Testing Expo North America 2008

Introduction to Standardized Diagnostic Communication: UDS on CAN (ISO 15765) with MVCI (ISO 22900) and ODX (ISO 22901)

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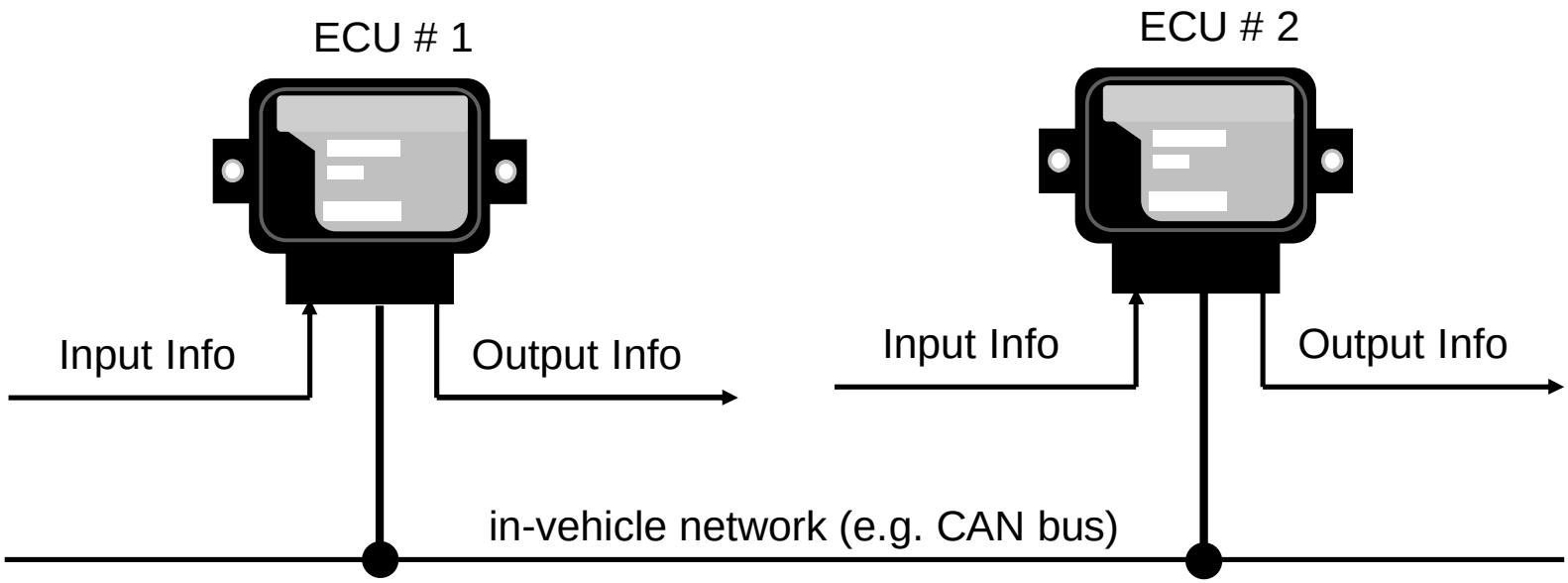
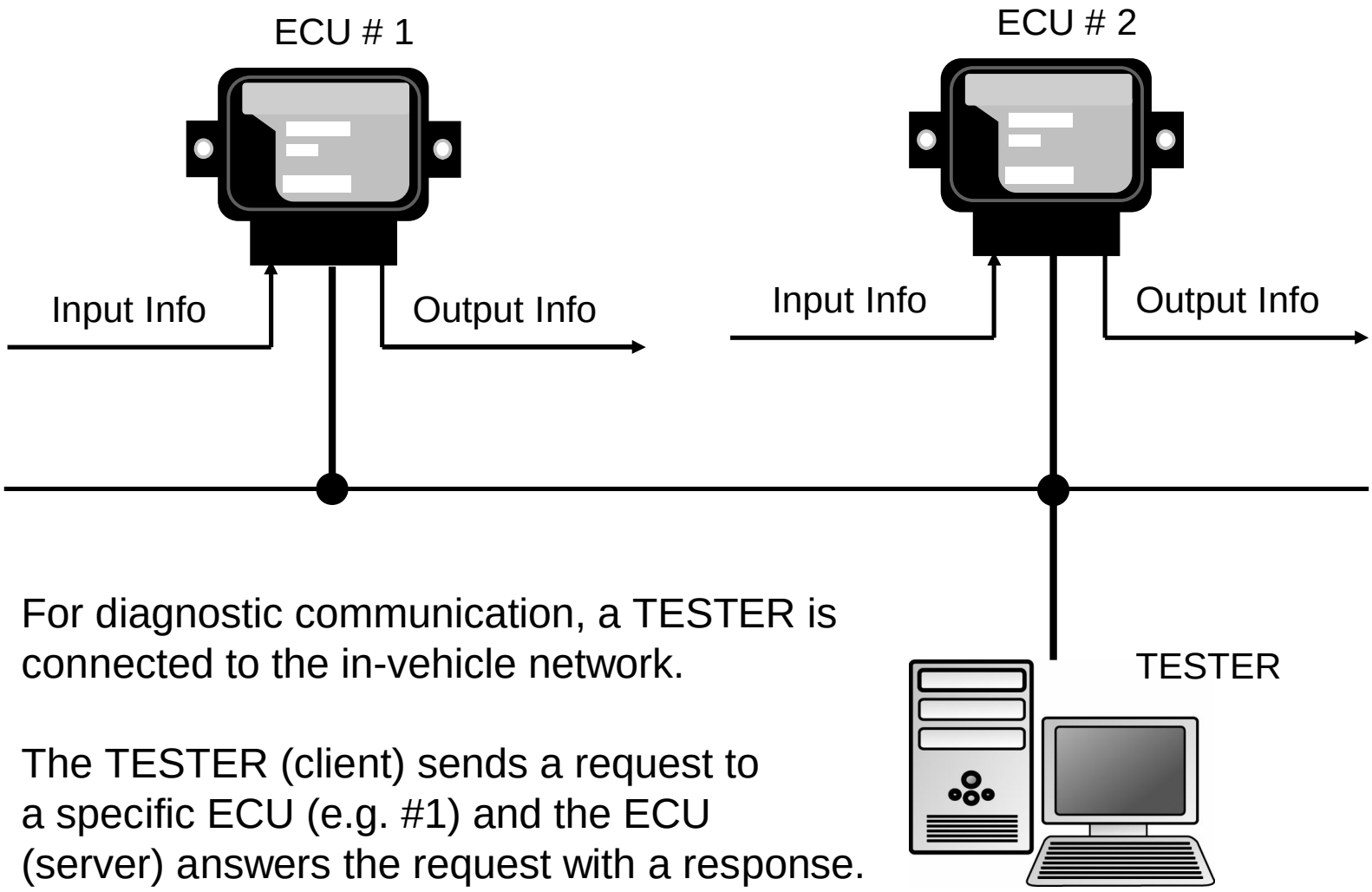
Onboard Communication



onboard communication

ECUs convert input information from sensors to output information for actuators.
ECUs send information to other ECUs and receice information from other ECUs (onboard communication).
For onboard communication, ECUs are interconnected via an in-vehicle network (e.g. CAN)

Diagnostic Communication



For diagnostic communication, a TESTER is connected to the in-vehicle network.

The TESTER (client) sends a request to a specific ECU (e.g. #1) and the ECU (server) answers the request with a response.

Diagnostic Services

Diagnostic communication requires a diagnostic protocol.

A diagnostic protocol contains a set of communication parameters and diagnostic services (request / response).

Typical examples for diagnostic protocols include KWP2000 and UDS.

ISO 14229-1(2006) : Road vehicles – Unified diagnostic services (UDS) specifies a diagnostic protocol on layer 7 of the OSI model.

Examples for diagnostic services of ISO 14229 include:

11_{hex} = ECU reset
86_{hex} = response on event
19_{hex} = read DTC information
23_{hex} = read memory by address
31_{hex} = routine control
36_{hex} = transfer data

UDS on CAN

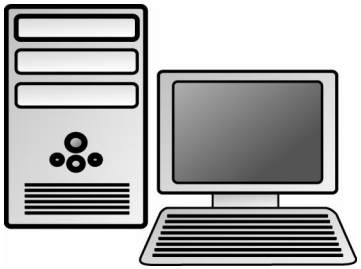
Today, diagnostic communication uses the existing in-vehicle network to transport requests and responses.

The transport protocol for UDS on CAN is specified in

ISO 15765-3 (2004): Road vehicles –
Diagnostics on controller area network (CAN) –
Part 3: Implementation of unified diagnostic services (UDS on CAN)

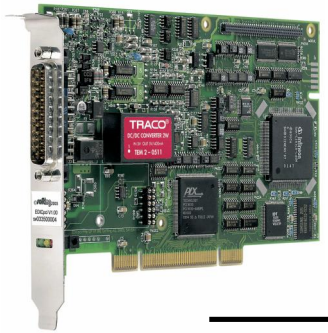
ISO 14229-1:2006 (UDS) and ISO 15765-3:2004 (Diagnostics on CAN) are complementary standards that together specify the diagnostic protocol “UDS on CAN”.

