Engineering Change Management
Partner process reengineering based on VDA 4965-1

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1. Basic Understanding of ECM

* In Mercedes Car Group the Engineering Change Management (ECM) system contains all information, the evaluation and the approvals about a Engineering Change Request (ECR) as well as the necessary controlling for the engineering and manufacturing implementation.

* ECM does *not* include versions of changes in a product (basic system: SMARAGD) or changes in the maturity level of a product (basic system: DIALOG).

**One Standard Process for all Engineering Changes**

- **Phase [1]: Initiation**
  - Description of the current status that has to be changed.

- **Phase [2]: Detailing**
  - Detailed solution description, affected part numbers.

- **Phase [3]: Evaluation**
  - Expert evaluation about cost, weight, dates, packaging etc.

- **Phase [4]: Approval**
  - Final recommendation (optional).

- **Phase [5]: Approval**
  - Decision of approval or rejection.

- **Phase [6]: Design Implementation**
  - Complete design; initialize release workflow.

- **Phase [7]: Productive Implementation**
  - Productive deployment in car lines.
# ECM: Partner process reengineering based on VDA 4965-1

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2. As-Is Situation at Mercedes Car Group

Starting with the first functional product prototypes along the entire life cycle of a product, engineering changes are managed based on one standard process in one basic system for all product lines (vehicles and components).

Benefits

- **Reduction of changes without request**
- **Process reliability**
  - One transparent and integrated change management process
- **Integration of the documentation and cost evaluation systems**
- **Personalized responsibility**
  - Supported by standardized, automated and paperless workflows
- **Supplier integration platform**
- **Reduction of processing time (for series phase)**

- First version of New Product Change Management (NCM) deployed at MCG in March, 26th 2001
- With version 4.2 (11/2004), NCM was established MCG-wide
- 6,600 active users
- Basic system for all kind of engineering change domains (new product projects, series product lines, model year)
2. As-Is Situation at Mercedes Car Group

After the organisation of the internal ECM process is completed, the focus has to be extended to the supplier community. First solutions are available but not deployed yet.

- NCM-supplier modul available based on the DC-Engineering Portal:
  - Initiation of ECRs
  - Status information about process progress

  **Fokus: Part Suppliers**

- NCM-gateway available based on XML and SWAN
  - Efficient Change Management through an interface between the Change Management Systems of two partners
  - Explicit and cross-system responsibilities for change requests regarding the entire Change Process
  - Avoidance of redundant data input and administration within consolidated systems
  - Synchronous data exchange by using existing technologies (XML, SWAN)

  **Fokus: General contractors, system and component suppliers**
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3. VDA Recommendation 4965 (ECM): The Motivation

Why an ECM Recommendation? - The daily business at an OEM

- More than 1,000 change orders per month
- With about 7,000 internal and external users to be involved with comments
- Which have to be managed not alone by purchase but also by engineering and planning

Mastering of the ECM processes becomes more and more mission critical for the Engineering Collaboration between OEM <-> 1.Tier and their x.Tier partners!

Harmonization and standardization is emergently required for integration of ECM processes to achieve:

- Efficient integration of each supplier with several OEMs and vice versa by reducing the existing variants in ECM processes
- Decrease of process time for both sites
- Increase of process quality and process safety
- Transparency of process status for OEM and suppliers
3. VDA Recommendation 4965 (ECM): The Leading Vision

**Step 1:** The Reference Process enables Harmonized Synchronisation

**Step 2:** Harmonized Synchronisation based on Reference Processes enables ECM Networks

- Based on the reference process each participant is able to connect to each ECM-Server of a coordinator either with his ECM-Server or with any ECM-Client.
3. VDA Recommendation 4965 (ECM): Expected Benefits

Based on harmonized ECM processes inside a future ECM network, cost reduction based on the expected benefits can be realized.

