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Critical Thresholds for Digitalization Maturity

The automotive industry is on the cusp of a profound transformation: both in the products it manufactures and in the way it manages the vehicle throughout its lifecycle. The Software-defined Vehicle (SWdV) is the first step in this transformation and forms the basis for further innovations such as automated driving and a real transportation-as-a-service business model. There are several obstacles in the way. These include the increasing complexity of vehicles, labor shortage and uncertainties in supply chains.

We are convinced that innovations in vehicle design, production, lifelong service and business models will enable the industry to overcome these challenges and offer end customers more efficient and exciting mobility. Digital transformation can help companies enable and accelerate cross-departmental and cross-functional innovation. Companies that establish and implement a long-term digitalization plan will evolve beyond the mere linking of data to higher-level functions, but also to the closed-loop optimization of vehicle platforms and further to generative artificial intelligence technologies.

That's why we at Siemens Digital Industries Software have started to formalize digitization into five main phases: Configuration, Connection, Automation, Generative Design and Closed Loop Optimization. Configuration and connectivity represent the first critical thresholds of digitalization maturity for automotive manufacturers as they embark on the development of the SWdV. These phases form the basis for interconnected engineering of multiple vehicle domains, robust traceability and design management through software and systems engineering methods, and cross-domain verification and validation of vehicle systems. These capabilities will enable engineering teams to develop hardware, software and mechanical systems together. This will ensure that the increasingly important software systems are well integrated into the rest of the vehicle, especially in safety-critical scenarios.

However, in order to exploit the full potential of SWdV, automotive manufacturers must strive for a higher degree of digitalization – through more automation, generative design and closed-loop optimization. Those companies that fully embrace digitalization will be successful.