ODX Live

How to Setup a Standards-based Diagnostic Process Chain
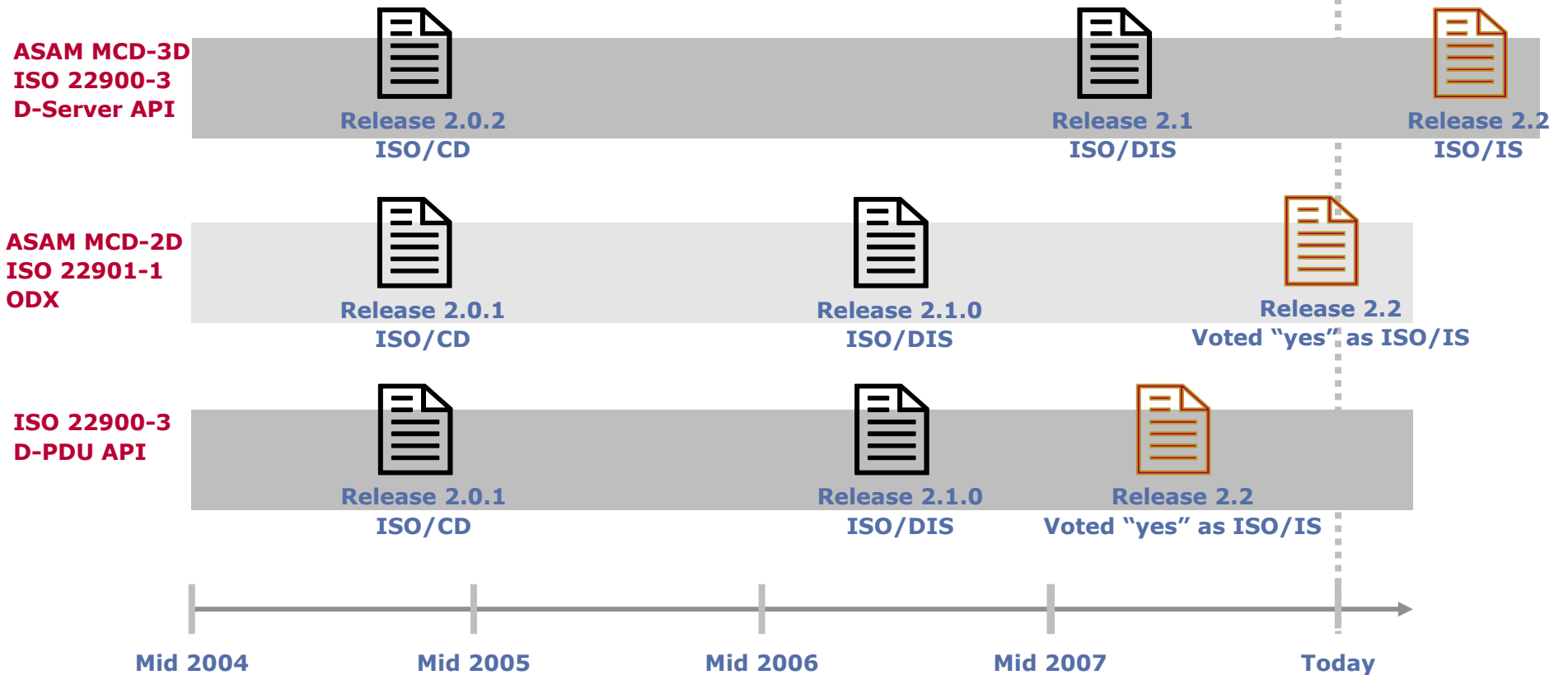
V1.0   2008-04-22

