Rise of Agile in Automotive R&D?

Expert Study

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Agenda

- Our understanding of Agile in Automotive R&D
  - Study Objectives and Methodology
  - Results of the Study
  - Implications for the Corporate Journey to Agile Mastery
Automotive R&D faces turbulent conditions

Digital disruptions

- 22 months: Motorola Razr to IPhone
- 48 months: Golf VI to Golf VII

Ambitious customer demands

Rising competitive intensity

Regulatory challenges

Source: Trend Report 2013, Association of German Automotive Industry (VDA)

EU g CO2/km

- 2010: 150
- 2015: 110
- 2019: 95

-39%
Turbulent R&D conditions trigger the need for agility

Turbulent conditions create R&D challenges

Development complexity

Highly structured automotive R&D processes

Do auto executive want to become agile?

“Bosch embraces agility by introducing Agile methods.“
Bosch, Denner, 2015

“New competitors keep us Agile.“
Daimler, Zetsche, 2013

“There is a significant opportunity to increase agility.“
Johnson Controls, Molinaroli, 2015

“We know that Tesla is Agile in updating their software and the car at regular intervals.”
Jeff Sutherland (on Tesla), 2013

Need for agility in automotive R&D systems
Agile requires a holistic approach

Four organizational domains to be addressed for the transition to Agile

- Domain of engineer’s and leader’s mindsets
- Cultural domain (Agile values)
- Domain of processes (Agile principles)
- Methodical transition
- Organizational orchestration
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Our study evaluates the state of Agile in automotive and derives imperatives for implementation

**Study objectives**

- Evaluation of state of Agile approaches in automotive R&D (incl. beyond software development)
- Identification of ways for successful implementation and rollout

**Interview partners**

**15 Practitioners** (R&D managers)
“*The ones under whose responsibility Agile practices are applied*”

**5 Conceptionists** (Process mgrs. & Agile experts)
“*The ones who design and support to implement Agile practices*”

* In the following, the company logos do not necessarily represent the overall company but the view of the interviewee(s) about the company
**In some companies two/three interviews have been conducted with different R&D managers. In these cases, the most representative case has been chosen for the following quantitative study results and the remaining interviews served as validation (sample size for quantitative analyses, n=14)
The study includes findings concerning drivers, Agile practices, barriers/ success factors and performance outcomes.

Research methodology

Open interview questions

Drivers

1. Implementation barriers and success factors

Agile practices

2. Performance

Study results

1. Drivers for Agile

2. Agile practices/ st.-quo

3. Barriers/ success factors

4. Performance

Interview analysis

Interview summaries

Cross-interview matrices for every dimension
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Drivers for implementation of Agile in automotive R&D

“Performance aspirations” is the most prevalent driver category - mainly efficiency instead effectiveness issues drive Agile

“What drives the consideration of implementing Agile approaches in the R&D landscape of your company?”

Top 3 drivers mentioned in each category, based on number of references by interviewees (n=15, practitioners n=10; conceptionists n=5)

Driver category 1: Market trends
- Digitalization
- New competitors
- Gen-Y as future workforce

Driver category 2: Performance aspirations
- Decrease time-to-market
- Increase cost efficiency
- Handling development complexity

Driver category 3: Dissatisfaction with status quo processes
- Overly structured R&D process landscape
- Lack of collaboration
- Low reliability of long-term planning
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Scrum is the only diffused Agile method and is applied majorly to pre- but also series-development - plans for Lean Startup exist

“Which Agile practices are currently applied in which development cycle?”

<table>
<thead>
<tr>
<th>Innovation Management</th>
<th>Startup Spin-Offs</th>
<th>Pre-Development</th>
<th>Series-Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Thinking</td>
<td>Lean Startup</td>
<td>(Custom-)Scrum</td>
<td>(Custom-)Scrum (+ partly Kanban)</td>
</tr>
<tr>
<td>Customer Development</td>
<td>Design Sprint</td>
<td>Extreme Programming</td>
<td>Crystal</td>
</tr>
</tbody>
</table>

- No application among studied cases
- Application planned
- Application
- Scrum often obsolete in late stages of series-development
Scrum is mostly applied for software/IT – rarely for mechanics

“How far is Scrum diffused in the R&D system?” & “In which disciplines is Scrum applied?”

