

Integration of Agile Methods in Automotive Software Development Processes

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Introduction

- Automotive software's are more complex to handle in terms of:
 - safety
 - complexity
 - innovation
 - high reliability
 - safety requirements
 - change management
 - User involvement
 - and to the features of physical system

Introduction

- In order to overcome these challenges, it is essential to adopt such development methods which should be:
 - flexible
 - fast with change management and user participation
 - and can accomplish the automotive requirements and standards
- Therefore to accelerate the development process in automotive software there is need to integrate agile development processes

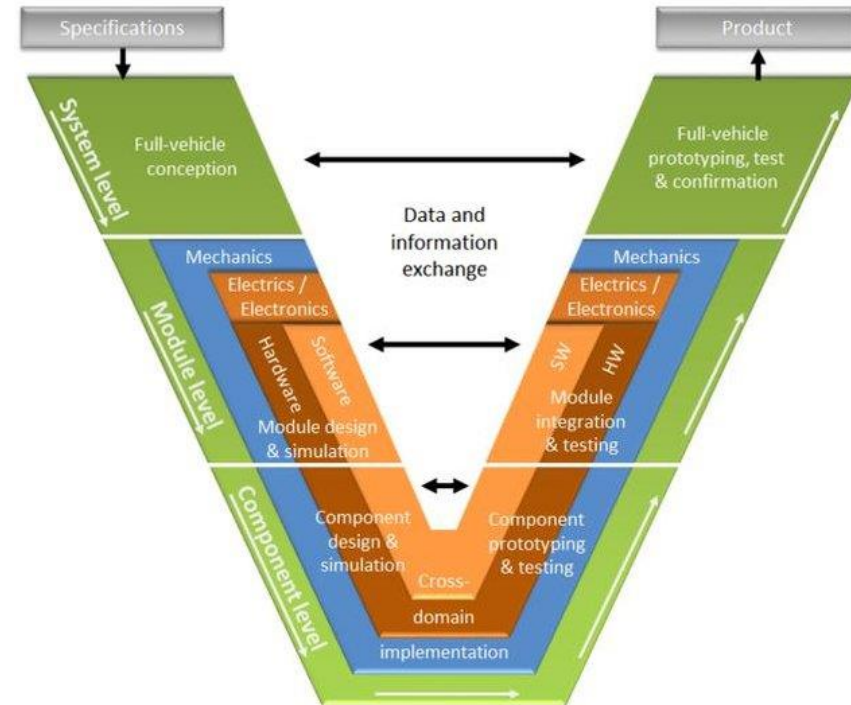
Aim of Study

- To provide insights to implementation of agile methods in automotive software development
 - how agile methods have been used in the development of automotive software, (benefits, challenges and limitations)
- And to recognize the effect linked to combined use of agile methods and traditional processes V model

Agile Vs V model in Automotive Software Development

- V model is the most common process model adopted by automotive industry for the automotive software development
- With the exponentially increasing complexity in automotive systems, the late validation and verification in V model result in:
 - higher risk of failure
 - higher cost of development
 - too slow to keep pace with changing market

