

## Product Catalog



Vehicle Diagnostics



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# Vector – the Company

Vector provides OEMs and suppliers of automotive and related industries a professional and open development platform of tools, software components and services for creating embedded systems.

Customers worldwide place their trust in the solutions and products of the independent and self-contained Vector Group.

## **Reliable Partner with Quality**

For many years, our customers have realized what they have in Vector: a reliable and competent partner for efficient solutions in electronic networking.

This reliability is based upon the factors below:

- > Global unique processes and standards
- > All Vector subsidiaries are certified according to ISO 9001:2000
- > SPICE level 3 (HIS scope) reached in the area of ECU software
- > CMMI maturity level 2 reached in the area of software services

## **Milestones / Key Data**

- 1988** Founding of Vector Informatik GmbH
- 1992** Sale of the first CANalyzer license
- 1994** Vector has more than 25 employees
- 1996** Sale of the first CANoe and CANape license
- 1997** Founding of Vector CANtech, Detroit/USA
- 1998** Founding of Vector Japan, Tokyo/Japan,  
Vector Informatik is DIN EN ISO 9001:1994 certified
- 1999** Vector has more than 100 employees worldwide
- 2001** Move to the new company building in Stuttgart,  
Founding of Vector Consulting
- 2002** Vector Informatik is DIN EN ISO 9001:2000 certified,  
Founding of Vector France, Paris/France,  
Founding of VecScan, Göteborg/Sweden,  
Vector has more than 250 employees worldwide
- 2003** Vector has more than 400 employees worldwide
- 2004** Move to the second company building in Stuttgart,  
Founding of customer care center north in Braunschweig  
and customer care center south in Munich/Germany
- 2005** Vector has more than 500 employees worldwide
- 2006** Founding of office in Regensburg/Germany  
Vector has more than 600 employees worldwide
- 2007** Vector has more than 700 employees worldwide  
Start of construction for the third company building  
in Stuttgart/Germany  
Founding of Vector Korea, Seoul/Rep. of Korea
- 2008** Vector has more than 800 employees worldwide  
Move to the third company building in Stuttgart
- 2009** Founding of Vector Great Britain, Birmingham  
Founding of Vector Informatik India, Pune  
Opening of Representative Office Shanghai, China
- 2010** aquintos becomes part of the Vector Group



## **High Customer Satisfaction**

The delivery quality and delivery time as well as consulting competence from Sales, Support, and Consulting are not just maintained on a high level, but are constantly being improved.

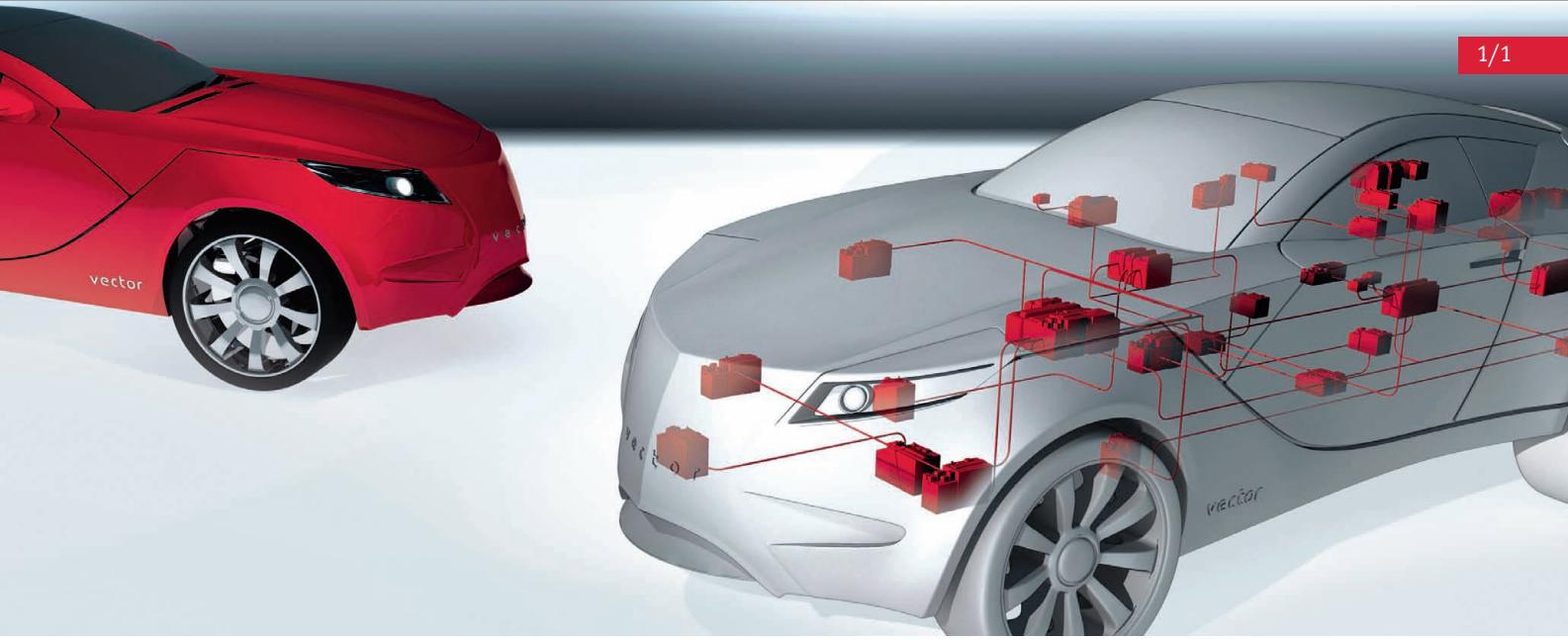
The success: our customers judge us on a scale of 1 to 5 (where 1 is the best grade and 5 the worst) with an average grade of 1.6.

## **Excellent Working Atmosphere**

70% of our highly-qualified employees work in the development environment. Teamwork in modern structures ensures a working atmosphere that in the past few years has been judged "very good" according to internal surveys. Trainees, interns, and graduating students also profit from the many opportunities to work actively with the newest technologies. Employee turnover at Vector, which has been extremely low for many years, confirms how each person at Vector understands his or her work: as mental work with a "fun" factor.

## **On Location Worldwide**

For Vector, partnership with its customers means understanding their requirements. In order to be responsive to our partners quickly and to be able to act purposefully, we are present worldwide. For optimal support on location, the Vector Group has established, in addition to its own locations, a globe-spanning network of distributors.



This catalog provides you an overview of Vector products and Services of the application area

#### **Vehicle Diagnostics:**

##### **Vehicle Diagnostics**

Tools for describing, implementing, testing and using diagnostic services in the ECU. The diagnostic content is formally described during ECU development, and this same content is reused in a wide variety of tools over the entire life of the ECUs.

Please request other catalogs in the application areas **Development of Distributed Systems**, **ECU Testing**, **ECU Calibration**, **Process Management and Development**, **ECU Software** or request further information about the Vector Solutions for various tasks in automotive networking:  
Internet: [www.vector.com/catalog/](http://www.vector.com/catalog/) • E-mail: [catalog@vector.com](mailto:catalog@vector.com)

##### **Development of Distributed Systems**

Tools and Services to design and develop a network of ECUs. Tools to simulate, analyze and test the communication of the network.

##### **ECU Testing**

Tools and services that allow the test of ECUs in all development phases, check the functionality of prototypes or execute regression and conformity tests.

##### **ECU Calibration**

Tools to access the ECU at run-time. This allows acquiring and modifying measurement data and parameters, so the ECU algorithms can be modified and optimized.

##### **Process Management and Development**

Tools and Services to support the process management required to develop complex vehicle electronics. This includes qualification of human resources, coaching, and supplying special tools that allow the management of complex data, workflows and projects.

##### **ECU Software**

Embedded software like real time operating systems (RTOS) and communication modules for e.g. CAN, LIN, FlexRay and Ethernet. Software for memory management and for re-programming of ECUs. Basic software for AUTOSAR. Development services for software components.

# Bus Systems, Embedded Network Protocols, Standards and appropriate Vector Products

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Bus System	Description	Application Area	Appropriate Vector Product	Page
CAN	CAN (Controller Area Network) was developed by the Robert Bosch GmbH in the early eighties and was internationally standardized (ISO 11898) in 1994. CAN was specifically developed for the serial data exchange between electronic control units in automobiles but is also used for the realization of industrial microcontroller networks.	Automotive engineering, automation engineering	All Vector Products	
LIN	LIN (Local Interconnect Network) has been developed especially for the cost-efficient communication of intelligent sensors and actuators in automobiles. LIN bus system characteristics: -> master/slave architecture -> time-controlled data transmission -> single-wire data transmission max. 20 kBaud -> synchronization mechanism integrated in the protocol (no expensive quartz needed)	Automotive engineering (body electronics bus e.g. networking within a seat)	CANalyzer.LIN/CANoe.LIN CANalyzer/CANoe Option SCOPE CANape CANbedded LIN Communication Embedded Gateway Flashbootloader CANister CANlog 3/4 GL1000, GL3000/4000/4200 MICROSAR LIN Multilog Network Designer LIN VN8900 XL-Interface-Family	
MOST	MOST (Media Oriented Systems Transport) has been developed especially for the transmission of multimedia data in automobiles. MOST bus system characteristics: -> optical data transmission up to 25 Mbit/s -> ring structure of the bus system -> usage of the standardized XML Function Catalog -> plug&play capability	Automotive engineering (multimedia applications; networking of infotainment devices e.g. tuner, DVD changer, etc.)	CANalyzer.MOST CANoe.MOST Flash Bootloader MICROSAR MOST Multilog VN2610 – USB-Interface for MOST	
FlexRay	FlexRay has been designed as a bus system for all security-relevant applications as well as for transmission of large amount of data in automobiles. FlexRay bus system characteristics: -> data transmission up to 10 Mbit/s -> redundant implementation of all networks -> deterministic transmission behavior As an exchange format for tools for the configuration of bus communication (design, parameterization) with FlexRay, the XML based FIBEX format (Field bus Exchange) is predominantly used.	Automotive engineering (e.g. security-relevant applications, brake-by-wire, high-speed backbone for other bus systems)	CANalyzer.FlexRay CANape CANoe.FlexRay Flash Bootloader FlexCard Cyclone II SE/E-Ray FRstress MICROSAR FR Multilog Network Designer FlexRay VN3300, VN3600 and VN7600 FlexRay-Interfaces	

Protocol resp. Exchange Format	Description	Application Area	Appropriate Vector Product	Page
AUTOSAR	The goal of the development partnership, founded by leading automotive OEMs and suppliers, is the definition of an open reference architecture for ECU-specific software.	Automotive ECUs, basic software	AUTOSAR Evaluation Bundle AUTOSAR Services AUTOSAR Basic Software Modules AUTOSAR Tools MICROSAR DIAG	
ARINC 8xx CANAerospace	ARINC 810 and 812 specify communication between modules in the on-board galley (Galley Master, Galley Inserts). The focus here is on power management. ARINC 825 specifies both the fundamental communication within CAN-based subsystems and between CAN subsystems, which for example are interconnected by AFDX. ARINC 826 specifies Software Data Load over CAN. Key protocol applications of CANaerospace are in engineering simulators, simulation cockpits and especially on drones (UAVs).	Avionics and space technology	CANalyzer.CANAero CANoe.CANAero	2/10

Protocol resp. Exchange Format	Description	Application Area	Appropriate Vector Product	Page
J1939/ ISO11783	J1939 is a communication protocol based on CAN for real-time data exchange between electronic control units (ECUs) in the area of commercial vehicles. It describes the information exchanged between the ECUs in such a system. ISO11783 is a further development for agricultural engineering.	Commercial vehicle engineering, railway engineering, agricultural engineering	CANoe.J1939 CANalyzer.J1939 CANoe.ISO11783 CANbedded J1939 CANape	● ● ● ● ●
NMEA 2000	NMEA 2000® is a communication protocol based on J1939 from the National Marine Electronics Association (NMEA) for the realtime data exchange between electronic control units in maritime electronics.	Marine engineering	CANoe.J1939 CANalyzer.J1939 CANbedded J1939	● ● ●
J1587/ J1708	SAE J1708 defines a serial, bidirectional network for use in the commercial vehicle industry. The SAE J1587 Standard regulates communication and standardized data exchange between different ECU based on SAE J1708 networks.	Commercial vehicles engineering	CANoe/CANalyzer.J1587	●
CANopen	The CANopen profile family specifies standardized communication mechanisms and device functionalities. CANopen is maintained by "CAN in Automation" (CiA), and can be implemented free of license.	Automation engineering, CAN embedded	CANoe.CANopen CANalyzer.CANopen CANerator CANopen ProCANopen CANeds CANopen Master Source Code CANopen Slave Source Code	● ● ● ● ● ● ●
J2534	The SAE J2534 standard defines the re-programming of ECUs via a PassThru interface. The purpose of this standard is to provide a unified communication capability via a standardized PC interface basically intended for flashing but also for diagnostics and other purposes.	Vehicle ECUs, Diagnostics, PassThru re-programming	PassThru XL Library	2/22
Ethernet/IP	Ethernet-based networks and the protocols built upon them are used in IT networks for decades. In the meantime they continue to grow in importance in the embedded environment. The main focus is on transmission of periodic signals and real-time capability.	Car2x, vehicles engineering, automation engineering, factory automation	CANoe.IP CANalyzer.IP MICROSAR IP	● ● ●
XCP/CCP	XCP is an improved and generalized version of the CAN Calibration Protocol V2.1. (CCP). XCP can be used also in non-CAN networks (e.g. FlexRay, SPI, SCI). The main benefit of XCP is the independence concerning the transport layer.	Automotive engineering, development of electronic control units, measurement and calibration	CANape XCP software component CANoe Option XCP GL1000, GL3000/4000/4200	● ● ● ●
KWP2000/ UDS	Keyword Protocol 2000 (KWP2000; ISO 14230) and "Unified Diagnostic Services" (UDS; ISO 14229) are standardized diagnostic protocols for electronic control units. The physical access to the ECU is possible via a serial connection ("K-line" KWP-on-K-Line) or via CAN (KWP-on-CAN, UDS-on-CAN).	Diagnostics of vehicle electronic control units, measurement and calibration	CANape CANdelaStudio CANdesc CANoe CANoe.DiVa vFlash Indigo	2/2 2/8 ● 2/16 2/20 2/14
ODX	The ODX format (Open Diagnostic Data Exchange) is based on the ASAM-MCD-2D-Basic working draft. Manufacturers of vehicles, electronic control units, and testers can write and exchange electronic control unit data in the uniform ODX format, which covers all manufacturers.	Diagnostics of vehicle electronic control units	CANdelaStudio CANdelaFlash ODX Studio CANape CANoe CANoe.DiVa vFlash Indigo	2/2 2/18 2/6 ● 2/16 2/20 2/14
RP1210	The RP1210 specification defines an open interface (API) between Windows-based applications and in-vehicle communication networks. This interface offers functionality for bus systems – such as CAN and J1708 – as well as for higher layer protocols such as J1939 and J1587.	Commercial vehicles engineering, engine control	RP1210 API	2/24

X/XX = Product information included in this catalog

● = Product information included in other application area catalogs or on the internet.

Please request further catalogs about the application areas **Development of Distributed systems, ECU Testing, ECU Calibration, Process Management and Development or ECU Software** at:Internet: [www.vector.com/catalog/](http://www.vector.com/catalog/) • E-mail: [catalog@vector.com](mailto:catalog@vector.com)

# Application Areas of the Vector Products

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The following matrix gives you an overview which Vector products support you in your specific application area.

**++** = main application area; **+** = additional application area

Vector Product	Development of Distributed Systems	ECU Testing	Diagnostics	ECU Calibration	ECU Software Components	Process Management	Page
ASAP2 Editor				++			
ASAP2 Lib				++			
ASAP2 Tool-Set				++			
AUTOSAR Basic Software (MICROSAR)					++		
CANalyzer		++					
CANape		+	+	++			
Option Adv. Multimedia		+		++			
Option GPS		+		++			
Option Simulink XCP Server		+		++			
CANbedded					++		
CANbedded Gateway					++		
CANbedded J1939					++		
CANbedded LIN					++		
CANdb++ Admin.J1939	++						
CANdbLib		++					
CANdelaStudio				++			2/2
CANdelaFlash				++			2/18
CANdesc				++	+		2/8
CANDito		+	++				
CANeds	++						
CANerator CANopen					++		
CANextender		++					
CANgraph		+		++			
CANister		++					
CANlog 3 and 4		++					
CANOe	+	++	+				
CANOe.DiVa		+	++				2/16
CANopen Master Source Code					++		
CANopen Slave Source Code					++		
CANscope		++					
CANstressD/DR		++					

Vector Product	Development of Distributed Systems	ECU Testing	Diagnostics	ECU Calibration	ECU Software Components	Process Management	Page
COMPASS						++	●
DaVinci							
Component Tester					++		●
Configurator Pro					++		●
Configurator Kit					++		●
Developer					++		●
eASEE.cdm				+		++	●
eASEE.rqm						++	●
eASEE.pm						++	●
eASEE.chm						++	●
eASEE.sdm						++	●
EEPROM Emulations Modul					++		●
Flash Bootloader			+		++		●
FlexCard Cyclone II		++					●
FRstress		++					●
GL1000, GL3000/4000/4200		++					●
High Resolution Timer					++		●
Indigo		+	++				2/14
Multilog		++					●
Network Designer CAN/LIN/FlexRay	++						●
ODX Studio			++				2/6
osCAN					++		●
PassThru XL Library			++				2/22
ProCANopen	++						●
RP1210 API		+	++				2/24
Test Automation Editor		++					●
Timing Analyzer	+				++		●
vFlash			++				2/20
VN2610 USB Interface for MOST			++				●
VN3300, VN3600, VN7600 Interfaces for FlexRay			++				●
VN8900			++				●
VT System			++				●
VX1000				++			●
XL-Interface-Family (e.g. CANcardXL, CANcaseXL, ...)			++	+			●

X/XX = Product information included in this catalog

● = Product information included in other application area catalog or on the internet.

