AGILE IN AUTOMOTIVE.
STATE OF PRACTICE 2014

Survey Results

January 2014
Survey respondents (19 interviews) were chosen based on the fact that they claimed to have initial to extensive experience in applying Agile principles and methods in automotive. 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.
Agenda

- Introduction Background
- Respondent Demographics
- Agile - What and Why
- Processes, Roles, Methods, Tools
- Experiences, Lessons Learned
- Conclusion
Background

• The car industry has been trying to apply Agile methods in embedded software development for some time
• However, feedback on experiences seems very diverse
• Therefore, Kugler Maag Cie performed 19 interviews, mainly with German and American companies
• The aim of the survey is to investigate what is the status of implementation of Agile principles and methods within the automotive industry (embedded system/software development)
  • 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®, ISO 26262) compatible or contradictory?
Survey Process

Selection of 15 to 20 key customers

Questionnaire followed up by phone interviews

Nov–Dec 2013

Analysis of interview results. Conclusions sent to participants in a detailed report

Report

January 2014
About The Survey

• Interviews were conducted in November and December 2013

• Survey respondents were primarily leading automotive companies (both OEMs and Tier 1 suppliers) from Germany and USA with distributed development teams in Romania, Bulgaria, Poland and India

• 19 surveys were analyzed. Among others, interviewed companies were BMW, Bosch, Continental, Daimler, Gentex, Hella, ...

• Survey respondents were engineering/software development managers/directors, project managers, team leaders, quality managers, as well as a few Scrum Masters and developers
About The Survey

Legend

Questions from the survey

Analysis of the results; Comments; Trends; ...;

Which domain(s) does it cover?

Graphical Representation of the Results

Remark: Sum of % may be over 100%, since more than one answer is possible for most of the questions
Respondent Demographics

Agile - What and Why
Respondent Demographics and Agile-What and Why

Summary

- The respondents that took part in this survey cover a large range of managerial and technical positions within their organization (Project and Quality Management, High Level Management, Engineering Team)
- Surveyed Agile projects differed with respect to
  - domain and types of project covered
  - scope of Agile implementation
  - number of teams involved and size of the teams
- Though projects were very diverse, the common denominator was “series production”
- Agile concepts can be misinterpreted; however, most of respondents have a pragmatic understanding what Agile is all about
- Agile initiatives in Automotive are not that new; some organizations already completed Agile transformation some years ago
- The main reason for adopting Agile is that traditional software development methods are not flexible enough
- Our initial hypotheses were confirmed by the results; however, we had a few surprises:
  - Agile is applied in all domains, not only in research, pre-series development and Infotainment series development
  - The typical team size is often larger than 10 people (we expected 7+-2)
Respondent Demographics – 1

The respondents are very different: from engineers to directors
Respondent Demographics – 2
Agile is used in all domains

Which domain(s) are covered by Agile projects?

Which Subdomain(s) / ECU Types are covered by Agile projects?

ECU /Application Types:

*Multimedia Applications:*
- Location-based Services Applications
- Telematics
- Radio Navigation

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

*Powertrain and Chassis Control:*
- Braking Systems
- Engine Management

*Integrated Systems/Services:*
- Intelligent Mirror System
- Active Safety
- Driving Assistance / Automatic Driving

**Domain classification:**
According to the HIS working group assessment ECU classification
Respondent Demographics - 3
Agile is mainly used in series development projects

Which type(s) of projects are covered?

- **Pre series development**: 44.4%
- **Serie**: 88.9%
- **Research**: 11.1%

Note: the sum is greater than 100% as some companies use Agile in more than just one lifecycle phase
Respondent Demographics - 4
For approx. one third of the respondents the scope of Agile implementation is “multi-location”

What is the scope of Agile Implementation?

