



## ODX – Areas of Application and Side Effects

Vector Congress, 2008-10-07

## > ODX Basics

Acceptance & Coverage

Lessons Learned

Getting Started with ODX

Summary

- ❑ Starting point:
  - ❑ OEM specific diagnostic protocols
  - ❑ Keyword-Protocol 2000
    - ❑ Often with proprietary extensions/modifications
  - ❑ Proprietary tool chains
    - ❑ Based on proprietary diagnostic data
    - ❑ Even in one and the same company
  - ❑ Diagnostic descriptions in \*.doc, \*.rtf, \*.xls, \*.txt, \*.pdf, ...
    - ❑ Only selected aspects of diagnostics were covered.
  - ❑ Earlier standards (MCD-2D 1.2.2, ODX Basic) were not accepted.

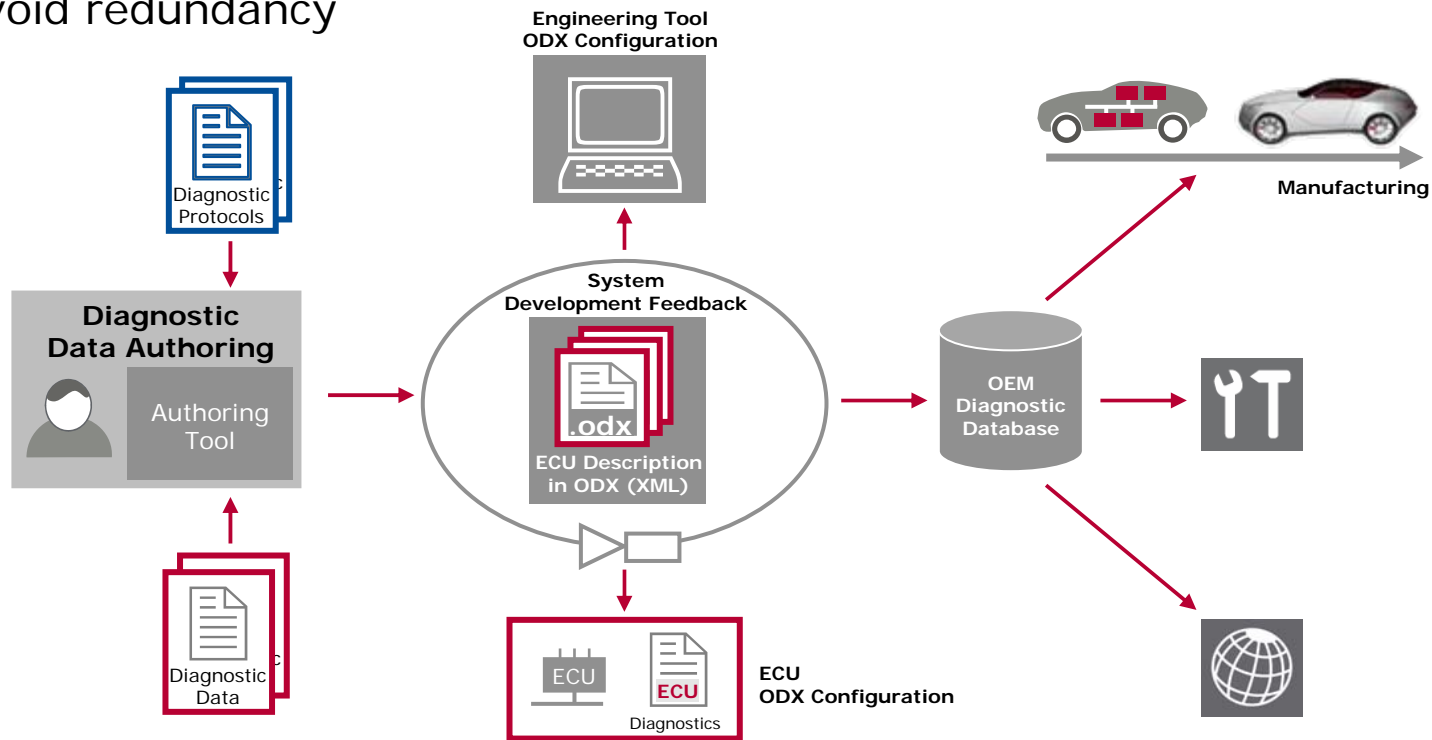


The exchange of diagnostic data and the reuse of data and concepts was not possible.