Expected Benefits:

- Reduce the existing variants of ECM communication for coordinator and participant
- Reduce the manual primary data entry
- Decrease the process time
- Increase of quality and safety
- Transparency of ECR status for coordinator and participant
- Direct use of the expertise of the related partners
- Advantage of a re-use of
  - Process definitions
  - agreements of partner
  - Interfaces, tools
3. VDA Recommendation 4965 (ECM): Processes in Collaboration Networks
3. VDA Recommendation 4965 (ECM): Available Standards

The Project Group "Engineering Change Management" of ProSTEP iViP and VDA has developed interaction scenarios, defined messages and data model to support ECM processes between customer and supplier using existing standards like PLM Services, STEP and XML.

- VDA recommendation 4965-1 and PLM-Services 1.0 finished, published and available for use, PLM-Services 2.0 will be available by end of 2006.
- First projects of implementation started by using the new standard (ECM-Client, XML-converter)
- Process for international standardization started within the organization of SASIG
ECM: Partner process reengineering based on VDA 4965-1

3. VDA Recommendation 4965 (ECM): Status of Commercialization

3.1. in-GmbH

Process-oriented integration for suppliers

- Send and receive ECM messages according to VDA 4965
- View and Modify ECM data like, parts list, comments, ... according to VDA 4965
- Suppliers were enabled to
  - connect to OEMs CM-System by Weblet ECM-Client
  - Start Engineering Change Request
  - Track Status of ECR
  - Set comments
- With no need of separate Change Management System
- According to the needs of the OEM
3. VDA Recommendation 4965 (ECM): Status of Commercialization

3.2. PartMaster GmbH

Product: ECM.Cockpit
3. VDA Recommendation 4965 (ECM): Status of Commercialization

3.3. PDTec: SAM4ECM

- Based on the SAM (STEP Assembly Manager) tool
- Sending and receiving ECM messages in compliance to VDA4965
  - synchronous using PLM web-services
  - asynchronous data transfer using ENGDAT
- Display and modification of ECM data
  - header information, part information, comments, …
  - in compliance with VDA 4965
- Visualization and modification of the effected parts
  - integration of jt-Viewer
  - integration of CATIA V4 und CATIA V5
- Suppliers are enabled to connect to the CM system of different OEM to
  - initiate new and trace existing changes, provide comments on them, …
  - … according to the guidelines of the OEM
  - own in-house CM system not required
ECM: Partner process reengineering based on VDA 4965-1

3. VDA Recommendation 4965 (ECM): Status of Commercialization

3.4. ProSTEP AG:

OEM/x.Tier

Partner

intelligent ECM Documents for humans

according VDA 4965

with integrated XML Data for machines

Enterprise Applications

ECM PDM CAD ... Import/Export Online/Offline Integration

optional Integration
3. VDA Recommendation 4965 (ECM): Status of Commercialization

3.5. T-Systems: PDM WebConnector

- flexible connection to internal systems
- Conversion of data to PLM Services

![PDM WebConnector](image1)

Company specific Data

![PLM Services Client](image2)

- Secured communication crossover companies
- server or client solution

![JT-Viewer Integration](image3)
ECM: Partner process reengineering based on VDA 4965-1

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Based on the ECM-Standard VDA 4965-1 and PLM-Services 2.0 in the future the integration of all partners of DaimlerChrysler AG (MCG, CCG, CVD) into the Change Management Process should be through the Communication Data Base (CDB).

The CDB already covers the synchronized management of ECRs on parts which are shared between the DaimlerChrysler business units.

- Data exchange with external partners will be based on STEP AP214 (ISO 10303-214), using PLM-Services
- First step: Integration of MCG part suppliers based on VDA 4965-1 in realization
- First productive use in Dec. 2006 (casting part supplier), rollout scheduled for July 2007
ECM: Partner process reengineering based on VDA 4965-1

4. ECM Partner Integration: Strategic Targets MCG

Extended MCG-Vision
(agreed with CG & CVD)

Supplier environment
DCX environment

1. DCX Web Client
2. Standardized Client
3. Local change mgmt. system

Common interface & protocol

Web service

Chrysler Group
Mercedes Car Group
Truck Group

WebCN
NCM
ABMA

Supplier w/ own LCMS
Supplier w/o own LCMS w/o Std. Client
Supplier with own LCMS

