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spdm
INTERNATIONAL CONFERENCE
Simulation Process & Data Management

A Smart SDM-Solution for Automotive Suppliers

Dr. Günter Staub, Dr. Alexander
Mahl PDTec AG

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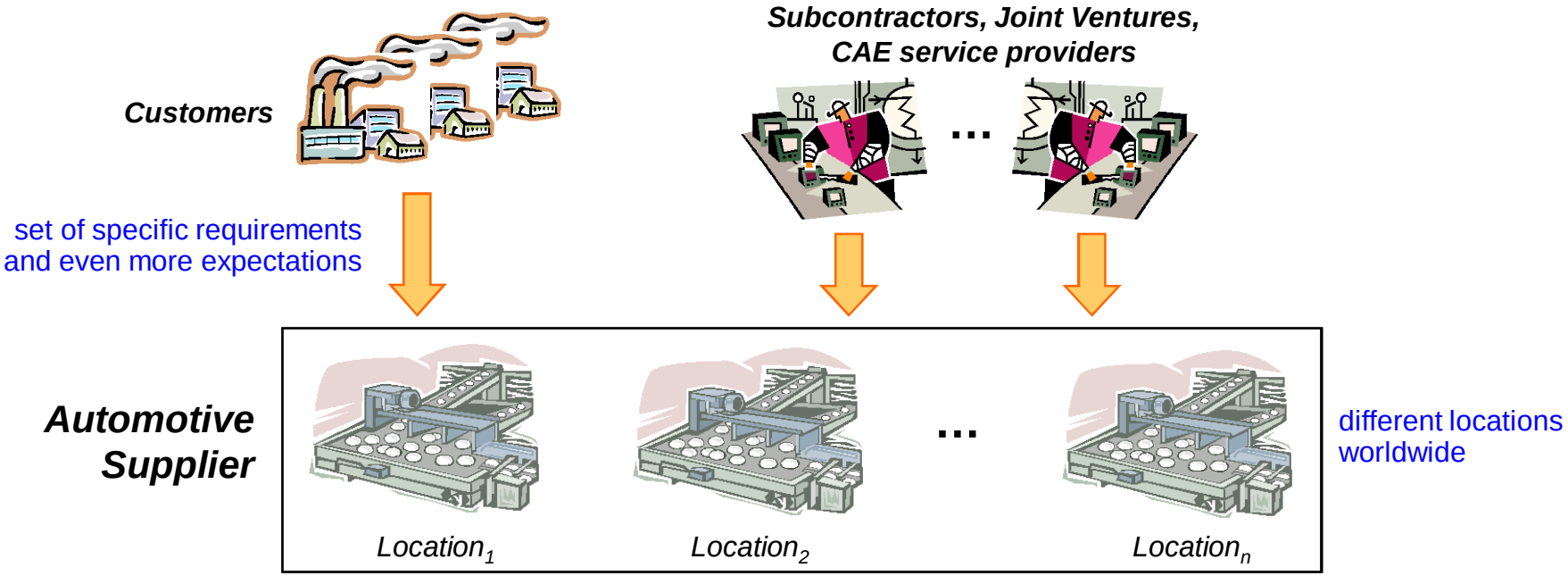
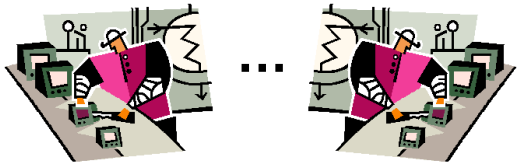
Typical Challenges for an Automotive Supplier



Typical Challenges for an Automotive Supplier

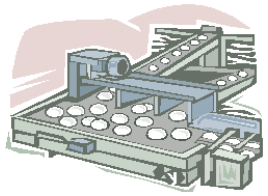
Customers

Subcontractors, Joint Ventures, CAE service providers

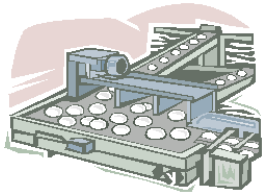


set of specific requirements
and even more expectations

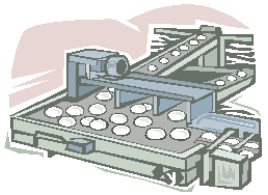
Automotive Supplier



Location$_1$



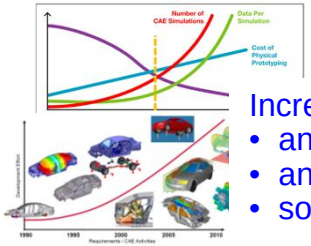
Location$_2$



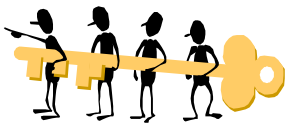
Location$_n$

different locations
worldwide

different CAE processes
separate CAE data stores
different disciplines



Increasing No. of
- analysis methods
- analysis tools
- solver runs/iterations



Harvesting of synergies across
- multiple CAE projects,
- multiple locations, and
- multiple CAE disciplines

is hard to achieve

Comparatively small IT budget (compared to those of OEMs)

