PDM WEBCONNECTOR
Introduction
# PDM WEBCONNECTOR

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PDM WEBCONNECTOR

MASTERING CHALLENGES WITH END-TO-END SOLUTIONS

Product lifecycle management by T-Systems.

BUSINESS CHALLENGES

Fully integrated IT:
- Integration and optimization of PDM, ERP and CAD systems
- Harmonization of heterogeneous tool landscapes

Standard solutions.
- Deployment of proven IT products for engineering user environments, process integration, collaboration
- Fast and efficient processes

Efficient collaboration:
- Implementation of secure collaboration solutions
- For teams, cross-company networks, and for involving large groups

Boosting productivity:
- Standardization of PDM/PLM processes
- Integration of CAD/data platform
- Focus on workflows

Expert guidance:
- Developing and embedding: of engineering-process and IT strategies, innovative engineering methods
- From concept development to implementation, roll-out and on-going operations
**PDM WEBCONNECTOR**

**USE CASES AND FEATURES**

- **Integration & Synchronization**
  - Monitor
    - Access and Performance monitoring

- **Migration & Co-existence**
  - Data mediation
    - Transformation Mapping Conversion
  - Usability
    - Administration Multi PLM access

- **Collaboration & Data Exchange**
  - Report
    - Reporting for business objects
  - Security
    - Identity and Rights Management
    - IP Protection
  - Process
    - Control and run business processes

**T-Systems International PLM Portfolio & Offering**

- Consulting
  - Process & IT landscape optimization
- Realization
  - Standard-Software customizing
  - Individual software solutions
  - System integration and migration
- Lifecycle Support
  - Application Lifecycle Management
  - Application Configuration & Operation
  - Rollout & Training
  - Business Process Support

**Countries**

- USA
- Europe
- China
- Brazil
- India
- Japan
# PDM WEBCONNECTOR

## WHAT COVERS THE PDM WEBCONNECTOR?

<table>
<thead>
<tr>
<th>SOA MIDDLEWARE</th>
<th>SERVICE &amp; DATA PROVIDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ PDM WebConnector is a SOA middleware, which offers a unified platform for access and data exchange between systems and domains.</td>
<td>▪ Service enabler for standard and individual PLM systems using SOA principles</td>
</tr>
<tr>
<td>▪ Wide field of application from compact service providing solutions up to corporate wide integration of various systems and business processes.</td>
<td>▪ Provider for standard and customer specific services.</td>
</tr>
<tr>
<td>▪ Specialized in the integration of customized PLM systems.</td>
<td>▪ Support of various formats and flexible data conversion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECURE COLLABORATION PLATFORM</th>
<th>PLM APPLICATION INTEGRATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Especially designed for support of online and offline collaboration scenarios</td>
<td>▪ Integration systems across domains based on proven technologies.</td>
</tr>
<tr>
<td>▪ Built-in ISO STEP engine (AP214)</td>
<td>▪ Best-in-class support for synchronization and migration scenarios.</td>
</tr>
<tr>
<td>▪ Up-to-date security mechanisms</td>
<td>▪ Powerful mapping, transformation, administration, monitoring and much more functionalities</td>
</tr>
<tr>
<td>▪ Full transparency of collaboration processes and their states</td>
<td>▪ Seamless embedding in the existing infrastructures</td>
</tr>
</tbody>
</table>
PDM WEBCONNECTOR
SERVICE ORIENTED PROCESS INTEGRATION

Standard Systems
- Enovia
- Teamcenter
- Windchill
- SAP
- ARAS Innovator

Formats & Standards
- JT, CATIA V4, V5, V6
- STEP AP214, AP242
- OMG PLM Services
- Office, PDF, 3D PDF

Connectivity Modules
- Customer
- Business
- Process

PDM WebConnector

Services
- PROCESS
- PROCESS ENGINE
- REPORTING
- CACHE
- MESSAGE BROKER
- MEDIATION
- ROUTING
- MONITORING

COMPOSED

DATA

External Clients
- Web Client
- Rich Client
- Portal

Enterprise Search Engines
- Exalead (Cloud View, One Part)

Collaboration Tools
- COM/TC
- COM/WTC
- COM/ARAS

Printing & Conversion
- 3D Printing
- CAD Conversion
- Management Cockpit

Custom Integration

Mainframe
- ECM
- ERP
- MES
- ...