GLOBUS
Comm. Data Base
CRT
X Reference Table

Extended MCG-Vision (agreed with CG & CVD)
4. ECM Partner Integration:
DCx „Step 1 Collaboration Process Scenario“
Collaboration Interaction Scenario:
1. Initiation of ECR
2. Comment on ECR
3. Information on ECR progress

ProSTEP/iViP Recommendation „VDA 4965“
Status: Released
SASIG-Recommendation „ECM“
Status: Draft
ISO-Standard
Status: under discussion
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Implementing the new ECM partner integration process requires investment for process reengineering and IT implementation.

Tasks:

- Analysis of the as-is process between coordinator and participant
- Definition of the target process based on the ECM definitions (incl. mapping to ECM data model)
- Implementation of an ECM server based on PLM-Services 2.0 and VDA 4965-1 on top of the company specific CM system
- **Either**: Adaption of business unit specific CM systems to the ECM reference process, messages and data model.
- **Or**: Installation and configuration of ECM client in companies without CM system
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6. ECM-Standardization: The next step

The realization of a global ECM collaboration network requires the availability of an global standard. Therefore the SASIG ECM workgroup has been established in April 2006.

The Vision
A joint OEM and Supplier effort leading to a more efficient Engineering Change Management collaboration throughout the Global Automotive Supply Chain.

The Mission
Within the next 3 years we provide an agreed standard which enables global ECM collaboration

An intermediate step will be an agreed standard focused on the ECR process by first quarter of 2008

- The key OEM and supplier community is represented in the SASIG ECM workgroup and agree on a common set of issues.
- Based on an agreed common ECM Reference Process the automotive companies are able to perform a harmonized synchronization for ECM collaboration.
- Encourage the development of ECM solutions based on open standards.
6. ECM-Standardization: The next step

In Scope
- cross company ECM processes
- engineering changes to the product definition information from the technical point of view.

Out of Scope
- change of existing internal company processes
- internal quotation and purchasing process

ECM Reference Process

The SASIG ECM Workgroup will …
- take the existing VDA4965 & review it in detail inside the national organizations
- define and agree on the complete ECM process with common terminology
- define technical issues on VDA4965 coming out of application examples from ECM collaboration projects out of the participating key OEMs and suppliers
- Concurrently review and improve the VDA4965 recommendation. This will lead to a 1st release of the SASIG standard by 1st quarter of 2008
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1. With the VDA 4965-1 and PLM-Services 2.0 the general conditions are available to realize the expected benefits of partner integration into the ECM process.

2. The implementation of a global ECM network requires a strong alignment of the involved companies (OEMs and Suppliers) to the existing standard.

3. The ROI of the resources which have to be invested for IT developments as well as for ECM process reengineering can only be reached if the global ECM network is realized based on an international ECM standard which is supported by standardized ECM-IT-solutions.

4. Precondition of a fast standardization of an international ECM standard on SASIG level is the commercialization of the existing VDA 4965-1 (ECR) in Client and Server solutions as well as the deployment to harmonized ECM processes inside the national OEM and supplier community.
ECM Client Presentation

ECM Client -- IN GmbH copyright 2006 - - Microsoft Internet Explorer

Login
ID: 
Password: 
Login

ECM-Client Create ECR

Identification
Title: 
Creation Date: 2006-03-03
Effectivity: --please select--
Initiator BU: in-gmbh
Initiator CR Number:
RefUrCRodinator:

Decision for Change Request
Initiator CR Number
notInitialEcrApproval1
notInitialEcrApproval2
notInitialEcrApproval3
notInitialEcrApproval4
notInitialEcrApproval5
ecrTitle4
ecrProblemDescription

Decision
Approved
Reason
because its cheaper
Acceptor
Development
Acceptance date: 31.01.2006

ECR
Comment
Decision
Thank you for your Attention!