DSA   vector

Diagnostic Standards
Interrelating ODX, MCD-3D and D-PDU-API
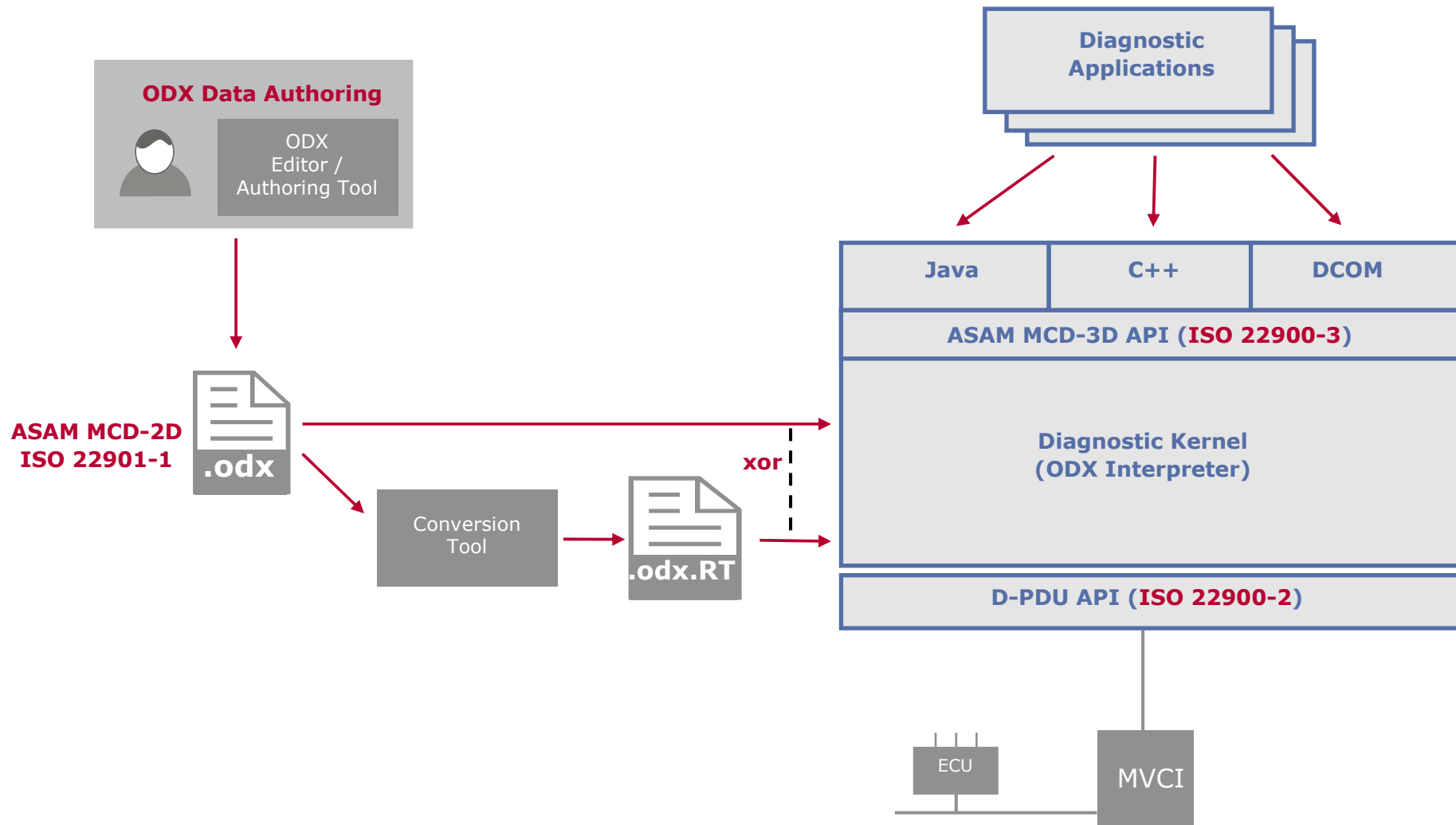
Diagnostic Standards
Status of Standardization

**ASAM MCD-3D
ISO 22900-3
D-Server API**

Release 2.0.2
ISO/CD

Release 2.1
ISO/DIS

Release 2.2
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

| Mid 2004 | Mid 2005 | Mid 2006 | Mid 2007 | Today |

DSA

Diagnostic Standards
Interrelating ODX, MCD-3D and D-PDU-API

ODX Data Authoring

CANdela Studio

PRODIS.OET

PRODIS.RTS

PRODIS.TTD

CANdito

CANape

CANoe

Java	C++	DCOM

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

PRODIS.MCD
Diagnostic Kernel
(ODX Interpreter)

ASAM MCD-2D ISO 22901-1

.odx

PRODIS Conversion Tool

odx.RT

xor

DSA D-PDU API (ISO 22900-2)

