*Originally published in the section New Products and Markets of the German technical magazine OEM & Supplier, issue 1/2012*

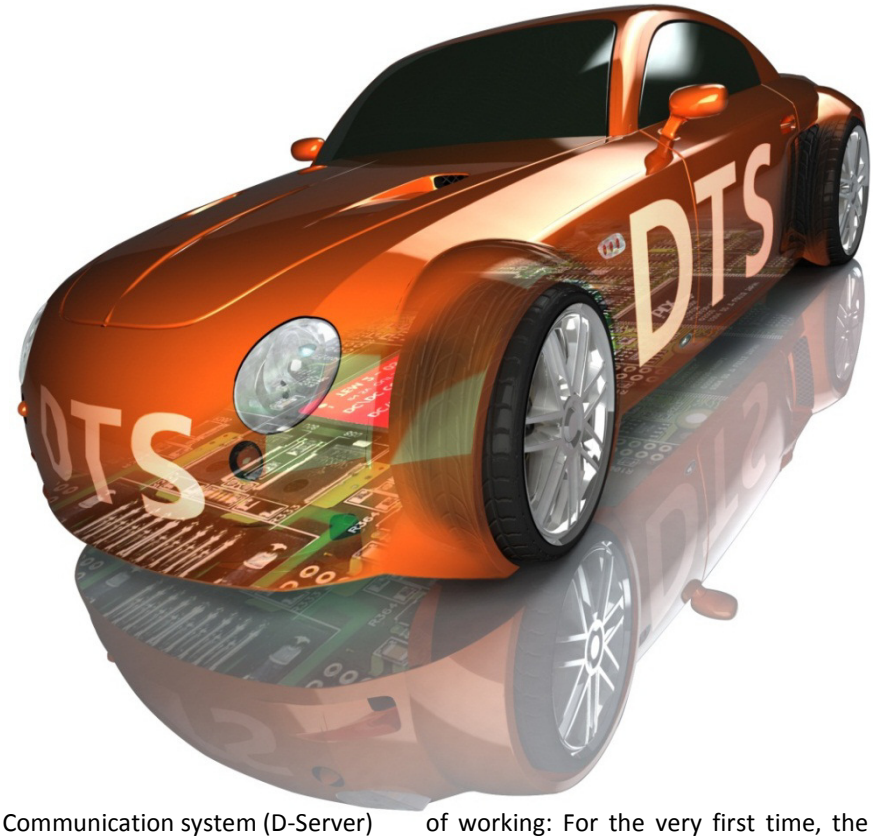
# Advantages of Using Current International Standards in Vehicle Diagnostics

By Matthias Ziegel, Product Manager of Diagnostic Tool Set, Softing Automotive Electronics GmbH, Haar, Germany

In the past, a lot of time and money were spent on developing non-compatible technologies. But today, vehicle manufacturers simply cannot afford to do that. The ever greater complexity when it comes to exchanging data both within a company's own value chain and with suppliers can only be truly mastered when all parties consistently use standards.

A large number of today's innovations are based on software developments, and vehicles are no exception. Software innovations improve vehicle performance and increase both the safety and sustainability of mobility. The number of ECUs and the associated networking are continually increasing in the process. The associated growing complexity must be mastered over a vehicle's entire lifetime.

In addition to actual control functions, diagnostics is increasingly a focal point in development. Although diagnostics was originally only intended for checking that legal emissions standards were being adhered to, today it plays an integral part in the entire value chain from engineering right through to after-sales service.




## MORE EFFICIENCY WITH STANDARDS

In the past, vehicle manufacturers spent a lot of time and money developing their own proprietary systems for ECU communication, systems that worked with non-compatible formats for data description. This made it virtually impossible for suppliers to use the same software when working with different manufacturers.

When no appropriate standards are available, costs are immense and manufacturers can become dependent on specific suppliers. This is why vehicle manufactures and software suppliers got together to specify and implement a whole range of international standards. The most significant standards for diagnostics are:

- Unified Diagnostic Services (UDS) as a diagnostic protocol compliant with ISO 14229
- Communication system (D-Server) compliant with ISO 22900 and 22901

The interfaces of the D-Server are also completely standardized. The data interface defines Open Diagnostic Data Exchange (ODX) as a data model and universal exchange format. Furthermore, the application interface (D-Server API) allows symbolic access to ECU and vehicle information. Using the bus system interface (D-PDU API), it is possible to use different bus protocols and vehicle communication interfaces (VCIs) from various manufacturers.

## MANAGING DIAGNOSTIC DATA AND SEQUENCES CONSISTENTLY

ODX has created a completely new way of working: For the very first time, the Engineering, Testing, Manufacturing and After-Sales Service Departments as well as all suppliers can use the same database for diagnostic tasks. Diagnostic specifications, such as services, jobs, vehicle topology and variants, are exchanged on a single-source basis over the entire lifetime of a vehicle (see Figure 1).