T-Systems SC PLM / PDM WebConnector - Introduction & Overview

04/10/2015
# PDM WEBCONNECTOR

## REQUIREMENTS AND CAPABILITIES

### Customer Requirements

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Business Processes</th>
<th>Security</th>
<th>Application Integration</th>
<th>Re-Organization</th>
<th>Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards</td>
<td>Execution</td>
<td>Identity Management</td>
<td>Standardized connectivity</td>
<td>Globalization</td>
<td>Heterogeneous infrastructures</td>
</tr>
<tr>
<td>Methods and templates</td>
<td>Controlling</td>
<td>Rights Management</td>
<td>Service-oriented architecture</td>
<td>Change/Evolution</td>
<td>Scalability and Flexibility</td>
</tr>
<tr>
<td>Partnering and joint ventures</td>
<td>Monitoring</td>
<td>Intellectual Property Protection</td>
<td>Performance</td>
<td>Cultural Differences</td>
<td>Networks</td>
</tr>
<tr>
<td>Interoperability</td>
<td></td>
<td></td>
<td>Application Management</td>
<td>Cost Reduction</td>
<td>Hardware</td>
</tr>
</tbody>
</table>

### PDM WebConnector Capabilities

- Transformation
- Conversion
- Mapping
- Messaging
- Mediation
- Verification
- Process choreography
- Service orchestration
- Monitoring
- Access
- Performance
- Operation
- Load
- Technical process engine
- Single sign on
- Transport security
- Authentication
- Access control
- Content security
- Trust security
- Services to standard systems
- Services to individual systems
- Mappings & transformations
- Clustering and load balancing
- Routing
- Versioning
- Loose coupling
- Highly distributed deployment
- Re-use of Services
- Easy integration of systems
- Data Filtering
- Single point of access for distributed systems
- Multiple OS / platforms (AIX, Solaris, HP-UX, Windows, etc.)
- Different Application Server (WebSphere, WebLogic, JBoss, etc.)
- Programming languages (Java, .Net, C/C++, etc.)
# PDM WEBCONNECTOR
## SERVICE FOR BACKEND SYSTEMS

<table>
<thead>
<tr>
<th>Service*</th>
<th>ENOVIA</th>
<th>Teamcenter</th>
<th>Windchill</th>
<th>Aras</th>
<th>SAP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VPM V4</td>
<td>V6</td>
<td>Delmia</td>
<td>Enterprise</td>
<td>Engineering</td>
</tr>
<tr>
<td>Supported Versions</td>
<td>V5</td>
<td>2007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read Parts</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Read Structures</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Traverse Structures</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Write Parts</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Download Binary-Files</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Upload Binary-Files</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Synchronize</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

- ✔ included
- ✔ partially included
- ? on request
## PDM WEBCONNECTOR
### HD INTEGRATION - TARGET SCENARIOS

<table>
<thead>
<tr>
<th>Scenario</th>
<th>PDM 1</th>
<th>PDM 2</th>
<th>Description</th>
<th>IP exchanged</th>
</tr>
</thead>
</table>
| Product Structure - BOM Synchronization | Design PS | Reference BOM | ▪ BOM initialized in PDM 2  
▪ BOM published to PDM 2  
▪ Design in PDM 1  
▪ Release in PDM2 | ▪ Product / Instance  
▪ Product / Reference  
▪ Representation  
▪ Representation Instance  
▪ Engineering data  
▪ ECA  
▪ Versioning and Lifecycle  
▪ Configuration (effectivities) |
| BOM –BOM Synchronization        | BOM   | BOM   | ▪ Part/BOM reuse across multiple sites  
▪ Release in PDM 1 master BOM | ▪ Part  
▪ BOM Relationship  
▪ Document  
▪ ECR/ECO  
▪ Versioning and Lifecycle  
▪ Configuration (effectivities) |
| BOM –Product Structure Synchronization | Reference BOM | PS | ▪ BOM initialized in PDM1  
▪ BOM published to PDM2  
▪ Design in PDM2  
▪ Release in PDM1 | ▪ Part  
▪ BOM Relationship  
▪ Document  
▪ ECR/ECO  
▪ Versioning and Lifecycle |
| Product Structure – Product Structure Synchronization | Design PS | PS | ▪ ProductStructure reuse across multiple sites | ▪ Product / Instance  
▪ Product / Reference  
▪ Representation (exact, tesselated)  
▪ Representation Instance  
▪ Engineering data  
▪ Versioning |
| Configuration Management       |       |       | ▪ Configuration Dictionaries managed in PDM2  
▪ Published to PDM1 for configured design | ▪ Configuration (options/variants, rules) |
PDM WEBCONNECTOR
DATA SYNCHRONISATION MULTI-SITE

