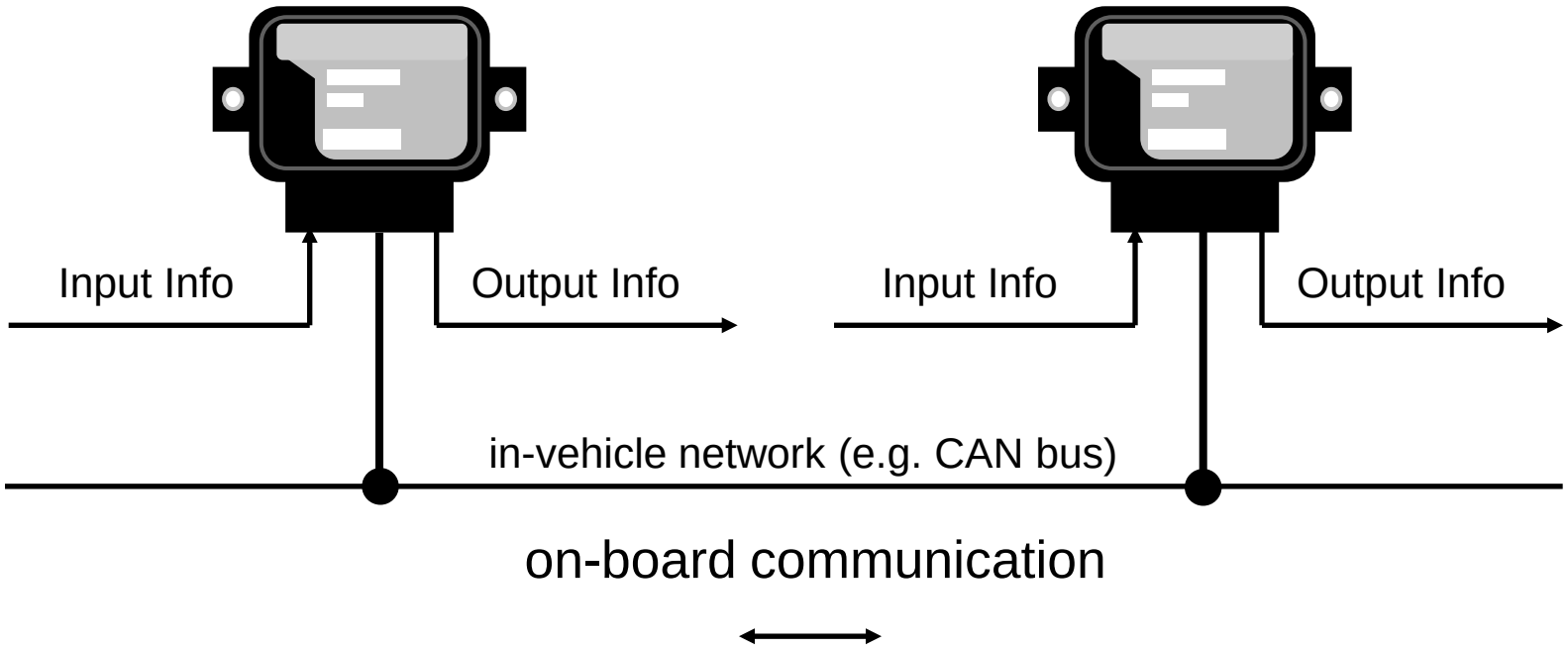
ASAM | Association for standardisation of automation and measuring systems