- One project: 16.7%
- Whole company: 5.6%
- Multi-location: 33.3%
- Business unit: 11.1%
- One location: 11.1%
- One department: 11.1%
- One product: 27.8%

**Multi-location** sometimes covers one project (pilot), one product development, one department, or even one complete business unit. In a few cases, the scope is “internal platform development” to internally try out new things.
Respondent Demographics – 5

Distributed teams are common in automotive Agile projects

- 56% of respondents use distributed teams
- 1.8 is the average number of teams in one single project applying Agile within considered scope
- 1 is the median of teams in one single project applying Agile within considered scope

Do you have distributed teams? How many teams are involved?
Respondent Demographics – 6
Most of the respondents are working with agile teams larger than 10 people

Team size ranges from 4 to 15 people, with the exception of “Kanban teams” (30-40). The biggest project in our survey had around 100 engineers in 8 teams. The largest application of Agile (completed transformation) was in a department with 200 engineers.
Definition of Agility

Agile concepts can be misread. However, most of the respondents had a pragmatic understanding of what Agile is all about.

What is your definition and understanding of Agility?

Many respondents referred to the Agile Manifesto as a source of inspiration but considered its applicability for the automotive industry as “wishful thinking”. Misinterpreting the Manifesto leads to wrong expectations from both management and team perspectives.

Agile is a mindset supported by a methods toolbox

Team centric approach (empowerment, communication, interactions, learning)

Iterative and incremental development

Transparency and flexibility to handle changes

A mindset and system of methods / practices for product development which is performed in a highly collaborative manner. Key factor is the empowerment of teams not only to work in a self-organized and cross-functional manner but also to assume responsibility for early and continuous delivery of business value.
Agile Implementation

About one-third of our respondents had already completed Agile transformation within their organization.

Which phase of the Agile transformation program are you currently in?

- At Tier 1 Suppliers, the status of implementation varied from first piloting to completion of agile transformation
- A majority of Tier 2 “pure” software suppliers had already been applying agile methods for several years
- Pilot projects typically covered the first sample development phases (A, B)
Agile Implementation
For over 50% of the respondents it was their first approach to Agile.

Some respondents mentioned 6 years of doing Agile, some even up to 10 years!!

2nd wave of piloting

Starting roll-out to non-SW disciplines

Started in 2007 with a pilot project, trying to fit standard processes (CMMI and ASPICE compliant) with Agile. Then another pilot. Then all new projects adopted Agile in the product segment.

How long have you been doing Agile?

★ 3.25
years is an average time of doing Agile

★ 2
years is a median time of doing Agile
Why Agile?

Traditional software development methods are not flexible enough

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

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

Reactivity over volatile markets (higher flexibility in development)

*Fail early = fail cheap*

The motivation was to optimize the development of complex and distributed projects. We failed to get the complexity and dependencies under control with traditional Microsoft Project planning & tracking in software development.

Flavor of the month !!!

New Trend
Agile Methods and Practices
Summary - 1

Agile methods and practices used

• Custom Scrum/Scrum is the most popular agile method used in projects, followed by Kanban.
• Kanban is mainly used where there is a continuous flow of work; e.g. maintenance and support (bugs, change requests), and as a visualization mechanism (Kanban Board)
• Scrum by the book doesn’t 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 practices are daily stand-up, retrospectives, and continuous integration

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 PO and SM roles are rarely defined in the same way as they are described in the Scrum Book. In most cases, the existing roles are kept, PO/SM scope of work is added to the existing roles, and it seems to work well
• 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 not a must, the crucial aspect for building teams is the need for communication among its members.
Agile Methods and Practices
Summary - 2

Tools used
• 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.
• **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 2-4 weeks.
  • Mainly software processes are covered in a Sprint. In 40% of the cases also system processes are covered, however mainly as a separate sprint.
  • Agile and Automotive SPICE® are perceived to be compatible. However, the Functional Safety and Agile scenario looks much more complicated.