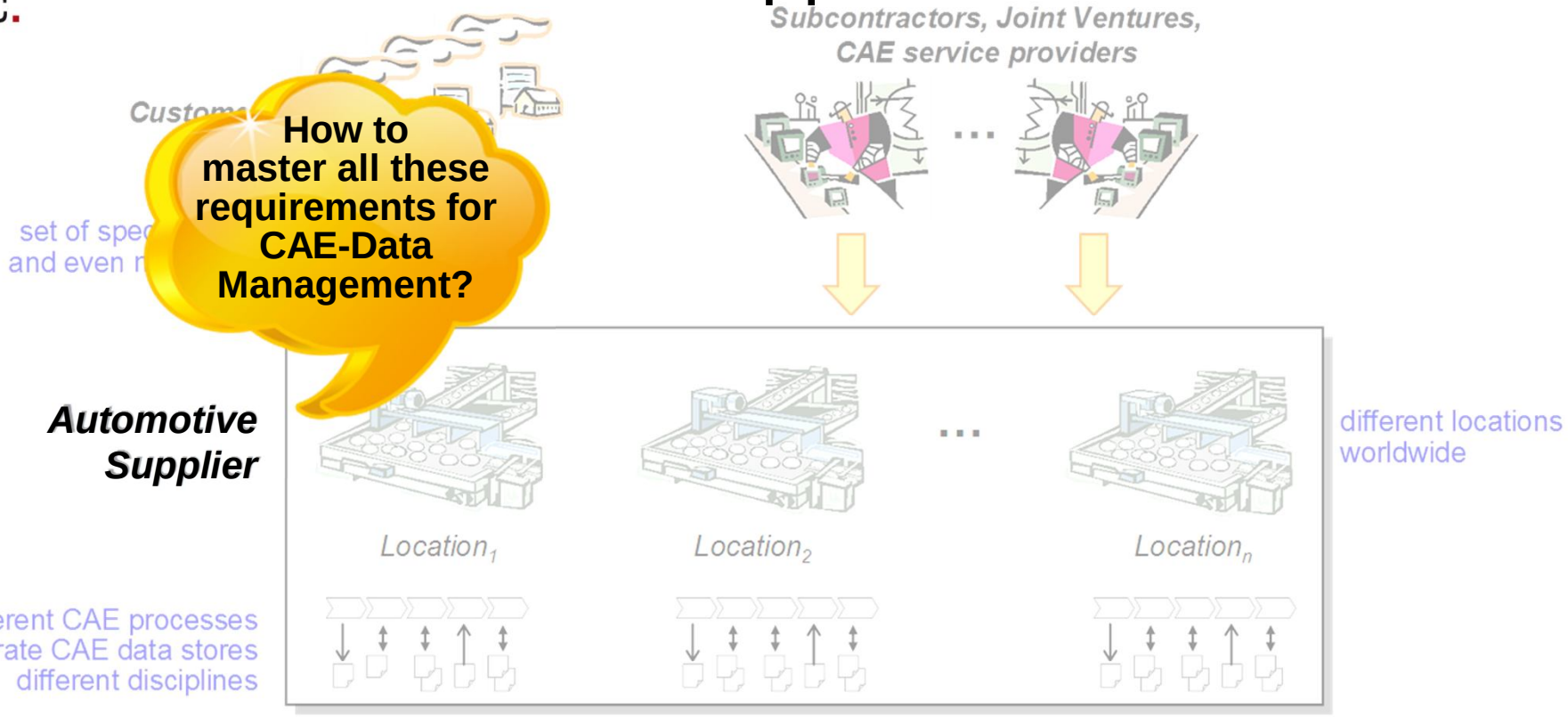
Resulting Requirements for SDM from an Automotive Supplier Perspective (1)

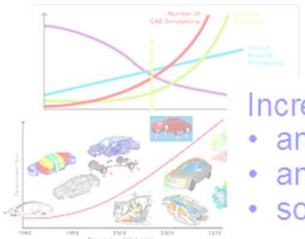
- Seamless integration of multiple locations, multiple OEMs, multiple CAE disciplines, sub-suppliers and joint ventures
- Coverage of the different customer requirements regarding CAE data within a single SDM solution
- Coverage of the entire CAE process chain as well as of parts of it
  - existing CAE processes and workflows should be covered
  - ability for integration of the existing tools, in house scripts, etc. and extensibility

Resulting Requirements for SDM from an Automotive Supplier Perspective (2)

- Central CAE data organization without redundancy, incl. versioning, suitable for all in-house simulation disciplines
  - reuse of existing CAE data (meshes, includes, results, etc.) across projects, locations, and customers
- Traceability: from CAE data to associated input data (e.g. CAD) and vice versa
- Out of the Box Solution for CAE process and data management without huge customizing costs

