Enterprise Simulation-Data-Management
with SimData Manager
Contents

- Company Overview
- SimData Manager
  - Product Overview (Slides)
  - Demonstration (via Movies – separate files)
- Summary
PDTec Company Overview

- **PDTec**
  - Stands for ... *Product Data Technology*
  - Founded 1998
  - Headquartered at Technology Park Karlsruhe, Germany
  - Focus on Engineering Data Management

- **Customer focus**
  - Automotive industry
  - Maritime Industry, Aerospace
  - Energy supply
  - System vendors and integrators

- 15+ yrs. profitable growth
Business Overview:

Focus disciplines:
- Collaborative Engineering
- CAE / Simulation
- Supplier and Partner Integration
- Systems Engineering
- ECM - Engineering Change Management
- Product Planning
- DM - Digital Manufacturing

“Innovation through Integration”
PDTec Key Customers

DAIMLER  Audi  PORSCHE
VDA  VDL Nedcar  MBtech
ODETTE SWEDEN  Nissan  Netzdienste Rhein-Main
AiAG  semcon  50hertz
MAGNA  ArvinMeritor  SILENT DIG
BOSCH  KEIPER  DB
DNV·GL  SCANIA  VOLVO
Partner Network

PDTec has a business & technology partner network
Software and Service Portfolio

- Process and IT consulting
- Individual software solutions
- Integration platforms and tools
- Standard software solutions
Standard software solutions

- Engineering & Product data management solutions for selected activities and disciplines in the product lifecycle
  - SimData Manager
    - CAE Data and Process Management for Simulation and Virtual Engineering Analysis
  - Collaboration Portal
    - Easy to use, web based information platform to support cross-enterprise collaboration processes and information retrieval
    - Business objects and document management incl. partner data
    - As CAD Portal optimized for CAD data management
    - Continuous data exchange and synchronisation with customers / partners / suppliers
Integration platform

- **ice.NET Integration & Collaboration Environment**
  - Software platform to efficiently implement reliable information systems, data warehouses, portal solutions, and “collaboration spaces“ to support selected product lifecycle processes
  - Use in own software applications and by partners and customers

- **PDMconnect**
  - Flexible Communication Framework for PDM/PLM based data communication
  - Adaptive PDM connectors to various PLM systems
  - Visualisation, Consistency check, Pre-and postprocessing of data
PDTec Software Stack

- ice.NET as common platform for various data management applications
- High synergy and quality through Re-use of components between multiple applications
- Mature Software Components through usage in multiple disciplines and application scenarios
Customer success: „EDAG - more than 800 users of CAD Portal“

- Leading Engineering Services Company
- Partners with many OEMs
- Data exchange via CAD Portal
Customer success: Daimler AG

- 15+ years partnership
- PDM, Data exchange, STEP, XML, JT, PDM/TDM Layout,…
- Developments for
  - Step Assembly Manager (SAM)
  - SAM4NX
  - SAMlight
  - Smaragd-STEP Schnittstelle
  - SmaragdView
  - PLMXXML Tools
  - PLM2PLM TCUA

- Development of a Strategic Production-Planning System TP+
  - Exclusively for Daimler Trucks
  - ice.NET - Platform
  - Ongoing developmemet projects
Partner Success: DNVGL

- Leading global certification company (maritime, wind energy, …)
- OEM business partnership
- ice.NET basis for multiple products in shipbuilding & maintenance
Partner Success: DIGSiLENT

- Leading global company managing Power Net
- OEM business partnership
- ice.NET basis for multiple products in energy & distribution
Customer Success: SimData Manager in Volkswagen Group

SDM solution
- Production since 2011
- Disciplines
  - Crash, Passenger Safety, Pedestrian Safety, CFD, NVH, Akustik, MBS, …
- 170 seats

PreSDM
- Production since 2013
- Disciplines: Crash, CFD
- KVS integration
- SDM Archive-System

SDM solution
- PreSDM deployment
- In Production
- Disciplines
  - Phase 1: CCD
  - Phase 2: CONNECT & Crash
- Replacement of legacy system
- New IT security requirements
- Roadmap deployment
- All disciplines
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SimData Manager - for Simulation Process and Data Mgmt.