# ODX Basics

## Objectives of ODX

- ❑ Single-Source-Principle in Development, Production, Service
- ❑ Use diagnostic data for specification, test, software generation
- ❑ Vehicle diagnostics, not ECU diagnostics
- ❑ Machine readable
- ❑ Avoid redundancy





# ODX Basics

## Building Blocks

Multiple ECU Jobs

Function oriented  
Diagnostics

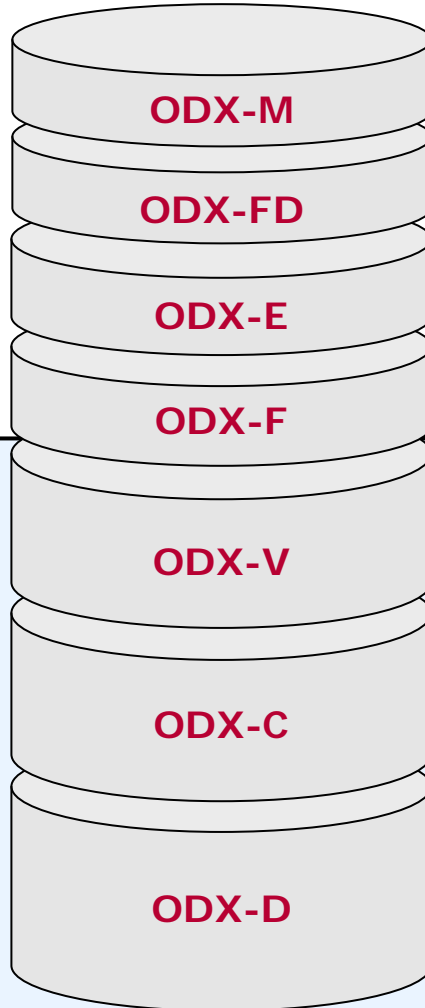
ECU Configuration

Flash Data

Vehicle Access /  
Topology

Communication  
Parameters

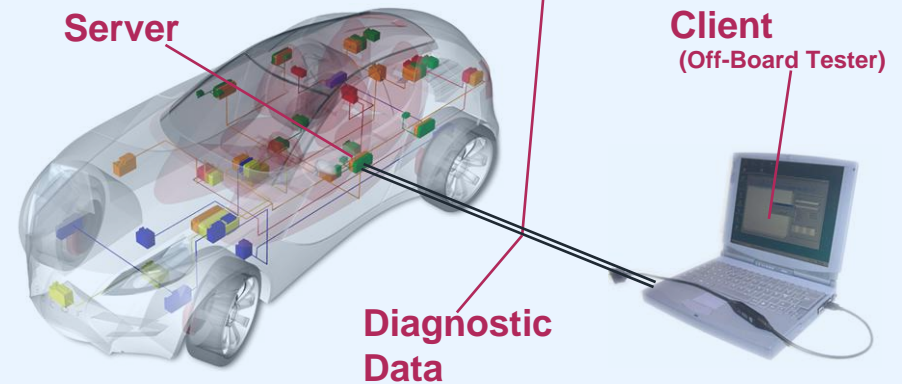
Definition of  
Diagnostic Services



Request: 0x22 0x0108

Response: 0x62 0x0108 0x78

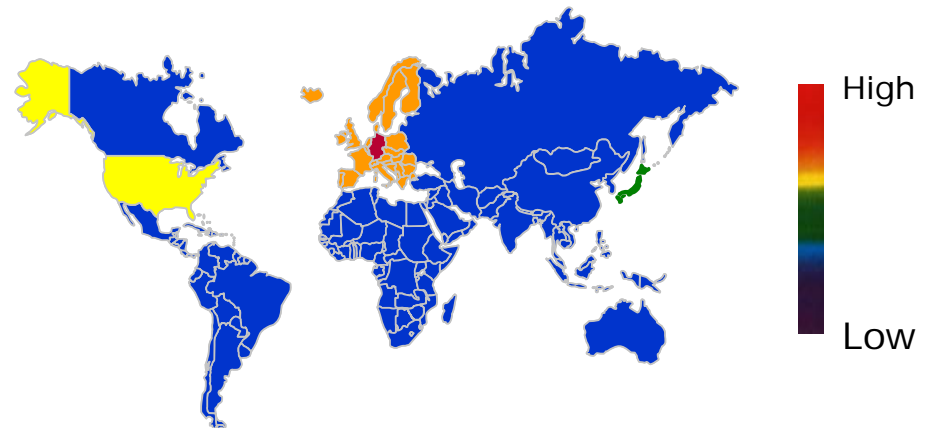
→ speed = 120 km/h