Typical Challenges for an Automotive Supplier





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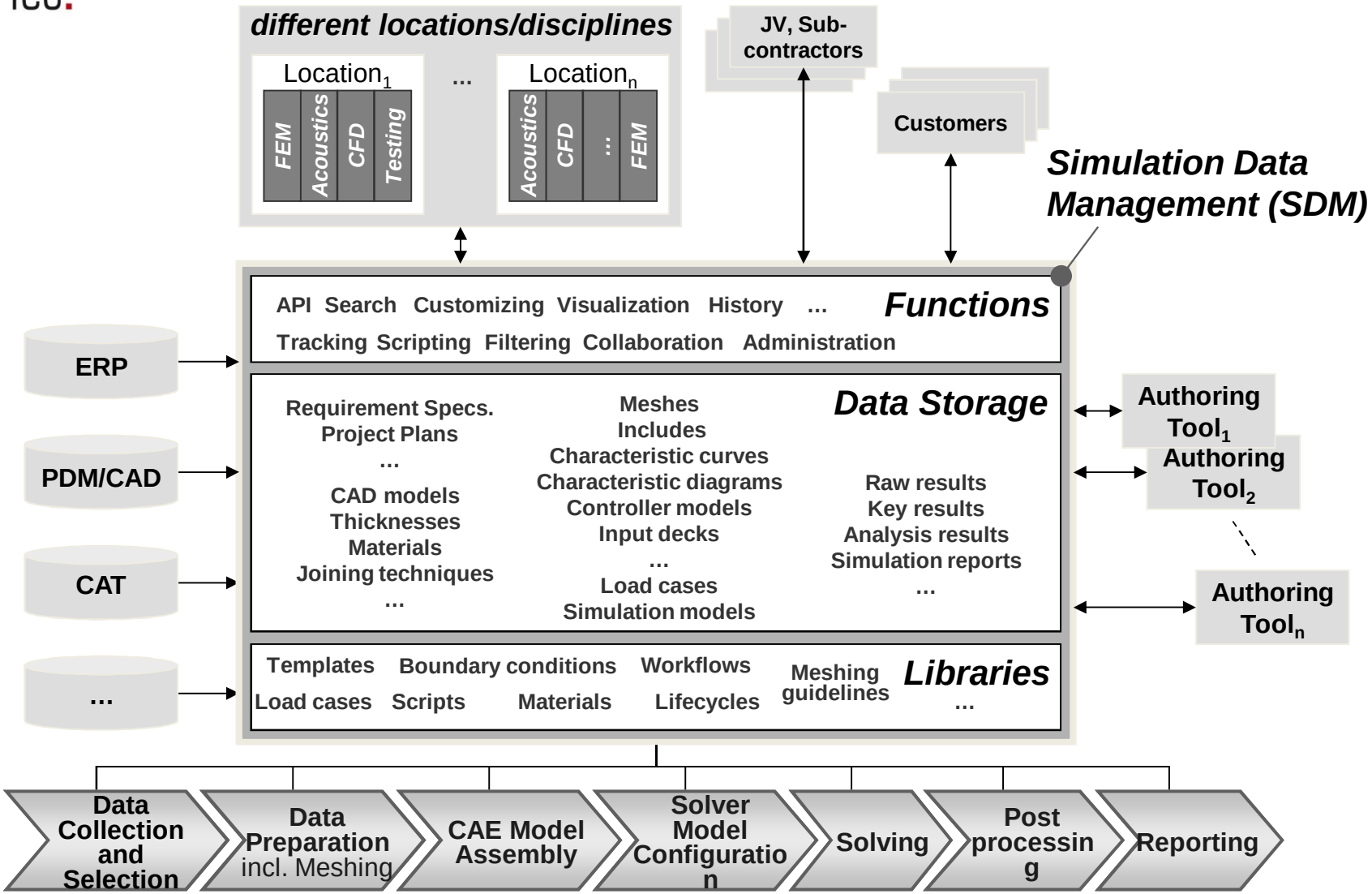
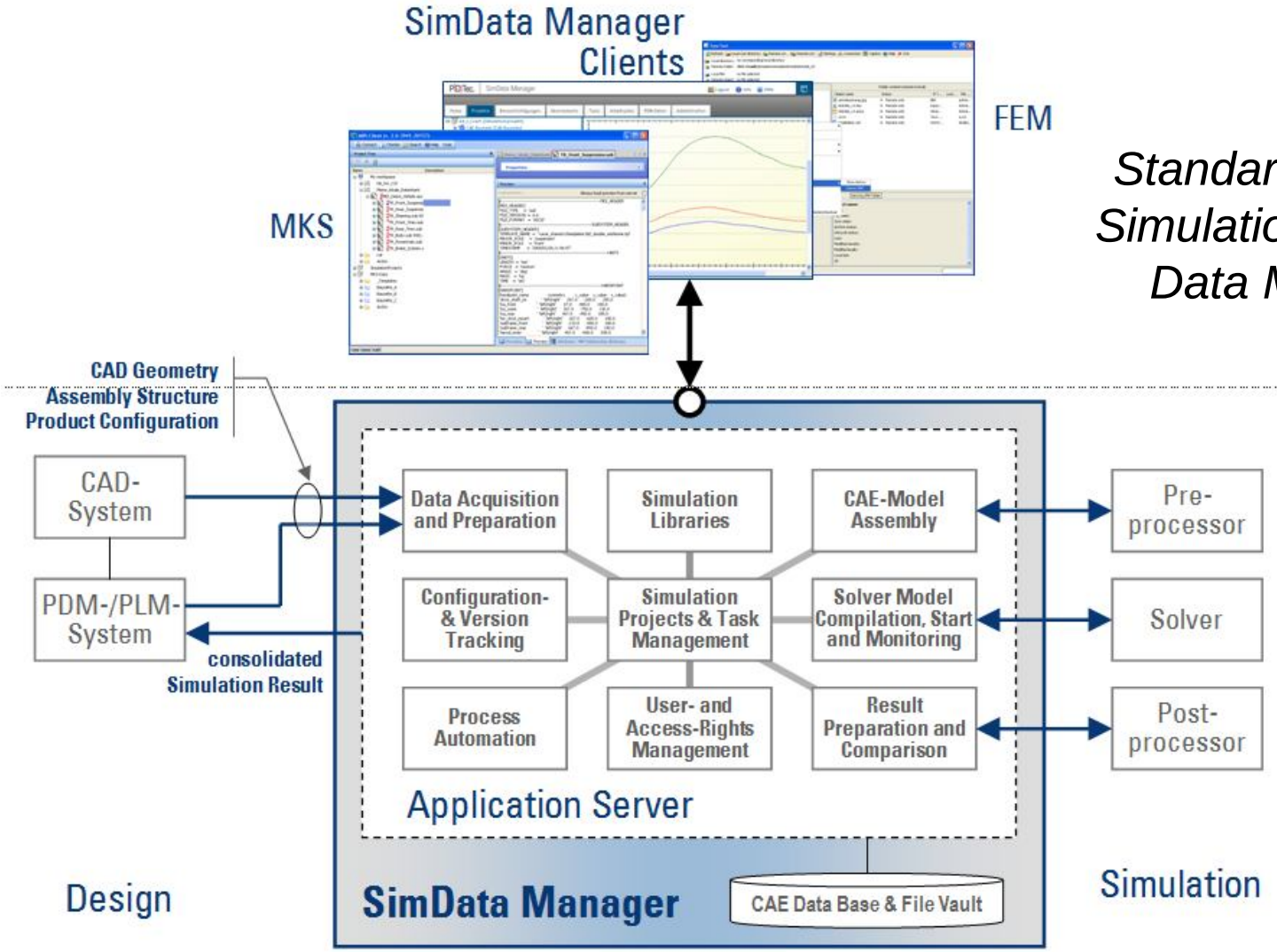
Solution Approach that meets the Requirements