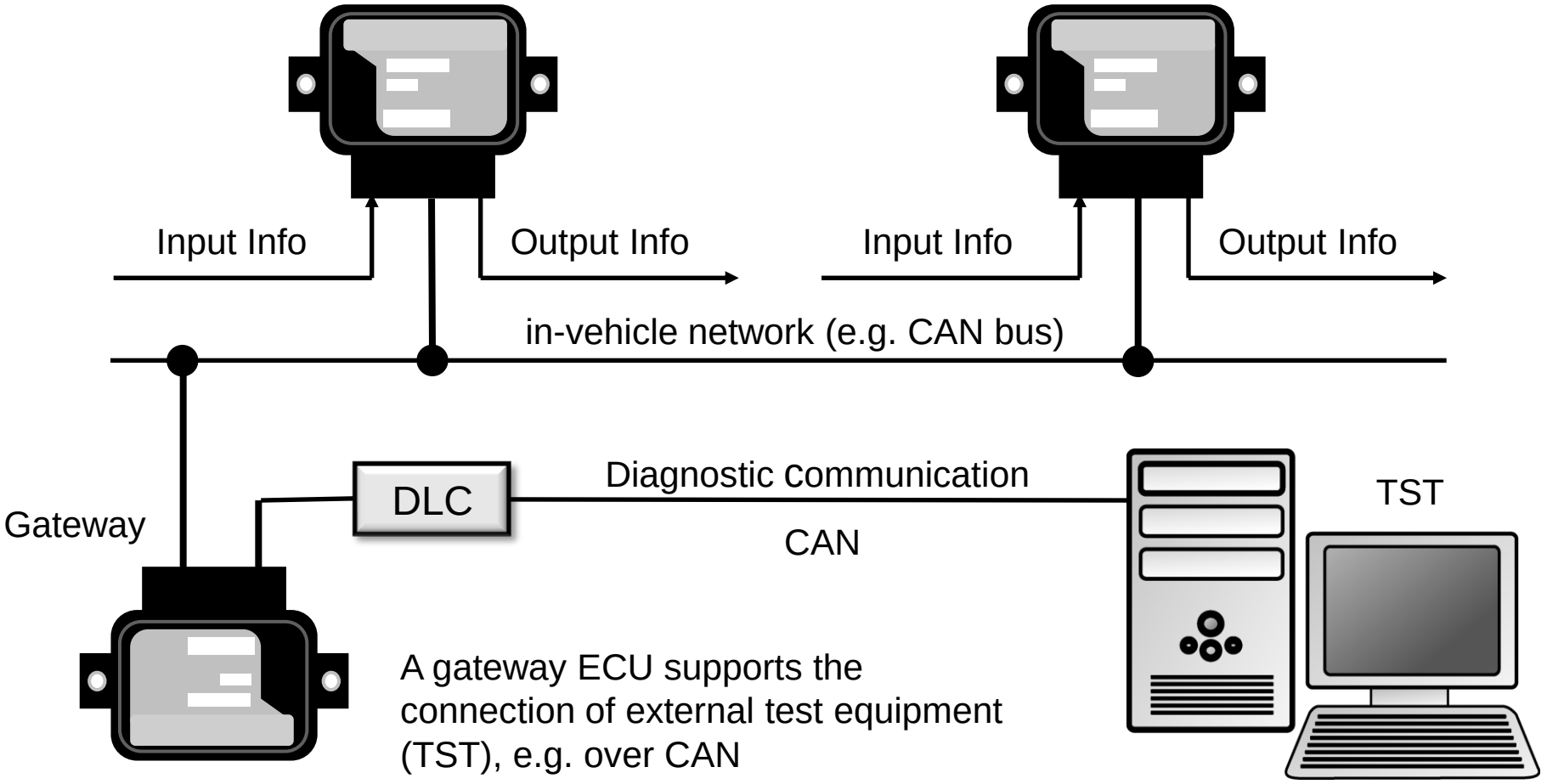
ASAM MCD D-Server in the Process Chain

Peter Subke, Softing Automotive Electronics

On-Board Communication

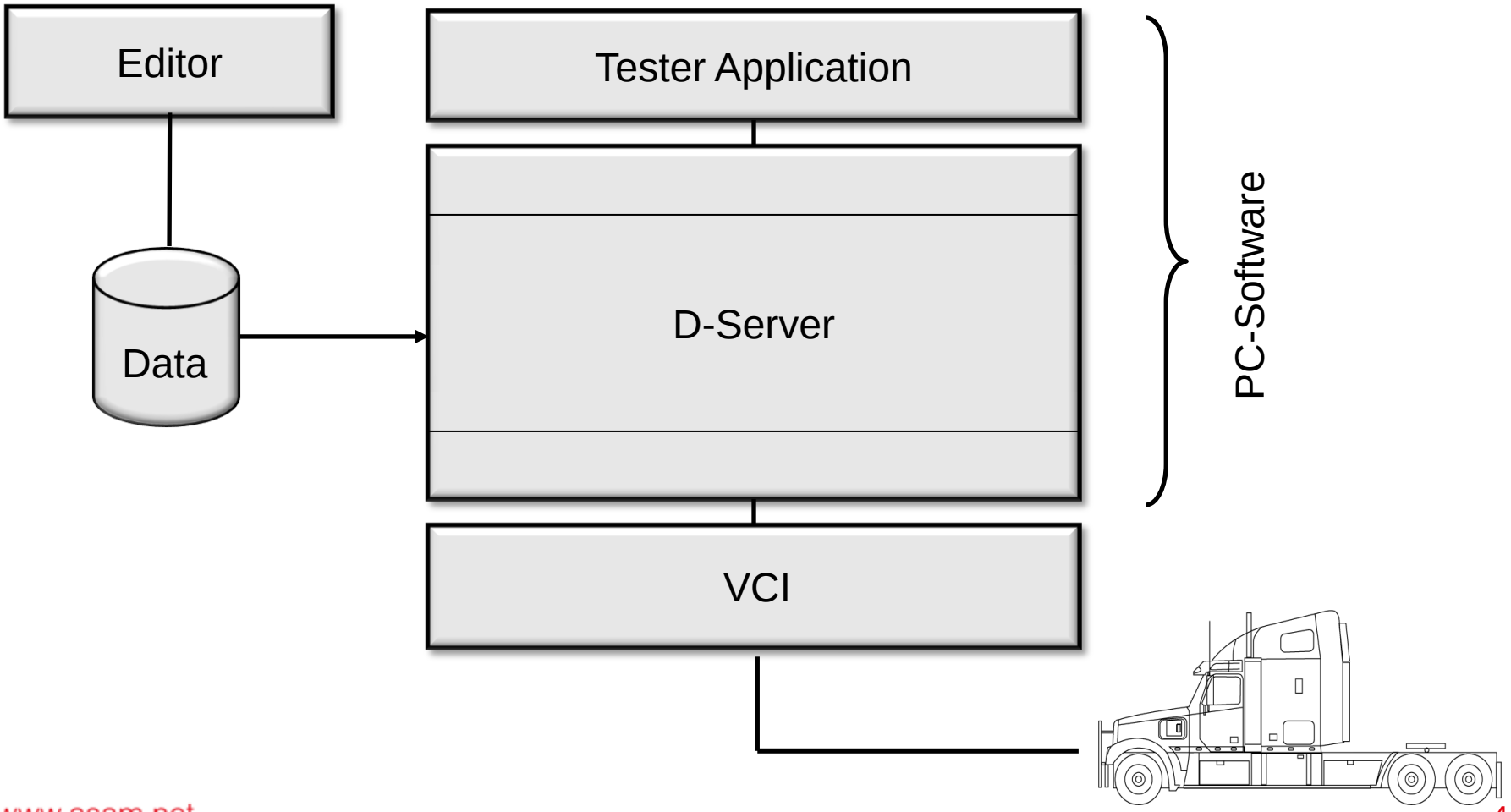


Diagnostic Communication

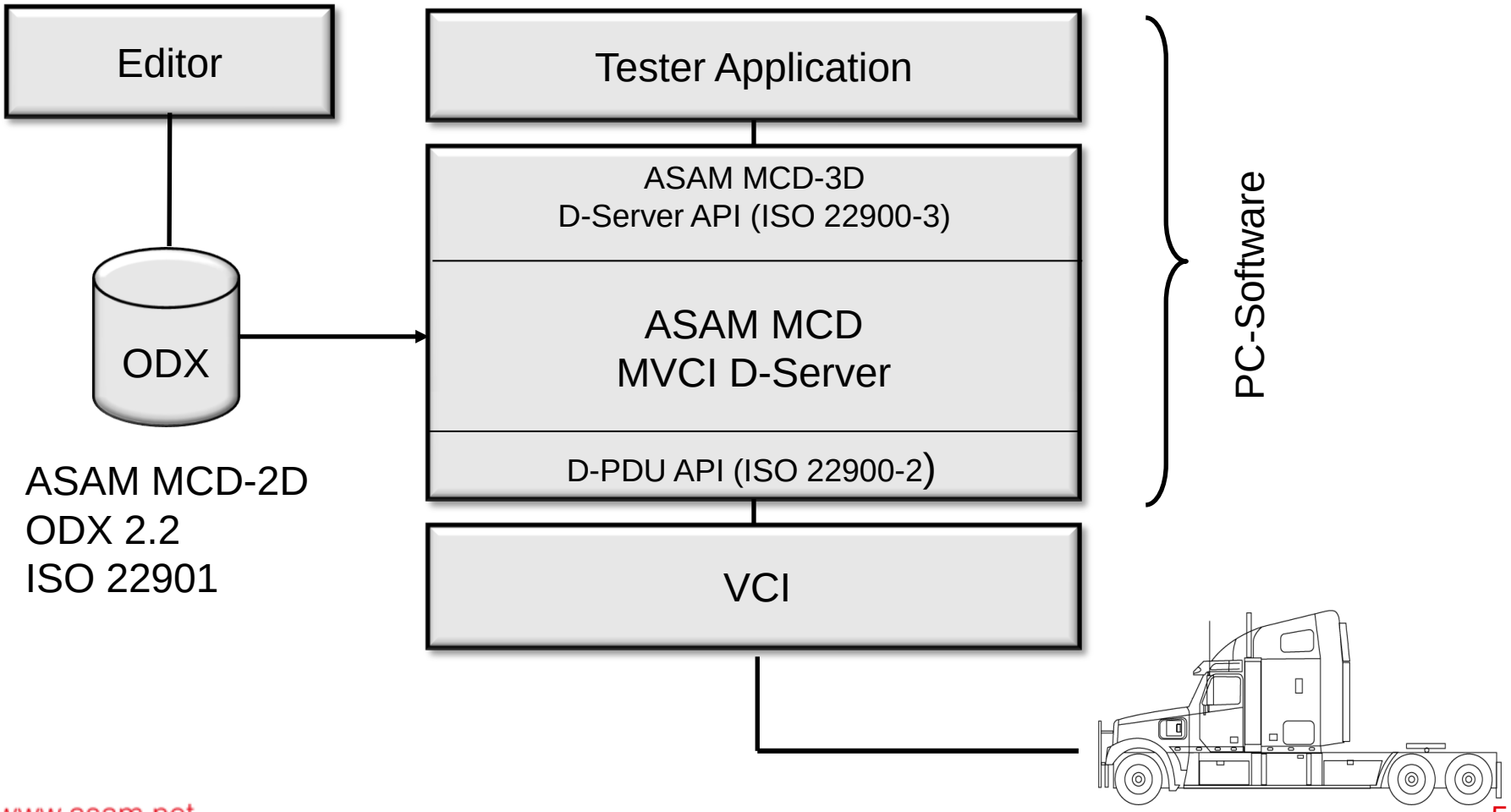


A gateway ECU supports the connection of external test equipment (TST), e.g. over CAN

Tester Software

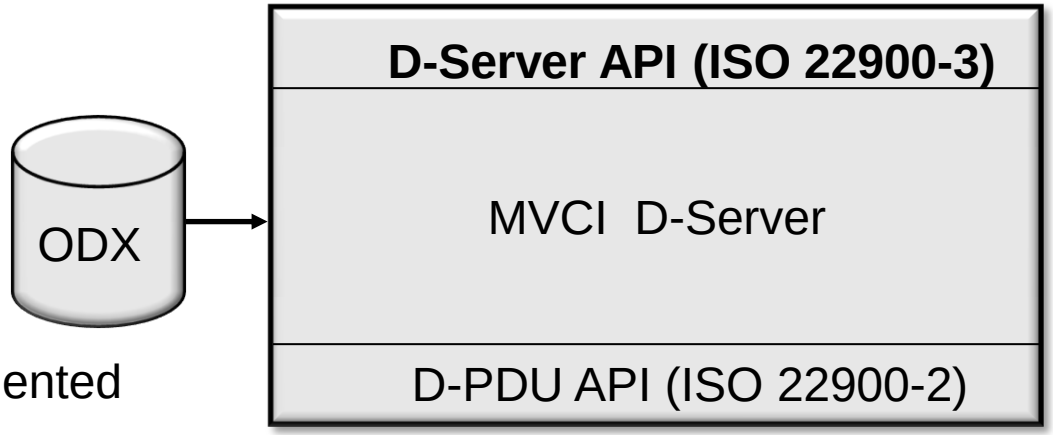