Please request further catalogs about the other application areas **Development of Distributed systems, ECU Testing, ECU Calibration, Process Management and Development or ECU Software** at:Internet: [www.vector.com/catalog/](http://www.vector.com/catalog/) • E-mail: [catalog@vector.com](mailto:catalog@vector.com)

# Solutions for ODX

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## ODX: A brief introduction

The Open Diagnostic data eXchange (ODX) format is an XML-based data format for description of the data relevant to vehicle diagnostics.

ODX was developed in a working group of ASAM and ISO. Releases within ASAM have been made since 2004. Release as an ISO standard was in 2008.

ODX was conceptualized as an open format for the exchange of diagnostic data between automotive OEMs and their suppliers. The primary use of ODX data is in parameterizing diagnostic testers.

## Vector's ODX mission statement

Today, Vector supports ODX in its diagnostic-related products (see table) and so Vector is enabling simple and effective work with ODX diagnostic data.

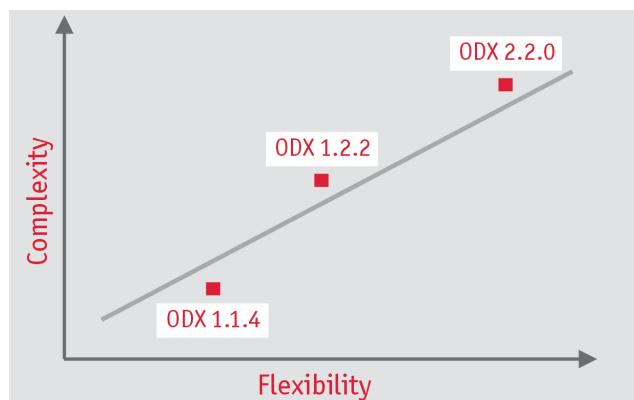
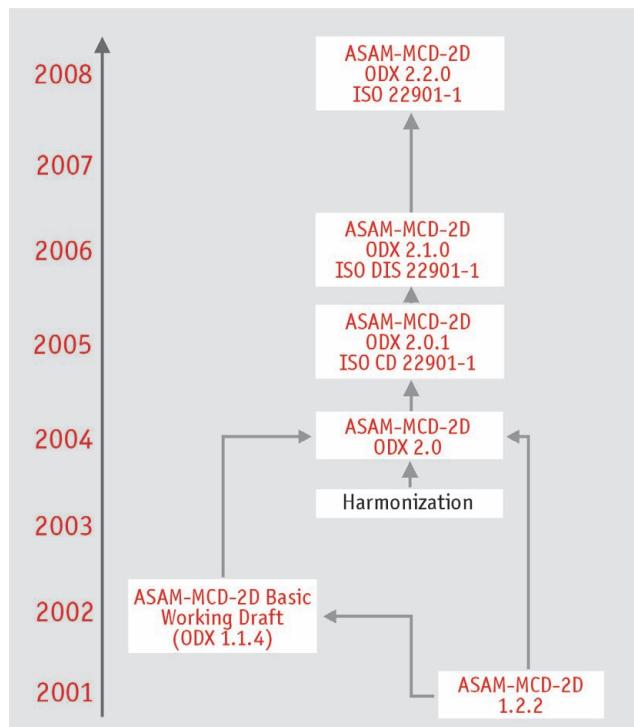
Since 2001, Vector is contributing to define the ODX standard in ASAM and ISO working committees. ODX is now released officially as ISO 22901-1:2008. Some automotive OEMs and suppliers are already integrating ODX in their development processes. It is now apparent that in practice the flexibility of the ODX standard will lead to different ODX dialects. Vector will strive to meet the challenge of supporting these ODX dialects in all phases of the diagnostic process.

Constructive feedback from users is important to us, since we are continually working on improvements.

## The CANdela approach and ODX

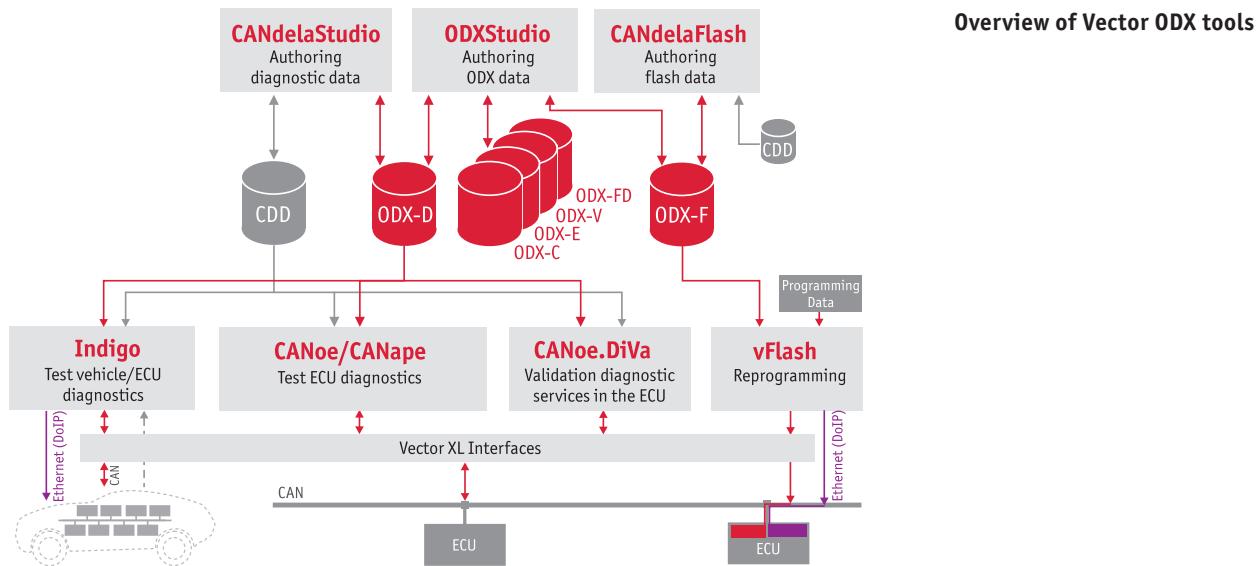
Both ODX data and CANdela CDD data are described in XML. Due to its high flexibility and broad coverage of diagnostic use cases, ODX is enjoying increased popularity among OEMs and suppliers. Nonetheless, its high flexibility is associated with considerable complexity. Consequently, when ODX data are created without supporting tools, extensive expert knowledge is assumed. Vector's answer to this is the CANdela approach: The user encounters a diagnostically-driven perspective of the data. A key aspect here is that it is not necessary to possess special expertise or knowledge of the underlying formats to create the data.

The CANdela data model goes beyond the use case of tester parameterization, since the data model is the data source for the entire diagnostic development process, which is organized in sub-steps: Specification, code generation, ECU testing and validation.



### Tip:

With the implementation of ODX it makes sense to simultaneously optimize development processes. The aspects of universality and reliability play a great role here. They make it possible to achieve sustained time and cost savings. Vector can offer you consultation and other services for implementing ODX to your existing processes. You will find further information on this on [page 1/8](#) in this catalog.



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ODX Tool	ODX Properties	Application Area	ODX-D	ODX-F	ODX-C, ODX-E, ODX-V, ODX-FD	Page
CANdelaStudio	CANdelaStudio supports import and export of diagnostic data from/to ODX. It decouples the wide diversity of data formats and is therefore ideal for migration of master data to the ODX format too.	Authoring diagnostic data	1.1.4, 1.1.5, 2.0.1, 2.1.0 2.2.0			2/2
ODXStudio	ODXStudio is a user-oriented authoring tool for diagnostic data in ODX format. As an optimal platform for a native ODX process, it offers full support of all categories of ODX data.	Authoring ODX data	2.0.1 2.2.0	2.0.1 2.2.0	2.0.1 2.2.0	2/6
CANdelaFlash	CANdelaFlash is the right tool for process-assured management of flash data and for generating ODX flash containers.	Authoring flash data			2.0.1 2.2.0	2/18
vFlash	vFlash is a very easy-to-use tool for programming one or more ECUs. Because of its flexible approach, it can support the different flash specifications of a wide variety of automotive OEMs.	Flashing, reprogramming			2.2.0	2/20
Indigo	Indigo is an easy to use diagnostic tester for full vehicle diagnostics, which is largely selfconfigured and conceals the complexity of the diagnostic protocol.	Test vehicle/ECU diagnostics	2.0.1 2.2.0			2/14
CANoe.DiVa	The DiVa Option (Diagnostic Integration and Validation Assistant) extends CANoe to a tool for automatically generating and executing of reproducible test cases for the implementation and integration of the diagnostic protocol.	Validation ECU diagnostics	2.0.1 2.2.0			2/16
CANoe CANape	CANape and CANoe – besides providing specific core functionality they also enable execution of ECU diagnostic tests. CANape and CANoe read in both CANdela data and ODX data to configure parameters for diagnostic functions.	Test ECU diagnostics	2.0.1 2.2.0			

# Engineering Services

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## Formats, standards and manufacturers

Today, vehicle diagnostics is typified by OEM-specific data formats and processes. In the near future, the ODX standard promises to offer relief for the problems in data exchange caused by this situation. In most cases, however, existing data and components must continue to be used in a migration, which results in an increased need for data migrations and process adaptations. That is why diagnostic tools from Vector are made to be adaptable to your special requirements, so that optimal use of our tools is assured.

Vector can provide you with both technical consultation and adaptation or customization of Vector tools in service projects. Our employees are very familiar with many OEM-specific data formats, the ASAM and ISO standards and underlying processes.

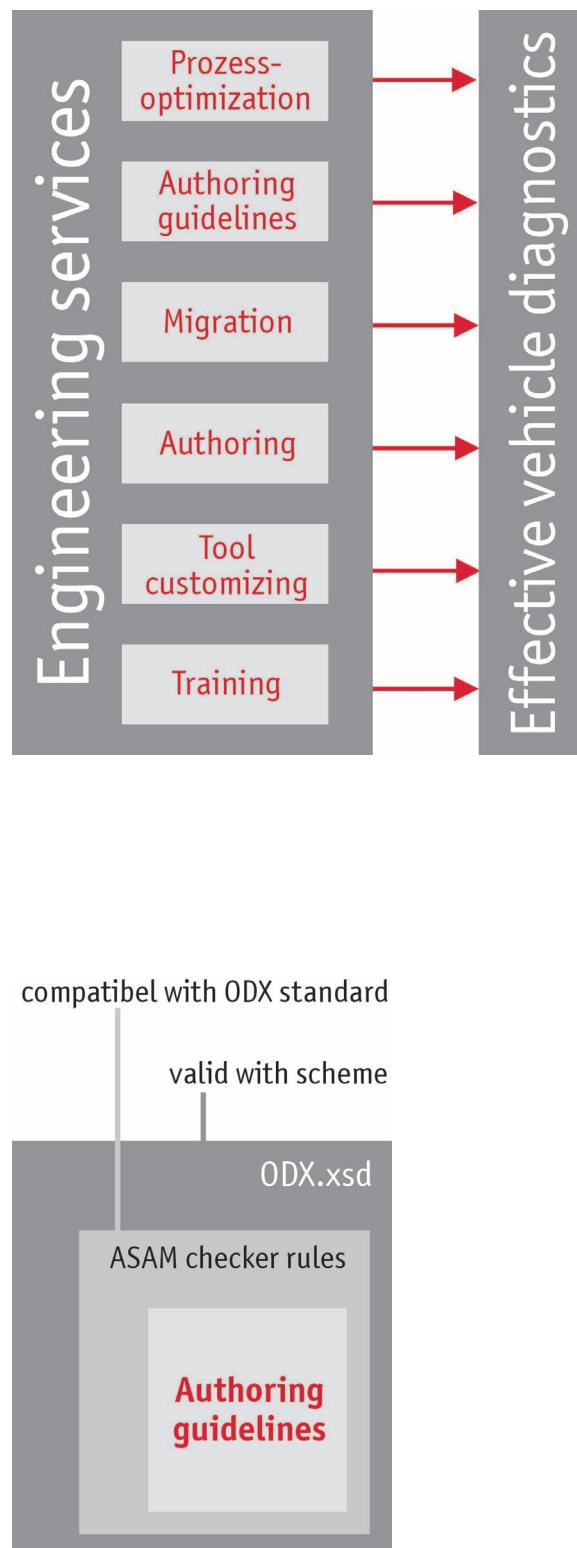
### Vector offers you services with know-how

Vector gives you the best conditions for implementing your requirements. The knowledge of our experienced employees is your advantage in coming up with efficient and customer-specific diagnostic solutions.

### Our services program for you:

- > Optimization of existing diagnostic processes
- > Migrations of master data, e. g. to ODX
- > Consultation on the implementation/integration of ODX in existing diagnostic development processes
- > Definition and implementation of authoring guidelines
- > Integration of customer-specific requirements in Vector products
- > Development of converters for proprietary data formats
- > Integration of CANdela in existing diagnostic processes
- > Creation of diagnostic specifications
- > Migration to UDS (ISO 14229-1)

“ODX authoring guidelines” are gaining in importance due to the implementation of ODX. In this area, Vector is able to call upon its comprehensive experience in numerous customer projects. Authoring guidelines ensure optimal and customized use of ODX in an exchange process and in the underlying tool chain. They take the flexibility of the standard and limit it to a dimension appropriate for the process chain. Conformance to authoring guidelines is checked frequently using special checker applications. Vector can offer you the necessary expertise for this task too.





### Training events

In training courses and workshops, we convey a fundamental understanding of diagnostics to you as a user. The workshops can offer you comprehensive insight into special topics such as ODX and the various diagnostic protocols. In addition, we also give you an overview of the Vector diagnostic tool chain. Practical exercises round out the lineup.

An excerpt from workshop contents:

- > Introduction to diagnostics
- > Diagnostics in the network
- > Diagnostic protocols and transport protocol (ISO 15765-2)
- > CANdela overall concept
- > Introduction to CANdelaStudio
- > Working with CANdelaStudio
- > Using diagnostic data in the Vector tool chain

We can also offer you customer-specific training events, at which we can combine or extend training contents according to your expectations. Upon request, these training events may also be conducted at your company site.

Do you have any questions about our services or special requirements? Then talk to us directly at:

Tel.: +49 711-80670-250

E-mail: [candela-info@vector-informatik.de](mailto:candela-info@vector-informatik.de)



# Vector Diagnostic Solution

Vector provides methods, tools and engineering services for the development of diagnostics. The engineers like our solution because it simplifies their daily business. The managers prefer our solution because they see the process efficiency and quality of work results. A close cooperation with our customers is a premise to recognize any innovation potential. Vector invests in the development of new methods and tools in order to provide appropriate and innovative solutions as soon as they are needed.

2/0

Tasks that are essential to the diagnostic development process:

- > Specification: Description of diagnostic requirements
- > ECU-specific software: Implementation of the diagnostic functionality in the ECU
- > Validation & testing of diagnostic functionality.

**The following difficulties may be experienced in this process:**

- > Diagnostic functionalities are usually implemented very late in an ECU's development process, and suitably configured diagnostic test systems are often available until just before the start of production.
- > The same data contents are described in different ways in the specification, ECU, and diagnostic tester. Typically, several versions and variants of the descriptions are created over the development cycle. This makes it difficult to preserve consistency.

## Solution: The CANdela Approach

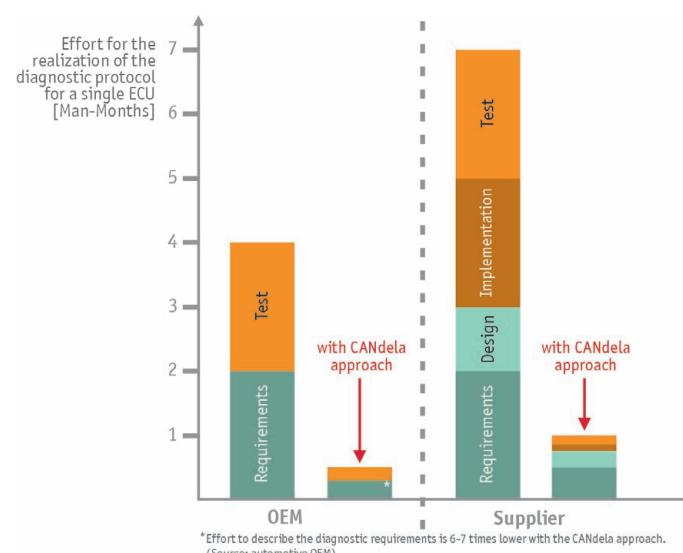
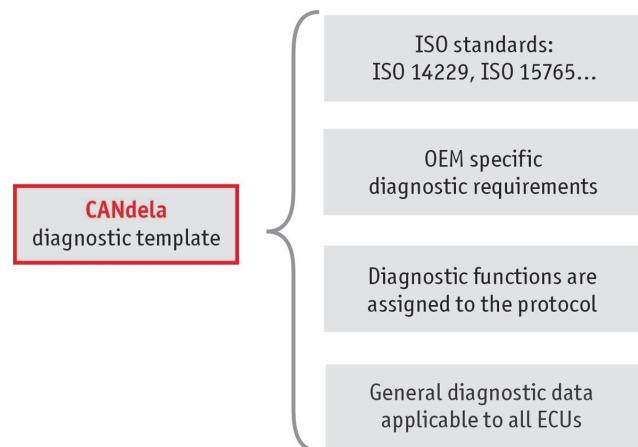
Formalization of requirements management closes the gap between the product specification and the requirements specification with the help of so-called "Diagnostic templates". Tool-supported, centralized management of diagnostic requirements in an XML database (Single Source Principle) assures consistency of the diagnostic description data. From this database the user can generate the specification and ECU-specific code, and automatically configure the parameters of diagnostic test systems.

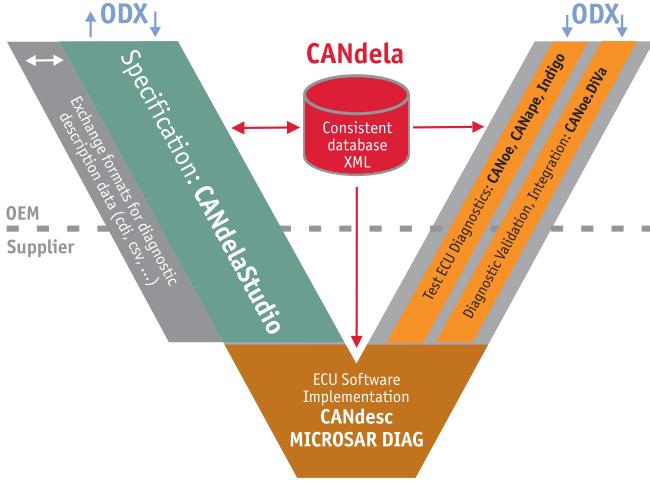
## Advantages for OEMs and Suppliers

Product quality is significantly enhanced by applying the single source principle. OEMs and suppliers also profit from enormous time and cost savings.