Communication system



Tester
Applications (e.g. MONACO, INCA, LabView, AD
Databases (EDF, ODX, FBX,CANdb, A2L)
D-Server (EDIABAS, ETESTER, COS, MVCI)

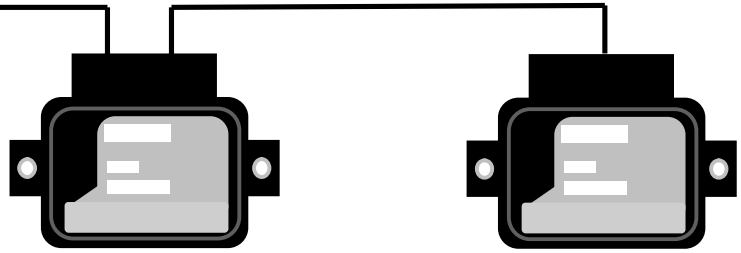
PC-to-ECU interface software
e.g. EIDBSS, Vecom, D-PDU API



PC-to-ECU interface hardware
e.g. ETK, EDIC, DCDI, VCI

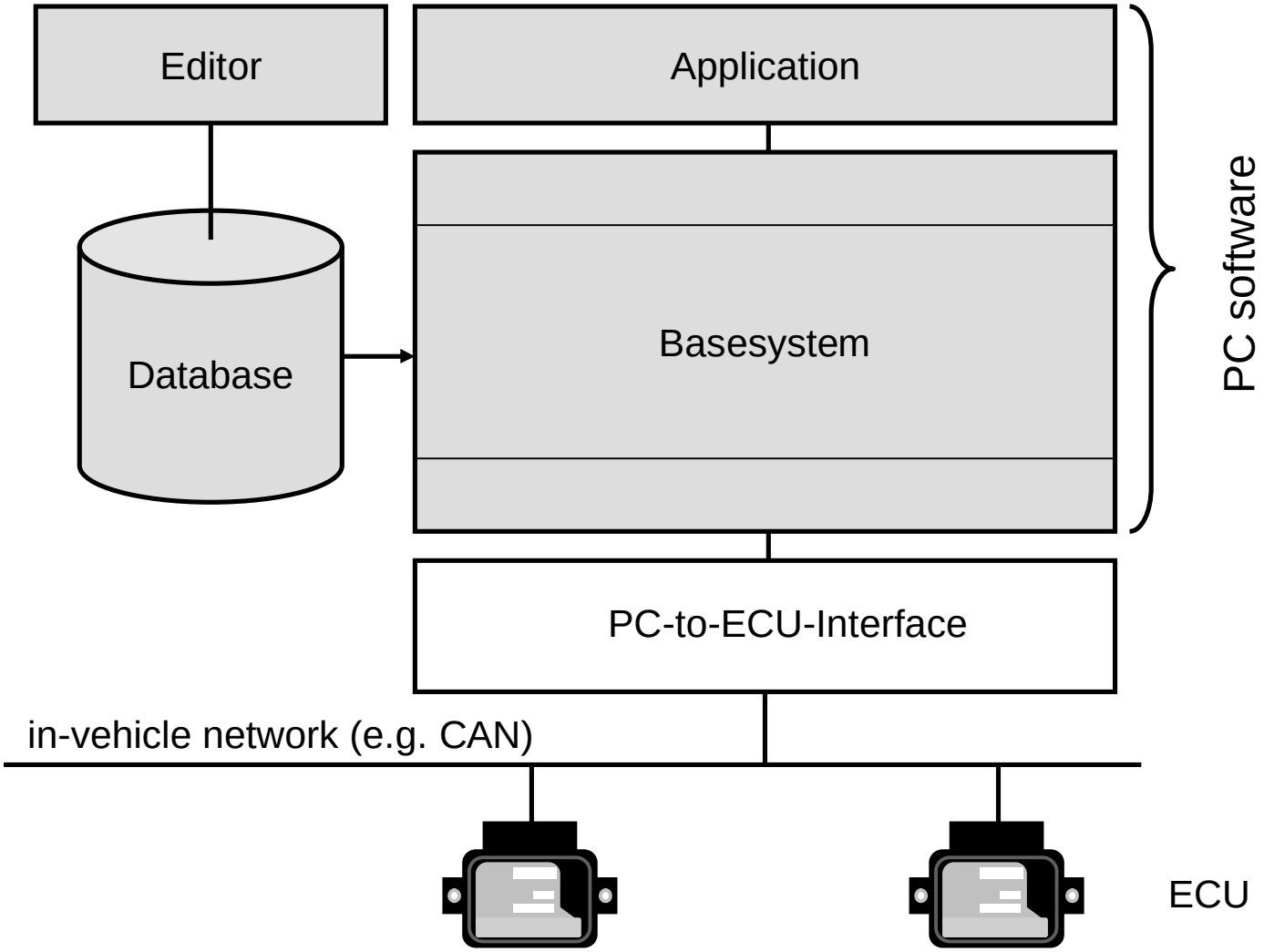
Onboard communication
CAN, LIN, FlexRay, MOST

Diagnostic communication
Diagnostic protocols
KWP 2000, UDS on CAN
UDS on FlexRay

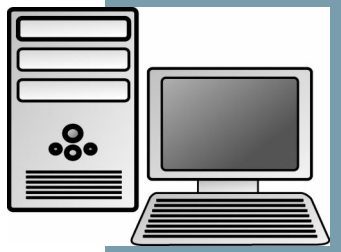


ECU software (e.g. AUTOSAR)

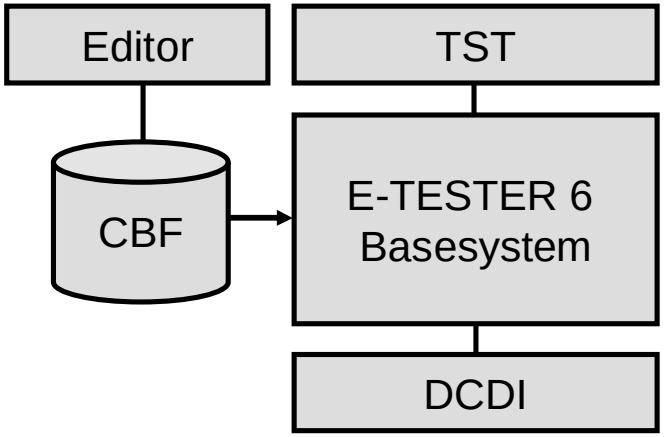
Components of a PC-based Tester

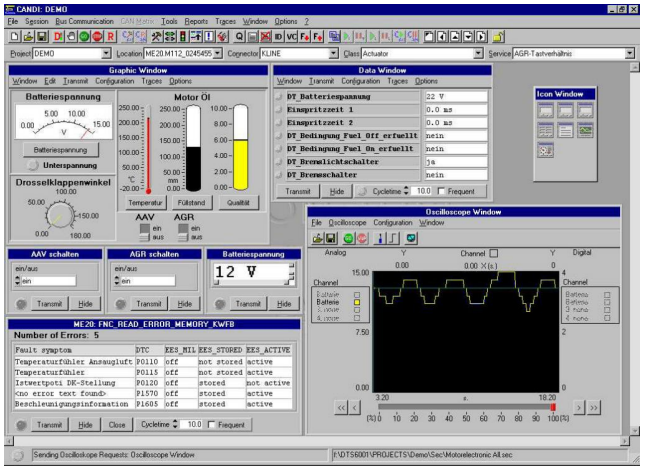


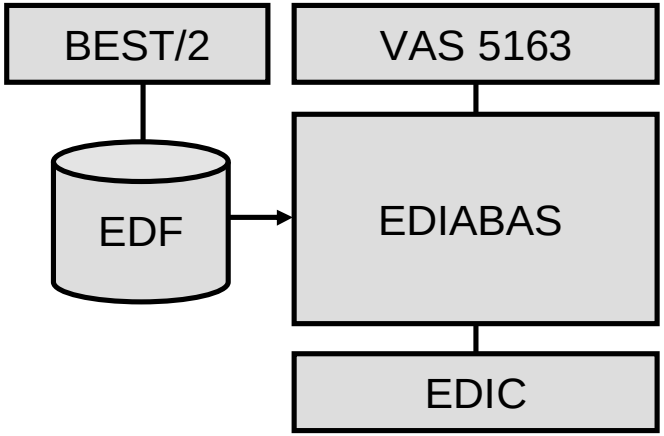
PC hardware



OEM-specific PC-based Tester (examples)







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Problem & Solution...

Too much energy is spent on the development of proprietary communication protocols and networking technologies.

Incompatible tester technologies cause high costs at the vehicle manufacturer and their suppliers.

Proprietary technologies make the vehicle manufacturer dependent of the selected tool supplier (single source).

Standardization is an advantage for vehicle manufacturers as well as for their suppliers.

Standardization serves the price, the quality, and the maintainability of the end product via scale and training curve effects.