ASAM based Tester Software



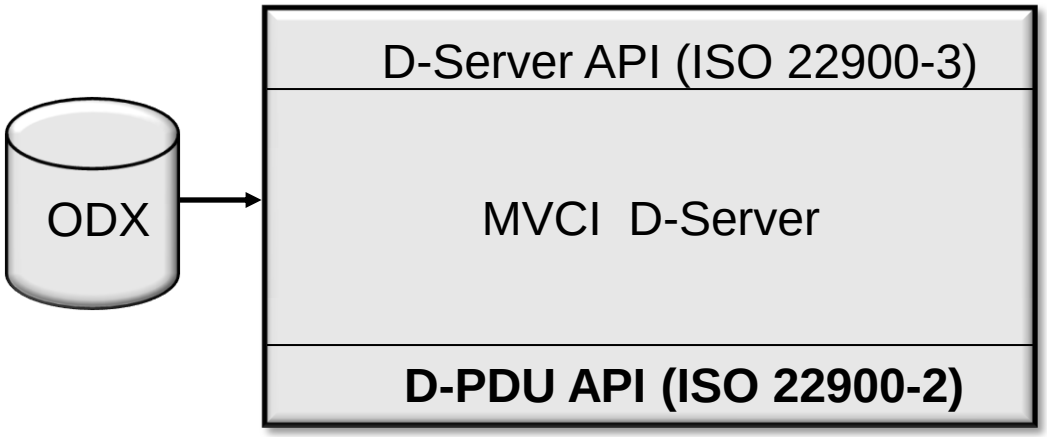
	MCD-3 1.0.1	MCD-3 2.0.1	MCD-3 2.0.2	MCD-3 2.1.0	MCD-3D 2.2.0
ODX 1.2.2	✓				
ODX 2.0.0					
ODX 2.0.1		✓	✓		
ODX 2.1.0				✓	
ODX 2.2.0					ISO 22901

D-Server API



- The D-Server API is an object-oriented programming interface for applications written in C/C++ or Java
- ISO 22900-3:2009 has been withdrawn in April 2010.
- The current stage date of the new committee draft (ISO/CD) is Sept 30, 2011
- As ISO/CD are not available for the public, there is no valid ISO standard for the D-Server API

D-PDU API



- Objective: Any application (incl. D-Server) that utilizes the D-PDU API can be executed on any D-PDU API compliant VCI
- ISO 22900-2 (D-PDU API) provides the description of API functions and the abstraction of diagnostic protocols, e.g. „ISO_14220_1_on_ISO_15765_3“