## Reduced Development Effort

The effort required for requirements engineering and the configuration of tester parameters is six to seven times less with CANdela. The early existence of a diagnostically capable ECU, uniform implementation of the diagnostic protocol across all ECUs in a vehicle, and assurance of diagnostic data consistency across different program levels and variants all result in savings on the same level of magnitude as for other development stages.





### Vector Diagnostic Development Tools

For the CANdela approach Vector offers powerful software tools that begin with the specification, cover implementation of the ECU-specific software, and finally assist in integration and functional testing:

- > CANdelaStudio: Simple and consistent specification of diagnostic functionality
- > CANdesc/MICROSAR DIAG: Simple and quick integration of diagnostics in the ECU
- > CANoe.DiVa: Automated Testing of Diagnostic Protocol Implementation and Integration in ECUs
- > Indigo: Easy to use diagnostic tester for vehicle wide diagnostics.

2/1

Standardized formats for exchanging diagnostic description data are supported, e. g. ODX, .cdi, .csv, etc. ♦

### The Vector diagnostic tools in the development process:

Acquisition of diagnostic data during the specification phase in a consistent data base. Availability of data for all subsequent process steps as a XML file.

	CANdelaStudio	CANoe	CANape	Indigo	CANoe.DiVa	CANdesc	MICROSAR DIAG	ODXStudio	CANdelaFlash	vFlash	RP 1210 API	PassThru XL Library
<b>Specification</b>	●											
<b>Implementation</b>						●	●	●				
<b>Diagnostic Test</b>												
ECU		●	●	●								
Vehicle				●	●							
<b>Validation Implementation and Integration Test</b>					●							
<b>Network, System, ECU Development</b>		●										
<b>ECU Application</b>												
Measurement												
Calibration			●	●								
<b>Reprogramming</b>												
Data Management												
Flashing			●					●	●			
<b>ODX Support</b>	●	●	●	●	●			●	●	●		
<b>OBD Support</b>	●	●	●		●		●					
<b>RP1210 Support</b>										●		
<b>PassThru Support</b>											●	
<b>Page</b>	2/2	●	●	2/14	2/16	2/8	2/10	2/6	2/18	2/20	2/24	2/22

# CANdelaStudio 7.1

## Optimization of the Diagnostic Development Process Using a Central Database

### Properties Overview

- > Easy and user-friendly description of diagnostics for all process steps
- > A template concept ensures a consistent development process and allows diagnostic data to be reused in different OEM-specific protocols
- > Import and export are possible in various exchange formats (ODX, CSV, RTF, HTML, A2L, XML, CDI)
- > Support for several standards (KWP2000, UDS, WWH-OBD, J1939, DoIP, FlexRay)
- > A quick learning curve is guaranteed, not just for diagnostic experts
- > Data consistency is ensured, enhancing product quality
- > Development times are shortened
- > Data and code tests are automated

### Application Areas

Substantial shares of resources in diagnostic development are used to keep implementation in the electronic control unit compatible with the various tester types. In addition it is important to assure that both electronic control unit and tester implementations conform to the underlying specification. Different development teams at different companies have to solve this task. This leads to coordination effort and consistency problems. The CANdela product family offers a comprehensive approach here for standardizing the entire diagnostic process, shortening development times, and avoiding inconsistencies.

CANdelaStudio as a specification tool and central component of the CANdela approach supports the user in the acquisition and processing of ECU diagnostic data and diagnostic functionalities. The acquisition of the data is done in a XML data base. This data is electronically available for the subsequent process steps:

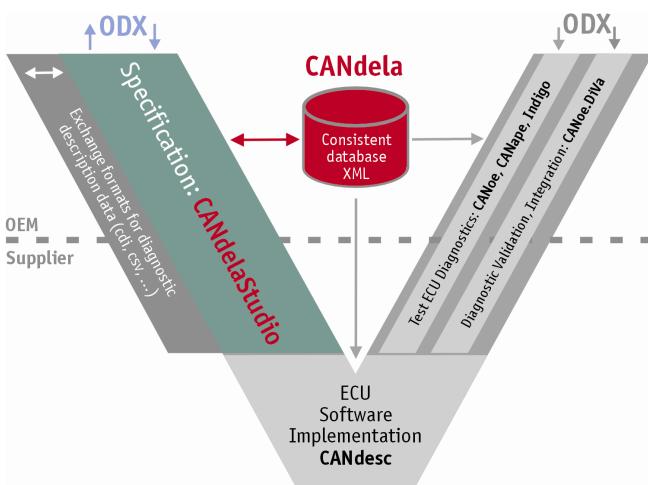
- > Implementation (ECU software CANdesc)
- > Diagnostic test in the development (e.g. CANoe, CANape, Indigo), the production environment, test stands, and service
- > Automated testing of diagnostic protocol implementation and integration in ECUs (e.g. CANoe.DiVa)

Thus the consistency of diagnostic data is ensured at any time in the process.

### Functions

Document templates are supported by CANdelaStudio to make it possible to handle manufacturer-specific differences in one standard tool. Content in the document template corresponds to a manufacturer-specific diagnostic specification. It contains a formal description of all allowable basic services of the electronic control units as well as the mandatory features that must be implemented in every electronic control unit. Optional features can also be described in the template, so that it is easy to select them at a later time if desired.

An electronic control unit is described in a separate document which is based on a document template. A variant concept makes it



**CANdelaStudio in the Diagnostic Development Process**

### New Functions of Version 7.1 – Benefits at a Glance

#### Improved Compare View

- > New optimized display of two documents in a tree view
- > Filter, search, navigation functions
- > Detail window with additional information
- > Direct comparison of referenced data types

#### ODX

- > CANdelaStudio now contains ODXStudio View for just viewing ODX files.

#### Support for Additional Standards

- > DoIP, FlexRay, J1939, WWH-OBD

#### More new Features

- > Find and replace function for data types is now available
- > Protection of "released variants" is possible
- > Improved processing of environment / snapshot data
- > Search for certain services on the basis of hex sequence

## Training

As part of our training program, we offer a range of classes and workshops on CANdelaStudio.

For more information and the dates of our training courses, please visit our homepage on the Internet at: [www.vector-academy.com](http://www.vector-academy.com)

possible to describe commonalities and differences among the different electronic control unit's variants with few redundancies.

### More Functions:

- > Displays changes between two versions of ECU diagnostic descriptions (Compare View) and saving the results. Several functions such as filtering, search, navigation functions, or also the direct comparison of referenced data types are possible.
- > Imports and exports diagnostic trouble codes (DTCs) from a file or to a file.
- > Extensive DTC descriptions can be documented and displayed when working with fault memory.
- > DTC-Overview that lists for each DTC the variant where the DTC is used. This is helpful when doing variant-spanning checking and maintenance of a set of DTCs.
- > Central DTC Pool offers selection list on ECU level and makes it easy to reuse existing DTCs.
- > Graphic visualization and table-based editing of state dependencies of diagnostic services. Documentation is exported as a separate chapter to the diagnostic specification in RTF format.
- > To ensure version-spanning document compatibility diagnostic description data that is created with CANdelaStudio 7.1 can also be loaded in CANdela version 3.0 and higher based programs.

More information in the "Knowledge Base" section at

<http://www.vector.com/kb/questions/83/>.

> Wizard for user-friendly editing of DTC record number dependencies in describing UDS Services 0x19 0x04 und 0x19 0x06.

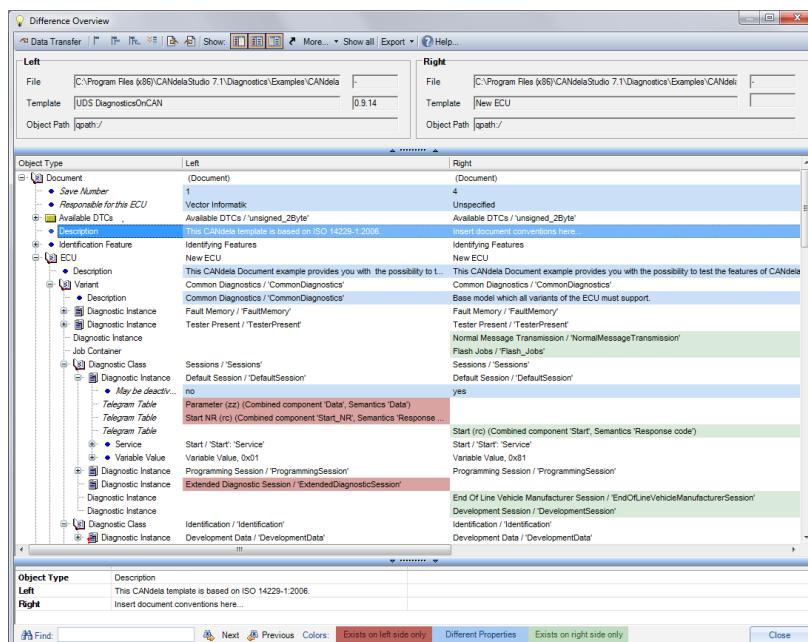
> Graphical Telegram Overview for request and response data to visualize the bit and byte positions.

### ODX Functions:

- > Import from ODX 2.0.1, 2.2.0
- > Export to ODX 1.1.4, 1.1.5, 2.0.1, 2.1.0, 2.2.0
- > ODXStudio Viewer for clear and concise display of ODX data.
- > Import of Layer and Services of an ODX ECU description and therefore simple exchange of data between different OEMs considering process conformity.
- > ODX export: Support of communication parameters and TABLEs for additional OEMs
- > CANdela data based checks regarding the ODX export.
- > Support of Object ID (OID)
- > Simple handling of Text ID (TID)
- > Enhanced export options, e.g.: one file per layer, use of ECU qualifier as prefix for generated ODX ID.

### Quality Improvement by Single Source Principle

The use of a formally specified, machine-readable XML database in all areas as a "Single Source", defuses the consistency problem and thereby significantly increases product quality. During the entire development phase changes in the database were made with CANdelaStudio. The diagnostic specification, the ECU software,



The screenshot shows the 'Difference Overview' window in CANdelaStudio. It compares two diagnostic descriptions: 'Left' (C:\Program Files (x86)\CANdelaStudio 7.1\Diagnositics\Examples\CANdela\UDS DiagnosticsOnCAN) and 'Right' (C:\Program Files (x86)\CANdelaStudio 7.1\Diagnositics\Examples\CANdela\New ECU). The window displays a tree view of objects and their properties. A red box highlights the 'Extended Diagnostic Session / ExtendedDiagnosticSession' entry under Diagnostic Instance in the 'Right' pane.

**Clear compare view of two diagnostic descriptions**

and the tester configuration will be generated and updated from this database automatically. The diagnostic specification may be generated in either Rich Text Format (RTF) or HTML format. It can be read or edited using conventional tools. The information is structured and prepared in a way that is oriented toward classic diagnostic specifications.

### Data Exchange

CANdelaStudio supports the following formats for exchanging diagnostic description data:

- > Import from ODX 2.0.1, 2.2.0
- > Export to ODX 1.1.4, 1.1.5, 2.0.1, 2.1.0, 2.2.0
- > Import of Layer and Services of an ODX ECU description
- > ODX export: Support of communication parameters and TABLEs for different OEMs.
- > Import and export of attribute values from/to a CSV file
- > Diagnostic specification export (RTF file, HTML file)
- > Service overview export (CSV file)
- > Import for data type „Text Table“ (CSV file)
- > Export of Variant Coding Keys (XML file)
- > CDI format: import of, amongst others, data types and DTCs and export of DTCs
- > Import of data from the A2L format

### Editions

#### > CANdelaStudio Standard

CANdelaStudio Standard provides all of the important functionalities needed for diagnostic requirements engineering. The template concept is utilized to automatically link the diagnostic data to be exchanged (e.g. ECU identification, reading and clearing of errors, driving of actuators, etc.) to the diagnostic services offered. CANdelaStudio guarantees the consistency of the data.

Application area:

All active participants in the diagnostic process should use CANdelaStudio Standard.

#### > CANdelaStudio ViewX

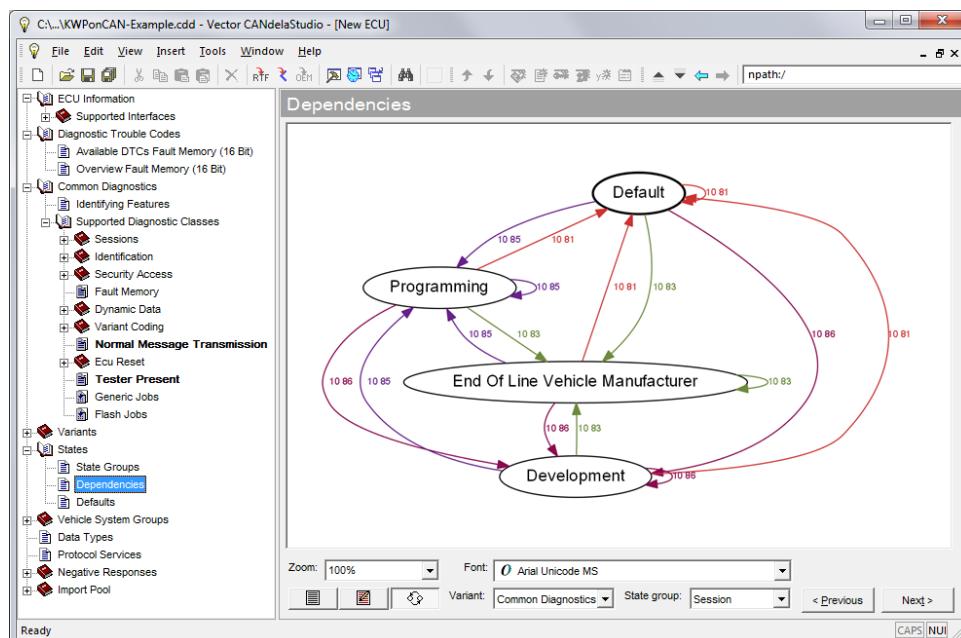
With the well-priced CANdelaStudio ViewX edition the user may view, compare (Diff-function), and export, but not modify diagnostic requirements and diagnostic data.

Application area:

Users of test systems and at test stations might apply this edition.

#### > CANdelaStudio Pro

In addition to the functionality of CANdelaStudio Standard the CANdelaStudio Pro edition supports multilingual requirements engineering. For this purpose CANdelaStudio Pro offers semi-automated translation of diagnostic data, which can be consistently edited in one language in the Standard edition. Additionally expandable dictionaries based on the open TMX standard can be



**Graphical visualization of state dependencies of diagnostic services.**

generated and used. Besides Western European languages, Far Eastern languages (e.g. Japanese) are also supported.

#### Application area:

International projects and projects where multilingual specifications are required or helpful.

#### > CANdelaStudio Admin

Like CANdelaStudio Pro. Additionally diagnostic templates can also be created and modified here.

#### Functions:

- > Modify protocol services
- > Modify fault memory layout
- > Modify diagnostic classes by considering diagnostic interdependencies
- > Opening and saving template files (CDDT files)
- > Translation of template files and editing the translation memory with the help of the TMX Editor.

#### Application area:

This edition should be made available to employees who are responsible for the global diagnostic concept of a group of ECUs or vehicle model series.

#### CANdelaStudio and other Vector Tools

##### > Diagnostic Testing

CANoe, CANape and Indigo are the diagnostic testers in Vector's diagnostic tool chain. They give the user symbolic access to all

#### Consultation and Project Assistance

In the diagnostics area Vector also offers consultation services for making adaptations to existing processes and tools:

- > Switch to ISO 14229 [2]
- > Migration to ODX and definition of authoring guidelines
- > Optimization of existing diagnostic processes
- > Integration of CANdela into existing diagnostic processes
- > Creation of special document templates

data and functions accessible via the diagnostic protocol (KWP2000, UDS). Parameterization is performed via a CANdela ECU description file (CDD file) or via ODX files.

#### > Validation of Diagnostics

CAN.DiVa simplifies the test of the implementation and integration of the diagnostic protocol in ECUs for OEMs and suppliers. DiVa generates automatically a CANoe test module from a CANdela ECU description file (CDD file). During execution CANoe documents the test results in a clear and concise report (CANoe Test Report).

#### System Requirements

Windows	XP (32 bit)	Vista (32 bit) / 7 (32/64 bit)
Processor	PC with min. 1,6 GHz	PC with min. 1,6 GHz
RAM	1GB	2GB

The screenshot shows the CANdelaStudio interface with the following details:

- Translation Memory Dialog:** A modal window titled "Edit translation memory" is open, showing a table with columns: German (Germany), English (USA), French (France), and Japanese. It lists entries like "Fault Memory" and "Read (number)" with their respective translations and alternative names.
- Main Interface:** The main window shows a table of terms with columns: Term in reference language, Translated?, Translation in target language, Format, Object Type, and Path. Terms listed include "Send", "Fault Memory", "Read (Number)", etc.
- Status Bar:** The status bar at the bottom left says "Ready".

**Translation of recurring text modules, which can be automated in CANdelaStudio Pro**

# ODXStudio 2.5

View, edit and manage diagnostic data in ODX 2.0.1 and 2.2.0 format – simply and conveniently

## Properties Overview

- > Processing of ODX 2.0.1 and ODX 2.2.0 data in each native format
- > Specialized views for ODX 2.0.1 and ODX 2.2.0
- > Quick work results thanks to user-oriented and easy-to-operate graphic user interface
- > Standard conformant - best “round-trip” functionality by use of ODX as internal data format
- > Quick loading, editing and saving of even very large sets of ODX data (>> 100MB)
- > Full coverage of all ODX categories
- > Optimal scalability: From individual ECU to entire vehicle or platform
- > Extensive features for support of OEM-specific authoring guidelines

ODXStudio is a user-oriented authoring tool for diagnostic data in ODX format. As an optimal platform for a native ODX process, it offers full support of all categories of ODX data:

- > ODX-D (DIAG-LAYER-CONTAINER, diagnostic data)
- > ODX-C (COMPARAM-SPEC, communication parameters)
- > ODX-V (VEHICLE-INFO-SPEC, vehicle topology and access)
- > ODX-F (FLASH, flash data container)
- > ODX-E (ECU-CONFIG, ECU coding data)
- > ODX-FD (FUNCTION-DICTIONARY, mapping to functions)

## Application Areas

ODXStudio was designed for all users who participate in an ODX-based diagnostic process and who view, edit, and process or manage

diagnostic data in ODX format. It supports a wide range of development – from individual ECUs to entire vehicles or vehicle platforms. It is equally well suited for users at automotive OEMs as at suppliers.