# Acceptance & Coverage

- ❑ Manufacturers like ODX because...
  - ❑ ... they can realize many of their use cases.
  - ❑ ... they can create ODX data mapping their preferred “look and feel”.
  - ❑ ... data exchange in joint ventures is simplified.
- ❑ ECU suppliers like ODX because...
  - ❑ ... they hope to get rid of OEM specific data formats.
  - ❑ ... they can better integrate diagnostics into their own software development process.
- ❑ Harmonization of tool chains. ODX based tools can be “easily” exchanged.
- ❑ The benefit of using ODX has been proven in many vehicle projects.

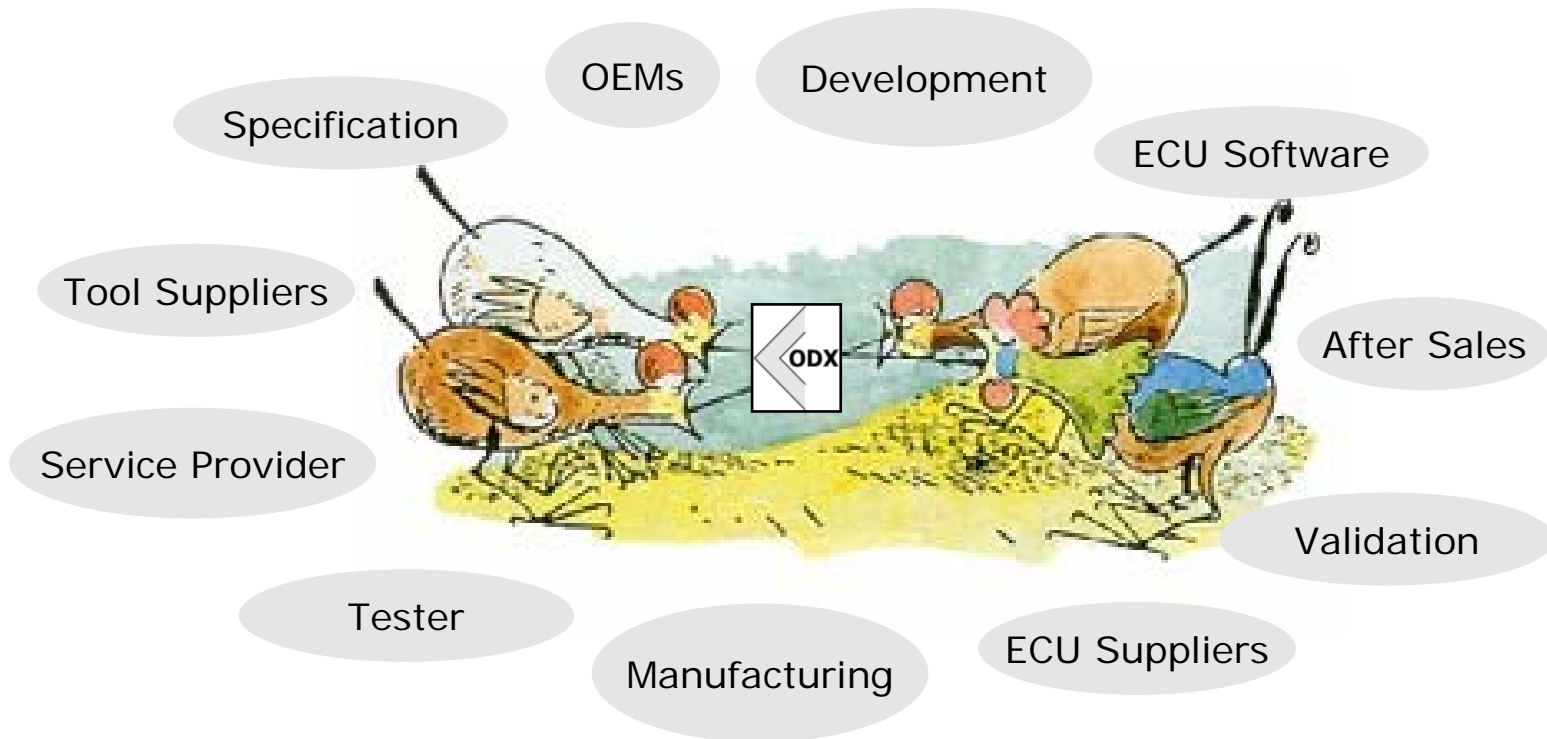
➔ Increasing number of ODX activities worldwide