D-Server & ODX ISO Standards

ISO 22900: Road vehicles – Modular vehicle communication interface (MVCI)

Part 1(2008): Hardware design requirements

Part 2 (2009): Diagnostic protocol data unit application programmer interface (D-PDU API)

Part 3 (CD): Diagnostic server application programmer interface (D-Server API)

ISO 22901: Road vehicles – Open diagnostic data exchange (ODX)

Part 1 (2008): Data model specification

Part 2 (2011): Emissions-related diagnostic data

OBD for Heavy-Duty Diesel

OBD (On-Board Diagnostics) is a system on-board a vehicle which has the capability of detecting malfunctions..

The United States

Federal Clean Air Act (FCAA)

is a federal law,

revised and expanded in 1990,

enacted to control air pollution on national level.

On-Board Diagnostics (OBD)

The Clean Diesel Trucks and Buses program as one result of the FCAA
requires that the emissions control systems (DPF, EGR and SCR) be monitored for malfunctions via an on-board diagnostic system (OBD).

The OBD system shall...

- … monitor the emission systems in-use for the actual life of the engine,
- ... be capable of detecting malfunctions of the monitored emission systems,
- ... illuminate a malfunction indicator light (MIL) to notify the vehicle operator of detected malfunctions,
- ... store fault codes (DTCs) identifying the detected malfunctions, and
- ... serve diagnostic communication to external test equipment.

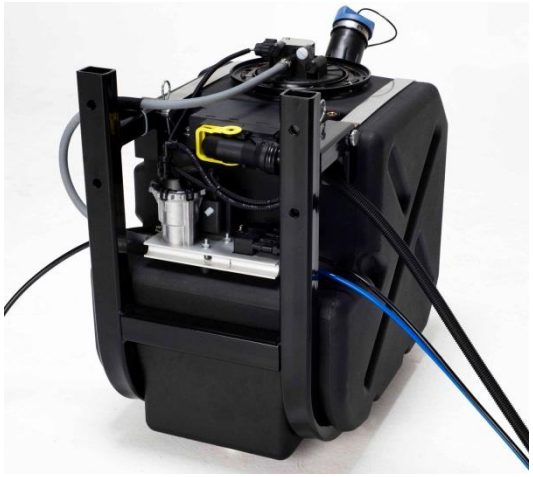
SCR for Heavy-Duty Diesel

- To meet the legislated emission values, heavy duty diesel engines are equipped with electronically controlled diesel particulate filter (DPF), exhaust gas recirculation (EGR) and/or a Selective Catalytic Reduction (SCR) system that employs DEF (Diesel Exhaust Fluid).
- The main function of SCR is the reduction of unvisible but harmful nitrogen oxide (NOx).
- This function is performed by the injection of DEF in the catalyst which is part of the exhaust system.

SCR Catalyst & Injector
(Albonair, Germany)

SCR Adblue tank and Dosing Unit
(Albonair, Germany)

SCR System Supplier



For diagnostic communication an external D-Server based TESTER is connected to the SCR-ECU.

Two diagnostic protocols are available (see ISO 22900-3 Table B.3):

- SAE_J1939_73_on_SAE_J1939_21 = „Truck and Bus on CAN“
- ISO_15031_5_on_ISO_15765_4 = „ISO OBD on CAN“

