ASAM SOLUTIONS GUIDE
STANDARDS | MEMBERS | PRODUCTS

Tool Interoperability
Long-Term Stability & Continuity
Seamless Data Exchange

ASAM
Association for Standardization of Automation and Measuring Systems
Dear Reader,

The automotive industry is facing rapid change: Disruptive innovations from the IT sector promise new business opportunities such as autonomous driving, connected technology, and – consequently – new business models for greater choice and convenience of transport. Each of these opportunities requires complex integrated systems, which must be simulated, developed, and validated. Therefore, we see many interesting opportunities for ASAM ahead of us. Some opportunities have already been identified, such as changes to the ECU architecture, big data applications, and secure vehicle connectivity. Others are yet to be discovered.

ASAM is the right community to take on these challenges.

We are a growing and dynamic community: As projects from new domains are being addressed within ASAM, we also see new groups of experts joining our association: The ideation activities in the connected vehicle area have brought the first Telematic Service Providers into ASAM. New application ideas for ASAM XCP have driven the major debugging tool suppliers to join. All these new members integrate into the established community, contribute to standards and incorporate standards into tools. This way, the entire community becomes stronger and is enabled to take on the upcoming challenges.

We are an active community: Not only the membership but also the number of projects is increasing. In 2016, ASAM released two completely new standards, ASAM CERP and ASAM CPX. Further new standards are currently under development and critical standards are being advanced (for more information see pages 6 - 7). Some of the projects have been initiated by American and Japanese members. These international members bring new ideas and new requirements into ASAM thus improving the quality and expanding the reach of ASAM standards. The ASAM Team has been expanded to support and encourage international collaboration.

ASAM is and will remain a community of technical experts in an increasingly expanding field of operation. The benefit of the community is driven by each member: your requirements, your needs, and your contribution in the working groups. We look forward to and encourage your continued participation.

Sincerely,

Marc Blatter
Chairman of the Board of Directors
ASAM e.V.

Yes, also scalable!

With ODS 6.0, accessing your measurement data becomes easy, by definition. Taking control of your exponentially growing stream of data and turning it into something actionable, is something we do for you. Now, we support ASAM ODS based on Big Data performance and scalability.

At HighQSoft, we specialize in wrangling your measurement data into something you can use, today and in the future. We offer multiple products and solutions to help you organize and manage data, no matter the volume and whatever the format.

Experience Analytics on Measurements. With our Avalon Big Data Application Server (ABAS) and HQL+.
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One effect is that more project initiatives and participants come from abroad. The concept projects “Big Data Technologies for ASM ODS” (initiated by US members) and “ASM HEX File Management” (initiated by Japanese members) are just some of these initiatives.

ASM tries to further push international exchange among experts. Therefore, ASM is continuously looking for cost-effective solutions to overcome time differences and language barriers, to reduce travel costs.

EXPERIENCE EFFICIENCY AND PROFICIENCY
One of ASM’s advantages is the fast standards development process as it has been proven in many projects over the years. But while the whole process is focused to bring standardization to conclusion ASM also stands for quality and usability of its standards.

Important Releases:
ASM CPI and ASM MCD-2 CERP provide a language and exchange format to capture expert knowledge about the calibration of ECU software. The two standards provide the basis for “Calibration Expert Systems” that help to manage the increasing complexity of ECU development. ASM tool vendors have already started to develop tools based on these new standards.

A new update to the popular ASM ODS standard has been released signifying a major technology update. ASM ODS 6.0 adds a new client-server API based upon HTTP, called the „HTTP-API“. This API exposes a set of web-services via HTTP-commands and uses Google protocol buffers (protobuf) to serialize the information transferred between client and server.

Current innovative projects:
ASM MCD-1 POD (Plug-on-Device) is a completely new standard which has been released in June 2017. It describes the configuration of POD- adapters for a calibration system and their software interface toward the ECU. The standard eases the integration of different PODs to an ECU, and ultimately allows exchanging PODs without any changes in the ECU’s software.

ASM HEX-File Management is the first project initiated and driven by Japanese members. This project will determine a concept for a potential new ASM standard that helps to select HEX Files that correctly work together due to the strong interdependencies between ECUs, particularly in the areas of ADAS and autonomous driving.

EXPERIENCE RELIABILITY & QUALITY
Standardization Process
ASM is convinced that contribution by more global experts ultimately leads to more useful results. High quality, paired with increased usefulness, lead to more acceptance of the standards.

ASM has worked the standard development process adding process steps that enable more members to provide input and expertise, even when not actively participating in a project group.

1. Ideation & Use Case Definition Workshop:
Members and non-members can propose ideas for new standards. The ASM Office works with the group to gain international participation and to ultimately guide them into the standard development process.

2. Proposal Workshop:
Members and non-members define their problem descriptions, use-cases, features, requirements and proposals for solutions. The members have to find a wide overlap of interest among members in developing a new or expanded standard.

3. Proposal Publications:
Members can enroll to directly participate in a project. Members can also comment on the proposal and ask the project group for consideration of certain features or requirements.

4. Public Draft Reviews:
Members have the opportunity to review a draft standard and provide feedback. The project group will consider the feedback and correct errors or improve the technical content prior to release.

These opportunities will be regularly announced via ASM Email alerts.

Increased Transparency
The ASM Office has established several instruments to better inform and enable participation in the community. Whether you sign up for the ASM newsletter and email alerts or watch out for updates on the ASM website: ASM cordially invites everybody to actively participate.
ASAM

Long-Term Stability & Continuity – Tool Interoperability – Seamless Data Exchange

BACKGROUND

Automotive manufacturers are being forced to seek out new ways to cut costs while at the same time increasing electronic content to deliver new features to consumers. Standards-based solutions can contribute to both of these goals by making it easier to integrate low-cost off-the-shelf solutions in unique ways to develop cutting edge features for their customers. ASAM standard interfaces, protocols, and data exchange formats help automobile manufacturers survive and thrive in difficult times by enabling engineering teams to deliver the features that customers want while driving down costs.

ABOUT ASAM

ASAM, Association for Standardization of Automation and Measuring Systems, was founded in 1998 as an initiative of German car manufacturers. ASAM has since established itself as a reliable and strong partner for standardization projects. The ASAM organization was created with the goal of offering a platform for the development of universal standards. End users of a standard ( OEMs and system suppliers) bring in their requirements and work together with tool vendors, service providers, and universities to commonly develop and maintain standards. All ASAM members have the opportunity to actively influence the development of the standards. ASAM is a registered association (e.V.) with the head office located near Munich, Germany and a branch office in Tokyo, Japan. The association has currently more than 190 members from the Automotive OEM, Tier-1, and tool supplier communities, as well as universities.

SCOPE

Measurement & Calibration

The ASAM standards in the measurement & calibration area support the ECU calibration process. The standards allow to seamlessly connect tools throughout the entire tool chain from the ECU to calibration data management systems. ASAM standards describe calibration protocols for typical automotive bus systems, file formats for unambiguous data exchange and APIs that provide remote access for tools and automation systems. ASAM standards for measurement & calibration are implemented in almost every calibration system on the market.

Diagnosis

ASAM standards in the diagnostics area support the development of diagnostic routines of an ECU and their communication to external devices. They allow a manufacturer independent description of diagnostic services, error codes, parameters and interfaces available on an ECU. Furthermore, ASAM provides an API for programmatic and vendor independent access to these features, e.g. from workshop testers.

ECU Networks

The lower-levels of vehicle bus systems are well standardized at ISO, SAE or other standardization organizations. However, they all have their proprietary description format, when it comes to specifying the actual communication on the bus (messages, frames, timing, etc.). ASAM MCD-2 NET (FIBEX) closes this gap by providing a formal data model and file exchange format for this purpose. The standard supports the most popular Automotive bus systems, which are FlexRay, MOST, CAN, TTCAN, LIN and Ethernet.

Software Development

The primary focus of ASAM standards in the software development area is to support the collaboration between customers (OEMs) and its suppliers. ASAM standards cover specific steps in the ECU software development process, for instance, by providing a formal and functional description of software components, software documentation generation, data format for change requests and a blockset for model-based development.

Test Automation

Test systems consist of many components, e.g. tools that control the tests, tools that execute the tests, test scripts, simulation models, sensors, actuators, the units-under-test and much more. They all need to communicate with each other and exchange data. ASAM standards provide APIs for integrating test components from different vendors into a seamlessly working system. If applied accordingly, individual components of a test system can be exchanged without the need to re-write test scripts, simulation models, drivers or other major integration efforts.

Data Management & Analysis

ASAM standards for Data Management & Analysis allow to store, search, retrieve and analyze large amounts of data from test stands, data loggers or other sources in the testing area. Clearly defined semantics of the data, APIs for data access, format definitions for database and exchange files make the data independent from their source and usable on an enterprise level. ASAM standards and compliant tools are an enabler to draw the maximum value from costly test data.

ASAM PROVIDES

For End Users: Easy system integration (plug & play) for automation and measurement systems with ECUs; exchangeability of tools (independent from manufacturer); seamless data exchange; data interpretation without misunderstandings and ultimately a competition boost. Long-term applicability guarantees the safeguarding of investments.

For Tool Suppliers: The ability to influence the standards with your knowledge; the ability to minimize development costs due to standardized requirements of various OEMs; the ability to share development costs through a common approach; and an increase in marketing potential.

For ASAM Service Providers: Know-how about standards; better technical solutions (e.g. connect data loggers with ODS data bases); a door-opener to clients; and a cost advantage due to using a few standards for many customers.

For Research Institutes: The opportunity to do industry-oriented research.

ASAM E.V. – THE ORGANIZATION

ASAM is set up as an incorporated association. This structure allows an easy integration of new members in the existing organization. The highest decision-making body of ASAM e.V. is the Annual General Assembly. Each company has voting rights in proportion to its annual membership fee. The delegates elect the Board of Directors and the Technical Steering Committee for alternating two-year terms. Additionally, they accept the annual financial report, approve changes of the statutes and vote upon any further decisions of strategic importance.

The Board of Directors (BoD) has operational control of the association, but is bound to the decisions of the membership meeting. The Board represents ASAM in all legal and public matters, which is responsible for the finances of the association, decides on the admission or expulsion of members, sets guidelines for the other committees and the head office, develops a long-term strategy for the association and monitors its execution.

ASAM ORGANIZATIONAL STRUCTURE

The Technical Steering Committee (TSC) focuses mainly on technical and market aspects of ASAM standards. The primary goal of the TSC is to ensure that the standard portfolio of ASAM meets market requirements and stays competitive. The committee evaluates technical proposals, monitors the progress of ongoing projects, and reviews and releases new or revised standards. The actual development work of standards is done by the ASAM Project Groups. These groups may work on the development of future versions of a standard (PvD Projects), or carry out maintenance tasks on a standard such as minor revisions or bug fixing (Maintenance Projects). New standard proposals are initiated by the members and submitted to the TSC for approval.

The central coordination role comes from the ASAM Head Office near Munich, Germany. It takes care of the distribution of standards, maintains an IT infrastructure for the Project Groups, provides first-level expertise on its standards, carries out technical marketing and provides general membership services.

ASAM cooperates closely with other organizations, e.g. ISO, AUTOSAR, Eclipse, ARTEMIS Standardization Working Group, MOST Cooperation (FIBEX-4MOST) and CAN in automation (CIA). With its branch office in Tokyo, Japan, and its representation in Pune, India, ASAM has created more support to advance standardization and the distribution of standards worldwide.

TECHNOLOGY

The TSC is responsible for the technical steering of ASAM e.V.

The standardization work is organized in project groups.
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| BS: Base Standard, AS: Associated Standard, SW: Software |
MEASUREMENT & CALIBRATION

ASAM CDF
CALIBRATION DATA FORMAT

An essential part of control algorithms in an automotive ECU are parameters, i.e. scalars, curves and maps. These have a major impact on the control behavior of the ECU and are typically determined through an iterative calibration process. Calibration parameter values are a result of this process. They are produced over time from different tests, for different software versions of an ECU and for different hardware versions of the controlled system. Calibration engineers need the values and further information about their maturity level to be able to decide on further actions. Calibration values are typically processed by multiple tools of the ECU development process, such as calibration data management tools, model-based development tools, code generators, calibration expert systems and product life-cycle management tools. This requires a common file format that is understood by all tools.

ASAM CDF (Calibration Data Format) defines a description format to describe the values of ECU calibration parameters and associated meta data in a well-defined XML format. ASAM CDF is a complementary standard to ASAM MCD-2 MC, in that MCD-2 MC describes the properties of the calibration parameters and CDF describes their values and associated information about their origin and quality.

ASAM CDF supports all data types used in the ASAM MCD-2 MC standard like scalars, curves, maps, arrays and structures. ASAM CDF additionally defines six dedicated maturity levels plus one "undefined" state. These maturity levels can be mapped to company-specific definitions. This allows transferring and correctly interpreting maturity information between different systems.

Application Area

The ASAM CDF standard is widely used in the automotive industry and is supported by every major calibration tool on the market. It is aligned with other ASAM standards like ASAM MCD-1 XCP/CCP, ASAM MCD-2 MC and ASAM MCD-3 MC/ASAP3.

Standard Authors


ASAM CPX
CALIBRATION PROCESS EXCHANGE FORMAT

ASAM CPX is an extension of the ISO OTX standard (ISO 13209), which defines functions to describe test procedures for the calibration of ECUs, i.e. to determine and validate the parameters of ECU software. This task is traditionally carried out by technical experts, who use their expert knowledge in test runs on simulation models, test benches or with prototype vehicles. This expert knowledge is business-critical IP of each company. However, without a standard, the knowledge is either not documented at all, or it is documented in formats chosen by the experts, e.g. verbal descriptions, Excel sheets or in a scripting language. This severely inhibits knowledge transfer within the company or between OEMs and its supplier.

ASAM CPX solves this problem by providing a formal description method, based upon ISO OTX, which provides the necessary functions to specify ECU calibration tests. ASAM CPX extends ISO OTX with a programmatic access API to calibration and measurement data on the ECU, access to meta information about this data (from A2L files), functions for controlling the execution of measurement tests and simulation models, and specific mathematical functions. Further extensions of OTX allow to use flow-charts and state-machines.

With the help of ASAM CPX, a company can now create comprehensive libraries of test sequences for all typical ECU calibration tasks, transfer this knowledge easily to new staff members, share the knowledge with its customers or suppliers, and increase the degree of automation step-by-step as better automation tools become available. In conjunction with ISO OTX part 1 to 3 and ASAM OTX part 4 and 5, a comprehensive language and exchange format is available for the automotive industry, which allows to specify the ECU calibration processes in detail and to freely exchange this knowledge.

Application Area

ASAM CPX is used for the description of ECU tests for calibration parameter determination and validation. The standard is useful for exchanging the test specifications between tools. The tools may be used for documentation purposes, for partial or full test automation.

Standard Authors

EMOTIVE GmbH & Co. KG, ETAS GmbH, HORIBA, Technische Hochschule Aachen, Vector Informatik GmbH, ZF Friedrichshafen AG

ASAM MCD-1 XCP
UNIVERSAL MEASUREMENT AND CALIBRATION PROTOCOL

ASAM MCD-1 XCP (Universal Measurement and Calibration Protocol) defines a bus-independent, master-slave communication protocol to connect ECUs with calibration systems. XCP is short for Universal Measurement and Calibration Protocol. The primary purpose of XCP is to adjust internal parameters and acquire the current values of internal variables of an ECU. The first letter X in XCP expresses the fact that the protocol is designed for a variety of bus systems. The standard consists of a base standard, which defines a bus independent memory-oriented protocol services without direct dependencies on specific bus systems. Several associate standards contain the transport layer definitions for CAN, FlexRay, Ethernet (UDP/IP) and TCP/IP) and serial links (SPI and SCI).

ASAM MCD-1 XCP accesses parameters and measurement variables in a memory address oriented way. The properties and memory addresses of this data are described in the A2L-file format, which is standardized through ASAM MCD-2 MC. The A2L-file contains all the information necessary to access and correctly interpret the data that is transmitted via the XCP protocol. This means that access to a specific parameter or variable does not need to be hardcoded into the ECU application. In other words, the ECU contains only a generic XCP protocol stack, which responds to memory access requests from the calibration system. Different calibration and measurement tasks can be performed by different configurations of the calibration system without recompiling and reprogramming the ECU application code.

ASAM MCD-1 POD
PLUG-ON DEVICE INTERFACE

Plug-on devices (POD) are hardware adapters, which provide direct read-write access for external tools, such as measurement and calibration systems or debuggers, to the ECU’s internal resources, like memory. PODs require a driver in the ECU software, called the POD Service Software (PSS), which handles the communication between the ECU software and the external tool(s). ASAM MCD-1 POD standardizes major parts of the PSS, significantly easing the job of ECU basic software developers and integrators. This has the major advantage that PODs and external tools can be exchanged without major changes to the internal ECU software, or with no changes to the ECU software at all in the most ideal case (plug-and-play). Consequently, it becomes much easier to switch tools for ECU development and testing activities, and to ultimately achieve the freedom to select the most appropriate tools for a given task. The standard supports the technical processes of POD configuration, detection and initialization. Furthermore, the use-cases of synchronous measurement and calibration are supported. More use-cases might be added in future versions of the standard. The standard specifies an API between the PSS and the ECU software. Some API functions are fully ASAM-specified and others just contain the syntactic interface description, allowing vendor-specific implementations within the PSS. Furthermore, an A2L file is provided for ASAM-compliant measurement and calibration tools. In parallel, the ASAM MCD-1 XCP has been extended with new commands and events to configure a POD and retrieve status information. The standard is shipped with a reference implementation for the standardized PSS functions.

Application Area

The standard has been created to support the development and integration of vendor-independent software drivers for the integration of PODs in ECUs. Tool vendors in the area of measurement...
A standard allows the connection of software development tools and CALIBRATION tools and ECU calibration interfaces with a read- and write access. Users can create their own descriptions for specific access. It additionally describes the ECU interface for data from different sources.

The standard also describes the organization of the ECU memory for its structure and measurement implementation values to physical values, ASAM MCD-2 MC describes computation methods for their conversion between both representations. Calibration engineers and ECU software developers typically use such use-cases, which are broadly named “CALIBRATION PEOPLE”. Tools based on the standard can be used where parameter dependencies shall be checked against pre-formulated rules. Typical uses are in calibration tools and calibration data management systems. Control strategies engineers and ECU software developers typically write the rules. Calibration engineers, test engineers, quality assurance and release management then typically apply the rules to check their adherence. In some companies, formal parameter checking is part of the release procedure for ECU software.

**Standard Authors**

**ASAM MCD-2 CERP**
CALIBRATION EXPERT SYSTEM RULE AND PRODUCT MODEL FORMAT

ASAM MCD-2 CERP is an extension of the ISO OTX standard (ISO 13209), which defines functions to describe calibration parameter dependencies. The current version covers the use-case of calibration parameter checking. The standard may be extended in the future to include the use-case of calibration parameter calculation. Tools, which cover such use-cases, are broadly named “CALIBRATION EXPERT SYSTEMS”. The standard is an attempt to solve the problem of the steadily growing number of calibration parameters in ECU software and their variants. Parameter dependencies and variants become increasingly more enmeshed and complex. Ensuring that there are no contradictions and violations within the calibration data set of an ECU becomes a task that can not be handled without tool support any longer. Some OEMs and ECU supplier companies started to develop in-house tools, which allow to automate the task of calibration parameter checking.

ASAM MCD-2 CERP provides a standardized way for defining calibration parameter dependency rules. The standard has functions for access to database information (according to ASAM MCD-2 MC), calibration runtime data (values, units) and the product model exchange file. Additionally, sophisticated check functions and procedures are defined to compare and validate data. The standard includes a product model that describes properties and features of the system, which are not calibration parameters in the ECU, such as the number of cylinders or the emission law to which the vehicle has to comply with. Together with the language elements of ISO OTX, it is possible to write arbitrary check routines including branches, loops, conditions and mathematical calculations. This allows software engineers and calibration experts to write check scripts that formalize empiric calibration knowledge and relevant information about the control loop, software and hardware design. This export knowledge is then used to validate calibration data.

**Application Areas**
Tools based on the standard can be used where parameter dependencies shall be checked against pre-formulated rules. Typical uses are in calibration tools and calibration data management systems. Control strategies engineers and ECU software developers typically write the rules. Calibration engineers, test engineers, quality assurance and release management then typically apply the rules to check their adherence. In some companies, formal parameter checking is part of the release procedure for ECU software.

**Standard Authors**

**ASAM MDF**
MEASUREMENT DATA FORMAT

Many software applications still use proprietary file formats to store acquired or calculated data. As a consequence, an exchange of data between different tools usually requires time-consuming data conversions that involve potential loss or alteration of information. The development of such converters is expensive and error-prone. Hence, a commonly accepted standard format greatly improves the seamless exchange of data between tools. MDF (Measurement Data Format) is a binary file format which stores recorded or calculated data for post-processing. It is originally developed as a proprietary file format in the 90s for use in the automotive industry, primarily for the areas of ECU development, calibration and testing. Since then, the format has evolved into a de facto industry standard and is supported by many companies. It is increasingly used in the automotive market, particularly by all leading tools in the measurement & calibration area. In 2009, MDF has been transferred to ASAM as an official industry standard.

As a compact binary format, ASAM MDF offers efficient and high performance storage of huge amounts of measurement data. MDF is organized in loosely coupled binary blocks for flexible and high performance writing and reading. Fast index-based access to each sample can be achieved by loss-free re-organization (i.e. sorting) of the data. Distributed data blocks even make it possible to directly write sorted MDF files. The file format allows storage of raw measurement values and corresponding conversion formulas, therefore raw data can still be correctly interpreted and processed by post-processing tools. Since it became an ASAM standard, MDF has been developed in close alignment with other ASAM standards such as MCD-2 MC (ASAP2) or ODS. Consequently, ASAM MDF supports special data types and information particularly required in the automotive area, e.g. structures and arrays (curves/maps), bus events and synchronized video data.
In addition to the plain measurement data and all necessary meta information for its interpretation, MDF 4.0 can also store descriptive and customizable supplementary data within the same file. MDF 4.0 offers flexible extensibility via generic XML fragments and a range of new features like custom signal grouping, events or attachments.

**DIAGNOSTICS**

**ASAM MCD-2 D**

**DATA MODEL FOR ECU DIAGNOSTICS**

The electronics of passenger and commercial vehicles can be diagnosed, configured and programmed with new software. The design of these functions is specific to a vehicle model and/or manufacturer and thus the diagnostic capabilities of every vehicle and built-in ECU are highly individual. Within the life cycle of the vehicle (engineering, production, service, end-of-life) many tools and applications access the ECU for testing, activation, de-activation, configuration and updating purposes. Before the standardization of ODX (Open Diagnostic Data Exchange) the diagnostic and configuration capabilities as well as the flash data descriptors were specified in non-standardized, mostly non-machine readable data formats (e.g. Word, PDF). Consequently, the relevant data had to be manually entered into all tools of the life cycle, which is error-prone, expensive and impedes fast development cycles.

ODX addresses these challenges by providing an XML-based, machine-readable data format to specify and exchange vehicle and ECU diagnostic capabilities including variants throughout the vehicle life-cycle. ASAM took great care in producing a semantically well-defined data model that is the foundation for the data format. Together with the related standards ASAM MCD-3 D and ISO 22900-2 (D-PDU API), an architecture for vehicle communication has been defined that permits seamless processing of diagnostic, configuration and flash reprogramming data. This architecture enables the complete re-use of diagnostic data throughout the ECU’s life cycle and thus prevents errors and reduces effort for the creation of test-, configuration- and reprogramming sequences.

Furthermore, ODX is independent of particular vehicle diagnostic protocols such as the KWP 2000 (ISO 14230), UDS (ISO 14229) or SAE J1939. ODX is designed as a data model to describe the structure of data streams (aka “diagnostic services”) and arbitrary protocols. In addition, specific descriptor ion formats have been defined to describe configuration data structures, flash re-programming data and vehicle functions. ODX allows for some variance of how the vehicle and ECU capabilities are expressed. As a uniform usage of ODX within the process leverages greater benefits in using the data, it is an established best practice to formulate authoring guidelines for the creation of ODX and implement these guidelines in editors and/or checking tools.

**Application Areas**

The standard ODX can be employed anywhere in the vehicle life cycle where vehicle electronics are tested, configured of flash re-programmed. OEMs employing this standard have reported considerably reduced setup times in the production of new models, highly reduced vehicle communication problems with diagnostic scan tools and much better support for vehicle variants.

**Standard Authors**


**ASAM OTX EXTENSIONS**

**OPEN TEST EXCHANGE FORMAT**

ASAM OTX is an extension of ISO 13029 „Open Test Exchange“ (OTX) with added functionality required by the market. The parts 1 to 3 of the ISO standard contain the definition of a language and exchange format for the specification of executable test sequences. OTX has originally been developed for the area of ECU diagnostics, but is not limited to this area. Soon after the first OTX-based tools appeared on the market, end users required additional functionality, which were now implemented in ASAM OTX and are intended to be transferred to ISO to become part of ISO 13029.

Part 4 includes the functions:

- Definition of new data types, such as enumeration, structure and a type of undefined content (similar to the C-type “void”).
- Change monitoring and triggering of events when items in a List or Map of any depth has been changed.
- General read and write access to files, such as opening a file, reading and writing individual bytes or lines, closing a file or deleting a file.

Part 5 includes the functions:

- Flow-charts.
- State-machines.

Furthermore, ASAM OTX contains a document that clarifies specification gaps, limitations and some known errors of ISO 13029.

**Standard Authors**


**ECU NETWORKS**

**ASAM MCD-2 NET**

**DATA MODEL FOR ECU NETWORK SYSTEMS**

During the implementation of ECU software, the correct configuration of the operating system’s network stack is a fundamental requirement in ensuring the interoperability of ECUs within automotive networks. The configuration includes the definition of exchanged signals, datatypes and their explicitly defined declarations for various automotive communication systems. This information is typically provided in interface descriptions created by OEMs and forwarded to their ECU suppliers.

The ASAM MCD-2 NET standard (called FIBEX) provides a uniform, XML-based interface description for configuring the software of automotive networks. The standard allows the definition of network topologies, consisting of ECUs with network ports and gateways. The standard consists of a generic interface description and technology-specific extensions for FlexRay, MOST, CAN, TTCAN, LIN and Ethernet. Technology-specific properties are described for each network port. For example, addresses as well as transport protocols and the reserved ports are described for Ethernet and IP. Furthermore, the interface description contains a list of sent and received signals for each ECU. In the case of service-oriented communication, service provider instances and consumers are listed for each ECU.

ASAM MCD-2 NET is used for the design, configuration, monitoring and simulation of communication on automotive networks. For example, the standard supports auto-generation of software code for ECUs and the configuration of test tools for simple testing of ECUs. Test tools, which can import the interface description, are able to interpret network traces or carry out residual network simulation.

**Application Areas**

The ASAM MCD-2 NET standard is widely used in the automotive industry and is harmonized with the AUTOSAR system template. The current version 4.1.1 made the standard compatible with AUTOSAR 4.1 and resolved a few bugs.

**Standard Authors**

SOFTWARE DEVELOPMENT

ASAM CC - CONTAINER CATALOG

ASAM CC (Container Catalog) is used for describing engineering objects such as source code, compiled objects or documentation files. The objects are described with meta information such as creator, name, description, version, engineering domain, configuration and storage location. The standard is primarily used for exchanging information about engineering objects between OEMs and suppliers. Since ASAM CC-compliant description files are based upon XML, with a standardized schema, tools and data repositories can import and export the data easily. Incremental data exchange is supported.

ASAM CC has the following main features:
- Description of the repository structure
- Description of the meta data for engineering objects
- Extensibility of the data model
- Revision information and change histories
- Support for linking
- Support for conditional document configurations (conditional compilation)
- Support for content view filtering

Standard Authors
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ASAM FSX - FUNCTIONAL SPECIFICATION EXCHANGE FORMAT

A lot of companies use common word processors or their own documentation systems to create functional specifications for software components. These systems are typically based on proprietary formats such as Word, PDF or HTML. This becomes a problem when different parties undertake projects. OEMs which develop parts of the ECU software and want to exchange their software components with one or more suppliers have to provide different documentation formats. Suppliers that have to integrate software components from different parties have to process different types of functional documentation formats and merge them with their own documentation to create a complete documentation of the ECU software. Consequently, integrated documents often appear to be fragmented and inconsistent. Styling, layout and content structure may vary greatly across a document. Different documents aren’t linked to each other by cross references and don’t have shared tables of contents or indexes. This makes the readability and traceability of the documentation worse. Documentation, which is patched together in such a way, can give a confusing and unprofessional impression to readers.

The exchanged documents, furthermore, do not allow for parsing and extraction of data like labels, revision numbers and status of the software. The exchanged data formats are mostly pure presentation formats, which do not support a defined document content presentation. Authors are allowed to do everything everywhere. This reduces the possibilities of automated data post-processing. The functional documentation of software has to meet additional requirement like variant handling (i.e. create documents for each variant of a software component), handling of multilingual documents (i.e. create documents for different languages) and filtering of content (e.g. documents for internal and external use).

Different formats, the lack of machine-readability and no support for creating different versions of the documentation causes an increased workload for OEMs and suppliers. ASAM FSX (Functional Specification Exchange) overcomes those problems by defining an XML-based, machine-readable format for the creation, processing and exchange of functional documentation of software for ECUs.

ASAM FSX has the following main features:
- Description of software functions
- Standardization of documentation structure
- Possibility to extend the documentation structure
- Full featured XML text model
- Support for multilingual texts
- Linking and indexing support
- Revision information and change histories
- Support for conditional document configurations (conditional compilations)
- Support for content view filtering

The standard is primarily used in the areas of model-based software development and software functional documentation. ASAM FSX is complementary to ASAM MUX, which contains the interface definitions of software functions.

Standard Authors

ASAM ISSUE - ISSUE EXCHANGE FORMAT

The development of software for electronic control systems is becoming increasingly widespread, either within one company or spread over several companies. Iterative and highly dynamic software development cycles between car makers and their suppliers cause an increasing amount of change requests, problem reports, and require a decreasing amount of time for solutions to be found. All parties involved have to concentrate on the actual issue content and not waste time on administrative tasks. Without automation the percentage of administrative work can easily amount to 50% of the total work needed to resolve an issue. This situation represents an increasing challenge for the automotive industry.

There is, furthermore, a clear motivation to go for a standardized cross-industry solution. Bilateral approaches between OEMs and system suppliers decrease productivity, as system suppliers would typically have to maintain several OEM-specific solutions in parallel. Previews to the ASAM-based solution, Email, fax and shared drives were the main channels for issue related information exchange. This had many disadvantages, as typically data consistency and progress tracking could not be ensured along the lifecycle of an issue request.

The ASAM ISSUE standard was created to overcome the problems of different exchange systems, information inconsistency and lack of progress tracking. The ISSUE schema is able to transport relevant information for an issue (e.g. identifier, title, responsible, lifecycle status, short textual description, delivery information, issue context, attachments) and is able to act as a tool-independent format for the exchange of change requests and problem reports between companies and their tools.

The schema of the ASAM ISSUE standard is flexible enough for process adaptations, but is still strict enough to allow content checks. In order to benefit from the ISSUE standard, it is necessary to export / import issues to the company-defined configuration & change management system. Some systems on the market provide such an ISSUE interface. The status of an issue remains fully transparent for all involved parties, as the complete lifecycle of an issue is supported and status changes are propagated.

Standard Authors
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ASAM LXF - LAYOUT EXCHANGE FORMAT

The results of data post-processing are typically compiled in an automatically generated report. Tools that generate such reports use a description file that defines the layout of the reports. ASAM LXF standardizes the layout description so that it can be defined once for a specific report and then shared among different reporting systems. This reduces the effort to maintain layout descriptions to a minimum and ensures that reports of the same type look the same, even though they have been created by different tools.

ASAM LXF (Layout Exchange Format) defines an XML-based format for describing layouts for graphical content used by data post-processing applications and automated document generators. A layout description contains the definition of a master layout, canvases, page formats, fonts and colors. The master layout determines the general page design, e.g. by specifying a header and footer, which are used on all pages. A page may contain just one canvas or a matrix of canvases. A canvas defines a drawing area and contains a set of graphical elements, such as images, lines, ellipses, rectangles, charts, tables or text. Elements can be grouped in one container. The XML format may contain embedded formulas that are resolved during runtime.