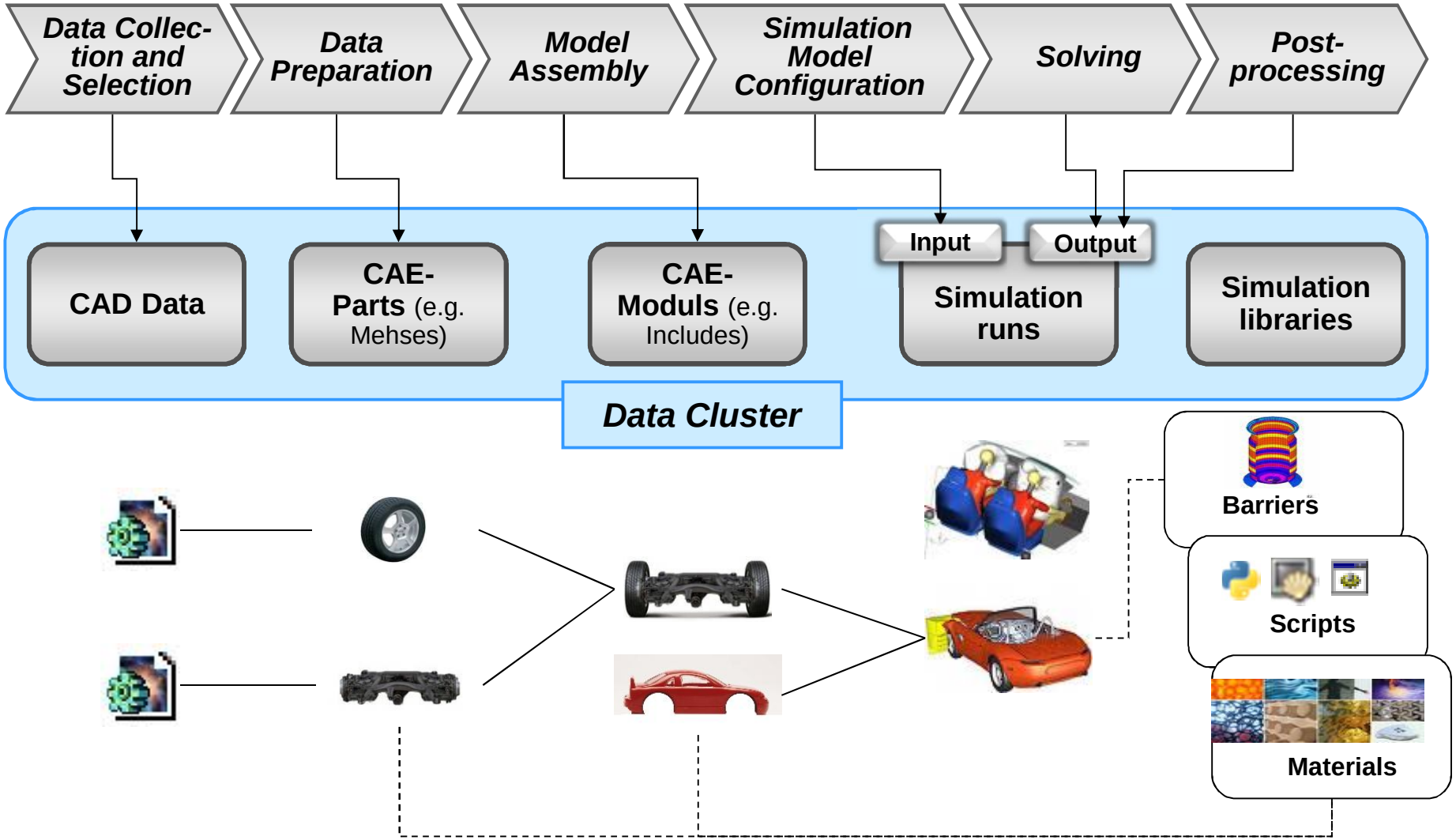


PDTec's SimData Manager



Standard Software for Simulation Process and Data Management

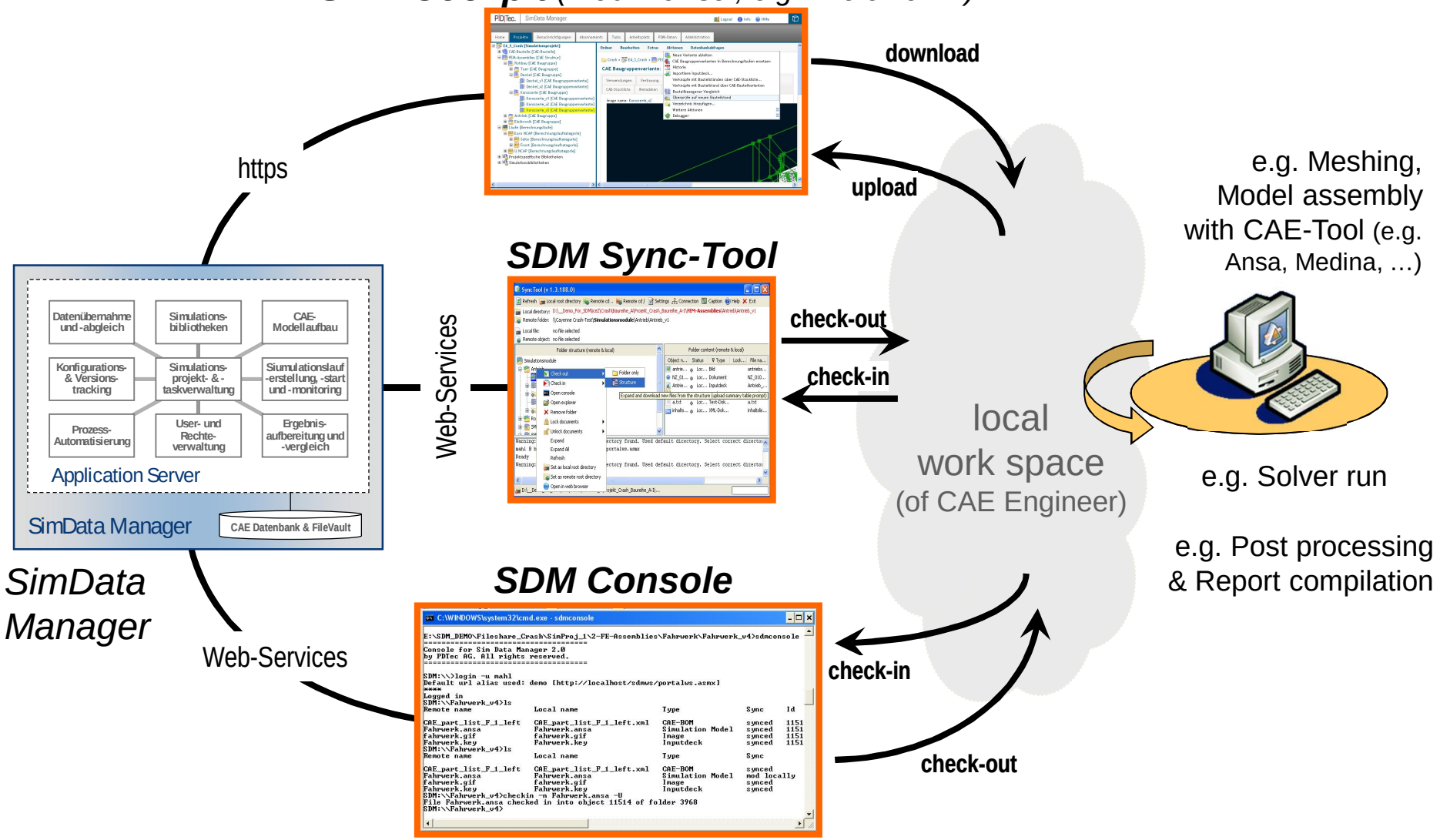
Process Scope and Data Clusters of SimData Manager



Existing PDM Interfaces for the Import of CAD/PDM-Data for the SimData Manager

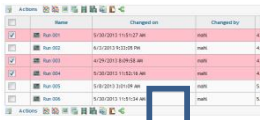
- OEM specific interfaces for the import of PDM data
  - Daimler: import on the basis of Smaragd/STEP data
  - Porsche: csv-file import from P-DMU
  - Audi: import based on meta data file from KVS/VPM
  - Other OEM's: in preparation
- Standard interfaces
  - CSV Interface
  - PLMXML, STEP (different dialects)
  - Native CATIA, native NX
  - ENOVIA
- Mapping tools for dealing with import of proprietary PDM data formats