- Auto filter for relevant CAD
- Run model configuration
- Plot/curve/value comparison
- Task management
- CAE Model Management
- Report generation
- Process Automation
- Configuration Version Tracking
- Lifecycle & Workflow

Application Server

SimData Manager

Metadata

File Vault(s)
Standard CAE Process in SimData Manager
Existing PDM Interfaces for the Import of CAD/PDM-Data

- OEM specific interfaces for the import of PDM data
  - Daimler: import on the basis of Smaragd/STEP data
  - Porsche: csv-file import from P-DMU
  - Audi: import based on meta data file from KVS/VPM
  - Volkswagen: Connect based on TeamCenter
  - Other OEM’s: in preparation

- Standard interfaces
  - CSV Interface
  - PLMXML, STEP (different dialects)
  - Native CATIA, native NX
  - ENOVIA

- Mapping tools for dealing with import of proprietary PDM data formats
Way of Working with SimData Manager

**SDM Cockpit** (Web Browser, e.g. Firefox or IE)

- **SDM Sync-Tool**
  - Check-in
  - Check-out

- **SDM Console**
  - Check-in
  - Check-out

Web-Services

Application Server

- SimData Manager
  - CAE Datenbank & FileVault

- SimData Manager
  - Web-Services

- SDM Cockpit
  - Web-Services
  - SDM Sync-Tool
  - SDM Console

- SDM Cockpit
  - download
  - upload

- SDM Sync-Tool
  - check-out
  - check-in

- SDM Console
  - check-in
  - check-out

- Web-Services

- e.g. Meshing, Model assembly with CAE-Tool (e.g. Hypermesh, Ansa, Medina, …)

- e.g. Solver run

- e.g. Post processing & Report compilation

- local work space
  - (of CAE Engineer)
Modules in SimData Manager

- SDM CAD Import Client
- SDM CAE Import Client
- SDM CAD-CAE Mapping Manager
- SDM CAE Part Manager
- SDM Workflow Builder
- SDM MBS Client
- SDM Console Interface
- SDM SyncTool
- SDM CryptoVault
- SDM Python API
- SDM Python Debugger

Authoring Tool Integration
- HyperMesh Integration
- Animator Integration
- Medina Integration
SDM CAD Import Client

- Manual/interactive import of PDM/CAD data
- Extended mapping functionality/engine
- Adaptable for special application (format, PDM, etc.)
- Supports various metadata formats (csv, PLMXML)
- Provides preview of the CAD/PDM structure created in SDM
- Certain PDM data can be deselect and will not be imported
SDM CAE Import Client

- Manual/interactive import of CAE data
- Supports the “offline” meshing process
- For outsourcing to external service providers
- Supports definition of attributes during upload
SDM CAD-CAE Mapping Manager

- Automates recurring CAD-updates from PDM
- Template Builder to map CAD models from various Assemblies
- Build CAE Assembly from multiple CAD-Trees
- Reuse the CAD-Mapping Template
- Filter rules based on regular expressions
SDM CAE Part Manager

- Reuse of existing CAE models
- CAE representations of a single part (e.g. mid surface, cleanup geometry, various FE meshes (density, mesh type, properties,..))
- CAE Assemblies (CAEmodule)
- Provides functionality to create packages (e.g. for suppliers, engineering service providers,...)
SDM Workflow Builder

- Graphical interactive Workflow module
- Recurring processes for reuse
- Capture of standard methods (key users)
- Extensive logical decision criteria's
- Able to embed external scripts
SDM MBS Client

- Support the data storage of MBS models
- MSC.AdamsCar
- Version control of MBS models
- Compare MBS models
- Traceability
- Collaborative work
- Lock mechanism
**SDM Console Interface (batch API)**

- Access of SDM data (export/import) via batch interface (command line)
- Allows (automated) import and export of files

- e.g. Meshing, Model assembly with CAE-Tool (e.g. Hypermesh, Ansa, Medina, HPC)
- e.g. Solver run
- e.g. Post processing & Report compilation

![Diagram](Image)

