

Software process assessment: key in the Automotive Domain but Why not so in the Space Domain

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There is wide consensus that the quality of the processes eventually helps to get higher quality products, to detect defects earlier, to leave less systematic faults in the product, etc. CMM/CMMI and SPICE were the initial process assessment models used to assess the quality of the software life cycle processes, focusing on software within a system, and measuring the capability levels as the quality criteria of those processes.

Different industry sectors found these models useful, and even defined their own sector specific process assessment models, often based on the ISO SPICE initial model. This is why today there are different process assessment models, such as: ECSS-Q-80-HB-02 for the European space domain, the AutomotiveSPICE [3] for the automotive domain, MediSPICE, CMMI, etc, and even other process assessment models for the assessment of HW, Mechanical, Agile, Data Management, Cybersecurity, Business, Very Small Entities, etc. processes respectively.

Nevertheless, not all those models are very much used. One of the reasons is still the lack of recognition of their added value (by many SW suppliers and customers). They often become successful when the customers require certain process quality level for allowing SW suppliers to sign in any contract.

In the automotive sector, customers require their suppliers to reach certain capability levels by their processes before delivery or sometimes even before the contract is signed. The main reason for these requests is to reduce project risks, while keeping the ‘as short as possible’ time to market characterising the automotive domain. These risks are feared to be very high today by the main manufacturers due to the tremendous SW revolution challenging current development and operational software paradigms. Today, InCar SW is incorporating completely different and new technologies, new architectures and with many different new features to add to the vehicle control, e.g. implementing:

- more and more features to implement such as infotainment functionalities for passengers, not anymore only for vehicle control;
- the main forces disrupting the automotive industry today —known collectively as ACES (autonomous driving (AD), connected vehicles, the electrification of the powertrain, and shared mobility);
- sensor, camera’s and LiDAR signal processing;
- increased need for safety/dependability and cybersecurity;
- different technology: SW with AI, SW in the Cloud, Data management, SW as a Service / On demand SW, etc.
- New HW architecture: the more than 200 microcontrollers (ECUs) in the vehicle today are becoming now to be two or three big CPUs (DCU – so-called Domain Control Unit) with very complex SW products (one SW product in today’s microcontroller can have more than 1.5 Million LOC – the size of the SW in one of the new CPUs may be of 10 Million?);
- Etc.

This paper will present what is requested today in the car industry (which capability levels to which processes) as well as the new AutomotiveSPICE v4.0, the added cybersecurity processes to be assessed, and then discuss about the SW evolution (not Revolution?) in the space industry and the role the SW process assessment could play.

This paper will present current demand of ASPICE assessments in the automotive domain.

[1] Russia hacked Ukrainian satellite communications, officials believe. BBC. 25 March 2022. [bbc.com](https://www.bbc.com/news/technology-61444444)

[2] Future Internet | Free Full-Text | Cybersecurity and Safety Co-Engineering of Cyberphysical Systems—A Comprehensive Survey ([mdpi.com](https://www.mdpi.com))

[3] Automotive SPICE Process Assessment / Reference Model Version 3.1. VDA QMC Working Group 13 / Automotive SIG (www.automotivespice.com)