ODXStudio can process the data of ODX versions 2.0.1 and 2.2.0 in each native format. This enables an easy re-use of diagnostic data across versions – and for instance a migration to “ISO-ODX” (ODX 2.2.0 = ISO 22901-1).

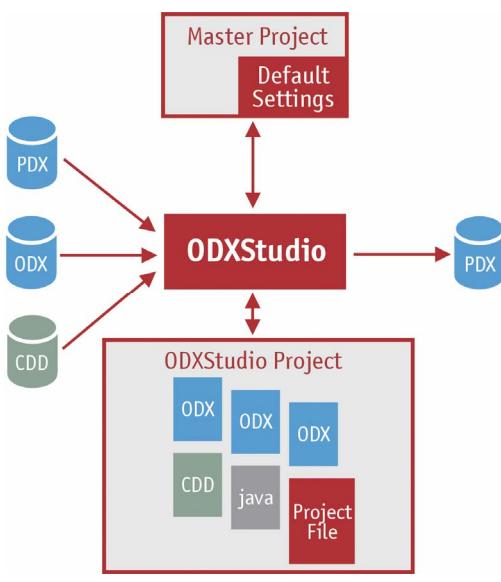
Different perspectives of the ODX data support users who have different levels of professional knowledge:

- > The ODX expert can use the ODX perspective to view and edit data elements with all details of the ODX specification.
- > The ECU developer without well-founded ODX expertise can use a Process perspective to view and edit the same data in reduced and process-oriented form.

Process perspectives can be created for specific application cases upon request.

## Functions

ODXStudio makes it easy for users to create new ODX data based on Master Projects, which already provide a project framework including standard libraries and meaningful default settings. This harmonizes the created ODX data, since it is comprehensively created on a predefined, uniform foundation. This approach substantially reduces initial effort in configuring new parameters.



ODXStudio: ODX files, Project and Master Project

## New Functions of Version 2.5

### Compare Feature

- > Comparison on file level - for a quick overview
- > Comparison of each ODX category in full depth - with all details
- > Comparison of entire projects or only parts
- > Various filters on displayed data

### Cut, Copy & Paste

- > Available for all ODX categories
- > Copy of ODX data even between two ODXStudio instances
- > Smart copy of referenced data

### Double-click to open

- > Open PDX and ODX files on double-click - no need to create an ODXStudio project first

### Plug-ins

- > Plug-ins can be now reloaded at runtime

ODXStudio offers a separate ODX perspective for each ODX category. This focuses the user's efforts on the specific category being edited. In addition, different process perspectives may be shown for each category. In these perspectives, for example, it is possible to enforce conformance to authoring guidelines right during input. An integrated roles concept makes it possible to preconfigure the visibility of individual perspectives for specific user groups.

#### Editions:

- > Pro Edition: Full functionality
- > ViewC Edition: Display of ODX data (also in the process perspectives)

Load and save times, as well as the response behavior of authoring tools are an important aspect of a tool's practical usability: ODXStudio loads for instance 280MB of ODX data in 32 seconds (T7500 CPU with 2.1 GHz and 2GB RAM).

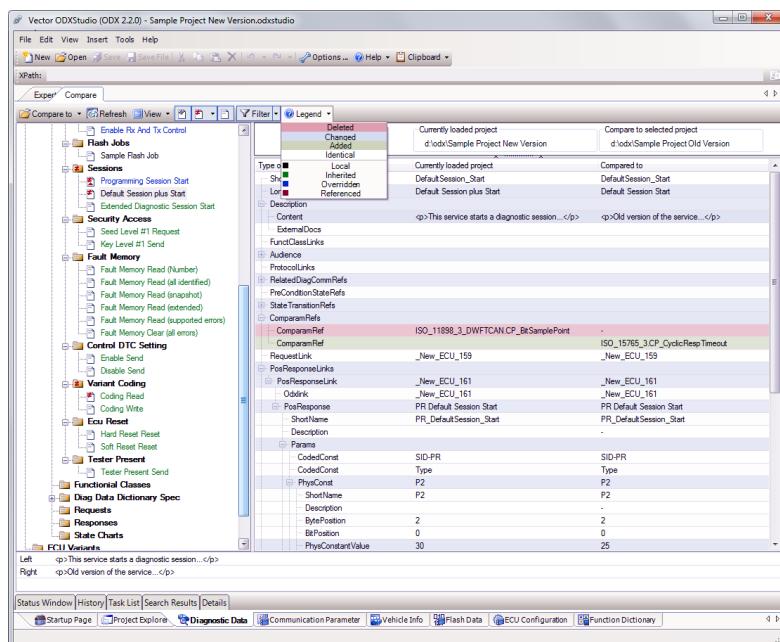
#### More Functions

- > Support of ODX 2.2.0 and ODX 2.0.1 each using the native format as internal data format
- > Load and save ODX files and PDX archives
- > Global multi-stage "Undo" and "Redo"
- > ODXPath Navigation: Easy and direct navigation to any ODX element with XPath
- > Browser History: Quick navigation within the project
- > Layer and container-based tree views for ODX-D

- > Configurable list views: Show or hide columns, configurable sequence
- > Task list: Documentation and tracking of tasks
- > Convenient term search function
- > Filter functions in lists and tree views
- > Powerful Compare View: Comparison of complete projects or PDX archives in an overview on file level as well as in detail on data model level
- > Documented plug-in APIs
- > Actions for automating and for pre-/post-processing
- > Report generation in HTML
- > Import of CANdelaStudio CDD data

#### System Requirements

	Windows XP (32 bit)	Windows Vista (32 bit)
		Windows 7 (32/64 bit)
Processor	PC with min. 1,8 GHz	PC with min. 2 GHz
RAM	1GB	2GB



Powerful Compare Viewer

# CANdesc

## Software Component for Diagnostics

Vector's CANdesc (desc = diagnostic embedded software component) enables vehicle and electronic control unit (ECU) manufacturers to implement the diagnostic protocol uniformly across different OEMs and their vehicle lines. CANdesc supports diagnostic communication via CAN, MOST, FlexRay. Any other bus system will be also supported using an optional abstract transport layer interface.

CANdesc can be ordered seamlessly integrated in the CANbedded world and also for stand-alone usage in a supplier-specific environment. To guarantee efficiency for different OEMs and vehicles, CANdesc is fully generated code. The generation process is based on the project-specific CANdela data base.

To ease and speed up the usage, a diagnostic code template is generated which fully implements all interfaces. Using this template a basically working diagnostic implementation is immediately available.

### Features and Advantages

#### Vehicle Manufacturers:

CANdesc offers assurance to the vehicle manufacturer that the diagnostic specification is implemented uniformly in all ECUs of a vehicle model.

Using CANdesc and CANdelaStudio, the comprehensive CANdela approach to diagnostics (see also product description for CANdela – CANdelaStudio), provides the greatest benefit.

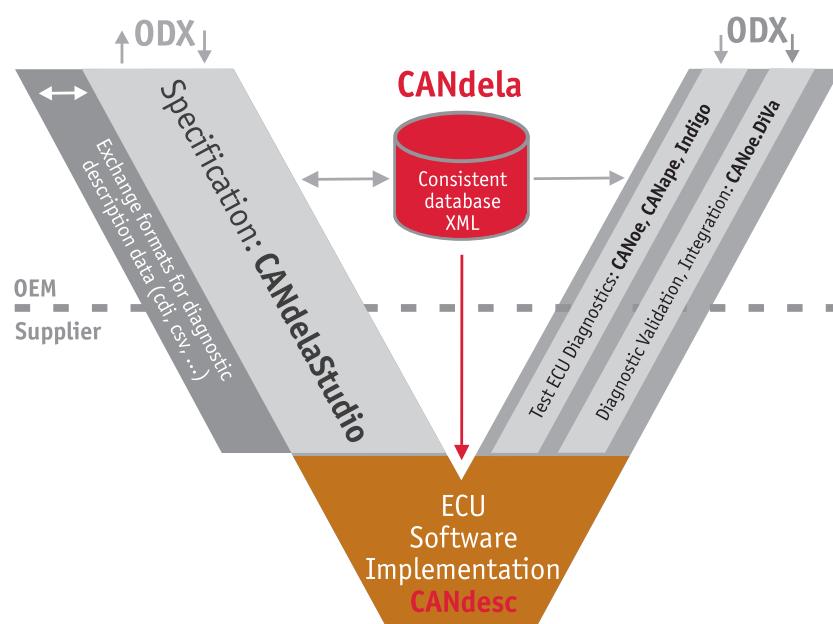
The diagnostic functionalities and diagnostic data for an ECU are described in the specification phase using CANdelaStudio and stored in a consistent database (CANdela). This ECU diagnostic specification can directly be used to generate the CANdesc code. Changes in this specification during the vehicle development can therefore be cost-efficiently updated in the ECU by a simple regeneration. This guarantees that the specification and the implementation always fit together.

The vehicle and ECU manufacturer can use the CANdela data base also for parameterization of test systems. Thus a continuous process chain beginning with the specification, continuing with implementation and finishing with integration and functional testing can be offered.

#### ECU Manufacturers:

CANdesc covers the vehicle manufacturer diagnostic protocol and transported data completely. This assures that

- > timing and content requirements of the diagnostic protocol are implemented correctly.
- > simplification of a product line concept in the diagnostic area in spite of multiple ECU variants and vehicle manufacturers is possible
- > development costs for implementation and testing effort are reduced
- > Predictability of the correct and complete diagnostic implementation is significantly increased.



**ECU diagnostic software component (CANdesc) in the V-Model diagnostic development process**

### Example of Code Size

Microprocessor: Motorola HC12, MC9S12DP256; Cosmic-Compiler 4.5 with an implementation of 10 diagnostic services and 30 sub functions with the data packets:

Code size: approx. 5.5 kB; tables and constants: approx. 700 bytes;

RAM: approx. 70 bytes plus bytes for the diagnostic buffer.

For average sized applications with approx. 120 sub functions the code size increases to approx. 9 kB.

### Functions

All vehicle manufacturer specific diagnostic features are implemented and encapsulated in CANdesc. This gives the ECU application a clear signal interface. Reutilization of the ECU application is thereby supported.

CANdesc covers

- > support of the total manufacturer-specific diagnostic protocol with all functional and timing constraints
- > full implementation of communication related diagnostic services (e.g. \$28 CommunicationControl)
- > implementation of "data unit" handling (\$2A, \$2C) according to the OEM specification
- > filtering of diagnostic requests according to service, session, service instance, format, session of service instance and security
- > correct responses to diagnostic requests
- > state management (depending on the CANdela database e.g. session and security handling)
- > generation of a diagnostic data buffer and preservation of data consistency between application and diagnostic request (functional, physical and multiple simultaneous)
- > a DAP (Diagnostic Adaptation Protocol) module for diagnostics of MOST ECUs (on request)

### Application Areas

- > ECUs for passenger cars and commercial vehicles
- > CANdesc can be used on CAN, MOST, FlexRay and any other communication system
- > Seamlessly embedded in the CANbedded world but can also be used as a stand-alone component.

### Product Components

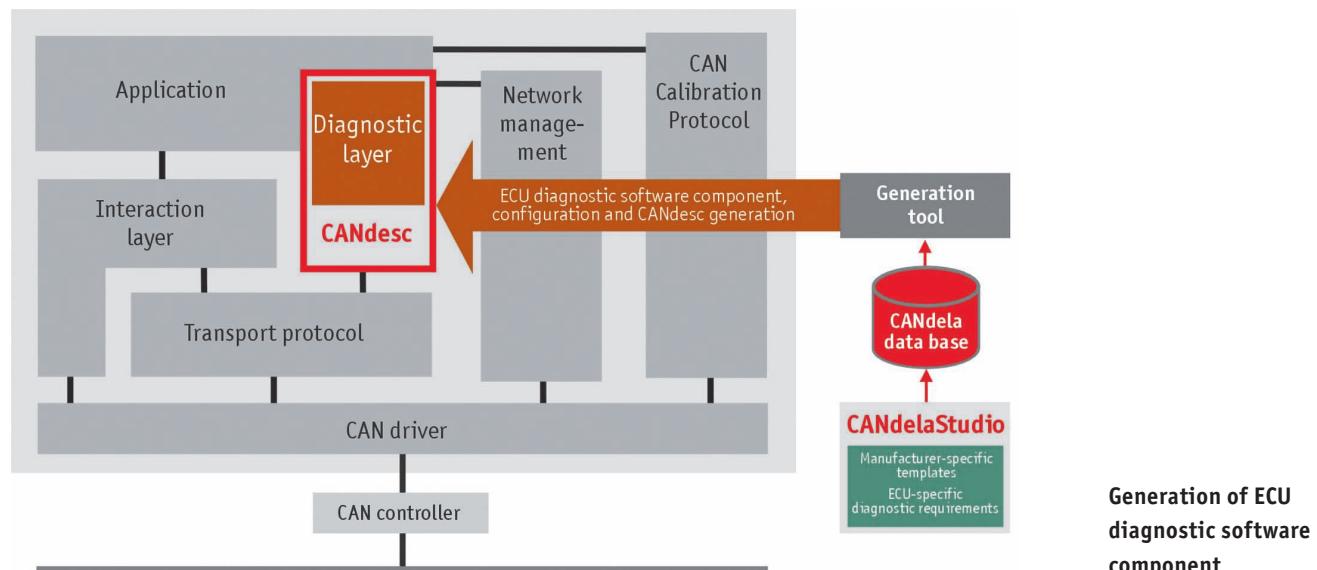
- > Executable Windows program (generation tool) with the CANdesc Option
- > Documentation/User Manual

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### Supplemental Services

Vector offers the following types of project services:

- > Adaptation of the application to CANdesc
- > Implementation of fault memory concepts
- > Process consultation services in the diagnostic area
- > Testing of ECU diagnostic implementation



# MICROSAR DIAG

AUTOSAR Basic Software Modules for the UDS Protocol

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## Summary of Advantages

- > Customized solutions available for many automotive OEMs
- > Vector's numerous years of experience in the diagnostics field
- > Contains all necessary extensions for use in production
- > Supports OBDII for DCM per AUTOSAR 3.1
- > Also supports WWH-OBD (Euro VI)
- > Variants handling already included for diagnostic configuration
- > Configurable via ODX format with CANdelaStudio
- > Application code templates are generated for the ECU software

MICROSAR DIAG contains the AUTOSAR-compatible implementation of UDS protocol ISO 14229-1:2006 and is ideal as diagnostic software for your vehicle project. MICROSAR DIAG performs a number of tasks. Offering:

- > OEM-specific implementation of the diagnostic protocol for communication between tester and ECU
  - > Fault memory and management
  - > Disabling of certain functionalities based on active fault entries
- Combined with CANdelaStudio – the widely used specification tool for creating diagnostic data – you get a complete diagnostic solution from a single source.

## Application Areas

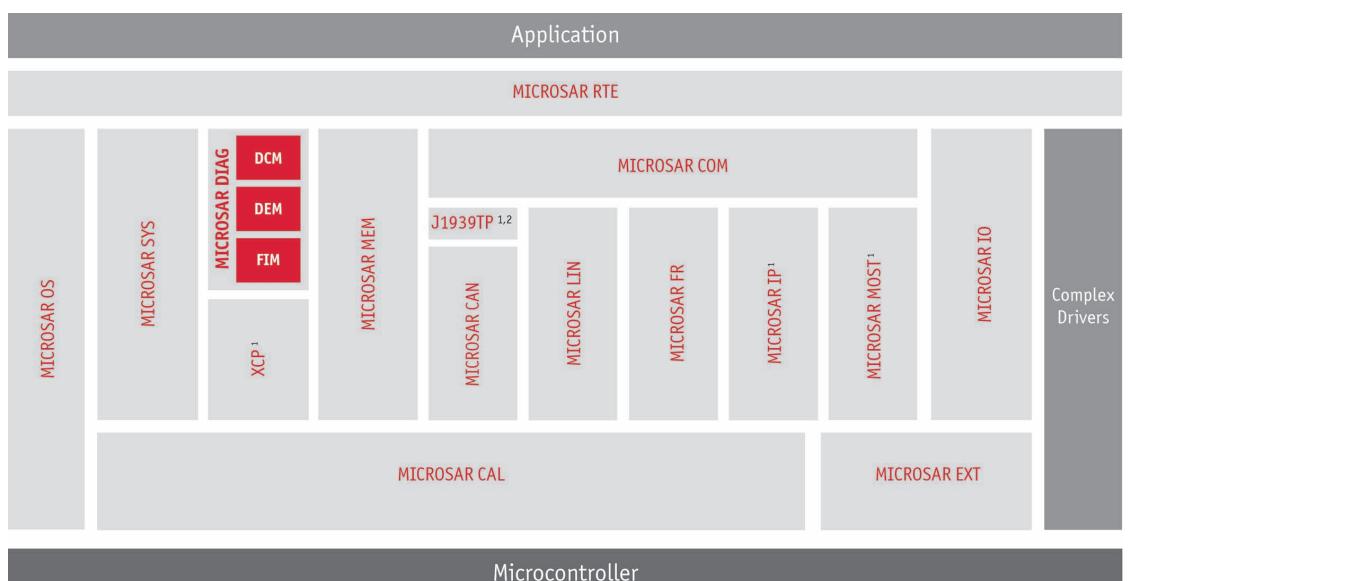
Diagnostics are not completely specified in AUTOSAR. Beyond the standard each OEM has their own specifications. For this reason Vector offers MICROSAR DIAG with OEM specific extensions. It is suited for the series use and is available already for many OEMs. For ECUs without diagnostics specification an OEM independent package of MICROSAR DIAG is available.

