



>>> DIAGNOSIS 4.0 AND SERVICE 4.0

ODX and OTX as data source of future applications



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ODX and OTX data in conjunction with OEM-specific knowledge are a powerful and versatile tool in the complete life cycle of the vehicle. This opens up completely new diagnostic possibilities for the OEM, as well as for the user and service technician. The diagnostic system presented here goes one step further and is the basis for future predictive maintenance and condition monitoring functionalities.

Today's vehicle systems are increasingly developing into a network of state-of-the-art technologies. sensitive sensors embedded electronic systems and highly intelligent software.

The interaction of these components also increases vehicle complexity and thus the diagnostic demands on the systems. The components of a modern diagnostic system, based on the ISO standards ODX (Open Diagnostic

Data Exchange) and OTX (Open Test Sequence Exchange), already offer service technicians a high-performance tool that can be used far more extensively than its original purpose would indicate.

This enables the increasing complexity to be managed and Diagnosis 4.0 and Service 4.0 applications to be implemented.

New diagnostic options

Today, the communication of the entire vehicle network is already described based on diagnostic components. In addition, non-standardized, manufacturer-specific protocols are also mapped using the ODX standard (Figure 1). This also enables smaller vehicle manufacturers and suppliers to use the latest diagnostic components based on standards. In addition to conventional service testers and the evaluation of data on a PC, service technicians can thus access additional convenient diagnostic functions. For example, the runtime environment of the diagnostic system can also be used as the basis for in-vehicle applications on the driver display or for data provision on telemetry units. This provides the OEM as well as the user and service technician with completely new diagnostic options. But a modern diagnostic system goes one step further and provides the basis for predictive maintenance and condition monitoring functionalities.

Experience shows that ODX and OTX data in connection with OEM-specific knowledge are powerful and versatile tools in the complete life cycle of a vehicle and should also be used holistically.

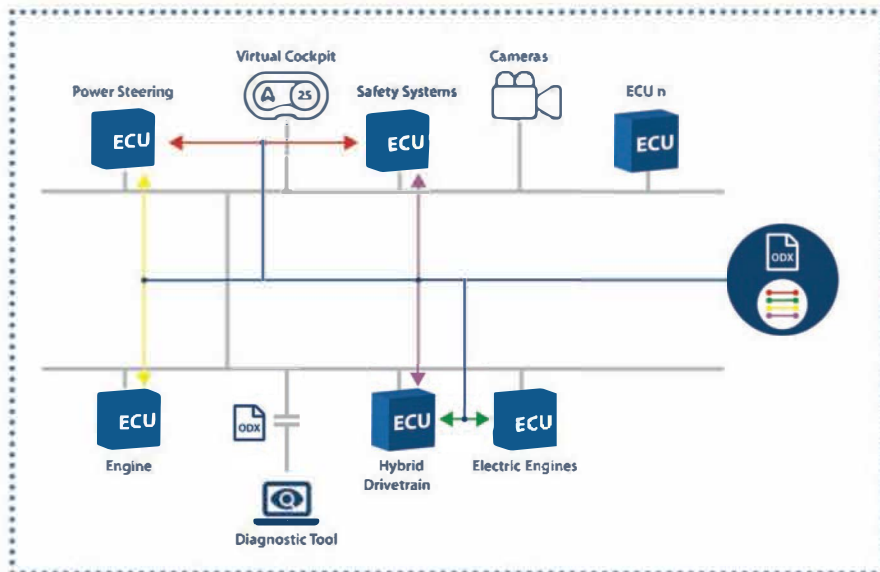


Image 1: Description of the entire vehicle communication and vehicle network in the ODX standard (© Sontheim)

Embedded diagnosis

Even during vehicle development, all ECU communication and the entire vehicle network can be described and defined in ODX in addition to the diagnostic interface. Already here, the diagnostic and communication information, based on ODX, is defined and the foundation for later analysis and evaluation procedures is created. This database can then be implemented in a platform-independent and standardized manner using OTX workflows with the aid of a modern diagnostic tool.