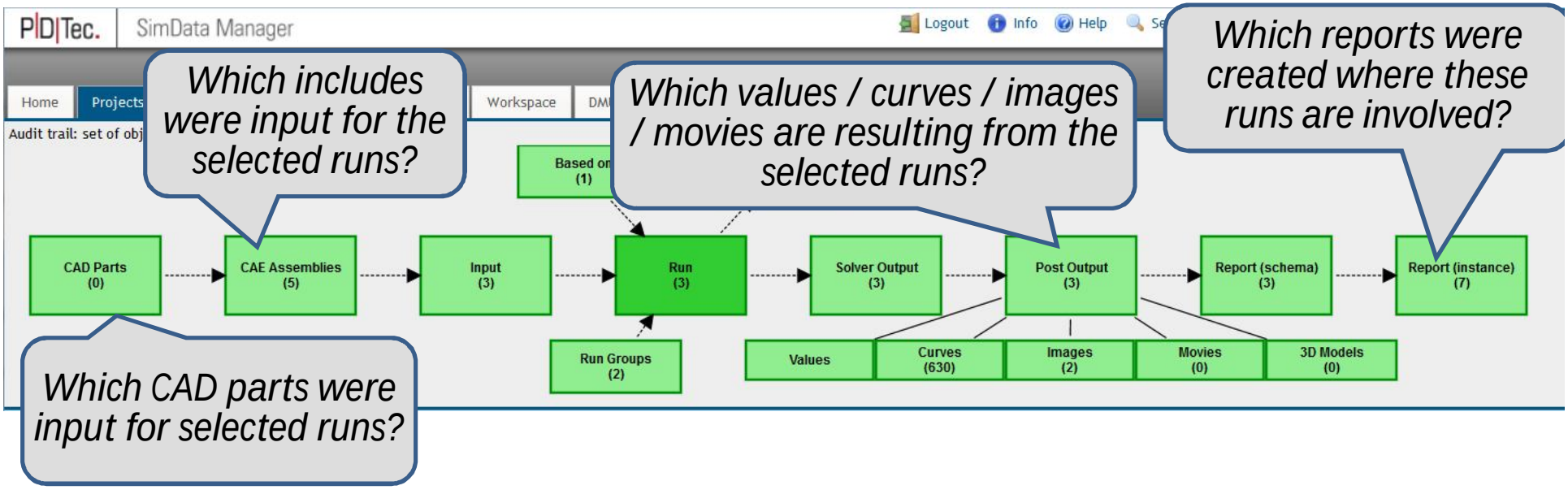
Way of Working with SimData Manager (FEM view)



Example: Trace Line of CAE Data within the SimData Manager

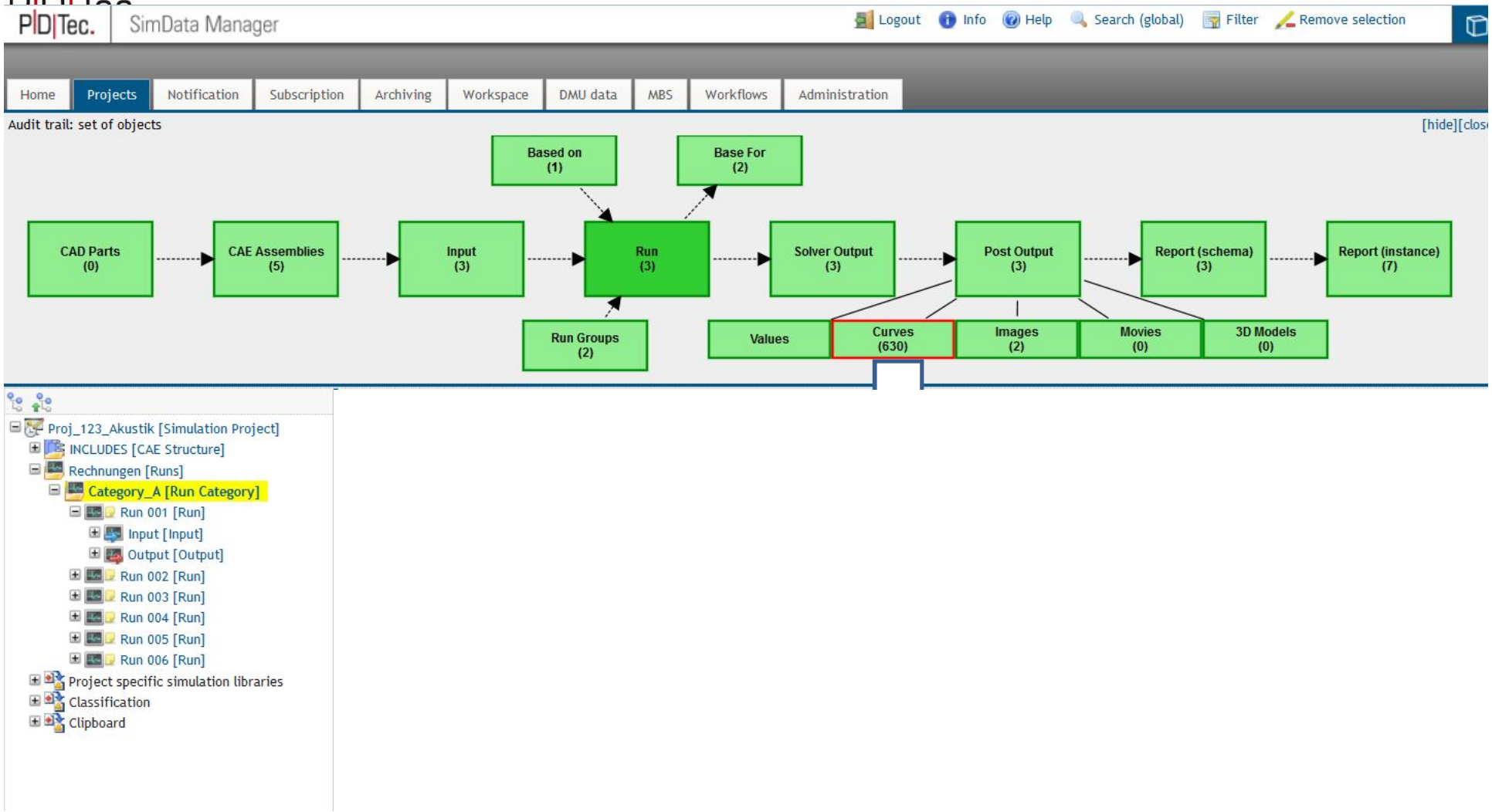
- Analyze the input and/or output of one or more simulation runs
- Select one or more runs and get needed information with one click