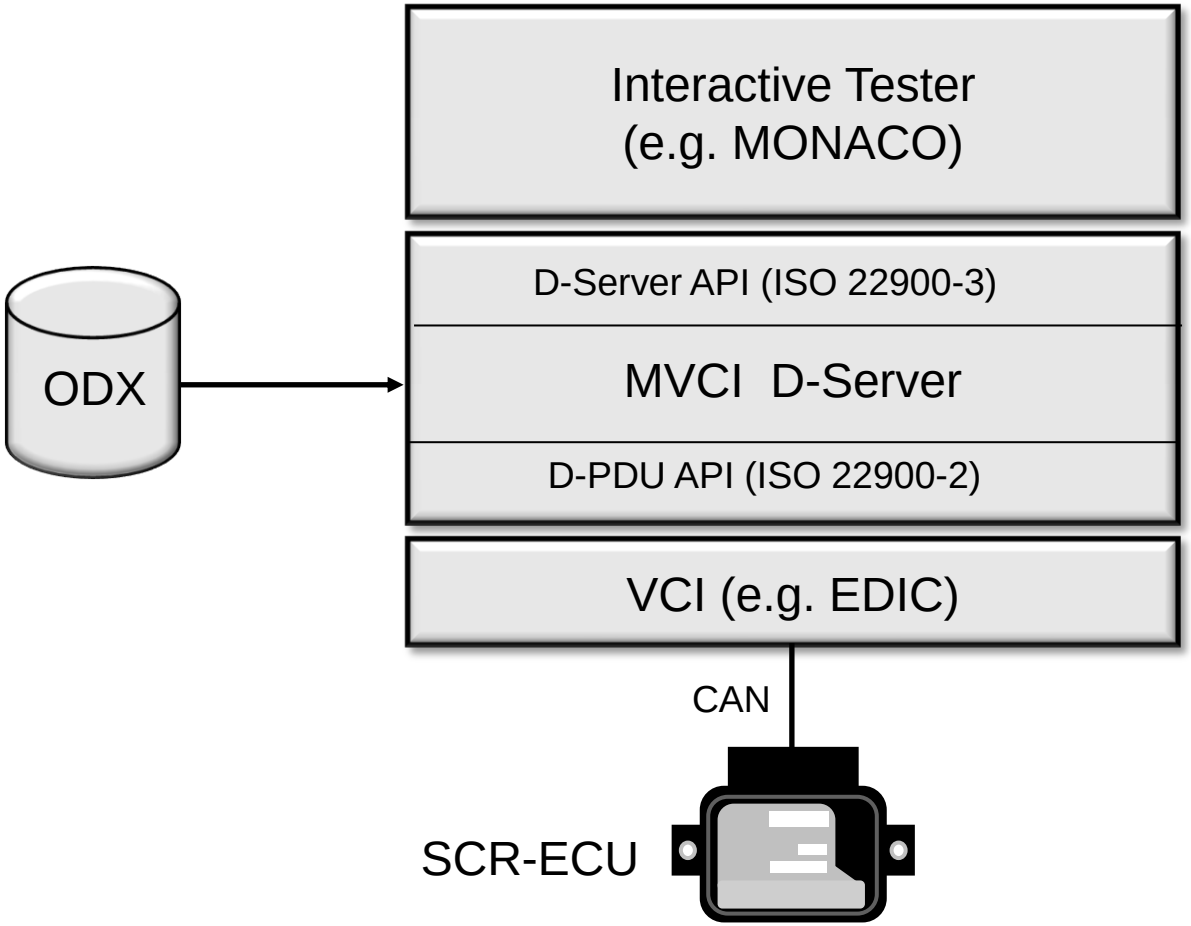
SCR Dosing Unit
(Albonair, Germany)

The diagnostic data, the DTCs, and the diagnostic protocols are stored in an ODX database.

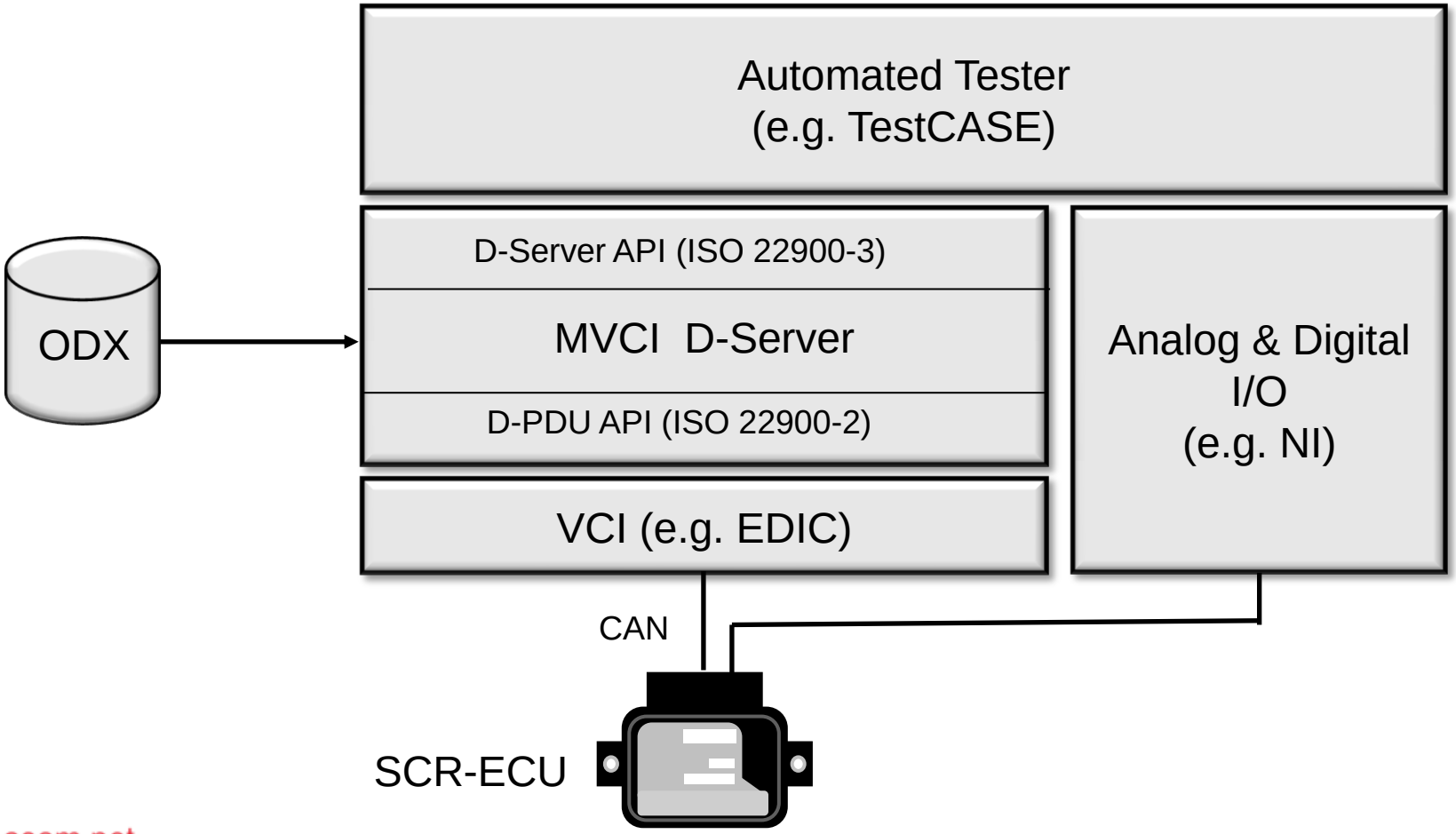
D-Server in the SCR supplier process chain