Current State of PDM WebConnector Development regarding Multi-Site

“Simple” - Multi-Site
- Both sites use the same PDM/PLM system (e.g. Teamcenter Unified at both sites)
- Automated synchronization of site contents (Meta-Data, Files etc.)
- Collision checks for concurrent changes

“Multi site” - Multi-Site (include also “Simple”)
- More than 2 sites of the same PDM/PLM system are affected
- Including individual synchronization scenarios (e.g. from one site to pre-defined other sites).
- Dynamic KPI-Based site detection....

“Multi PDM/PLM” – Multi-Site
- Every site may use a different PDM/PLM system (e.g. Teamcenter, Windchill, Enovia, Aras, SAP)
- Site specific characteristics (data model, configuration etc.) are covered
- Conversion of physical files (JT, Tiff, 3D PDF, STEP etc.)
Search
- Direct access to all available systems
- System and function specific document view
- Configurable and enhanceable tree view

Multi PDM Client
- Query objects
- Visualize geometries
- Show content attributes of a selected object
- Expand objects to see related parts
- Download: files
- Show details of an object - including the master data results of the specific object.

Administration
- System administration
- User und Policy administration
- Logging administration

Access Monitoring
- Supervising and monitoring of available functions
- Archiving of test cases and protocols
- Access time and duration
- Performance measurement
- Graphical display in different kinds of diagrams

Operation Monitoring
- Automated operation monitoring for connected systems
- Average access time
- Notifications on failure
**PDM WEBCONNECTOR**
**MONITORING**

Monitoring

- The PWC Monitoring record the information described below, with less or without harming the performance of the service call.
- The PWC offers WebService interfaces to query the monitored information in an individual granularity.
- Build-in notification mechanisms for system failures (e.g. Email)

Access

- Trace every single access to a web service operation with a predefined set of information (time, IP, client, user, operation, system etc.)

Performance

- Records the achieved response time for every involved component of the request (PDM WebConnector Server – Connectivity Module – Backend System)

Operation

- Observe every integrated system for availability and response time
PDM WEBCONNECTOR
ACCESS AND PERFORMANCE MONITORING

- Redirection from general overview to detailed analysis table.
- Possibility to filter calls based on various parameters.
- Analysis table visualizes all important call information (e.g. operation name, result, durations, etc.).
- Administration and handling of call information done by PWC.
- Long time archive for huge amount of calls available (performance enhancement).

- Generate diagrams on the fly
- All parameters selectable
- Already defined diagrams available
PDM WEBCONNECTOR
SECURITY BUILDING BLOCKS

Security

Identity Management
- Single-sign-on to login once and to use different services. Genuine user information administered centrally.
  - Protect against identity theft and unauthorized access

Content Security
- Signed data proofs origin and changes to data. Encryption during storage (DB, file system,...) and for SOA multi-hop communication.
  - End-to-end protection against modifications and eavesdroppers.

Access Control
- Only authorized user can access function and retrieve/modify specific data. Business needs dictate access control rules. Logging of access attempts.
  - Protect against unauthorized access.

Authentication
- Username and password management. Possibility to manage passwords and users at central system.
  - Protect against identity theft and assure user identity.

Transport Security
- Assure confidentiality and integrity of data during transit between client and server. Authentication of server and/or user.
  - Protect against man-in-the-middle attacks against communication.

Traffic Control
- Low level control of the data communication. Block traffic depending on source/destination address, for example, access only within company.
  - Protect against access from untrusted domains and against flooding attacks.

Complexity

- high
  - SAML (Single Sign On)
  - Identity Management
- medium
  - Digital-Signature
  - XML-Encryption
  - Access control rules
  - Client Certificate
  - Data Filtering
  - Auditing & Traceability
  - Siteminder
  - Username Token
  - Credentials
- low
  - SSL/TLS
  - VPN
  - IP
  - Firewall/DMZ
  - Gateway (e.g. XML)
PLM Services V2.0 is an Object Management Group (OMG) standard (like CORBA, UML, MDA, ...) which defines

A standardized PLM data model based on ISO 10303 (STEP) AP214 3rd Edition

Standardized PLM functionality (corresponding to typical use cases validated by many automotive companies within the PDTnet project at the ProSTEP iViP Association)