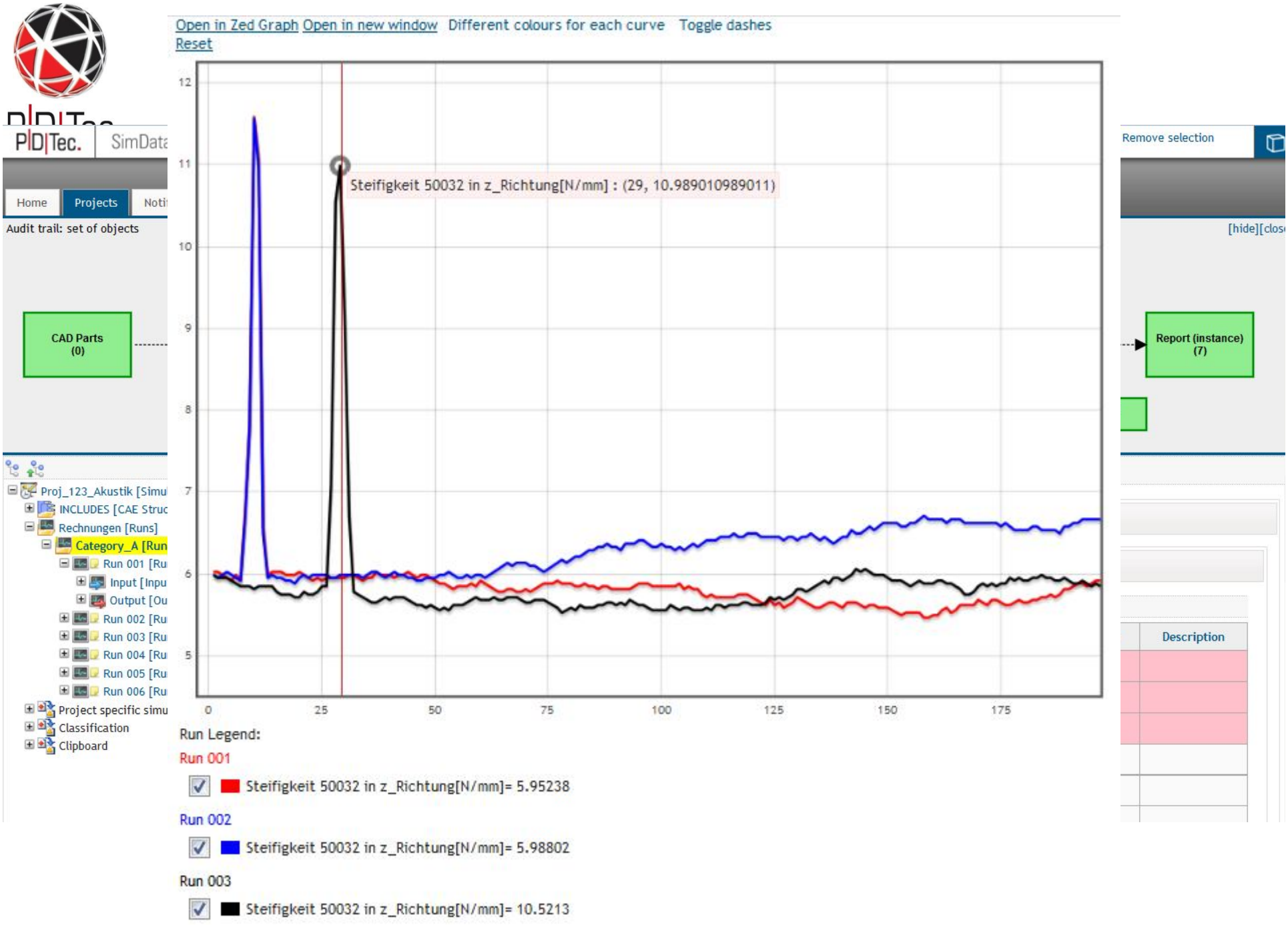




- Trace line visualization is configurable in order to fit specific customer needs

