

Agile and Automotive

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Introduction

The automotive industry had adopted ASPICE as a model for their software development. ASPICE is based on CMM, which was developed in the nineties, well before the software industry had discovered better ways of software development. There is quite some resistance to adopt Agile, although Agile fully meets the reasons why ASPICE was adopted by the automotive industry. With this document, I try to explain why Agile is a good choice also for the automotive industry, but it also highlights some hurdles still to be removed.

Management summary

The automotive industry has done a fantastic job with respect to quality. They rightfully prioritized quality, as cost of non-quality were very high. This all came at the price of innovation and productivity. New technology enable big software companies to enter the market and these are a serious threat for the traditionally hardware oriented OEMs.

There is no fundamental objection of the OEMs against Agile as long as quality is maintained, but many misconceptions exist. In fact, Agile is a better way to secure quality and in-time delivery, but perceptions in the market are different. Good things like the V-model, highly appreciated in the car industry, also apply in Agile.

So, what is blocking the widely adoption of Agile processes and a continuous flow of feature development? The process of software updates is not yet secure and business models around continuous feature growth are still to be developed. But continuous feature releases also demand very different non-R&D processes within the OEM like quality assurance and purchasing.

The automotive industry

The automotive industry has done a fantastic job with respect to quality

With failure rates around 0.1%, automotive products have a substantial higher quality than many consumer products. This is an impressive achievement of the industry, achieved in the eighties and nineties of last century. Quality is now very much in the DNA of all car manufacturers, which surely has contributed to the safety on the road. They have implemented very strict process control, both in manufacturing and product development, and this quality mind-set has been imposed on the suppliers.

The OEMs prioritized quality, as cost of non-quality are very high

There as another reason rather than safety, why the automotive industry has invested a lot in quality and that is the very high cost of non-quality. Cars are very expensive and the costs of a car returned because of quality problems is huge. Also, workshops are expensive, especially as the modern technology in cars require high investments in the workshops. Where consumer electronics could easily make a software update available to the end-user, cars had to go to the expensive workshops for software updates.

This came at the price of innovation and productivity

This all came at the price of innovation. Innovation has been extremely low compared to consumer electronics products. Many OEMs have confirmed openly that quality is more important than innovation. Also, the strict processes, designed for quality, did not manage the intrinsic uncertainty in R&D projects with respect to effort required and customer needs, leading to many changes and re-work and unnecessary waste. Also, the long lead-times and big investments made time to break-even for many projects very long (if ever achieved), which made the industry not attractive for top quality software companies who could easily make higher returns on

their investment in other industries. Software was often seen as a cost to be covered by the sales of hardware and only companies with a hardware DNA could afford to be in the automotive industry and still make money, except for some players like TomTom who could also offer content or players like NNG who could improve their returns by serving niche markets.

Software companies enter the market and become a threat for the OEMs

The market, however, is changing rapidly. The customer expectations are changing; due to the smartphone, customers are used to innovation, always connected and frame rates well above 40 fps. But also software companies like Google, Amazon, Microsoft and Facebook want to enter the car industry and offer state of the art in-car infotainment and mobility solutions. The car industry has either to become a software industry or become a platform builder for these big software companies. And companies like Tesla have proven also newcomers can make these platforms. Tesla has also proven that current connectivity technology is good enough to provide software updates over the air, substantially lowering the cost of non-quality. This trend may go faster for IVI systems than for safety related components in the car.

Agile and the automotive industry

There is no fundamental objection of the OEMs as long as quality is maintained

The car industry had adopted ASPICE as their software development model. ASPICE is based on CMM, which was developed in the nineties. There is no fundamental objection from the car industry to apply newer software methods, but their DNA prevents them from compromising on quality. And I believe they are right, never give up such a major achievement. On the other hand, the software industry has not done a good job in selling Agile as a quality first software development method. Many people believe Agile is you-will-see-when-I-am-ready, first-code-than-think, no documentation, release and repair, no architecture, etcetera rather than delivering quality. These thoughts are all wrong, but it does not help the adoption of Agile in the automotive industry.

In fact, Agile is a better way to secure quality and in-time delivery

I believe that Agile is a better way to meet deadlines as it is more transparent on progress and offers more means to identify the need for corrective measures in an early phase. It also offers the option to reduce scope until the last minute of the project. And most important, it drives quality from the beginning and secures a continuous compliance with customer quality demands. It is also more productive as waste is avoided; waste created by changed views on the required specification but also waste due to late finding and resolution of defects.

The V-model also applies to Agile

CMM and ASPICE very much support the think-before-you-act approach and have embraced models like the V-model. There is a lot of value in these models, but they undervalue the uncertainty in R&D processes, both in terms of predictability of what the customer wants as well as the predictability of what it takes to create. Sometimes the only way to know what it takes, is to start and learn on the fly (take a bite). That is why Agile has replaced the "big-V" model by many small V's, in a long iteration of small, more manageable, more transparent and even more predictable steps. The result is a more predictable process.

What is still blocking Agile and a continuous flow of feature releases?

Software updates not yet a secure process

A lot of the software in the car is still made once and used for many years. Best case, new models of the same car can receive a software update, but not the cars in the field. One of the reasons for this is that the software update process is still far away from a secure and mature process and connectivity has for a long time been insufficient to support this. This is changing rapidly. When connectivity allows for server side execution, it may be expected that this change will even come faster. It will also lower the dependency on the available hardware and make second hand car sales more attractive, which is good for the car industry in general.

Business models on continuous feature growth not yet widely accepted

A continuous flow of features is only interesting if it leads to more business and customers will pay for extra features. But these models still have to be developed. Current business models are still far away from smartphone type of applications where customers buy new features on their phone continuously. The trend that OEMs will become mobility providers and enter the services market will accelerate the need for new business models.

Downstream quality assurance too costly to facilitate continuous feature growth

Although the manufacturing processes in the car industry have moved quality assurance as much as possible upstream, the bad performance of many suppliers in R&D processes have created a lot of downstream quality assurance work within the OEM. And these departments will fight to survive and block practices where they are not heavily involved in testing. And they can only do this against contracts and large and detailed specifications, that have only value in preserving these departments.

These downstream quality assurance processes require substantial capacity at the OEMs. Strict cost budgeting at the OEM very often blocks further feature growth. OEMs are also not always able to indicate how the extra costs of validating new features are outweighed by the benefits of the new features.

Purchasing practices still very much contractor based

In the nineties, the car industry has substantially innovated the purchasing function and realised an impressive power gain. People like Lopez have initiated in the nineties a strong supplier management process, where supplier management was based on contracts, large specifications, tier-1 and tier-2 structures and rigid supplier selection processes. But today's innovation requires much more long term partnerships. Incentive schemes and role descriptions for purchasers have to change substantially and will create resistance in the organisation against this change.