The ASAM LXF standard is harmonized with and typically used in conjunction with ASAM CEA, which produces the content for generated reports.

Standard Authors
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Application Areas
ASAM LXF is used in the automotive industry to automate the layout generation of reports. It is typically used in conjunction with ASAM CEA, which provides the content generated by ASAM CEA.
SOFTWARE DEVELOPMENT

ASAM MBFS
MOdel BASED FUNCTION SPECIFICATION

Embedded software development increasingly relies on model-based development and graphical programming. This has the advantage that control algorithms are more understandable to engineers, are better documented and that the specification is written in an executable format. Models are frequently the input for production code generators. The core of model-based development is the blockset, which essentially represents the programming language of the model. Several vendor-specific tool suites emerged on the market, that use different blocksets with different semantics and different graphical representations. Although the blocksets are similar among all vendors, their differences still make conversion of models between different tool-suites very labor intensive and error-prone. Embedded software developers have to therefore learn different blocksets, which is an additional effort. ASAM MBFS (Model Based Function Specification) overcomes this problem by setting a standard for a blockset library. The blockset consists of 70 blocks, which cover the typical functionality needed in embedded software development. The standard includes blocks for linear and non-linear math operators, logical and relational operators, counters and timers, integrators, filters, curves, maps, delays, switches and memory blocks.

ASAM MBFS defines for each block:
- the graphical representation (icon, ports)
- input, output, internal states and temporary variables
- the semantics (verbal description and pseudo code)
- test vectors

Application Areas
Blocksets that are implemented according to ASAM MBFS are available in major tool-suites for model-based development and graphical programming. They are supported by code generators for production code generation. ASAM MBFS includes a description of a reference implementation in MATLAB/Simulink.

Standard Authors
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ASAM MDX
META DATE EXCHANGE FORMAT FOR SOFTWARE MODULE SHARING

The development of software for automotive ECUs is typically carried out in distributed development processes, where software originating from different suppliers and engineering groups have to be integrated into one executable. Software integration is a highly repetitive and iterative task. If the suppliers used different interfaces or software architectures for the same software system, then the initial software integration will fail and cause time consuming debugging and issue-resolution activities. Failed software integrations are one of the major causes of ECU projects running out of time and budget.

To solve this problem, automotive companies have defined a description format via the ASAM MDX standard, which describes software functions, their interfaces, owned data and scheduling in a standardized XML format. ASAM MDX contains the following definitions for functions and data:
- Software components, -features, -classes and -services
- Variables, calibration parameters and system constants
- Base types
- Type definitions for structures, enumerations and unions
- Units, constraints, computation methods, address methods and much more data properties

This format allows the user to unequivocally specify all integration aspects of the embedded software functions. OEMS have the advantage that they can link supplied software with the overall system without permanently running into integration issues. Suppliers can hide their know-how by delivering just the object code. The object code can still be linked and calibrated, even though the sources of the supplied software are not known by the integrator. Since MDX is technology- and vendor-independent, it allows all involved parties in a software development process to use the tools of their choice, as long as they are able to import and export MDX-compliant description files.

ASAM MDX can describe all data constructions (measurements and characteristics) defined in ASAM MCD-2 MC and the AUTOSAR Software Component Template. Furthermore, ASAM MDX is complementary to ASAM FSX, which contains the behavioral description of software functions.

Standard Authors
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TEST AUTOMATION

ASAM ACI
AUTOMATIC CALIBRATION INTERFACE

The majority of ECUs in a vehicle undergo the calibration development step. The calibration of some vehicle components can be very complex and time consuming. This is particularly true for internal combustion engines. The role of an engine ECU is to continuously measure a large amount of engine data (requested load, speed, fuel and air temperature, etc.) and to calculate a set of optimal control output signals. The control strategies of the engine ECU have to meet contradicting optimization goals (high torque at low fuel consumption and emission, etc.) in a multitude of different environment and dynamic load conditions. Running the tests on an engine dynamometer to find the optimal calibration parameters, curves and maps is a function of many input parameters and conditions. This complex task can hardly be done manually anymore within acceptable time and cost limits. Consequently, test stands are increasingly equipped with systems that automate the calibration task.

ASAM ACI (Automatic Calibration Interface) defines an interface between test stand automation systems (TAS) and automated calibration systems (ACS). The interface consists of an object-oriented, client-server API, which offers four services. The services are requested by the ACS (the client) and carried out by the TAS (the server):
- Player service: controlling of test stand actuators for set-point adjustment
- Recorder service: recording of measurement values (mean or actual) from the test stand

ASAM ATX
AUTOMOTIVE TEST EXCHANGE

Increasing complexity in the field of automotive electronics together with extended quality requirements causes additional investments for test automation. A lot of ECU projects use customized and vendor-specific turn-key test systems. For instance, such test systems typically use test automation software that is rigidly coupled with specific measurement & calibration hardware. The test automation software additionally stores test cases in proprietary formats. As a consequence of this, the choice of test software and test hardware, which can work together seamlessly, is very limited and often dictated by the turn-key system vendor. If a user of testing systems is determined to use best-in-class systems that do not originate from one vendor, he will be confronted with an increased workload to maintain the different systems with regards to know-how, support, version compatibility and other issues. This is particularly true when different software systems are used for test case development. This can lead to the following problems:
- Know-how cannot be easily transferred from one test bench to the other (additional training costs for employees)
- Switch to the newest testing technology will always be difficult because of tool-specific formats and test hardware incompatibility
- Test cases cannot be easily ported from one test system to another

ASAM ATX (Automatic Test Exchange) overcomes those issues by providing a standardized XML format, which enables the exchange of test data between different test systems. ATX supports the ISTQB “Certified Testers” syllabus methodology and can be used for many activities in the test process, e.g. test specification, test planning, test execution and test evaluation. The following data is handled by ASAM ATX:
- Watcher service: monitoring of out-of-bounds channel values
- Device service: further services such as ECU-specific and test stand-specific operations
The goal of the standardization was to reduce cost and time efforts a device had to be integrated or exchanged in an existing test bed to have a long lifetime, devices of different generations had to coexist in rating systems, physical interfaces and protocols. Since test beds, control devices and test bed automation systems. Previously, this an independent integration interface between measurement & control devices. As a result, ASAM GDI allows a device-in-dependent application execution and application-independent device integration. This allows quickly exchanging devices in existing test beds, or conversely migrating to a new test automation system with less effort while still using existing measurement & control devices.

This approach abstracts the test bed automation system from the operating system, communication buses, protocols and measurement & control devices. As a result, ASAM GDI allows a device-independent application execution and application-independent device integration. This leads to a new integration of existing test beds, or conversely migrating to a new test automation system with less effort while still using existing measurement & control devices.

ASAM GDI is used in chassis dynamoseters, engine dynamometers, emission test benches and transmission test beds. Furthermore, GDI-compliant devices are used in car assembly lines, e.g. for fluid-filling stations, and in service areas where miscellaneous measurement modules are integrated into a shop floor tester. The standard is also used for the integration of data loggers and measurement modules for supplier-independent device configuration.

ASAM GDI APPLICATION PROGRAMMING INTERFACE FOR MC SYSTEMS

One of the major tasks of ECUs development is the calibration of control strategies, i.e. tuning of parameters and look-up tables and the recording of values of internal variables during the runtime of the ECU. This is done via various busses, bus protocols or proprietary plug-on devices between the ECU and an application system. These are technology-dependent and can be vendor-specific. MC-servers are used to provide uniform calibration access to ECUs independent of the used busses, protocols or interfaces. The main objective of ASAM MCD-3 MC is to provide a remote control interface for such MC-servers, primarily by providing measurement and calibration services via an OOO-API to the upstream tool-chain. The main advantage of the API is the encapsulation of vendor-specific and technology-dependent communication interfaces. The standard allows that any client application, such as test automation systems or automated calibration systems, can connect via the MC-server to an ECU and carry out typical measurement and calibration tasks. Several ECUs can be connected to one MC-server and accessed in parallel through client applications.

To be able to access data on an ECU, the MC-server reads an A2L data description file (ASAM MCD-2 MC), which contains a description of available calibration parameters (CHARACTERISTICS) and measurement variables (MEASUREMENTS). The MC-server makes services available to access this data. Characteristics of the type ‘scalar’, ‘array’, ‘map’, ‘cube 3D’, ‘cube 4D’, ‘cube 5D’, ‘value block’ and ‘ASCI’ can be adjusted. Measurement tasks are available via the Collector, Watcher and Recorder services. The Collector acquires the values of MEASUREMENT or CHARACTERISTIC objects with a common rate over a defined period of time (continuous data acquisition). The Recorder is a means to managing high bandwidth measurements that the MC-server acquires from the ECU or other external inputs, but which cannot be transferred from the MC-server to client applications synchronously because of the lower available bandwidth. Measurement data is therefore stored in a file that can be retrieved by client applications later on. A Watcher is a service which continuously monitors measurement values and triggers events if a predefined condition evaluates to “true”. Multiple Watchers can be defined to monitor multiple variables at the same time. The Watcher may be used to start and stop Collectors or Recorders.

The standard is used for calibration and measurement purposes in development, testing and production of ECUs. ASAM MCD-3 MC currently coexists with the older ASAM ASAP3 standard, which is dependent on specific interfaces (RS232, TCP/IP) and still holds a significant market share.

ASAM MCD-3 MC API is specified in an object-oriented but technology-independent UML model and mapped to DCOM. This allows to easily add new programming language mappings to the standard without having to change the core of the standard.

ASAM MCD-3 MC APPLICATION PROGRAMMING INTERFACE FOR D SYSTEMS

The ECUs of passenger and commercial vehicles can be diagnosed, configured and programmed with new software. These use-cases are performed through serial bus communication on established vehicle busses like CAN, K-Line or Ethernet. Many different diagnostic protocols are used for the communication between an external test device and the ECU, e.g. UDS, KW2000 or J1939. Common to all these protocols is that the data stream is hexadecimal encoded and cannot be interpreted without detailed documentation of the data content. Before the standardization of ASAM MCD-3 D, it was common practice to implement diagnostic, flash reprogramming and configuration applications on the basis of these hexadecimal encoded messages. The increasing complexity of ECUs, their high number of variants and shortened development cycles made it virtually impossible to continue implementing diagnostic applications in this manner.

The standard ASAM MCD-3 D is employed anywhere in the vehicle life-cycle where vehicle electronics are tested, configured or re-programmed. The standard describes the API of a diagnostic kernel that is able to interpret the hexadecimal encoded messages and provides them as human-readable data values to an application. In order to achieve this, a compliant diagnostic kernel interprets an ODX data description file (ASAM MCD-2 D), which contains a full description of diagnostics data and their conversion between

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TEST AUTOMATION

The physical and encoded views. The diagnostic kernel is also capable of resolving ECU variants and thus allowing the implementation of applications valid for multiple variants. Employing a diagnostic kernel is a key aspect of establishing an ODX-based diagnostic process chain as such a kernel guarantees uniform interpretation of the ODX data.

It was an important design goal of the ASAM MCD-3 D standard to cover all known vehicle communication use-cases based on diagnostic protocols and to establish a solution that is independent of the used protocol. An application developer needs to have no further knowledge of particular diagnostic protocols when implementing against the API. The ASAM MCD-3 D API is specified in an object-oriented but technology-independent UML model and then mapped to popular software technologies such as Java, C++, or DCOM. This allows to easily add new programming language mappings to the standard without having to change the core of the standard.

Standard Authors

ASAM XIL
GENERIC SIMULATOR INTERFACE

ASAM XIL is an API standard for the communication between test automation tools and test benches. The standard supports test benches at all stages of the development and testing process – most prominently model-in-the-loop (MIL), software-in-the-loop (SIL) and hardware-in-the-loop (HIL). The notation “XIL” indicates that the standard can be used for all “in-the-loop” systems. This has the advantage that it enables users to freely choose testing products according to their requirements and integrate them with little effort.

The standard furthermore decouples test-cases from real and virtual test systems. This allows to transfer tests between different test systems with little to no migration effort. Consequently, tests can be easily re-used. Know-how is much easier transferred from one test bench to another, resulting in reduced training costs for development- and test engineers.

The ASAM XIL API comprises access to the following components of the simulation system:

- Reading/writing parameters in simulation models
- Capturing/generating signals in simulation models
- Capturing, reading and writing of ECU variables
- Capturing of network messages (CAN only with current version)
- Exchanging data with an ECU via diagnostic services
- Controlling electrical error simulation hardware (e.g. to set up short circuits)

Application Areas
The ASAM XIL API is primarily used by hardware-in-the-loop simulators (HIL systems) for testing ECU in real-time. The standard has been successfully applied in powertrain, steering and electric lighting tests.

Quality Assurance
Cross tests for ASAM HIL installations have been carried out in 2012 and are planned for the future to ensure compatibility between test automation software and HIL test systems.

Standard Authors

DATA MANAGEMENT & ANALYSIS

ASAM CEA
COMPONENT FOR EVALUATION AND ANALYSIS

Plenty of test-data post-processing applications are available on the market, which have either a proprietary plug-in architecture or no plug-in capabilities at all. Customized solutions for such applications, such as data file importers, special mathematical algorithms or special graphic elements, cannot be easily reused in another application and would require significant porting effort.

ASAM CEA (Component for Evaluation and Analysis) defines an application framework and functional components for the evaluation and analysis of test measurement data. The standard is most commonly used for the development of reusable application components for processing and visualization of testing data. It defines everything to create components in a standardized way in order to be able to be used in different programs from different manufacturers. If the application framework is compliant with the CEA-standard, then CEA-components can be loaded and used by the application. If the framework follows modern SW-architectural rules (e.g. object oriented, event driven, full state, etc.), then it will be easy to implement the functions needed for CEA-compliance. The standard describes the necessary techniques for component developers. ASAM CEA defines a component-based framework within a producer-consumer architecture. For a well-defined run-time sequence structure, events are defined which inform “consumers” of any change within the context. The framework can be extended by plug-in components. The interfaces, data items and events are clearly defined to obtain interchangeable components between CEA-compliant frameworks.

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ASAM ODS
OPEN DATA SERVICES

Numerous solutions in testing, evaluation and simulation within the automotive industry have their own administrative systems and proprietary formats to store data, with very different approaches in maintaining descriptive information. Extending and modifying such solutions, and connecting them to third party components, is a growing challenge as complexity is continuously increasing. Also the demand for unified knowledge bases as a foundation for data mining and for cross-disciplinary collaboration cannot be met by such diverse and usually inaccessible information pools. New ideas from new players in the market will hardly find their way into legacy systems unless an easy and standardized way for information access is available. Finally, the need for product lifetime storage & retrieval calls for standardized methodologies that may be used even if tools and businesses have been discontinued.

The ASAM ODS (Open Data Services) standard focuses on persistent information storage & retrieval. The main objectives are to reduce costs and risks within projects and to provide a reliable basis for applications that produce and/or consume information. Using standardized interfaces and common data structures minimizes the efforts for system integration within heterogeneous environments and significantly eases information exchange. It moreover allows the integration of lightweight solutions that work on a standardized information pool. A fully standardized persistence layer secures the investments made in such data server systems, as information becomes independent from specific implementations.

Standard Authors

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DATA MANAGEMENT & ANALYSIS

ASAM ODS specifies:
• A common data model (base model) for unambiguous and complete definition of data, providing a rough classification by adding semantics to the data, which finally enables different systems to interpret similar data in the same way. It serves as a basis for many derived application models, which themselves cover the needs of specific application areas.
• Interfaces to store & retrieve data in ODS servers in a standardized way, including interfaces to maintain a formal description (meta-information) of the actual application model. This allows systems to generically operate on different ODS data sources.
• Standardized text-based formats (ASAM Transport Format) for exchanging data and meta-information between different systems & platforms (two variants: ATF/CLA, ATF/XML).
• A database model for relational databases used to physically store the information. It also allows exchanging database files between systems with the same data base management system.
• Application models, reflecting typical scenarios for the use of ASAM ODS. Currently models for NVH data, test bed calibration data, workflow descriptions and results, crash test data, geometrical data, and data from bus communications are provided.

Application Areas
ASAM ODS is predominantly used in the area of test automation and test bed systems, but is not limited to this area and can be used wherever information must be stored in a consistent manner. Application areas are: Test Data Management, Measurement & Calibration, Integration of Automation and Measurement Systems, Simulation, Data Post-Processing, Reporting, etc.

Latest Additions and Improvements
The object-oriented API for client-server communication (short: OO-API) has been supplemented by a new web-service API using the Hypertext Transfer Protocol (short: HTTP-API). The HTTP-API furthermore uses the Google Protocol Buffers specification for the serialization of application data. The new HTTP-API includes most of the functionality of the OO-API and is capable of replacing it in typical communication scenarios. The new API significantly eases client-server communication via the internet and is an important step towards enabling ODS for Big Data systems.

Major characteristics of the new API are:
• W3C HTTP transport protocol
• Binary & Json data serialization via Google Protocol Buffers 3.0
• W3C SSE notifications for change events
• Usable with reverse proxy
• The specifications for the OO-API and RPC-API remain part of the standard.

Quality Assurance
Cross-tests are organized from time to time. They are open to ASAM members, who develop ODS-based servers or client applications. Cross-tests allow to check the communication and data exchange behavior of the tools, thereby improving tool-interoperability, easing tool-chain integration and increasing standard-compliance of the tools.

Standard Authors
MIGRATION FROM AN IN-HOUSE DIAGNOSTIC BASE SYSTEM TO A COTS SOLUTION
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FEATURED STANDARDS:
ASAM MCD-3D, ASAM MCD-2D (ODX)

SUMMARY
Since 1997 Daimler has been implementing a diagnostic system which, using a proprietary, data-driven communication platform, exchanges data between the diagnostic application and the vehicle. This platform incl. the data is used consistently at Daimler in Engineering/Development, Manufacturing, and After Sales. When the S-Class 222 was launched in 2013, Daimler opted for a COTS product (commercial off-the-shelf) from Softing. Since then, the Softing product has been used for data communication between the diagnostic application and the vehicle for all new Mercedes cars and VAM series in Engineering/Development, Manufacturing, and After Sales. Thanks to a clever migration strategy that was implemented from the very beginning, the project was not just successful in technological terms, but also ensured a fast return on investment.

SITUATION
Daimler had already successfully introduced a diagnostic communication platform in 1997, operating it in all processes throughout Engineering/Development, Manufacturing, and After Sales. This system was (further) developed especially for use at Daimler. In essence this system was a database for storing ECU diagnostic information and sequence systems with an API. The ECU diagnostic information from the database was converted into a runtime system and processed by the sequence system making it legible for operators.

The advantage of this procedure is obvious:
• ECU diagnostic data is created just once and then used by multiple applications
• Integration into tools takes place using a standard API that is documented and supported centrally
• Due to the use of a standard platform, the runtime behavior of the diagnostic services is deterministic

Finally, the data process has the distinct advantage that the data for Manufacturing and After Sales Service is of uniform quality due to the fact that it is created in parallel to Engineering/Development.

On the tool side, three tools in particular had to be adapted to suit the new runtime environment from the very beginning: the engineering tester that had just been launched and was already based on the new format (DTS Monaco from Softing), the manufacturing system NSIP (used all over the world in all car manufacturing sites), and the After Sales service tester XENTRY Diagnostics. NSIP is a Daimler-specific development whereas XENTRY Diagnostics is based on a framework that has already been implemented on the basis of a previous version of the ASAM MCD-3D standard. All components are very critical in terms of performance, instabilities and bugs due to their implementation worldwide.

SUCCESS STRATEGY
A multiple-phase procedure was agreed from the outset to be able to ensure project completion:
• Conversion of VCI driver to D-PDU API standard before all other steps
• Proof of Concept phase
• Implementation of the data with engineering tester
• In parallel, the piloting of the modified applications for Manufacturing and After Sales

In the run-up to the implementation of a new VCI (Vehicle Communication Interface, eCOM) the driver layer was converted to the D-PDU API standard. This meant that the old system and a D-Server could work on the same hardware.

A new communication platform can generally only be introduced with a new vehicle project because otherwise all diagnostic descriptions, test sequences and tools would have to be modified during operation. For the new vehicle project, however, this means not only the challenge of implementing a new development, but also of migrating to the new communication platform. This necessitates a fallback which would enable diagnostics if the implementation of the new communication platform should fail. In this case, this was relatively simple because the authoring system for the ECU diagnostic data enables both an export to the old format and to ODX. All that needed to be done was generate both databases for a while. The data for the new vehicle was modified and then exported from the authoring system to the new format for the migration of acquisition control units.

CHALLENGES
A new communication platform can generally only be introduced with a new vehicle project because otherwise all diagnostic descriptions, test sequences and tools would have to be modified during operation. For the new vehicle project, however, this means not only the challenge of implementing a new development, but also of migrating to the new communication platform. This necessitates a fallback which would enable diagnostics if the implementation of the new communication platform should fail. In this case, this was relatively simple because the authoring system for the ECU diagnostic data enables both an export to the old format and to ODX. All that needed to be done was generate both databases for a while. The data for the new vehicle was modified and then exported from the authoring system to the new format for the migration of acquisition control units.

CHALLENGES DURING THE PROJECT
During the project, it became clear that the procedure selected was exactly the right one. All in all, the implementation was on schedule and delivered the right quality. To ensure total adherence some extra functions had to be added to the Softing MVCI-Server. This was necessary because the tools featured some operating sequences which could not be reproduced with the standard. The development methodology selected enabled simple extension implementation.

BUSINESS BENEFITS
• Free selection of tools and suppliers
• Simplified cooperation with other OEMs
• High level of maturity due to several different users
LAB DATA MANAGEMENT USING ASAM ODS
Robert Bosch Engineering and Business Solutions Pvt. Ltd.

FEATURED STANDARD:
ASAM ODS

SUMMARY
Challenge: Bosch has over 350 different validation facilities that cater to various component and system testing needs. The labs are spread across various business units; Diesel systems, chassis systems, power tools, electrical drives, and after market, to name a few. Each lab follows a unique tooling and process methodology for management of their lab and test data. This has resulted in a lot of duplicate and overlapping solutions making it difficult to maintain and improve.

Solution: R&BEI and CI division of Robert Bosch GmbH are jointly working on concepts that will help the Bosch labs to effectively manage the lab data. The overall goal is to provide a single solution for lab and test management across all Bosch labs and extend the solution even to small labs that currently do not have an IT system for lab data management.

Key Benefits:
The test processes and metrics can be reproduced across labs. The efforts and costs involved in development and maintenance of parallel solutions is reduced. Test labs can rely on a solution that is already used and accepted by other labs. Productivity of test engineers is improved as they can use a single solution for various test processes.

SITUATION
The standard lab information management solution (sLIM), has been developed as a lab data management platform based on ASAM ODS. The overall goal is to streamline the common test processes at major test labs in Bosch in order to have a comprehensive lab data management solution. Common rail (CR) test facility at Bosch, India started a pilot phase to evaluate the potential benefits of the solution. After a successful pilot, the solution is now in pilot phase across various labs in other regions including Korea, China and Japan.

A survey of the validation facilities within Bosch indicated that there are over 350 labs that are responsible for testing activities. The labs were spread across geographies in order to cater to the needs of the local market. Many labs have developed their own solution for storing the details of test processes and documents. This approach not only was duplicating the cost and efforts spent on IT across labs but was also leading to islands of solutions, that were specific to domains. Many solutions were so specific to the needs of individual labs that it made the acceptability of solution very low when it was piloted across other domains. Another compelling issue was the lack of huge funds, for small labs in emerging markets such as China and India, for developing a comprehensive lab data management solution.

SUCCESS STRATEGY
The goal was to develop a comprehensive standard lab and test management solution (sLIM) that could be adapted across the various business domains with minimal changes. The approach commenced with the unifying of test processes from multiple labs.

The following were the main focus areas:
- Understand the common test processes across labs
- Understand the tools that were currently in use at the labs
- Use a common data standard for storage and management

A detailed process checklist was prepared by having a focused workshop with representatives from various business units. The most important features were ranked using nominal group technique. After several rounds of focus group workshops, the following common business problem clusters were identified:
- Requirement Management – How to manage test requests?
- Project Management – How to plan projects, test activities and track them to closure?
- Inventory Management – How to plan the equipment and test resource requirements for testing?
- Quality Management – How to ensure quality control?
- Commercials Links – How to control project procurements associated with testing?
- Management reporting – How to generate metrics that are useful for management?

A common scenario that existed in all the labs was the usage of excel sheets with data analysis setup like INCA, LabVIEW, FAMOS etc.

ASAM ODS standard was chosen for the data modelling of the standard lab and test management (sLIM) solution. To begin with, a simple application model on ASAM ODS core data model was used to model the data requirements of various processes in:
- Projects, test organization and tracking
- Management of inventory and test resources
- Search and building lab KPIs
- Integration with post processing

Although, choosing ASAM ODS looked to be an overkill in the beginning, the benefits were soon realized. The application model of ASAM ODS was flexible enough to accommodate major process requirements of the lab.

CHALLENGES DURING THE PROJECT
The process requirements practiced by each lab were different. Modelling the unified processes using a common data model was a difficult exercise. The requirements were so wide and diverse that, satisfying one lab meant opposition to another. A common data model and priority processes was shortlisted based on the requirements of the pilot labs in India. The processes were modelled into the ASAM ODS application model. The processes that were not directly mappable to the ASAM ODS model, took the benefit of ASAM application element, for example custom workflows, feature mapping etc. Based on an incremental approach, the lab clusters are identified and the requirements were modeled into the ASAM ODS model.

BUSINESS BENEFITS
The solution standardized test documentation and offered time saving functionalities like search. It improved the productivity of test engineers. Project management processes, such as calculation of effort overrun, utilization of lab resources, were standardized, automated and made reliable. This in turn helped to improve the project cost estimation. The hardware investment for storage of measurements were reduced through centralized approach along with techniques like compression. The solution has opened up numerous collaboration possibilities between labs, e.g. resource planning made it possible to share resources across labs improving the cost savings for the department. The management could now derive quantitative figures on lab utilization that was necessary to take critical business decisions. Overheads like user trainings were reduced because of a single solution strategy. The solution is now undergoing further improvements to include automation of part tracking. The overall goal of one standardized lab data management solution is finding high acceptance from labs across different business units and ASAM ODS has played a pivotal role in this data centralization strategy.

RAJASHEKAR MB
COMMON RAIL SYSTEM DEVELOPMENT, ROBERT BOSCH INDIA
ASAM ODS: A FOUNDATION STANDARD FOR MODEL BASED SYSTEM ENGINEERING THAT SUPPORTS COMPLETE PRODUCT VALIDATION MANAGEMENT (PVM) ACROSS ALL VEHICLE DOMAINS

PVMsys InfraSolutions Pvt. Ltd.

FEATURED STANDARD: ASAM ODS

SUMMARY

Challenges: Recently, it was observed that every OEM seemed to be facing these following questions:
- How to bring real testing data into the model world from hundreds of different kinds of test rigs with different file and data formats?
- How to connect business information to test data, to convert that data into knowledge?
- How to connect enterprise wide validation knowhow to improve efficiency in overall validation and verification process?

Similar problems were recently addressed by PVMsys, collaborating with a major Japanese luxury car manufacturer. As it was a one-of-a-kind ambitious project, we had to successfully work on a prototype with a team from a single domain. Now, it is on course to being implemented across all vehicle development domains and functions.

Solution: The solution was arrived upon by extending the usage of the ODS standard beyond test life cycle to complete the full validation life cycle. The ODS standard already has standardized test objects, and well defined engineering data types. This was extended with a companywide engineering meta data dictionary to support enterprise wide integration of different functions and domains, as well as complete validation life cycle of one function.

ASAM ODS provides well defined semantics for test, subtest, and measurement, at an abstract level. At the OEM, every group could easily map their test data, and measurement conditions as subtest, and as data on the measurement level.

Key Benefits: Now, the complete enterprise can talk a common engineering meta data language, and can access the data from any domain or function. This helps speed up the complete product development life cycle, and relevant information can be accessed in time, which is necessary to make quick engineering decisions and conclusions.

SITUATION

Most of the automotive OEMs have defined processes to capture key product life cycle data. However, when it comes to validation, every engineer is free to do his own experiment, store data in his own format, utilize tools of his own choice, and store data with limited or practically no business information. This makes it difficult to reuse the test information, as the context of the information is completely missing. This also leads to inconsistencies in the validation process, which in some cases, can be expensive. Some of the OEMs manage their test data, but only for engineers who want to access this data and do analysis. This still only serves the purpose for the engineer in that particular domain or function. The connectivity of one domain or function to others is still missing.

It is common knowledge that in the entire vehicle validation process, many functional groups are involved. On many occasions, there is a need to solve a vehicle problem jointly. Consider, for example, a problem of vibration observed during on-road testing. To identify the root cause of the problem, multidisciplinary teams have to work together from different domains, mainly because the source of vibration can either be the engine, or the structure of the vehicle. When multidisciplinary teams work together, there is a need to exchange data. To pick up the example above, this means that a vehicle testing group will show the logged vibration data. The power train group then checks for some load condition, its combustion data, and the time series ECU data about the engine torque. After combining the data from different domains, they could identify the main source of vibration, which could be because of the sudden torque change for that test condition in the combustion data.

The above scenario clearly indicates the need to exchange data across vehicle domains, to solve a problem collaboratively, and quickly. It also highlights the need for an integration platform that allows engineers from different domains to exchange data without worrying about the source of data. This is possible mainly because of the ASAM ODS standard, which allows storing heterogeneous engineering data. The benefit of ASAM ODS is that the application model, and the defined data semantics allow seamless exchange of data between domains and functions.

CHALLENGES

The initial proof of concept could validate the assumption that the base ODS standard can be the basis for managing product validation data. Nevertheless, the biggest challenge was to define an engineering meta data dictionary for every function group or domain, as they do not have standard nomenclature. An engineering meta data dictionary consists of domain, function, test plan, test type, test condition, measurement characteristic, and measurement points. It is unique for every domain and function group.

SUCCESS STRATEGY

Usually these projects are driven as an IT strategy by the IT team. However, in this case a different approach was followed - an approach that combines engineering domain expertise and adapts IT solution architecture.

We offered domain consulting to map engineering validation knowhow onto the standard validation life cycle process. Initially, a prototype was proposed to capture the key validation processes, and its external interfaces for one of the function groups in the powertrain domain. An important skeleton for an engineering meta data dictionary was created, where key validation meta data like test type, measurement characteristic, measurement condition, and measurement point definition was created. Another crucial strategy was used where standardization could be achieved with minimum additional efforts by the engineer. With just simple catalogues and templates, the engineer could easily organize the engineering meta data and test the data.

In the second phase, the same skeleton was used to map data from different domains and functions. It was also possible to map data to (1) third domains and processes (1); every function group could define their engineering dictionary, which was then integrated on a domain level, and extended up to enterprise level.

For the whole process of implementation, the ODS standard was used. After the implementation, the nomenclature was standardized. With this, quick correlation was possible because of the engineering meta data dictionary. As for the solution finding, we followed a consulting approach. We listened to the customer’s use cases, considering the different domains, and then mapped the use cases using UML models. For that, we used ASAM ODS’ well-defined semantics and application model for test data, and mapped the defined UML diagrams.

CHALLENGES

The biggest challenge in the project was the acceptance by the engineers from the different domains. They perceived their domain and data to be different from the other domains. However, once we mapped the domain data at an abstract level, they understood the benefit.

The second challenge was the effort for the standardization of engineering meta data. Initially, the engineers decided to go with the minimal standardization level, but then gradually extended the standardization level from mid-level to a full standardization level.

Since, this was an enterprise wide initiative (top down approach), a broad level integration strategy was established. Soon after every engineer had grasped the concept of a meta data dictionary, this approach was widely accepted.

BUSINESS BENEFITS

Owing to the high probability of this being the first time any OEM has ever thought of using the base ODS standard to store data beyond the measurement domain, our client can now clearly see the great benefit of this approach to reduce time to market, and to better reuse the data. ODS already provides well defined semantics and application models. These models can easily be extended to store complete validation life cycle data for function groups. Additionally, these individual domains, and function groups can be glued together with a powerful enterprise level meta data dictionary.
ASAM connects:
People | Solutions | Standards

ASAM – Where engineers meet to standardize connections between devices and software applications for seamless data exchange

Co-develop standards with our 190+ member-organizations:

Experience the ASAM Spirit
Be part of a global network of experts who all work together to turn ideas into standards that drive automotive development.