Contradictions to our initial hypothesis
• There isn’t a single case where the Product Owner comes from the customer organization. However “internal” Product Owner seems to function 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 -1

Custom Scrum/Scrum is the most popular Agile method used in projects, followed by Kanban.
Agile Methods and Practices - 2
Daily stand-up and retrospectives are the most popular Agile practices
Agile Methods and Practices - 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 (Kanban Board); However, the real scope of Kanban goes beyond pure visualization. Only once was the full application of Kanban principles (according to Anderson’s book i.e. limit WIP, ...) mentioned.
Agile Methods and Practices – Scrum -1

• Custom Scrum spans from small adaptations of Scrum (process, roles) to incremental development only. Even when Scrum is mentioned, “Scrum by the book” is never used. Processes and roles are more or less tailored, depending on the project environment.

• Scrum by the book is perceived as incompatible with Automotive constraints.

• Feature Driven Development (FDD) is always used in combination with Scrum.

• Scrum is sometimes used in combination with elements of Extreme Programming practices; e.g. Continuous Integration, Test Driven Development, Refactoring.
Agile Methods and Practices – Scrum -2
Working software is mainly delivered at the end of every iteration

Are you delivering a working software after every iteration?

Most respondents said that they deliver **working software at the end of each iteration/sprint.**

2 weeks of short iterations are for internal delivery, one month of long iterations are for delivery to customers

Delivery of working SW every 2 or 4 weeks, depending on different parameters (sometimes 2 weeks’ internally)

Do you regularly organize retrospectives resulting in concrete improvement proposals?

Most respondents perform retrospectives at the end of an iteration, with product improvements usually going to the backlog and process improvement opportunities being tracked separately. For KANBAN, there is a separate swimlane for improvement

Retrospective: After each sprint, including defect root cause analysis and the question “Where could we have found the mistakes earlier?”

Process improvements are not included in the backlog (backlog is for product matters only); therefore sometimes there is no systematic processing of identified improvements
Agile Methods and Practices – Scrum -3
About 50% of the teams plan daily
Definition of Done seems to be a challenge

Does the team plan every day?

Half of the teams plan daily, with others planning 3 times per week, or weekly.

Every week, with some adjustments during daily standup

Once per iteration = iteration planning, one prior to release (=release planning), adjustments are possible but need to be confirmed by the team

Do you use the "definition of done" for activities?

How is it applied?

The Definition of Done (DoD) is not commonly used in projects. For some it is well defined, but for others there is no definition or it is in the process of being defined.

DoD was actually a difficult issue at the beginning. People were too easily ticking the box, saying that they had achieved. This created technical deficits. This was solved by training and more control

Example of DoD: documents are done + reviews are done + QA approval + module test completed

Product owner is defining the DoD for each tasks/user stories
Agile Methods and Practices

2-4 weeks time frame is perceived as an optimal one; and mostly software processes are covered

What is the current timeframe for a sprint?

The timeframe for an iteration /sprint varies from 1 week to 6 weeks. However, most respondents mentioned 2-4 weeks as the optimum iteration time frame.

Which processes are covered within a sprint?

In most cases the iteration covers software development processes. However, system level processes were also covered in a few projects, either part of one sprint (for 4-6 weeks sprint), or as a separate “upfront” sprint.

In some cases, the notion of sprint is used as a waterfall “phase” i.e. 1st sprint – System analysis and design, 2nd sprint – Software Development – 3rd sprint – Software and System Test...
Agile Roles - 1

Most of the interviewed organizations use Product Owner and Scrum Master roles in their projects.

Which roles are used in Agile projects?

Usually Product Owner /Scrum Master roles are full-time jobs; however, sometimes the Product Owner /Scrum Master is responsible for more than one project.
Agile Roles - 2

Product Owner and Scrum Master roles are often assumed by traditional roles

The role of **Product Owner (PO)** is either a specific role or assumed by Team Leaders (TL) or Project Leaders (PL).