Overall diffusion of Scrum (ΣFTE in Scrum projects)

High

OEM 1
OEM 2
OEM 3
OEM 3
OEM 4
OES 3
OES 4
OES 6

Low

Primarily SW development
Cross-discipline development
Primarily mech. development

Few teams apply Scrum in product SW pre-development
≈250 engineers are working on projects for vehicle software

≈70-75 teams have been trained to apply Scrum for seating and interior development

1 gearbox pre-development project with several teams applies Scrum

Discipline of Agile projects

PVM 2016 – Expert Study: Agile in automotive R&D
Most companies are beyond the Agile pilot phase, however for all of them it’s a long way to Agile mastery

Questions in fields like Agile awareness, mgmt.-support, standardization, organizational experience, diffusion

P.SW = Product software; E.IT. = Enterprise IT; cross = cross disciplinary development (mech.+software); mech. = mechanics development

Source: Phase model adopted from Christensen (2001), Strategic Management of Innovation
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## Barriers and success factors in four domains to be considered

<table>
<thead>
<tr>
<th>Implementation barriers</th>
<th>Success factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domain of support functions</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Domain of processes</strong></td>
<td></td>
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<tr>
<td><strong>Domain of processes</strong> (Agile principles)</td>
<td></td>
</tr>
<tr>
<td><strong>Cultural domain</strong> (Agile values)</td>
<td></td>
</tr>
<tr>
<td><strong>Domain of engineer’s and leader’s mindsets</strong></td>
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</tbody>
</table>

### Quality Management
- Interfaces to non-agile divisions
- Procurement

### Relation of Scrum to existing processes
- Inconsistent definition of Agile
- Splitting mechanics into increments

### Ingrained hierarchical role structure
- Low organizational maneuverability
- Low entrepreneurial responsibility

### Change affinity of employees
- Mindsets of leaders
- Skills for Agile roles

### Top-Management Support
- 3D Printing
- Methodical coverage by PMO

### Agile suitability analysis
- Systematic adaption of method
- Early integration of employees

### Intrinsic Agile values
- Bottom-up pull for Agile
- Mgmt. transfers power

### Coaching
- Servant leadership
- T-shaped experts
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Improved transparency, collaboration & motivation enable positive performance results - often only after an incubation time

“Which performance outcomes did you achieve through Agile approaches?“
10 performance outcomes have been mentioned and were assigned to three categories

% of interviewees that mentioned negative/positive impact on performance outcome*, n=14

<table>
<thead>
<tr>
<th>Performance Catalysts</th>
<th>Negative impact</th>
<th>Positive impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparency</td>
<td>31</td>
<td>54</td>
</tr>
<tr>
<td>Collaboration</td>
<td>54</td>
<td>62</td>
</tr>
<tr>
<td>Motivation</td>
<td>62</td>
<td>54</td>
</tr>
<tr>
<td>Efficiency</td>
<td>54</td>
<td>38</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>38</td>
<td>23</td>
</tr>
<tr>
<td>Product quality</td>
<td>23</td>
<td>69</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>69</td>
<td>54</td>
</tr>
<tr>
<td>Reduced steering effort</td>
<td>54</td>
<td>46</td>
</tr>
<tr>
<td>Overall</td>
<td>46</td>
<td>77</td>
</tr>
</tbody>
</table>

* Remaining interviewees were indecisive
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The study confirmed that Agile mastery requires a holistic approach that considers initiatives in the four domains:

- **Domain of support functions**
- **Domain of processes** (Agile principles)
- **Cultural domain** (Agile values)
- **Domain of engineer's and leader's mindsets**

**Integrate silo systems**

- Organizational orchestration
- Methodical transition
- Change mgmt.

**Identify and nurture bottom-up movements** by providing management support

**Tailored Agile approaches**

**Review project typology**
Our study depicts the state of Agile in automotive R&D and derives implications for the corporate journey to Agile mastery

1. Digitalization, efficiency aspirations and inflexible process landscapes drive Agile practices

2. The automotive industry is on the verge of rolling Agile approaches out into larger parts of R&D

3. First players successfully apply Scrum beyond the team level and outside software development

4. Many barriers like quality mgmt., procurement, strong hierarchies & employee`s mindsets remain

5. We have developed an implementation framework to facilitate Agile mastery on a corporate level