ODOX Live

How to Setup a Standards-based Diagnostic Process Chain
Diagnostic Standards
Interrelating ODX, MCD-3D and D-PDU-API

ODX Data Authoring

ODX Editor / Authoring Tool

ASAM MCD-2D
ISO 22901-1

Conversion Tool

.PDX

.DCOM

Java
C++

Diagnostic Kernel
(ODX Interpreter)

ASAM MCD-3D API (ISO 22900-3)

D-PDU API (ISO 22900-2)

Diagnostic Applications

ECU

MVCI

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Diagnostic Standards
Status of Standardization

- **ASAM MCD-3D ISO 22900-3**
  - Release 2.0.2: ISO/CD
  - Release 2.1: ISO/DIS
  - Release 2.2: Voted "yes" as ISO/IS

- **ASAM MCD-2D ISO 22901-1 ODX**
  - Release 2.0.1: ISO/CD
  - Release 2.1.0: ISO/DIS
  - Release 2.2: Voted "yes" as ISO/IS

- **ISO 22900-3 D-PDU API**
  - Release 2.0.1: ISO/CD
  - Release 2.1.0: ISO/DIS
  - Release 2.2: Voted "yes" as ISO/IS

Timeline:
- Mid 2004
- Mid 2005
- Mid 2006
- Mid 2007
- Today
Diagnostic Standards
Interrelating ODX, MCD-3D and D-PDU-API

ODX Data Authoring

CANdela Studio

ODX Conversion Tool

PRODIS Conversion Tool

.PRODIS.ODX

.PRODIS.RTS

.PRODIS.TTD

PRODIS.MCD
Diagnostic Kernel (ODX Interpreter)

PRODIS.MDI

PRODIS.OET

PRODIS.RTS

PRODIS.TTD

CANape

CANoe

CANape

CANoe

JAVA

C++

DCOM

ASA MCD-3D API (ISO 22900-3)

ASAM MCD-2D
ISO 22901-1

.DDX

CANcase/cardXL

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Introducing ODX into the diagnostic process requires...

- **ODX Authoring Guidelines**
  - How to setup valid ODX files that can be used throughout the process

- **ODX Data Management**
  - How to exchange data between all process stakeholders
    - Repository / Database / ...
    - Packaging: Full or incremental; overlapping or disjoint
    - Source Format / Binary Format for process-wide MCD-3D system

- **ODX Change Management**
  - How to handle new versions of an ODX file for the same ECU

- **ODX Migration Plan**
  - How to migrate to new ODX release version later

- ...
Life-Cycle Wide Diagnostic Process

Diagnostic Development Use Cases (1)

Specification
- Specification & Requirements Tools

ECU Implementation
- Development Environment

ECU Validation/Release
- Validation Tools
  - ECU + SW Spec.

Diagnostic Testing
- Development Tools
  - Car + ECU
  - SW Spec.

Vehicle Integration
- Testing & Validation Tools

Vehicle Validation/Release
- Validation and Data Mgmt. Tools
  - Car + ECU
  - SW Spec.
Life-Cycle Wide Diagnostic Process

Production End-Of-Line Testing (2)

Vehicle Validation
- Release
  - Validation
  - Documentation
  - Data Mngmt.
  - Tools

Test Sequence
- Implementation
  - Authoring Tool
  - Test Sequences

Test Sequence
- Validation
  - Production Diagnostic Tester
  - Tester Configuration
  - Test Sequences Production

Release Coordination
- Control System
  - Release Control Settings

Central Diagnostics Server
- Release Control Settings

Production Control System
- Vehicle Data

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Slide: 7
Life-Cycle Wide Diagnostic Process
After Sales Diagnostic Package Supply (3)

- Vehicle Validation Release
  - Validation Documentation
  - Data Management Tools

- Test Sequence Implementation
  - Authoring Tool
  - SW Spec.

- Diagnostic Data Authoring
  - Authoring Tool
  - Diagnostic Data

- Test Sequence Validation
  - Production Diagnostic Tester
  - Test Sequences
  - Diagnostic Data

- Diagnostic Package Release Management
  - Configuration Tool
  - DP Brand A
  - DP Brand B
  - DP Region Z

- Garage
- EOL Rework Area
Use case: Author the diagnostic specification

Specifying the diagnostic specification

- ECU SW Spec.
- CANdelaStudio
- .odx
- .cdd
- .rtf
- .doc
- .xml

Data Repository
Diagnostic Development

Specification: Essential Tool Features

- User-friendly GUI
  - Hide complexity of ODX data model, no experts-only solution
  - Guarantee data consistency already at editing time
  - The tool follows the OEM specific authoring guidelines - not the user.