# Lessons Learned

## Complexity of ODX

- ❑ Interests and requirements to vehicle diagnostics are complex.



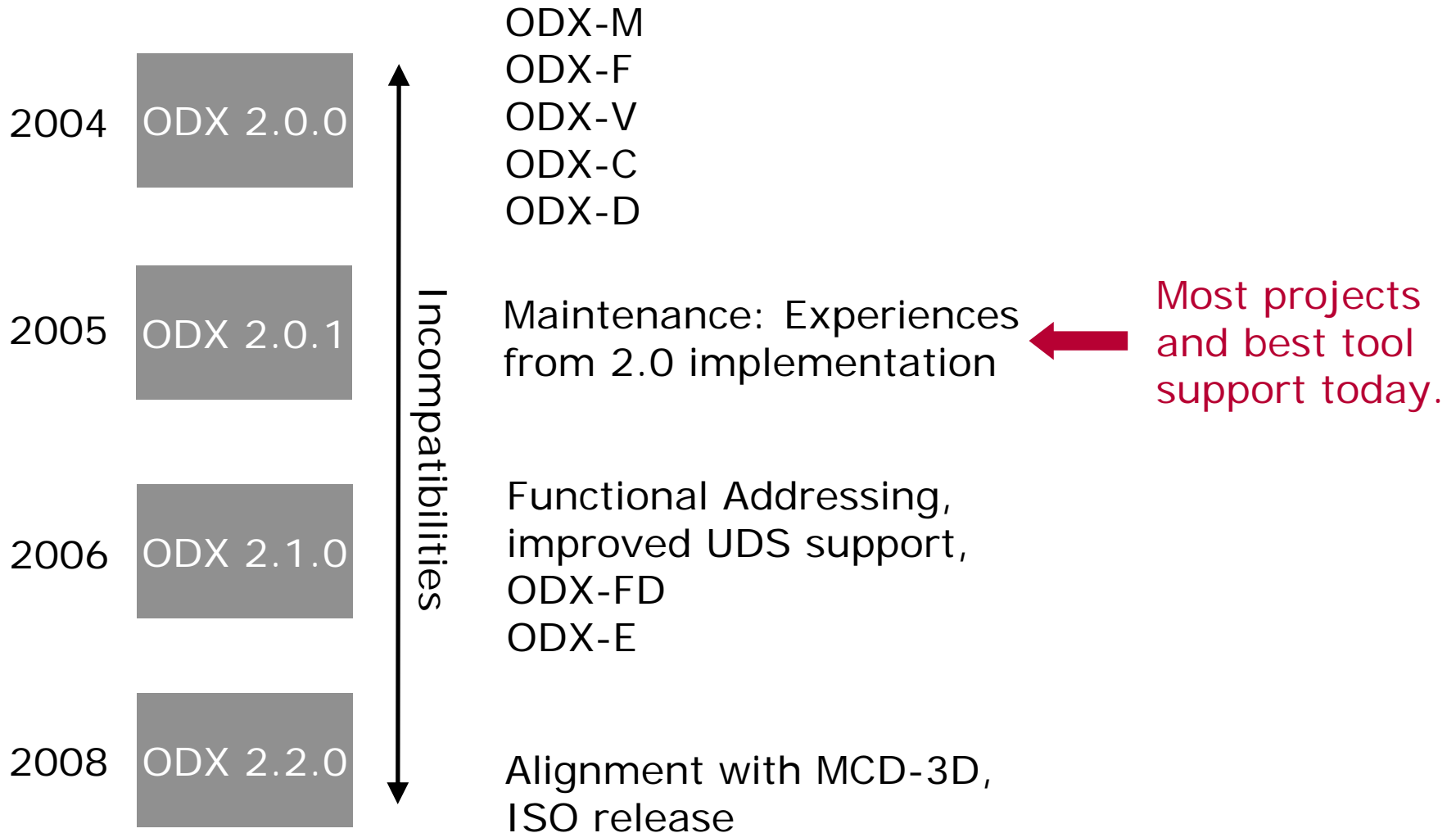
Many stakeholders of diagnostics have been involved in the standardization of ODX.