MICROSAR DIAG can be used for current and future legal requirements such as EURO VI. The support of OBDII (ISO 15031/SAE J1979) as well as WWH-OBD (ISO27145) is available as an option.

If your ECU requires diagnostic configuration variants, MICROSAR DIAG offers a powerful solution. With GENy you can define up to 31 different parameter sets and save them resource-optimized in the ECU. This avoids redundancies in the ECU software, because identical interfaces to the same data, services or DTCs are combined in the generated diagnostic code.

## Functions

MICROSAR DIAG contains the three BSW modules DCM, DEM and FIM from the AUTOSAR architecture. Their functions are described in the following sections.



**MICROSAR DIAG  
modules**

**Training**

In the framework of our training program, we offer various training courses and workshops on MICROSAR at our classrooms or at your business site. For more information on individual training events and dates please visit:  
[www.vector-academy.com](http://www.vector-academy.com)

**Contact and Availability**

You will find information on the availability of hardware-specific MICROSAR BSW modules at:

[www.microsar.com/availability/](http://www.microsar.com/availability/)

We would be glad to provide you with information on OEM-specific variants and individual support for your AUTOSAR projects.

Find your contact person at: [www.vector.com/contact](http://www.vector.com/contact)

**Diagnostic Event Manager (DEM) Functions**

According to AUTOSAR, it is the OEM who specifies diagnostic functionality. Only interfaces are defined for the DEM module, so that users can develop their own functional software (SWCs) independent of the use case.

Vector can offer you DEM variants that have been modified for many different OEMs. These variants cover the requirements of the specific carmakers. A generic OEM-independent variant is also available. This version supports the following functions as standard features:

- > Administration of all DTC status bits per the UDS standard
- > Definition of individual snapshot records and extended records
- > Pre-defined extended records (e.g. OccurrenceCounter)
- > Counter and time-based error debounce algorithms
- > Suppression of low-priority errors when memory is full
- > Flexible unlearning (aging) of errors
- > Variants handling for diagnostic configuration
- > Link-time configuration
- > Compressed configuration data to optimize code size

The following AUTOSAR functions are optionally available:

- > Support of combined errors
- > Implementation of additional error debounce algorithms (e.g. frequency-based)
- > WWH-OBD (ISO 27145)
- > Post-build configurability
- > J1939 diagnostic interfaces for DM1–3

**Diagnostic Communication Manager (DCM) Functions**

The DCM contains functions defined in AUTOSAR Release 3.0.

The following functions are optionally available:

- > Support of OBDII (ISO15031) per AUTOSAR 3.1
- > WWH-OBD (ISO 27145)
- > Post-build configuration
- > Support of multiple diagnostic protocols per AUTOSAR

In addition, the DCM contains the following extensions to AUTOSAR as standard features:

- > Inclusion of the most important UDS Services not contained in AUTOSAR 3.0 (In the table below you will find an overall view of all supported UDS services and associated tasks of the application software).
- > OEM-specific extensions (e.g. RoutineControl Service, ECU-PassiveMode)
- > Variants handling for diagnostic configurations
- > Link-time configuration
- > Multiple client support
- > Seamless interaction with the Vector Flash Bootloader
- > Generation of an application code template for the ECU software

Diagnostic Service Name (ISO 14229-1)	Service ID	AUTOSAR Extension	The SCW has to ...
<b>Diagnostic and Communication Management Functional Unit</b>			
DiagnosticSessionControl	10		... grant service execution
ECUReset	11	X	... grant service execution
SecurityAccess	27		... calculate seed/key for each security level
CommunicationControl	28	X	... grant service execution
TesterPresent	3E		-
ControlDTCSetting	85		-
<b>Data Transmission Functional Unit</b>			
ReadDataByIdentifier (RDBI)	22		... handle data acquisition for each DataId
ReadMemoryByAddress	23	X	-
ReadDataByPeriodicIdentifier	2A		- (internal, but data acquisition is done through RDBI)
DynamicallyDefineDataIdentifier	2C		- (internal, but data acquisition is done through RDBI)
WriteDataByIdentifier	2E		... handle data access for each DataId
WriteMemoryByAddress	3D	X	-
<b>Stored Data Transmission Functional Unit</b>			
ReadDTCInformation	19		-
ClearDiagnosticInformation	14		-
<b>Input/Output Control Functional Unit</b>			
InputOutputControlByIdentifier	2F		... control I/O for each DataId
<b>Remote Activation Of Routine Functional Unit</b>			
RoutineControl	31		... start (stop/request result) for each RoutineId

**The DCM module from MICROSAR  
DIAG supports the UDS diagnostic services**

#### Services for Diagnostic Applications:

- > Customer-specific extensions of MICROSAR DIAG
- > Creation of a customer-specific diagnostic application
- > Integration of diagnostics in your ECU software

#### Function Inhibition Manager (FIM) Functions

All functions of AUTOSAR Release 3.x are standard features of the MICROSAR FIM. The following functions are optionally available:

- > Post-build configuration
- > Periodic or event-based evaluation of FIM status to prevent bursts in processor loading
- > Export of an ASAP2 file for read-out of momentary status information over XCP

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#### Configuration and Parameterization

You can adapt BSW modules from MICROSAR DIAG to meet the needs of your application by modifying the configuration. Since diagnostic-specific parameterization of the DCM is limited using the standard AUTOSAR 3.0 exchange file "ECU Configuration Description", the MICROSAR DCM modules are parameterized by a CDD file. You can create them quickly and easily or import them from the most commonly used ODX dialects with the proven "diagnostic authoring tool" CANdelaStudio.

The DEM may be configured via either a CDD file or an "ECU Configuration Description".

#### Scope of Delivery

- > Software modules as a library with C header files, optionally as source code
- > Command line based generator (for Windows NT/2000/XP/Vista/Windows 7)
- > BSW module description
- > DLLs for configuration with GENy
- > Documentation
- > Converters for CANdela diagnostic descriptions

#### The complete AUTOSAR Solution from Vector

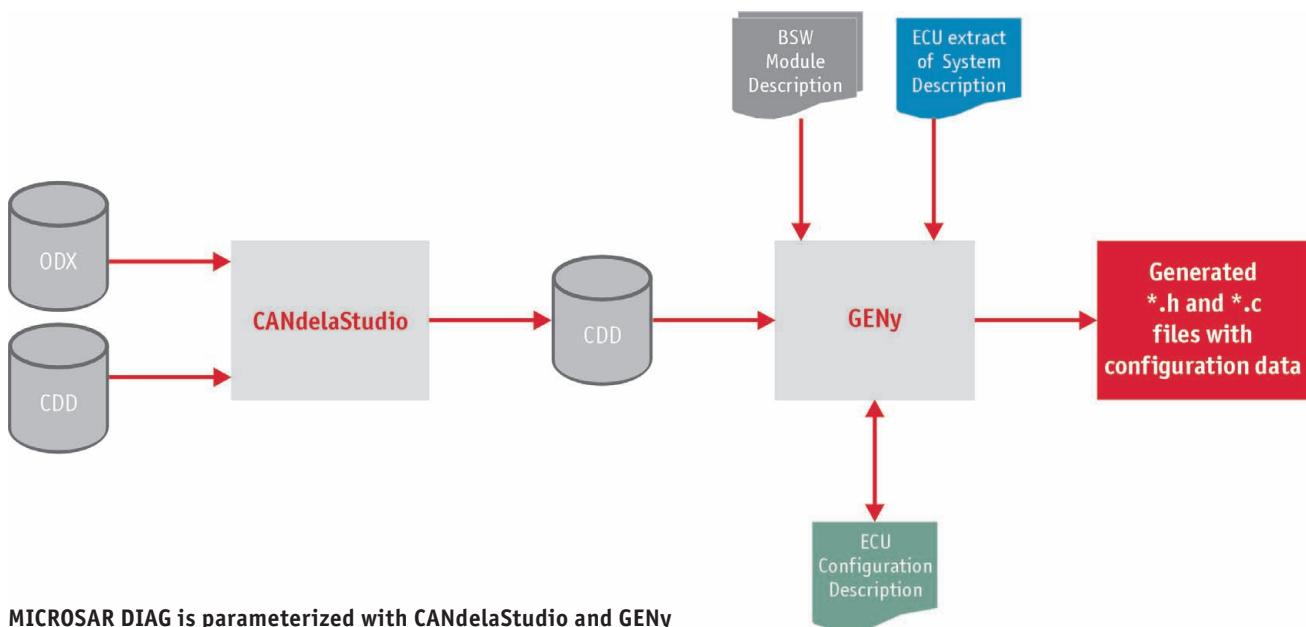
The AUTOSAR solution from Vector consists of the DaVinci tools, MICROSAR-basic software and the MICROSAR RTE. You will find information on properties of BSW modules from the MICROSAR packages and detailed descriptions of functional features of individual DaVinci Tools in the relevant datasheets.

#### Other Relevant Vector Products

You can combine MICROSAR DIAG with the following MICROSAR products to fulfill relevant ISO standards:

- > MICROSAR CAN (ISO 15765-3 or ISO/DIS 14229-3)
- > MICROSAR FR (ISO/DIS 14229-4)
- > MICROSAR IP (ISO/DIS 14229-5)

To parameterize MICROSAR DIAG you will need CANdelaStudio. For more information on this, see the separate datasheet in Vector's diagnostics catalog.





# Indigo 3.0

## In-Vehicle Diagnostics – Quick and Easy

### Properties Overview

- > Easy-to-use diagnostic tester for vehicle-wide diagnostics
- > Use case driven user interface
- > Parameterization via ODX, Ford MDX and CANdela data
- > Simultaneous support of UDS, KWP and GMW3110
- > DoIP support
- > OBD support (OBD II or WWH-OBD)
- > Direct overview of vehicle status and vehicle identification data
- > Automatic configuration
- > Clear separation of Diagnostic and Configuration modes

Indigo is an easy to use diagnostic tester that is largely self-configured and conceals the complexity of the diagnostic protocols. It gives you a quick overview of a vehicle's status and lets you access diagnostic data in an uncomplicated way. Its problem-oriented approach means that use cases are modeled directly. This makes handling of the various diagnostic tasks very convenient, and tasks are easy to perform with a minimum number of user interactions.

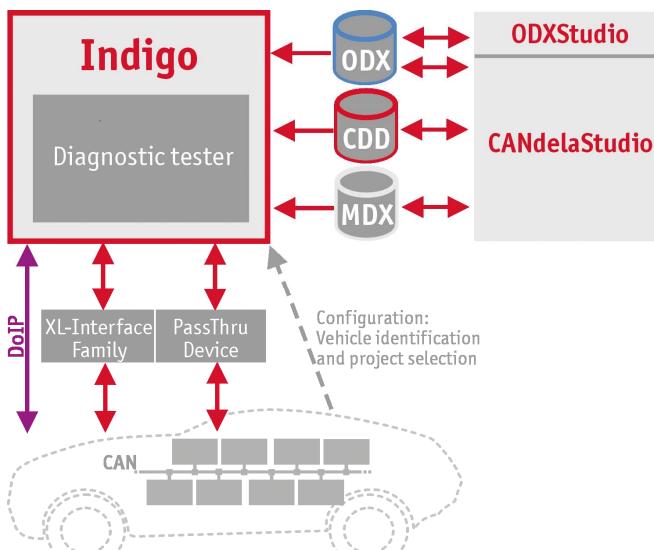
### Application Areas

Indigo was designed for applying diagnostics in the development of ECUs and their integration in the vehicle, without requiring detailed diagnostic knowledge by users.

Indigo guides you to a solution for your task: beginning with the various vehicle views, and progressing to detailed views, it lets you work toward a solution quickly. Indigo can be operated with very few user interactions. This makes it especially well suited to use during test drives. Its clear distinction between configuration mode and diagnostic mode ensures that the configured project and settings are not changed inadvertently. Moreover, the reduced number of controls in diagnostic mode simplifies use of the tester considerably. Later analysis of the data is especially important in the case of test drives. This is accomplished by saving the acquired data in an organized form using reports that can be analyzed at a later time or archived for documentation purposes.

### Functions

- > Vehicle DTC Auditor: graphically displays ECUs and their fault memories.
- > ECU DTC Auditor: graphically displays supported and identified DTCs of an individual ECU.
- > ECU DTC Browser: displays the identified DTCs with their status flags, environment data and error conditions.
- > Vehicle Identification Browser: displays identification data of multiple ECUs in summary form.
- > Parameterizer: used to read out and modify ECU data vehicle-wide. Display of selected data.
- > Live Data: used to read out data vehicle-wide – updated periodically. Displays data configured by the user.



Parameterization and configuration of Indigo as diagnostic tester and interaction with the vehicle

### New Functions of Version 3.0

#### OBD II / WWH-OBD

- > New Use Case Windows for reading OBD data. Transparently access the data via ODB II or WWH-OBD protocol.

#### MDX Diagnostic Data Format

- > In addition to ODX and CANdela data, Indigo can now also use the Ford MDX data format for parameterization.

#### Scripting extension

- > With Indigo's scripting support recurring tasks can be automated. The user can now also interactively make decisions and enter values for being processed in the script.
- > Script Recording and the new Scripting Toolbox make it easy to create scripts, even for users without programming knowledge.

- > Diagnostic Console: offers direct access to all diagnostic services for manual execution.
- > Trace: displays sent and received diagnostic data (including data interpretation) – especially focused on diagnostics.
- > Variant Coding: vehicle-wide variant coding, which supports the backup and restoring of coding data.
- > Manual and automatic variant selection.
- > Automated TesterPresent handling.
- > ECU Control: controls the states of the ECUs – ECU-specific or vehicle-wide – e.g. diagnostic session and security access.
- > Vehicle Explorer: gathers general information about the vehicle (Identification Data and Fault Memory) without special knowledge about the installed ECUs. Includes an automatic ECU search mechanism.
- > Vector Diagnostic Scripting Library: scripting support to automate recurring tasks – scripts can be reused in all Vector diagnostic testers (e.g. CANoe, CANape).
- > Use of diagnostics on test drives: key tasks can be executed with a minimum of interaction. Keyboard shortcuts are provided for the most important functions. The displayed font size can be adapted individually on different requirements.
- > Intuitive use of the tester by clear separation between Configuration mode and Diagnostic mode and user interface that is strongly use case driven.

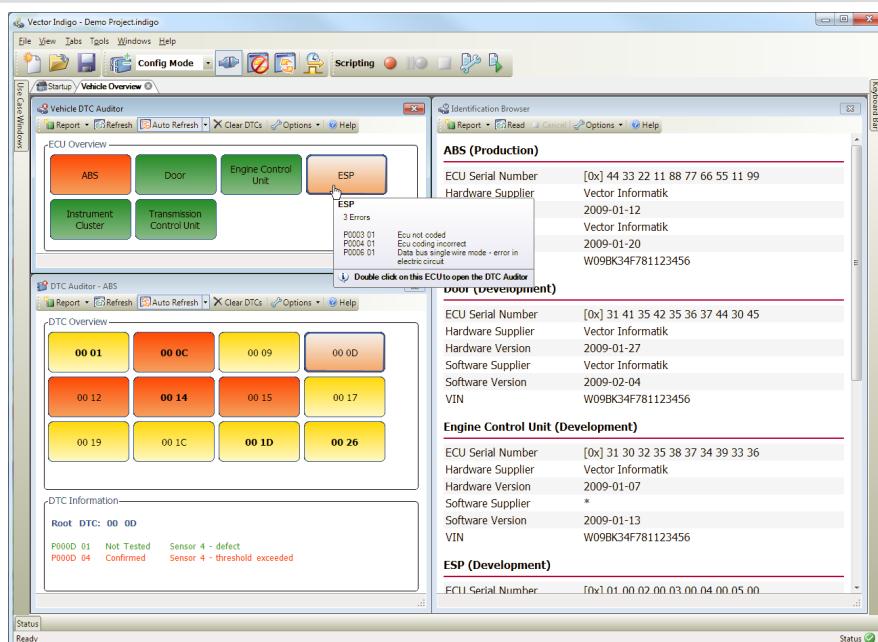
- > Focus on vehicle-wide diagnostics: Vehicle-based views enable a quick overview of vehicle status and access to diagnostic data vehicle-wide.
- > Support of ODX (2.0.1, 2.2.0), Ford MDX and CANdela data, including simultaneously within a project.
- > Support of UDS, KWP and GMW3110, including simultaneously within a project.
- > Support of DoIP according to ISO-CD 13400
- > OBD II/WWH-OBD: Use Case Window for reading out OBD data.
- > Detailed report functionality for later data analysis, configurable via XML-based format templates.
- > Custom design of reports using XSLT stylesheets.

### Supported Hardware

Vector interface hardware (e.g. CANcardXL, CANcardXLe, CANcaseXL, VN16xx family)

### System Requirements

	Windows XP (32 bit)	Windows Vista (32 bit)
		Windows 7 (32/64 bit)
Processor	PC with min. 1,6 GHz	PC with min. 2,0 GHz
RAM	1GB	2GB



User interface: Well-organized display of vehicle status information

# CANoe.DiVa 2.6

## Automated Testing of Diagnostic Protocol Implementation and Integration in ECUs

### Properties Overview

- > Automatic generation of test cases and their specifications with comprehensive test coverage
- > Test cases are executed based on ECU diagnostic descriptions in ODX or CANdela format, and a test report is generated
- > Support of different diagnostic standards (UDS, KWP2000, GMW3110, OBD)
- > Scope of testing is easy to configure
- > Fully integrated in the CANdela product family
- > These advantages bring time and cost savings with a simultaneous increase in the quality of the ECU diagnostic software.

DiVa (Diagnostic Integration and Validation Assistant) extends CANoe to a tool for automatically generating and executing of reproducible test cases for the implementation and integration of the diagnostic protocol.

### Application Areas

On the supplier side comprehensive tests accompany a development and numerous regression and release tests are required. The automotive OEM also needs tests for integration and release. CANoe.DiVa was designed for use in the following areas at vehicle OEMs and suppliers:

- > Functional development and software development
- > Test laboratories and vehicle integration

On the supplier side CANoe.DiVa supports the diagnostic implementation of the ECU. The developer tests already during his/her ongoing development and perform finally a full range of regression tests. These regression tests can also be utilized as part of a release procedure for the diagnostic portion of an ECU.