Experience Thought Leadership
Work together with experts on a common vision while broadening understanding on highly relevant industry topics.

Experience Efficiency and Proficiency
Take advantage of a well-organized association, with clearly structured processes and technical expertise – all focused to drive projects to success.

Experience Reliability & Quality
Rely on solutions and standards that are based on joint decision-making by experts – thus increasing industry acceptance, quality and usefulness and reducing likelihood of failure.

More information
www.asam.net

Association for Standardization of Automation and Measuring Systems

LIST OF MEMBERS: OEMs

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www.audi.com

BMW AG
www.bmw.com

DAIMLER AG
www.daimler.com

Ford Motor Company
www.ford.com

General Motors Company
www.gm.com

Hino Motors, Ltd.
www.hino-global.com

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Automobile R&D Center
world.honda.com

Jaguar Land Rover
www.jaguarlandrover.com

MAN Truck & Bus AG
www.man-mn.com

NISSAN MOTOR CORPORATION
www.nissan.co.jp/EN

NISSAN Motor Co. Ltd.
www.nissan-global.com

ADAM OPEL AG
www.opel.com

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VOLKSWAGEN AG
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TIER-1 SUPPLIERS

**BOSCH**
Robert Bosch GmbH
The Robert Bosch GmbH company and its employees are as from the very beginning partners of the ASAM e. V. We are involved in the definition of standards applicable to various topics being related to automotive control units. We will integrate the ASAM standards into our products according to our customers’ wishes.
www.bosch.com

**Continental**
Continental Automotive GmbH
As a leading international supplier of automotive electronics and mechatronics it is essential to fully support industry standards instead of dedicated and proprietary solutions. Especially within the context of calibration, measurement, diagnosis and for distributed OEM-supplier development Continental relies on ASAM standards.
www.continental-corporation.com

**DENSO**
DENSO Corporation
DENSO is one of the largest global automotive suppliers of advanced technology, systems and components, heading toward an automotive society where cars put less drag on the environment and drivers have fewer worries about traffic accidents. Everything we do at DENSO is based on our philosophy: “Contributing to a better world by creating value together with a vision for the future.”
www.globaldenso.com

**Detroit Diesel Corporation**
Detroit Diesel Corporation
For over 88 years, Detroit Diesel has designed and built the heavy-duty engines that fuel commerce and transportation across North America and around the world. Our engines drive a wider range of heavy-duty vehicles. and now we’re offering our own line of axles built with same precise engineering and rock-solid durability you expect from our engines.
demanddetroit.com

**FPT Industrial**
FPT Industrial is a brand of CNH Industrial, dedicated to the design, production and sale of powertrains for on and off-road vehicles, marine and power generation applications. The FPT Industrial sales network consists of 93 dealers and over 900 service centers in almost 100 countries. A wide product offering, including six engine ranges from 31 kW up to 740 kW, transmission parts,  steering column, and joints. Further, NSK supplies a wide variety of bearings, as well as automatic transmission parts, steering column, and joints. Further, NSK supplies a wide variety of bearings, as well as automatic transmission parts, steering column, and joints. Further, NSK supplies a wide variety of bearings, as well as automatic transmission parts, steering column, and joints.

**Hyundai MOBIS**
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As an automotive parts company founded in 1977, Hyundai MOBIS produces and supplies products such as automotive modules, core automotive parts, and after-sales parts, and has been recently ranked fifth among global automotive parts suppliers. Aiming at creating value for the safety and happiness of customers, Hyundai MOBIS is increasing its influence in the automotive parts industry through superior quality and technology.
en.mobis.co.kr

**KEIHIN**
Keihin Corporation
At a time of substantial changes in automobiles and motorcycles, Keihin is evolving with the aim of continuing to lead the world as a “manufacturer of integrated systems.” We are further broadening our old perspective of pursuing the world’s highest quality for individual parts by working on advanced integration of mechanics and electronics to achieve optimization in whole energy management systems.
www.keihin-corp.co.jp

**MTU Friedrichshafen GmbH**
MTU is one of the world’s leading manufacturers of large diesel engines and complete propulsion systems. Together with MTU Onsite Energy, MTU is one of the leading brands of Rolls-Royce Power Systems. Its product range is the widest and most modern in the sector. It covers diesel engines as well as complete propulsion systems for ships, for heavy agricultural, rail and military vehicles, and for the oil and gas industry.
www.mtu-online.com

**NSK**
NSK Ltd.
NSK supplies a wide variety of bearings, as well as automatic transmission parts, steering column, and joints. Further, NSK also make the electric power steering system (EPS), which is ready for the 21st century steer-by-wire technology.
www.nsk.com

**PowerTEQ**
Powerteq LLC
Powerteq produces modules, programmers, and monitors for all major vehicle manufacturers, under the Diablo Sport, Edge Products, and Superchips brands. Powerteq endeavors to produce the highest quality products on the market and delivers them with superior customer and technical support. As leaders in the automotive performance market place, each Powerteq brand delivers unmatched value to customers by providing an extraordinary driving experience.
www.powerteq.com

**ZF Friedrichshafen AG**
ZF is a global leader in driveline and chassis technology with 121 production companies in 26 countries. In 2013, the Group will presumably achieve a sales figure of around €17 billion with 73,600 employees. In order to continue to be successful with innovative products, ZF annually invests about 5% of its sales in research and development. ZF is one of the ten largest automotive suppliers worldwide.
www.zf.com

**Motorenfabrik Hatz GmbH & Co. KG**
Hatz is a specialist in 1 to 4-cylinder diesel engines which are used in all manner of applications, such as construction machinery, compressors and utility vehicles. Besides, Hatz produces components for the automotive industry and systems like pumps, generating sets and scalable electricity stations based on customer demand.
www.hatz-diesel.com

**NIRA Dynamics AB**
Founded in 2001 and headquartered in Sweden, NIRA Dynamics is at the forefront of sensor fusion, providing cost-efficient, value-adding services to the global vehicle industry. Customers include some of the world’s leading car manufacturers, such as Audi, Volkswagen, Seat, Skoda and Renault.
www.niradynamics.com

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TOOL VENDORS

A&D Company, Limited
A&D Company specializes in measurement, control and simulation solutions for powertrain testing and vehicle development. Our open, flexible and cost-effective tools are designed to fit a wide variety of applications, from durability and performance to hardware-in-the-loop simulation and hybrid/electric vehicle development and testing. Our complete range of products includes torque transmitters (wheel, axle, drive plate), FFT analyzers, hydraulic testing systems, data acquisition and control and combustion analysis systems, as well as real-time simulation systems and model-based automated calibrations tools.

Contact: Mr. Eisuke Oguro, Mail: eisuke-oguro@aandd.co.jp

A&D Data Acquisition Products
Type
Software for engine/powertrain test cell automation systems
Functionalities
Automation system for engine/powertrain/EV/HEV test cells
ASAM Standards
ASAM CAT ACI, ASAM AE MCD-3

A&D ORION
Type
Software automated ECU calibration
Functionalities
Automated calibration of ECUs’s on the test bed.
ASAM Standards
ASAM AE MCD-1 CCP, ASAM AE MCD-1 CCP, ASAM AE MCD-3

A&D Real-Time Platforms
Type
Executing Environment for A&D DSP system
Functionalities
Utilizing real-time OS, executing measurement, controls, real-time simulation
ASAM Standards
ASAM AE MCD-1 CCP, ASAM AE MCD-1 CCP

A&D Real-Time Software Development Environment
Type
Development Environment for A&D DSP system
Functionalities
Model Builder, C or Execution Code Generation, GUI Generation, Execution System
ASAM Standards
ASAM AE MCD-2 MC (ASAP2/A2L)

A&D VirtualConsole
Type
Graphical User Interface (GUI) Designer
Functionalities
Arranging GUIs, Measuring values and graphs, linking with external applications
ASAM Standards
ASAM AE MCD-3

Accurate Technologies Inc.
Accurate Technologies Inc. (ATI) is a global, independent supplier of control system development tools headquartered in Wixom, Michigan, USA. ATI’s portfolio of hardware and software products provides easy to use, customizable solutions to accelerate control system design, rapid prototyping, in-vehicle calibration and network analysis.

Contact: Mr. Jeff Smith, Mail: jsmith@accuratetechnologies.com

Canary Interface Module
Type
Interface for CAN and ISO 9141 devices
Functionalities
Pocket-sized CAN Interface for ATI’s VISION Calibration and Data Acquisition system. Communicating via the Universal Serial Bus (USB) connection, its two CAN channels enable communication from ATI VISION software to ATI data acquisition hardware, ECUs for calibration, and other CAN-based products. Use either CAN Channel to bridge data between ATI’s data acquisition hardware, ECUs (using CCP or XCP), or other CAN devices that are compatible with VISION Calibration and Data Acquisition Software. These devices include ATI’s EMX Data Acquisition Series and most third party data acquisition modules.

ASAM Standards
ASAM AE MCD-1 CCP, ASAM AE MCD-2 XCP

CANLab™ Network Analysis Software
Type
Multi-bus Network Analysis Tool
Functionalities
Multi-bus network analysis tool that provides a complete solution for key industry standard network protocols including Controller Area Network (CAN) including J1939 and Local Interconnect Network (LIN) with the support of popular databases and hardware with advanced post analysis included. It can be used to view network activity, send and receive signals or messages, record and replay data, manipulate and analyze data, and check statistics, all in real-time.

ASAM Standards
ASAM AE MCD-1 CCP

DLX Datalogger Module
Type
Data logger, measurement, and interface for CAN and ISO 9141 devices
Functionalities
Offers a unique combination of a CAN interface, data acquisition module, and data logger all in one compact package. Communication channels include CAN, K-line, and LIN that interface to ECUs or communicate with ATI data acquisition hardware.

ASAM Standards
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-3

VISION Network Hub
Type
Interface for CAN and ISO 9141 devices
Functionalities
Rugged interface used to enable synchronous CAN communication between VISION software and memory emulated, CAN CCP, ISO 9141, KWP2000 base controllers, and ATI EMX and EDAQ Data Acquisition modules.

ASAM Standards
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP

VISION™ Calibration & Data Acquisition Software
Type
Measurement and Calibration System
Functionalities
Integrated calibration and data acquisition tool that collects signals from the ECU and external sources, measures relationships between inputs and outputs, enables real-time calibration and modification of closed loop control systems, time aligns and analyzes all information, manages calibration data changes, and programs the ECU. VISION works with legacy systems or tools including those that follow the ASAM standard. Convert files to/from VISION for data sharing or, in many cases, use hardware supplied by other vendors. For the physical access to ECUs, VISION supports the full range of hardware interfaces.

ASAM Standards
ASAM AE CDF, ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-3
AMIUM GmbH
Your partner for gas analysis, signal processing and automation.
Contact: Andreas Schwentner, Mail: info@amiium.at

AMS GmbH
AMS is the specialist for measurement and analysis of engineering data, especially data from test and simulation. The award-winning data processing software jBEAM is a platform-independent tool for data acquisition, analysis and visualization. AMS is intensively committed in the CEA and ODS standards.
Contact: Mr. Bernhard Sünder, Mail: bernhard.suender@AMSonline.de

AMS-ATF Importer/Konverter
Type CEA Component
Functionalities Import/export of ODS-ATF files, including extensive checking functionality
ASAM Standards ASAM CAT ODS

jBEAM
Type CEA Framework for desktop usage
Functionalities Complete area of data import, data analysis, and data visualization
ASAM Standards ASAM CAT CEA, ASAM CAT ODS

jBEAM-Web
Type Library for web-based applications
Functionalities Complete area of data import, data analysis, and data visualization
ASAM Standards ASAM CAT CEA, ASAM CAT ODS

MaDaM
Type Web-based test and measurement data management system
Functionalities An indexing technology based MDM system without the need of a relational database. A web-based user interface (HTML5) allows the usage of modern smart devices. Manual and automatic import of files, supporting nearly all data formats incl. MDF4, ATFX, Diadem, Excel. Server based reporting and interactive analysis. Analysis features can be extended by ASAM-CEA components.
ASAM Standards ASAM CAT CEA, ASAM CAT ODS, ASAM COMMON MDF

TesteeM
Type Test Automation
Functionalities Test management software for developing and executing test sequences. Sequences can be configured graphically using Petri-net theory, which allow to analyse the defined sequences. Full multithreading for parallel execution flows. Test steps can be programed with Groovy scripting language. Integrated online visualization (extendable by ASAM-CEA components) and flexible reporting features. Test results can be exported in ATFX or MDF4 file formats. Multi language aware.
ASAM Standards ASAM CAT CEA, ASAM CAT ODS, ASAM COMMON MDF

Apicom S.p.A.
Apicom designs and develops test equipment for motorcycles, automotive industries, engine manufacturers, and offers a complete range of products and services, providing state-of-the-art cost effective systems.
Contact: Mr. Roberto Iovacchini, Mail: riovacchini@api-com.com

Horus
Type Software
Functionalities Test bed software automation
ASAM Standards ASAM CAT ODS

APTJ Co., Ltd.
APTJ provides AUTOSAR based software platforms for automotive control systems. Our products are developed upon the study conducted by Nagoya University which have been installed on the H-IIB rockets. Our future development plan extends to autonomous driving and dynamic mapping technology. We provide leading edge technology and efficient support.
Contact: Mr. Hiroyuki Takashima, Mail: hiroyuki_takashima@aptj.co.jp

Jullinar
Type AUTOSAR-based software platform which includes implementation of the XCP slave
Functionalities Our software solution, Jullinar, is based on AUTOSAR Classic Platform R4.2.2 with various optimizations and enhancements. Consists of: Basic Software Modules including xcp which supports the XCP Slave features, Runtime Environment which supports measurement and calibration using the XCP protocols.
ASAM Standards ASAM AE MCD-3 XCP

ArcCore AB
Being one of the vendors providing AUTOSAR products to the automotive market, we bring a new way of developing and offering state-of-art products and services to the market. It can easily be described in three words: Standards, Open and Innovative.
Contact: Mr. Michael Svenstam

BSWBuilder
Type Tool
Functionalities Configuration of Autosar BSW
ASAM Standards ASAM AE MCD-2 MC (ASAP2/A2L)
Australian Semiconductor Technology Company
ASTC is a design partner to the global electronics supply chain, from semiconductor, IP, and software vendors, to software, OEM, and systems companies.

Contact: Mr. Ad Peeters, Mail: ad.peeters@astc-design.com

Autient, Inc.
Autient is an engineering services company specializing in automotive ECU software development and test systems.

Contact: Mr. Tom Zagotta, Mail: tom.zagotta@autient.com

AVL LIST GMBH
AVL is the world largest privately owned and independent company for the development of powertrain systems with internal combustion engines as well as instrumentation and test systems.

Contact: Dr. Gerald Sammer, Mail: gerald.sammer@avl.com

CAMEO calibration environment
Type: Software for the automated calibration of combustion engines and transmissions
Functionalities: Online control of the calibration process and offline global modeling
ASAM Standards: ASAM CAT ACI, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-3

CONCERTO Data Postprocessing Software
Type: For interactive & automated data postprocessing in automotive application
Functionalities: Data format conversion & management, data analysis, calculation & visualization
ASAM Standards: ASAM CAT CEA, ASAM CAT ODS

CRETA™ Calibration Data Browser
Type: Calibration Data Browser
Functionalities: The AVL CRETA Calibration Data Browser allows calibration engineers of engine and transmission control units to interactively visualize any control unit maps, curves and parameters while studying or reading the application note of a control unit.
ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L)

CRETA™ Calibration Data Management
Type: Enterprise Calibration Data Management for engines, transmissions and hybrid.
Functionalities: As a central calibration data management system of xCU parameters, AVL CRETA™ allows the central storage, conflict-free merging and traceable documentation of calibration datasets during series calibration projects.
ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L)

iGEM Offline
Type: AVL iGEM Offline test data evaluation is an innovative solution for efficient data analysis of exhaust emission tests according to legislative demands
Functionalities: iGEM Offline includes a series of effective tools and offers the possibility for authorized users to change or expand an existing record configuration. The Formula Editor helps to change calculation variables and formulas and add them into the database. The configuration can be adapted to comply with new legislation or modified technical conditions. Report templates can be created and modified easily via drag and drop operations in the Report Layout Editor. Several different types of reports can be created besides the typical standard reports such as online and modal reports; specimen, equipment and consumable data record sheets; statistics COP and audit reports; testing series reports and also combinations of different types of reports.
ASAM Standards: ASAM CAT ODS

PUMA Open Test Bed Automation
Type: Software for test bed automation for stand alone and networked environments
Functionalities: Automation system for engine, transmission/powertrain and chassis dyno test beds
ASAM Standards: ASAM CAT ACI, ASAM CAT CEA, ASAM CAT GDI, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-3, ASAM CAT ODS

SANTORIN Data Management Server
Type: Software for ASAM ODS compliant data storage, access and exchange
Functionalities: ODS Server for ODS data models, ODS data browser & Admin clients
ASAM Standards: ASAM CAT ODS

Test Factory Management Suite (TFMS)
Type: Process data management software for test fields
Functionalities: Test request handling, test equipment management, scheduling of resources, UII Management, reporting, utilization optimization
ASAM Standards: ASAM CAT ODS

TestGate
Type: Web based software for remote monitoring of test fields
Functionalities: Graphical overview of the test field, overview of test beds and online values
ASAM Standards: ASAM CAT ODS
b-plus GmbH

b-plus GmbH was founded 1996 in Deggendorf and is specialized as an innovative system provider with state-of-the-art technologies in the business segments automotive, automation and embedded system solutions. Equipped with long experience and profound know-how in project and product area, like industrial networking, design of complex control system software or the design of embedded µController and PC hardware solutions, several development teams realize qualified solutions for challenging industrial and automotive applications. We consider ourselves as a competent full service provider beginning with professional consulting through the conception and management phase of a project up to its realisation. Thus we are a professional partner of our customers commencing at the development phase to the series production and the system integration.

Contact: Mr. Alexander Noack, Mail: alexander.noack@b-plus.com

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BASELABS GmbH

The BASELABS GmbH is focused on the data fusion in multiple sensor scenarios. We provide software and consulting services for the implementation of advanced driver assistance systems (ADAS) and automated vehicles. The design of environment perception algorithms and the convenient provision of these algorithms to our customers is a key part of our offering. Exemplary customers are Bosch, Denso and Daimler.

Contact: Mr. Norman Matters, Mail: norman.matters@baselabs.de

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Beijing Rainfe Technology Ltd.

Beijing Rainfe Technology Ltd. was founded in 2007. It is one of the top ten PLM solutions providers in China (according to Cimdata report 2010). The company focuses on design/simulation and testing solutions through its enterprise software platform and engineering tools. Beijing Rainfe’s projects come from the aerospace, marine, defense, auto, and energy industries.

Contact: Ms. Jinji Liu, Mail: bji@rainfe.com

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BETA CAE Systems International AG
BETA CAE Systems offers state-of-the-art CAE solutions that meet the requirements of all simulation disciplines, for many sectors, including the automotive motorsports and aerospace. The company’s products, ANSA pre-processor, Epylis solver, µETA post-processor, and SPDRM simulation-process-data-and-resources manager, hold a worldwide leading position.
Contact: Dr. Sam Saltiel, Mail: ansa@beta-cae.com

**ANSA/META suite**

**Type** Pre- & Post-processing for FEA & CFD simulation and test.

**Functionalities**
- META provides an embedded ASAM ODS browser specifically designed to ensure flexibility, performance and ease of use in navigating and querying ASAM ODS data sources. It provides an overview to the data hierarchy included in the data model and a powerful query tool for retrieving data from the server. The wide range of tools in META for assisting NVH testing through the selection of suitable measurement and excitation locations along with the various specific plot types such as Campbell diagrams, and the output of geometry in ATFX format from ANSA, enable our software suite to easily fit in a development cycle process which includes test and simulation. All functionality is also available through scripting thus, allowing the full automation of tasks involving interaction with ASAM ODS data sources.

**ASAM Standards** ASAM CAT ODS

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Brüel & Kjær Sound and Vibration A/S
Brüel & Kjær is a world-leading manufacturer and supplier of sound and vibration measurement systems. Our focus areas are automotive businesses, ground transportation, aerospace, space, defense, airport environment, urban environment, telecom and audio. Brüel & Kjær has an unparalleled portfolio of sound and vibration measuring equipment and is a renowned deliverer of innovative instrumentation solutions.
Contact: Mr. Torben Nielsen, Mail: torbeng.nielsen@bksv.com

**ASAM ODS Connectivity**

**Type** B605

**Functionalities** Data exchange using ATFX/XML format

**ASAM Standards** ASAM CAT ODS

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CAETEC GmbH
CAETEC is one of the leading company’s in developing data acquisition hardware like data loggers and measuring devices for automotive testing. The ARCOS data logger family is the most powerful and flexible data logger for fleet testing. The CLIC devices are the newest and fastest data acquisition modules for analogue signals in vehicles.
Contact: Mr. Stephan Bacher, Mail: bacher@caetec.de

**ARCOS**

**Type** data logger

**Functionalities**
- CCP/XCP measuring on CAN & Flex Ray

**ASAM Standards** ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX)

**µCROS**

**Type** data logger

**Functionalities**
- CCP/XCP measuring on CAN & Flex Ray

**ASAM Standards** ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX)

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Canoo Engineering AG
Canoo Engineering AG is a software company specialized in custom solutions and consulting on the Java and web platform. Canoo focuses on user experience design, UI engineering, and development of omni-channel business applications. Canoo is a founding member of the openMDM® working group, an open-source platform and toolbox for management of measurement data based on ASAM ODS. Canoo also develops general ASAM ODS solutions.
Contact: Mr. Hans-Diark Walter Mail: hans-diark.walter@canoo.com

**openMDM committer & service provider**

**ASAM Standards** ASAM CAT ODS
CMORE Automotive GmbH

We are experts in the development of new systems in the field of vehicle electronics as well as the validation of sensor-based driver assistance and safety systems. At our facilities in Lindau (Bodensee) and Böblingen, our range of services encompasses not only embedded software development, we also execute complex projects for our customers, and manage them throughout the entire product development process, from prototyping and testing to series production. A key focus in the development of the automotive branch is highly-automated an autonomous driving. With our expertise and know-how we thrive to become one of the pioneers of autonomous driving.

Contact: Mr. Gregor Matenaer, Mail: gregor.matenaer@cmore-automotive.com

PODBOX

Type Diagnosis ECU

Functionalities The multifunctional platform for the automated reporting of test drives, as well as a measurement and diagnostic unit. Its compact design combined with its numerous interfaces permits the PODBOX to be used in the laboratory and also in the vehicle. A highlight of the PODBOX is its independence from operating system, as all data are accessible via a web browser.

ASAM Standards ASAM AE MCD-2 D (ODX)

Cognitran Ltd.

Cognitran provide the tools that help companies gain control over complex business activities and provide innovative ways to deliver product-specific and market-specific information to end users via the Internet. Our systems deliver cost efficiencies by re-using data across multiple information types and programs with an advanced linguistic tools minimising translation costs. All solutions are built on non-proprietary and modular XML technology using advanced software and techniques. Existing work has met industry-wide acclaim for the use of pioneering technology and our customer base includes many global manufacturing companies. Through our core products we deliver an end to end solution for OEM publication requirements 1. ISIS – a fully integrated online AfterSales Package, incorporating maintenance and repair documentation, diagnostics and service history. 2. Blaise – a comprehensive document creation and management system which simplifies content re-use and gives you total control over the creation, translation and publishing process.

Contact: Mr. Ben Schneider, Mail: ben.schneider@cognitran.com
Control-Tec LLC  
Established in 2009, Control-Tec is a start-up technology-based company specializing in vehicle data acquisition systems & custom analysis software for the light and heavy-duty transportation industries. Our Vehicle Data Recorders record data in near real-time from the vehicle and upload the data via cellular from all over six continents.

Contact: Mr. William Leisenring, Mail: bleisenring@control-tec.com

CT-1000  
Type: Data Logger
Functionalities: Vehicle Data Acquisition & Telematics
ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MDX

Qualifier  
Type: Automated Vehicle Validation Service
Functionalities: Data Acquisition & Analysis, Telematics, Cloud
ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MDX

CPAC Systems AB  

Contact: Mr. Marco Monzani, Mail: marco.monzani@cpacsystems.se

CSM Computer-Systeme-Messtechnik GmbH  
Computer-Systeme-Messtechnik GmbH is a leading and innovative manufacturer of mobile measurement technology and data acquisition systems. For more than 30 years, we have been setting benchmarks in the field of automotive measurement technology with our products being successfully applied by almost all manufacturers of passenger cars and commercial vehicles as well as their suppliers and service contractors worldwide. Our measurement modules and data loggers have been proven to be very reliable for developing and testing new vehicles and their components, even under most demanding environmental conditions. Given the continuous demands on measurement technology CSM is constantly facing new challenges, like, for example, currently in the fields of electric and hybrid vehicles (e-mobility). Continuous innovation in combination with long-term satisfied customers are the two key factors for our success now and in the future.

Contact: Mr. Christoph Höhleis, Mail: info@csm.de

INCA AddOn  
Type: SW AddOn for ETAS INCA Development Tool
Functionalities: Configuration and handling of CSM MiniModules in INCA
ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L)

Cybermetrix Inc.  
CyberMetrix is an engine test technology and services company. Complete delivery from built-for-customers test cell facility and equipment design, integration, commissioning, as well contract testing services using our high-end labs, including world’s highest thermal capacity cold test facility.

Contact: Mr. Bruce Thomason, Mail: bthomason@cybermetrix.com

CyFlex  
Type: Test bed automation
Functionalities: High-end data acquisition and controls, intelligent instrument integration, enterprise features.
ASAM Standards: ASAM AE MCD-3, ASAM ASAP3

Mach  
Type: Test data analysis
Functionalities: Centralized and traceable engine analysis for modular complex products such as engines and vehicles, enterprise features.
ASAM Standards: ASAM CAT ODS

Danlaw Technologies India Limited  
Danlaw Technologies India Limited (DTIL) is established in the year 1999. DTIL specializes in providing the automotive testing solutions, automotive electronic control unit testing and developing automated testing tools. DTIL has expertise in development of products such as Ms. Suite (embedded software verification and validation tool), Diagnostic and Physical layer testing automation Tools, Portable Programmable Device and Datalogger (Telematics). DTIL also provides services such as CAN, LIN, Ethernet protocol testing using standards such as GMW14241, GNW1110, GDDS, ISO11898, ISO14229.

Contact: Mr. Prabhakar Emamy
Dassault Systèmes
Dassault Systèmes, the 3DEXPERIENCE Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes’ collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. For more information, visit www.3ds.com.
Contact: Mr. Tim Webb, Mail: tim.webb@3ds.com

DEWETRON GmbH
DEWETRON is specialist for universal test and measurement systems. The company is headquartered in Graz and develops, produces and sells high precision and sophisticated measurement solutions all over the globe. We provide state-of-the-art solutions for a wide range of industries focusing on the core markets of automotive, energy & power analysis, transportation, aerospace and general measurement engineering.
Contact: Mr. Raimund Trummer, Mail: raimund.trummer@dewetron.com

DSA Daten- und Systemtechnik GmbH
Being an innovative partner for the automotive industry, DSA develops hardware and software solutions for enabling diagnostic and data logistic processes at all stages of the vehicle lifecycle. The DSA portfolio ranges from offline and over-the-air flash programming and coding of ECUs to guided repair, MSG solutions, and remote diagnostics for vehicle fleets. The DSA Skylyze platform offers customized Big Data analytics for vehicle manufacturers and other manufacturing domains. Currently more than 400 employees are working for DSA at subsidiaries all over the world. DSA is market leader and has been repeatedly awarded by major OEMs. DSA systems are operated in 29 countries, 175 car plants, and 30,000 workshops all over the world.
Contact: Mr. Tobias Katz, Mail: Tobias.Katz@dasa.de

Authoring Guidelines & Process Setup
Type Consulting & Technical Documentation
Functionality Interested in setting up ODX- and/or OTX-based diagnostic processes within your organization? We have all the necessary know-how to define efficient and streamlined processes for all process participants starting with the supply chain and covering engineering, production, service and the independent after market. We document your processes, define and specify the necessary authoring guidelines for ODX and OTX and help your tool suppliers to implement process and guidelines into the tools. Please ask for our project references.

ASAM Standards
ASAM AE MCD-2 D (ODX), ASAM AE MCD-3, ASAM AE MCD-3 D

Firmware Update over-the-Air (FOTA)
Functionality With the DSA connected vehicle solution, software updates and configuration can be pushed to the vehicle “over the air” at any time. The vehicle health status is transmitted over wireless networks to a Connected Vehicle Server, which contains the current configuration of the vehicle together with performance indicators and error codes. Flash files are reconstructed based on the deltas of the current configuration and an up-to-date configuration matrix. All changes can be applied using the infotainment unit or vehicle connectivity gateway as a diagnostics tester, which performs flash programming and configuration to all ECUs. With firmware updates over-the-air (FOTA) campaigns no longer require expensive recalls and problems can be proactively corrected in the field. More cars will receive safety-critical updates because customers do not have to spend time taking the car to the workshop. With over-the-air configuration, it is possible to provide on-demand activation of features based either on additional customer purchases or changes on customer profile.

ASAM Standards
ASAM AE MCD-3 D

PRODIS.Authoring
Type Diagnostic Data and Application Authoring Tool
Functionality PRODIS.Authoring is a full-fledged authoring environment to edit, maintain, test and release all your diagnostic data and applications for dealerships and workshops. Its elaborate ODX import functionality and graphical test application authoring capabilities - including OTX support - make it the number one authoring tool for service diagnostics worldwide. Apart from the support of these cutting edge standards, it comprises features for the integration of technical documentation (RMI - Repair & Maintenance Information), wiring diagrams, part locators, repair videos etc. Its module to author and maintain helpful guided diagnostics has received astonishing market attention. With PRODIS.Authoring you provide vehicle platform data releases to be executed in our lean and fast service diagnostic runtime system PRODIS.RTS with one button click. A key feature of PRODIS.Authoring is its elaborate support for variant management in the life-cycle of your vehicle platforms.

ASAM Standards
ASAM AE MCD-2 D (ODIX), ASAM AE MCD-3, ASAM CAT GDI

PRODIS.Automation
Type Authoring tool for engineering and production diagnostic, flash programming and configuration applications
Functionality PRODIS.Automation is the most advanced solution for the graphical authoring, maintenance and release of diagnostic, flash programming and configuration applications for your engineering and production purposes. It comprises our renown ODX Browser, which allows for the efficient drag&drop implementation of sequences, also compliant to the new OTX standard. Interfaces for vehicle communication (ASAM MCD-3D) as well as test stand and test equipment integration (ASAM GDI) are integrated into the tool. PRODIS.Automation ships with an integrated version and configuration management solution, ideally supporting team collaboration and traceability of all changes.

ASAM Standards
ASAM AE MCD-2 D (ODIX), ASAM AE MCD-3, ASAM AE MCD-3 D, ASAM CAT GDI

PRODIS.OET
Functionality With PRODIS.OET you can interactively test your ODX data against an ECU (prototype) or against simulations. The testing of partially integrated vehicle electronics is also supported. All tests and test results are recorded and can be reported in different formats, e.g. for exchange with the ECU developer or for archiving. The automatic repetition of previous tests as well as the monitoring and analysis of all ongoing bus communication are key features of the tool. And if you want to
integrate your parameterized ODX services and jobs into test sequences: Just drag them out of OET and drop them in a graphical PRODIS Automation or PRODIS Authoring test sequence. Naturally, PRODIS.OET comprises our renown implementation of the ASAM MCD-3D standard PRODIS.MCD.

**Type:** Diagnostic Kernel

**Functionalities:** Consistently and efficiently shipping diagnostic data, including ODX and OTX data, to the field (e.g. to service technicians or dealerships) has become a key challenge. PRODIS.MCD has the capability to operate on ODX data of all three major released versions (2.0.1, 2.1.0, 2.2.0) of the ODX standard, even if multiple files of different standards are mixed within one project! To ensure safe and fast distribution of the ODX data to testers in the field (pilot, production, service) PRODIS.MCD ships with an intelligent data converter that releases a very compact binary file. With respect to VCI integration, PRODIS.MCD can integrate VCIs compliant to the ISO 22900-2 D-PODU API standard as well as VCIs compliant to the SAE J2534-1 standard. PRODIS.MCD is part of our extensive diagnostic test suite PRODIS, but can also be licensed as a separate product for integration into your diagnostic tool chain. By the way - this product is also DoIP-ready!