- Diagnostic communication test
- Software regressions test
- EOL flash programming
- Service tester

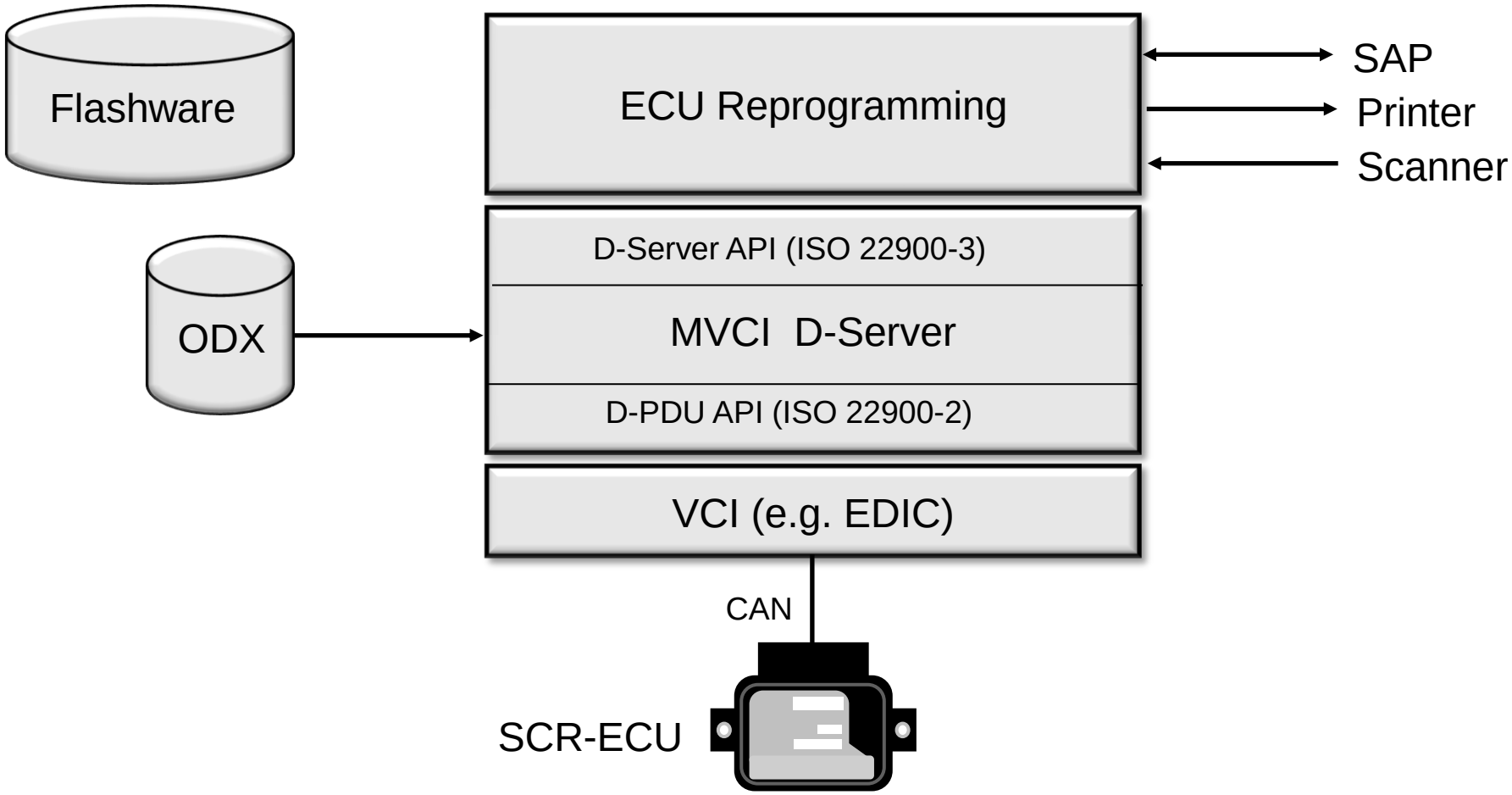
Diagnostic communication test



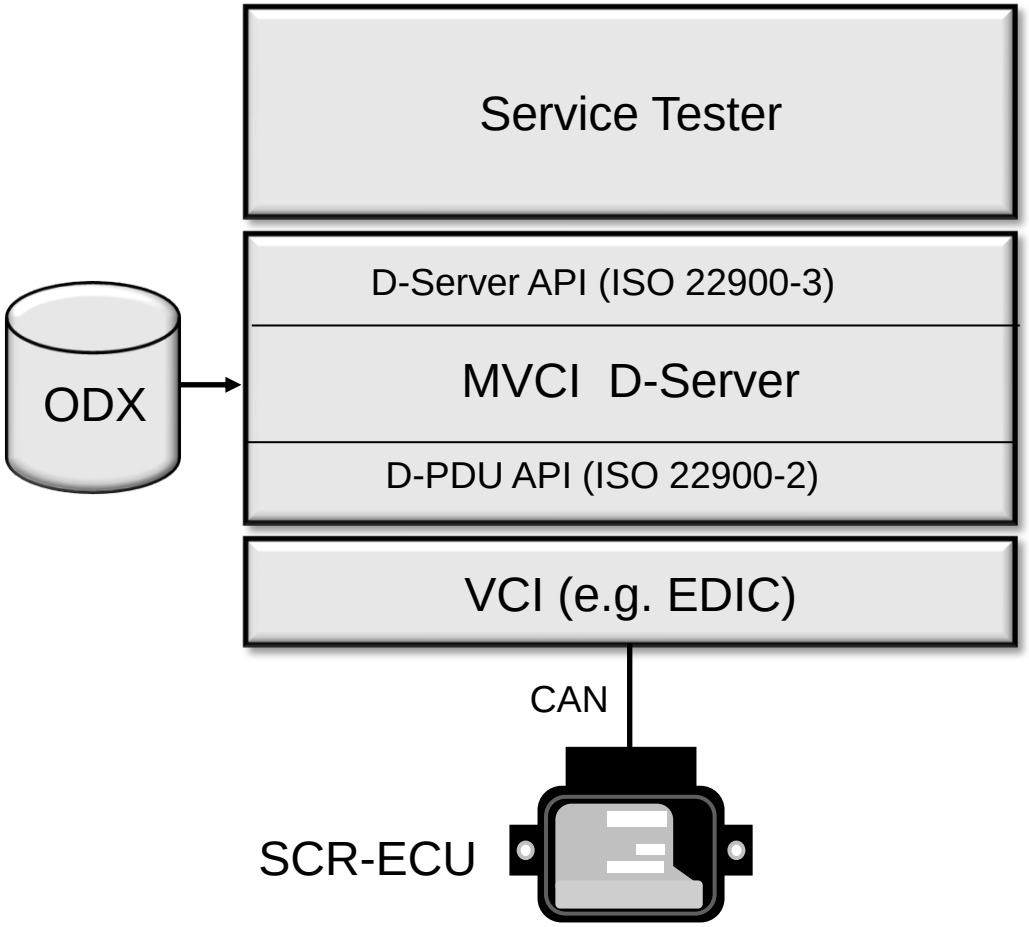
Software regression test



EOL flash programming

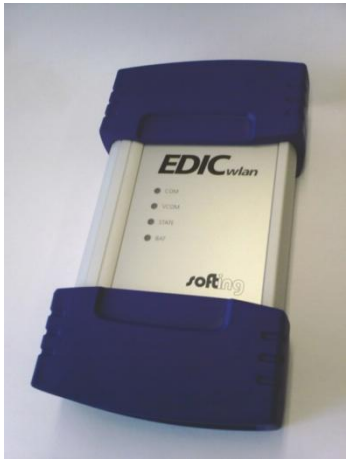


Service Tester



A state-of-the art Service Tester shall support guided fault finding

Service Tester PCs and VCIs shall be ruggedized



Ruggedized VCI with D-PDU API for HDD applications (Softing)

Summary

- The ASAM MCD D-Server is used in all phases of the process chain (development > after sales service)
- The tester applications and the VCIs may vary, the D-Server remains the same
- The ODX database contains diagnostic data, DTCs and diagnostic protocols for different tester applications