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Efficient development and testing approach for successful GSR (General Safety Regulation) homologation

- From legislation to successful verification and validation-

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Advanced Driver Assistance Systems (ADAS) have become key technologies shaping the future of mobility and the automotive industry. Attributed to their widely recognized benefits such as active safety improvements, driver workload reduction and traffic pressure alleviation, ADAS features are increasingly being welcomed to the market.

More importantly, safety related ADAS features are mandated by regulatory agencies all around the world in the coming years. The General Safety Regulation (GSR) enforces a minimum set of active and passive safety functions in all new vehicles sold in the EU. Thus, OEMs are forced to implement and develop all those active (and passive) safety features to achieve the homologation. This of course also affects the suppliers. AVL presents its approach to face this challenge and to support OEMs in the development of their ADAS features. Basically, three main goals are addressed: to ensure a successful homologation, to reduce the development and testing efforts to a necessary minimum, and to guarantee the end consumers acceptance.

The methodology for an efficient and streamlined feature homologation will be a major factor that defines the success and competitiveness of the engineering process. In this paper the cornerstones for the feature design, elicitation of system level requirements, feature verification and validation are laid out. Also, the importance of the early and continuous involvement of the technical service is described. Considering the necessary steps that were identified, AVL is facing these challenges by utilizing its in-house legal- and standards database to identify homologation requirements and critical test cases and scenarios early in the development process and considering and tracking these boundary conditions from the design of the automated driving feature to the integrated solution in the vehicle on the road. The whole process including the three key activities is depicted in figure 1; the close alignment with the technical service and the set-up of the feature as well as legal database is shown in block number 1 below.

In the second block all testing activities for the verification are gathered. This includes virtual as well as proving ground testing. With a novel physical method-based approach, the proving ground tests can be reduced to a necessary minimum. It is possible to identify the most critical test cases which must be executed on the test track and reduce the overall real-world testing effort down to 15 percent compared to the full factorial approach. Virtual testing is used as a complimentary environment to cover all required test cases. The link from the virtual to the real-world was established with AVL's inhouse testing tool which compares and links the test results directly to the before derived requirements from the legal database. Hence, requirement fulfillment can be tracked easily throughout the whole feature development process. This is the basis to meet the demands from the homologation authorities. It can easily be seen that this part is related to the second goal, which is to reduce the efforts in development and testing.

Finally, public-road validation shall ensure end consumers satisfaction and is represented in block 3. For these activities also AVLs' testing tool is used to ensure traceability and feedback to the legal data base. The whole public-road validation process with its key elements, route planning, fleet monitoring, test coverage analysis and continuous reporting is discussed in detail as well.

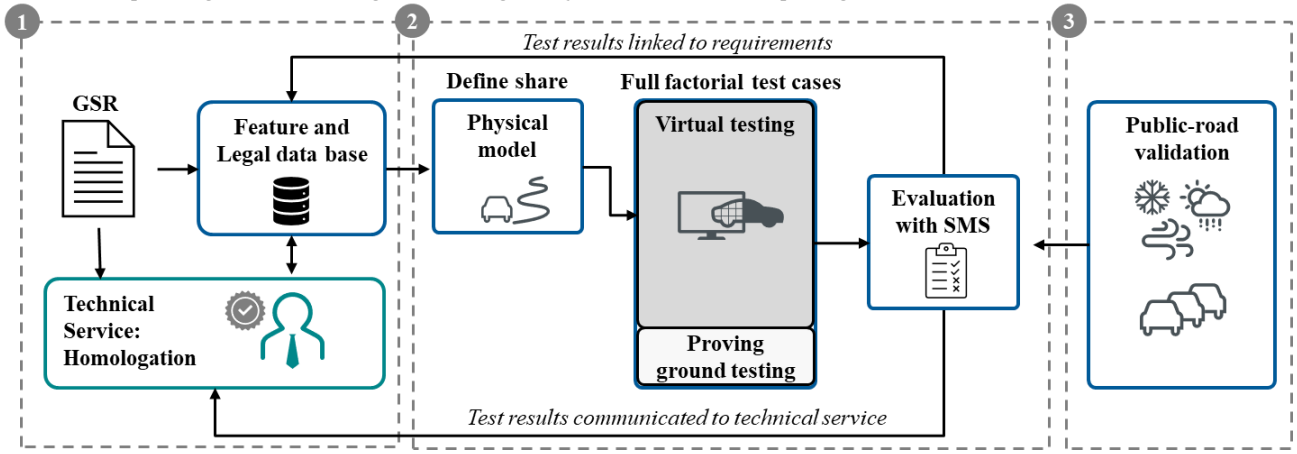

Fig. 1: AVL's development approach for successful ADAS homologation.