**ASAM Standards:**

- ASAM AE MCD-3
- ASAM AE MCD-3 D

**PRODIS.MCD Type:** Diagnostic Kernel

**ASAM Standards:**

- ASAM AE MCD-3
- ASAM AE MCD-3 D

**Remote Diagnosis and Telematics**

**Functionalities:** Monitoring of construction as well as agricultural vehicles and transportation fleets to detect defective systems or critical situations saves time and money. Determined real-time monitoring of working machines and commercial vehicles can be used to optimize fleet management. DSA provides hardware and software platforms for telematics and remote diagnosis independent of the vehicle type and manufacturer as well as the integration of existing standalone Internet of Things (IoT)-based solutions. DSA telematics units enable for transmission of fleet management data like GPS position, driving speed, and machine parameters, information on state and drive, parameters of sensor systems (brake pressure, coupling sensor, door lock, freight, etc.) as well as information about cooling aggregate/sections of refrigerated trucks (temperature etc.).

**ASAM Standards:**

- ASAM AE MCD-3 D

**dSPACE GmbH**

dSPACE stands for complete development systems for electronic controls in automotive, aerospace and mechatronics. dSPACE systems are used in R&D applications in industry and universities where fast time-to-market and sold results are key requirements. Typical applications are system and software architecture design, rapid control prototyping, automatic production code generation, hardware-in-the-loop simulation and calibration.

**Contact:** Mr. Jobst Richert, Mail: asam@dspace.de

**AutomationDesk**

**Type:** Automated testing for hardware-in-the-loop (HIL) simulation

**Functionalities:** AutomationDesk is a powerful front-end tool for automated testing of the application software or diagnostic functions of electronic control units (ECUs).

**ASAM Standards:**

- ASAM AE HIL
- ASAM AE MCD-3 D
- ASAM AE MCD-3 MC
- ASAM AE XIL
- ASAM AE XIL-NA
### ControlDesk Next Generation
- **Type:** Experiment and instrumentation software for ECU development
- **Functionalities:**
  - The software includes functionalities for laying out experiments, instrumentation, measurement, post-processing, ECU calibration, as well as diagnostics access. It offers synchronized data capture across ECUs, RCP and HIL platforms, and bus systems, and has an integrated project and experiment management.

### dSPACE ECU Flash Programming Tool
- **Type:** ECU flash programming
- **Functionalities:**
  - Software for programming the ECU flash memory via XCP on CAN, XCP on Ethernet, various types of on-chip debug ports like JTAG/NEXUS, NB/D/AUD, JTAG/OCIS, DAP and JTAG/SID and the dSPACE Generic Serial Interfaces GS1 and GS2.
  - ASAM Standards: ASAM AE MCD-1 XCP

### dSPACE Ethernet Configuration Package
- **Type:** Hardware-in-the-loop (HIL) simulation
- **Functionalities:**
  - Convenient software tool for configuring a dSPACE system as a simulation node in an Ethernet network. It relies on network data available in a FIBEX representation.
  - It is also used to generate the communication code and controller configuration.
  - ASAM Standards: ASAM AE MCD-2 NET (FIBEX)

### dSPACE FlexRay Configuration Package
- **Type:** Hardware-in-the-loop (HIL) simulation and rapid control prototyping
- **Functionalities:**
  - Convenient software tool for configuring a dSPACE system as a simulation node in a FlexRay network. It relies on network and scheduling data available in a FIBEX or AUTOSAR representation. It is also used to generate the communication code and controller configuration.
  - ASAM Standards: ASAM AE MCD-2 NET (FIBEX)

### dSPACE XCP Service
- **Type:** XCP service to be implemented on the ECU
- **Functionalities:**
  - ECU service code for XCP on CAN and Ethernet (TCP/IP, UDP/IP) supporting measurement, calibration, bypassing and ECU flash programming.
  - ASAM Standards: ASAM AE MCD-1 XCP

### Platform API Package
- **Type:** Package of application programming interfaces (API) for accessing simulation platforms
- **Functionalities:**
  - Program interfaces in .NET and Python for reading, writing, stimulating and capturing model variables on dSPACE real-time platforms.
  - ASAM Standards: ASAM AE HIL, ASAM AE XIL, ASAM AE XIL-MA

### RTI Bypass Blockset
- **Type:** Rapid control prototyping (primarily bypassing) and hardware-in-the-loop (HIL) simulation
- **Functionalities:**
  - Simulink® blockset providing ECU read and write access from dSPACE real-time platforms via different kinds of ECU interfaces such as CCP, XCP, DPMEM PODs or on-chip debug ports. The blockset is especially designed for the dialog-based configuration of bypass applications. It allows ASAM MCD-2 MC (ASAP2) files to be imported and ECU variables to be selected via a convenient browser. It handles conversion formulas and the selection of bypass hooks automatically. In addition, the RTI Bypass Blockset supports on-target (internal) bypassing, allowing the bypass model to be compiled and downloaded directly into the free flash memory and RAM of the target ECU. For this, model parameters and signals are automatically added to the ECU’s ASAM MCD-2 MC (ASAP2) file.
  - ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/2L)

### SystemDesk
- **Type:** System and software architecture development
- **Functionalities:**
  - SystemDesk supports the development of software architectures and distributed automotive electrics/electronics (E/E) systems. Such systems can be modeled according to the AUTOSAR standard. Existing communication matrix files can be imported into SystemDesk to specify network communication. When AUTOSAR software components are modeled or imported in SystemDesk, available ASAM MCD-2 MC (ASAP2) models can be imported as well. During generation of the AUTOSAR run-time environment (RTE) and virtual ECUs (V-ECUs), ASAP2 file generation is also performed for variables that are tagged for calibration and measurement according to the AUTOSAR concept. When V-ECUs are built, instances of the CXP service (XCP on Ethernet - TCP/IP) are implemented in the V-ECU code. Thus, the V-ECUs and variables described in the ASAM MCD-2 MC (ASAP2) files can be accessed during simulation.
  - ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-2 MC (ASAP2/2L), ASAM AE MCD-2 NET (FIBEX)

### TargetLink
- **Type:** Production code generation (for ECU development)
- **Functionalities:**
  - TargetLink is a software system that generates production code (C code) straight from the MATLAB®/Simulink®/Stateflow® graphical development environment. The C code generation options range from plain ANSI C code to optimized fixed- or floating-point code for AUTOSAR platforms. Versatile code configuration options ensure that the production code copes with processor constraints. Converting graphical models directly into production code ensures perfect consistency between model and code at all times. Since the same model will always result in the same proven code, TargetLink’s code generation is deterministic and thus guarantees the highest software quality. Every step can be tested against the specification via the built-in simulation features.
  - ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/2L)

### Variable Editor
- **Type:** Variable description file editor
- **Functionalities:**
  - Convenient tool for visualizing, editing and creating ECU description files according to the AE MCD-2MC standard.
  - ASAM Standards: ASAM AE MCD-2 MC (ASAP2/2L)

### VEOS
- **Type:** PC-based simulation platform for ECU development
- **Functionalities:**
  - VEOS is a PC-based simulation platform for virtual validation in the development of electronic control units (ECUs) and systems. VEOS is used in the early development stages to simulate a wide range of models – function models, virtual ECUs, bus systems, and vehicle models – independently of the simulation hardware.
  - ASAM Standards: ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/2L), ASAM AE XIL-MA
**List of Members & ASAM Related Products**

**Application Stories**

**ASAM Standard Portfolio**

**About ASAM**

**Contact & Imprint**

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**DTS INSIGHT CORPORATION**

DTS INSIGHT CORPORATION is engaged in designing and development of microcomputer, peripheral system and others to providing consulting and tools that help Japanese and international companies improve the development process for embedded product. We can provide ECU measurement tools, software development environments, ICE, debugger, and CAN/Serial programmer.

Contact: Mr. Tadaoki Sueyama, Mail: info-mvi@dts-insight.co.jp

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**ASAM Standards**

- **ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (ODX)**
  - Functionalities: Versatile/high-speed flash on-board programmer for both small production line and large production line that can support both stand-alone and network control.
  - Type: Programmer (CAN/Serial)
  - ASAM Standards: ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (ODX)

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**E.S.R. FIBEX Tools**

- **Type**
  - Product

- **Functionalities**
  - FIBEX editor, FIBEX library

- **ASAM Standards**
  - ASAM AE MCD-2 NET (FIBEX)

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**E.S.R. ODX Tools**

- **Type**
  - Product

- **Functionalities**
  - ODX editor, ODX library

- **ASAM Standards**
  - ASAM AE MCD-2 D (ODX)

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**eGlue Technologies Srl**

eGlue Technologies is an Italian SME founded in 2008 by a group of engineers with academic and industrial experience. eGlue Technologies designs and develops innovative software platforms for automotive and industrial applications. The focus of the company is the research of new technologies and paradigms to design and develop complex systems in a simple way. Besides the solid experience in embedded software development, the team has a detailed understanding of all the latest platforms, tools and industry standards.

Contact: Mr. Alessandro Miglietti, Mail: alessandro.miglietti@eGlueTechnologies.com

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**Electrobbit Automotive GmbH**

Electrobbit (EB) establish itself among the key suppliers of embedded automotive software solutions. Apart from the development of future-oriented products, the company also specializes in services and consulting for the automotive industry, supplying serial-software-solution implementations for a broad range of AUTOSAR and FlexRay, Infotainment, Navigation, HMI and Driver Assistance systems.

Contact: info.eautomotive@electrobbit.com

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**EB tresos Busmirror**

- **Type**
  - Rest Bus Simulation Solution

- **Functionalities**
  - EB tresos Busmirror is able to emulate missing FlexRay nodes in the network (rest bus simulation). This allows developers to test their own ECU software performance in interaction with emulated ECUs and to simulate potential error scenarios. Functions can be processed on the hardware in real-time using target user-modules.

- **ASAM Standards**
  - ASAM AE MCD-2 NET (FIBEX)

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**EB tresos Designer**

- **Type**
  - Network design tool for AUTOSAR based embedded systems

- **Functionalities**
  - The EB tresos Designer is a versatile system design tool for the generation of CAN and FlexRay network configurations. Powerful wizards support the configuration of the interdependent protocol parameters and immediately highlight parameter constraint violations. Standardized exchange formats like ASAM MCD-2 (FIBEX)
### Application Stories

#### EB tresos Inspector

**Type:** Measuring and analysis tool in FlexRay and CAN networks

**Functionalities:** EB tresos Inspector seamlessly integrates both FlexRay and CAN bus systems. Measurements are displayed in frame and signal analysis windows. It can be used for gateway and run-time analysis and entails various signal display instruments such as bar and pointer instruments as well as y-t oscilloscopes.

**ASAM Standards:** ASAM AE MCD-2 NET (FIBEX)

#### EB tresos Studio

**Type:** Basic Software Configuration for AUTOSAR Modules

**Functionalities:** EB tresos Studio is a feature-rich configuration environment for basic software components in accordance with AUTOSAR. It allows to configure, validate and generate basic software in an easy-to-use graphical user environment. Through its open interfaces it can be extended with customer-specific software modules. Consequently, legacy parameter descriptions, like BDC, LDF or OIL, can be imported as well, making it the ideal tool for company-wide software deployment.

**ASAM Standards:** ASAM AE MCD-2 NET (FIBEX)

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### ASAM Standards

- **ASAM AE MCD-2 NET (FIBEX)**
- **ASAM AE MCD-2 D (ODX)**
- **ASAM AE MCD-3 D**

### e motive

**e motive OTX/PTX-Viewer Firefox Addon**

- **Type:** Firefox Addon
- **Functionalities:** The emotive OTX/PTX-Viewer Firefox Addon gives the user the opportunity to view and analyze single OTX files as well as whole OTX projects (PTX) in a very easy and convenient way without a lot of requirements and installation effort. The only requirement is the well-known Mozilla Firefox Browser. The following section describes the installation and usage of the OTX/PTX-Viewer.

**ASAM Standards:** ASAM AE MCD-2 D (ODI)

### Emotive GmbH & Co. KG

**Emotive OTX-Runtime-API**

- **Type:** Software Library
- **Functionalities:** The OTX-Runtime-API provides client applications with easy, fast and reliable access to OTX data model. The main task is loading of OTX projects, browsing the structure and executing of procedures.

**ASAM Standards:** ASAM AE MCD-2 D (ODI)

### Esterel Technologies GmbH

**Esterel Technologies SCADE**

- **Type:** Software development environment
- **Functionalities:** SCADE solutions support software engineers in the critical systems and software development space, by graphically designing, verifying and automatically generating C and C++ code. Esterel Technologies SCADE product solutions easily integrate, allowing for development optimization and increased communication among team members.

**ASAM Standards:** ASAM AE MCD-2 C (ASCAP2/A2L)

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**Enable the further use of the generated communication matrix in other COTS tools and the whole EB tresos product family, e.g. EB tresos Studio or EB tresos Inspector.**

**Emotive OTX-API**

- **Type:** Software Library
- **Functionalities:** The OTX-API provides client applications with easy, fast and reliable access to OTX data model. The main task is loading of OTX projects and the editing and validating of OTX procedures.

**ASAM Standards:** ASAM AE MCD-2 D (ODI), ASAM AE MCD-3 D

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**Emotive OTX-Viewer**

- **Type:** Software Library
- **Functionalities:** The OTX-Viewer Firefox Addon gives the user the opportunity to view and analyze single OTX files as well as whole OTX projects (PTX) in a very easy and convenient way without a lot of requirements and installation effort. The only requirement is the well-known Mozilla Firefox Browser. The following section describes the installation and usage of the OTX/PTX-Viewer.

**ASAM Standards:** ASAM AE MCD-2 D (ODI)
ETAS GmbH

ETAS provides innovative solutions for the development of embedded systems for the automotive industry and other sectors of the embedded industry. As a systems provider, ETAS supplies a multifaceted portfolio that covers the range from integrated tools and test solutions to engineering services, consulting, training, and support. Security solutions in the area of embedded systems are offered by the ETAS subsidiary ESCRYPT. Established in 1994, ETAS GmbH is a 100-percent subsidiary of the Bosch Group, with international locations in 12 countries in Europe, North and South America, and Asia.

Contact: Ms. Anja Krahl, Mail: anja.krahl@etas.com

<table>
<thead>
<tr>
<th>List of Members &amp; ASAM Related Products</th>
<th>Member Reference by Standards</th>
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| ETAS ASCET - Function Development and Software Engineering Tool | **ETAS ASCET** - Function Development and Software Engineering Tool
Type: Function Development and Software Engineering Tool
Functionalities: ETAS ASCET - Model-based ECU Software Development: The ASCET product family provides an integrated solution for model-based development of application software for embedded systems. ASCET is widely used for modeling, simulation, rapid prototyping, and ISO 26262/IEC 61508 SIL3 certified automatic code generation for a variety of HW platforms. ASCET supports automotive standards such as ASAM, AUTOSAR, MISRA-C:2004, and OSEK.
ASAM Standards: ASAM AE MBFS, ASAM AE MCD-2 MC (ASAP2/A2L) |

| ETAS ASCMO - Accuracy Prediction of Complex System Behavior: ETAS ASCMO facilitates the optimization and calibration of complex systems in virtual environments on the PC. The use of ETAS ASCMO significantly reduces the effort required for testing on real-world systems, e.g., at the bench or in the vehicle. ETAS ASCMO uses a data-based model of high accuracy to describe system behavior. The model is based on a minimal number of measurements taken on the actual system.
ASAM Standards: ASAM COMMON MDF |

| ETAS EHANBOOK - Interactive ECU Documentation: ETAS EHANBOOK is an interactive documentation solution for efficient ECU calibration. It offers a large variety of views and chained links for improved ease of navigation through extensive ECU documentation. ASCET and Simulink® are translated into new interactivity boundaries, too. ETAS EHANBOOK links to ETAS INCA to facilitate the live display of values from INCA experiments and to create INCA experiments more quickly. The entire contents (texts, structures, graphics, models) of the ECU documentation is stored in a so-called EHANBOOK Container. The generation of it is based on input data in standard ASAM formats.
ASAM Standards: ASAM AE CC, ASAM AE F PX, ASAM AE MDX |

| ETAS EHOOKS - Bypass Hook Insertion Tool: ETAS EHOOKS is a software tool that facilitates the efficient insertion of bypass hooks into ECU software. The EHOOKS user can place bypass hooks directly into the HEX & A2L files without knowledge of software details - there is no need for access to either ECU source code or ECU software build environment. EHOOKS ECU ports are developed with the support and involvement of the Tier 1 ECU software development team. This allows EHOOKS to do a very high quality job of placing the hooks into the ECU software, but also makes EHOOKS very simple to use.
ASAM Standards: ASAM AE MBFS, ASAM AE MCD-2 MC (ASAP2/A2L) |

| ETAS INCA - Integrated Environment for Measurement, ECU Calibration, and Diagnostics: INCA is a universal product family for online and offline calibration of ECU function parameters, controlled via a graphical user interface or remote access. INCA performs the measurement of signals obtained from ECUs and from the vehicle environment, and incorporates powerful tools for managing ECU projects and parameters, analyzing measured and reading diagnostic data, as well as flash programming.
ASAM Standards: ASAM AE CDF, ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (IDX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MCD-3 MC, ASAM COMMON MDF |

| ETAS INCA-FLOW - Guided and Automated Calibration: INCA-FLOW provides a graphical development environment enabling calibration engineers to specify automation sequences for INCA without the need for programming. To ensure results of consistent quality, INCA-FLOW is fully integrated with INCA and supports best-practice processes for calibration, validation, and measurement.
ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L), ASAM COMMON MDF |

| ETAS INTECRO - Integrated Prototyping Environment: INTECRO Integrated Prototyping Environment supports the development of embedded control software through integrated functions modeled in the engineers familiar ASCET-MD, MATLAB®, Simulink®, AUTOSAR, and C code development environment. INTECRO provides a common environment for prototyping control functions on the PC or in the real world by means of rapid prototyping hardware.
ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX) |

| ETAS INTECRO-RLINK - Prototyping Blockset: With INTECRO-RLINK, function developers can perform all steps of prototype configuration and generation directly in Simulink®. The Prototyping Blockset supports configuration tasks for the various ETAS prototyping targets and their connectivity with ECU bypass plus sensor and actuator signals. In addition, the Windows PC is supported for non-real-time prototyping.
ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX) |
ETAS ISOLAR-A
Type: Software Engineering Tool
Functionalities: ETAS ISOLAR-A – AUTOSAR Authoring; ISOLAR-A is an AUTOSAR authoring tool. It is built on Eclipse technology and uses the Artop framework to enable easy integration into existing development environments. ISOLAR-A can be integrated with other AUTOSAR-compliant tools from ETAS or third-party vendors.
ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE XIL

ETAS ISOLAR-EVE
Type: Software Engineering Tool
Functionalities: ETAS ISOLAR-EVE – AUTOSAR Software Validation: ISOLAR-EVE is an Eclipse-based environment for the configuration of virtual ECUs. ISOLAR-EVE is closely integrated with the ETAS ISOLAR-A AUTOSAR authoring tool and the application software behavior modeling/auto-coding tool ETAS ASCET. ISOLAR-EVE is open to other AUTOSAR-compliant authoring and behavior modeling tools as well as to manually coded AUTOSAR application software components.
ASAM Standards: ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L)

ETAS LABCAR-AUTOMATION
Type: Test and Validation Tool
Functionalities: ETAS LABCAR-AUTOMATION – Automated ECU Testing: Develops, manages, and executes abstract and test bench-independent automated tests for embedded software. To ensure high-quality automated tests, the tool supports different activities and roles in the testing process.
ASAM Standards: ASAM AE MCD-2 D (OSK), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE XIL

ETAS LABCAR-OPERATOR
Type: Test and Validation Tool
Functionalities: ETAS LABCAR-OPERATOR – Automated ECU Testing: Develops, manages, and executes abstract and test bench-independent automated tests for embedded software. To ensure high-quality automated tests, the tool supports different activities and roles in the testing process.
ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE XIL

ETAS XETK/ETK
Type: ECU Interface
Functionalities: ETAS XETK/ETK – Universal ECU Interfaces: XETKs/ETKs comprise parallel or serial Electronic Control Unit (ECU) interfaces for calibrating, flashing, measuring, rapid prototyping (bypass), and debugging. XETKs/ETKs are designed to support function development for, and calibration of, automotive ECUs in harsh environments (operating temperature range from -40°C to +110°C). XETKs/ETKs provide excellent power-on (cold start) features, proven reliability, high performance, low latency, and high data throughput. XETKs support the ASAM XCP standard.
ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L)

FEV Automatisierungssysteme GmbH
Founded in 1978, FEV is an internationally recognized leader in the design and development of internal combustion engines and supplier of advanced test and instrumentation systems. In 2011, the FEV Automatisierungssysteme GmbH has been established to combine the company-wide expertise in automation systems. This newly established subsidiary can look back on many years of experience in the proper and efficient operation of engine test cells. This enhances FEV’s position as a highly competent and experienced provider of advanced test cell solutions. We only offer test cell equipment to our customers that has already met the arduous operational demands presented by our own powertrain test facilities and engineering staff.
Contact: Ms. Kathrin Hilbich, Mail: hilbich@fev.com

FEV France
FEV France offers a large selection of modular solutions, which are easy to integrate and fully compliant with other equipments and softwares on the market. It also provides test bed engineering services. Its worldwide presence enables FEV France to offer the full range of its services and products to all transport sector manufacturers.
Contact: Mr. Régis De Bonnaventure, Mail: regis.de-bonnaventure@d2t.fr

MORPHEE
Type: Test bed automation system
Functionalities: One single system covering automation, ECU calibration and real-time simulation on a test cell. Reliable, powerful, open and upgradeable as it is, MORPHEE is a perfect solution for controlling your test cells as safely as can be. Whatever kind of test facility you have, MORPHEE adapts to your working methods and provides you with the latest technology in order to reduce your development time.
ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MCD-3, ASAM AE MCD-3 MC, ASAM CAT ACI, ASAM CAT ODS

OSIRIS
Type: Combustion analysis system
Functionalities: Real time combustion analysis in a test cell or on-board a vehicle. OSIRIS is a turn-key fast acquisition system. Originally designed to sample data at each engine revolution crank angle, it can also work as a time based oscilloscope. Fast to install and easy to use, it covers all needs of engine engineers during every step of a powertrain development.
ASAM Standards: ASAM AE MCD-3

TEST MANAGER
Type: Test data management system
Functionalities: This data base solution perfectly fits the collaborative working environment of
modern test centers. TEST MANAGER is an essential add-on to MORPHEE for maximum productivity at reduced administration costs. It provides central handling, sharing and protection of the test data of all your co-workers, from the test demands to the result files, including test procedures. It is based on robust, powerful and proven data bases and easily adjusts to customer specific data flow and data models.

### ASAM Standards
- **ASAM CAT ODS**

### xMOD
- **Type**: Simulation platform
- **Functionalities**: xMOD is a simulation platform involved for every stage of the development cycle by integrating control and operative models. The integration is first MIL (Model-In-the-Loop) then SIL (Software-In-the-Loop) and finally HIL (Hardware-In-the-Loop) and EIL (Engine-In-the-Loop). It facilitates stand alone and tool coupling co-simulation between several simulation tools.
- **ASAM Standards**: ASAM AE MCD-1 XCP, ASAM AE MCD-2 HIL (ASAP2/A2L), ASAM AE MCD-3

### FuelCon AG
- **Technology**: Technology, which always knows the ideal method to use: These are our testing, assembling and diagnostic systems for fuel cells, batteries and electric powertrains. Innovative engineering “Made in Germany”, based on years of experience in automated testing and assembling processes.
- **Contact**: Mr. Mathias Bode, Mail: sales@fuelcon.com

### TestWork
- **Type**: Automation Software
- **Functionalities**: data acquisition, data storage, test planning, test execution, test automation, test evaluation
- **ASAM Standards**: ASAM ASAP3, ASAM CAT ODS, ASAM COMMON MDF

### Gaiologic Corp.
- **Gaiologic Corporation**: Gaiologic Corporation is a Technical Trading Company established in 2002 to introduce new technologies from the United States and Europe into Japan. The office is located in Tokyo. Gaiologic provides services and high-value products such as Diagnostic Tools and Measurement Equipments for the automotive market.
- **Contact**: Ms. Pei Sunnam, Mail: pei@gaiologic.co.jp

### DTS-Monaco (Diagnostic Tool Set)
- **Type**: Engineering Tool (Diagnostic)
- **Functionalities**: Full feature engineering tool with application oriented user interfaces for diagnostics, flash programming, measurement, variant coding, OBD, bus node emulation, communication analysis
- **ASAM Standards**: ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D

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**FEV**

**KEEP THE SAME WORKSPACE ENVIRONMENT FROM DESIGN TO PHYSICAL TESTING**

At the office as well as at the test bed: Develop and validate your powertrain in a unique collaborative workspace environment. Combine co-simulation, automation and online calibration activities in the all-in-one system MORPHEE to boost your development process.
**IPemotion**

**Type:** DAQ Software

**Functionalities:** Windows DAQ. Software for configuration, acquisition, visualization, analysis, automation, and control applications.

**ASAM Standards:** ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBER), ASAM COMMON MDF

**M-LOG, IPElog, FLEETlog2**

**Type:** Hardware for data acquisition and bus measurement

**Functionalities:** Acquisition, online calculation and storage

**ASAM Standards:** ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM CAT GDI, ASAM CAT ODS

**M-Series Modules, X-Modules**

**Type:** Measurement modules for analog data acquisition

**Functionalities:** Acquisition of analog signals, A/D conversion and output to CAN and Ethernet

**ASAM Standards:** ASAM AE MCD-1 XCP, ASAM CAT GDI

**OTX Studio**

**Type:** Comfortable editor for OTX sequences

**Functionalities:** Easy-to-use authoring system according to ISO 13209, based on Softing D-Server DTS and ODX data. Many supplements to the standard, e.g. DLL access, file access, GUI library

**ASAM Standards:** ASAM AE MCD-2 O (ODX), ASAM AE MCD-3 O

**GIGATRONIK Ingolstadt GmbH**

GIGATRONIK is a development partner specialized in the field of automotive electronics and information technology. We develop solutions in the field of System Architecture & Electrical Systems, Component Development, System Integration & Testing, Vehicle Integration, Process & Project Management, Diagnostics, Data Management, Environmental Systems and Rapid Application Prototyping.

**Contact:** Mr. Walter Gold, Mail: walter.gold@gigatronik.com

**MDM Based Systems**

**Type:** www.mdm-community.org

**Functionalities:** Data management

**ASAM Standards:** ASAM CAT ODS

**HBM Prenscia**

nCode products are offered through HBM Prenscia, developer of innovative concepts and software solutions for improving reliability, availability, maintainability, safety, durability, and performance. For over 30 years, the nCode brand has provided cutting-edge solutions spanning both test and CAE applications with specific capabilities for fatigue and durability. nCode product development is ISO9001 certified. HBM-nCode has a global team of regional sales and application engineers that are available through offices in Europe, North America and Asia.

**Contact:** Mr. Kevin Miller, Mail: info@hbmprenscia.com

**nCode GlyphWorks**

**Type:** Analysis Software

**Functionalities:** A graphical, process-oriented environment that contains a wide range of data processing and visualization capabilities with specialized options for durability such as fatigue analysis, accelerated testing, and frequency domain tool such as ride quality and rotating machinery analysis. The ASAM ODS connectivity capability in GlyphWorks enables users to browse, search and select data from ASAM ODS database.

**ASAM Standards:** ASAM CAT ODS, ASAM COMMON MDF

**nCode VibeSys**

**Type:** Analysis Software

**Functionalities:** nCode VibeSys is a powerful data processing system for acoustics and vibration test data analysis. It is an easy-to-use software that enables acoustics and vibration engineers to design a reliable product that satisfies customers’ expectations in terms of sound, comfort, and regulatory requirements. The ASAM ODS connectivity capability in VibeSys enables users to browse, search and select data from ASAM ODS database.

**ASAM Standards:** ASAM CAT ODS, ASAM COMMON MDF
HEAD acoustics GmbH

The NVH Division of HEAD acoustics provides high-performance products and systems for multichannel sound and vibration analysis and for binaural recording and playback. Founded in 1986, the scope of services includes almost any application in the areas of sound and vibration as well as consulting, training, and support. The products and solutions offered by HEAD acoustics are mainly used in the automotive industry, but also by manufacturers of IT, office, and household appliances, as well as companies and institutions working in the area of acoustic environment protection.

Contact: Mr. Christian Krohn, Mail: sales@head-acoustics.de

Artemis SUITE

Type: Software

Functionalities: Sound & Vibration Acquisition & Analysis Artemis SUITE is the universal software solution for your sound and vibration analysis. It combines all the tools required for performing comprehensive measurements and analyses with functions for data management, report generation, and automation – all in a consistent software environment. The software is optimally suited for troubleshooting and sound engineering in the noise and vibration area. Use Artemis SUITE for sound optimization and sound design for technical products, the evaluation of environmental noise and many other purposes. Enjoy the modern look and feel and the sophisticated concept!

ASAM Standards: ASAM CAT ODS

Hewlett-Packard Japan, Ltd.

Hewlett-Packard Enterprise is an industry leading technology company that enables customers to go further, faster. With the industry’s most comprehensive portfolio, spanning the cloud to the data center to workplace applications, our technology and services help customers around the world make IT more efficient, more productive, and more secure.

Contact: Mr. Takahiro Yoshimi, Mail: Takahiro.yoshimi@hpe.com

HQL Dynamics Ltd.

HQL markets a wide range of innovative digital acquisition, storage and analysis products, ranging from hand-held to full rack-based test cell systems. Customer benefits include: large channel counts, higher bandwidths, shorter tests and reduced costs. HGL also provides professional consultancy services for vibration analysis, software development and test measurement support.

Contact: Mr. Andrew Law, Mail: alaw@hgl-dynamics.com

HighQSoft GmbH

For over twenty-five years, HighQSoft GmbH has been an international leader and independent partner for the development of Measurement Data Management systems (MDMs). We develop server-side infrastructure solutions to handle testing data, which range in scale from a single test stand to an entire enterprise, for our customers, which are primarily from the automotive and transportation industries. Our flagship product, the Avalon ODS Server Suite, provides everything from data preparation and import, data management, and access to data evaluation. We specialize in taking time-, frequency- and event-based raw data from any source or proprietary format, combining it with valuable use-case information, and turning it into actionable knowledge for businesses. Our software and solutions transform vehicle innovations into high-quality serial production at all major OEM’s around the world.

Contact: Dr. Ralf Nörenberg, Mail: ralf.norenberg@highqsoft.de

Avalon Big Data Application Server (ABAS)

Type: ASAM ODS Server with integrated big data processing and storage, ASAM ODS 5.3.0 and 6.x compliant

Functionalities: Our Avalon Big Data Application Service (ABAS) permits ODS-based measurement data management systems to connect to big data resources. The implementation as a SPARK client defines interfaces for communication (and standardization) between our Avalon ODS Server and SPARK. While metadata operations remain within Oracle, thereby allowing the system to retain most of ODS’s management functionalities, the system redirects mass data operations to predefined jobs in SPARK. Therefore, ABAS provides a scalable and high-performing ODS system. Our current implementation works with Apache Parquet but is independent to the physical storage technology used.

ASAM Standards: ASAM CAT ODS, ASAM COMMON MDF

Avalon ODS Server Suite

Type: ASAM ODS Server, ASAM ODS 5.3.0 and 6.x compliant server

Functionalities: Our Avalon ODS Server Suite is the reference server implementation of the ASAM ODS Standard and backbone of the majority of ODS 5.3 compliant data storage solutions for OEMs and suppliers within the worldwide automotive industries. The server is fully compatible with all ASAM ODS features and any Application Model. Therefore, the application receives the flexibility to store and manage measurement data of any technical domain (e.g. Noise-Vibration-Harshness, Road-Load, Engine, Wind-Tunnel, Crash, Brakes, …), integrates several Measurement Data Format Files (e.g. MDF4.1, MDF3.x) and provides interchangeability with the ASAM Transport Format file (ATF). Our Avalon ODS Server now supports ODS 6.x.