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ASAM is short for
Association for the **S**tandardisation of **A**utomation & **M**easuring systems

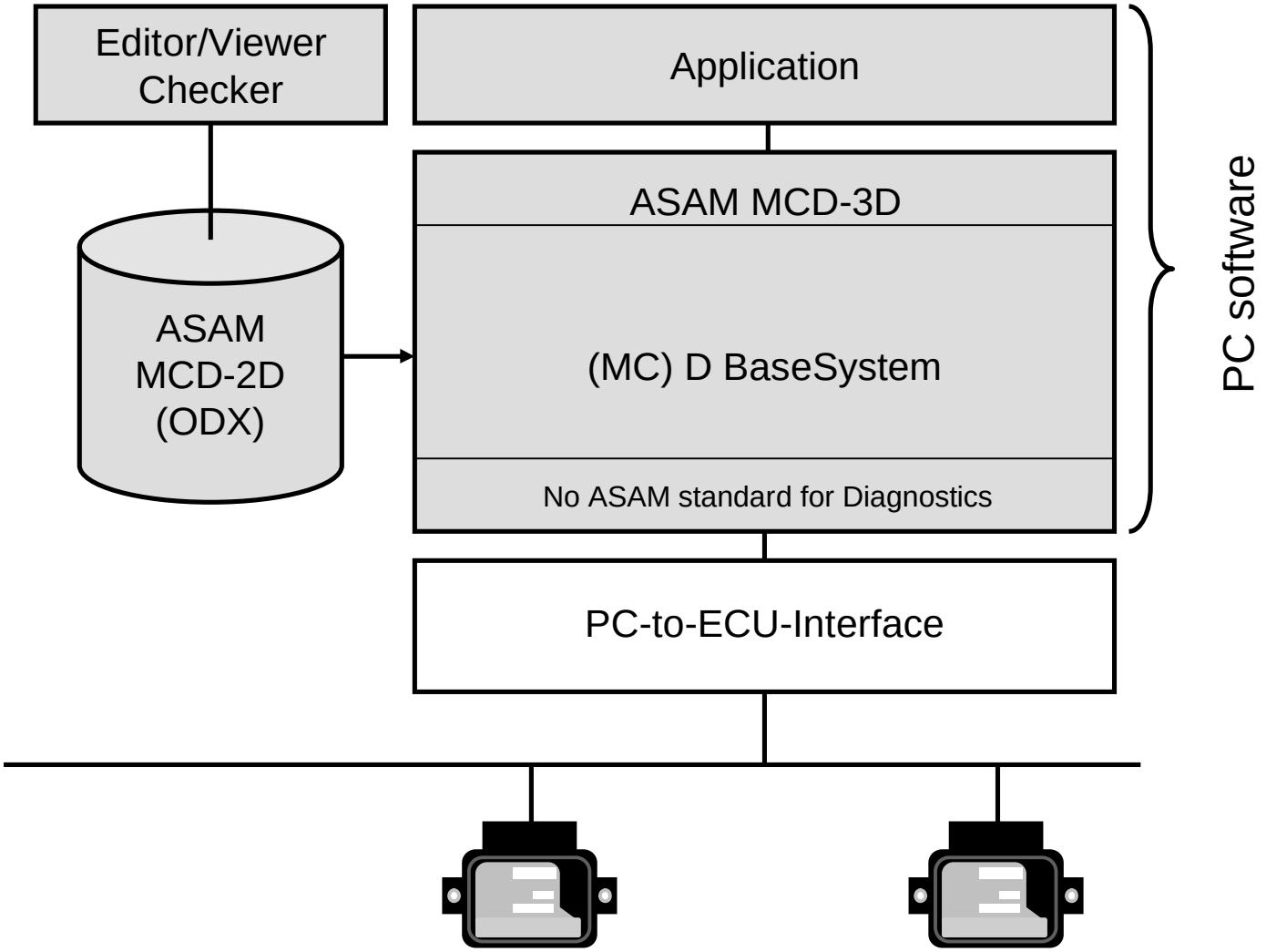
The ***vision*** of ASAM is that standards enable products that can be freely interconnected with seamless data interchange.

The ***mission*** of ASAM is to develop platform independent extensible standards, and to enable products that use and are compliant with those standards

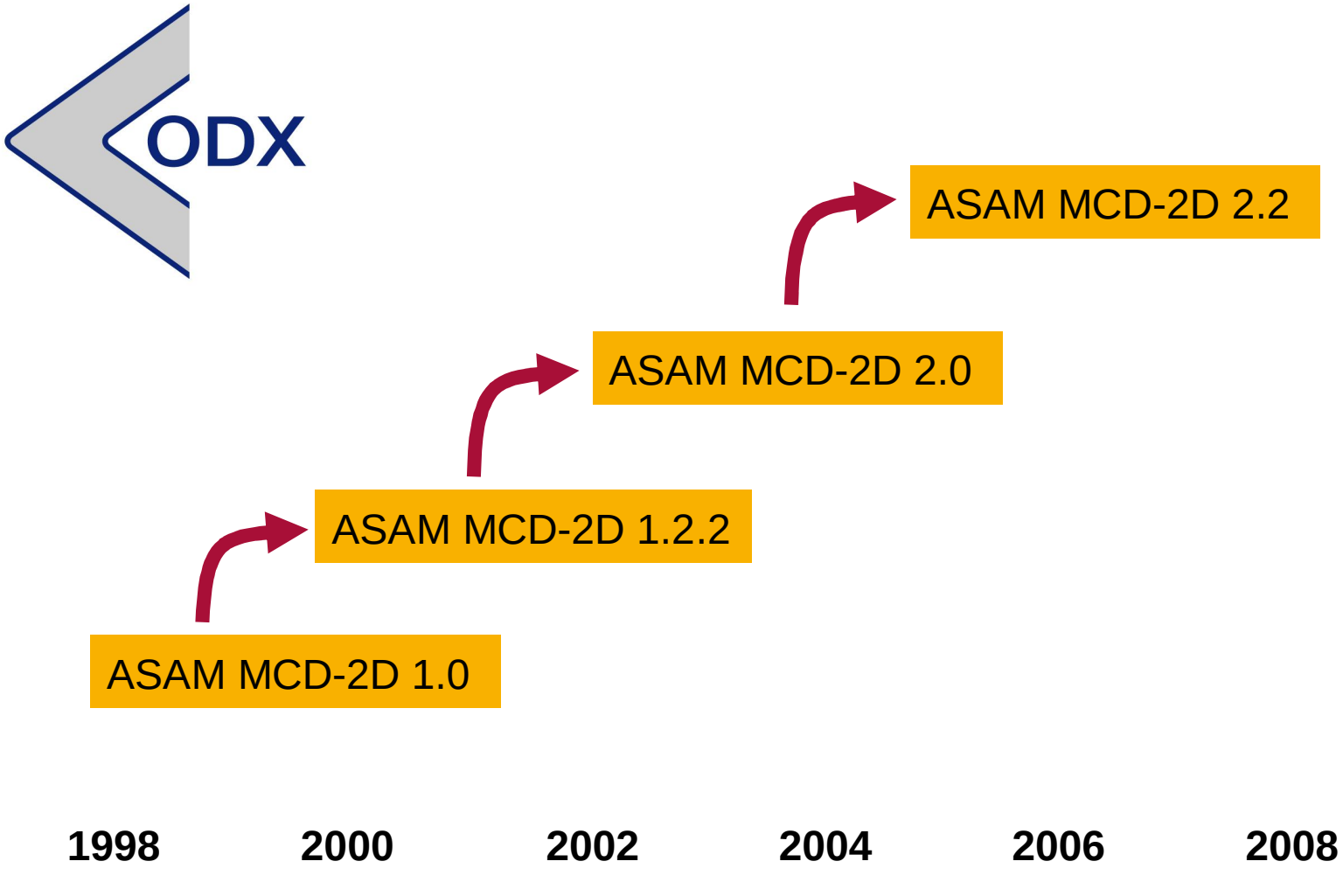
ASAM MCD = Working group for **M**easurement, **C**alibration and **D**iagnostics

ASAM AE = ASAM **A**utomotive **E**lectronics

The ASAM MCD system



History of ASAM-MCD 2D (ODX)



