<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>City</th>
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<tbody>
<tr>
<td>Dr. Michael Daginnus</td>
<td>Volkswagen AG</td>
<td>Wolfsburg</td>
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<tr>
<td>Kai Barbehön</td>
<td>BMW AG</td>
<td>München</td>
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<tr>
<td>Dr. Dieter Marx</td>
<td>Porsche AG</td>
<td>Weissach</td>
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<td>Stephan Esch</td>
<td>Audi AG</td>
<td>Ingolstadt</td>
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<td>Dr. Ralf Belschner</td>
<td>Daimler AG</td>
<td>Sindelfingen</td>
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<tr>
<td>Jochem Spohr</td>
<td>MBtech</td>
<td>Sindelfingen</td>
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Overview

- HIS Structure
- Process Assessment
- Simulation and Tools
- Flash Programming
- Compatibility Management
- Software Test
- Standard Software
- Models of Cooperation, Distribution of Results
Summary

• HIS focuses on product relevant topics, not on long term research

• HIS focuses on the harmonization of requirements, it supports standardization by the relevant organizations

• The goal is to define harmonized interfaces (product and process) to reduce supplier effort to adapt to differing OEM requirements

• All partners have agreed to work together in a very efficient way
WG process assessments objectives

• Selection of a standardized assessment method which
  - is most appropriate for determining suppliers software process capability in the automotive industry
  - can be tailored in order to select a subset of processes most relevant to the automotive industry and related to the sub models of the V-Model
  - is an international standard and widely used in the software community
  - allows assessments for projects and organizational units

• Definition of a framework for exchanging assessment results in order to
  - compare the capability of software processes within divisions or product lines/areas (e.g. comfort product line) at the suppliers objectively
  - minimize or reduce effort needed to perform an assessment for OEM and suppliers

• Definition of requirements for assessor qualification (based on an internationally accepted international assessors certification scheme) focused on automotive software to ensure comparability of assessment results within the HIS

• Transfer of experiences and results of the HIS and its members to extended working groups (Automotive SPICE™) for further developments
Process Assessment
Results (1)

- Selection of a standardized assessment method - Solution: Automotive SPICE™
- From 2001 to 2006 HIS members have executed about 200 SPICE assessments
- Transfer of experiences and methodical results of the HIS and its members to HIS-external working groups (AUTOSIG, VDA, iNTACS) for further developments in software process improvement
- Definition of a framework for exchanging neutral assessment results within HIS
  - It is neither an objective to establish a certification scheme nor to perform certification of suppliers.
  - HIS-external (automotive) SPICE Assessments can also be accepted after validation for use in contract awarding procedures
In 2001 the automotive industry, major European car manufacturers (including HIS-members) have started the „Automotive SPICE™“ initiative together with the Procurement Forum and the SPICE User Group called AUTOSIG to develop an automotive specific SPICE variant.

All HIS members will perform and accept from 2007 on only Automotive SPICE™ assessments executed by iNTACS certified Automotive SPICE™ assessors.

HIS WG „Process Assessment“ supports activities to roll out the Automotive SPICE™ methodology worldwide to increase the number of useful assessment results in order to reduce effort of HIS members.

Note: Each OEM has its own requirements regarding capability levels. There are no commonly required capability levels defined by the HIS.
Qualification profile
HIS Competent Automotive SPICE™ Assessor

• Technical degree or equivalent required
• From January 1st, 2007 a certification (e.g. iNTACS) is required
• Special knowledge and experience in software engineering: minimum of 3 years collected in at least 3 of the following fields
  - System- and/or software development
  - System and/or software requirements analysis
  - Software design, coding or testing
  - Software project management
  - Software quality assurance
  - Software risk management
  - Software change request or configuration management
  - Software maintenance
• participation in at least 5 assessments (under supervision of competent assessor and final aptitude recommendation)
Automotive SPICE™ status

- First released version V2.2 of Automotive SPICE™ was published in August 2005 (PAM V2.2, PRM V4.2) and is available at:

  http://www.automotivespice.com

  (free download after registration)

- The Automotive SPICE™ Change Control Board (CCB) was established in September 2006 to proceed the necessary changes. Next CCB planned for mid 2007.