ASAM Standards: ASAM CAT ODS, ASAM COMMON MDF

HQL

Type: HighQSoft Query Language

Functionalities: Our HighQSoft Query Language (HQL) is designed to provide easy access to the ODS API, for developers as well as for end-users. The development of specific ODS client software on basis of the generic ODS API is a challenge that can be met by experts only. Business entities utilized for the application use case (test, vehicle, user) are usually also contained in the application model (database schema) of the ODS server. The ASAM ODS API by definition is free of entities of the business user (e.g. vehicle) are usually also contained in the application model (database schema) of the ODS server. The ASAM ODS API by definition is free of entities of the business layer, which complicates the task of developing an application interface for it. HQL solves exactly this issue by providing a more abstract interface, which ac-
cepts both base model and application model entities. Features are: • Full Support of the ASAM ODS API functionality • distinct OO API without ASAM ODS definitions • statements may be utilized by an interpreter • Supports application development as a library and web-service

ASAM Standards
ASAM CAT ODS

Manatee Web Application
Type
Web-based Measurement Data Management (MDM) application for the ASAM ODS server

Functionalities
Our Manatee Web is a Measurement Data Management (MDM) application to grant end users a convenient access to their ASAM ODS database. The web application initially provides users with functionality to quickly and dynamically browse, search for, bookmark, share and export their measurement data – and all that as a configurable product which is independent of the application model used. Furthermore, the integration of third-party tools like DIAdem allows quick processing of the data for domain-specific analysis. Administrators have intuitive access to features as e.g. user group and user management and the Avalon ODS Server Control Service. Key features of the application are: • data browser – a very flexible data navigator with configurable navigation trees, presentation of instance meta-information and dependencies, tabular and graphical channel quick view, presentation of AoFile dependencies • data search – with multiple and configurable search patterns and a HighQSoft Query Language (HQL) console to create favorite searches • favorites and cart – for measurement data and searches • data sharing with colleagues – without creating redundancies and the data leaving the database • data export options – export your data to CSV and ATFx • third-party tool interfaces (e.g. DIAdem) • user group and user management • application administration

ASAM Standards
ASAM CAT ODS, ASAM COMMON MDF

Matlab® Integration Toolbox
Type
ODS Integration Toolbox for Matlab®

Functionalities
Integrating Matlab into ODS applications and evaluations has been a long struggle ever since. Until now. MATLAB® offers to create a toolbox that you can share with others. These files can include MATLAB® code, data, apps, examples, and documentation. When you create a toolbox, MATLAB® generates a single installation file (.mltbx) that enables you or others to install your toolbox. We are using this feature to provide a seamless HQL and ASAM ODS integration package for MATLAB. Our toolbox contains Java libraries, programming examples, documentation and help in order to provide everything you require for including ODS data in your Matlab.

ASAM Standards
ASAM CAT ODS

Merlin Analysis Server
Type
Analysis Server for ODS based Measurement Data Management systems (MDM).

Functionalities
Our Merlin Analysis Server 2G is a second generation analysis framework to move the task of executing evaluations from the individual engineer to the server. Thus, analysis may be initiated by e.g. automated import processes or certain events in the Avalon server (Notification Server). The results may be whatever you want them to be: A new measurement, a graph, a document, an email, … . See for yourself, Merlin is a wizard.

ASAM Standards
ASAM CAT ODS, ASAM COMMON MDF
HORIBA
HORIBA Automotive Test Systems, part of the HORIBA Group, achieved global leadership as a supplier of emissions and various certification test systems, as well as a testing partner for powertrain research and development. HORIBA is able to provide total solutions to its customers with full turnkey capability for all industries using electric motors, internal combustion engines, and turbines. These include the automotive, heavy-duty, off-road, consumer goods, marine, aerospace, and locomotive sectors.

Contact: info@horiba.de

Shiningview
Shiningview is a fast growing professional vehicle and ECU design, development, testing tool chain solutions provider. With stable product quality, high cost performance and rapid response to the customer, shiningview has been recognized by more and more customers. The company’s business continues to expand.

Contact: Mr. Kang Li, Mail: fred.lee@shiningview.com

Huijing Electronic Technology (Shanghai) Co., Ltd.
Shiningview is a fast growing professional vehicle and ECU design, development, testing tool chain solutions provider. With stable product quality, high cost performance and rapid response to the customer, shiningview has been recognized by more and more customers. The company’s business continues to expand.

Contact: Mr. Kang Li, Mail: fred.lee@shiningview.com

iAV GmbH
What we develop moves you. IAV – Your Partner for Automotive Engineering. Our engineering is at the heart of vehicles across the globe. As one of the leading development partners to the automotive industry, IAV offers more than 30 years of experience and a range of skills second to none. With our expertise in the entire vehicle, and the passion to match, we provide technically perfected solutions that balance both rational and emotional aspects. Employing 6,000 members of staff and first-class facilities, we assist manufacturers and suppliers in carrying out their projects wherever they are in the world - from concept to start of production. Your goals are our mission.

Contact: Mr. Puran Parekh, Mail: sales@iavs.co.in

ICS AG - Informatik Consulting Systems AG
ICS is a partner for the complete product lifecycle - from evaluation and consulting to realisation and maintenance. The domains are Automotive, Transportation and Aerospace/Defense (e.g. Embedded Control Systems, RAMS, Verification&Test, Quality Assurance). Our wide diversification helps us to understand the problems of our customers. A competent knowledge of technologies, methods and standards enables us to transfer this knowledge into applicable solutions.

Contact: Mr. Thomas Reiner, Mail: thomas.reiner@ics-ag.de

iASYS Technology Solutions Pvt. Ltd.
iASYS is an independent integrator which designs and manufactures data acquisition and controls systems for advanced powertrain test rigs.

Contact: Mr. Puran Parekh, Mail: sales@iavs.co.in

Orbit Central
Type Central repository to monitor all test benches data from one location. Test plans can be synchronized on test benches from a central location.

Functionalities
ASAM Standards ASAM CAT ODS

Orbit test automation platform
Type Simulation, automation and controls systems for engine, transmission, powertrain, chassis dyno and electric vehicle test benches for research and development.

ASAM Standards ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-3 MC, ASAM CAT ACI, ASAM CAT GDI, ASAM CAT ODS

Test benches
Type Engine & vehicle chassis dyno test benches for entire range of vehicles.

ASAM Standards ASAM CAT ODS
ASAM Solutions Guide 2017

List of Members & ASAM Related Products

Influx Technology Ltd.
Influx Technology make specialist tools for the development of automotive control systems. Vehicle (MCD) data loggers, (OBD) diagnostic and specialist (CDM) tools for development engineers. Formed in 1999 we operate in the UK and Bulgaria with distributors in the US, China, India and Japan.

Contact: Ms. Fiona Keen, Mail: fkeen@influxtechnology.com

Rebel LT Data Logger
Type  CAN data logger
Functionality  2x CAN buses, 1x K-Line, 4x analog inputs, 4x digital Input/output channels, SDHC card logging, ABS enclosure; Supports J1939 and OBD logging; Connects to Module Analyser for on-line CAN Analyser functionality; Can be combined and stacked with the Influx K-Box for additional sensors and thermocouples. Add-on modules (charged separately): Internal 18 Hz GPS with antenna, 1kHz internal XYZ accelerometer +/-16G max, 3G modem.

ASAM Standards  ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP

INTEMPORA
Intempora develops the RTMaps software and other related tools for real-time multimodal applications. RTMaps is widely used in the automotive and mobile robotics domains, either for facilitating the development, tests and validation of perception functions based on multiple sensors (vision, data fusion, localization…) or for HMI developments and human factors analysis.

Contact: Mr. Nicolas Du Lac, Mail: nicolas.dulac@intempora.com

Data loggers
Type  Wide range of data loggers from small ARM-based architecture devices to clusters of distributed high-performance PCs
ASAM Standards  ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE XIL, ASAM AE XIL-MA

RTMaps
Type  Software development environment
Functionality  Multiple & heterogeneous sensors acquisition Data Timestamping, Graphical development, C/C++, SDK, Record / Playback, Multithread, Embedded deployment, Interoperability with many complementary tools (Matlab, Simulink, simulators…)
ASAM Standards  ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE XIL, ASAM AE XIL-MA
Intrepid Control Systems, Inc.

Intrepid Control Systems is a global provider of innovative tools to engineers in vehicle, test, and embedded engineering. With thousands of customers worldwide, Intrepid provides embedded communication interfaces for protocols such as CAN, LIN, FlexRay, J1939, Keyword 2000, UARTh, J1939, ISO14229 and GMLAN. Major customers include automotive and commercial vehicle OEMs from a wide variety of countries. Along with a global network of distributors, Intrepid has offices in the USA, China, Japan, Germany, India, and Australia for direct sales and support.

Contact: Mr. Colt Correa, Mail: ccorrea@intrepidcs.com

neoVI FIRE / neoVI RED

Type: Vehicle Interface Adaptor, PC to Vehicle Network Adaptor

Functionalities: Monitor vehicle network, Log vehicle network data, Run real-time scripts, Simulate networks, ECU’s, & gateways. Use a stand-alone data logger by logging data to removable SD card. Use for ECU prototyping.

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MDX

neoVI PLASMA

Type: Remote Data Logging Tool, Vehicle Fleet Management Tool

Functionalities: Standalone data logger, Remote data logger with auto-download via WIFI, 3G or Ethernet; Heads-up display for test vehicles; In-vehicle data acquisition system; Captive test fleet data collection; Fleet management and more. Support for CAN, Lin, FlexRay, MOST, XCP/CCP, Ethernet, ISO14229, GMLAN, J1939, Analog Inputs, and more.

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MDX

ValueCAN

Type: PC to CAN (Controller Area Network) Adaptor/Interface

Functionalities: Dual Channel Isolated Dual Wire CAN to USB interface; Connect PC to a Controller Area Network (CAN) bus

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MDX

Vehicle Spy Professional

Type: Software

Functionalities: Software for performing diagnostics, node/EUCU simulation, data acquisition, automated testing, memory edit or calibration, and vehicle network bus monitoring, and more. Supports CAN, LIN FlexRay, MOST, J1939, J1950, K-Line, ISO9141, J1708, ISO14229, UARTh, Keyword, GMLAN, CCP/XCP, and more.

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MDX

IPETRONIK GmbH & Co. KG

Operating via its four interrelated divisions: IPEmeasure measurement technology; IPEmotion software; IPEngineering Technical Center; and IPElec Test Bench Technology, IPETRONIK is uniquely positioned to offer one of the industry’s only true customer-specific turnkey data acquisition solutions. Having begun as a hardware-only provider nearly two decades ago, IPETRONIK has now developed into an internationally renowned technology partner to some of the world’s most prestigious vehicle manufacturers, offering a combination of measurement technologies, software, accessories, and unique in-house testing capabilities and facilities. Consistent with the company mission of PROGRESS IS THE FUTURE, 180 highly trained IPETRONIK staff members and sales partners, headquartered in Baden-Baden, Germany, with additional offices in the United States and India, as well as subsidiaries worldwide, ensure constant growth and innovation in response to market needs. We look forward to providing customers with innovations and improved solutions far into the future.

Contact: Mr. Joerg Strothmann, Mail: joerg.strothmann@ipetronik.com

IPEmotion

Type: DAQ Software

Functionalities: Windows DAQ-Software for configuration, acquisition, visualization, analysis, automation, and control applications.

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM COMMON HDF

M-LOG

Type: Hardware for data acquisition and bus measurement

Functionalities: Acquisition, online calculation and storage

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC, ASAM AE MCD-2 NET (FIBEX), ASAM CAT GOI, ASAM CAT ODS

M-Series Modules

Type: Measurement modules for analog data acquisition

Functionalities: Acquisition of analog signals, A/D conversion and output to CAN

ASAM Standards: ASAM CAT GDI

Ms-SENS, Sx-STG

Type: Measurement modules for fast analog data acquisition

Functionalities: Acquisition of analog signals, A/D conversion and output to Ethernet

ASAM Standards: ASAM AE MCD-1 XCP

IPG Automotive GmbH

IPG Automotive GmbH is a worldwide leading provider of simulation solutions, test systems and engineering services for OEMs and suppliers in the automotive industry. IPG supports its customers in mastering the technological challenges relating to safety, comfort, agility and fuel economy/energy consumption – with forward-thinking solutions for the entire development process. In addition to conventional vehicle dynamics simulation, the CarMaker, TruckMaker and MotorcycleMaker simulation tools open up a wide range of Model-, Software- and Hardware-in-the-Loop simulation. It encompasses the development and testing of chassis control systems, driver assistance systems as well as systems combining chassis, powertrain and steering. Also included are holistic fuel economy/energy consumption analyses, hybrid technology and electric mobility.

Contact: Ms. Katharina Brömel, Mail: katharina.bromel@ipg.de
**CarMaker**

**Type**

**Functionalities**
Flexible model integration from multi-domain environments, maneuver- and event-based testing through „CarMaker Operation System“, easy reconstruction of complex real test driving tasks, efficient system validation in the whole vehicle environment, integrated application in all development phases „X-in-the-Loop“, automated test of comprehensive maneuver catalogs and vehicle variants, powerful interface structure for third party tools

**ASAM Standards**
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 NET (FIBEX), ASAM COMMON MDF

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**MotorcycleMaker**

**Type**

**Functionalities**
Supporting of different front and back wheel carriers like telescopic fork, telescopic or swing arm, different drive concepts based on drive shaft, on chain or on swing arm mounted engine, the bending and the torsional stiffness of the body frame and the wheel carriers is taking into account, influence of the driving stability with aerodynamic effects, driving behavior analysis on downhill and uphill slopes and banking on three-dimensional tracks

**ASAM Standards**
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 NET (FIBEX), ASAM COMMON MDF

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**TruckMaker**

**Type**

**Functionalities**
Real-time performance with every truck/trailer configuration, up to 10 axles with configurable single or twin tires, all special suspension types for trucks and trailers, various powertrain versions up to 8x8, all typical trailer hitch systems (ball, trapezoid, fifth wheel etc.), flexible truck and trailer body, fixed or movable loads and suspended cabin, pneumatic test box for active brake and air suspension systems

**ASAM Standards**
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 NET (FIBEX), ASAM COMMON MDF

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**iSYSTEM AG**

iSYSTEM was founded in 1986 and is a privately held company headquartered in Schwabhausen close to Munich and subsidiaries in Slovenia and the USA. For 30 years now iSYSTEM is i.a. specializing in customers from the automotive, aerospace and medical industries where quality and safety play a huge role. Customers of iSYSTEM develop embedded systems that can save lives and ensure that this is not unnecessary in danger. iSYSTEM develops, manufactures and markets on embedded software development and test specialized hardware and software tools. The BlueBox hardware and software allow quick access to all kinds of single and multi-core microcontroller via the many different forms of debug interfaces. This software can be developed and tested directly on the real hardware without code instrumentation.

**Contact:** Mr. Erol Simsek, Mail: erol.simsek@isystem.com

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**IXXAT Automation GmbH**

IXXAT is a supplier of data communication solutions for the automotive and the industrial market. IXXAT employs a staff of 80 people and has an ISO 9001 certified quality management. Our core technologies are FlexRay, CAN, LIN, Real-Time Ethernet, IEC61508 as well as safety relevant solutions (IEC61508). Beside hardware components, the product range includes solutions for test stands, hardware-in-the-loop, vehicle communication test/analyzing tools, OEM components and protocol software.

**Contact:** Mr. Thomas Waggershauser, Mail: waggershauser@ixxat.de

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**iSYSTEM Intelligente Systeme GmbH**

As an independent test house we are your competent partner in ensuring function and quality of embedded systems across all industry sectors. Right from the beginning of the development process we take care of all different aspects of software and hardware testing thus providing a complete and continuous testing solution – from one source.

**Contact:** Mr. Florian Spiteller, Mail: Florian.Spiteller@iSyst.de
Keisokugiken Corporation

Keisokugiken Corporation (KGC) is established in 1980. We specialize in development and distribution of products for automotive measurement, test automation, and simulation. We also research technology in hardware-in-the-loop simulation for hybrid and new energy vehicles.

Contact: Mr. Noriyuki Hirose, Mail: hirose@kgc.co.jp

Connecting to ECU calibration tool via ASAP3

Type: Using ECU calibration tool for Hardware in the loop system of transmission.
Functionalities: ECU data measurement and calibration.

ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 CERP

Kistler Instrumente AG

Kistler is a strong partner of the automotive industries for measurements of force, torque, pressure and acceleration. A worldwide organization with 1200 employees and 25 group companies supplies the automotive industries with sophisticated high-end system solutions. Instrumented crash test facilities, e.g. crash barriers and crash trolleys with piezo-technology as well as wheel force measuring systems with piezo- and strain gauges technology for almost every application are core competencies in the field of automotive engineering.

Contact: Mr. Mirko Ciecinski, Mail: mirko.ciecinski@kistler.com

RealTime Automation

Type: EtherCAT Master
Functionalities: Powerful EtherCAT Master - I/O reaction times in microsecond range, cycle frequency < 20 kHz possible - Real-time PDO data exchange - SDO and mailbox communication: CoE, FoE, EoE, SoE - Distributed Clocks, Hot Connect, Cable Redundancy - Safety over EtherCAT up to SIL3 - Powerful EtherCAT Master - I/O reaction times in microsecond range, cycle frequency < 20 kHz possible - Real-time PDO data exchange - SDO and mailbox communication: CoE, FoE, EoE, SoE - Distributed Clocks, Hot Connect, Cable Redundancy - Safety over EtherCAT up to SIL3 - EtherCAT PC Slaves - EtherCAT Automation Protocol

ASAM Standards:

RealTime Automotive

Type: Automotive real-time management software
Functionalities: Real-time software tools for measurement, storage and simulation - Can be used for data acquisition and Hardware-in-the-loop - Direct real-time connection between Windows-PC and automotive bus - Support of FlexRay, CAN, CAN-FD and LIN in real-time - For measurement systems, testing rigs

ASAM Standards: ASAM COMMON MDF

RealTime Machine Vision

Type: Image capture and processing software
Functionalities: Image capture with GigE Vision (incl. 10 Gbit/s) and USB3 Vision - Multi-Camera support, Hot Connect - GopiCam access and configuration - Image processing with HALCON and OpenCV - Immediate control reaction to processed images in real-time

ASAM Standards: ASAM COMMON MDF
### K-DCP Framework
**Type**
Platform to create customer specific solutions for Engineering / Production and Aftersales Use-Cases

**Functionalities**
- Data driven platform for Engineering, End-of-Line and Aftersales solutions based on ODX and OTX that can be used stand-alone, on cloud servers or telematics hardware and can be extended with customer specific use-cases created with the K-DCP Diagnostic Authoring tool. Supported hardware: 12S-eCOM (In2Soft Interface), DoIP, Vector CANcard/XL/CANcase, dSpace DCI-CAN/Calibration-Hub, others on request.

**ASAM Standards**
ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D, ASAM AE OTX

### Project Services
**Type**
System solutions, consulting and engineering services as well as training

**Functionalities**
- On-site/Off-site Engineering
- Process definition
- Authoring Guidelines
- Diagnostic content creation and management
- Aftersales service tool development
- Training & workshops on tools, technologies and standards

**ASAM Standards**
ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D, ASAM AE OTX

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### KPIT Technologies GmbH

KPIT is expert for Diagnostics and Telematics. Bundled in the Diagnostic and Connectivity Platform, our remote diagnostics capable Diagnostic Stack as well as our software tools cover all possible applications of off-board diagnostics in Engineering, Testing, Production and Aftersales Service. We globally provide system solutions, consulting and engineering services as well as training.

**Contact:** Ms. Stefanie Köhler, Mail: stefanie.koehler@kpit.com

### Database Designer

**Type**
Design and administration of ODX data in conformance with the international industry standards ODX 2.0.1 and 2.0.2. Provides options for converting a completely new data structure or selectively adapting the existing data in the desired format (DEM and Tier1 collaboration). Compatible to work with all dialects of the ODX standards. Provides an option to create the right data for UDS control unit with in-built UDS on CAN description of KPIT. Object-based comparison of whole ODX projects or selected layers, resolved inheritance, expert and diagnostic modes, XML/PDF export. Complete project or single layer formatting, output formats: PDF, MS Excel, DOC/RTF (on demand). XML validation, ASAM rule set check, API for company-specific rules, configurable error descriptions and correction instructions, XML/XLS and PDF export.

**ASAM Standards**
ASAM AE MCD-2 D (ODX)

### K-DCP Authoring (OTX Suite)

**Type**
OTX Editor, Executer and Debugger, UI and Navigation Editor, Multi-User Workflow and Publication management

**ASAM Standards**
ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D, ASAM AE OTX

### K-DCP Communicator

**Type**

**ASAM Standards**
ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D, ASAM AE OTX

### PAoptimizer

**Type**
Optimization system

**Functionalities**
Optimization system supporting the complete design chain from DOE, measurement, modeling, evaluation, optimization, support of ECU calibration tools.

**ASAM Standards**
ASAM CAT ACl, ASAM AE MCD-3

### PAtools®

**Type**
Open test system

**Functionalities**
Open test system Functionality: Free configurable test bench automation system for all types of test benches in research and development and quality assurance.

**ASAM Standards**
ASAM AE MCD-3

### testXplorer

**Type**
Test data management system

**Functionalities**
Test management system: database extension for central data storage and archiving, data integrity check, web-based retrieval, process support in the test center with functions for order management, test bench planning, SAP-interface and traceability.

**ASAM Standards**
ASAM CAT CEA, ASAM CAT ODS
List of Members & ASAM Related Products

Kvaser AB
Kvaser – world leading CAN development Kvaser supplies advanced CAN solutions to engineers designing and deploying systems in areas as wide ranging as trucks and buses, petrol-driven and electric cars, industrial automation, avionics, construction equipment, building automation, domestic appliances, marine, medical, military, railway, telecoms, textiles and more. With 30 years of experience and more than 60 CAN-related products to our name, Kvaser has deep knowledge of CAN and related bus technologies. Whilst R&D and production are carried out in Sweden, our standard products are available through its sister company MicroNova AG (based in Vierkirchen near Munich). In order to make this shared identity more visible to the outside market, the company operates under the name of ks.MicroNova GmbH since January 2017.

Contact: Mr. Andre Bergmann, Mail: Andre.Bergmann@karts.de

Ks. MicroNova GmbH
ks.MicroNova GmbH (formerly carts GmbH) is a leading provider of hardware-in-the-loop (HIL) test benches for the validation of Electronic Control Units (ECU) and control components. For the development of high-quality testing solutions for the automotive industry, the company works in close cooperation with its sister company MicroNova AG (based in Vierkirchen near Munich). In order to make this shared identity more visible to the outside market, the company operates under the name of ks.MicroNova GmbH since January 2017.

Contact: Mr. Andre Bergmann, Mail: Andre.Bergmann@karts.de

Lauterbach GmbH
Lauterbach GmbH is the leading manufacturer of complete, modular and upgradeable microprocessor development tools worldwide with experience in the field of embedded designs since 1979. It is an internationally well-established company with blue chip customers from every corner of the globe and close relationships with all semiconductor manufacturers.

Contact: Mr. Norbert Weiß, Mail: norbert.weiss@lauterbach.com

Lipowsky Industrie-Elektronik GmbH
Development and production of microcontroller equipped electronic units for automotive, industrial and scientific applications. We are specialized on LIN and CAN-Bus systems and realtime, multitasking applications.

Contact: Mr. Andreas Lipowski, Mail: info@lipowsky.de

M&M Mess- und Kommunikationstechnik GmbH
M&M as software house provides systems for analysis and diagnosis of communication software and interfaces. The company is specialized for software development in the areas of device integration and connection of physical interfaces. This also includes software development for embedded systems and middleware for embedded device integration. ASAM solutions from application till device are in focus. M&M offers development and diagnostic tools for creation, interactive testing and analysis of ASAM interfaces and products. This includes also training for ASAM Standards and expert opinions for ASAM solutions. For ASAM GDI a complete tool chain is provided, which includes development tools and as runtime environment a middleware solution. M&M develops test cases and realizes the frameworks for testing.

Contact: Mr. Bernd Wenzel, Mail: wenzel@meskom.de

Kvaser Memorator Pro SHS
Type CAN data logger
Functionality A five channel CAN bus interface and standalone datalogger that allows users to monitor and collect data from up to five CAN channels. Standalone mode logs data to an SD card; interface mode connects to the PC via USB. Supports CAN FD.

ASAM Standards ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-3, ASAM CAT ACJ, ASAM CAT ODS

Kristl, Seibt & Co GmbH
The KS Tornado software package provides measurement, control and report functions for test benches and is optimized for engine and chassis dynamometer test stands, power train test benches and vehicle component test rigs.

ASAM Standards ASAM AF MCD-2 MC (ASAP2/A2L), ASAM AF MCD-3, ASAM CAT ACJ, ASAM CAT ODS

MicroNova Software und Systeme
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Offices DE info@micronova.de SE sales.se@micronova.com UK sales.uk@micronova.com

M&M Mess- und Kommunikationstechnik GmbH
an@coord
Type GDI Warehouse - Runtime Environment; Platform Windows and Linux, available as source code or run time licence

Functionality Individual adapted Coordinator with specific optimization features (performance, memory, security,...) and C++ Technology Reference; string overloaded data type interface for shortcut service based configuration (description of DCD's by application); PIDsupport; device drivers of any alignment usable.

ASAM Standards ASAM CAT GDI

an@dapt
Type GDI Warehouse - Runtime Environment; Platform Windows and Linux, available as source code or run time licence

Functionality Platform adapter for operating system independent Device drivers

ASAM Standards ASAM CAT GDI

M&K Mess- und Kommunikationstechnik GmbH
M&K as software house provides systems for analysis and diagnosis of communication software and interfaces. The company is specialized for software development in the areas of device integration and connection of physical interfaces. This also includes software development for embedded systems and middleware for embedded device integration. ASAM solutions from application till device are in focus. M&K offers development and diagnostic tools for creation, interactive testing and analysis of ASAM interfaces and products. This includes also training for ASAM Standards and expert opinions for ASAM solutions. For ASAM GDI a complete tool chain is provided, which includes development tools and as runtime environment a middleware solution. M&K develops test cases and realizes the frameworks for testing.

Contact: Mr. Bernd Wenzel, Mail: wenzel@meskom.de

an@coord
Type GDI Warehouse - Runtime Environment; Platform Windows and Linux, available as source code or run time licence

Functionality Individual adapted Coordinator with specific optimization features (performance, memory, security,...) and C++ Technology Reference; string overloaded data type interface for shortcut service based configuration (description of DCD’s by application); PIDsupport; device drivers of any alignment usable.

ASAM Standards ASAM CAT GDI

an@dapt
Type GDI Warehouse - Runtime Environment; Platform Windows and Linux, available as source code or run time licence

Functionality Platform adapter for operating system independent Device drivers

ASAM Standards ASAM CAT GDI

M&M Mess- und Kommunikationstechnik GmbH
an@coord
Type GDI Warehouse - Runtime Environment; Platform Windows and Linux, available as source code or run time licence

Functionality Individual adapted Coordinator with specific optimization features (performance, memory, security,...) and C++ Technology Reference; string overloaded data type interface for shortcut service based configuration (description of DCD’s by application); PIDsupport; device drivers of any alignment usable.

ASAM Standards ASAM CAT GDI

an@dapt
Type GDI Warehouse - Runtime Environment; Platform Windows and Linux, available as source code or run time licence

Functionality Platform adapter for operating system independent Device drivers

ASAM Standards ASAM CAT GDI
<table>
<thead>
<tr>
<th><strong>an@mod</strong></th>
<th><strong>Type</strong></th>
<th>Warehouse Development Tools; Development and diagnostic tools for creation, interactive testing and analysis of ASAM interfaces and products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functionalities</strong></td>
<td></td>
<td>graphical UML GDI Device model generator and generation of the accomplishing DCD / DIT / DIF files. Released GDI Companion DCD of MCD3 O0 model was generated by an@mod.</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
<td>ASAM CAT GDI</td>
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<tr>
<th><strong>an@pact</strong></th>
<th><strong>Type</strong></th>
<th>GDI Warehouse - Runtime Environment; Platform Windows and Linux, available as source code or runtime licence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functionalities</strong></td>
<td></td>
<td>Communication Types GDI; IP (TCP/IP, UDP/IP) and GDL, COM</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
<td>ASAM CAT GDI</td>
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<tr>
<th><strong>an@pars</strong></th>
<th><strong>Type</strong></th>
<th>Warehouse Development Tools; Development and diagnostic tools for creation, interactive testing and analysis of ASAM interfaces and products</th>
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</thead>
<tbody>
<tr>
<td><strong>Functionalities</strong></td>
<td></td>
<td>GDI and MCD parser and semantic checker with data access</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
<td>ASAM CAT GDI; ASAM AE MCD-2 MC (ASAP2/A2L)</td>
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<tr>
<th><strong>an@skel</strong></th>
<th><strong>Type</strong></th>
<th>Warehouse Development Tools; Development and diagnostic tools for creation, interactive testing and analysis of ASAM interfaces and products</th>
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</thead>
<tbody>
<tr>
<td><strong>Functionalities</strong></td>
<td></td>
<td>C++ Skeleton generator for GDI Device Driver; automatic user code integration through directed programming and reengineering</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
<td>ASAM CAT GDI</td>
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<tr>
<th><strong>an@stub</strong></th>
<th><strong>Type</strong></th>
<th>Warehouse Development Tools; Development and diagnostic tools for creation, interactive testing and analysis of ASAM interfaces and products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functionalities</strong></td>
<td></td>
<td>Object oriented application generation based on DCD classes; efficient application generation for testing of application sequences and effective usage of devices drivers; available for C++ and Python; Stub classes encapsulate GDI specific Coordinator access (Coordinator API version independent); Profile independent usage of GDI device drivers; automatically serialization of data types described by DCD for stream oriented data exchange. STUB is additionally available as OTX output (capable of being integrated with OTX standard mechanism into OTX editor) to create test-, diagnostic and automation sequences. The GDI functionality can be used directly by the user in OTX (access to device specific functionality which encapsulates the generic access via one device independent extension for all devices)</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
<td>ASAM AE OTX, ASAM CAT GDI</td>
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<tr>
<th><strong>an@test</strong></th>
<th><strong>Type</strong></th>
<th>Warehouse Development Tools; Development and diagnostic tools for creation, interactive testing and analysis of ASAM interfaces and products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functionalities</strong></td>
<td></td>
<td>The goal of the test application is the development and verification of ACI server solutions. Execution of defined test cases based on ACI test catalogue and evaluation of result. Initial (re-entry), repetition and acceptance test are possible. In case of error, faults are analyzed and a diagnosis is made. Additional test cases can be modified for application specific procedures. Results of the test application are comparable and reproducible.</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
<td>ASAM CAT ACI</td>
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<tr>
<th><strong>an@vis</strong></th>
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<th>Warehouse Development Tools; Development and diagnostic tools for creation, interactive testing and analysis of ASAM interfaces and products</th>
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</thead>
<tbody>
<tr>
<td><strong>Functionalities</strong></td>
<td></td>
<td>Interactive online testing of device drivers with analysis and visualization</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
<td>ASAM CAT GDI</td>
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<tr>
<th><strong>iMCa</strong></th>
<th><strong>Type</strong></th>
<th>MATLAB High Performance connector between AUSY, MATLAB and MC-System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Functionalities</strong></td>
<td></td>
<td>The iMCa (intelligent multi client adapter) allows the access from different clients to ECU via a MC-System for high speed data measurement and calibration of characteristics. A sample time from 4 ms is guaranteed. The solution allows an easy integration in existing test benches or alternatively the realization of automation tasks via MATLAB applications. Transient and dynamic system illustration allows closed loops. Additionally a bidirectional process value exchange between MATLAB and AUSY is possible. Different MATLAB instances can run in parallel. MATLAB in connection with iMCa can be used as standalone automation system. With iMCa it is possible to extend an existing test bench environment with a MATLAB access. The MCA MATLAB user is independent from the knowledge of communication protocols. The MCA .NET interface can be used in C#, C++ and IronPython additionally.</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
<td>ASAM ASAP3</td>
</tr>
</tbody>
</table>

**MAHA-AIP GmbH & Co. KG**

MAHA-AIP (Automotive Industry Products), located in South-Germany, designs and manufactures various test stands for light-, medium- and heavy-duty vehicles, motorcycles and ATVs for vehicle manufacturers, their sub-suppliers and certification labs (EPA, NIER, JRC, CARB etc.). Test drives can be simulated indoors with reproducible results on roller test stands (rolling roads) to improve product quality and optimize costs.