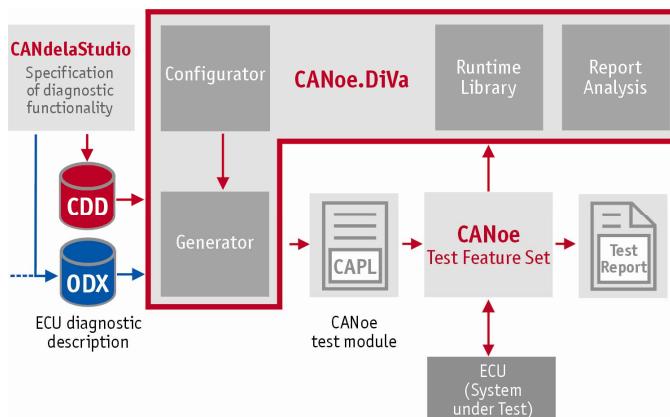
The automotive OEM uses the CAN.DiVa in automated incoming goods testing when an ECU sample is submitted. Integration tests on a development test bench or in the vehicle are also supported. The OEM can use the CANoe.DiVa to easily create test specifications based on quality requirements or to generate test documentation. OEMs and suppliers can expand the scope of test by adding new test patterns or tailor existing test patterns for their special needs.

### Functions

The CANoe.DiVa is a configuration tool with its own user interface, a test case generator and a runtime library for expanding CANoe's test functionality. DiVa utilizes ODX or CANdela ECU diagnostic descriptions to generate the test cases automatically.

If desired the configuration tool can be used to generate a test specification containing many details on several test contents and test sequencing.

DiVa generates automatically the test environment that can be loaded in CANoe. During execution CANoe documents the test results in a clear and concise report (CANoe Test Report).



**Configuration, generation and execution of test cases based on diagnostic descriptions in the ODX or CANdela format**

### New Functions of Version 2.6

#### Test Depth

- > Automatic comparison of diagnostic parameters with values that are delivered via CANoe environment variables, system variables or CCP/XCP.

#### Requirement Mapping

- > Documentation of ISO14229 (UDS) requirements in CANoe.DiVa tests.

#### Automatic Setting of Fault Memory Entries

- > Support of OBD fault memory tests
- > Support of VT2516 digital module (VT-System)

#### Test Analysis

- > Generating of a clear test summary based on the comments and error classifications

## Training

As part of our training program, we offer a workshop for CANoe.DiVa at our classrooms.

For more information and the dates of our training courses, please visit our homepage on the Internet at: [www.vector-academy.com](http://www.vector-academy.com)

### Functions in Detail:

- > Automatic generation of a CANoe test module from a diagnostic description in ODX (2.0.1, 2.2.0) or CANdela format
- > Test of functional addressing on a single ECU.
- > Selectable test focus (What should be tested?)
  - > Timing of diagnostic protocol
  - > Format of diagnostic protocol
  - > Data contents
  - > Diagnostic interface to the ECU application
  - > Sessions and security levels
- > Configurable scope of testing:
  - > Full test: Every service is executed with every test case (Good and Bad cases) – e.g. for regression tests.
  - > Each service once: Execution of a selection of test cases, whereby each service is executed at least once.
  - > Quick test: Testing of all services with all Good cases and testing of representative services with Bad cases.
- > Determined manipulation of the diagnostic communication on transport protocol level at tester side.
- > Modification of test cases to be generated (e.g. to exclude critical services and thereby avoid undesirable changes or damage to the controlled system)
- > Documentation of test cases by generation of a clearly organized and detailed test specification.
- > Scanning of Service ID and Sub-Function ID areas. Undocumented services will be reported.

### > Generation of a test report by CANoe

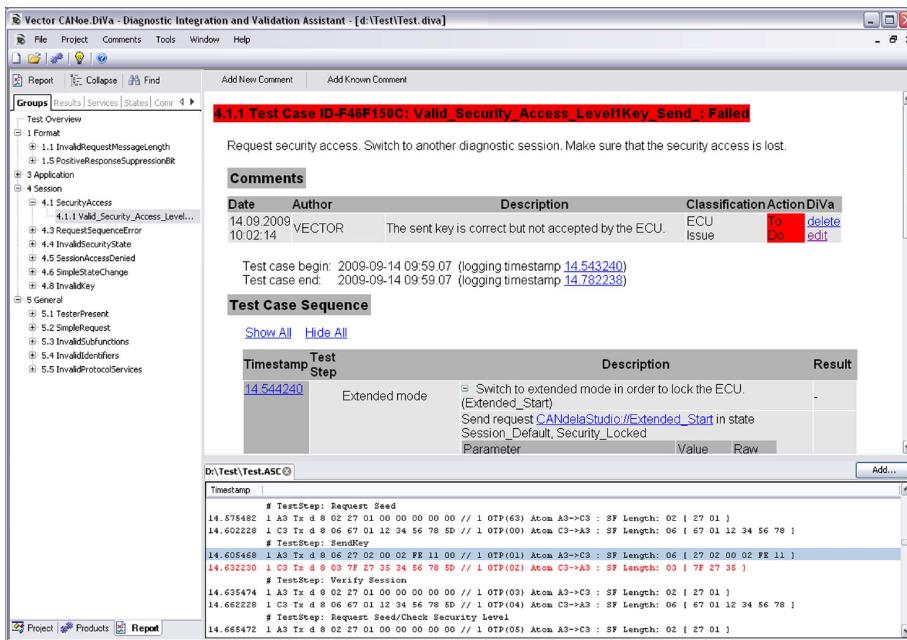
- > Comfortable test report evaluation for efficient error detection, validation and elimination, e.g. commenting of test cases, classification of test results, comparing of different test runs, creation of report extracts (Mini Reports)
- > Automatic setting and verifying of fault memory entries (DTC) with the use of Vector Test System (VT System) or the CANoe Interaction Layer.

### Supported diagnostic standards and protocols:

- > ISO 15765 Diagnostics on CAN
- > ISO 14229 Unified Diagnostic Services on CAN (UDS)
- > ISO 14230 (KWP2000)
- > ISO 15031 OBD (J1979)
- > GMW 3110 (v1.5, v1.6)
- > Specific test support for various OEMs

### Requirements

CANoe.DiVa 2.6 will run on the CANoe variants Full and Run. Basic requirement is an installed CANoe license, Version 7.6 or higher. To generate tests a description file in ODX or CANdela format is required. This description files also provide the added value of immediate parameterization of a diagnostic tester in CANoe. Thus it is possible to communicate with the ECU directly via the diagnostic console or use further parts of the “Diagnostic Feature Set” in CANoe.



### Supported Test Analysis

# CANdelaFlash 2.1

## Management of Flash Data and Generation of ODX Flash Containers for an Assured Process

### Properties Overview

- > Import and Export of ODX Flash Containers
- > Modularization of flash data
- > Management of software revision levels and part numbers
- > Administration of data for Flash ROMs
- > Reuse of diagnostic descriptions from CANdelaStudio
- > Can be used by both vehicle manufacturers and suppliers
- > Comfortable user interface

### Application Areas

Today the development process for an ECU is very complex. While previously just a few ECUs were “flashable” in the vehicle, in future all ECUs will have a flash capability.

The large number of ECUs that are networked together in the vehicle, and their growing complexity and amount of programmable data will require management of the flash data for an assured process. In the future the flashing of ECU sub-functionalities will also come to the forefront.

CANdelaFlash is a software tool designed to manage these requirements.

CANdelaFlash should be used wherever process-assured flashing of ECU functionalities (full or partial) is required. It can be implemented in both ECU development at a supplier and in test vehicle or preproduction development at the vehicle OEM.

### Functions

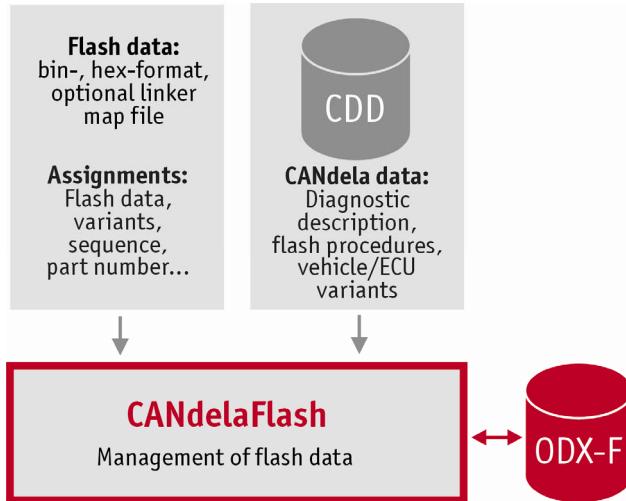
CANdelaFlash supports the import and export to the standardized ODX format completely. ODX Flash Containers can thereby be prepared at an early stage in the development process. These ODX Flash Containers have become a standard for modern flash tools used in development and production.

CANdelaFlash fits seamlessly into existing tool chains. In particular it supports the development process with other Vector products such as CANdelaStudio. Another advantage of CANdelaFlash is that it supports modularization of flash data, e.g. post-flashing of individual ECU functionalities (gear shift programs, idle-speed control, country variants, etc.).

CANdelaFlash offers a simple and easy-to-use interface. For example, the organization of a CANdelaFlash document is shown in a tree view, and most entries are made via easy-to-use tables with intuitive input masks.

### Functions at a Glance:

- > Assignment of software revision levels and part numbers
- > Assignment of the various software revision levels to specific ECUs in the vehicle
- > Identification of valid target ECUs. Checking whether the session is valid for the ECU that has to be programmed.
- > User-friendly acquisition and management of binary and hexadecimal data for Flash ROMs (e.g. import of source files in “Intel Hex” and “Motorola S-Record” formats)



### New Functions of Version 2.1

#### Data Extraction Plugin Interface

- > Interface for automatic extraction of data out of hex files at import time or interactively using the menu via OEM specific plug-in

#### Base Session

- > Optional definition of session defaults for a project

#### Session Wizard

- > Simple creation of flash sessions through configurable Session Wizard
- > Mask out unused or read only elements in the user interface

### Process-assured generation of ODX Flash Container

- > Use of templates for new CANdelaFlash documents
- > Creation and editing of sessions and data blocks
- > User-friendly editing of the segments of a data block including extensive consistency checks
- > Grouping of sessions into so-called Flash Classes
- > Cut, copy, and paste functions for objects of the CANdelaFlash document
- > Searching of the CANdelaFlash database for objects by their names
- > Import and Export of the CANdelaFlash document into ODX 2.0 and ODX 2.1 data format
- > Import/export of embedded flash data from/to ODX
- > Creation and editing by authors, revision entries, and brief descriptions
- > Interfacing to external tools by user-defined actions
- > Plug-In interface for linking customer-specific security DLLs for CRC and signature calculation
- > Support of customized user settings
- > Reuse of diagnostic data (from CANdelaStudio)
- > Detailed recording of program sequences (Output Window)
- > Read and write of PDX archives (Packaged ODX)
- > Expanded format checking in attribute masks via specification of regular expressions in the template

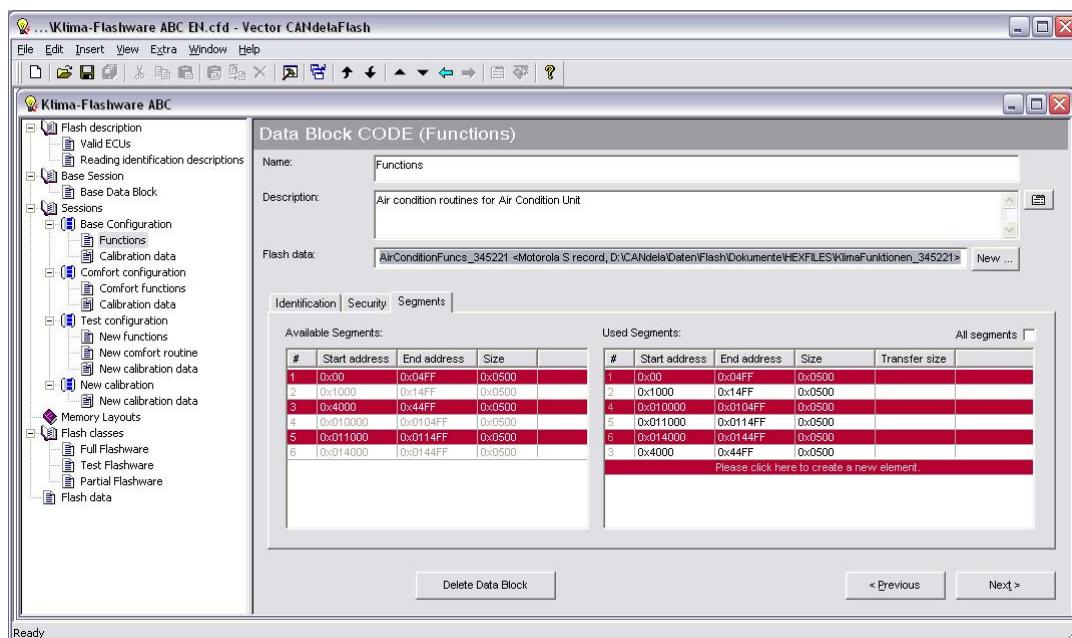
### Structure of the CANdelaFlash Data

The management and the acquisition of flash data are done comfortably via the user interface in the following structure:

- > Flash description: Reference to multiple ECUs (CANdelaStudio ECU-specific descriptions; \*.cdd files)
- > Base Session: Optional definition of session defaults for a project
- > Sessions: Session with list of data blocks. This is a list of jobs for upload/ download (initial programming, reprogramming, partial reprogramming). The data blocks reference the flash data (reusable in different sessions) and they specify the segments of flash data for upload/ download.
- > Memory layouts: Description of the memory layouts of several ECUs
- > Flash classes: User-defined organization of sessions in any desired number of flash classes
- > Flash data: Database of reusable flash data

### System Requirements

	Windows XP (32 bit)	Windows Vista (32 bit)
		Windows 7 (32/64 bit)
Processor	PC with min. 1,8 GHz	PC with min. 2 GHz
RAM	1GB	2GB



**Flash data management  
with CANdelaFlash: Structure of the CANdelaFlash data**

# vFlash 2.1

Flashing of ECUs easily and quickly - over CAN, FlexRay or Ethernet (DoIP)

## Overview of Advantages

- > Easiest reprogramming of ECUs via CAN, FlexRay or Ethernet (DoIP)
- > Simple exchange of pre-configured Flash projects - all relevant data is packed in one file
- > Flash projects are easy to create using templates
- > Supports different protocols and flash sequences (based on the specifications of many different automotive OEMs)
- > Direct "native" programming of data in Intel hex, Motorola-S and binary format
- > Flash programming based on ODX-F
- > Flashing of compressed data
- > Supports interactive flashing (GUI) as well as batch processing (C API)
- > Interacts perfectly with Vector Flash Bootloader

vFlash is a very easy-to-use tool for programming one or more ECUs. Because of its flexible approach, it can support the different flash specifications of a wide variety of automotive OEMs without requiring modifications by the end user.

## Application Areas

vFlash is designed for all users at automotive OEMs and suppliers whose tasks include (re-)programming of ECUs. It supports ECU programming over CAN and over Ethernet (DoIP), either individually or in an ECU network group. vFlash lets users flash in

the laboratory, at programming stations, at a laboratory vehicle or in the vehicle.

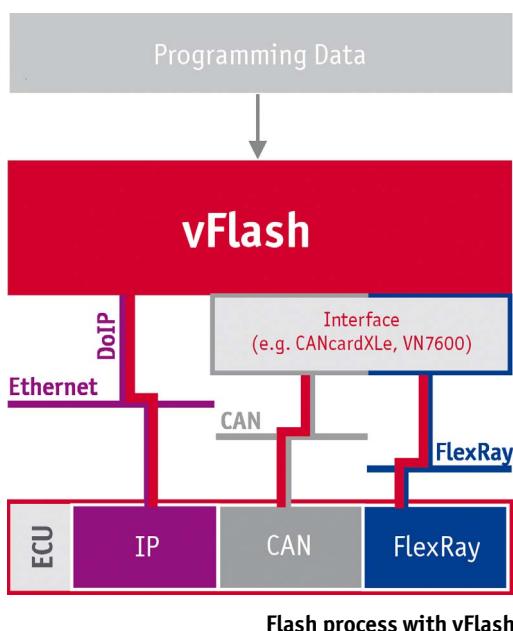
vFlash is very simple and does not require any expert knowledge to use – the user interface is tailored for flashing tasks. vFlash may be used either interactively or by remote control. In the interactive mode, the user loads a project and starts programming by the push of a button. In remote control mode, vFlash can be executed from the command line or controlled via a C programming interface. vFlash is designed to process very large quantities of data. You can transmit 4GB or more – or segments of very large binary data sets – quite easily. Last but not least, the vFlash tool's very fast transmission rate significantly reduces flash times in the case of large amounts of data.

## Functions

vFlash utilizes flash projects to save and exchange the configuration to program individual ECUs. Flash projects contain all relevant settings and reference the data files to be programmed.

If the focus is on flexibility in changing the flash data, the referenced data files can simply be exchanged in background, e.g. as part of an automated software build process. In this case, the flash project remains unchanged.

If the focus is on a process-safe exchanging of flash configurations, the flash projects may be exchanged in the Pack&Go format. In this case, all relevant settings together with the data files are packed in an archive file.



## New Functions of Version 2.0 and 2.1 – Benefits at a Glance

### Bus System FlexRay (Version 2.0)

- > ECU reprogramming now also via FlexRay

### Flash Attributes (Version 2.0)

- > vFlash allows now extending the user interface with template specific attributes. The user can enter for these attributes values, which can be passed to the flash script for further processing.

### OEM-specific Extentions (Version 2.0 and 2.1)

- > Ford: specific container format (vbf) and flash process
- > FIAT: specific data format (idx, prm) and flash process
- > GM: specific data format (gbf) and flash process

The user creates flash projects based on flash templates. A flash template defines the diagnostic services and presettings that are relevant to the flash process for a group of ECUs of a specific automotive OEM (e.g. for a vehicle platform). In practice, the flash specifications of automotive OEMs differ enormously, not least of all due to the differences in diagnostic protocols and in-house flash standards. The advantage of flash templates concept is that the differences described above remain largely hidden from the user.