CANcase/cardXL

PRODIS.MDI

DSA

Diagnostic Standards
Introduction into the Process

- 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
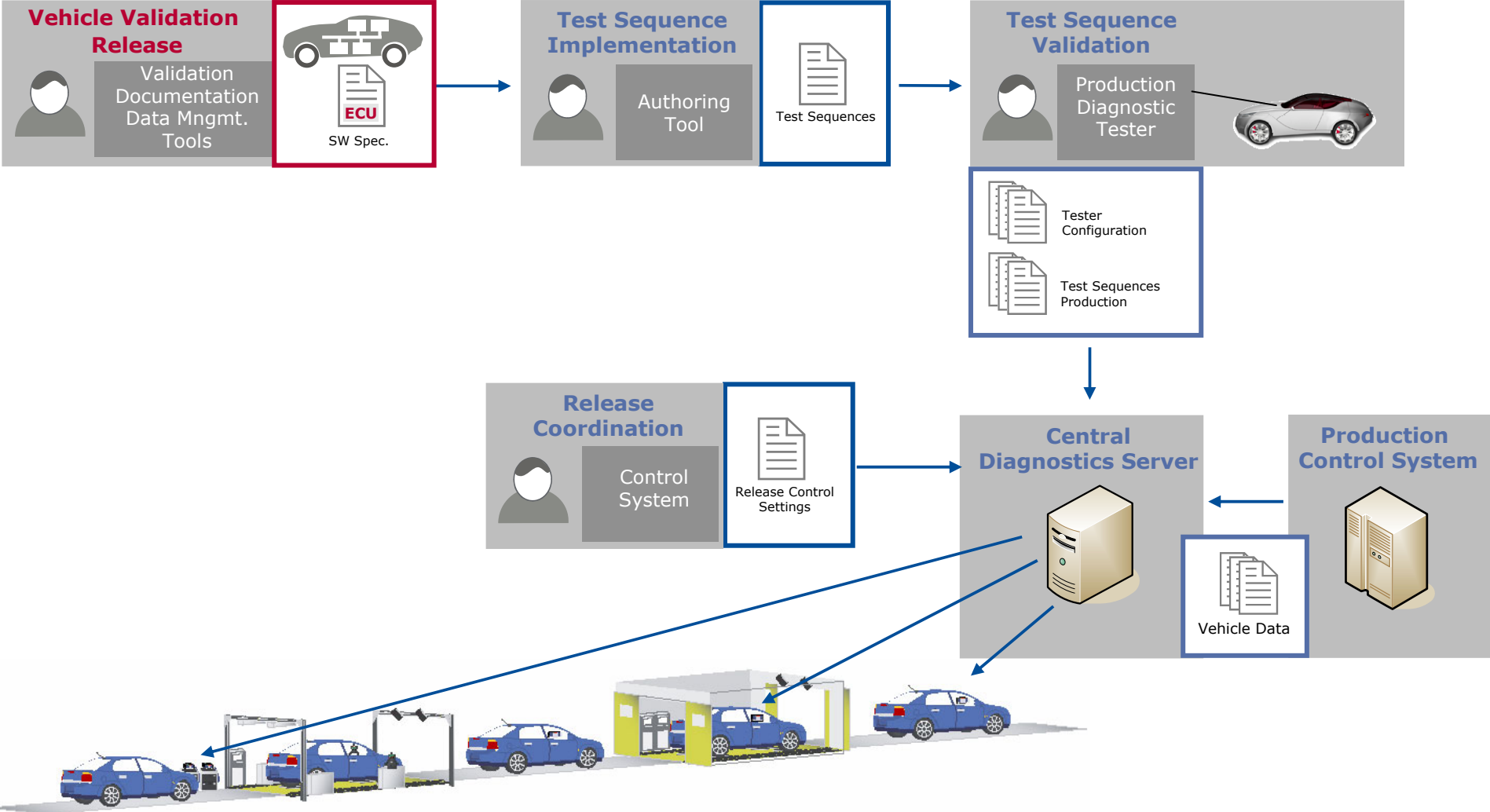
  - …