**Contact**: Mr. Manfred Dittrich, Mail: Manfred.Dittrich@Maha.de

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**Contact & Imprint**

Phone + 49 8374 585 0
Fax + 49 8374 585 551
www.maha-aip.com

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**List of Members & ASAM Related Products**

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**Member Reference by Standards**

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**Application Stories**

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**Type Consulting and coaching (also inhouse available)**

**Training**

**Type**

**Functionalities**

**Contact:**
MathWorks GmbH

The MathWorks is the world’s leading developer of technical computing software for engineers and scientists. With an extensive product set based on MATLAB and Simulink®, The MathWorks provides software and services to solve challenging problems and accelerate innovation in automotive, aerospace, communications, electronics, instrumentation, process and other industries.

Contact: Mr. Guido Sandmann, Mail: guido.sandmann@mathworks.de

MATLAB

Type: Technical computing environment
Functionalities: High-level programming language for numeric computation, data analysis and visualization, system design and other technical applications. MCD-2 data can be imported into MATLAB using various third-party add-ons.

ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L)

Real-Time Workshop Embedded Coder

Type: ECU production code generation
Functionalities: Real-Time Workshop Embedded Coder provides production code generation for Simulink models, designed for embedded systems development. Real-Time Workshop Embedded Coder generates optimized ANSI-C code for fixed-point and floating-point microprocessors, plus automatic generation of MCD-2 data definition files.

ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L)

Simulink

Type: Model-based Design environment for modeling and simulation
Functionalities: Block-diagram environment for modeling, simulating, analyzing and generating code for prototyping, hardware-in-the-loop and production code generation. MCD-2 data can be imported for use with Simulink models using MATLAB programming.

ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L)

Target Support Package

Type: Target-specific extension for Real-Time Workshop Embedded Coder to support multiple embedded targets
Functionalities: Includes blocks for use with Simulink and Real-Time Workshop Embedded Coder, providing support for CCP (CAN Calibration Protocol) and creates a MCD-2 data definition file for the generated C code and automatically inserts memory address attributes for variables and parameters (dependent on selected target).

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-2 MC (ASAP2/A2L)

xPC Target

Type: Rapid control prototyping and HIL system
Functionalities: xPC Target is a solution for prototyping, testing and deploying real-time systems using standard PC hardware. It is an environment that uses a target PC, separate from a host PC, for running real-time applications. It can connect to CAN calibration tools, such as Vector CANape, using an XCP interface.

ASAM Standards: ASAM AE MCD-1 XCP

MBtech Group GmbH & Co. KGaA

The MBtech Group is a leading international engineering consulting service provider focusing on the mobility industry. From the automotive industry to rail transport to aerospace, companies worldwide profit from the integrated solutions offered by MBtech as a member of the AKKA Technologies Group. MBtech has approximately 3,300 employees at locations in Europe, North America and Asia.

Contact: Headquarter MBtech Group GmbH & Co. KGaA, info@mbtech-group.com

measX GmbH & Co. KG

MeasX offers complete test and data management systems for component and electronics testing in the automotive industry. This includes test rig automation, data acquisition, data analysis and storage. Based on standard hardware and software tools, measX systems are efficient, flexible and cost effective.

Contact: Mr. Joachim Hilsmann, Mail: joachim.hilsmann@measx.com

MVA-PC

Type: Engine test data evaluation and reporting
Functionalities: DIA(dem)R based solution optimized for the requirements of engine test data analysis. Automatic generation of standard reports including data evaluation via formulas and scripts. Management of evaluation methods, formulas, layouts on different levels (user related, company standards). Batch processing of evaluations and report generation.

ASAM Standards: ASAM CAT ODS

X-Frame

Type: Data evaluation and data management system
Functionalities: Ready to use solution and development platform for DIA(dem)R based data evaluation applications. Covers data management, evaluation, management of evaluation methods and formulas, reporting, user management, parameter and layout management. Open interface for customizing. Implemented applications include: Data management and analysis of long term drive and handling tests; Link of individual component test rigs into the ODS environment; Management of tests, test samples and results in a companywide ASAM ODS environment.

ASAM Standards: ASAM CAT ODS
Meidensha Corporation
The Meidensha Dynamometer has been established on a worldwide basis and the company continues to expand its reputation in all areas of dynamometer systems, i.e. drive simulation and analysis, test rigs, data acquisition and analysis, computer systems.
Contact: Mr. Takuya Ito, Mail: ito-takuya@mb.meidensha.co.jp

MFP GmbH
MFP creates tailored solutions for Test Automation and Manufacturing Execution. Our recent development is an application for optimising the material flow in production, based on the interaction of several software agents with ASAM GDI interface. The execution system controls a just-in-time production in real-time, based on RFID-measurements and adapting to unforeseen events.
Contact: Dr. Robert Patzke, Mail: robert.patzke@mfp-online.de

Aptovia
Aptovia is an application for adaptive material flow control
Functionality Report current material position; Control any transport system; Integrate express orders
ASAM Standards ASAM CAT ACI; ASAM AE MCD-3

MAGUS
Type Software for supplier independent device configuration
Functionality Device independent planning of automation and measurement applications; Automated device configuration from application parameters
ASAM Standards ASAM CAT GDI; ASAM CAT ODS

Micro Nova AG
Micro Nova AG is a German software and system company with more than 160 employees. The company offers products, solutions and services for testing of electronics and mechatronics for the automotive sector.
Contact: Ms. Martina Heinze, Mail: martina.heinze@micronova.de

EXAM
Type Test automation system
Functionality EXAM defines a comprehensive tool and methodology based on UML to represent, implement and evaluate test cases. It enables you to graphically model test processes in sequence diagrams without programming knowledge. EXAM is suitable for use in Hardware-in-the-Loop simulation (HiL), test bench automation and Software-in-the-Loop simulation (SiL).
ASAM Standards ASAM AE HiL

NovaCarts
Type Hardware-in-the-loop (HiL) simulation platform
Functionality NovaCarts is a modular HiL simulation platform and software supporting setups from HiLs for single ECUs up to complete Integration HiL Systems. NovaCarts offers modularity in hardware and software, allowing it to extend setups on demand. The modularity also allows it to switch easily between hardware and software simulations instantaneously.
ASAM Standards ASAM AE HiL

MTT Motorexel SARL

Müller-BBM VibroAkustik Systeme GmbH
Müller-BBM VibroAkustik Systeme is one of the leading suppliers of vibroacoustic measurement technology for the interpretation of dynamic data, particularly in the fields of acoustics, vibration and strength. Our engineering expertise and competence for the measurement tasks at hand results in innovative solutions that seamlessly integrate into existing system environments. As one of the ASAM foundation members, we demonstrate enduring ASAM ODS expertise. This is reflected in our involvement in the definition of standards including the definition of the format for digital bus data, NVH or geometry.
Contact: Mr. Florian Klüber, Mail: info.de@MullerBBM-vas.de

edp
Type Web-based engineering data portal
Functionality Interactively browse, query and analyze ASAM ODS data in the internet browser. Access to ASAM ODS data - especially NVH data (ODS-relational database, ODS-
API, ATF/XML: Data processing (decompression of sum levels, nth octaves and orders, statistical calculation, data mining, audio). Export of stored data and processing results. Presentation of interactive graphics (SVG - scalable vector graphics). Creation of high quality VAS Graphics2Go® packages for interactive Microsoft® Office integration. Supported ASAM standards: ASAM ODS V5.1, V5.2, V5.3; NVH and Geometry data model; ASAM ODS data access with OO-API; exchange format ATF/XML.

ASAM Standards
ASAM CAT ODS

PAK
Type
Dynamic Data Measurement and Analysis System

Functionalities
Data acquisition: fast, static, digital (CAN, FlexRay™, EtherCAT®) channels; limitless channel counts. Data analysis: real-time analysis; selectable track parameters; configurable measurement descriptions; ASAM ODS based; user-configurable quantity catalog; system-independent data viewing based on ATF/XML; interactive graphics; creation of high quality VAS Graphics2Go® packages for interactive Microsoft® Office integration. Supported ASAM standards: ASAM ODS V5.1, V5.2, V5.3; NVH, Geometry and Bus data model; database; exchange format ATF/XML.

ASAM Standards
ASAM CAT ODS

National Instruments Corporation
National Instruments is the leader in Graphical System Design and offers sophisticated hardware and software products. Found at nearly every automotive OEM and Tier 1 supplier, our tools save time and money across all stages of the automotive engineering process by providing a common platform. NI’s revolutionary concept has changed the way engineers and scientists approach measurement and automation, through industry-leading I/O, flexible off-the-shelf hardware and the powerful software development environments, to create user-defined solutions for applications ranging from End-of-Line and in-furnace test to in-vehicle data logging and embedded software validation.

Contact: Ms. Stephanie Amrite, Mail: stephanie.amrite@ni.com

ECU Measurement and Calibration Toolkit
Type
Add-on for ECU measurement and calibration.

Functionalities
The NI ECU Measurement and Calibration Toolkit extends the NI LabVIEW, NI LabWindows™/CVI, and Microsoft C/C++ development environments to support measurement and calibration applications for the design and validation of electronic control units (ECUs).

ASAM Standards
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L)

NI DataFinder Server Edition
Type
Centralized ASAM ODS compliant data management software

Functionalities
NI DataFinder Server Edition is an ASAM ODS server which works out-of-the-box by indexing test files with no need for IT support or database knowledge. NI DataFinder Server Edition integrates easily into existing systems and offers the indexed data through an ASAM ODS CORBA interface.

ASAM Standards
ASAM CAT ODS, ASAM COMMON MDF

NI DIAdem
Type
Data management, analysis, report generation and script based automation.

Functionalities
NI DIAdem is a single software tool that can be used to quickly locate, load, visualize, acquire, analyze, and report measurement data collected during data acquisition and/or generated during simulations.

ASAM Standards
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM CAT ODS, ASAM COMMON MDF

NI LabVIEW
Type
Graphical System Design based application development environment (ADE).

Functionalities
Graphical System Design software that provides engineers and scientists with the tools needed to create and deploy measurement and control systems through unprecedented hardware integration.

ASAM Standards
ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM ASAP3, ASAM COMMON MDF

NI LabWindows™/CVI
Type
ANSI C based application development environment (ADE)

Functionalities
LabWindows™/CVI is a proven ANSI C development environment for engineers and scientists which increases productivity when creating test and measurement applications.

ASAM Standards
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX)

NI TestStand
Type
Test Automation

Functionalities
NI TestStand is a ready-to-run test management software used for developing, executing, and deploying test and validation systems. Users can develop test sequences that integrate code modules written in any test programming language. Sequences also specify execution flow, reporting, database logging, and connectivity to other enterprise systems.

ASAM Standards
ASAM AE HIL, ASAM AE XIL, ASAM AE XIL-MA

NI VeriStand
Type
Application development environment (ADE) for real-time testing applications.

Functionalities
NI VeriStand is a powerful out-of-the-box software environment for configuring and performing real-time testing applications, such as HIL, MIL, SIL and test cells more efficiently.

ASAM Standards
ASAM AE HIL, ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE XIL, ASAM AE XIL-MA, ASAM ASAP3
**NI-XNET**

Type Hardware Driver

Functionalities High-performance driver software technology behind NI’s CAN, LIN, and FlexRay interfaces for PCI, PXI and NI C Series, which provides a set of driver software and APIs for NI LabVIEW, NI LabWindows/CVI, and C/C++ on Windows and LabVIEW Real-Time OS.

**ASAM Standards**

ASAM AE MCD-2 NET (FIBEX)

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**NorCom Information Technology AG**

NorCom specializes in augmenting automotive development processes by employing today’s big data technologies. Based on Hadoop we set up big data technology frameworks for analytics and data logistic capable of dealing with automotive data formats. Scalability is proven up to several hundred petabytes. We also provide solutions for document based collaboration using natural language processing and deep learning to interlink information of structured and un-structured nature.

Contact: Mr. Tobias Abthoff, Mail: tab@norcom.de

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**Ono Sokki Co., Ltd.**

We, Ono Sokki Co., Ltd., are designing and manufacturing the measurement and control system for automobile testing and development. Also the instruments for analyzing the noise and vibration are available on our production line.

Contact: Mr. Yu Kumakura, Mail: kumay@onosokki.co.jp

**Engine Test Bed**

**Type** FAMS8000

**ASAM Standards** ASAM CAT ACl, ASAM AE MCD-3 MC

**ORANGE**

**Type** OP-3000

**Functionalities** ECU Calibration

**ASAM Standards** ASAM AE MCD-3 MC

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**ORME**

ORME is a French company located in Toulouse, specializing in signal and image processing. ORME has based its activities on its know-how and on a close relationship with its customers to fit their needs. ORME realizes specific algorithm studies and software developments as well as training. ORME also develops and commercializes its own software for data analysis: TrackImage (image sequence analysis) and Track-Report (test analysis and reporting).

Contact: Mr. Luc Oriat, Mail: luc.oriat@orme-toulouse.com

**TrackReport**

**Type** Software

**Functionalities** Automatic test analysis and reporting

**ASAM Standards** ASAM CAT ODS

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**Parametric Technology Corporation**


Contact: Mr. Thomas Hornak, Mail: integritygermany@ptc.com

**Integrity, a PTC product**

**Type** Application Lifecycle Management System

**Functionalities** Requirements Management, Architecture Management, Change Management, Test Management, Traceability

**ASAM Standards** ASAM AE Issue

**Source, a PTC product**

**Type** Software Configuration Management

**Functionalities** Integrated Configuration and Change Management, Full traceability to Requirements and Models, Integration in Test Management.

**ASAM Standards** ASAM AE CC
Peak Solution GmbH

Peak Solution is focused on the design and implementation of software applications for the planning, description, evaluation and documentation of tests. The solutions are based on standardized, flexibly adjustable software components which, thanks to their open interfaces, can be integrated smoothly into existing application and system landscapes. Special focus is placed on the use of applicable standards like ASAM ODS.

Contact: Mr. Guido Schneider, Mail: g.schneider@peak-solution.de

openMDM based systems

Type  An open and manufacturer independent open source software platform for the implementation of company-wide test and measurement data management solutions

Functionalities  Proven software modules for test definition and order placement as well as storage, search and exchange of measurement data, customizable application model, interfaces to many measurement systems and data formats, like e.g. DIADEM, FAMOS, Excel, etc.

ASAM Standards  ASAM CAT ODS

Peak BigODS Engine

Type  Evaluation of test data in a Big Data Cluster

Functionalities  The Peak BigODS Engine offers you the possibility to evaluate comprehensive amounts of test data in a HDFS/VarN-based Big Data Cluster considering complex criteria. Along with the Peak BigODS Engine, we provide special connectors (= input formats) for different measurement data formats (e.g. ASAM ODS, MDF3, MDF4, ISO9141, etc.). Data analysts can integrate the connectors into Apache Spark applications in order to "decode" the measurement data and to evaluate them through complex analyses. Apache Spark’s In-Memory technology ensures particularly quick data processing. Providing an accordingly large Cluster of physical and virtual servers, petabytes of measurement data can easily be processed. Just like HDFS/VarN, the Spark-Custer’s performance increases linearly with its size. Using Java and Python, our predefined query algorithms can be integrated in existing applications (e.g. Peak ODS Server, openMDM®).

ASAM Standards  ASAM CAT ODS

Peak ODS Permission Manager

Type  Reliable protection for measurement data

Functionalities  The Peak ODS Permission Manager helps you to automate the often very complex allocation of granular read, write, edit and delete authorizations for different ODS instances (e.g. projects) and their assigned elements (e.g. tests and measurement results that are linked to a project). This is done on the basis of freely definable criteria and conditions, which you can comfortably manage in an administration interface. For example: At periodic intervals, the Peak ODS Permission Manager determines those projects, tests and measurement results to which the defined selection criteria apply (e.g. project type = confidential) and allocates or withdraws the respectively included rights for the defined user groups. In this way, it is guaranteed that the access to new test data or tests that change their status over time is protected promptly and in accordance with the agreed security and confidentiality guidelines.

ASAM Standards  ASAM CAT ODS

Peak ODS Server

Type  Peak ODS Server offers standardized methods and interfaces for saving and reading test data on the basis of ODS

Functionalities  Peak ODS Server supports the ASAM standards ODS 5.3, ODS Mixed Mode and ODS Extended Query. It is optimized for use in connection with the measurement data management framework openMDM. But also other data acquisition, automation and analysis systems can be expanded fast and cost-effectively to access ODS databases using the Peak ODS server. Providers who would like to use the Peak ODS Server in their own OEM solutions or customer projects will find that Peak Solution has a fair partner concept with interesting conditions. The Peak ODS server works with Oracle and MS-SQL data bases.

ASAM Standards  ASAM CAT ODS

Professional services for openMDM

Type  Professional services for the implementation of company-wide test and measurement data management solutions

Functionalities  Consulting, system set-up, customizing, software development, system integration, support and maintenance for the open MDM framework

ASAM Standards  ASAM CAT ODS

PEAK-System Technik GmbH

The company PEAK-System from Germany is a leading provider of hardware, software, and services for the mobile and industrial communication sector with emphasis on the field busses CAN and LIN. The product range includes:

Contact: Mr. Uwe Wilhelm, Mail: info@peak-system.com

Hardware ...
- CAN/FD connections for High-speed USB 2.0 and PCI Express
- CAN/LIN interfaces for conventional PC interfaces and embedded applications
- I/O modules with CAN connection for control, measured data recording, and processing
- Converters for different physical transmission types (bus converter modules)
- Routers and gateways for the forwarding of messages between CAN busses and other networks
- Data loggers and diagnostic hardware
- Products for education, demonstrations, and test setups
- Chip solutions for the CAN connection to USB, PCI, and PCI Express
d Software ...
- CAN development systems for Windows® 10, 8.1, 7, CE 6.0.a and for Linux
- Programming interfaces for various protocols and standards like CCP, XCP, ISO-TP, UDS, OBD-II, and Passthru
- Software to monitor and diagnose CAN and LIN busses
- Programs for recording, playback, and simulation of message traffic
- Configuration software for CAN hardware from PEAK-System
Peak-System Technik AG

ASAM Solutions Guide 2017

111000

ASAM Standard Portfolio

List of Members & ASAM Related Products

About ASAM

Contact & Imprint

Member Reference by Standards

Accessories...
- Helpful CAN accessories
- PC adapter cards for PC/104 Small Form Factor Boards
- CAN cables and adapters for various applications

In addition to development as well as distribution and trade of hardware and software products, PEAK-System Technik provides know-how in form of different services like custom-designed hardware and software development or hardware adjustments.

PEAK-System from Darmstadt, Germany was successfully certified according to the international standards ISO 9001:2008 and ISO 14001:2004.

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PCAN-CCP API

Type: API / Programming Interface

Functionalities: Free CCP programming interface for Windows (32/64-bit). The API covers functions for each command of the CCP standard and additional commands for communication management. The physical communication via CAN is based on the programming interface PCAN-Basic. Both APIs are part of the scope of supply of every CAN interface from PEAK-System.

ASAM Standards: ASAM AE MCD-1 CCP

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PCAN-XCP API

Type: API / Programming Interface

Functionalities: Free XCP programming interface for Windows (32/64-bit). The API covers functions for each command of the XCP standard and additional commands for communication management. The physical communication via CAN FD and CAN is based on the programming interface PCAN-Basic. Both APIs are part of the scope of supply of every CAN interface from PEAK-System.

ASAM Standards: ASAM AE MCD-1 XCP

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Pico Technology Ltd.
Pico Technology is the market leader in PC-based Oscilloscopes and Dataloggers; our award-winning PicoScopes are used to improve quality and reduce cost. PicoScope complements serial diagnostics as an essential part of accurate diagnostics. PicoScope verifies problems and repairs in service, and debug designs effectively and efficiently in development.

Contact: Mr. Phil Service, Mail: phil.service@picotech.com

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PikeTec GmbH
PikeTec is a software company specialized in functional testing and verification of ECU software. For this, PikeTec created the tool TPT which supports systematic automated test of control software. Testing Simulink-models works as well as testing ASCET-models or C-Code. TPT supports MIL, SIL or even PIL and HIL testing procedures.

Contact: Mr. Jens Luuedemann, Mail: info@piketec.com

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PLS Programmierbare Logik & Systeme GmbH
PLS is among the worldwide leading suppliers of debuggers, emulators and trace solutions for microcontrollers and System-on-Chips. The leading edge Universal Debug Engine (UDE) offers entirely new dimensions for fast, flexible and robust access to multi-core systems and deeply embedded systems.

Contact: Mr. Jens Braunes, Mail: Jens.Braunes@pls-mc.com

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Polytec GmbH
Polytec is a global corporation with facilities in Europe, North America and Asia. It is the worldwide leading supplier for non-contact laser Doppler vibration measurement systems. Polytec’s innovative measurement solutions allow our customers to maintain their own technical leadership in markets from automotive and aerospace to micro technology.
Contact: Mr. Jörg Sauers, Mail: j.sauer@polytec.de

PSV-500 Scanning vibrometer
Type Scanning vibrometer
Functionalities Full-field vibration measurement for testing of acoustic materials
ASAM Standards ASAM CAT ODS

PSV-500 3D H 3D Scanning Vibrometer
Type 3D Scanning Vibrometer
Functionalities Full-field vibration measurement for NVH and structural dynamic testing
ASAM Standards ASAM CAT ODS

RoboVib Structural Test Station
Type Automated Modal Testing
Functionalities RoboVib is a robotic experimental modal test station utilizing non-contact Laser Doppler Vibrometer for sample probing. The main purpose is the validation of structural dynamic models on component level up to full car bodies. RoboVib is offered as solution for NVH labs or as a measurement service by Polytec GmbH for Europe or Polytec Inc. for the United States
ASAM Standards ASAM CAT ODS

QTronic GmbH
QTronic provides tools and services for model-based development. Our outstanding software tools are used by developers at Mercedes-Benz, AMG, BOSCH, ZF, IAV, Continental, Toyota, Honda, SAIC and others. Silver and TestWeaver support highly automated validation and test of virtual ECUs on Windows PCs. This helps to identify design problems much earlier and faster with much lower costs than ever possible.
Contact: Dr. Jakob Mauss, Mail: jakob.mauss@qtronic.de

Silver
Type Virtual ECU on Windows PC
Functionalities Silver is a tool used by automotive development engineers to simulate ECUs in closed loop with a vehicle model on Windows PC. This way, work on control development, test, and calibration can be selectively shifted from road, test rigs, and HIL to Windows PC where it can be performed faster, cheaper and without blocking limited resources. Silver provides built-in support for automotive standards such as ASAP2/A2L, MDF, CAN, and XCP to perform co-execution of control software and of vehicle simulation models. Silver also supports the FMI (Functional Mockup Interface), which greatly simplifies the import of models from simulation tools such as Dymola, Simulink, MapleSim, AMESim, SIMPACK or Mo- delica into the Silver environment. Silver is a product partner of The MathWorks, which translates into seamless integration of Silver into the MATLAB®/Simulink tool chain. Silver can be connected to CANopen or INCA for measurement and calibration, or can be used for rapid-control prototyping via CAN. Silver provides interfaces for test automation with Python, TestWeaver, ECU-TEST, TPT and others. Advanced testing support: range check for all measurements and characteristics, detection of common software bugs, measurement of speed and stack consumption for ECU tasks, back-to-back tests, code coverage and other criteria recommended by ISO26262. Silver is in use for control development at Mercedes-Benz, BMW, AMG, IAV, Continental and others.
ASAM Standards ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM COMMON MDF

TestWeaver
Type: Automated System Validation
Functionalities: TestWeaver (testing without test scripts) is a tool that autonomously searches for weak points and bugs in control software and calibration data. Users have to supply a simulation model (implemented e.g. using MATLAB®/Simulink, Silver or HL) and to specify computable quality indicators. TestWeaver constructs automatically driving scenarios that minimize these indicators. This helps to find bugs early and with much less effort than otherwise possible. A typical ECU (software + calibration data) is checked within 24 hours on a standard PC. The automatic test case generation of TestWeaver can run with MIL, SIL, or HL setups and allows to achieve a much higher test coverage with less effort than otherwise possible. TestWeaver is in use for software development at Mercedes-Benz, AMG, Bosch, ZF, SAIC and others.

ASAM Standards: ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM COMMON MDF

CalveRA
Type: Expert system for project independent processing of application data
Functionalities: CalveRA is a standard server-oriented software for the knowledge-based validation of parameter data sets in ECU software. The special knowledge is entered into CalveRA by experts into special, restricted parameter data sets. Development engineers in different projects can resort to this knowledge. From the parameter data inside CalveRA, reference parameter sets can be created which are then used to validate the results of the development engineers. By these means the experience from historical projects can be reused. Furthermore the reference data set can be used as suggestion for the application data, allowing now, manifold projects to be dealt with. Label list are imported out of A2L description files. DCM calibration data files are used to import specific data sets that have to be validated against the expert data in CalveRA and to export the reference data sets as basis for new application projects.

ASAM Standards: ASAM AE MCD-2 MC (ASAP2/A2L)

DiagRA M
Type: Diagnostic tool
Functionalities: DiagRA M with support for MCD-1 (CCP/XCP), CANdb, SMB (serial management bus) and for measurement data accessed by DiagRA D. Calibration tool DiagRA C for adjustment (CCP/XCP) of parameters as well as characteristic curves and fields with graphical and numerical display. Adjustment on-line and off-line. XCP on CAN, FlexRay and Ethernet. Integrated functionality for parameterization of DEPM (Diagnoses Error Path Manager). Data included in ODX can be compared with calibrated values in the A2L/HEX projects. ASAP3 Interface for remote controlled measuring implemented.

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MCD-3 MC, ASAM ASAP3

DiagRA C
Type: Measurement and calibration tool
Functionalities: DiagRA C is a measurement device for calibrating parameters as well as characteristic curves and fields with graphical and numerical display. Adjustment on-line and off-line. XCP on CAN, FlexRay and Ethernet. Integrated functionality for parameterization of DEPM (Diagnoses Error Path Manager). Data included in ODX can be compared with calibrated values in the A2L/HEX projects. ASAP3 Interface for remote controlled measuring implemented.

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MCD-3 MC, ASAM ASAP3

DiagRA M Toolset
Type: Integrated toolset for measurement, diagnostics and calibration
Functionalities: The DiagRA M Toolset is an applications and diagnostics tool for working with electronic control units in the automotive industry. It is an integration of the already widespread tools DiagRA-M, DiagRA-C and DiagRA-D. It is used in the whole cycle of vehicle development, production and life.

ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MCD-3 MC, ASAM ASAP3

RA ODX Viewer
Type: ODX Data management tool
Functionalities: ODX viewer tool filters and displays the data out of ODX projects in several ways, arrange them well and exports complete or reduced data sets in several formats like XML, PDF and CSV. Manufacturer-specific configurations are possible. ODX containers can be imported in full. Parameters and their calculations can be displayed in a detailed window. RA ODX Viewer comes with an integrated structural view through ODX Explorer.

ASAM Standards: ASAM AE MCD-2 D (ODX)

Silver Scan-Tool
Type: OBDII/EOBD/HD-OBDO/EWD-OB diagnostic tool
rd electronic gmbh

rd electronic supports tools and systems for data management, device integration, test and automation systems for end-of-line test and integration frameworks for different computer platforms. In the area of ECUs rd electronic develops and manufactures on-board interfaces and controllers as well as real-time bus analyzers for all bus systems.

Contact: Mr. Jürgen Döring, Mail: juergen.doering@rd-electronic.com

ASAM Standards ASAM AE ATX, ASAM AE COMMON Seed&Key and Checksum Calculation

FLG

Type

Driver guide system for run-in and brake test stands

Functionalities

Driver guide system for run-in, diagnosis and brake test stands in end-of-line and development test stands. Connects to ECUs via radio transmission, test and driver guidance editor, online test compilation, test order and report integration, chassis dyno GDI integration platform, prepared for MCD-3 migration.

ASAM Standards ASAM CAT GDI

GDI Framework

Type

GDI integration platform for Windows and Linux (RT)

Functionalities

Integration platform for ASAM GDI devices for test and automation systems. DLL, shared lib and Java coordinator interfaces. ASAM GDI V4.2.4.1/4 DCD/DIT parser integrated or stand alone. Macro engine for system persistency and setup procedures - GINA/2010 compatible. Platform adapter for Windows and Linux include serial, IP4, CAN, CANopen, and USB.

ASAM Standards ASAM CAT GDI

Lexikon

Type

Metadata and Application Data Model Management

Functionalities

Web-based solution providing full metadata management services; (Parameter generation, Application Data Models, Equation). Capable of saving Business Rules for naming conventions, equation generation and model construction. Vendor and operating system independent, multilingual support from single licence to full enterprise version. Provides metadata integrity to ODS data repositories.

ASAM Standards ASAM CAT ODS

Services

Type

Consulting and co-engineering

Functionalities

rd electronic supports development of: ODS-Data models, ODS system architecture; GDI-integration and driver development; CEA-Component development; MCD-Migration

ASAM Standards ASAM CAT CEA, ASAM CAT GDI, ASAM AE MCD-3, ASAM CAT ODS

ReliaTec GmbH

The ReliaTec is specialized in supporting their customers in the design and development of innovative products and services. As a technologically oriented innovation partner we apply our know-how in the development of software components and tools for networked real-time systems based on LIN, CAN, FlexRay and Ethernet.

Contact: Ms. Daniela Kirchhof, Mail: sales@reliatec.de

ReliaFX Access

Type

Software Product

Functionalities

FIBEX-Importer Library

ASAM Standards ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 NET (FIBEX)

RENK Test System GmbH

RENK Test System GmbH, a member of the MAN-group provides various turnkey test systems for R&D and Quality Assurance applications customized for the automotive, aviation, wind turbine and railway industry for more than 25 years now. RENK also offers consulting for test system design as well as services, maintenance of test systems, technical support and training.

Contact: Mr. Mathias Karreer, Mail: info.testsystem@renk.bz
Schließheimer Soft- und Hardwareentwicklung GmbH
Schließheimer GmbH specializes in Software and hardware development for microcontroller real-time Systems. The Company performs Software tests for the automotive industry. Schließheimer develops Software and hardware products as prototypes or in small batches. Schließheimer’s portfolio includes the Software tools CanEasy and Can for CAN/LIN bus development, analysis, and Simulation.
Contact: Mr. Pascal Baumgärtner, Mail: baumgaertner@schleissheimer.de

science + computing ag
science + computing ag (s+c) an Atos Company – founded in 1989 – is an IT services and software-development company operating in the fields of computer aided testing, engineering and design (CAT/CAE/CAO). s+c offers a broad spectrum of services related to the handling of huge amounts of engineering data: consulting and concepts, system analysis and integration, custom tool development, optimization of distributed systems, data management and operation of complex, heterogeneous IT-environments. 2015 s+c has become part of Atos SE and operates under the brand of Atos since July 1st 2016. Visit Atos SE at: http://de.atos.net/de-de/home.html
Contact: Dr. Dietmar Rapf, Mail: D.Rapf@atos.net

ASAM ODS consulting and integration
Type Consulting, engineering, support
Functionalties Consulting customers in the organization of their test data. Design of ASAM ODS application models. Implementation of ASAM ODS databases.
ASAM Standards ASAM CAT ODS

ASAM ODS database and version migration
Type Consulting, engineering, support
Functionalties Migrating engineering data to ASAM ODS databases. Migrating ASAM ODS based data or ASAM ODS databases to newer versions of the standard.
ASAM Standards ASAM CAT ODS

ASAM ODS server and Database operation
Type Support and operations
Functionalties 1st and 2nd level support in the operation of ASAM ODS servers, underlying databases (i.e. Oracle) and servers, problem analysis and operations.
ASAM Standards ASAM CAT ODS

Software development
Type Component based GUI application development, consulting
Functionalties Mapping individual Engineering processes into DataManagement applications. Programming of individual GUI applications for comfortable access to ASAM ODS based data using rich client or web based applications. Integration of and integration in Customer software. Using and utilizing standard software i.e. developing data management systems based on the open MDM framework http://www.openmdm.org
ASAM Standards ASAM CAT ODS

Scienlab electronic systems GmbH
Scienlab produces test systems to test industrial products as well as electrified drive train components for electric and hybrid vehicles. The business unit Test Systems develops customer-specific test environments for energy storage systems, battery management systems, inverters, DC/DC converters, charging devices and charging infrastructures, and for the integration of multiple components.
Contact: sales@scienlab.de

EnergyStorageDiscover
Type Software for battery tests
ASAM Standards ASAM COMMON MDF

SesKion GmbH
We provide measurement and simulation systems for automotive sensor interfaces like PSIS, DS1, SENT and SPI. Our Simulyzer product family is used in development and production of ECU and sensors for airbag systems. Including crash data capturing and algorithm validation.
Contact: Mr. Jürgen Pfeiffer, Mail: j.pfeiffer@seskion.de

SGE GmbH
The SGE Ingenieur GmbH is specialized in ECU development for the vehicle and mobility industry. We provide ECU calibration, functional development, calibration and testbed automation, application development in MATLAB/SIMULINK and simulation model development for HIL/MIL/SIL/residual bus applications.
Contact: Mr. André Sell, Mail: andre.sell@sge-ing.de

DataArtist
Type Software
Functionalties Measurement Data Visualization and Analysis
ASAM Standards ASAM COMMON MDF

MapArtist
Type Software
Functionalties Map Creation, Map Visualization and Optimization
ASAM Standards ASAM AE MCD-2 MC (ASAP2/A2L), ASAM COMMON MDF

ModelArtist
Type Software
Functionalties Model based calibration.
ASAM Standards ASAM COMMON MDF

SGE Circus
Type Software
Functionalties Measurement Data Visualization and Analysis, Map Creation, Map Visualization and Optimization, Model based calibration
ASAM Standards ASAM AE MCD-2 MC (ASAP2/A2L), ASAM COMMON MDF
Siemens AG

For 35 years Siemens is delivering test systems for the automotive industry and automotive suppliers and leverage the long term experience to build optimized solutions. The ASAM solutions ASAM MCD-3D server, ASAM MCD 2D(ODX) and ASAM GDI are integral part of the Siemens SIDIS Pro test software and can be used from administration, test authoring and execution.

