agile is above all a mindset that is supported by principles and methods. Moving away from the traditional development approach is commonly viewed as a “MUST” to manage the rising complexity and constantly growing pace of changes. Agility is a competitive weapon for automotive companies; however, the principles from the Manifesto and methods need to be tailored to the constraints (SOP, complex supply chain, etc.).

### Agile in Automotive: Scope and Methods

The scope of application of Agile in Automotive is mainly software. This is rather legitimate since methods like Scrum are coming from the software world. The extension to other disciplines; e.g. System, Hardware, is perceived as difficult since those activities are managed sequentially and the overall automotive ecosystem is rather traditional, not to say conservative.

All existing methods or frameworks; e.g. Scrum, Kanban, etc. have been adapted to automotive constraints. The choice of suitable practices is cherry-picking based, applying what fits best to a given environment.

### Expectations and Benefits

The expectations regarding Agile are very ambivalent. On the one hand it is seen as the silver bullet that will solve all our software problems while, on the other hand, there is a very strong negative a-priori attitude that it is not applicable to Automotive. Each individual (developers, managers) has their own expectations based on a personal interpretation of the principles. Productivity, Quality and Transparency are the most cited expected improvements. However, the improvements mostly mentioned are related to human aspects; i.e., staff morale, collaboration, etc. Agile puts the developers and teams back in the forefront. Few organizations can prove quantitative improvements.

### Experiences and Lessons Learned

Experiences with Agile vary from six months to up to ten years. The early adopters built up new organizations almost from scratch, taking into consideration current trends, including Agile (those showing high productivity improvement). The “early majority” is piloting Agile in an incremental way.

Is Agile the “Flavor of the month”? Well, this will strongly depend on the “change management” approach used.

An implementation of Agile addressing, in sequence, first values, then principles, and finally methods and practices, will be prone to success. Other approach are just “methods patches” and will not sustain long-term.



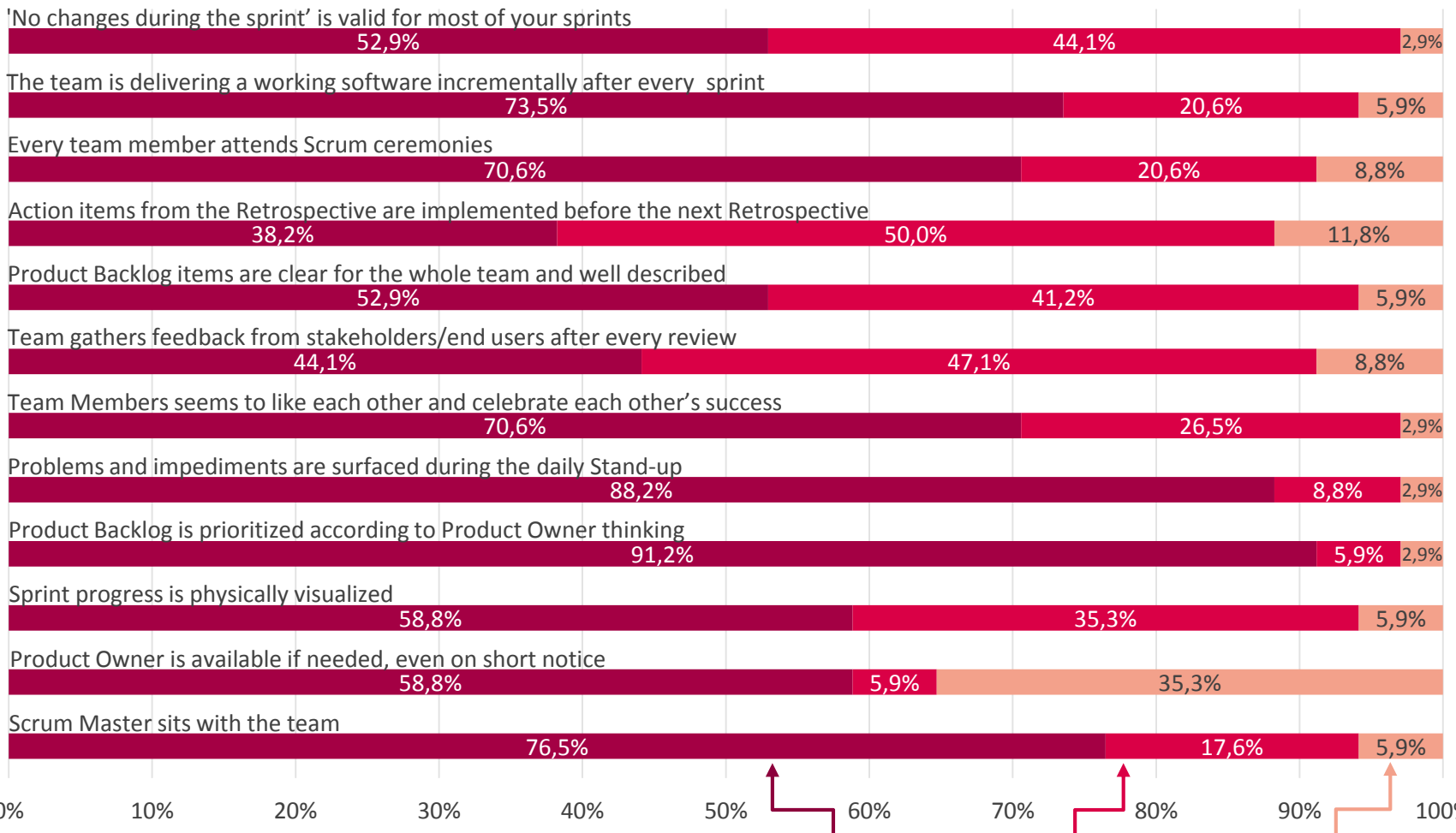
# Annex, Acknowledgements, and Disclaimer