Standardized ECM functionality for the exchange of asynchronous messages (according to the VDA Recommendation 4965)

One of the implementations of the OMG PLM Services is as WebServices (defined by a WSDL specification, with a SOAP Binding, and a XML Schema specification) suitable for collaboration over the intranet/internet
COLLABORATIVE ENGINEERING.
STEP AP 242 – „MANAGED MODEL BASED 3D ENGINEERING“

STEP AP214 (Core Data for Automotive Mechanical Design and Processes)
Standard for the exchange of product data
PLM Services V2.0 is an Object Management Group (OMG) standard (like UML, MDA, ...) which defines

STEP AP203 – „Configuration Controlled Design)
Standard for the exchange of product data, mainly used in Aerospace and Defense industry

STEP AP 242 – „Managed Model Based 3D Engineering“, The merging of the two leading STEP application protocols, AP 203 and AP 214
In addition to the functionality familiar from AP 214 following areas are addressed:
- results of the Product Data Quality (PDQ) initiative
- improved kinematic functionality
- offering an option for also exchanging metadata, structure data, process data and kinematic data in XML
- backbone for visualization and thereby complements JT standardization activities
PDM WEBCONNECTOR
BASIC PROCESS MODULES

SEAMLESS PROCESS INTEGRATION FOR PLM

- Controlling
  - Trigger
  - Authentication
  - Authorisation
- Configuration
  - Reconciliation
  - Delta
  - Data Export
  - Transformation
  - Validation
- Content
  - Mapping/Conversion
- General
  - Digital-Signature
  - XML-Encryption
- Informational
  - Monitoring
  - Logging
  - Notification
  - Publish
  - Subscription/Unsubscribe
  - Packaging
- Security
  - Authentication
  - Authorisation
  - Access control rules
  - Data Filtering
  - Routing
  - Integration of extern. tools
- Import of part data, product structure, CAD, documents, configuration data, delta-exchange, variants, versions, etc.

Export of part data, product structure, CAD, documents, configuration data, delta-exchange, variants, versions, etc.

Mapping and transformation of data due to different data models, using a standard XML exchange format.
PDM WEBCONNECTOR
CUSTOMER REFERENCE PROJECT @ DAIMLER

CUSTOMER
Daimler AG
Target Group: Manufacturing Industry, Automotive OEM

CHALLENGE
- Service oriented integration platform for Mercedes Car Group and Truck Group.
- Interdisciplinary data exchange between engineering and production systems (e.g. BOM, PDM, ECM, Legacy...).
- Support for heterogenic platforms all over the world.

BEST SOLUTION
- Best in class middleware solution based on SOA principles and open standards.
- Predefined frameworks and adapters - processes and methodology for system integration.
- Comprehensive consultant and tool support for Governance concepts, requirements- and release management, administration and monitoring.

CUSTOMER BENEFITS
- Single Point of Access for any Provider System based on open standards.
- Interdisciplinary support for a wide range of business and enterprise processes - engineering to production
- Loose coupling of provider and consumer systems to enable an independent enhancement
### Facts @ Daimler MCG & Trucks

- In productive use since 2004
- >10 integrated systems in production
- >20 consumer applications
- >150 services (service operations)
- >600 concurrent sessions
- >15 million service calls p.a.
## PDM WEBCONNECTOR

**CUSTOMER REFERENCE PROJECT @**

### CUSTOMER

Northrop Grumman  
Target Group: Aerospace & Defense Industry

### CHALLENGE

- Provide a cost effective solution for PDM replication/synchronization between two on-line Teamcenter Enterprise and Teamcenter Unified Platform instances.
- Enables also synchronization for the three off-line air gaped platforms of Teamcenter Enterprise and Unified Platform.
- Provides additional enhancements and tools to easy support of both the on-line and off-line systems.

### BEST SOLUTION

- Integrate Teamcenter platforms by using the existing Connectivity Modules of the PDM WebConnector.
- Implement the complex replication process using the standardized Web Services of the PDM WebConnector to access the systems.