**Scrum Master (SM)** is either a specific role or assumed by Project Leaders or Team Leaders.

PO = SW PL – not optimal, but it works. All constellations are possible. Difficult to find the right combination. To either do only SM or TL is not really possible. We are approaching it very pragmatically.

Project Leader role and Team Leader roles are still there. No change.
Agile Roles – 3

The interface with the customer is implemented very diversely in projects, Product Owner never comes from the customer organization

How is the interface with the customer set up?

The customer interface is managed by

- Product Owner or Chief Product Owner (if several sub-projects), or
- by usual project communication.

Communication with the customer is done via

- the usual project interfaces; e.g., project leader, planning, reporting etc.
- Regular meetings (PO, Customer)
- Defined hierarchical interface on different levels (PM Level, technical level, sales, ...)

Does the Product Owner come from the organization or from the customer?

In all cases, Product Owners come from the internal organization.

Customer POs must be avoided. We have seen it as not working, since the customer PO was focusing on urgent rather than important things...

First “tentative indications” are visible that OEMs are open to “PO” concept
Agile Roles - 4

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

• Single Product Owner versus hierarchy of Product Owners (led by Chief Product Owner), or Product Owner managing a “stakeholders” group
• Product Owner is sometimes Software Project Leader, Group Leader, Senior Management, Lead Architect
• Scrum Master is sometimes Software Project Leader, QA, Team Member not coming from the development team
• Once mentioned: Product Owner = Scrum Master or no Product Owner/Scrum Master
• It is difficult to assess if the standard roles (e.g. PM) mapped to agile roles (SM/PO) are really working according to Scrum rules

It is very difficult to find the right “personality” to fulfill PO and SM roles
Agile Roles – 5
The role of Quality Engineer is usually a role outside the agile team

How have you implemented independent a 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.

QA and Scrum Master roles are sometimes combined.

Independent QA on a project level, not part of agile teams.

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

QA activities are taken into consideration in the sprint and planned accordingly e.g. reviews/... QA Engineer is team member. He is close to the team and has a good overview of the project. No parallel planning of QA,. Always independent reporting.

The quality function is distributed, the team have to do the quality job; e.g., reviews, ... (self policing).

QA verifies work results at the end of the sprint – one important element is the baseline audit.

Quality Person is from external team - assigned to this project (25%) , responsible for checking if the agile methodology is followed and assuring quality before release.
How to fit Agile in to the organization?
No major organizational changes are needed to run Agile projects

Were "organizational" 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.
There are a few organizations that were built around Agile methods from the beginning.

Did interfaces with "Non-Agile" areas change?
In most cases, nothing really changed. Existing mechanisms like feature plan and integration schedule are handling those interfaces.
Agile projects are typically “encapsulated”, so no need for changes.
PO role (or PO Team) is actually addressing those dependencies.

No org. changes as such. We organize regular trainings in the department to raise awareness about our approach, how it works, why we are doing this, etc.

Strategic focus is to implement agile elements without organizational changes!!

The project organization did evolve over time, not the line organization. However, this may change in the future.

PO team composed of other disciplines (HW and mechanic, system test) and customer interfaces

The Scrum team structure has nothing to do with line organization since they are cross-sites.

Strategic focus is to implement agile elements without organizational changes!!

The project organization did evolve over time, not the line organization. However, this may change in the future.
How to fit Agile with the organization?

Distributed teams do work as soon as the right communication means are set up.

Was any geographical reorganization necessary during the introduction of Agile, e.g. co-located versus distributed teams?

In almost all cases no geographical re-organization took place, although the co-location aspect is obviously an advantage.

The challenge was related to the composition of teams; i.e., should they be necessarily co-located or do we allow distributed teams?

The key criteria is not co-location but communication needs. Therefore distributed teams are allowed.

Originally, SCRUM teams were co-located. However it did not work out. It does not make sense to bring people together if they do not have reason to communicate. The key criteria for a team split is features and competencies. Therefore Scrum teams are now typically internationally distributed because expertise is distributed.