Combination of ODX and MCD-3D versions

	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				(✓)	
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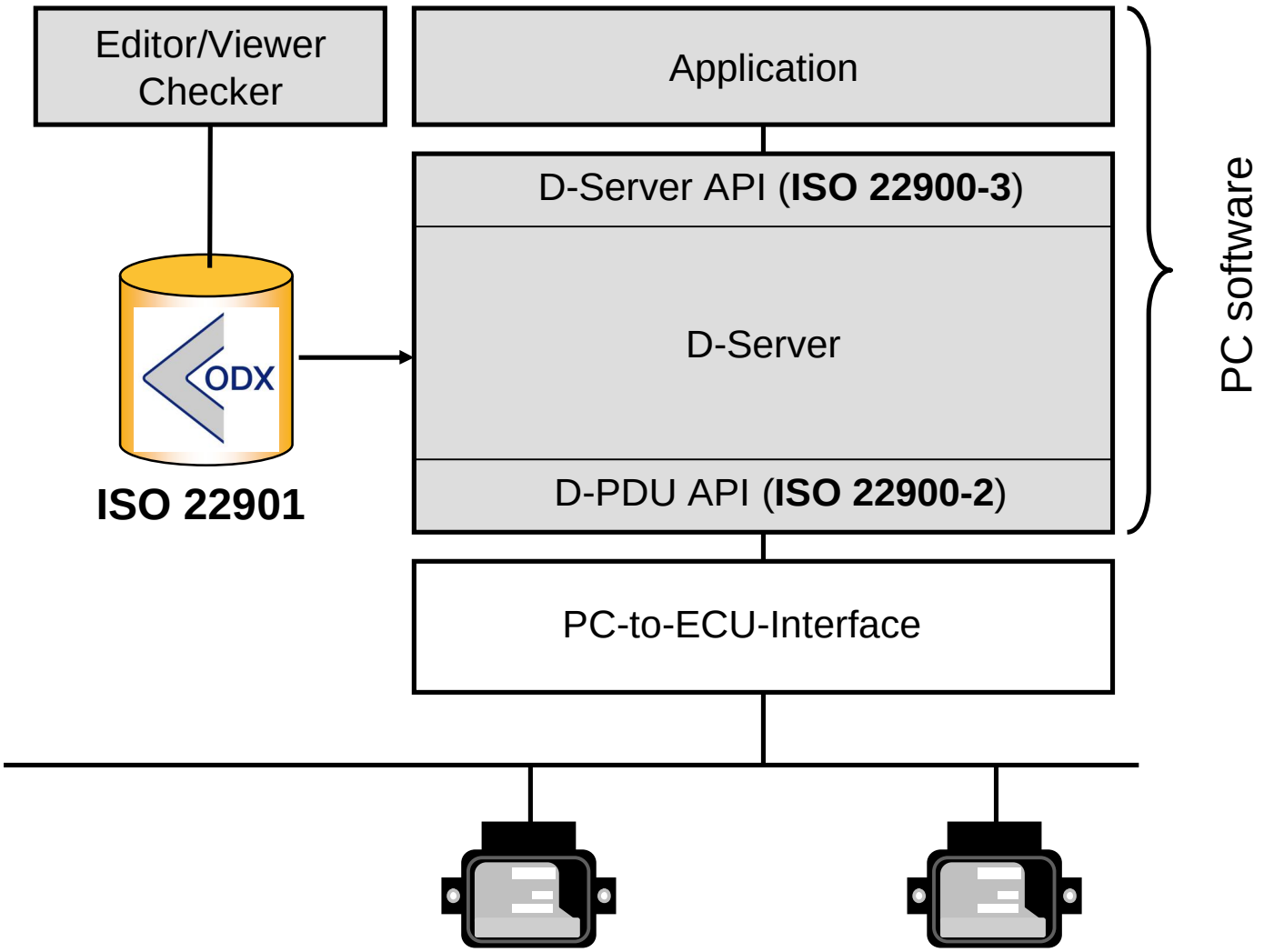
✓ = commonly used combinations (✓) = to be used in future

PC based TESTER: ASAM goes ISO (MVCI & ODX)



ISO 22900 and ISO 22901

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

Part 1(2008): Hardware design requirements

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

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

Part 4 (AWI): Conformance test

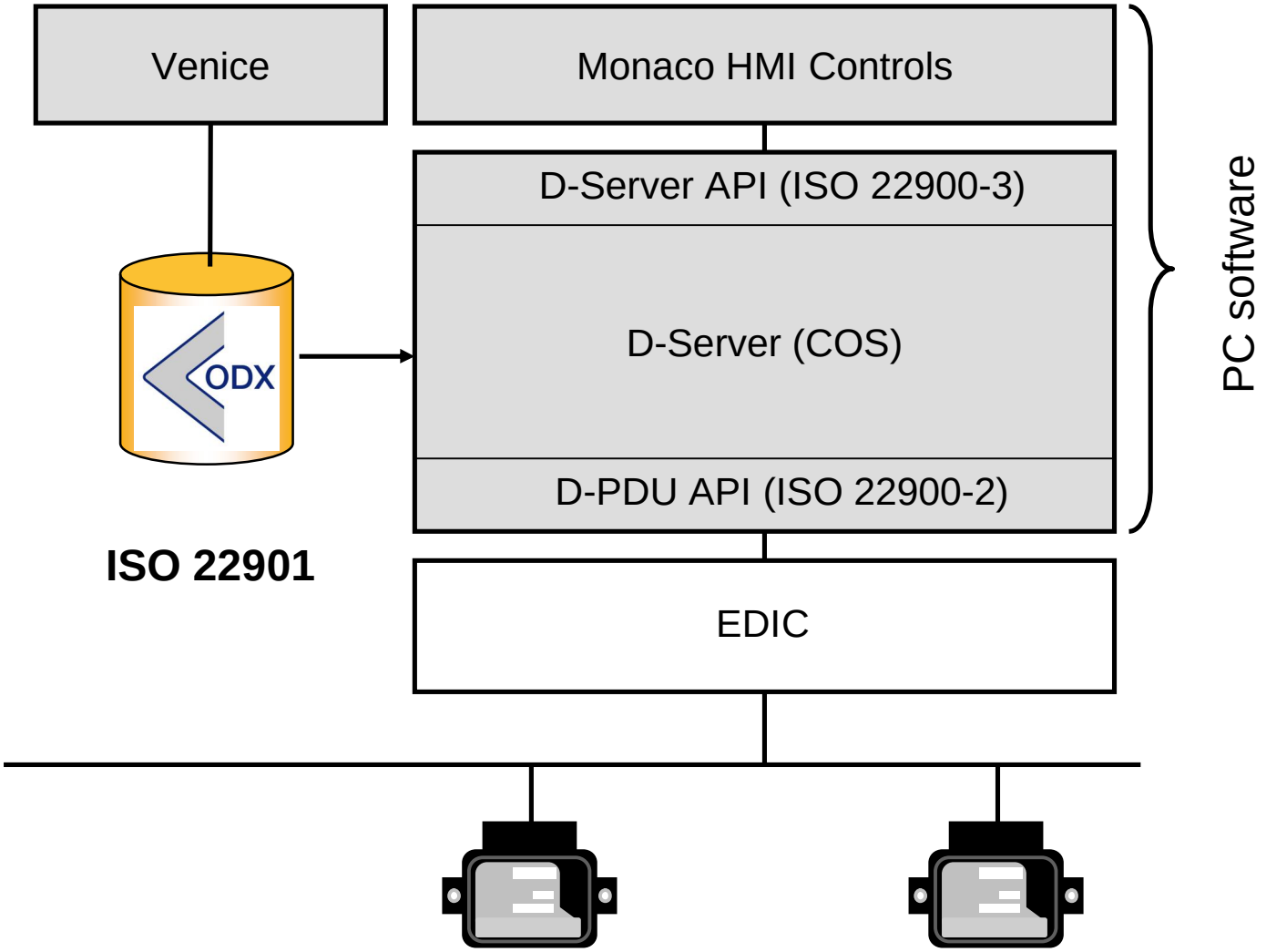
ISO 22901: Road vehicles – Open diagnostic data exchange (ODX)

Part 1 (PRF): Data model specification

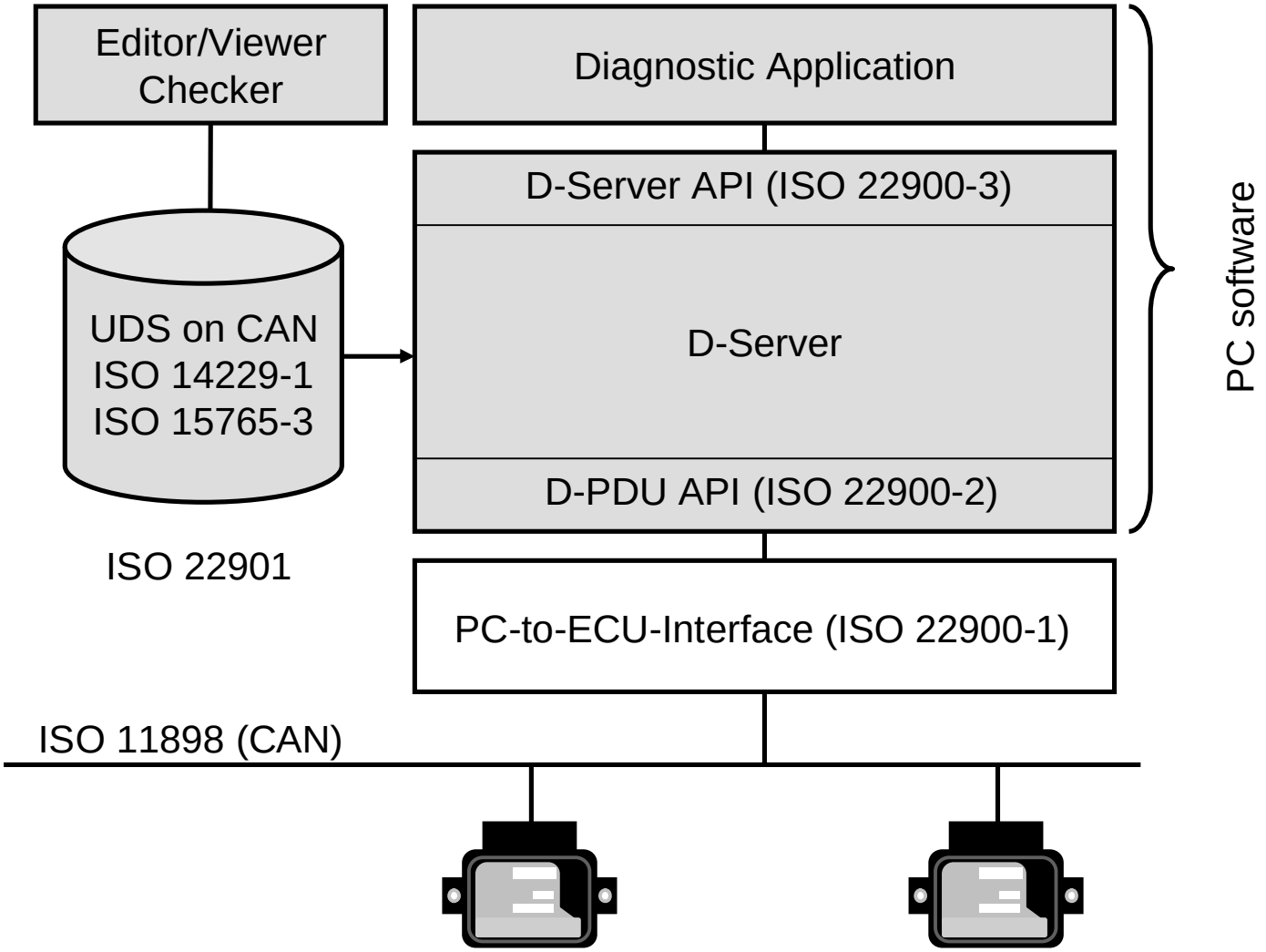
Part 2 (CD): Emissions-related diagnpostic data in ODX format