The reference flash process from Vector is also available as source code (C#). This lets end users modify the flash sequence themselves as necessary. All that is needed for this is Microsoft Visual Studio for C#; the Express Edition can be obtained from Microsoft free-of-charge.

#### Transfer rate

Programming of 100kByte data in 4.1s (24.4kByte/s) into an idealized reference ECU over CAN at 500kBit/s with STmin = 0, BS = 0

#### Supported Hardware

- > CAN: e.g. CANcardXL, CANcardXLe, VN16xx family
- > CAN/FlexRay: VN7600; FlexRay: VN3600

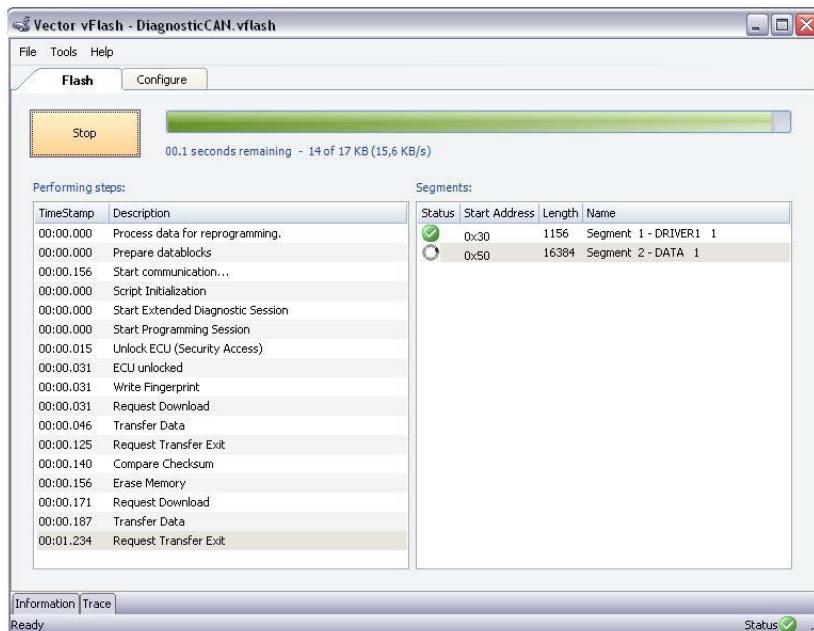
#### OEM-specific flash templates

Vector offers prepared flash templates for a number of different automotive OEMs.

Please contact us at: [www.vector.com/contact](http://www.vector.com/contact)

#### System Requirements

	Windows XP (32 bit)	Windows Vista (32 bit) Windows 7 (32/64 bit)
Processor	PC with min. 1.6 GHz	PC with min. 1.6 GHz
RAM	1GB	2GB



vFlash User Interface

# PassThru XL Library

Use of Vector XL-Hardware Interfaces for Applications that are based on SAE J2534

2/22

## Properties Overview

- > Standardized communication driver for the Vector XL hardware interfaces
- > ISO transport protocol implementation
- > OEM-specific applications based on J2534 can be operated via Vector XL-Hardware interfaces
- > J2534 applications can be operated simultaneously with various Vector tools, such as CANoe or CANape via a Vector XL-Hardware interface.
- > Uniform programming interface with reasonable number of functions that conceals the hardware specifics and communication protocols

## Application Areas

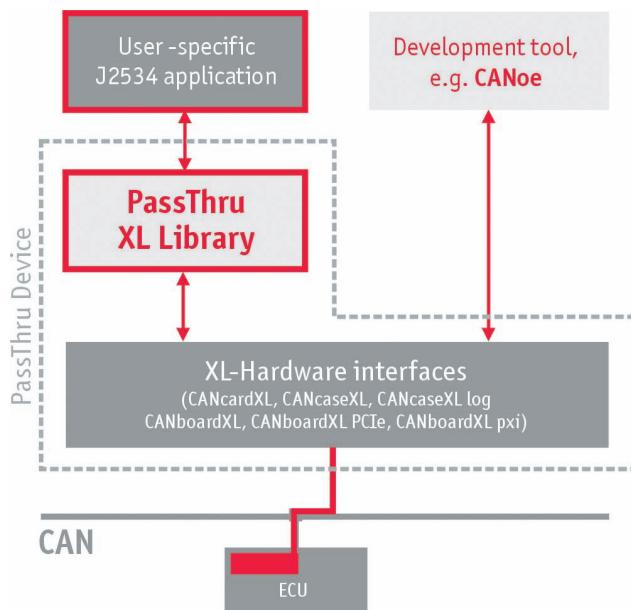
In the field of vehicle electronics development and vehicle diagnostics there are many OEM-specific applications that communicate with ECUs. If these applications are based on proprietary communication solutions, exchanges between communication components involve considerable effort.

A modular and reusable solution can help here to save on costs and development effort. The SAE J2534 PassThru standard defines a common communication driver that can be used for ECU diagnostics and ECU reprogramming.

If a diagnostic or reprogramming application is built upon a J2534 programming interface, then it is possible to use PassThru hardware devices from different manufacturers. This allows to exchange the communication layer without modifying the application.

For these reasons, interest is growing in ECU diagnostics and reprogramming via a PassThru interface in developing and servicing modern vehicles. For vehicles that are sold in the US market, legal requirements have even been in place since 2004 requiring that OEMs provide a PassThru-based application for reprogramming ECUs.

Combined with the Vector XL interface hardware, the Vector PassThru XL Library provides a J2534 compliant PassThru Interface/Device. Simultaneously, a Vector tool such as CANoe or CANape can be operated over the same hardware interface. Consequently, you only need one hardware interface to operate both your J2534 application and various Vector development tools. This makes the Vector PassThru XL Library a cost-effective solution, especially for OEMs and suppliers who already use a Vector development tool with a XL hardware interface and also utilize or develop J2534-based test and flash applications.



Application architecture  
utilizing the PassThru XL Library

## Functions

The PassThru XL Library supports the J2534-1 standard and the most important GM-specific functions of the J2534-2 standard.

### Supported protocols:

- > **ISO15765**: is fully supported
- > **SW\_ISO15765\_PS**: is supported (no pin switching)
- > **ISO15765\_PS**: is supported (no pin switching)
- > **CAN**: is fully supported
- > **SW\_CAN\_PS**: is supported (no pin switching)
- > **CAN\_PS**: is supported (no pin switching)

### Supported API functions:

- > PassThruOpen
- > PassThruClose
- > PassThruConnect
- > PassThruDisconnect
- > PassThruReadMsgs
- > PassThruWriteMsgs
- > PassThruStartPeriodicMsg
- > PassThruStopPeriodicMsg
- > PassThruStartMsgFilter
- > PassThruStopMsgFilter
- > PassThruReadVersion
- > PassThruGetLastError
- > PassThruIoctl

## Supported Hardware:

The Vector PassThru Library can be used with the following XL Hardware interfaces:

- > CANcardXL (PCMCIA)
- > CANcardXLe (ExpressCard)
- > CANcaseXL (USB)
- > CANcaseXL log (USB + logging)
- > CANboardXL (PCI)
- > CANboardXL PCIe (PCIe)
- > CANboardXL pxi (pxi)

# RP1210 API, Version 2.1

Running Applications on CAN, SAE J1939 and SAE J1708/J1587 Networks

The RP1210 API is an open interface between Windows-based applications and in-vehicle communication networks. This interface offers functionality for bus systems as well as for higher layer protocols. Its areas of use are very diverse and depend on the implemented application. The RP1210 specification was developed as a "Recommended Engineering and Maintenance Practice" by the Technology & Maintenance Council (TMC) of the American Trucking Association (ATA). Especially in the USA, voluntary conformance to this recommended practice has gained the support of commercial trucking companies, OEMs and suppliers.

## Application Areas

Typical RP1210 applications involve diagnostic tools in the heavy-duty vehicle field, such as those used in the service area. Vector's RP1210 API can be used to operate these tools during development, including with Vector interface hardware.

### Special Functions

- > Comfortable channel mapping enabled by full integration in the configuration dialog of the Vector hardware interfaces
- > Multiple clients per channel
- > Full multithreading capability including different optional wait modes, e.g. waiting for tx indications of messages or completion of higher layer protocol transactions.
- > Compatibility to RP1210-0, RP1210-A and RP1210-B (draft)

### Functions for CAN (extract):

- > Standard (11-bit identifier) & extended (29-bit identifier) format
- > Hardware based CAN-ID filtering
- > Concurrent cyclic Broadcast Message delivery option

### Functions for SAE J1939 (extract):

- > Data Link Layer: Parameter Group (PG-) Data & Transport Protocol Handling (BAM & CMDT)
- > Network Layer: Dynamic address management (claiming/ protection of address)
- > Various filtering possibilities (e.g. PGN, source and destination address)
- > Concurrent cyclic Broadcast PG delivery option

### Functions for SAE J1708/J1587 (extract):

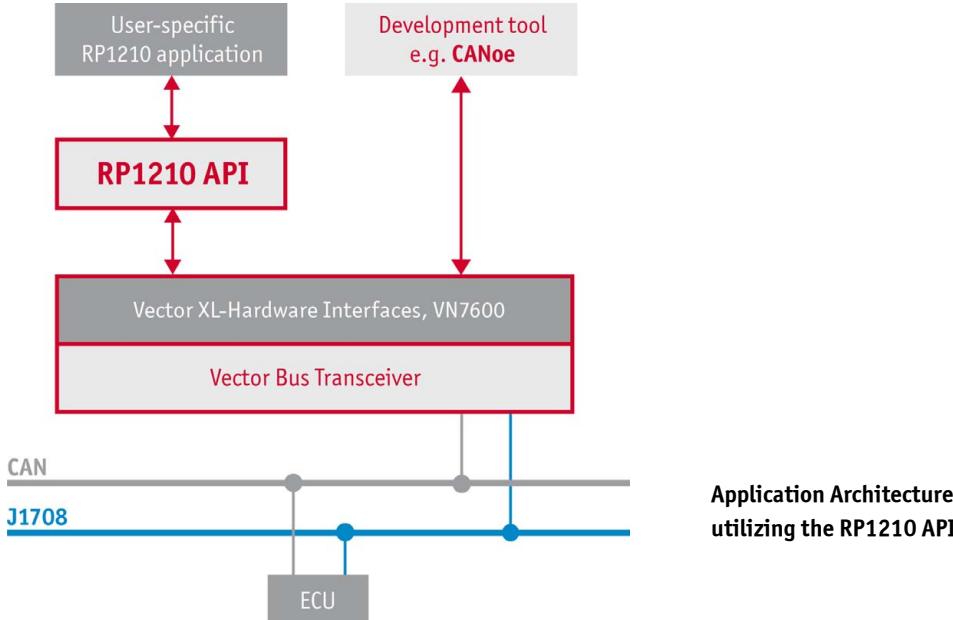
- > Optional checksum generation & error validation
- > Message Identifier filtering possibilities
- > Concurrent cyclic Broadcast Message delivery option

### Hardware Interfaces

The RP1210 API can be used together with Vector XL-Interface hardware and the VN7600, and with the related bus transceivers. The VN7600 interface does not offer any support for J1708/J1587.

### System Requirements

- > Windows 2000/XP/Vista/7 (Windows 7 also 64-bit version)



**Application Architecture  
utilizing the RP1210 API**

# VectorAcademy

## Seminar or Workshop?

Vector offers seminars and workshops on Vector software tools as well as the latest bus technologies and protocols at Vector Group locations worldwide.

VectorAcademy seminars serve to communicate theoretical basics, while workshops distinguish themselves through their applicability, practical examples, and exercises.

## Modularity

Trainings are partly constructed of several independent, one-day modules designed to follow one another. Beginners and advanced users can adjust their individual training program to suit their own needs.

You will find the latest information on current dates, additions to the training offerings, and information about registration of the Vector Group at [www.vector-academy.com](http://www.vector-academy.com).

## Customer-Specific Trainings

Additionally, we offer customized training courses, where we combine or expand the contents according to your needs. If desired we can also conduct all training courses at your company site. We would be glad to provide you with a quotation based on your specific needs. Please contact our training consultants:

Vector Informatik:	<a href="mailto:academy@de.vector.com">academy@de.vector.com</a>
Vector Consulting Services:	<a href="mailto:info@vector-consulting.de">info@vector-consulting.de</a>
Vector CANtech:	<a href="mailto:academy@us.vector.com">academy@us.vector.com</a>
Vector Scandinavia:	<a href="mailto:academy@se.vector.com">academy@se.vector.com</a>
Vector France:	<a href="mailto:academy@fr.vector.com">academy@fr.vector.com</a>
Vector Japan:	<a href="mailto:academy@jp.vector.com">academy@jp.vector.com</a>
Vector Great Britain:	<a href="mailto:academy@uk.vector.com">academy@uk.vector.com</a>
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## The Training Team

Our training team consists of experienced engineers, who enjoy sharing their experience and knowledge base.

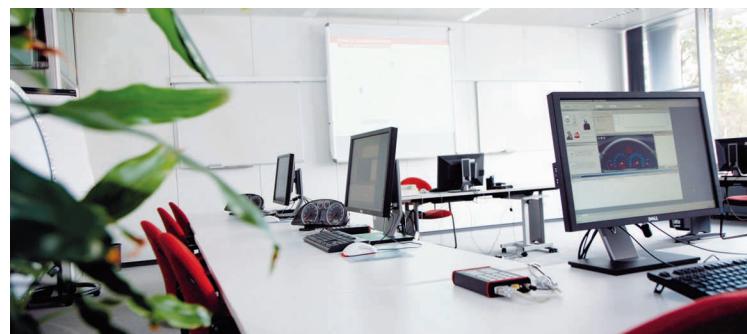
A continuous flow of information between trainers and development departments ensures that the training courses we offer reflect current trends and developments.

## Premises

We conduct our trainings in generously appointed and modern classrooms, equipped with state-of-the-art training technology and powerful workstations, running the latest development, analysis, measurement, and diagnostics software. Exercise hardware and demonstration objects complete the working environment.



3/0



# Germany

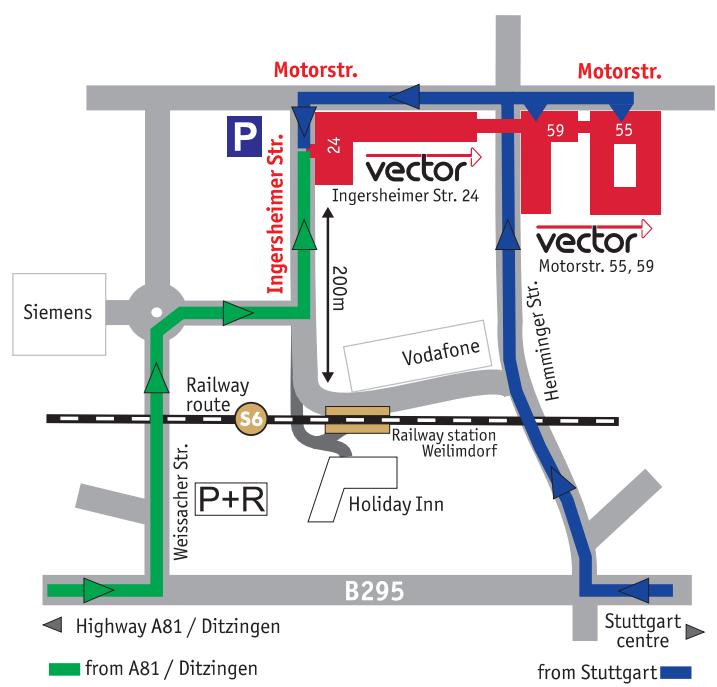
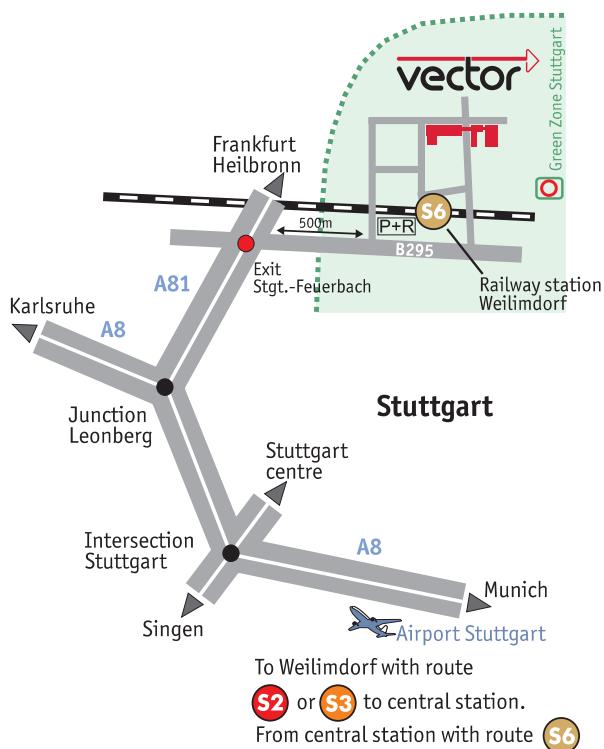


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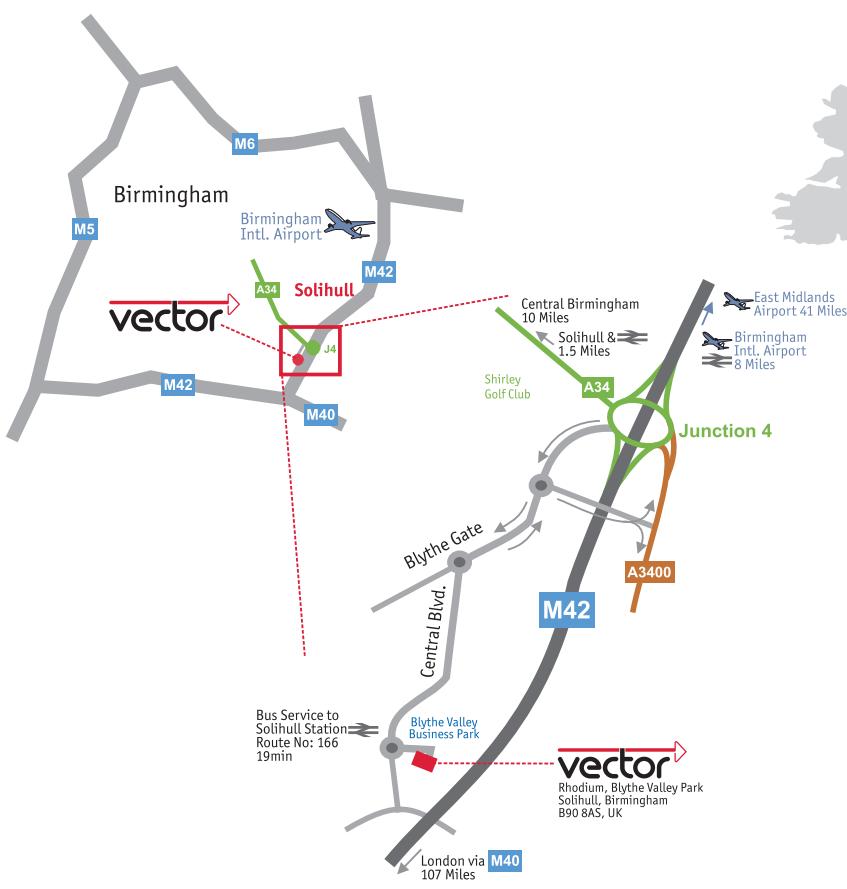
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## Vector Informatik GmbH, Stuttgart (Headquarter)