**SimData Manager**

- Prozess-Automatisierung
- Konfigurations- & Versions-tracking
- Simulations-Projekt- & -taskverwaltung
- User- und Rechtsverwaltung
- Ergebnisauflistung und -vergleich

Application Server

- CAE Modellaufbau
- Simulationsbibliotheken
- Datenübernahme und -abgleich

SimData Manager

- CAE Datenbank & FileVault

**Check-in**

**Check-out**

**local work space**

(of CAE Engineer, HPC)
SDM Sync-Tool

- Syncronization of authoring tools in offline mode
- Local folder checkout’s will be in sync with the SDM db
SDM CryptoVault

- Storage of highly confidential data in a separate vault
- Supports high security & safety standards
SDM Python API

- Supports external Python scripts / applications
- API concept
- Supports the development of customer specific functions
- Supports the development of automation tools to capture domain-specific processes
SDM Python Debugger

- Development tool for Python scripts
- Supports debugging during development
- SimData Manager is a web application, debugging takes place on a “test server” (not at the production instance)
- Python Debugger can also provide 5 additional installations for SimData Manager, which might be installed locally on the computer of the developer (for this specific case, the full SDM installation would be on client).
HyperMesh Integration

- API Webservice integration of SimData Manager - HyperMesh
- Automatic launch of HM in SDM
- Browse of SDM in HM
- Open file in HM and save back
- Easy editing & visualization of CAE models
Animator Integration

- Python integration of SimData Manager - Animator
- Automatic launch of Animator in SDM
- Open file in Animator and save back
- Easy visualization of CAE models
Medina Integration

- Python integration of SimData Manager - Medina
- Automatic launch of Medina in SDM
- Open file in Medina and save back
- Easy editing & visualization of CAE models
Audit Trail from CAD to CAE Data to Reports

- Analyze the input and/or output of one or more simulation runs
- Select one or more runs and get needed information with one click

Which includes were input for the selected runs?

Which values / curves / images / movies are resulting from the selected runs?

Which CAD parts were input for selected runs?

Trace line visualization is configurable in order to fit specific customer needs
Easy Comparison of Curves, etc.
Steifigkeit 50032 in z_Richtung [N/mm] = (29, 10.989010989011)

Run Legend:
Run 001
- Steifigkeit 50032 in z_Richtung [N/mm] = 5.95238

Run 002
- Steifigkeit 50032 in z_Richtung [N/mm] = 5.98802

Run 003
- Steifigkeit 50032 in z_Richtung [N/mm] = 10.5213
Or compare images …

- Analogue handling to start comparison
API and GUI for Definition of (Standard-)Reports

- GUI Editor and XML-API for definition of reports
- Comparison of multiple simulation runs based on report definition
- Several diagram types are supported
  - bar chart
    - for scalar values and tables
  - curve diagram
  - threshold analysis: compare many curves against threshold and see progress over time

Problem seems to be solved …
Traceability: From Report to Runs (curves, images), Includes, and even CAD

Which CAD Parts?

Which runs?

Which Includes

Start trace line from report

- Which Curves?
- Which Includes
- Which CAD Parts?
Vault and Content Management – Deployment Options

- **Simple File Vault**
  - Web Browser
  - Smart Client
  - Application Server
  - Vault Service

- **Database Vault**
  - Web Browser
  - Smart Client
  - Application Server
  - Vault Service
  - SAN / NFS / CIFS

- **Ice Vault**
  - Web Browser
  - Smart Client
  - Application Server
  - Vault Service
  - SAN / NFS / CIFS
Multisite – Vault Replication (Example)

Site: Brazil

Vault Server
Location: Brazil

Main Site: Germany

Application Server(s)

Database Server

Site: <somewhere else>

Vault Server
Location: -/-
Summary

- Reduced effort for information provision, for model assembly and for generation of reports
- Synergies provided by an uniform data storage organization, even across different simulation disciplines (e.g. crash, aero dynamics) → potential for in-house standardization
- Improved transparency and higher quality of the simulation process
  - Immediate traceability of the simulation results
- Saving significant time in the simulation department
- Simple deployment within the company through usage of modern web technologies
- Straightforward integration of different locations as well as of external partners
  - CAE service providers, Subcontractors, Joint Ventures
- ...
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