(F)DIS = Final draft International standard - WD = Working draft - .AWI = Approved work item – PRF = proof

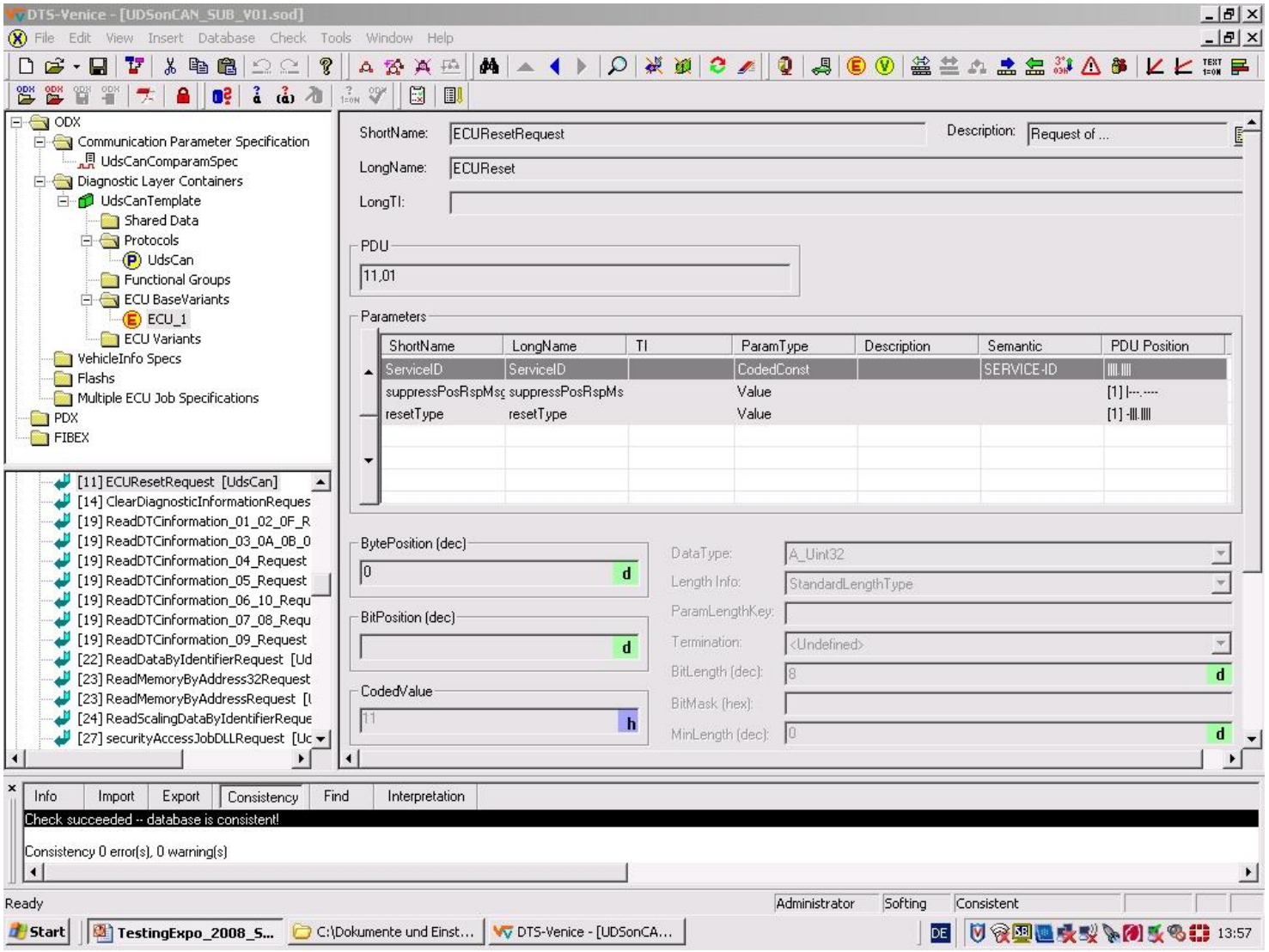
PC-based tester by Softing: DTS V7



Summary



Screenshot: ODX database with UDS on CAN



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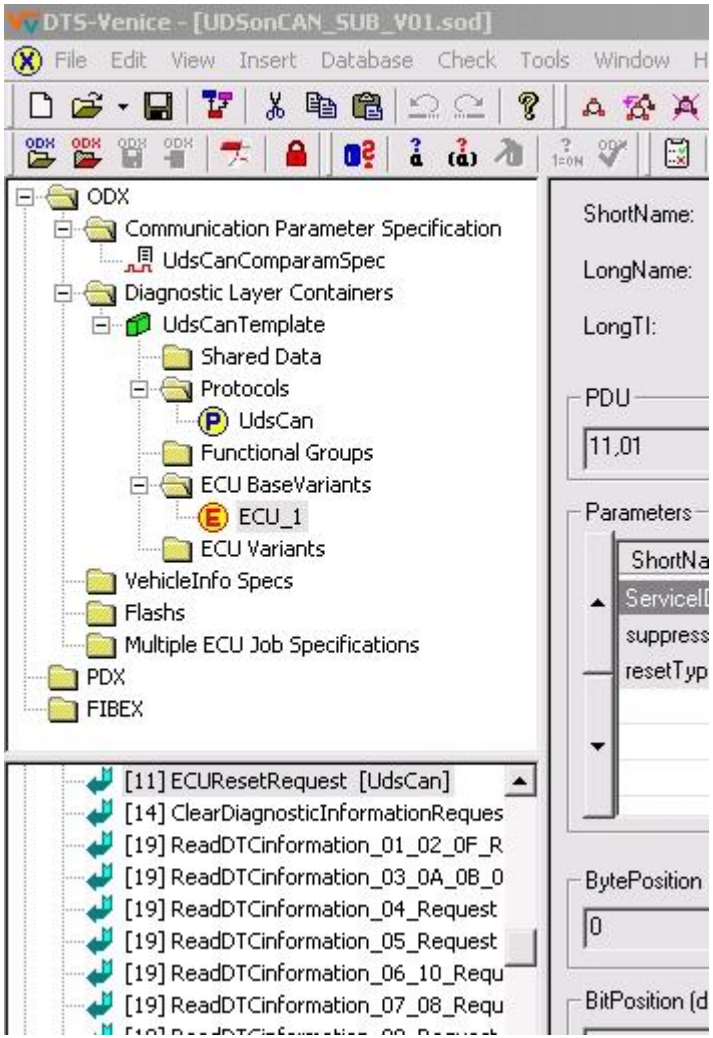
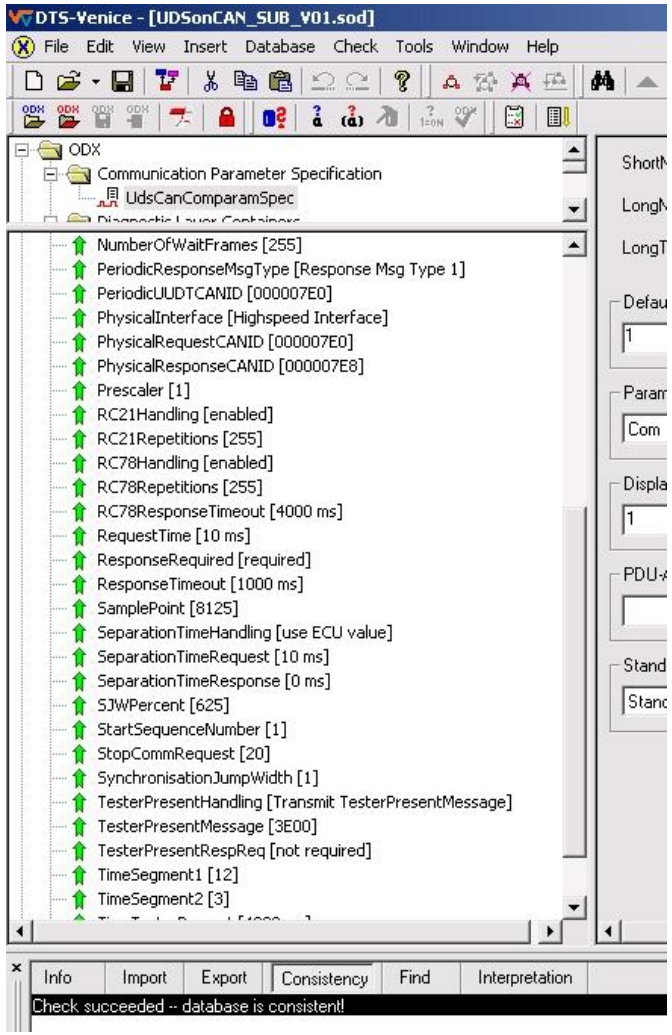
Screenshot: ODX cats and UDS on CAN comparams