Focus on having "non distributed" teams when possible
Agile Methods and Practices

Agile is compatible with Automotive SPICE®

How have you integrated Agile principles/practices with ASPICE requirements?

The majority of respondents said there was no contradiction between Agile and Automotive SPICE®.

Mapping exists; should be ASPICE compliant

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

ASPICE requirements are also considered, Capability level 2 needs to be fulfilled (either with additional tasks or covered by Definition of Done)

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

What are the consequences of applying Agile practices towards the current ASPICE compliant process landscape?

Kanban actually improved the compliance with some Automotive SPICE® practices (SUP.9, SUP.10)

SCRUM mainly supports MAN.3, partly ENG.4 and ENG.6 (Definition of Done).

Small adaptation = Review process overhead. Since we do a lot of iteration, we cannot allow to do reviews thoroughly each time

It's always a challenge, depending on individual customers and assessors to be assessed as ASPICE compliant while using an Agile approach

Internal assessments show no contradictions between the two "worlds". This is because no “pure” agile development is carried out, but agile aspects were included in the standard processes.
Agile Methods and Practices
It is difficult to integrate Agile and Functional Safety requirements

How have you integrated Agile with Functional Safety Requirements?

Most of the Agile surveyed projects have ASIL QM.

The Functional Safety requirements (ISO 26262) are perceived as more independent from Agile than ASPICE requirements.

Those requirements are mentioned as more difficult to integrate as there is less room for interpretation.

Some projects see it as nothing more than additional tasks in the backlog.

What is the ASIL of Agile Project?

Part of the Agile Manifesto is not “compatible” with Functional Safety requirements

FS process is not really iterative. Key challenge is to bring together iterative development and some non-iterative activities

FS is planned in the project as a separate timeline
Tools used

Kanban

- Jira Agile; 16.7%
- PTC Integrity; 11.1%
- Traditional Board; 11.1%
Tools used

Project /CR /PR/ Task Management

- Jira Agile; 27,8%
- PTC Integrity; 11,1%
- Physkal Kanban Board; 11,1%
- Version One; 5,6%
- Agilo; 5,6%
- Redmine; 5,6%
- IBM Tool Suite; 5,6%
- Serena Dimension; 5,6%
- MS Project; 5,6%
- Test Track Pro; 5,6%
- Internal Tools; 5,6%
Tools used

Build Tools

- Jenkins: 16.7%
- Cmake: 11.1%
- Internal Tools: 11.1%
- Bitbake: 5.6%
- Visual Studio: 5.6%
- Gmake: 5.6%
- Ant: 5.6%

Survey – State of Practice „Agile in Automotive“ © 2014 by Kugler Maag Cie, All Rights Reserved
Tools used

Bug Tracker

- Jiga Agile (former greenhopper); 22.2%
- PTC Integrity; 22.2%
- Bugzilla; 11.1%
- Test Track Pro; 5.6%
- Serena Dimensions; 5.6%
- Redmine; 5.6%
- Internal Tools; 5.6%
- IBM Change; 5.6%
- Clear Quest; 5.6%
Tools used

Integration

- Jenkins; 66.7%
- Internal Tools; 11.1%
- Team City; 5.6%
- Hudson; 5.6%
- Internal Tools; 11.1%
Tools used

Test / Test Automation

- Xunit; 5.6%
- PTC Integrity TM; 5.6%
- Google Test Framework; 5.6%
- Jenkins; 5.6%
- Rational Instruments; 5.6%
- Quality Center; 11.1%
- Internal Tools; 33.3%

Survey – State of Practice „Agile in Automotive“ © 2014 by Kugler Maag Cie, All Rights Reserved
Tools used

Configuration Management

- Subversion; 33,3%
- Git; 27,8%
- PTC Integrity; 22,2%
- Mercurical; 5,6%
- IBM Synergy; 5,6%
- Serena Dimensions; 5,6%
- Clear Case; 5,6%
Experiences, Lessons Learned
Experiences, Lessons Learned

Summary

• No Agile projects failed so far though success of some projects is still under investigation. All respondents confirmed the continuation of Agile transformation.