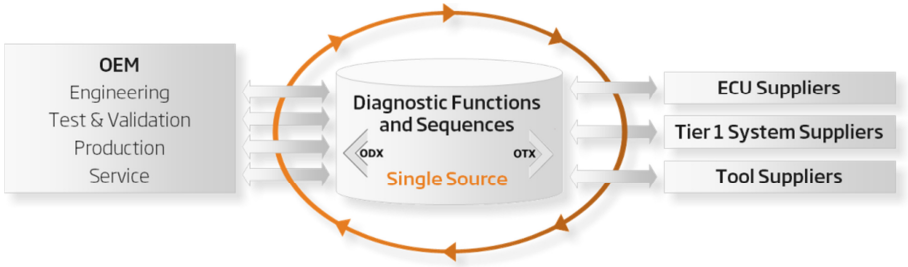
However, complex diagnostic sequences for function tests and guided fault diagnosis cannot be specified with ODX. This gap has now been closed with the new standard Open Test Sequence Exchange (OTX). It makes it possible for users to describe diagnostic sequences formally in XML and also enables access to diagnostic functions, flashing and user interaction to name a few of the

advantages. Unlike Java jobs in ODX, sequences can be reused long-term once created. Even when using different tools, exchange is still possible using the central database.

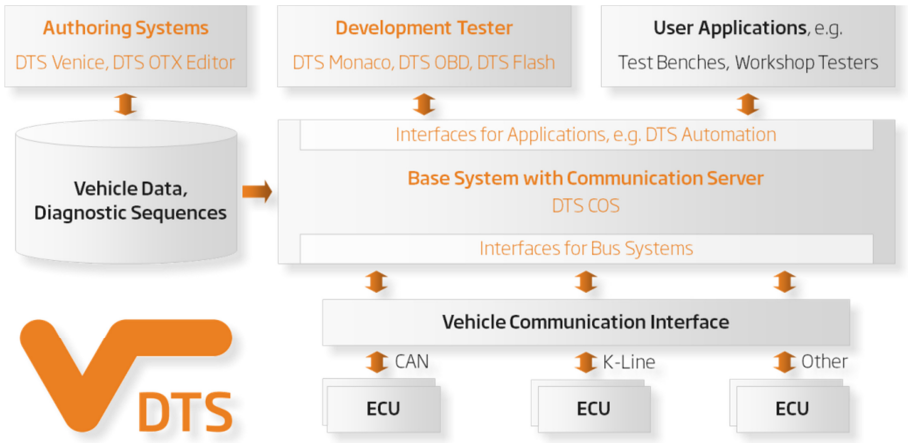
## USING STANDARDS ON THE ROAD TO A COMPLETE SOLUTION

With Softing's Diagnostic Tool Set (DTS), developers, engineers and technicians create consistent diagnostic functions and sequences based on international standards. This means reliable diagnostic communication can be ensured over the entire value chain.

As illustrated in the system overview (see Figure 2), the DTS Base System not only includes the standard-compliant communication system with standardized interfaces described above, but also high-performing authoring systems for ODX and OTX, a universal engineering tester and an easy-to-configure interface for automation tasks.




**Single Source: Central database for all diagnostic data and sequences**




**System overview: The Diagnostic Tool Set covers all possible applications of diagnostics in engineering, testing, manufacturing and service.**

## SUCCESSFUL PILOT PROJECT

The need for greater efficiency meant that the communication system used to date by a well-known German vehicle manufacturer was no longer able to fulfill the demands made of it. A non-compatible data format made it difficult to exchange diagnostic data.

The bus system interface was a proprietary one and diagnostic sequences were created with different tools. In addition to the high costs of proprietary developments, it was also taking an inordinate amount of time and money to keep maintenance running at the appropriate level.

The OEM decided to look for a system that was readily available on the market – a system that supported the latest standards, guaranteed a smooth transition from the system used to date and that would be easy to extend. After a long and thorough search, the OEM decided to implement the Diagnostic Tool Set. In Version 8, DTS supports not only the latest Version 2.2 of the ODX standard but also the previous, proprietary data format as well as the new OTX Standard 1.0. As part of the gradual replacement of the previous system, DTS is now already being used successfully in several areas of the company.

## CONCLUSION

Vehicle diagnostics is now covered completely by the latest ODX and OTX standards. This facilitates the exchange of diagnostic functions and sequences between the engineering, testing, manufacturing and after-sales service departments as well as with suppliers. At the start of the value chain, the standards considerably reduce the amount of time required for development and thus reduce costs. The central database improves data quality and international standardization ensures global reusability long-term. At the end of the value chain, the after-sales service department will be able to localize problems faster and more precisely than before thanks to considerable improvements in the area of guided fault diagnostics.

The use of a readily available system such as the Diagnostic Tool Set represents a significant reduction in costs in comparison to proprietary developments. The greatest advantage for vehicle manufacturers, however, is that the software supplier is responsible for maintaining the system and that the costs are spread over all users. ■

## STANDARDS SUPPORTED BY THE DIAGNOSTIC TOOL SET

- **Communication system with MVCI Server/ASAM MCD runtime system (D-Server)**

  ODX Container for diagnostic data:
  ISO 22901-1/ASAM MCD-2D

  Application interface:
  ISO 22900-3/ASAM MCD-3D

  Bus system interface:
  ISO 22900-2 (D-PDU API)
  via CAN and K-line
- **ISO 13209 (OTX)**
- **ISO 14229 (UDS)**
- **ISO 15031 (OBD)**
- **ISO 15765 (KWP2000)**
- **SAE J2534**
- **SAE J1939**
- **and many more**

**Matthias Ziegel**

**is Product Manager for the Diagnostic Tool Set at Softing Automotive Electronics GmbH in Haar, Germany**