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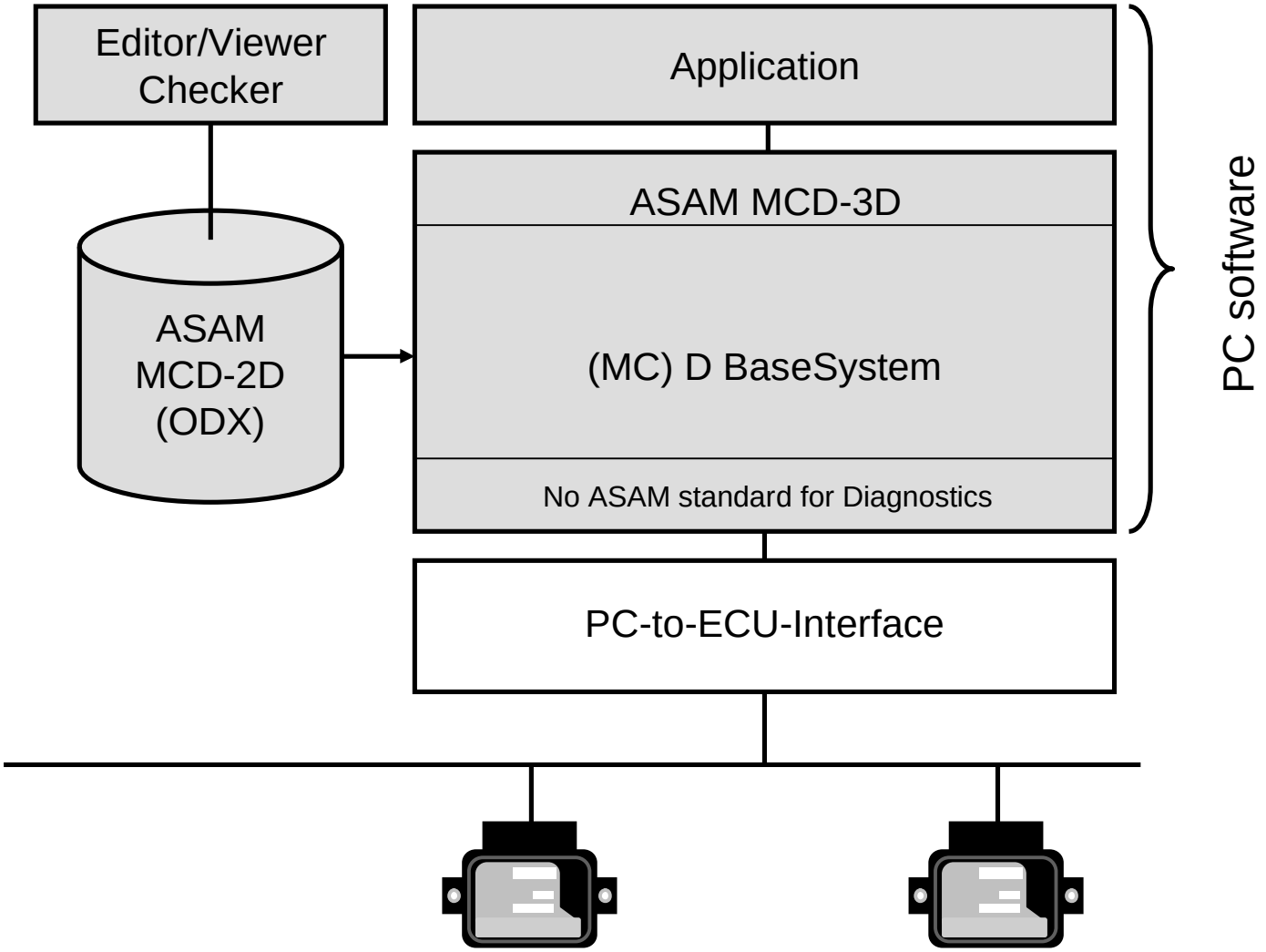

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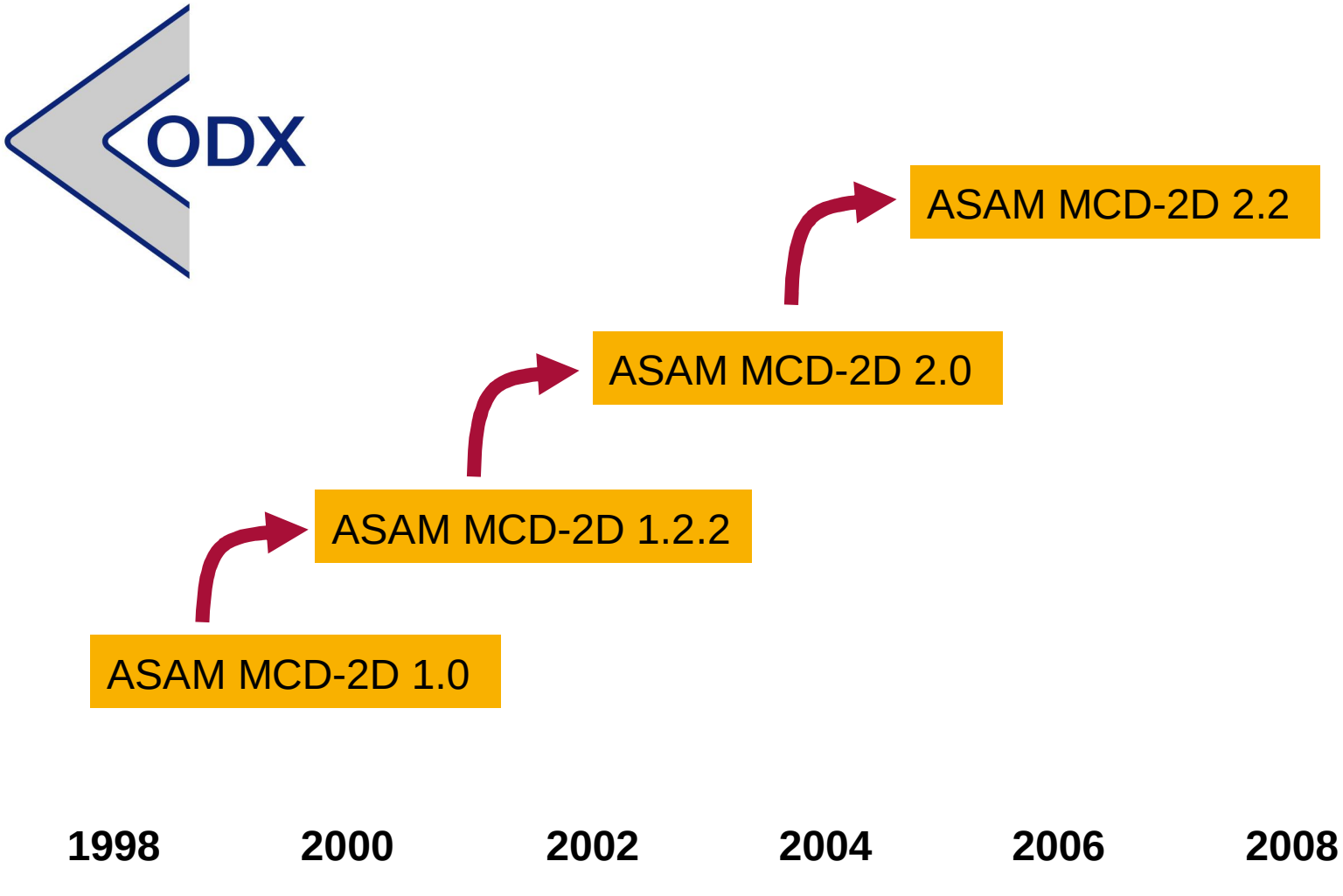