• Main barriers and concerns regarding adoption of Agile indicated by interviewees relate to fitting agile elements into non-agile framework and its inability to scale.

• The main success factors for Agile transformation are management commitment and support, freedom to innovate, and communication.

• Productivity increase, better visibility and improved team morale seem to be biggest benefits of Agile transformation.
Experiences, Lessons Learned
Most of the Agile projects succeeded,... but mind the social skills

Would you consider Agile projects to have succeeded or failed?

About 78% of the respondents considered the implementation of Agile principles successful.

In all cases it took a couple of pilot iterations to get it right (adaptation of processes, changing people’s mindsets,...).

Agile projects clearly have succeeded by achieving better quality, predictability and team satisfaction

We can back up the success with significant quality and time to market improvements

It is unthinkable to go back to our old way of doing things

We have not achieved the optimum due to inadequate social skills from key individual

Agile does work under certain conditions and for certain types of projects

Process discipline is a key success factor
Experiences, Lessons Learned
Most of the Agile projects succeeded; barriers can be removed

Which were the main causes of failed Agile projects?
No projects really failed so far...
However, a majority of respondents mentioned that following Agile methods and principles “blindly” (as described in the Agile manifesto) would have led to failure.
The main perceived “risk” areas for failure are the lack of understanding what Agile means, and appropriate “social” skills.

What are the barriers for a further adoption of Agile within your organization?

The main identified barrier does not relate to the further adoption of Agile for the Software development part (inevitable and the “only” way to proceed) but to the extension to other disciplines (System, HW, …)
The “sequential mindset” is still deeply anchored in the automotive industry, and it will take years to change.
“Culture” was also mentioned as a barrier. Some respondents stated that it may be easier to implement agile concepts in North America/Europe than in Asia (e.g. India, Japan). But this needs to be proven.
Experiences, Lessons Learned

The major concern is the inability to scale of agile methods

What were/are still the main concerns regarding Agile?

Inability to scale perceived as the main concern, specially regarding Scrum implementations.

Most current pilots are evaluating the scalability aspect (distributed development).

Additional concerns relate to compatibility with ASPICE and ISO 26262 and a risk that Agile will be implemented because of “fashion” rather than common sense.

Reading Agile manifesto is scary to management. People think there is no structure (Wild west). The higher in the hierarchy, the more doubts about Agile

OEMs do not support the Agile world. The Automotive world is changing very slowly

Agile is sometimes wrongly understood by developers that you may do whatever you want... Remove this misunderstanding early on
Experiences, Lessons Learned

Only a few organizations could prove benefits quantitatively

Expectations and Benefits of Agile?

Only a few organizations could prove quantitative improvements

Most of respondents mentioned:

- Improved employee morale
- Increased project visibility
- Reduced risks
- Improved productivity

Project objectives are typically successfully reached, this also applies to employee motivation. Whether there is an efficiency increase can not be evaluated yet

What were the expectations regarding Agile approaches?

- Shorter TTM was sporadically achieved
- We achieved a 3 to 4 fold productivity increase compared to previous developments

Which benefits could you measure?
Experiences, Lessons Learned
Management Commitment and Communication

What are the organizational preconditions for successful Agile transformation?
Preconditions for success 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

Managers with vision and assertiveness
High maturity in the development process must be already established (at least Level 2)
Excellent, open minded development team, empowered to define its methods
Flat hierarchy
Ability to show agile project progress in a traditional form (e.g., milestone assessment) to achieve understanding at all levels of management
Proper communication about Agile, what it is, to raise realistic expectations
The necessary move away from the weak matrix (dominated by line organization) to temporarily created teams consisting of part-time workers.
Experiences, Lessons Learned
Agile to be continued

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.