- ❑ Main focus of ODX is the tester perspective of the communication between ECU and tester.
  - ❑ The modeling approach is based on the request/response communication principle.
- ❑ Support of further protocols such as J1939 is limited today because ...
  - ❑ ... the request/response principle is broken.
  - ❑ ... COMPARAM-SPECs are not yet standardized for other protocols than KWP/UDS.
    - ➔ Proprietary tester implementations. Exchangeability?
- ❑ Diagnostics on FlexRay, IP, Most, LIN might cause further adaptations to the ODX standard.

ODX support is best for Keyword Protocol 2000 and UDS.

# Lessons Learned

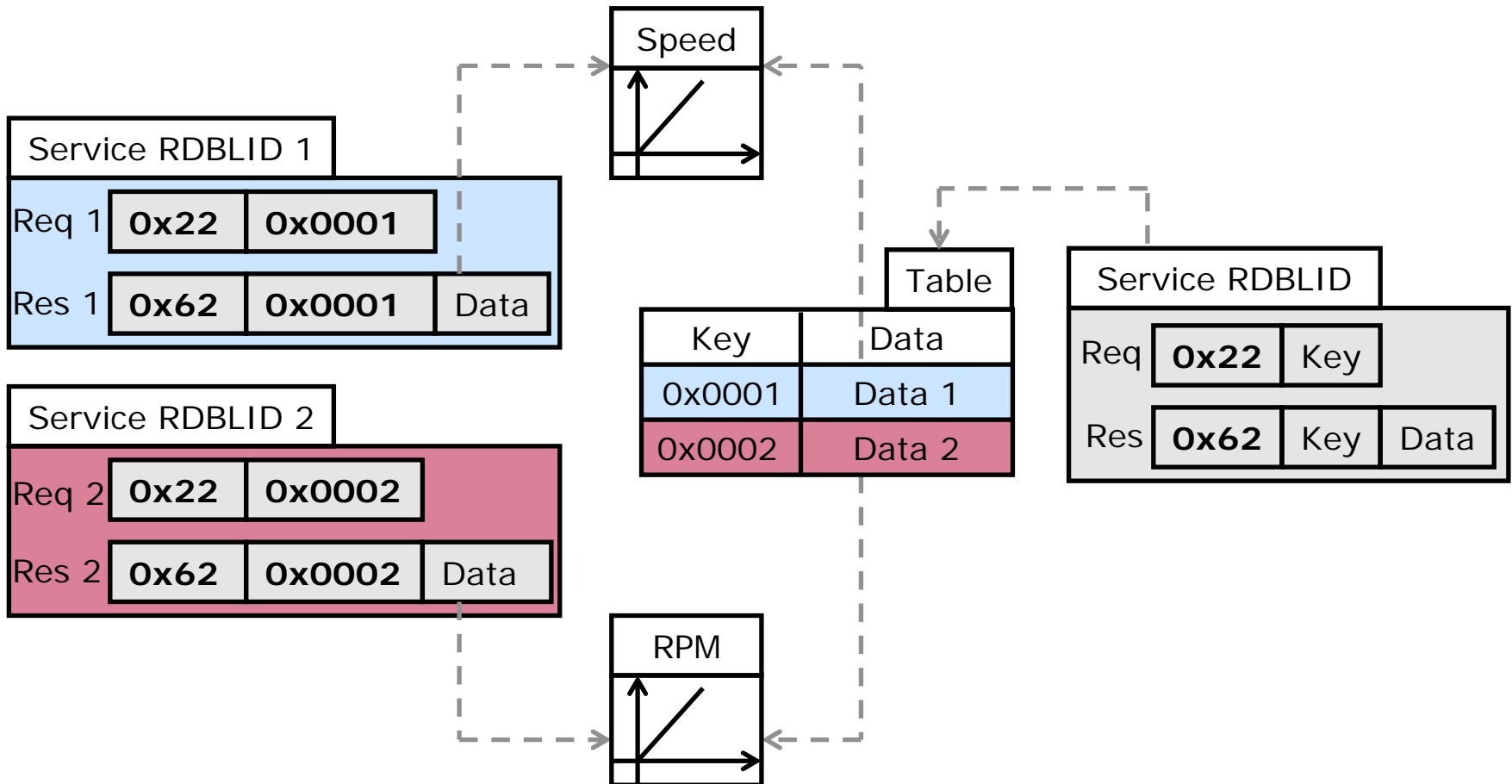
## Versions



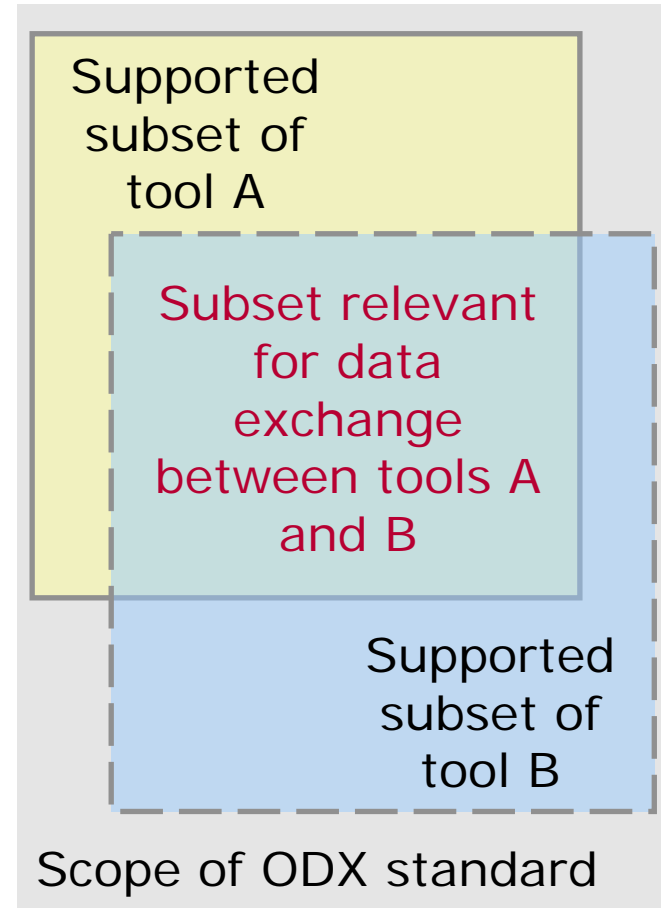
# Lessons Learned

## Flexibility and Dialects

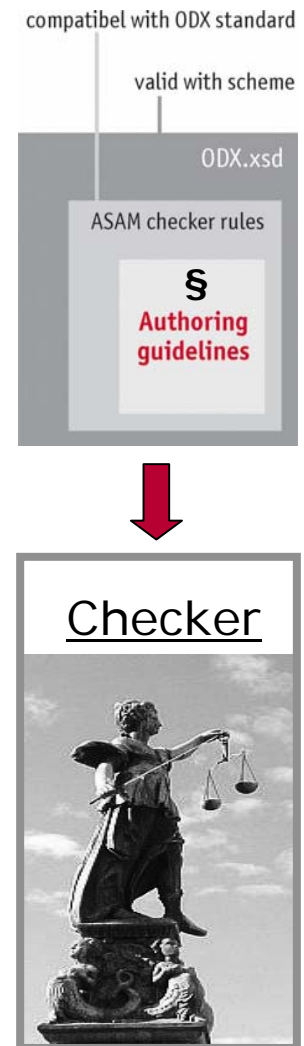
- ❑ ODX offers SEVERAL options for the description of ONE diagnostic feature.



- ❑ ODX dialect: Subset required by tools or processes
- ❑ Reasons for dialects:
  - ❑ Companies use different ODX consuming tools (test systems).
  - ❑ Most ODX consuming systems do not support the whole ODX standard (today).