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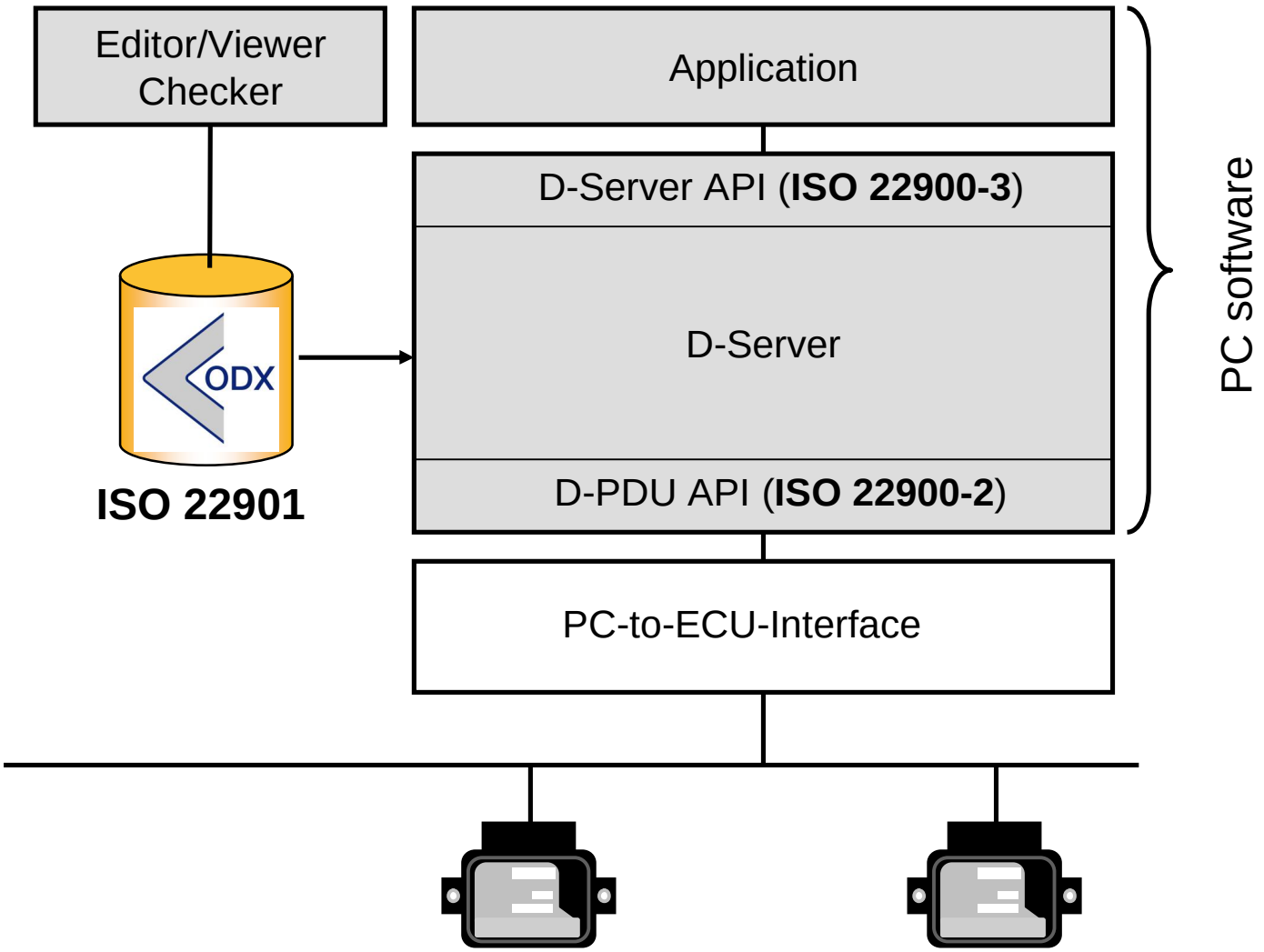

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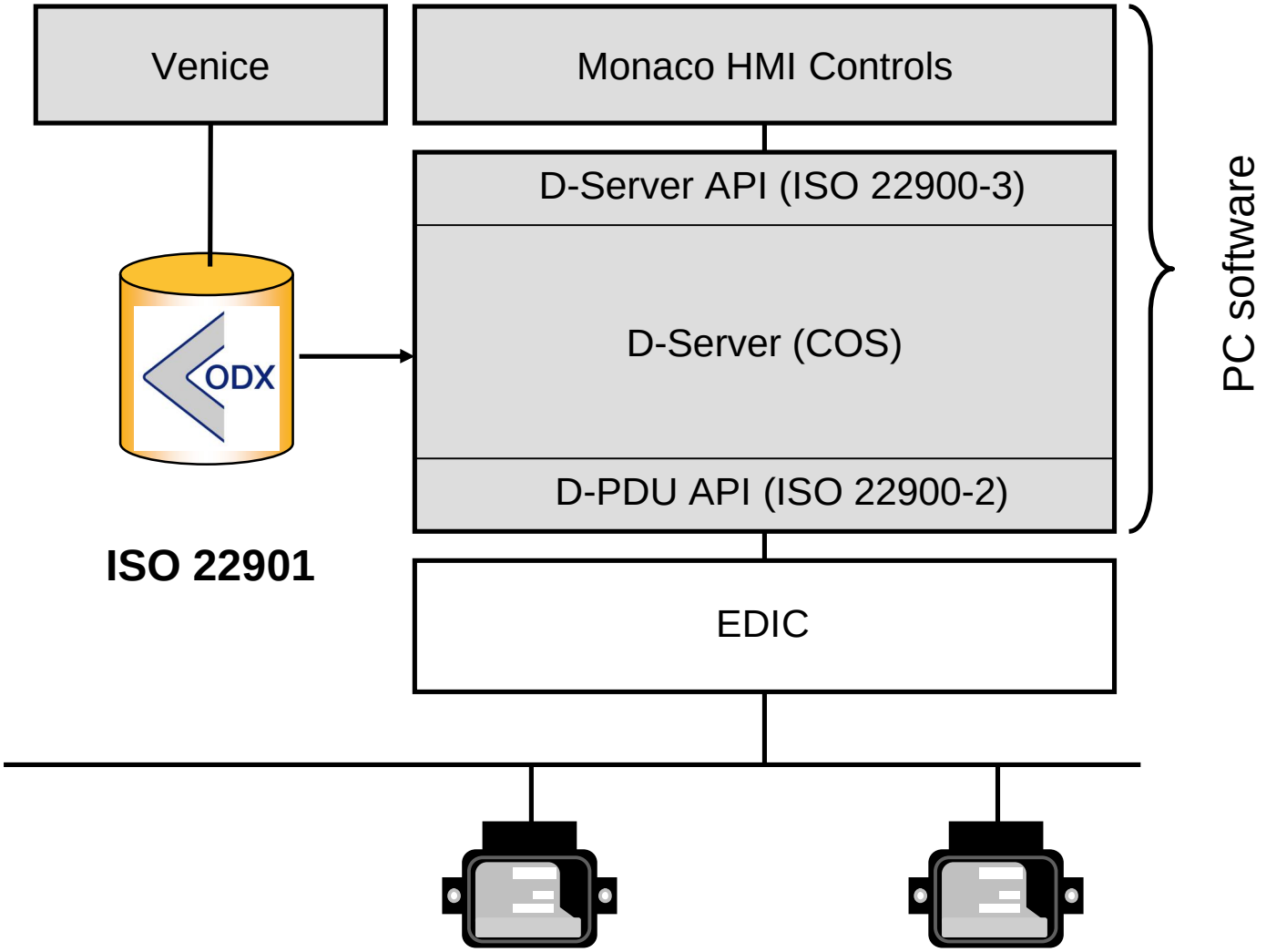

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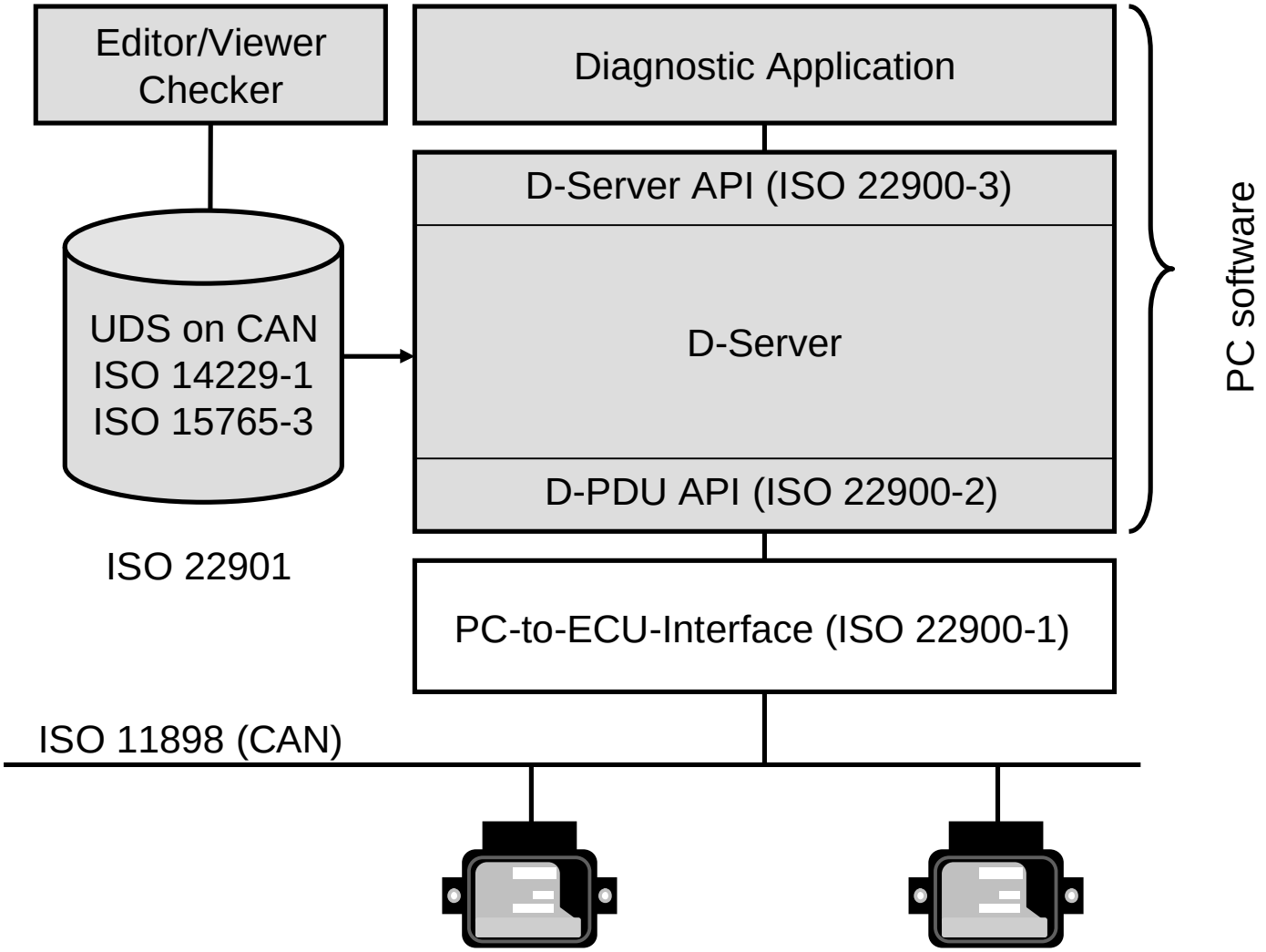