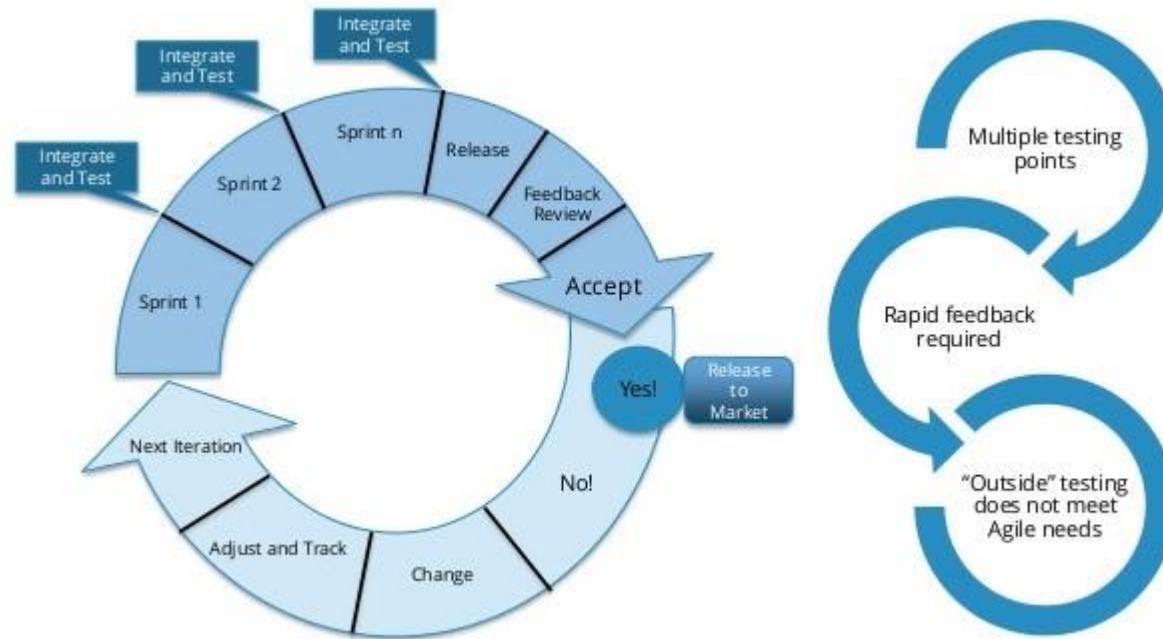
- delay in response to the changes from customer and market
- not well adapted to the requirements of software intensive systems



Agile Vs V model in Automotive Software Development

- Agile is time boxed, iterative approach to software delivery that builds software incrementally from the start of project. Agile enables:
 - Individuals and interactions over Processes and tools
 - Customer involvement over Contract negotiations
 - Working software's over Comprehensive documentation
 - Respond to change over following a plan
- Use of agile methods result in
 - faster reaction on changed requirements from customers and market
 - offer user involvement
 - improve the final software during the development process
- The adoption of agile practices within the automotive domain is therefore a possible way to keep pace with fast changing market demands

Agile Vs V model in Automotive Software Development



Literature Review

- Manfred Broy explained challenges identified in automotive software by stating main focus areas in automotive embedded systems and process problems
- B.Liu presented a study which describes an Inc V development process for automotive industry
- A hybrid methodology was proposed for process improvement with scrum and V model in safety critical software development environment
- An assessment model for the automotive domain is the Agile, Hybrid Assessment Method for the Automotive Industry (AHAA)
- Hantke presents a development process that includes elements from SCRUM and parts of the standard SPICE
- Thiel et al. analyze the combination of agile software development and plan-driven processes

Identified Challenges in Automotive Software Development

- The mentioned challenges are result of literature findings in context of automotive domain
 - Collaboration type
 - Collaboration Control
 - Deliverable maturity
 - Planning horizon
 - Change Management
 - User Involvement
 - Project Risk
 - Time to market
 - Complexity
 - Pace for changes
- The identified challenges are mentioned in table with contradictory prioritization with respect to agile methods and V model

Mapping of Identified Challenges w.r.t. Agile Methods and V Model

Challenge	V Model	Agile
Collaboration type	Contract Negotiation	Individuals and interaction
Collaboration Control	Processes and tools	Customer Collaboration
Deliverable maturity	Extensive documentation	Working Software
Planning horizon	Plan compliance	Response to Change
Change Management	Rigid and not flexible	Ability to manage changing priorities
User Involvement	Less user involvement	User involved throughout the project
Project Risk	Relatively big risks	Project Risk reduction
Delivery (time to market)	Longer time required to market	Shorter time required to market
Complexity	Difficult to handle complexity	Better processes to handle complexity
Pace for changes	Low pace for change	High pace for change

Conclusion

- From literature findings, it is encountered that automotive industry is moving from traditional paradigms to more flexible approaches i.e. agile methods
- Literature also revealed no fruitful results for combining agile methods and V model
- Neither there exists any approach particularly addressing the combine effect of agile and V model in automotive software development
- Results from literature and discussion interview reveal that the conducted approach is promising and need to investigate further