DSA

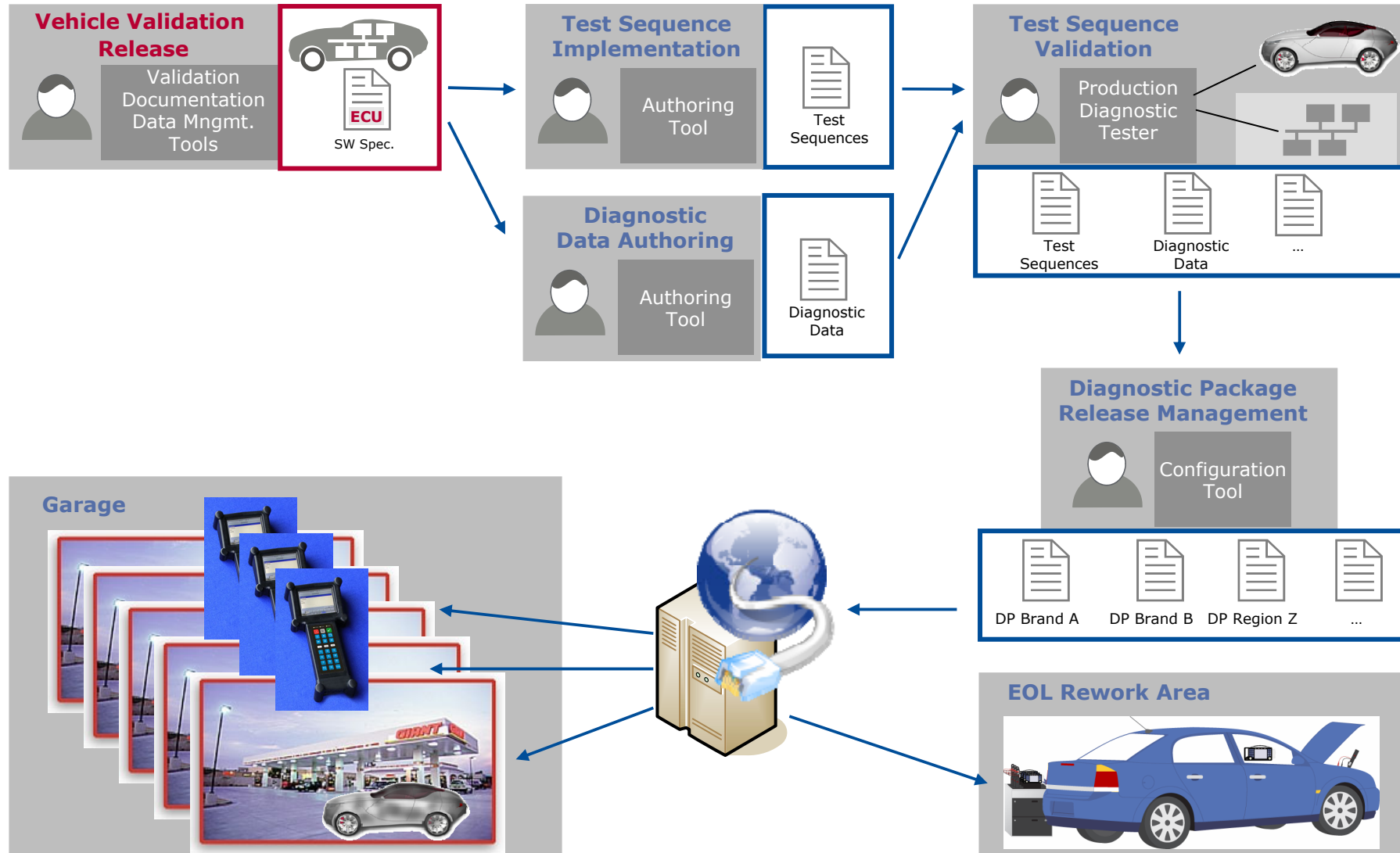# Life-Cycle Wide Diagnostic Process

Diagnostic Development Use Cases (1)

Diagnostic Testing

Development Tools

ECU
SW Spec.

Specification

Specification & Requirements Tools

ECU
SW Spec.

Vehicle Integration

Testing & Validation Tools

+ ECU
SW Spec.

ECU Implementation

Development Environment

ECU + ECU
SW Spec.

ECU Validation/Release

Validation Tools

ECU + ECU +
SW Spec.   Validation Report

Vehicle Validation/Release

Validation and Data Mngmt. Tools

+ ECU
SW Spec.

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Life-Cycle Wide Diagnostic Process

Production End-Of-Line Testing (2)

Vehicle Validation Release

Validation Documentation Data Mngmt. Tools

ECU

SW Spec.

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

Vehicle Data

Production Control System

DSA

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

Vehicle Validation Release
Validation Documentation Data Mngmt. Tools
ECU
SW Spec.

Test Sequence Implementation
Authoring Tool
Test Sequences

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

DSA

Diagnostic Development

Specification: Workflow

Specification

Specification
Requirements
Tools

ECU = .odx

SW Spec.
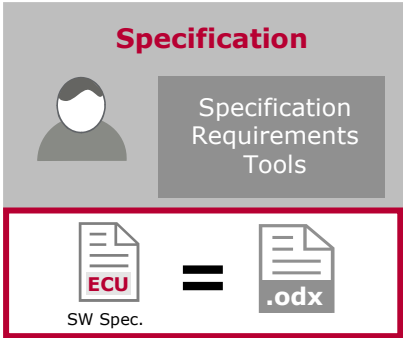
Use case:
Author the diagnostic specification