- Roll out some agile techniques to non-SW disciplines
- Pilot on a larger scale project
- Get a higher degree of tool automation
- Clarify terminology company-wide, explain that Agile is not limited to individual techniques or methods only but that it includes more (e.g. continuous integration or culture).
Experiences, Lessons Learned

Selection of Quotes

Pure agile according to the book does not work in Automotive, specially when taking into consideration the entire system development process.

Strategic focus is on the implementation of agile elements without organizational changes.

To implement 100% Agile would be the biggest mistake. You have to find out what is working for you, selecting “pieces of methods”.

The discussion "agile" versus "traditional" is dangerous and should be avoided. Evolution instead of revolution should be the preferred approach. We are de facto moving between those two worlds. Limitation to software development only is not enough - all parties of product development must be involved.

Use a cherry picking approach to select the methods /practices that do make sense.

The order of introduction in order to achieve an agile culture is essential: Values -> principles -> Methods.

The Scrum Master can be the “driving force” for the team if she/he has the right profile.
Conclusion
Conclusion - 1

• The scope of the application of Agile principles and methods in the automotive industry is mainly limited to software development; the nature of software development is iterative.

• Agile in Automotive means:
  • Shorter development cycles = iterative development
  • Continuous integration
  • Team-centric approach (emphasize empowerment, communication, interaction, learning)
  • Cherry-picking approach: select agile methods and practices that make sense in a given context
  • Agile is applied in all automotive domains and project types, in series production, in combination with Automotive SPICE®, and even in a few functional safety relevant product developments (Kanban). Experience with the use of Agile principles and methods ranges from 6 months to 10 years

• The approach mostly used is “Custom” Scrum, although many implementations are fairly far away from Scrum by the book. In most cases existing roles, such as project and team leader are kept, and agile roles (Product Owner, Scrum Master) are added to these existing roles. This seems to work well

• Use of Kanban is seen exclusively in support and maintenance (Problem Resolution and Change Request Management) and as a visualization mechanism
Conclusion - 2

• Agile is a mindset supported by principles, methods and practices. Some Agile principles, as defined in the manifesto, are still perceived as wishful thinking, since their application would imply an agile mindset across the organization.

• The return on experience is very positive and Agility is viewed as a suitable approach to address current challenges like rising complexity, high pace of change and decreasing Time to Market. Benefits with regard to productivity increase, better project visibility and improved team morale were visible and all respondents confirmed the continuation of Agile transformation.

• The full benefits of Agile may be achieved when applying it beyond software development.
Agile Manifesto and the Automotive World

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 centered approach (empowerment, self-responsibility, communication, interactions, learning, ), 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,...).

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, XP, ... 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, ... Agile puts the developers and teams back in the forefront. Few organizations can prove quantitative improvements. But when they do, they are quite impressive (3-4 fold productivity improvement...).

Experiences and Lessons Learned

Experiences with Agile vary from 6 months to up to 10 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 a 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.
Acknowledgements

We would like to warmly thank all survey respondents for their time and openness during the interviews.
FEEDBACK IS A CONSTITUTIVE ELEMENT OF THE AGILE COMMUNITY.

Your response is very welcome. Don’t hesitate to contact us.

Markus Müller, Principal at Kugler Maag Cie markus.mueller@kuglermaag.com

Frank Sazama, Process Director at Kugler Maag Cie frank.sazama@kuglermaag.com

Christophe Debou, Process Director at Kugler Maag Cie christophe.debou@kuglermaag.com

Piotr Dudzic, Process Consultant at Kugler Maag Cie piotr.dudzic@kuglermaag.com

Peter Abowd, Process Director at Kugler Maag Cie North America peter.abowd@kuglermaag.com

KUGLER MAAG CIE GmbH
Leibnizstr. 11,
70806 Kornwestheim
(Greater Stuttgart), Germany
+49 7154 1796 100

www.kuglermaag.de/agile2014
www.kuglermaag.com