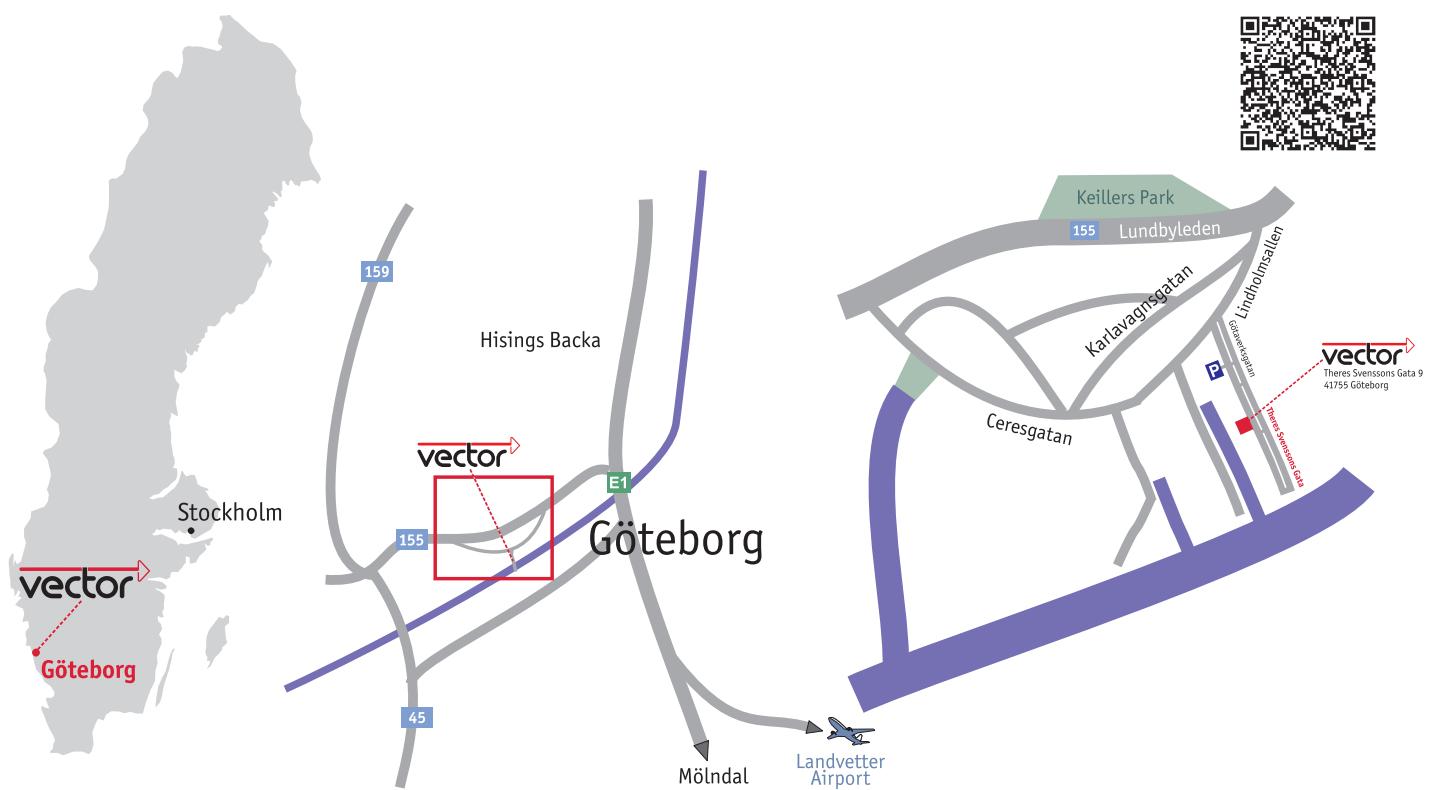
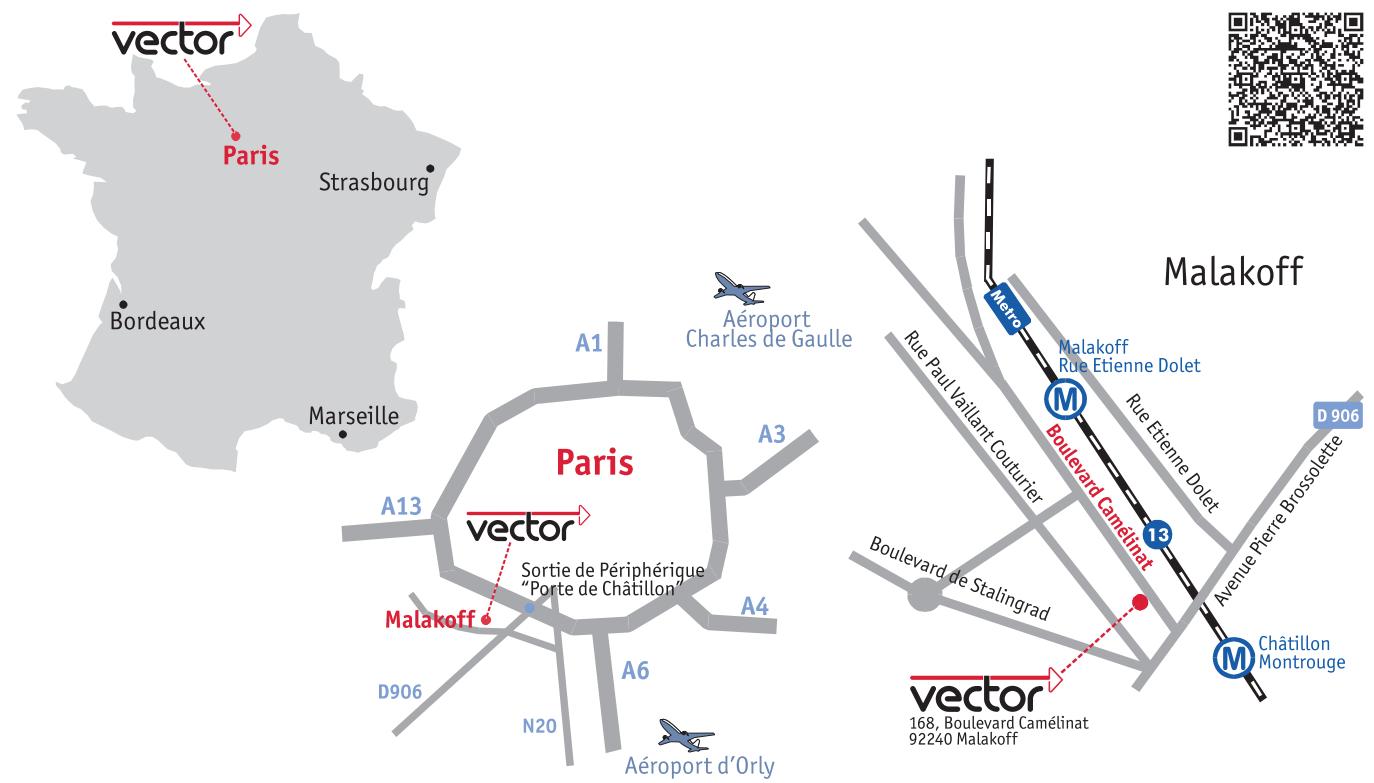
# USA and Great Britain

Subsidiaries: Vector CANtech Inc., Vector GB Limited



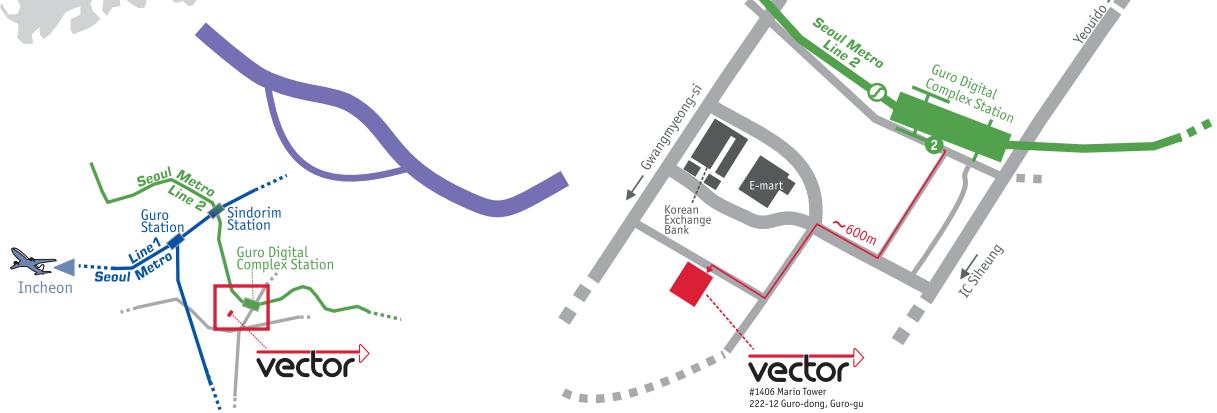
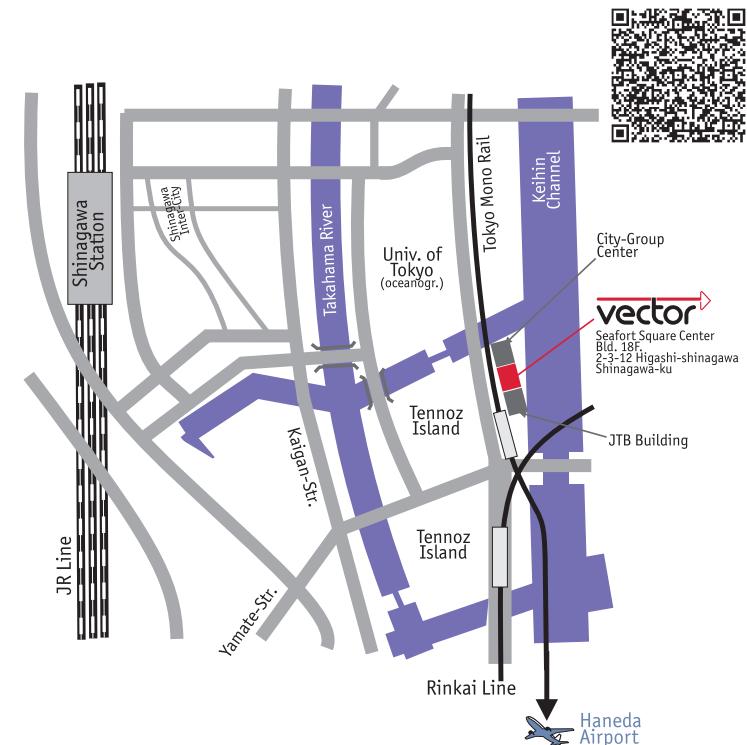
# France and Sweden

Subsidiaries: Vector France S.A.S., VecScan AB



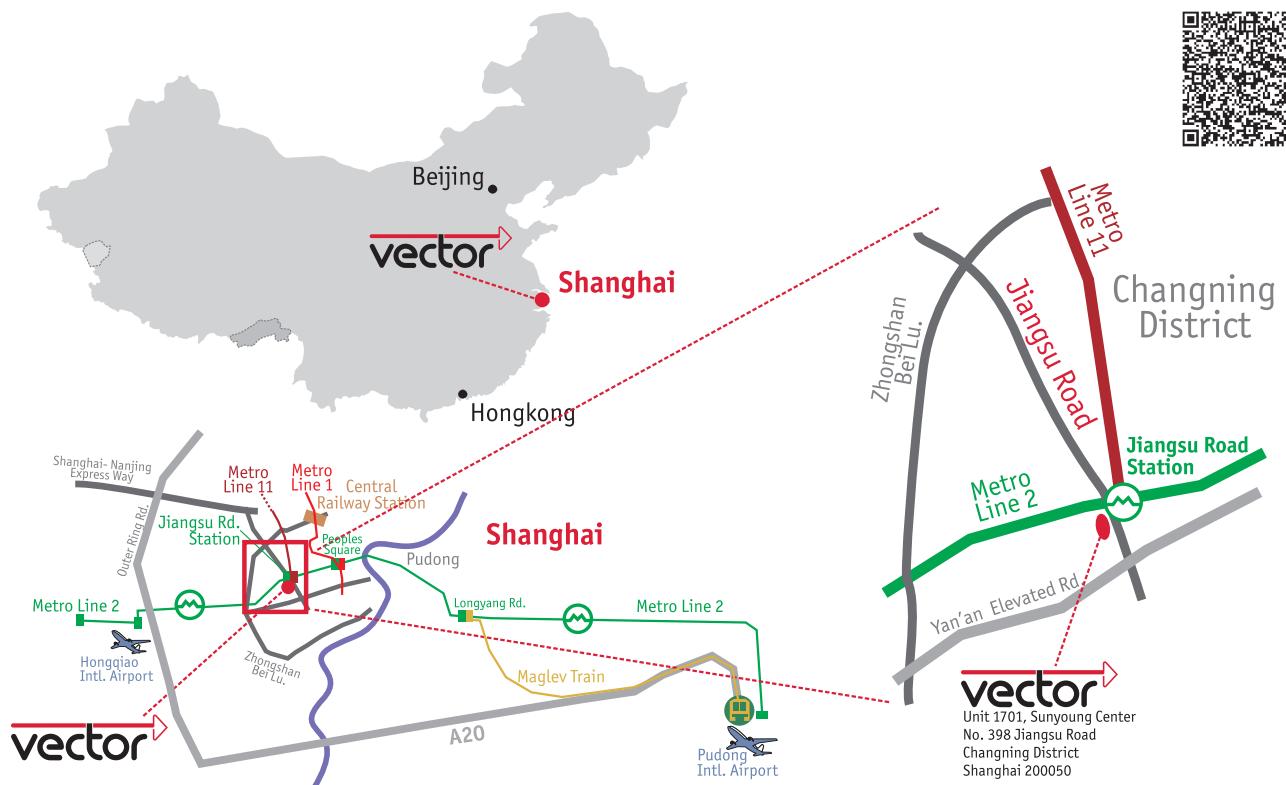
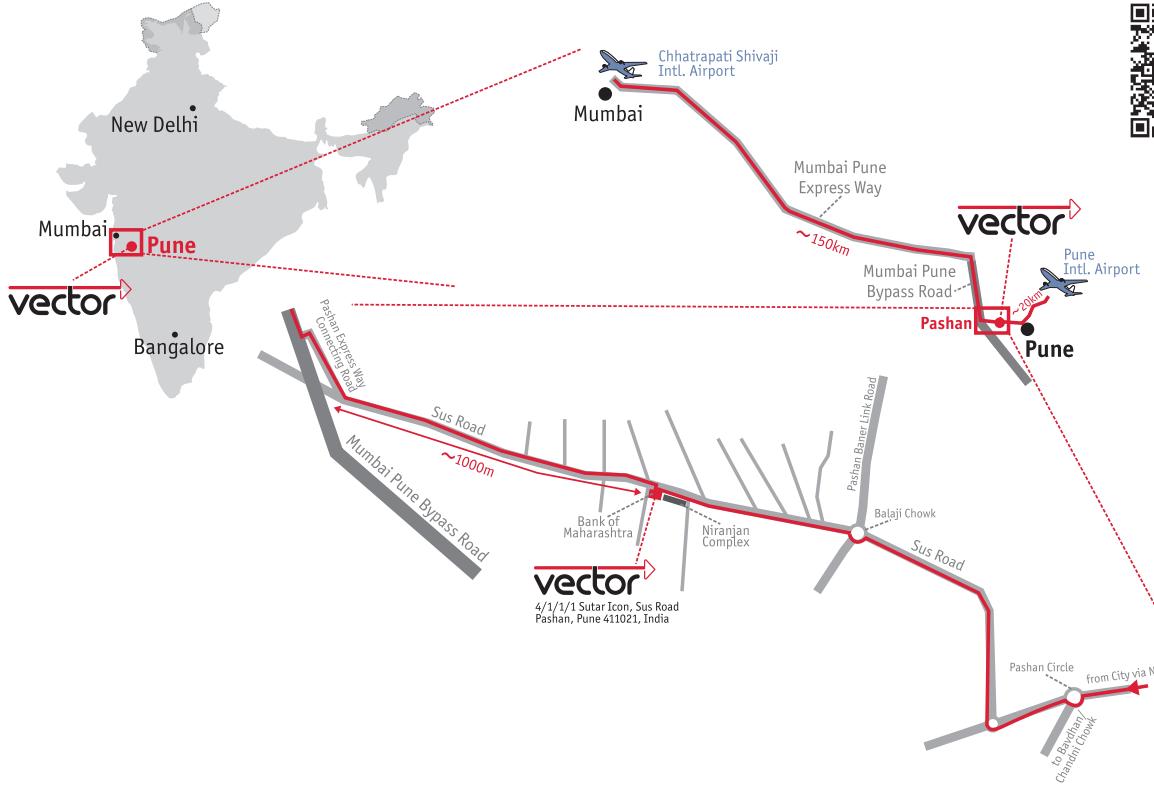
# Japan and Korea

Subsidiaries: Vector Japan Co., Ltd., Vector Korea IT Inc.



# India and China

Subsidiaries: Vector Informatik India Pvt. Ltd., Vector Informatik China





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