Contact: Mr. Klaus Karpf, Department Manager of Diagnostic Systems, Mail: klaus.karpf@siemens.com

SIDIS Authoring

Type
Editor
Functionalities
The SIDIS Pro authoring suite is used to design all test routines required in the production environment. The suite takes advantage of the integrated ASAM MCD 2D (ODX) and the ASAM GDI interface as well as the import of OTX routines. The graphical user interface with the Flow view allows the easy design of the test flow. A full implemented version control system enables a comprehensive support of the complete releasing process.

ASAM Standards
ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D, ASAM CAT GDI

SIDIS GDI

Type
Editor, GDI API
Functionalities
SIDIS GDI provides a GDI API to interface roller benches, wheel alignment machines or filling stations according to ASAM GDI standards. The authoring tool of SIDIS Pro provides an editor to create the test sequences.

ASAM Standards
ASAM CAT GDI

SIDIS MCD-3D Server

Type
ASAM Runtime Kernel
Functionalities
Server API (3D) Interface (.net, COM/DCOM, Java), multi client and remote capable. Interface to SIDIS MVC is available with performance-optimized CF Interface and PDU API. High performance diagnostic kernel incl. time measurement traces. Communication processor supports standard protocols (KWP 2000 on K and CAN), UDS and dedicated OEM protocols.

ASAM Standards
ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D

SIDIS MVC

Type
Vehicle communication interface
Functionalities
VCI supports standard protocols like KWP 2000 on K-Line and CAN-Bus, UDS, J1939 and dedicated OEM protocols. ASAM features like asynchronous operation, multilink and multi-client capability are available. Devices with WLAN, RF, USB, LAN and serial interfaces are available.

ASAM Standards
ASAM AE MCD-3 D

SIDIS Runtime

Type
Runtime component
Functionalities
The SIDIS Pro runtime component executes the tests design and developed with the SIDIS Pro authoring system and takes advantage of the parallel communication to multiple ECUs and GDI components to save cycle time in the production line. The embedded CANalysier, debugging and logging functionality simplifies the validation of the test routines.

ASAM Standards
ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D, ASAM CAT GDI

Siemens PLM Software

Siemens PLM Software is an engineering innovation partner for companies in the automotive, aerospace and other advanced manufacturing industries. Siemens PLM Software enables its customers to get better products faster to market, and to turn superior process efficiency to their strategic competitive advantage. Siemens PLM Software offers a unique combination of virtual simulation software, testing systems, engineering services, process and data management. Siemens PLM Software is committed to openess of its Simulation and Test solutions, based on the support of standards, so as to enable optimal interoperability of Siemens PLM Software solutions with complementary solutions supporting the development processes at its customers.

Contact: Ms. Allison Fassin, Mail: info.lms.plm@siemens.com

LMS Test.Lab

Type
Integrated environment for functional performance Testing
Functionalities
LMS Test.Lab is a complete solution for test-based engineering combining high-speed multi-channel data acquisition with a suite of integrated testing, analysis and report generation tools. LMS Test.Lab is designed to make testing more efficient and more convenient for the users. It includes solutions for rotating machinery, structural and acoustic testing and vibration control. Support of the ASAM ODS format is a cornerstone in the application, providing full data compatibility with data originating from other sources than LMS Test.Lab.

ASAM Standards
ASAM CAT ODS

LMS Test.Lab Data Management

Type
Engineering Data Management Solution
Functionalities
The LMS Test.Lab Data Management solution provides an environment for efficient management, sharing and data exchange for both work-in-progress and published NVH test data. LMS Test.Lab Data Management can manage ASAM-ODS data securely, publish data beyond the restricted project team and increase the efficiency of sharing data across the company.

ASAM Standards
ASAM CAT ODS

Sierra CP Engineering Ltd.

Sierra-CP Engineering has over 30 years’ experience in providing test equipment solutions, all based on our proprietary CADET V14 Control & Automation package. Our range comprises of engine, powertrain, vehicle and component testing equipment as well as engine combustion air handling systems, emissions sampling, robot drivers, fuel measurement and fuel conditioning solutions. We design and manufacture all of our own solutions and support them globally with locations in UK, China, USA, India and Malaysia.

Contact: Mr. Phil Roberts, Mail: pnr@sierra-cp.com

CADET Automation System

Type
Test Bed Automation System
Functionalities
Data acquisition, real time control, test sequencing

ASAM Standards
ASAM AE MCD-1 CCP
**SIMTEC Elektronik GmbH**

SIMTEC Elektronik GmbH develops and produces custom-specific measurement systems, control devices and power electronics for industrial applications. The measurement devices collect and analyse non electrical quantities like force, temperature, flow and pressure. All devices are equipped with well-established field busses. The in-house production is capable of assembling and testing printed circuit boards, mounting modules and complete devices.

Contact: Mr. Thomas Gessele, Mail: entwicklung@simtec-elektronik.de

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**Sky Technology Inc.**

SkyTechnology inc. provide measurement system that specializes in R&D in response to your request. We will aim to risk reduction and cycle shortening of the system development.

Contact: Mr. Reino Ikeda, Mail: r_i@skytechnology.co.jp

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**Sodius SAS**

Linking, synchronizing or exchanging engineering data are the most needed capabilities today to enhance productivity and collaboration not only between applications but between teams and organizations. Sodius develops data synchronization products and services that allow people and systems to work together to deliver projects across disciplines, teams, and organizations. In order to ensure high quality on-time deliverables, Sodius supports both systems and software design teams with dedicated services and solutions for requirements management, architecture, modeling and ALM/PLM domains.

Contact: Mr. Thomas Capelle, Mail: tcpelle@sodius.com

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**Softing Automotive Electronics GmbH**

Softing provides products and services covering the entire life cycle of an ECU. Its range includes the Diagnostic Tool Set (DTS) product family with authoring, flash and analysis tools as well as ODX runtime systems, and the Softing TDX workshop application. Additional tools based on VCI Communication Framework VCF like data logger for the vehicle bus systems, residual bus simulation, and measuring enable symbolic access to the ECUs. Furthermore, Softing offers customer-specific solutions for every stage of the ECU life cycle, especially solutions for development, test, production or after sales applications.

Contact: Mr. Markus Steffelbauer, Mail: markus.steffelbauer@softing.com
### OTX Studio

**Type**: Comfortable editor for OTX sequences including ASAM MCD-3D server

**Functionalities**:
- Easy-to-use authoring system according to ISO 13209, based on Softing D-Server
- DTS COS and ODX data, specification view (flow charts) and implementation view (line-based), debugging, online-change of code while debugging, reporting. Many supplements to the standard, e.g. DLL access, file access, GUI library

**ASAM Standards**: ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D, ASAM AE OTX

### Softing TDX

**Type**: Workshop tester based on ODX/OTX/ASAM MCD-3D

**Functionalities**:
- Fully configurable workshop tester for all diagnostic functions incl. handling of error memory, measurement, flash programming and guided functions/diagnostics

**ASAM Standards**: ASAM AE MCD-2 D (ODX), ASAM AE MCD-3 D, ASAM AE OTX

### VCF

**Type**: Run time environment (API) supporting simulation, measurement and diagnostic capabilities on current bus systems

**Functionalities**:
- VCI communication framework (VCF) based on HS- and VIN|ING VCI families; supports low level diagnostics, measurement (XCP and direct bus), residual bus simulation, and data logging, data interpretation via CANdb/FIBEX/LDF/AUTOSAR

**ASAM Standards**: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM COMMON HDF

## Sohatex GmbH

Sohatex GmbH is a specialist for the development of control software for internal combustion engines and measurement software for test cells. The used modular ECU-hardware enables very flexible control of internal combustion engines (including “Next-Cycle Control”) from one-cylinder R&D engines to 16 cylinder engines with any kind of fuel injection.

Contact: Mr. Johann Spreitzer, Mail: spreitzer@sohatex.com

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**Optimize your Data**

**Softing Automotive Electronics**

The core areas of expertise of the Automotive Electronics segment, Diagnostics, Measurement, Testing and Communication, provide the industry with key technologies.
Sontheim Industrie Elektronik GmbH

As a manufacturer of high performance and quality hard- and software products Sontheim Industrie Elektronik GmbH provides a broad range of high-tech products for automation and automotive industry and is also specialized in protocol stacks like ISO15765 (KWP2000 on CAN), J1939 and RAW-CAN, which can be used by the M.D.T. to develop diagnostic applications.

Contact: Mr. Daniel Magnus, Mail: daniel.magnus@s-i-e.de

CANexplorer 4
Type: CAN-Bus monitoring, logging and analyzing software
Functionalities: Modular, efficient, intuitive - the CANexplorer 4 is a completely new developed fieldbus analyzing software which reflects years of know-how regarding the work with CAN-networks within complex machines and vehicles. This new generation features a lot of more functions combined with an intuitive and flexible handling. The CANexplorer provides the complete range of function modules for data acquisition, data processing, data conversion, data logging and data visualization.

ASAM Standards: ASAM AE MCD-2 D (ODX)

CANfox
Type: CAN-to-USB interface
Functionalities: The CANfox is a compact CANto-USB interface with a 32-Bit micro controller. It provides 1 opto isolated CAN-channel and 1 RS232 channel. With its compact design and providing high performance it's perfect for mobile use. The multithread software interface SIECA132 with demo application for own operations is included.

ASAM Standards: ASAM AE MCD-2 D (ODX)

CANUSB
Type: CAN-to-USB interface
Functionalities: The CANUSB is a robust CAN-to-USB interface even for rough use and provides up to 2 opto isolated CAN-channels with additional features like ErrorFrame detection and analogue level measurement of the CAN-level. The multithread software interface SIECA132 with demo application for own operations is included.

ASAM Standards: ASAM AE MCD-2 D (ODX)

COihawk
Type: ECU, Telematics Module, Diagnostic Module, CAN-to-Ethernet Gateway, CAN-to-Wi-Fi Gateway
Functionalities: Equipped with a 32-bit microcontroller and based on a MicroC/OS-II Linux operating systems, COihawk™ offers standard interfaces such as CAN and Ethernet as well as a Wi-Fi interface and optional digital in- and outputs. The on-board device has a robust design of IP67k and is capable of operating in harsh environments including exposure to dust, extreme temperatures, shock, vibration, and high pressure water or steam jets. A webserver is also integrated.

ASAM Standards: ASAM AE MCD-2 D (ODX)

M.D.T. Modular Diagnostic Tool
Type: Development Tool
Functionalities: As M.D.T. is a tool for the development of diagnostic applications for the automotive industry by using the latest technology. The multithread based systems provide the possibility to develop diagnostic application without coding by using multiple protocol stacks like ISO15765 (KWP2000 on CAN), RAW-CAN, J1939 and RAW-CAN.

ASAM Standards: ASAM AE MCD-2 D (ODX)

ODX-Editor
Type: Development Tool
Functionalities: In addition to the M.D.T. the ODX-Editor provides the user an easy way for editing existing or the creation of new ODX-D ata by using a graphical user interface. It cares to observe the rules for creating valid data, tests existing databases and provides help functions during the editing.

ASAM Standards: ASAM AE MCD-2 D (ODX)

STAR ELECTRONICS GmbH & Co. KG
STAR ELECTRONICS (formerly Eberspaecher Electronics GmbH & Co) belongs to the pioneers in the field of the automotive bus system FlexRay, which is used in particularly safety critical environments. Eberspaecher Electronics develops and manufactures hardware and software platforms for the evaluation of FlexRay in various customer environments. Star Electronics is leading in the sales of FlexRay interface platforms and provides a wide range of further FlexRay products for remaining bus simulation, gateways and signal manipulation. The STAR COOPERATION Group acquired the Goeppingen-based company Eberspaecher Electronics with its proven products in vehicle networking technology as an ideal supplement to the development and workshop services of its subsidiary BERGER ELEKTRONIK in Sindelfingen. From September 1st, 2015, on, both companies carry the name STAR ELECTRONICS while maintaining their independency under company law. The umbrella brand STAR COOPERATION will dominate the brand identity of these two companies.

The EE solutions portfolio of the STAR COOPERATION Group comprises of standardized products for vehicle networking, energy as well as sensor/actor technologies and development by proxy of special products, test benches, testing boards and applications/embedded software. The production line is equipped with a fully automated PCB assembly. In addition, the workshops produce cable sets and install and modify vehicles to order.

Contact: Mr. Christian Huschle, Mail: christian.huschle@star-cooperation.com

CHI Generator
Type: Export tool to generate CHI (Controller Host Interfaces) files out of FIBEX files
Functionalities: The CHI Generator reads the FIBEX file and supports the CHI export of the communication controllers Bosch E-Ray, FreeScale MFR4200, MFR4300, MFR4310, MPC5567 and Fujitsu MB885221, MB9S460X.

ASAM Standards: ASAM AE MCD-2 NET (FIBEX)

CHI Generator RBS
Type: Export tool to generate CHI (Controller Host Interfaces) files to stimulate a couple of ECUs described in a FIBEX file
Functionalities: The CHI Generator reads the FIBEX file and supports the export of the communication controllers Bosch E-Ray, FreeScale MFR4200, MFR4300, MFR4310, MPC5567 and Fujitsu MB885221, MB9S460X. The physical ECUs of an RBS remain bus simulation (M.D.T.) together with a number of ECUs, which are to be simulated, will be defined, and thus a CHI file for an ECU simulating the remaining bus will be exported.

ASAM Standards: ASAM AE MCD-2 NET (FIBEX)
**Star Cooperation®**

*Your Partners in Flexibility*

**FlexConfig Developer**

Type: Configuration tool for FlexRay networks

Functionalities: FlexConfig Developer is a cost-effective, powerful and user-friendly design and configuration software for automotive networks. New networks are easily created by using wizards. Existing networks are clearly displayed and can be changed easily. With the help of the numerous export options, almost every hardware platform can be configured with the network data.

ASAM Standards: ASAM AE MCD-2 NET (FIBEX)

**FlexConfig RBS**

Type: Creation of complete hardware based remaining bus simulations (RBS), gateways and signal manipulation for FlexRay, CAN, Ethernet, BroadR-Reach and CAN-FD

Functionalities: FlexConfig RBS is a configuration software tool consisting of three packages: RBS (remaining bus simulation), gateway and control (signal manipulation). In combination with the FlexDevice hardware product family, it is made available in a compact, high-performance, comprehensive solution for applications such as ECU development, rapid prototyping, function tests, test benches.

ASAM Standards: ASAM AE MCD-2 NET (FIBEX)

**STIEGEL Datensysteme GmbH**

The STIEGEL Datensysteme GmbH is specialized in sophisticated hard- and software solutions for data acquisition, processing and test rig control. The company, located in Rothenburg ob der Tauber (Germany), was founded in 1984. The software supports standard data acquisition hardware from all major manufacturers and common data formats.

Contact: Mr. Max Staudacher, Mail: max.staudacher@stiegele.eu

**MGraph**

Type: Software

Functionalities: Data analysis and presentation

ASAM Standards: ASAM CAT ODS

**MLab**

Type: Software

Functionalities: Data acquisition and test rig control

ASAM Standards: ASAM AE MCD-1 XCP, ASAM AE MCD-1 CCP, ASAM AE MCD-2 NET (FIBEX)

**Synchrotek GmbH**

Synchrotek is using the array of in-house built applications and software modules providing almost automatic transfer from model based solutions to prototyping hardware, so the focus is on flexible and cost effective solutions.

Contact: Mr. Nikola Bulatovic, Mail: info@synchrotek.com

**TechSAT GmbH**

Contact: Mr. Elwin Muerth, Mail: ts-sales@techsat.com

**Synopsys GmbH**

Synopsys, Inc. is the Silicon to Software™ partner for innovative companies developing the electronic products and software applications we rely on every day. As the world’s 15th largest software company, Synopsys has a long history of being a global leader in electronic design automation (EDA) and semiconductor IP and is also growing its leadership in software quality and security solutions. Whether you’re a system-on-chip (SoC) designer creating advanced semiconductors, or a software developer writing applications that require the highest quality and security, Synopsys has the solutions needed to deliver smart, secure products for the era of connected everything. – See more at: http://www.synopsys.com/Company/AboutSynopsys/Pages/CompanyProfile.aspx?hash=czqyD4b.dpuf

**Virtualizer**

Type: Simulation Tool for automotive Platforms

Functionalities: Virtualizer™ addresses the increasing development challenges associated with software-rich semiconductor and electronic products by enabling companies to accelerate both the development and deployment of virtual prototypes. The results: Accelerated time to market, increased developer productivity, improved product quality, enhanced communication between teams.

ASAM Standards: ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L)

**Taylor Dynamometer**

Turn to Taylor Dynamometer for proven products, deep expertise and accountable support for your vehicle testing operations. Founded in 1929, Taylor is a global manufacturer of complete test cell solutions, engine, chassis and towing dynamometers, hydraulic test centers and data acquisition and control systems. Everything you need to succeed.

Contact: Mr. Jeff Brown, Mail: sales@taylordyno.com

**DynPro2**

Type: Data Acquisition and Control System

Functionalities: Engine, Chassis, Hydraulic and other applications. DynPro2 provides data analysis tools, centralized management of data, support for vehicle communication protocols, reporting, post-processing, closed loop control, even integrate room temperature, lights, safety interlocks and much more into your testing process.

ASAM Standards: ASAM CAT ODS

**TechSAT GmbH**

Contact: Mr. Elwin Muerth, Mail: ts-sales@techsat.com
**TESIS DYNAware GmbH**

OEMs and suppliers throughout the world rely on simulation solutions from TESIS DYNAware. With over 20 years of experience in the Automotive Industry, customers can benefit from simulation expertise in the development of new engine and drivetrain concepts as well as for vehicle dynamics control systems, complete vehicle simulation, energy management and driver assistance systems.

Contact: Mr. Maximilian Chucholowski, Mail: m.chucholowski@tesis.de

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**DYNA4**

**Type**: Automotive Simulation Software

**Functionalities**: Open and flexible simulation framework with model handling, test automation and result management, extensive real-time model library for vehicle dynamics, engine dynamics, advanced powertrains and driver assistance systems

**ASAM Standards**: ASAM AE HIL, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE XIL, ASAM COMMON MDF

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**veDYNA**

**Type**: Vehicle Dynamics Simulation Software

**Functionalities**: Vehicle dynamics simulation model for real-time simulation of passenger cars, trucks and trailers with conventional, hybrid or electric powertrains, tools for suspension analysis and

**ASAM Standards**: ASAM AE HIL, ASAM AE XIL, ASAM COMMON MDF

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**TESCA S.R.L.**

Environmental testing (temperature, vibration), Pulse pressure testing, Air filter testing, Straining and mechanical testing. Creation of customer tailored test benches integrating different systems (Automation).

Contact: Mr. Francesca Conte, Mail: francesca.conte@texaengineering.it

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**TOYOTA Corporation**

TOYOTA Corporation is just independent Technical trading company in Japan, as the TECHNOLOGY INTERFACE between European/American and Japanese/Asian test and measurement engineering since 60 years ago. And TOYOTA Corporation also provide system integration, localization and after services of from TOYOTA Technical Development Corp. provides development services for production of cars. Its business activities include developing and manufacturing measurement instruments and systems; planning of equipment and systems; proposal and supply of model base development solutions; calibration, inspection, and repair of measurement instruments; and development support for next-generation businesses.

Contact: Mr. Haruo Fukuro, Mail: fukuro@toyo.co.jp

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**CRONOS-compact/-flex**

**Type**: Universal data acquisition system for in-vehicle tests and test-beds

**Functionalities**: CRONOS-compact is a networkable data acquisition system with up to 512ch for analog and digital buses (like CAN/CCP, LIN etc) measurement in any environment. CRONOS-Compact can be connected with any test-bed controller and MCD tools via XCP on Ethernet by using A2L files.

**ASAM Standards**: ASAM AE MCD-1 CCP, ASAM AE MCD-2 MC (ASAP2/A2L)

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**imc FAMOS**

**Type**: Comprehensive data processing & signal analysis framework

**Functionalities**: Data acquisition of fast, slow of physical measurements and buses measurements. Data analysis with innovative technologies. Highly effective Engineering Data Management

**ASAM Standards**: ASAM CAT ODS

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**imc-CANSAS**

**Type**: Dynamic Data Measurement and Analysis system / Web-based engineering data portal

**Functionalities**: Data acquisition, High-performance CAN-bus based measurement modules for applications in test stands, in-vehicle and industrial environments. imc CANSAS is a revolutionary concept for the decentralized capture of physical measurement data.

**ASAM Standards**: ASAM AE MCD-2 MC (ASAP2/A2L)

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**imc-PAK/edp**

**Type**: Dynamic Measurement and Analysis system / Web-based engineering data portal

**Functionalities**: Data acquisition, high-performance CAN-bus based measurement modules for applications in test stands, in-vehicle and industrial environments. imc PAK/edp is a revolutionary concept for the decentralized capture of physical measurement data.

**ASAM Standards**: ASAM CAT ODS

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**imc-TrackReport**

**Type**: Signal Analysis & Automated Report Generation Software

**Functionalities**: TrackReport offers a full data visualization and analysis environment, where interactive and automation help creating simulation or test reports. Configurable report models handle data post-processing algorithms as well as the graphical setup. TrackReport can be also used as ASAM-ODS Client tool.

**ASAM Standards**: ASAM CAT ODS

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**Peak ODS Server - ASAM-ODS tools**

**Type**: Server and clients for measurement data management with openMDM framework

**Functionalities**: Consultation for the Process and Methodology in any Test & Measurement fields, Support services and Training for Japanese engineers who is considering improving Measurement Data Management.

**ASAM Standards**: ASAM CAT ODS

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**imc-PAK/edp**

**Type**: Dynamic Measurement and Analysis System / Web-based engineering data portal

**Functionalities**: Data acquisition, High-performance CAN-bus based measurement modules for applications in test stands, in-vehicle and industrial environments. imc PAK/edp is a revolutionary concept for the decentralized capture of physical measurement data.

**ASAM Standards**: ASAM CAT ODS

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**imc-CANSAS**

**Type**: Dynamic Measurement and Analysis System / Web-based engineering data portal

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**ASAM Standards**: ASAM AE MCD-2 MC (ASAP2/A2L)
**TraceTronic GmbH**

Since its foundation as a spin-off from Dresden University of Technology, TraceTronic has been working with a large number of strong partners throughout the automotive industry. Our highly competent and interdisciplinary team of engineers offers a wide range of services in the field of software applications for validation of embedded systems. Due to our close relationship with customers and the years of experience and scientific research, we have the expertise to guarantee powerful and customized products and services.

**Contact:** Mr. Frank Günther, Mail: info@tracetronic.de

**ASAM Standards**
- ASAM AE MCD-2 NET (FIBEX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MCD-3
- ASAM AE XIL-MA, ASAM COMMON MDF

**ECU-TEST**

**Type:** Test automation software

**Functionalities:**
- ECU-TEST is a test automation software for the validation of embedded systems in automotive environments. This software executes regression tests which are essential for validating complex technical products such as electronic control units (ECUs). ECU-TEST can be applied during product development as well as during quality control of production itself.

**ASAM Standards**
- ASAM AE ATX, ASAM AE COMMON Seed&Key and Checksum Calculation, ASAM AE HIL, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE MCD-3, ASAM AE XIL, ASAM AE XIL-MA, ASAM COMMON MDF

**TEST-GUIDE**

**Type:** Software for test report management

**Functionalities:**
- TEST-GUIDE is a centralized database application, flexibly deployable in different development and test environments. It has been developed specifically for use in the automotive area (by ASAM ATX-compliant interface) and provides the capability to manage, view and analyze test executions and results via an intuitive, web-based interface.

**ASAM Standards**
- ASAM AE ATX, ASAM AE COMMON Seed&Key and Checksum Calculation

**TRACE-CHECK**

**Type:** Tool for fully automated evaluation and reporting of recorded signal data

**Functionalities:**
- TRACE-CHECK is the highly efficient tool for the automatic evaluation and validation of recorded measured data. With TRACE-CHECK, even complex requirements can be formalized efficiently and reusable. The created test specifications enable the automatic validation of measured data and thus a fast assessment of large amounts of data in different recording formats.

**ASAM Standards**
- ASAM AE MCD-2 NET (FIBEX), ASAM COMMON MDF

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**TTTech Automotive GmbH**

TTTech Automotive, a subsidiary of TTTech Computerotechnik AG, provides reliable control unit platforms and software solutions offering highest safety classification in accordance with ISO 26262/ASIL D. The modular, certified hardware and software solutions are used for serial production in the field of control and monitoring of electric and hybrid propulsion systems as well as for vehicle dynamics and driver assistance. To validate the vehicle functions, the product range is completed by intelligent data loggers and test equipment for networked systems. TTTech Automotive is a premium member of the FlexRay and AUTOSAR consortia and endorses these open standards for automotive electronic architectures with its products and solutions. Further information on the company and products is available at www.ttttech-automotive.com and products@tttech-automotive.com.

**Contact:** Mr. Marc Lang, Mail: marc.lang@tttech-automotive.com

**TTX-Connexion**

**Type:** Intelligent gateway for signal manipulation

**Functionalities:**
- 4-Way-Gateway (2 x CAN, 2 x FlexRay); signal routing and manipulation; Datalogging on CF card; Comfortable network configuration via FIBEX, CANdb, and AUTOSAR TL (V3.0); Online-viewing and analyzing with TTXAnalyze; Stand alone in vehicle operation

**ASAM Standards**
- ASAM AE MCD-2 NET (FIBEX)

**TTX-DataLogger**

**Type:** Comprehensive Recording & Analysis of the entire vehicle network

**Functionalities:**
- Simultaneous, extensive data logging with a central time stamp; Configurable power management; Filters, triggers, pre-analysis; Open data format; Integrated CCP/XCP master; Freely programmable; Wake-up recording

**ASAM Standards**
- ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX)

**TTX-Disturbance Node**

**Type:** Reproducible failure injection for FlexRay

**Functionalities:**
- Synchronous and asynchronous disturbances; global and local disturbances; Disturbances on channel A and/or channel B; Configurable, triggerable disturbances (incl. 60 test cases); Termination resistor and short-circuit tests; Sending of disturbed frames; Can be automated

**ASAM Standards**
- ASAM AE MCD-2 NET (FIBEX)

**TTX-Optical Link**

**Type:** Optical decoupling for FlexRay

**Functionalities:**
- Optical decoupling for FlexRay

**ASAM Standards**
- ASAM AE MCD-2 NET (FIBEX)
Vector Informatik GmbH

Vector is the leading manufacturer of software tools and software components for networking of electronic systems based on CAN, LIN, FlexRay, Ethernet, WLAN and MOST as well as multiple CAN based protocols. The Vector know-how is reflected in a wide range of tools as well as in integrated consulting services with software and systems engineering. Workshops and seminars complete the manifold training program. Customers from the automotive engineering, the commercial vehicle, aerospace, transportation and control technologies around the world trust in the solutions and products from the independently-owned Vector Group.

Contact: Mr. Alfred Kless, Mail: info@vector.com

ASAP2 Editor
Type Editor for MCD-2MC (ASAP2) files
Functionalities Comfortable editor for creating, modifying and updating MCD-2MC description files (*A2L) exploiting the corresponding linker map file.

ASAP2 Lib
Functionalities The ASAP2 Lib is a function library for reading ASAP2 files of all released versions, including the current V1.61. The library was developed for the C programming language and can be embedded in applications. On demand Vector offers development of customized A2L-converters.

ASAP2 Tool-Set
Type Updating and merging MCD-2MC (ASAP2) files
Functionalities The ASAP2 Updater updates the address and data type information of an ASAP2 file using the linker map file. The ASAP2 Merger merges several ASAP2 files to a common ASAP2 file.

CANalyzer
Type Tool for stimulation and analysis of networks
Functionalities CANalyzer is the universal software analysis tool for ECU networks and distributed systems. CANalyzer makes it easy to observe, analyze, and supplement data traffic in CAN, LIN, MOST, FlexRay or Ethernet systems. With powerful functions and user-programmability, all needs are covered from simple network analysis to advanced troubleshooting of complex problems. CANalyzer support the developer in implementing the diagnostic functionality of an ECU.

Canape
Type Measurement, calibration and diagnostic system
Functionalities Time-synchronous measurement data via CCP or XCP from CAN, LIN, FlexRay, MOST or external test equipment. Environment recognition by video, audio or GPS. Convenient real-time calibration by CCP or XCP. Seamlessly integrated diagnostics by KWP2000 and UDS. Convenient management of calibration data.

Calibrating ECUs optimally
From A to Z!

Your efficient all-round solution for measurement, calibration and diagnostics

Universal tool support simplifies your calibration of ECUs. The versatile CANape tool lets you cover all application cases effortlessly:

> Quickly and reliably capture measured data from various sources – synchronous and time-precise. Whether via CCP, XCP-on-CAN/FlexRay/Ethernet or from external test equipment
> Conveniently calibrate the parameters of your ECU algorithms, either online in the ECU or offline in the Hex file
> Easily manage large amounts of calibration data – with full traceability at all times

Vector supports you from functional development to production-ready ECU, in the laboratory, on the test bench and during driving trials.
Functionalities

- Specify ECU diagnostic services and data in a user-friendly way. This information can be used for test system data supply, ECU auto-code and ECU software validation. Import/export from/to many different formats, including ODX (MCD-2D).

- A template concept ensures a consistent development process and allows diagnostic data to be reused in different OEM-specific protocols. CAnNetStudio supports several standards like KWP2000, UDS, WWH-OBD, J1939, DoIP, FlexRay.

- A quick learning curve is guaranteed, not just for diagnostic experts. Data consistency is ensured and enhances product quality.

ASAM Standards

- ASAM AE MCD-2 D (ODX)

CAnNetStudio

Type

Authoring tool for diagnostic specification

Functionalities

- Tool for test, simulation, diagnostic and analysis of networks

- CANoe is the comprehensive software tool for development, test and analysis of entire ECU networks and individual ECUs. It supports you throughout the entire development process of CAN, LIN, MOST, FlexRay or Ethernet systems. Its versatile functions and configuration options are used worldwide by OEMs and suppliers. The open design makes CANoe the first choice for ECU development for combustion engines and projects related to electrification of the powertrain.

- ASAM AE HL, ASAM AE MCD-1 CCP, ASAM AE MCD-1 KCP, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM AE XIL, ASAM AE XIL-MA, ASAM COMON MDF

ASANmoe

Type

Tool for Automated Testging Diagnostic Protocol Implementation and Integration in ECUs

Functionalities

- Automatic generation of test cases with comprehensive test coverage based on ECU diagnostic descriptions in ODX or CAnNetStudio format. Test cases are executed, an extensive test report is generated. According to a case study, savings of effort by a factor of 4 up to 2 are achieved.