In particular, an optimized runtime system and the MCD-3D server support the implementation and execution of embedded diagnostic applications directly in the vehicle. This means that diagnostic processes, their control and the graphical presentation can already be carried out and shown directly in the vehicle display on board. An external service tester is therefore no longer absolutely necessary. The same diagnostic workflow can also run on a mobile application (smartphone, tablet, etc.) or on a telemetry unit, and a fault can be evaluated remotely, for example, and corrected in the field via over-the-air update without the vehicle having to go to a workshop.

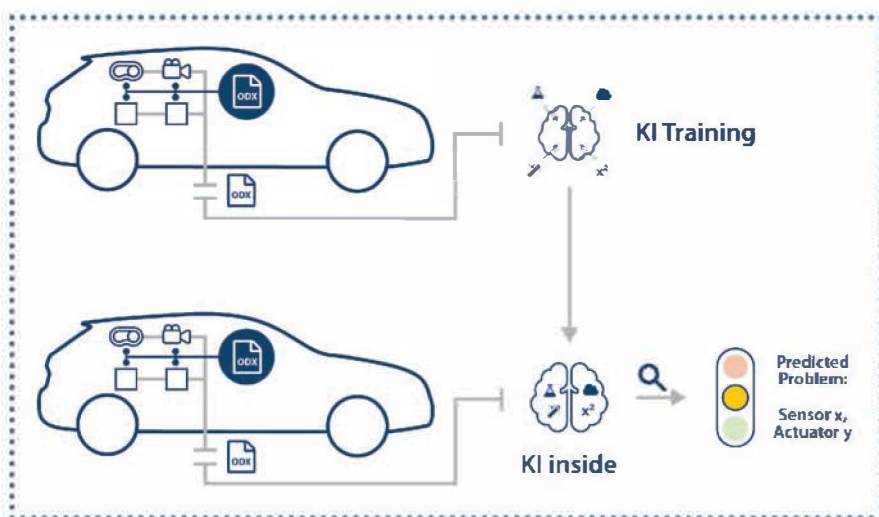


Image 2: Standardized ODX data as the basis for AI and predictive maintenance systems. (© Sontheim)

Description of the entire communication

Sontheim offers integrated system solutions for these applications. The web-based Communication Lifecycle Manager 2.0 can be used to describe the entire communication in the vehicle network in the ODX standard. Even during the definition of this system description, several teams can work simultaneously on the design of the entire vehicle network.

OEM-specific knowledge is incorporated from the outset in the form of detailed ODX descriptions. The Diagnostics Tool 2.0 with OTX standard, system can also be offered as an MCD-3D server and multi-platform support then uses this data for diagnostics on a PC, embedded in the vehicle on a display, or directly on a telemetry ECU, which then also uses standard interfaces such as MQTT (Message Queuing Telemetry Transport).

If the complete vehicle communication is stored in ODX and, in addition, categorized and assigned to the respective vehicle function, this data can very easily serve as the basis of a predictive maintenance system (Fig. 2). The information can now be used in a functioning vehicle, e.g. the zero series. Based on the information and signals exchanged in the vehicle network, an AI can be trained for the ideal operating state of the vehicle or individual subsystems. Moreover, such a system does not need any programmed knowledge about the mode of operation of the vehicle to be monitored. The system can detect anomalies based on observations and point out the sources of the anomalies. Investigations show that the data provided via the diagnostic interface is already sufficient to determine deviations from the optimum operating state. A temporal prediction of a component failure is already possible here.

Conclusion

The classic diagnostic systems will continue to be used. However, the toolbox of a service employee will contain far more powerful tools in the future. Sontheim's experience in the development of diagnostic components, customer-specific diagnostic applications and intensive cooperation with customers has shown that ODX and OTX are extremely high-performance and versatile tools. They provide important information during the complete life cycle of a vehicle and will become even more important in the future as a data source for intelligent applications. ■ (oe)

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Varying Applications

The components of the latest generation of diagnostic tools from Sontheim have been developed from the ground up for such a use case. They provide the necessary basis to operate monitoring even on embedded devices with limited resources. The implementation in a telemetry unit, a vehicle terminal, a VCI or even in the cloud is possible without any problems and thus opens up a wide variety of application areas.



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