



## Right on track to achieve Automotive SPICE Level 3 with software archaeology and continuous tests

For over two decades, SynSpace has been supporting its customers in the sustainable development of optimised processes. The consulting company is using the Axivion Suite to align an automotive supplier's existing software with a recently developed architecture as part of a continuous integration and improvement process.

**THE CHALLENGE ++** The automotive supplier's project revolves around an open-source software solution that relies on several programming languages. These software components, which took several man-years to develop to maturity, have already been implemented in various car models. Further vehicle types are being equipped with the software on an ongoing basis.

The components are technically mature, but were not developed consistently according to processes under the Automotive SPICE standard. There were no written requirements and no specifications regarding a uniform software architecture. In addition, the software that had been developed over the years was subject to very shallow testing. However, the automotive manufacturer regularly needs new feature releases that comply to the Automotive SPICE Level 3 assessment methods. This means that, in addition to the requirements, the supplier

also has to subsequently document an architecture for the existing software. This then forms the development basis for both new code and old code, which – as soon as it is “re-used” – may need to be adapted accordingly. The automotive supplier called in consulting company SynSpace to implement a system that will ultimately meet the requirements of SPICE Level 3.

**THE SOLUTION ++** As an external consultant, SynSpace creates solution strategies based on quality goals agreed jointly with the client. Various quality goals were agreed between the automotive supplier and its customer for old and new code. A risk assessment was conducted under the motto “Never Change a Running System” and a valid procedure established in accordance with the Automotive SPICE standard. This involved comparing both processes: the development of new software and the further development of

existing software that has grown up over the years and for which there is no software architecture whatsoever. In turn, this meant that the development processes had to be expanded to include a software archaeology approach. On this

*“The Axivion Suite is a real game changer. Thanks to continuous tests, the programmers go through a learning curve, which increases acceptance of the respective architectural requirements. In this kind of software archaeology project, this clears the way for reaching Level 3 of the Automotive SPICE standard.”*

Kosmas Kopmeier, Director Engineering Consulting, SynSpace Group GmbH, Freiburg

basis, a higher-level architecture was defined and the development process adapted accordingly. Of course, the existing software does not fully match the architecture because functional and non-functional requirements were only identified in retrospect. However, new code must comply with the architectural specifications; old code is only adapted when it is revised.

The Axivion Suite is the tool that is being used to check the code and architecture. This is enabling the software to be aligned with the recently developed architecture as part of a continuous integration and improvement process. The Axivion Suite facilitates continuous tests while also allowing the depth of testing to be constantly increased. The solution is being implemented in an agile approach with continuous integration and a Git pull request workflow.

**THE SUCCESS ++** With the Axivion Suite, old (unchanged) and new (changed or added) code can be examined separately in a delta analysis. The Axivion Suite enables static code analysis as well as other tests that are integrated into the process, revealing any architectural violations immediately: unacceptable deviations of the code from the architecture are apparent right away. Deviations of the architecture and warnings from the static code analysis can be properly assessed and compared against each other. In turn, this provides a good basis for risk assessment, in other words for deciding whether changes are absolutely necessary or useful, or whether they involve risks that are difficult to calculate. Using the Axivion Suite also increases the depth of testing continuously because it ensures a continuous test process with access to the config system. The regular tests create a higher level of acceptance among developers in code programming and also ensure a better understanding of the defined architecture in the long term.

The project is set to run for another 10 years. During this time, new software features will be implemented based on the existing code and the software will be adapted to the architecture as part of a continuous integration and improvement process. Even though the project is still in the initial phase, the automotive supplier's Engineering and Quality Assurance departments are already highly satisfied with its success. And from SynSpace's perspective, there is nothing substantial to prevent an assessment being carried out according to SPICE Level 3. The automotive supplier is on track to achieve this goal at an early or middle phase of the project.

#### **ABOUT THE SYNSPACE GROUP ++**

SynSpace is an international company specialising in technology and process consulting with a focus on quality management, project and process management as well as training. The SynSpace Group's strength lies in combining methodological knowledge, strategic consulting and implementation expertise. Optimising added value is the number one goal in the consulting projects. To this end, custom approaches and solution models are developed based on the existing tools and standards of the SynSpace Group. For further information about the SynSpace Group, please visit: [www.synspace.com](http://www.synspace.com)

**ABOUT AXIVION ++** Axivion, based in Stuttgart, Germany, is a provider for innovative software solutions for static code analysis and for protection from software erosion. The core product of Axivion is the Axivion Suite, a tool suite for the improvement of software quality and maintainability of software systems implemented in the programming languages C, C++ and C#. In addition to static code analysis, the tool suite includes innovative software tools for architecture verification and clone management. Moreover, the

tool suite detects software erosion factors such as cycles, dead code and violations of programming rules.

Axivion's MISRA checker covers 100% of all automatically testable MISRA rules for the standards MISRA C:2004, MISRA C:2012, and MISRA C++:2008. Furthermore, the AUTOSAR C++14 styleguide as well as the CERT® programming rules for secure software development are supported.

The Professional Services Team of Axivion offers methods and training concepts as well as service and consulting to support customers to assure an effective and efficient rollout of the tools.

Axivion's customers are companies that develop innovative technical software across different industries, e. g. industrial automation, automotive, railway, electronics, information and telecommunication, avionics, medical, mechanical engineering, as well as measurement, control and regulation technology. More information is available at [www.axivion.com](http://www.axivion.com)

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