- Second released version V2.3 of Automotive SPICE™ is planned to be published in Q1/2007
### Automotive SPICE™

**HIS defined Process Reference Model (PRM)**

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<tr>
<td><strong>MAN.1</strong> Organizational alignment</td>
<td><strong>ENG.1</strong> Requirements elicitation</td>
<td><strong>SUP.1</strong> Quality assurance</td>
</tr>
<tr>
<td><strong>MAN.2</strong> Organization management</td>
<td><strong>ENG.2</strong> System requirements analysis</td>
<td><strong>SUP.2</strong> Verification</td>
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<tr>
<td><strong>MAN.3</strong> Project management</td>
<td><strong>ENG.3</strong> System architectural design</td>
<td><strong>SUP.3</strong> Validation</td>
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<tr>
<td><strong>MAN.4</strong> Quality management</td>
<td><strong>ENG.4</strong> Software requirements analysis</td>
<td><strong>SUP.4</strong> Joint review</td>
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<tr>
<td><strong>MAN.5</strong> Risk management</td>
<td><strong>ENG.5</strong> Software design</td>
<td><strong>SUP.5</strong> Audit</td>
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<td><strong>MAN.6</strong> Measurement</td>
<td><strong>ENG.6</strong> Software construction</td>
<td><strong>SUP.6</strong> Product evaluation</td>
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<td><strong>ENG.7</strong> Software integration</td>
<td><strong>ENG.8</strong> Software testing</td>
<td><strong>SUP.7</strong> Documentation</td>
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<td><strong>ENG.9</strong> System integration</td>
<td><strong>ENG.10</strong> System testing</td>
<td><strong>SUP.8</strong> Configuration management</td>
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<td><strong>ENG.11</strong> Software installation</td>
<td><strong>ENG.12</strong> Software and system maintenance</td>
<td><strong>SUP.9</strong> Problem resolution management</td>
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<tr>
<td><strong>ENG.13</strong> Change request management</td>
<td><strong>SUP.10</strong> Change request management</td>
<td><strong>SUP.11</strong> Change request management</td>
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<td><strong>ACQ.1</strong> Acquisition preparation</td>
<td><strong>RIN.1</strong> Human resource management</td>
<td><strong>OPE.1</strong> Operational use</td>
</tr>
<tr>
<td><strong>ACQ.2</strong> Supplier selection</td>
<td><strong>RIN.2</strong> Training</td>
<td><strong>OPE.2</strong> Customer support</td>
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<tr>
<td><strong>ACQ.3</strong> Contract agreement</td>
<td><strong>RIN.3</strong> Knowledge management</td>
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<td><strong>ACQ.4</strong> Supplier monitoring</td>
<td><strong>RIN.4</strong> Infrastructure</td>
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<td><strong>ACQ.5</strong> Customer acceptance</td>
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<td><strong>ACQ.11</strong> Technical requirements</td>
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<tr>
<td><strong>ACQ.12</strong> Legal and administrative requirements</td>
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<td><strong>ACQ.13</strong> Project requirements</td>
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<td><strong>ACQ.14</strong> Request for proposals</td>
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<td><strong>ACQ.15</strong> Supplier qualification</td>
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<td><strong>SPL.1</strong> Supplier tendering</td>
<td><strong>PIM.1</strong> Process establishment</td>
<td><strong>REU.1</strong> Asset management</td>
</tr>
<tr>
<td><strong>SPL.2</strong> Product release</td>
<td><strong>PIM.2</strong> Process assessment</td>
<td><strong>REU.2</strong> Reuse program management</td>
</tr>
<tr>
<td><strong>SPL.3</strong> Product acceptance support</td>
<td><strong>PIM.3</strong> Process improvement</td>
<td><strong>REU.3</strong> Domain engineering</td>
</tr>
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- **HIS-Scope**
- **not included in ISO/IEC 15504-5**

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**Automotive-SPICE™**

**HIS defined Process Reference Model (PRM)**
Simulation and Tools
Goals (1)

- Identification of requirements on tools and the respective interfaces, using typical Use Cases instead of prescribing one specific tool
  - Common sense of the development process scenario including all process steps and the documents used in each step
  - Comparison of the tools used by the OEMs and by the suppliers to identify the important interfaces
Simulation and Tools
Goals (2)

• Definition of
  • general requirements and
  • specific requirements
  on development tools and their usability

• Identification and prioritization of the most important interfaces
  between tools, using typical Use Cases

• Common view and requirements on tool evaluations

• One face to tool vendors regarding the requirements

• One face to our suppliers regarding the tool interfaces
Simulation and Tools
Results 2006

Expert group HIL/Test:

- beginning with ASAM-standardization
- currently no further activities in the scope of HIS

Expert group RE/RM:

- release of the open Requirements Interchange Format („RIF“) version 1.1
- development of sharable „RIF“ exchange tool „EXERPT“ for DOORS
- guidance for other tool vendors and their „RIF“ implementations
Simulation and Tools