CANdelaStudio

.odx

.cdd

.rtf
.doc

.xml

Data
Repository

.odx

Template

.cdd

vector
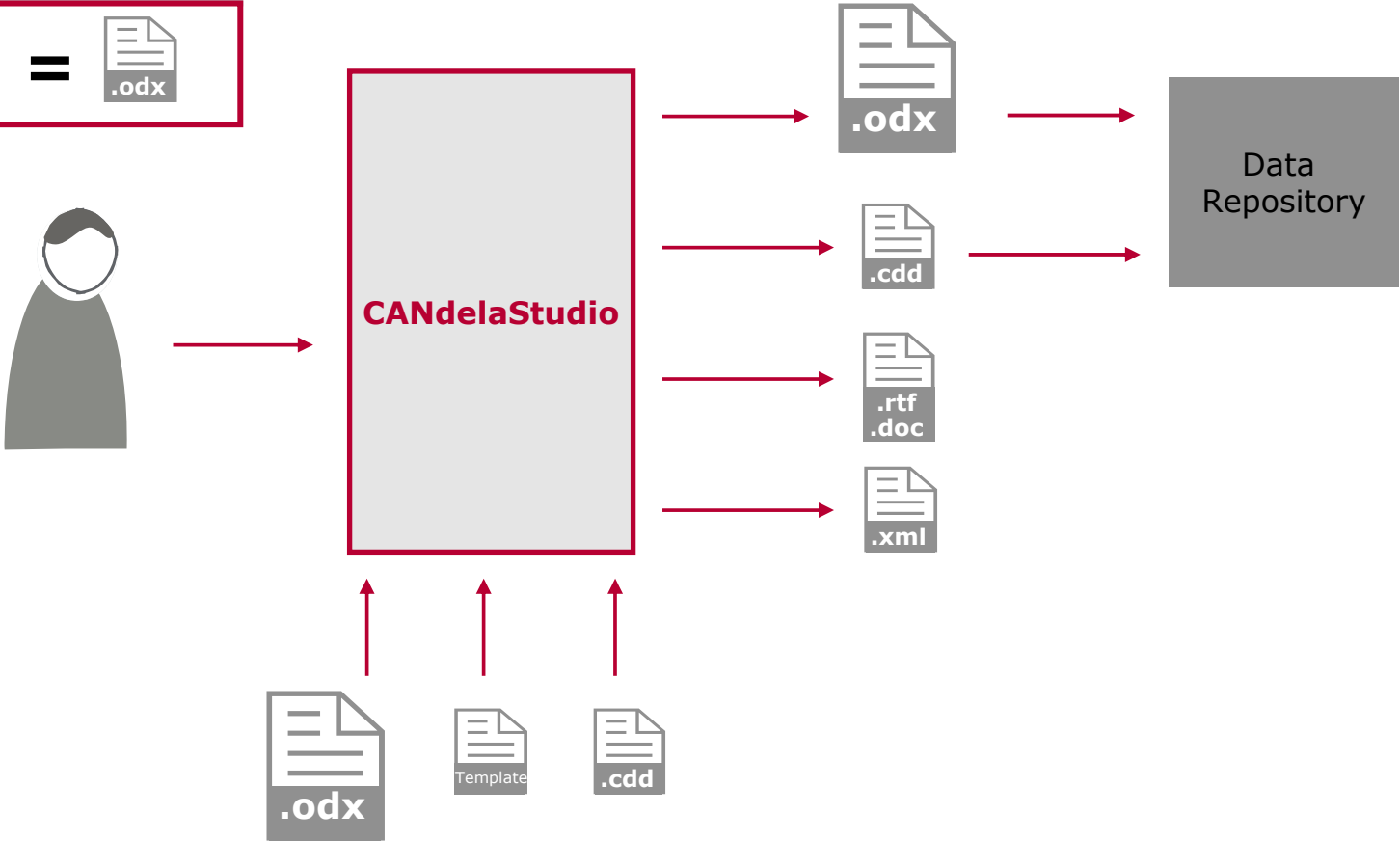
Diagnostic Development

Specification: Essential Tool Features
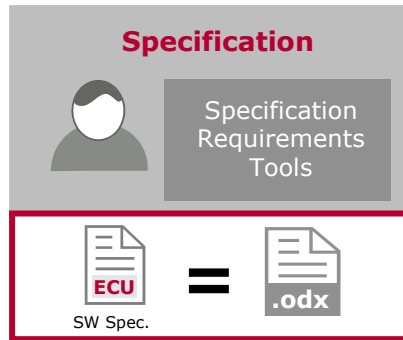
CANdelaStudio
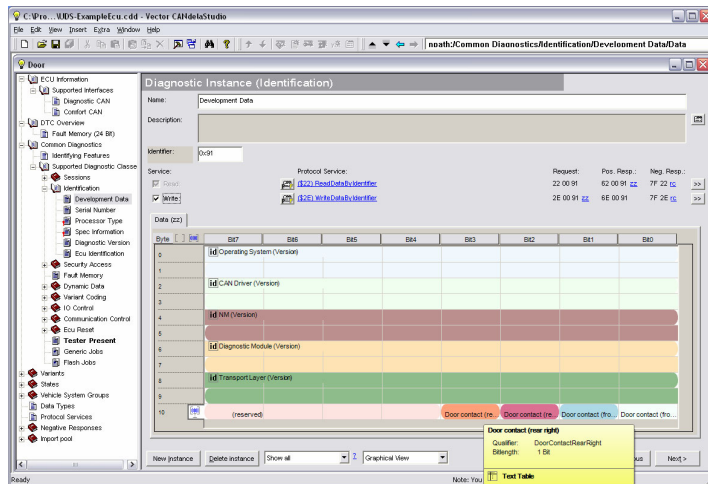
- ❑ User-friendly GUI
  - ❑ Hide complexity of ODX data model, no experts-only solution
  - ❑ Guarantee data consistency already at editing time
  - ❑ The tool follows the OEM specific authoring guidelines - not the user.
- ❑ Provide foreseeable ODX data
  - ❑ Create predictable, recurrent ODX data structures - not by user's choice.
- ❑ Support reuse of existing data
  - ❑ Auto-migrate between ODX versions
  - ❑ Import data in .csv and .xml format

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Diagnostic Development

Testing: Workflow

Diagnostic Testing

Development Tools

Use case:
Apply diagnostics in various tools for testing, analysis, simulation, measurement and calibration

.odx

.a2l

.xml

.dbc .cdd

CANoe
CANape
CANdito

.asc/.blf	Communication trace
.xml	Validation reports
.cdf/.mdf	Measurement data file (V2.0)
...	