  - ❑ ODX allows not-standardized extensions.
  - ❑ Diagnostic processes are different. Avoid irrelevant data.
  - ❑ Data exchange processes are different.



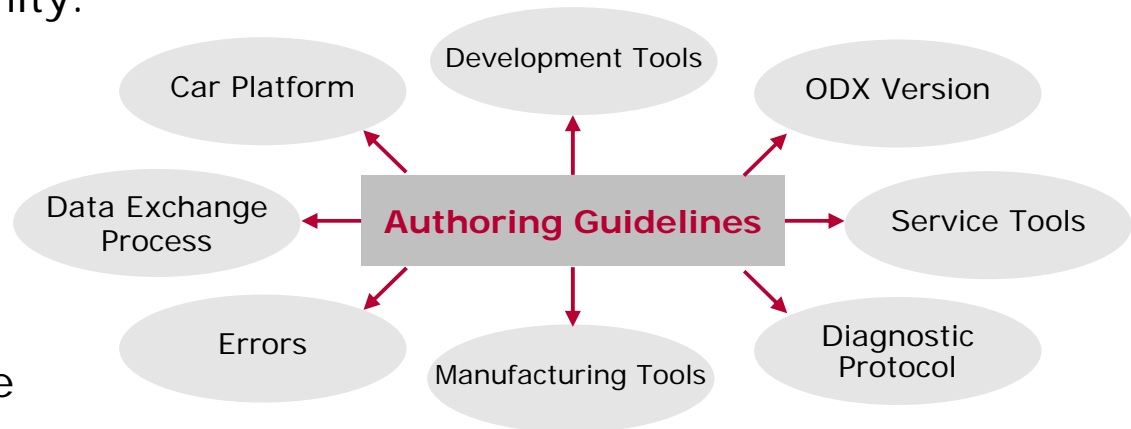
- ❑ Consequences:
  - ❑ Full reuse of ODX data is only possible if consuming tools support the same dialects.
  - ❑ Company specific authoring guidelines define structure and shape of ODX.
  - ❑ Checker applications ensure conformance to authoring guidelines.



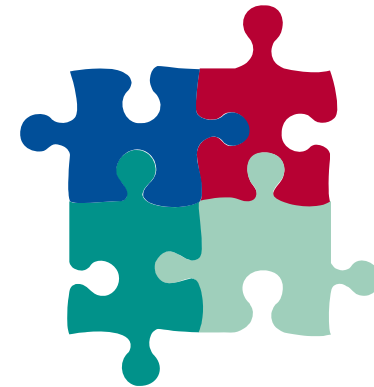
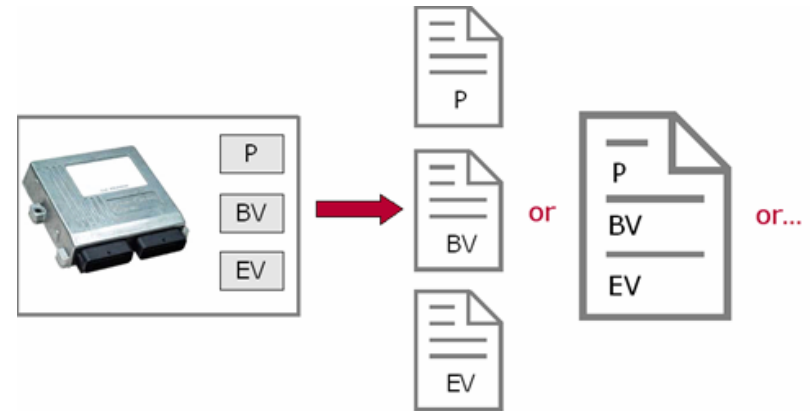
# Lessons Learned