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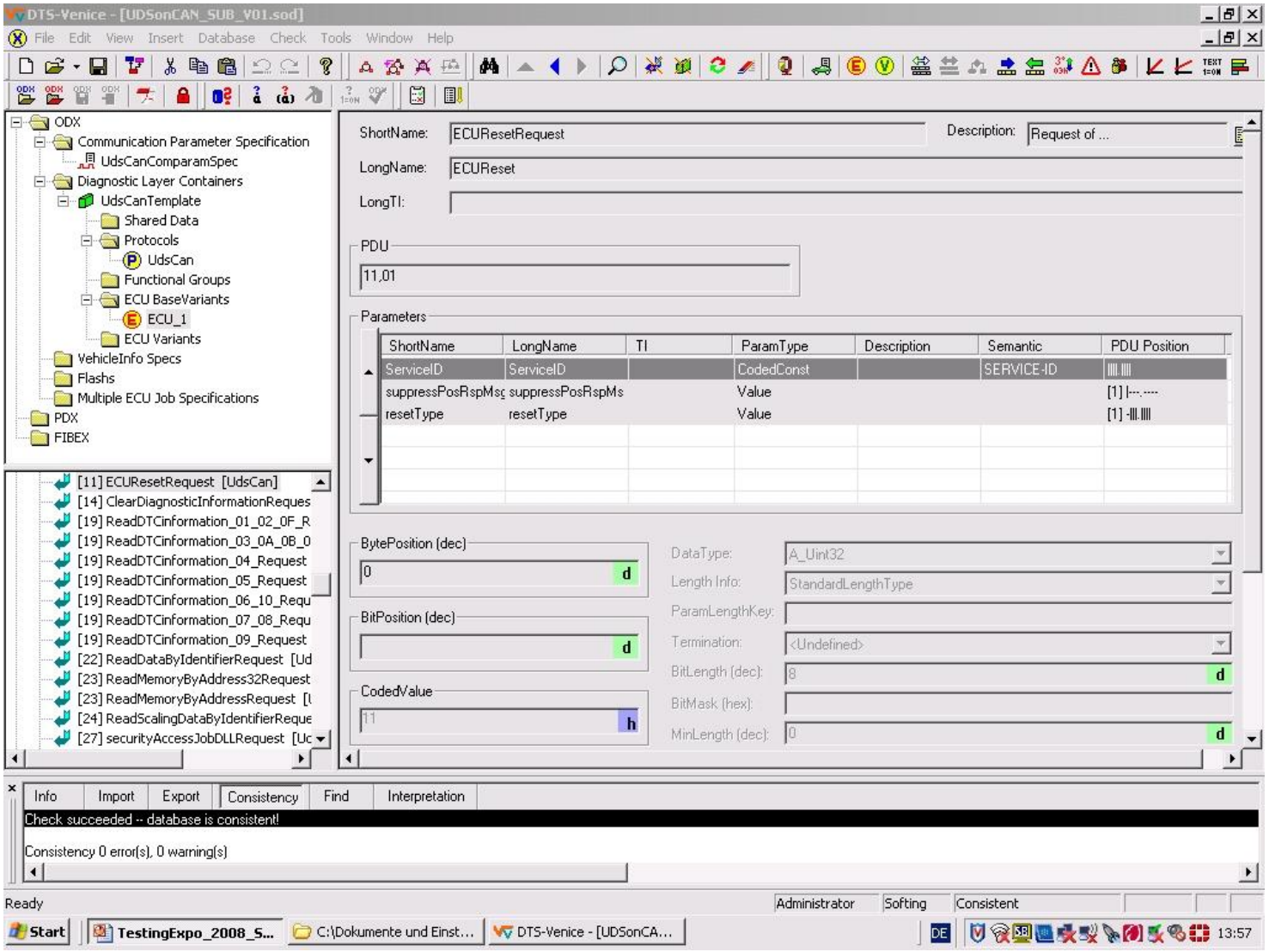

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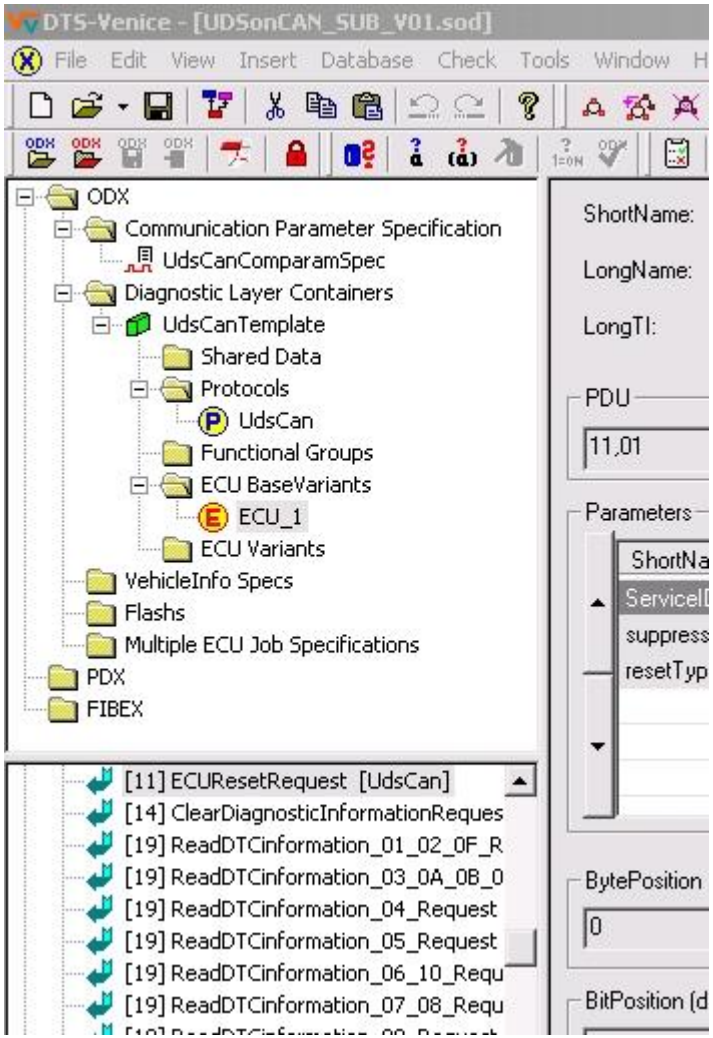

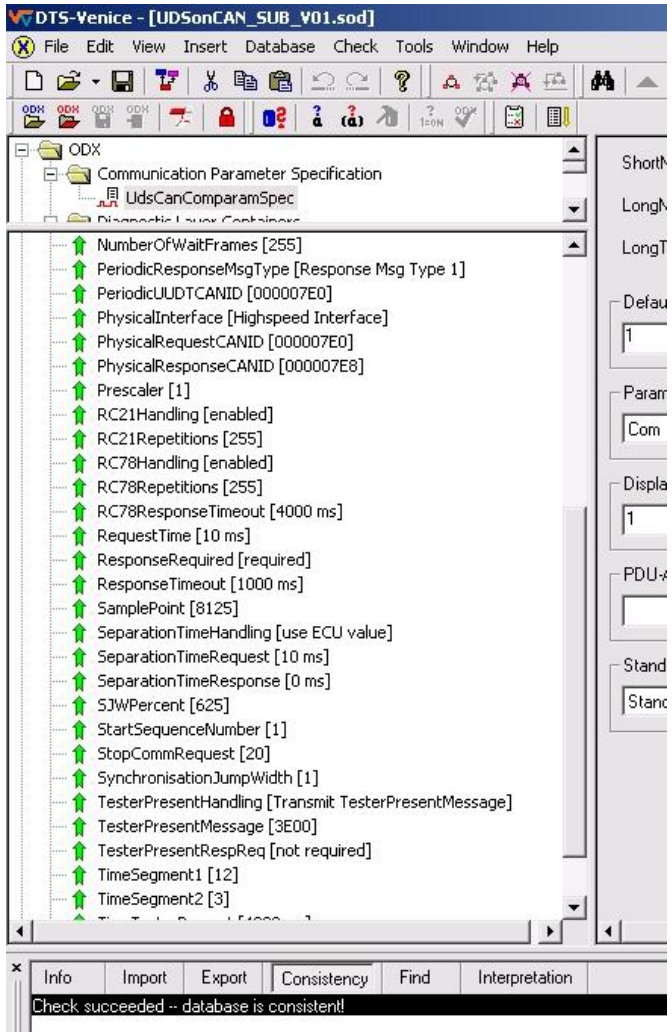

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