- Provide foreseeable ODX data
  - Create predictable, recurrent ODX data structures - not by user’s choice.

- Support reuse of existing data
  - Auto-migrate between ODX versions
  - Import data in .csv and .xml format
Use case:
Apply diagnostics in various tools for testing, analysis, simulation, measurement and calibration

- CANoe
- CANape
- CANdito

Documentation formats:
- .odx
- .a2l
- .xml
- .dbc
- .cdd
- .cdf/.mdf
- .asc/.blf
- .xml
- .cdf/.mdf
- Measurement data file (V2.0)
- Validation reports
- Communication trace

...
Testing: Tool Architecture (from the diagnostics perspective)

- Support open standards and interfaces...
  - Support ASAM standards where possible
  - Integrate components of other tool suppliers (software libraries, hardware, ...)

- ... but provide an integrated and seamless tool solution
Diagnostic Development

Testing: Essential Tool Features (from the diagnostics perspective)

- Provide a use case driven GUI for diagnostics on different levels of abstraction (e.g. fault memory, oscilloscope, service console)
- For those users where diagnostics is one task amongst others: The diagnostic feature set is an integral part of development tools of other disciplines, e.g.
  - trace and analyze communication of normal CAN communication and diagnostics synchronously
  - measure/calibrate/flash by CCP/XCP or UDS/KWP
- Support diagnostic communication for many, many OEMs in all relevant flavors (UDS, KWP, GMW)
- Support diagnostic communication via different networks (CAN, FlexRay, ...)
- Off-the shelf products which can be widely configured
Use Case:
Author EOL Test Sequences based on MCD-3D Kernel and supplied ODX data files

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Slide: 14
Author test sequences as tree or graphically

Use direct access to complete ODX project through integrated ODX Browser

Browse ODX Services, ODX Tables and place references to Objects directly in the test sequence

Avoids having to look into ODX source data or generated reports

By reading data through the MCD-3D interface, it is ensured data is available during execution on the tester.
Production End-Of-Line Testing

ODX-based Test Sequence Change Support

- Get full change support, when ODX project is changed (new version is received)
- All potentially impacted parts of existing test sequences are highlighted
- Explanations about every potential impact are given by tool
- Author can work through them one by one with help of ODX browser and adapt test sequence to newest ODX project release
Releasing ODX packages to After Sales Garages

Workflow

Use Case:

Package ODX projects and After Sales Diagnostic Applications for release to the dealers
Annotate ECUs with validity ranges, e.g. \{Brand1, ModelX, 2007\}

Freely define new annotation criteria and its value ranges

Freely define configurations that should go into one coherent data package (e.g. brand-specific, region-specific,...)
Joint Reference Projects

- ODX data supply for End-Of-Line Testers
  - ODX Diagnostic data created and maintained in CANdelaStudio
  - PRODIS.Office imports ODX and enables efficient implementation of End-Of-Line tests at multiple OEM production sites running PRODIS.RTS
  - In productive use for more than 5 years, based on ODX 1.1.5 and 2.0.1

- ODX data supply for EOL-Testers and After-Sales-Testers in MVCI-based, heterogeneous architecture
  - ODX Diagnostic data created and maintained by CANdelaStudio
  - EOL tests and AfterSales tests authored with PRODIS.Authoring directly based on generated ODX
  - The PRODIS.RTS chain supports PRODIS.MDI and CANcardXL interface hardware via D-PDU API
  - Based on ODX 2.1, automated migration from 2.0.1 is supported
Conclusion

- ODX-based tools are already available in the market.
- ODX lays the foundation to integrate products of different tool suppliers.
- The introduction of standards into real-world processes requires that the tools may be customized to the processes.

- DSA and Vector provide powerful solutions in different application domains, which may be adapted to specific customer needs.
- DSA and Vector share practical experiences to introduce standards into the processes by several joint projects.

ODX is live!
Thank you for your attention.

For detailed information please refer to:
www.dsa.de
www.odx-solutions.com

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