vector
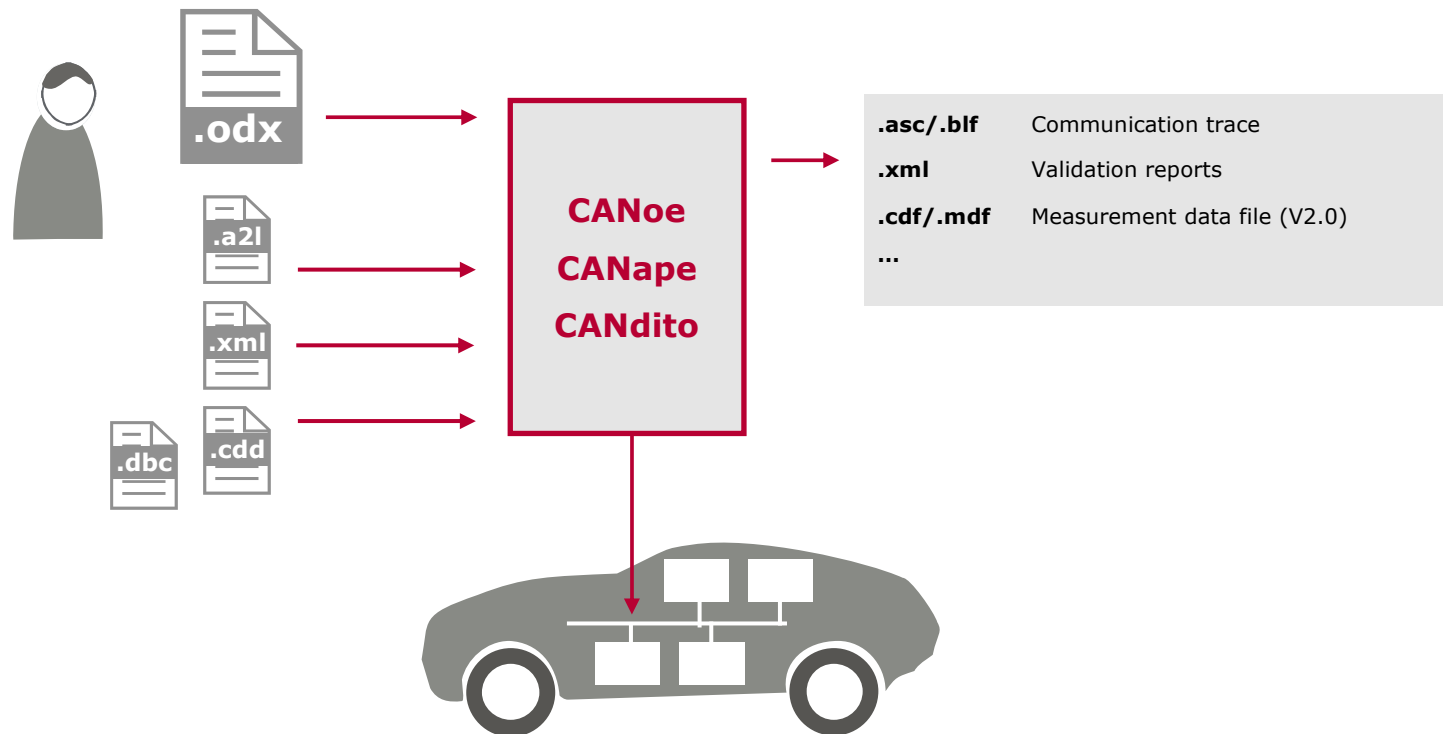
Diagnostic Development

Testing: Tool Architecture (from the diagnostics perspective)

Diagnostic Testing

Development Tools

CANape, CANoe CANdito

Many non-diagnostic Features

CANdela DiagComServer

PRODIS.*MCD*

D-PDU API

XL Interface Family

PRODIS.*MDI*
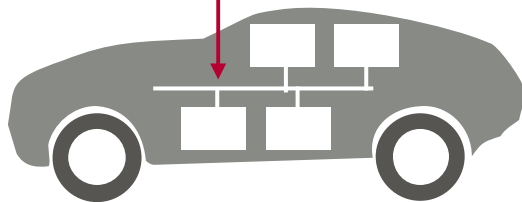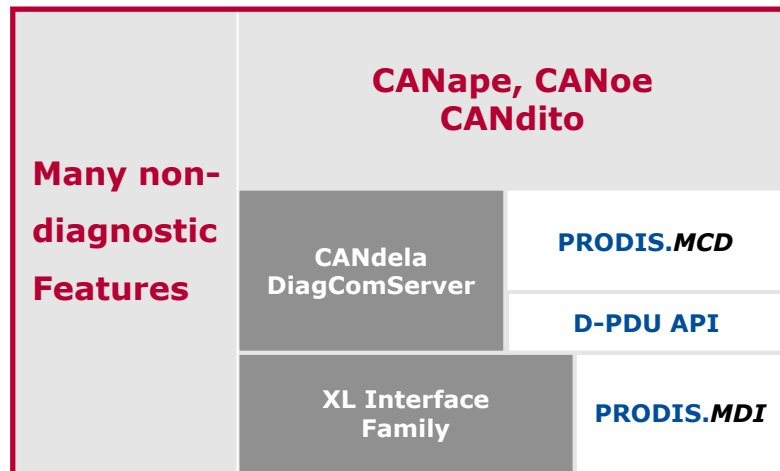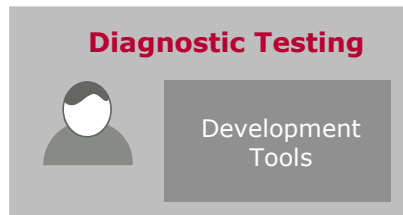
- ❑ Support open standards and interfaces…