ASAM Standards

- ASAM AE MCD-2 D (ODX)

CDM Studio

Type

Calibration Data Management

Functionalities

- CDM Studio is an efficient tool for editing parameter set files. It is easily used to display, compare and edit parameters created in ECU calibration. When solving complex tasks, filters are used to reduce the number of parameters shown on the screen. In addition to calibrating parameter values you can take values from different files and merge them to create new version levels. In using CDM Studio, you retain an overview of your work packages, reliably track parameter changes and manage data levels responsibly. Since all relevant file formats of the automotive industry are supported, it does not matter which measurement and calibration tool is used to generate the parameter files.

ASAM Standards

- ASAM AE CDF, ASAM AE MCD-2 MC (ASAP2/A2L)

Consulting & Engineering Services for ODX

Type

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.

Functionalities

- 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. Our services are: Optimization of existing diagnostic processes, Migration of master data to ODX, consultation on the implementation/integration of ODX in existing diagnostic development processes, definition and implementation of authoring guidelines, OEM-specific ODX Techdays

ASAM Standards

- ASAM AE MCD-2 D (ODX)

DaVinci Configurator Pro

Type

Configuration of AUTOSAR basic software

Functionalities

- DaVinci Configurator Pro is the configuration tool for MICROSOAR basic software (BSW) and runtime environment (RTE). It masters the complete ECU configuration workflow and supports multiple input formats such as AUTOSAR System Description or the ASAM file formats FIBEX (description for CAN and FlexRay networks) and ODX (description of diagnostic implementation). DaVinci Configurator Pro exports A2L files that describes the measurement and calibration parameters of MICROSOAR BSW and RTE.

ASAM Standards

- ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX)

FIBEX Explorer pro

Type

Tool for viewing, editing and creating FIBEX XML files

Functionalities

- View, edit and create FIBEX files for FlexRay including manufacturer extensions in a user-friendly way without detailed knowledge of the XML-based file format. The tool provides loss-less editing functions for FIBEX files.

ASAM Standards

- ASAM AE MCD-2 NET (FIBEX)

GL Logger Family

Type

Data logger for test fleet operators and test benches

Functionalities


ASAM Standards

- ASAM AE MCD-1 CCP, ASAM AE MCD-1 KCP, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 NET (FIBEX)

Indigo

Type

Vehicle-oriented diagnostic test system

Functionalities

- Easy-to-use diagnostic tester to apply diagnostics during system development and vehicle integration. No diagnostic expert knowledge required by users. Self-configuring, use-case driven and vehicle-oriented GUI. Parameterized via ODX and other relevant data formats. Simultaneous support of KWP, UDS and GMR3110. Also support of Diagnostics over CAN FD and DoIP, as well as OBD (OBDII or WWH-OBD). Direct overview of vehicle status and vehicle identification data. Additionally Indigo Remote is the remote diagnostics solution that lets you access vehicles directly and interactively from anywhere in the world.

ASAM Standards

- ASAM AE MCD-2 D (ODX)

MDF Validator

Type

Tool for viewing and validating the structure of MDF files

Functionalities

- MDF Validator is a freeware tool to validate and analyze the block structure of MDF files (3.x/4.x). It will check the loaded MDF file and display format errors and
<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Functionalities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
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<tr>
<td>ASAM COMMON MDF</td>
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<tr>
<td><strong>MDF4 Lib</strong></td>
<td>Type</td>
<td>Function library for reading and writing MDF3 and MDF4 files</td>
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<tr>
<td></td>
<td>Functionalities</td>
<td>Function library you can use to validate and sort MDF files and read them in your own applications. Along with the widely used MDF3 format, the new ASAM-standardized MDF4 format is also supported. The library offers a convenient C++ and .NET interface for easy access to signal data and meta information in a MDF file, independent of the specific MDF version (3.x/4.x).</td>
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<tr>
<td><strong>ASAM Standards</strong></td>
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<tr>
<td>ASAM AE MCD-2 XCP</td>
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<tr>
<td><strong>MICROSAR</strong></td>
<td>Type</td>
<td>AUTOSAR basic software which includes an implementation of the XCP Slave</td>
</tr>
<tr>
<td></td>
<td>Functionalities</td>
<td>The package MICROSAR XCP supports XCP communication with an XCP master on various communication topologies such as CAN, CAN-FD, LIN, FlexRay or Ethernet. The runtime environment MICROSAR RTE supports software components with calibration ports allowing access to calibration data. MICROSAR RTE manages calibration data access during offline and online calibration; the latter supports different network access strategies like isolated RAM and Single- and Double-Pointed. Configuration (e.g., transport layer parameters or XCP events) is done in the configuration and generation tool DaVinci Configurator Pro.</td>
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<tr>
<td><strong>ASAM Standards</strong></td>
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<tr>
<td>ASAM AE MCD-1 XCP</td>
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<tr>
<td><strong>ODXStudio</strong></td>
<td>Type</td>
<td>Authoring Tool for diagnostic data in ODX format</td>
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<tr>
<td></td>
<td>Functionalities</td>
<td>Easy-to-operate user-oriented authoring tool for diagnostic data in ODX format. Standard conformance: perfect round trip functionality by use of ODX as an internal data format. Quick loading, editing and saving of even very large sets of ODX data (≈ 100 MB). Optimal scalability: From individual ECU to entire vehicle or platform. Extensive features to support OEM-specific authoring guidelines. Full coverage of all ODX categories ODX-O, ODX-C, ODX-V, ODX-F, ODX-E, ODX-FD.</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
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<tr>
<td>ASAM AE MCD-2 D (ODX)</td>
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<tr>
<td><strong>Training for ODX</strong></td>
<td>Type</td>
<td>Training</td>
</tr>
<tr>
<td></td>
<td>Functionalities</td>
<td>Training for ODX, with exercises</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
<td></td>
<td></td>
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<tr>
<td>ASAM AE MCD-2 D (ODX)</td>
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<tr>
<td><strong>vCDM</strong></td>
<td>Type</td>
<td>Collaboration platform for calibrators</td>
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<td></td>
<td>Functionalities</td>
<td>vCDM is a collaboration platform to exchange data within and among globally distributed calibration teams. It provides sophisticated functions to support an iterative calibration approach. The database founded tool collects, merges, transforms and distributes calibration data. Many formats are supported (DCM, CDF 2.0, CSV, PaCo, CANape PAR, Intel-HEX and Motorola S-Record). The physical calibration data is tracked within a data warehouse. Reports to track calibration maturity are available. Analysis functions and APIs can be used to benefit from the collected intellectual property.</td>
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<tr>
<td><strong>ASAM Standards</strong></td>
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<td>ASAM AE CDF, ASAM AE MCD-2 MC (ASAP2/A2L)</td>
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<tr>
<td><strong>vFlash</strong></td>
<td>Type</td>
<td>(Re-)Programming ECUs over CAN, CAN FD, FlexRay, LIN or Ether (DoIP)</td>
</tr>
<tr>
<td></td>
<td>Functionalities</td>
<td>vFlash is a very easy-to-use tool for programming one or more ECUs via CAN, CANFD, FlexRay, LIN or Ether (DoIP). It provides ECU programming based on direct &quot;native&quot; flashing in Intel hex, Motorola-S and binary format as well as flash programming based on ODX-F. Because of its flexible approach, vFlash can support different flash specifications of a wide variety of automotive DMEs without requiring modifications by the end user. The edition Flash Station allows additionally the simultaneous flashing of up to 8 ECUs each on a separate communication channel.</td>
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<tr>
<td><strong>ASAM Standards</strong></td>
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<td>ASAM AE MCD-2 D (ODX)</td>
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<tr>
<td><strong>vSignalyzer</strong></td>
<td>Type</td>
<td>Display, Evaluate and Document Measurement Data</td>
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<td></td>
<td>Functionalities</td>
<td>vSignalyzer is a convenient tool for efficiently evaluating measurement data of all types. It gives you extensive options for visualizing the data as well as functions for manual and automated analysis and reporting. Measurement data acquired in network development, analysis and ECU calibration may be read-in from various file formats.</td>
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<td><strong>ASAM Standards</strong></td>
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<tr>
<td>ASAM COMMON MDF</td>
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<tr>
<td><strong>VX1000</strong></td>
<td>Functionalities</td>
<td>The VX1000 System is a scalable solution with top performance for your measurement and calibration tasks. It can be used in the vehicle - both in the interior and in the engine compartment --, on test benches and in the laboratory. The VX1000 base module is connected to a PC over XCP on Ethernet. Overview of Advantage: very small adapter (POD) for the ECU interface, high measurement data throughput of up to 50 Mbyte/s, 80000 samples/s, function bypassing with very short latency times. VX1000 supports all features for Engine Management ECUs like coldstart, page switching …</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
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<tr>
<td>ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L)</td>
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<tr>
<td><strong>XCP Professional</strong></td>
<td>Type</td>
<td>Implementation of the XCP Slave</td>
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<tr>
<td></td>
<td>Functionalities</td>
<td>Implementation of an XCP slave for non-AUTOSAR ECUs using the Vector CAN-bedded stack. Supporting CAN and LIN network topologies. Configuration (e.g., transport layer parameters or events) is done in the configuration and generation tool GENy.</td>
</tr>
<tr>
<td><strong>ASAM Standards</strong></td>
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<tr>
<td>ASAM AE MCD-1 XCP</td>
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</tbody>
</table>

Functionalities  Continuously increasing data rates require an innovative, easy-to-use data handling. Special focus on enhanced data availability while road/endurance tests. Functionalities  Copy Station. For improved data handling. Special focus on enhanced data availability while road/endurance tests.

Contact: Mr. Peter Blume, Mail: peter.blume@vigem.de

CCA 9002
Type  Car Communication Analyzer, high performance multi-bus data logger, test tool
Functionalities  The CCA 9002 is a high-performance, multi-bus data logger focusing ADAS, AD, e-mobility, infotainment, and eW&B validation and verification. It offers continuous and/or event-based recording at data rates up to 4 Gbit/s. The data is stored on removable data storage modules with 2 TB, 4 TB, or 8 TB capacity. The system configuration is modular, i.e., by adding plug-in capture units you can adapt type and number of interfaces to the specific application requirements.

ASAM Standards  ASAM AE MCD-1 XCP

CCA CS1-10G
Type  Copy Station. For improved data handling. Special focus on enhanced data availability while road/endurance tests.
Functionalities  Continuously increasing data rates require an innovative, easy-to-use data handling. The Copy Station CCA CS1-10G is the ideal complement for your ViGEM CCA 9002 Car Communication Analyzers. The CCA CS1-10G copies reliable and quick recorded data from a removable data storage module via 4x USB 3.0 to USB-drives, or via 10 Gbit Ethernet to a server. Ease-of-use is of importance during road tests. No drivers, no software and no PC connection is required. Simply insert the CCA removable data storage module, connect USB Drives\(^1\), via USB 3.0 to the CCA CS1-10G and start copying. All data will be copied automatically. The copy progress is displayed.

ASAM Standards  ASAM AE CC, ASAM AE CDF, ASAM AE ATX, ASAM AE COMMON Seed&Key and Checksum Calculation, ASAM AE Container Catalog, ASAM AE FSX, ASAM AE HIL,
Data Declaration System (DDS)

**Type**
ECU SW Development Environment

**Functionalities**
DDS represents a central repository for all ECU variable declarations and thereby ensures consistency between your ECU source code and your ASAP2 description file. Interfaces: ANSI-C, Export: Address Import (IEEE 695, ELF/DWARF), ASAP2 Import & Export, XML Export & Import, Interface to autocoding tools

**ASAM Standards**
ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 D (ODX), ASAM AE MDX

FunDoc

**Type**
Automated function documentation of simulation models

**Functionalities**
The objective of the Visu-IT! FunDoc tool is to ease the documentation process of simulation models. At this junction it is designed as a first-step tool in your documentation process chain. FunDoc is able to connect to several development tools and place the gathered information at users disposal for edit or print.

**ASAM Standards**
ASAM AE CC, ASAM AE CDF, ASAM AE FSX, ASAM AE MDX

PACES

**Type**
High performance access to a global data dictionary for ECU variables

**Functionalities**
The tool PACES (Parametrisation and Configuration of Embedded Software) provides a high performance access (Java) to a global data dictionary. It eases the handling and management of data declarations as well as the configuration of projects. PACES can be integrated into different tool chains and environments, e.g., Eclipse.

**ASAM Standards**
ASAM AE MCD-2 MDX

VisualThreat Inc.

VisualThreat is a leading connected-car security vendor based in California. The company offers the end-to-end connected-car security solutions to minimize penetration from cyber attacks. VisualThreat’s Vehicle Cyber Security Protection Framework (FUSE) includes: F-Firewall U-Umbrella Policy S-Security-Over-The-Air (SOTA) E-Event Intelligence

**Contact:** Mr. Wei Yan, Mail: wyan@visualthreat.com

VisualThreat Auto-X

**Type**
testing tool

**Functionalities**
CAN BUS testing

**ASAM Standards**
ASAM AE ATX, ASAM AE COMMON Seed&Key and Checksum Calculation, ASAM CAT ACI

We4Data GmbH

We4Data GmbH develops test automation software for HIL and SIL environment from the Hardware-Software-Interface to any functional application tests. We support our customer in the measurement system integration and design and deliver testbeds for ECUs.

**Contact:** Mr. Olaf Nennerich, Mail: Olaf.Nennerich@we4data.de

Weber Electronic & Race Engineering GmbH & Co KG

Development and integration of measurement systems. Automotive chassis analysis. Automation systems in combination with PLC’s

**Contact:** Mr. Bernhard Weber, Mail: bweber@weber-engineering.net

PECM

**Type**
Dewatering Pump Controller

**Functionalities**
Engine Controller, Pump Condition Monitoring & Reporting System

**ASAM Standards**
ASAM COMMON MDF

WLS12

**Type**
Data Logger

**Functionalities**
12 CAN/PD, WiFi, Bluetooth, GPS (10Hz), LTE, BroadR Reach, Ethernet, 3x Gyro, 3x ACC, 4x DIG IN/OUT, Dual Core, Linux, Online Calculations

**ASAM Standards**
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-3 MC, ASAM CAT ODS, ASAM COMMON MDF

Weisang GmbH

Weisang GmbH is developing software and providing services for technical applications. Weisang’s core product FlexPro is a software package for analysis and presentation of measurement data and is used worldwide by thousands of engineers, scientists and measurement technology experts in automotive and other industries. FlexPro is the client tool of choice to access data stored on ASAM ODS servers and in ATX files as well as data from various data acquisition systems.

**Contact:** Ms. Judith Digbé, Mail: j.digbe@weisang.com

FlexPro

**Type**
Software

**Functionalities**
Archiving, analysis and presentation of measurement data.

**ASAM Standards**
ASAM CAT ODS
White Pine Software Technologies, LLC
White Pine is a new company that specializes in engineering data management and analysis solutions and software development services. Our company is developing a variety of useful software tools and products primarily aimed at very large scale, high speed data acquisition, processing and analysis using both ASAM ODS and Big Data technologies.
Contact: Mr. Robert Smith, Mail: robert.smith@whitepine-st.com

Wind Hill Technologies Co., Ltd.
Wind Hill Technologies was founded in 2003, the headquarters is located in Beijing where set up its R&D center and factory, and we have branches in Shanghai and in Hong Kong. Our product series include ECU tools, test and measurement, industrial automation, testing equipment and engineering services. At present, our products have been widely used in automobiles, engineering machinery, railway, military, etc.
Contact: Mr. Dr. Thomas Qiu, Mail: info@windhill.com.cn

X2E GmbH
X2E is a highly innovative and flexible partner in the development of advanced electronic solutions for automotive and aerospace applications. The main products are high performance automotive data loggers for the automotive industry. Additionally X2E provides complex solutions, from development of ECU's to automotive bus analyzing tools. Our high performance multibus data loggers are capable of recording data from several automotive bus systems simultaneously (CAN, LIN, FlexRay, RS232, Analog, MOST, Ethernet, BroadR-Reach) with a 20ns precision timestamp. Furthermore, our product range provides a platform which not only collects data, it is also capable of sending data at any time. The data loggers can be tailored to your requirements because of our flexible slot-concept. X2E supports its customers by equipping them with the products which are tailored to their exact needs and more importantly by developing new innovative solutions for them. With an in-house production facility, X2E can provide the full service range from development to production. Innovation, Quality and Customer Satisfaction is what X2E offers to its customers.
Contact: Mr. Florian Weindel, Mail: florian.weindel@x2e.de

Xoraya Car PC
Type: Automotive PC Platform
Functionalities: BroadR-Reach; CAN; RS232; GBit-Ethernet; WLAN; GPS; GSM; HDMI

Xoraya Connect
Type: Remaining Bus Simulation Platform
Functionalities: CAN, LIN, FlexRay, MOST, Ethernet, RS-232
ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP

Xoraya Minilogg
Type: automotive data logger
Functionalities: 100ns precise timestamp CAN, LIN, FlexRay, MOST, Ethernet, BroadR-Reach, RS-232, GNLog, DLT, Analog, XCP, CCP, PSIS, Video-Interface
ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM COMMON MDF

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ASAM Standards: ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L), ASAM AE MCD-2 NET (FIBEX), ASAM COMMON MDF
AxiDoc Eco Documentation Suite Editing solution for functional specification based on MSRSW, AE-FSX, AE-MDX, MSRRREP, AE-CC and AE-ATX

Type: Documentation System
Functionality: Editing, Checking, PDF-Publishing for Functional Specification and Test Specification
ASAM Standards: ASAM AE CC, ASAM AE CDF, ASAM AE Container Catalog, ASAM AE FSX, ASAM AE MDX, ASAM AE MSRSW

EcoDoc-Publisher PDF publishing for functional specification.
Type: Documentation System
Functionality: Checking, PDF-Publishing for Functional Specification
ASAM Standards: ASAM AE CC, ASAM AE CDF, ASAM AE FSX, ASAM AE MDX

EcoDoc-Publisher Server Web application server for server based PDF publishing and continuous integration of functional specification
Type: Documentation System
Functionality: Checking, PDF-Publishing for Functional Specification
ASAM Standards: ASAM AE CDF, ASAM AE MDX, ASAM AE FSX, ASAM AE CC

XIDiff Generic XML differ
Type: Generic XML Tool
Functionality: Show the differences between XML documents, merge of XML documents.
ASAM Standards: ASAM AE CC, ASAM AE CDF, ASAM AE Container Catalog, ASAM AE FSX, ASAM AE Issue, ASAM AE MCD-2 D (ODX), ASAM AE MCD-2 NET (FIBEX), ASAM AE MDX, ASAM AE MSRSW

XMetal-Kit for MSRSW, MDX, Container Catalog, MSRRREP and MSRSYS
Type: Documentation System
Functionality: Editing, Checking, PDF-Publishing
ASAM Standards: ASAM AE CC, ASAM AE CDF, ASAM AE FSX, ASAM AE MDX, ASAM AE MSRSW

ACADEMICS

Aristotle University
Aristotle University of Thessaloniki is the largest university in Greece with more than 90,000 undergraduate and postgraduate students. The Laboratory of Applied Thermodynamics (LAT) belongs to the Energy Division of the Mechanical Engineering Department of Aristotle University. Its educational and research activities cover Applied Thermodynamics and Combustion → Internal Combustion Engines and Emissions Control → Emissions Inventories and Forecasts → Energy Policy and Renewable Energy Sources
Contact: Mr. Samaras Zissis, Mail: zisis@auth.gr

Brandenburgische Technische Universität Cottbus
The Chair of Automotive Technologies and Propulsion Systems teaches and performs research on conventional and alternative powertrains for vehicles and motorcycles. The research focuses particularly on thermal and energy management of vehicles, waste heat re-utilization concepts, and cooling systems for the evaluation of fuel consumption and emission in legal reporting as well as in real driving situations.
Contact: Mr. Dirk Gollau, Mail: gollau@tu-cottbus.de

Budapest Univ. of Technology and Econ, Dep. of Control and Transport Automation
The Budapest University of Technology and Economics can trace its evolution through several academic institutions, dating back to 1782. With 24,000 students and many researchers it is one of the most important research centres in Central Europe. The main research area of the Department of Control and Transport Automation are the control theory and automotive engineering.
Contact Mr. Szilárd Aradi, Mail: aradi.szilard@mail.bme.hu

Das virtuelle Fahrzeug Forschungsgesellschaft mbH
VIRTUAL VEHICLE is an independent, international platform for research and development of new simulation methods/tools in the automotive and rail industry, enabling faster and more efficient development, early validation of concepts and a multidisciplinary approach. Fields of research include Vehicle Safety, Thermodynamics, NVH, E/E, Software, System Design and Optimization.
Contact Mr. Mario Driussi, Mail: mario.driussi@v2c2.at

FH Aachen
The FH Aachen is a major research center in Germany. The competencies of the scientists in our 10 faculties and 7 institutes lie in the future fields of energy, mobility, and life sciences. In addition, outstanding experts in the areas of design, architecture, and civil and mechanical engineering, as well as in economics and logistics, and also in the fields of electrical, information and production technology work at the FH.
Contact: Mr. Klaus Thormann, Mail: thormann@fh-aachen.de
FH Braunschweig / Wolfenbüttel  
University of Applied Sciences, Department of Informatics.  
Contact Mr. Detlef Justen, Mail: d.justen@fhbwl.de

XII. - Co-Simulationsbackplane  
ASAM Standards  
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 MC (ASAP2/A2L)

FZI Forschungszentrum Informatik  
Forschungszentrum Informatik (FZI) is a non-profit contract research organisation that concentrates its efforts on innovative information technologies for providers of investment and consumer products, production processes and information services. FZI supports the development of innovative applications based on recent but already proven techniques, offering its partners a unique interdisciplinary environment that fosters joint research amongst diverse fields of Informatics, Mechanical and Electrical Engineering.  
Contact: Dr. Martin Hillenbrand, Mail: hillenbrand@fzi.de

Hochschule für Angewandte Wissenschaften Hamburg  
With 14,000 students Hamburg University of Applied Sciences is one of the largest of its kind in Germany. Founded in 1970, our roots go back to the 18th century. The CoRE (Communication over Real-time Ethernet) group of the department of computer science researches in the area of future automotive communication infrastructures.  
Contact: Prof. Dr. Franz Korf, Mail: korf@informatik.haw-hamburg.de

Hochschule Heilbronn  
Heilbronn University ranks amongst the major Institutions of Higher Education in the state of Baden-Württemberg with over 8,000 students. It works closely with its partners in business and industry in education and research, e.g. the study programme Automotive-Systems-Engineering is sponsored by major companies and offers support and consulting to every interested organisation.  
Contact Mr. Prof. Dr. Ansgar Meroth, Mail: ansgar.meroth@hs-heilbronn.de

Consulting  
ASAM Standards  
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 NET (FIBEX)

Research and Development Projects  
ASAM Standards  
ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 NET (FIBEX)

Hochschule Trier  
Hochschule Trier is a University of Applied Sciences with 6000 students. We perform research in Vehicle Systems and Electronics as well as in Energy Efficient e-mobility.  
Contact Mr. Prof. Dr. Matthias Scherer, Mail: scherer@fh-trier.de

Hochschule für Angewandte Wissenschaften Heilbronn  
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www.informatik.haw-hamburg.de

FZI Forschungszentrum Informatik  
Forschungszentrum Informatik (FZI) is a non-profit contract research organisation that concentrates its efforts on innovative information technologies for providers of investment and consumer products, production processes and information services. FZI supports the development of innovative applications based on recent but already proven techniques, offering its partners a unique interdisciplinary environment that fosters joint research amongst diverse fields of Informatics, Mechanical and Electrical Engineering.  
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54290 Trier, Germany  
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www.fh-trier.de

HTW Dresden  
Dresden University of Applied Sciences provides programmes like vehicle engineering, mechatronic systems / automotive mechatronics and informatics, with a close connection to automation, measuring, and automotive electronic systems. The university is a centre for teaching and applied research: a Research Institute for Vehicle Engineering, numerous state-of-the-art laboratories and a wide range of third-party funded projects guarantee a high standard in innovation and development. For our partners we offer industrial contract research, studies to elaborate on detailed questions, technical expert opinion on failure analysis at existing facilities, joint research projects, technology transfer, consulting, and academic training.  
Contact: Mr. Hans-Georg Wagner, Mail: hans-georg.wagner@htw-dresden.de

Institut für Kolbenmaschinen (IFKM), KIT  
Contact: Mr. Sergei Koch, Mail: sergei.koch@kit.edu

Japan Automobile Research Institute  
Our Institute is a non-profit organization and work for environmental issues and safety issues of Automotive society in the world. The number of the employees are about 360, 300 researchers, engineers and 60 employees in administrative section.  
Contact: Mr. Hisayuki Irie, Mail: hirie@jari.or.jp

Jiangnan University  
Jiangnan University, situated in the beautiful city of Wuxi, Jiangsu Province, is one of China’s national key “211 Project” universities and functions directly under the supervision of China’s Ministry of Education.  
Contact: Ms. Dr. Na Tian, Mail: tianno@jiangnan.edu.cn

Nagoya University  
Due to the growing complexity of recent embedded systems, the industry faces difficulties in designing and implementing high-quality systems according to demand. To address these industrial needs, we established the Center for Embedded Computing systems in April 2006 for promotion of collaboration among industry, academia, and government.  
Contact: Mr. Tadashi Sakamoto, Mail: sakamoto@nces.is.nagoya-u.ac.jp

RWTH Aachen  
The Institute for Automotive Engineering (ika) of RWTH Aachen University is Europe’s leading institute in automotive engineering. Starting from the idea to innovative concepts for components and systems up to vehicle prototypes the staff of the institute creates and designs the future vehicle. In cooperation with car manufacturers and suppliers the ika is making an acknowledged contribution to help solve current and future global challenges.  
Contact: Mr. Christian Sahr, Mail: sahr@ika.rwth-aachen.de

HTW Dresden  
Dresden University of Applied Sciences provides programmes like vehicle engineering, mechatronic systems / automotive mechatronics and informatics, with a close connection to automation, measuring, and automotive electronic systems. The university is a centre for teaching and applied research: a Research Institute for Vehicle Engineering, numerous state-of-the-art laboratories and a wide range of third-party funded projects guarantee a high standard in innovation and development. For our partners we offer industrial contract research, studies to elaborate on detailed questions, technical expert opinion on failure analysis at existing facilities, joint research projects, technology transfer, consulting, and academic training.  
Contact: Mr. Hans-Georg Wagner, Mail: hans-georg.wagner@htw-dresden.de

Institut für Kolbenmaschinen (IFKM), KIT  
Contact: Mr. Sergei Koch, Mail: sergei.koch@kit.edu

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Contact: Mr. Christian Sahr, Mail: sahr@ika.rwth-aachen.de
Technische Hochschule Köln
TH Köln represents a broad range of educational and research activities. With more than 20,000 students, half of them in engineering programs, there are many opportunities for automotive and ASAM-related projects, student thesis, and other kinds of cooperation. Faculty members are actively involved in ASAM Project groups and familiar with ASAM standards.
Contact: Mr. Rainer Bartz, Mail: Rainer.Bartz@th-koeln.de

Consulting
ASAM Standards ASAM CAT ACI, ASAM CAT GDI, ASAM AE MCD-2 NET (FIBEX), ASAM CAT ODS

Contract Research/Development
ASAM Standards ASAM CAT ACI, ASAM CAT GDI, ASAM AE MCD-2 NET (FIBEX), ASAM CAT ODS

Student Internship
ASAM Standards ASAM CAT ACI, ASAM CAT GDI, ASAM AE MCD-2 NET (FIBEX), ASAM CAT ODS

Student Projects
ASAM Standards ASAM CAT ACI, ASAM CAT GDI, ASAM AE MCD-2 NET (FIBEX), ASAM CAT ODS

TU Darmstadt, Institut für Verbrennungskraftmaschinen und Fahrzeugantriebe
The Institute for Internal Combustion Engines and Powertrain Systems is a subdivision of the Technical University of Darmstadt. The institute has about 70 employees, 14 of them scientific assistants. There are 12 dynamic engine test beds, 3 of them with hybrid simulation systems. Main topics are: Electrification, Methodology and Simulation, Exhaust aftertreatment, ICE Optimization, alternative fuels.
Contact: Mr. Dr. Bernd Lanzen, Mail: lzenzen@vkm.tu-darmstadt.de

TU Dresden, IAD – Institut für Automobiltechnik
The Institute of Automotive Technology (IAD) at the Dresden University of Technology covers all automotive related topics in research and teaching. The IAD consists of the three chairs in Automotive Engineering, Vehicle Mechatronics and Internal Combustion Engines. The IAD as a main collaborative research partner of the automotive industry provides competence in modeling and simulation of various automotive domains and operates several test benches, e.g. for engines, generators, batteries and many more.
Contact: Mr. Andreas Unger, Mail: unger@iad.tu-dresden.de

Universität Kassel
Perform Research and Development Work in the fields of: Hardware-in-the-Loop Simulation and Modeling, Design of Experience supported Testing on Test beds for Engines and Gear Boxes, Functions development for engine ECUs.
Contact: Mr. Ludwig Brabetz, Mail: Brabetz@uni-kassel.de

Universität Stuttgart, Institut für Verbrennungsmotoren (IVK)
IVK/IFFS (Research Institute of Automotive Engineering and Vehicle Engines Stuttgart) operate various test facilities, e.g. a full-scale and a model-scale wind tunnel, a driving simulator and several engine test stands. Additionally, the institute offers support in simulation, NVH, thermodynamics, vehicle dynamics, road load studies, automotive electronic systems, communication and power networks, alternative vehicle and powertrain concepts.
Contact: Mr. Carsten Unger, Mail: info@ivk.uni-stuttgart.de

University of Bath, Powertrain and Vehicle Research Centre
The Powertrain and Vehicle Research Centre (PVRC) conducts internationally prize-winning research, focusing on improving the efficiency and emissions of both diesel and petrol engines. We conduct research that is systems-based on all aspects of automotive powertrain engineering. Our research represents four decades of achievement and extensive engagement with the automotive industry.
Contact: Mr. Sam Akhurst, Mail: S.Akhurst@bath.ac.uk

University of Bologna
The University of Bologna is considered to be the oldest University in the Western World (founded 1088). Today it hosts about 90,000 students in 11 Schools, 33 Departments on 5 Campuses.
Contact: Mr. Enrico Corti, Mail: enrico.corti@unibo.it

Virginia Tech Transportation Institute
The Virginia Tech Transportation Institute (VTTI) conducts research to save lives, time, and money and protect the environment. As one of seven premier research institutes created by Virginia Tech to answer national challenges, VTTI is continually advancing transportation through innovation and has impacted public policy on national and international levels.

Zhejiang University
Zhejiang University is a comprehensive national university, founded in 1897. It’s one of the earliest modern academies of higher learning established in China. Zhejiang University is a key comprehensive university whose fields of study cover philosophy, literature, history, education, science, economics, law, management, engineering, agriculture, medicine and etc.
Contact: Ms. Hong Li (PHD), Mail: lihong@zju.edu.cn

SMR Automation
ASAM Standards ASAM AE MCD-1 CCP, ASAM AE MCD-1 XCP, ASAM AE MCD-2 D (DDX)
ECU NETWORKS

ASAM MCD-2 NET (FIBEX)

ASAM MCD-4

ASAM MCD-5

ASAM MCD-6

SOFTWARE DEVELOPMENT

ASAM ACI

ASAM FKS

ASAM ISSUE

ASAM LKF

ASAM MBFS

ASAM MDX

TEST AUTOMATION

ASAM ACI

ASAM ATX

ASAM GDI

ASAM ASAPS

ASAM ASAP3

ASAM CEA

ASAM ODS

ASAM MCD-3

ASAM MCD-3 MC

ASAM MCD-3 D

ASAM XII

DATA MANAGEMENT & ANALYSIS

ASAM CEA

ASAM ODS

ASAM MCD-3

ASAM MCD-3 MC

ASAM MCD-3 D

ASAM XII

ASAM CE
For questions and further assistance, please contact the ASAM team:

**ASAM OFFICE**

Dr. Klaus Estenfeld  
Managing Director  
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klaus.estenfeld@asam.net

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Mail: info@asam.net  
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