### CUSTOMER BENEFITS

- Automated replication for common data (Standard Parts).
- Existing Connectivity Modules to access Teamcenter Enterprise and Unified Platform.
- Support of strongly customized PDM systems.
- Configurable data validation at import and export.
- Support and easy adaption of the individual replication process of the customer.
## PDM WEBCONNECTOR

### CUSTOMER REFERENCE PROJECT @ Bosch Mahle TurboSystems

### CUSTOMER

- **BMTS**
- **Target Group:** Manufacturing Industry, Automotive

### CHALLENGE

- Introduction of PLM (Windchill) and optimization of business use cases along the product creation process
- Powerful API and Services in order to meet the strong business requirements
- Ensure the process safety in continuously growing number of products and employees
- High performance and robustness

### BEST SOLUTION

- SOA based integration of Windchill including full support of core business objects e.g. part, part structure, document and change request.
- Enhanced functional and data scope (e.g. classification)
- Seamless connection of neighboring systems e.g. SharePoint and SAP
- Syntax checking of function-specific input parameters
- Automated setting of system internal default values
- Transfer of the registration and authorization information

### CUSTOMER BENEFITS

- High efficient data exchange from and to Windchill
- Cost savings for implementation and maintenance due to existing standard PDM WebConnector Windchill Connectivity Module
- Guaranteed process reliability supported by embedded monitoring tool
- Automated notification in case of system failure
- Implementation of customer specific functions with considerably reduced effort
**PDM WEBCONNECTOR**

**MAIN FOCUS 2014**

- New look & feel for PWC Client and enhanced features
- Support for “Multi PDM/PLM” – Multi-Site
- Enhanced support for “Augmented reality”, “Big Data” and “Industry 4.0”
- Enterprise Service Repository
- Enhanced ENOVIA V6 integration
- Message Broker based on WS-Notification standard

- Version 3.3 – 31.07.2011
- Version 3.4 – 23.12.2011
- Version 3.7 – 31.10.2013
- Version 3.8 – 31.08.2014
- Version 3.9 – 31.10.2015
PDM WEBCONNECTOR
ROADMAP 2015

- Enhance Monitoring – Add new capabilities
- Increase Security – Standard Processes
- Improve Performance – Cope better with load peaks
- Improve Usability – New web client
- Innovation – Exalead, New ENOVIA V6 Integration, Multi-PLM-Client
- Continuous improvements - For systems (e.g. Teamcenter and Windchill)

2010
- Version 3.3 – 31.07.2011
- Version 3.4 – 23.12.2011

2011

2012
- Version 3.7 – 31.10.2013

2013
- Version 3.8 – 31.08.2014

2014
- Version 3.9 – 31.08.2015

2015

2016

2017
PDM WEBCONNECTOR
INNOVATION

1. Big Data
2. Augmented reality
3. Cloud Based & Mobile PLM
4. Industry 4.0
HD PLM INTEGRATION
PDM WEBCONNECTOR HIGHLIGHTS

ARCHITECTURE - HIGHLIGHTS
✓ High performing Server
✓ Client
✓ Connectivity Modules
✓ Client Framework
✓ Connectivity Module Framework

CLIENT- HIGHLIGHTS
✓ Search Area
✓ Test Area
✓ Administration
✓ Access Monitoring
✓ Operation Monitoring
✓ Statistical Overview
✓ Performance Analysis & Dashboards
✓ (new) Multi PDM Client
✓ (new) Process Control

USE CASES
✓ Service & Data Provider
✓ PLM Application Synchronization
✓ Data, Function and Process Migration
✓ Multi-disciplinary Integration
✓ Secure Online & Offline Collaboration

Legend:
✓ Highlight
✓ Unique compared to competition
✓ New functionality
PDM WEBCONNECTOR

SUMMARY

PDM WebConnector provides an easy, cost effective and secure way for enterprise integration, monitoring and administration of different systems

The PDM WebConnector architecture is service-oriented and modular

It is easy to extend and customize

PDM WebConnector is a middleware application running on most application servers and operating systems

It supports state-of-the-art security technologies

Quick return of invest, since the PDM WebConnector’s Connectivity Modules are proven by productive use and offer high performance and robustness

Protection of investment for your PLM customizing by usage of standards like JEE, Web Services, SOAP
PDM WEBCONNECTOR
OUR SERVICES

Consulting
- System analysis, system architecture, business processes

Products
- PDM WebConnector Kernels based on licenses
- Connectivity Modules for PDM systems
- WS Client Framework for client development

System development
- Customizing and maintenance of connectivity modules for enterprise specific customizing
- Implementation of individual connectivity modules for legacy systems (e.g. proprietary systems)

Application Management
- Operation of application servers for enterprise Web Services
Contact.

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