# Annex

## Scrum “by the book” (Scrum Guide) is rarely used

### How does your Scrum implementation conform to the book?



Yes

No

No Answer

## Acknowledgements

We would like to warmly thank all interviewees and online survey respondents for their time and openness.



# Disclaimer

Study participants were chosen based on representativeness in order to ensure a high data quality (e.g. representatives from different business units with different observations and experiences).

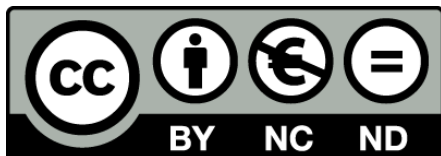
However, we cannot make any statements about the extent of the implementation of Agile principles in the development of automotive embedded systems/software across the whole industry.

Note: Small rounding errors may occur through the use of integer percentages.

## **THIS STUDY IS LICENSED UNDER CREATIVE COMMONS 4.0**

Sharing is appreciated under the following conditions:

- Non-Commerical
- No derivatives
- Attribution: Please refer to [www.kuglermaag.de/agile2015](http://www.kuglermaag.de/agile2015), [www.kuglermaag.com](http://www.kuglermaag.com)



## Contact in case of questions ...

---

KUGLER MAAG CIE GmbH  
Leibnizstr. 11  
70806 Kornwestheim, Germany  
information@kuglermaag.com  
www.kuglermaag.com

... *contact me*



Sergej Weber  
sergej.weber@kuglermaag.com  
Mobile +49 173 6768934

Contributers to the Study (in alphabetical order):

Albertz, Joachim  
Debou, Christophe  
Dudzic, Piotr  
Fäustle, Michael  
Hientz, Horst  
Hörmann, Klaus

Hostie, Stephan  
Kirwan, Pat  
Maag, Bonifaz  
Minnaar, Birgit  
Müller, Markus  
Pribil, René

Sazama, Frank  
Strube, Dominik  
Thomas, Michael  
Vanamali, Bhaskar  
Wachendorf, Dieter



KUGLER MAAG CIE GmbH  
Leibnizstr. 11,  
70806 Kornwestheim, Germany  
[information@kuglermaag.com](mailto:information@kuglermaag.com)  
[www.kuglermaag.com](http://www.kuglermaag.com)

© KUGLER MAAG CIE GmbH

 **KUGLER MAAG CIE**  
besser mit uns