  - ❑ Support ASAM standards where possible

  - ❑ Integrate components of other tool suppliers (software libraries, hardware, …)

- ❑ … but provide an integrated and seamless tool solution

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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

Production End-Of-Line Testing

Workflow

Author

Manage ODX Change

PRODIS.*Office*

Binary Differ

PRODIS.*MCD*

ODX Release Cycles

.odx
.odx
.odx

PRODIS Conversion Tool

odx.RT

Worker

PRODIS.*RTS*

Prüfprogramminterpreter

PRODIS.*MCD*

D-PDU-API
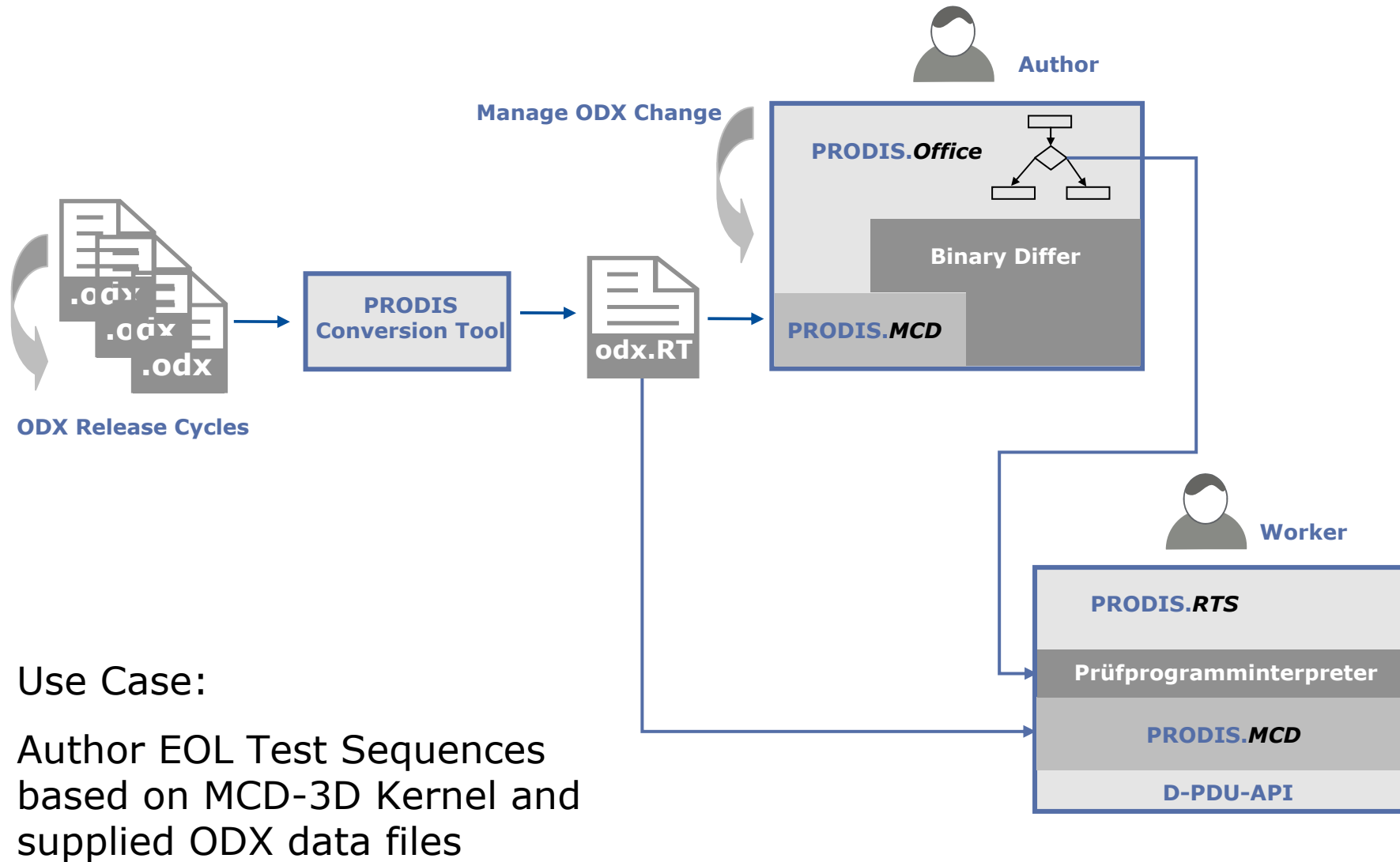
Use Case:

Author EOL Test Sequences based on MCD-3D Kernel and supplied ODX data files

DSA

Production End-Of-Line Testing
ODX-based Test Sequence Authoring

- ☐ 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

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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 high-lighted

- ❑ 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

Author

Release Manager

PRODIS.*Authoring*

PRODIS.*Authoring*

ODX Projects of multiple vehicles

PRODIS.*MCD*

Test Sequences

ODX Container

DP Brand A   DP Brand B

x .odx
y .odx
z .odx

External Annotations

Configurations

PRODIS.*MCD*
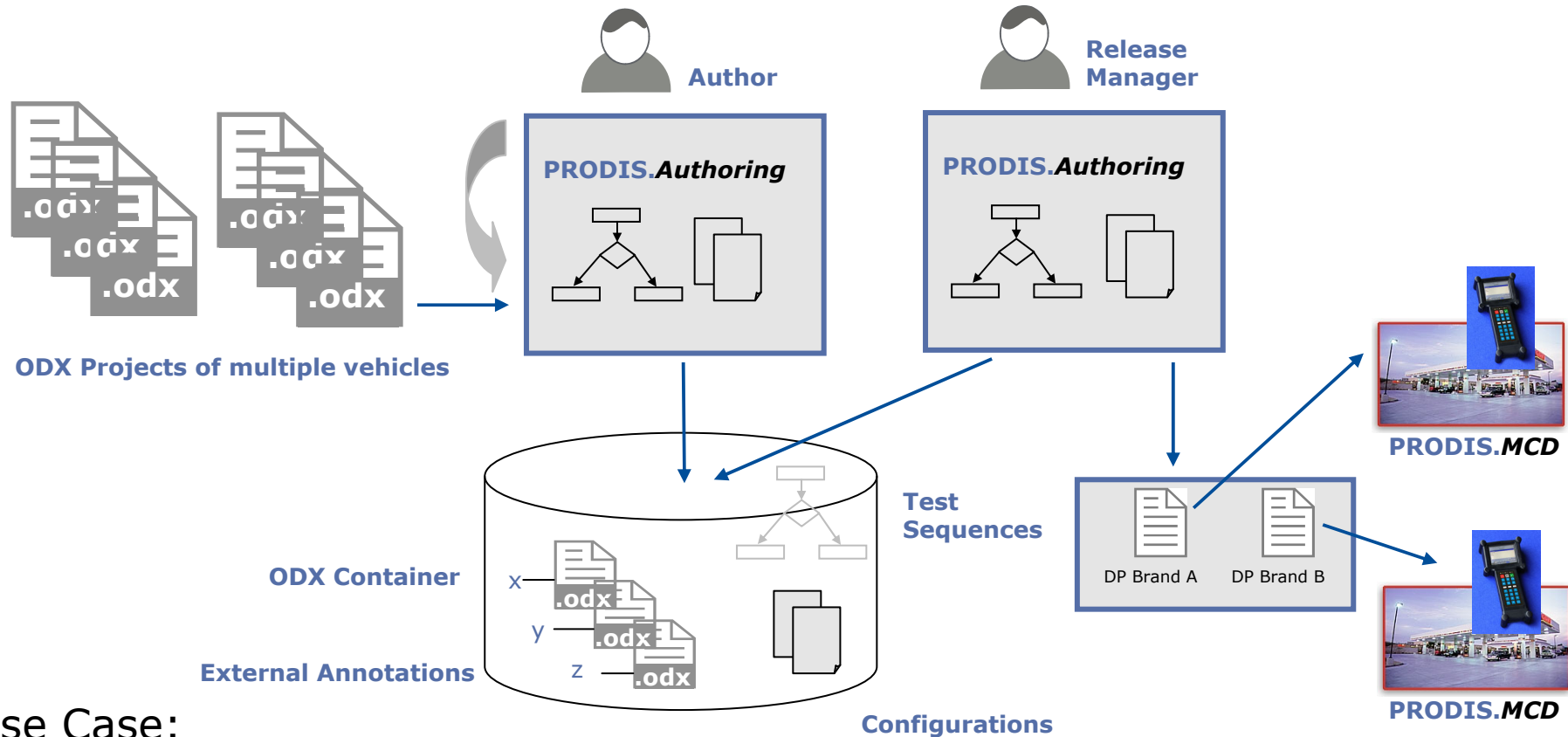
Use Case:

Package ODX projects and After Sales Diagnostic Applications for release to the dealers

DSA

Releasing ODX packages to After Sales Garages

Workflow

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
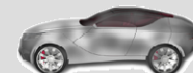
Conclusion

- ❑ 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!

vector

Thank you for your attention.

For detailed information please refer to:

www.dsa.de

www.odx-solutions.com

Authors:

Dr. Ansgar Schleicher, DSA

Christoph Rätz, Vector Informatik