Prospects

- roll-out of „RIF“ as exchange standard in automotive industry
- ensure conformance of „RIF“ implementations
- establish „RIF“ as quality hallmark
- optimization of the „RIF“ specification
- further development of sharable „RIF“ exchange tool „EXERPT“ for DOORS
- preparation of international standardization
Flash Programming

Goals

- Optimization of flash process
- Standardization of relevant ECU modules
  - HIS Flashloader Specification v1.1.pdf
  - HIS-konforme Programmierung von Steuergeräten auf Basis von UDS v1.0.pdf
- Software Security
Flash Programming
Flashloader Architecture

- Security Module
- Boot Manager
- Run-Time Environment
- Diagnostics Module
- Transport Protocol
- CAN Driver
- Flash Driver
- EEPROM Driver
- Watchdog Driver
- Operating System (at least Multitasking)

⇒ ISO 14229 (UDS)
⇒ ISO 15765

Hardware
Flash Programming
Ongoing:

- Reference implementation of HIS-Flashloader
- Test specifications for:
  - Flashloader
  - Security Module
- HIS Standard for software based activation/deactivation of vehicle functions based on the HIS Security Module
Compatibility Management

Goals

- Information exchange about configuration management, programming and service strategy for electronic control units and ECU software

- Definition of specification rules for evaluation of compatibility of ECU versions (in the form of a supplier questionnaire). Integration of suppliers with standard interchange format.
Compatibility Management
Results 2006

- Glossary for Compatibility management is established
- Results of Benchmarks to other lines of business are exchanged
- Structure for the interchange format is defined
  - Standardized Questionnaire of the supplier about changes in the Hard- and Software of the ECU‘s and their effects on compatibility
Simulation and Tools

Prospects

- Aggregation of the supplier-questionnaire
- Discussion of technical implementation of the interchange format
- Discussion of possibilities to connect the interchange file to OEM internal systems
Software Test
Results (1/2)

Presently, the HIS working group „Software Test“ is not active.

- **TPI-Automotive®: Improvement Model for the Automotive Test Process**

  Adaptation of the TPI® Model to the needs of the automotive industry:
  - Projects with multilateral relation networks
  - Integration of individual electronic control units to systems
  - Use of components of the shelf, standard cores, etc.
  - Use of automotive wording

- **HIS set for coding guidelines for C (MISRA)**

  Definition of subsets of the MISRA „Guidelines For The Use Of The C Language In Vehicle Based Software“, (versions 1998 and 2004).
Software Test
Results (2/2)

- HIS Requirements on Software Testing
  - Configuration of the test environment
  - Requirements for software developing and testing process
  - Test lifecycle
  - Requirements for test documentation
  - Analysis and improvement of the testing process
  - Description of the test methods
  - Glossary

- HIS Set of Software code metrics

  Definition of a common set of software metrics to make statements about the quality of the software product and the software development process.
Standard Software
Goals and Achievements

- Common specification of standard software modules
- Standardization of the implementation of standard software modules
- Interfaces for configuration of standard software modules

The results of the standard software group are intermediate solutions. They are in use, but they are being extended by AUTOSAR

The standard software group is therefore currently inactive, the group members contribute actively to AUTOSAR
Standard Software Documents

- **CAN Driver:**
  Functionality and interface standardized (based on Vector CAN driver)

- **I/O Interface and drivers:**
  Functionality and interface standardized (based on 3Soft)

- **Protection of applications**
  - General document on Requirements for processors, OSEK etc.
  - Draft for extensions to OSEK OS (results included in AUTOSAR OS which is a superset of OSEK OS)

- **HIS assigns the software supplier identifications for HIS and AUTOSAR**
Standard Software Documents

- “Bedien- und Anzeigeprotokoll“ (BAP, protocol for communication between cluster instruments and ECUs to display data)
  - Specification is finalized
  - This specification is not an open specification, but will be made available to suppliers working for HIS members
Models for Co-operation

- HIS members actively take part in existing standardization initiatives where the HIS topics are addressed (OSEK/VDX, ASAM, VDA,AUTOSAR, ...)
- HIS product relevant standards can be accessed via existing products (e.g. standard software modules)
- HIS results can be transferred to extended working groups to be further developed and standardized (Automotive SPICE)
- Rollout to suppliers is done through mandatory usage of standard software modules, systematic introduction of SPICE-based process assessments etc.
Distribution of Results

- HIS web site is installed
  www.automotive-HIS.de
- official results are available on the website
- published HIS results are free for everybody, however it is up to users to take care of the patent situation
- an email distribution list is installed which informs about new results
- an email address is installed for queries concerning HIS, see link on website