## Data Quality

- ❑ ASAM checker
  - ❑ Conformance to ASAM checker rules
- ❑ Authoring guideline based checker
  - ❑ Additionally checks conformity to authoring guidelines.
- ❑ Vision:
  - ❑ Authoring guidelines contain necessary restrictions relevant for all consuming systems.
  - ❑ Checker ensure conformity.
- ❑ Experience:
  - ❑ A thousand rules
  - ❑ Many dependencies
  - ❑ Hard to keep up-to-date



- ❑ One ECU in one/several files
- ❑ Inheritance mechanism
- ❑ Import mechanism (Sharing)
- ❑ Vehicle projects spread over many files
- ❑ Differential data exchange
- ❑ Process partners must ensure that exchanged ODX data fit together.

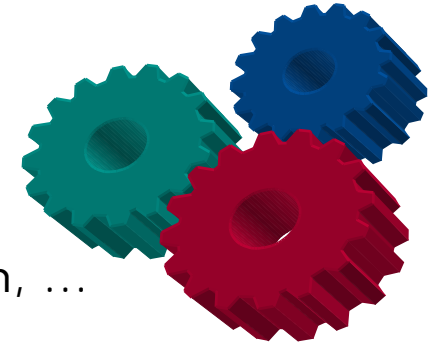


Data consistency and data management is a challenging topic.

# Getting Started with ODX

## Key Success Factors

- ❑ ODX introduction is a large-scale activity.
  - ❑ Many stakeholders are affected.
  - ❑ Know-how must be built up.
  - ❑ A well-tuned tool chain must be built up:
    - ❑ Editor, checker, tester, data management system, ...
- ❑ Consider requirements of stakeholders
  - ❑ Migration of legacy data
  - ❑ Don't bother the users with the complexity of ODX.
- ❑ Define data exchange process together with process partners.
- ❑ Authoring guidelines are crucial. Effort is high.



Solid ODX know-how is required for key decisions.

- ❑ ODX support and MCD-3D support are different topics.
  - ❑ ODX is a data model.
  - ❑ MCD-3D is a broad programming API.
    - ❑ Abstraction of diagnostic communication and data interpretation
    - ❑ Implementation of the API = 3D-Server (MVCI, ISO 22900-3)
- ❑ The investment for making an existing tool compliant to ODX is lower than to integrate a 3D-Server (because of its architectural impact).
- ❑ It may be decided tool-by-tool what's the best choice.

The introduction of ODX does not require a (continuous) introduction of MCD-3D at the same time.

# Summary

## ODX Benefits

- ❑ ODX is the base for diagnostic data reuse.
  - ❑ There is no alternative.
  
- ❑ ODX is not only a standardized data format.
  - ❑ ODX simplifies the human communication.
    - ❑ Stakeholders use the same wording to exchange ideas.
  - ❑ Tool architectures converge.
  
- ❑ ODX and UDS are well aligned.
  - ❑ ODX pushes UDS.



- ❑ Car platforms have been developed based on ODX diagnostics.
- ❑ Main focus today: Tester parameterization
  
- ❑ Code generation activities are starting.
  - ❑ Combination of Autosar and ODX?
  
- ❑ Diagnostic validation: ODX driven generation of ECU test cases
  
- ❑ Usage of ODX in function oriented development
  - ❑ Team approach!

Thank you for your attention.

For detailed information about Vector  
and our products please have a look at:  
[www.odx-solutions.com](http://www.odx-solutions.com)

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