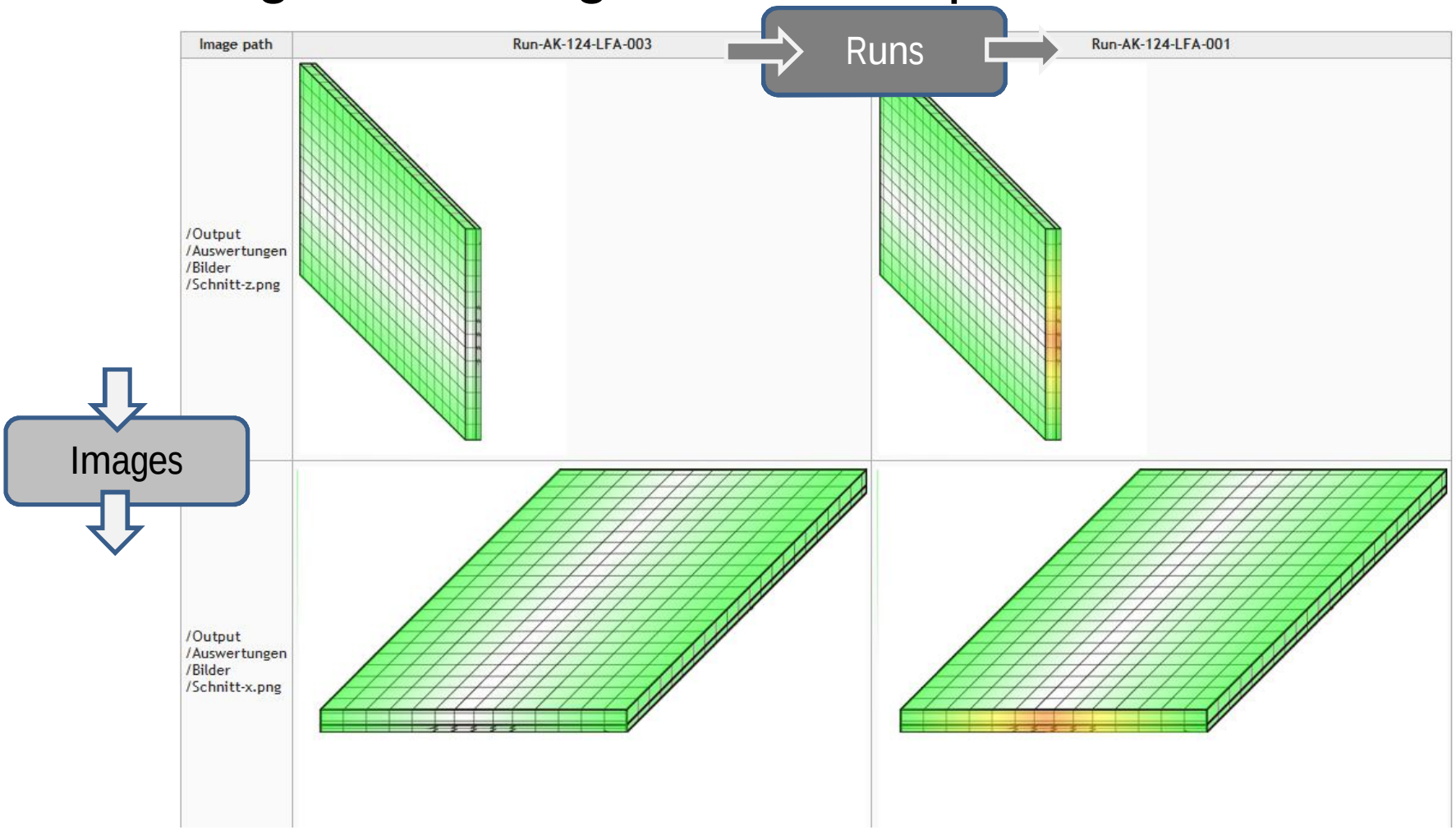
Easy Comparison of Curves, etc.




Open in Zed Graph
Open in new window
Different colours for each curve
Toggle dashes
Reset
Steifigkeit 50032 in z_Richtung[N/mm] : (29, 10.989010989011)
12
11
10
9
8
7
6
5
0
25
50
75
100
125
150
175
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
PDTec.
SimData
Home
Projects
Audit trail: set of objects
CAD Parts (0)
Remove selection
[hide][close
Report (instance) (7)
Description
Proj_123_Akustik [Simu
INCLUDES [CAE Struc
Rechnungen [Runs]
Category_A [Run
Run 001 [Ru
Input [Inpu
Output [Ou
Run 002 [Ru
Run 003 [Ru
Run 004 [Ru
Run 005 [Ru
Run 006 [Ru
Project specific simu
Classification
Clipboard

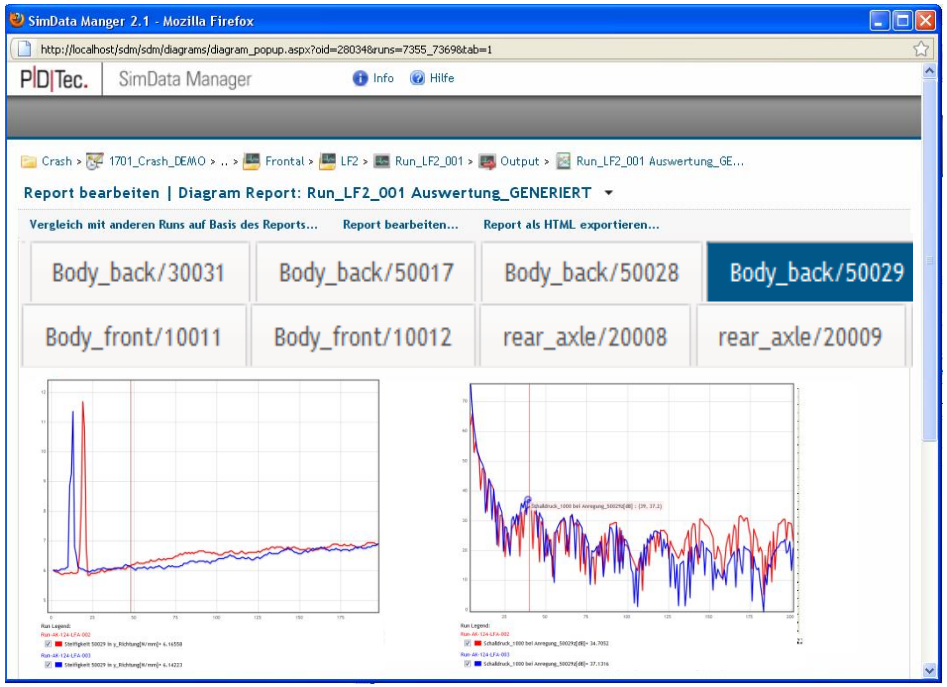
Or compare images …

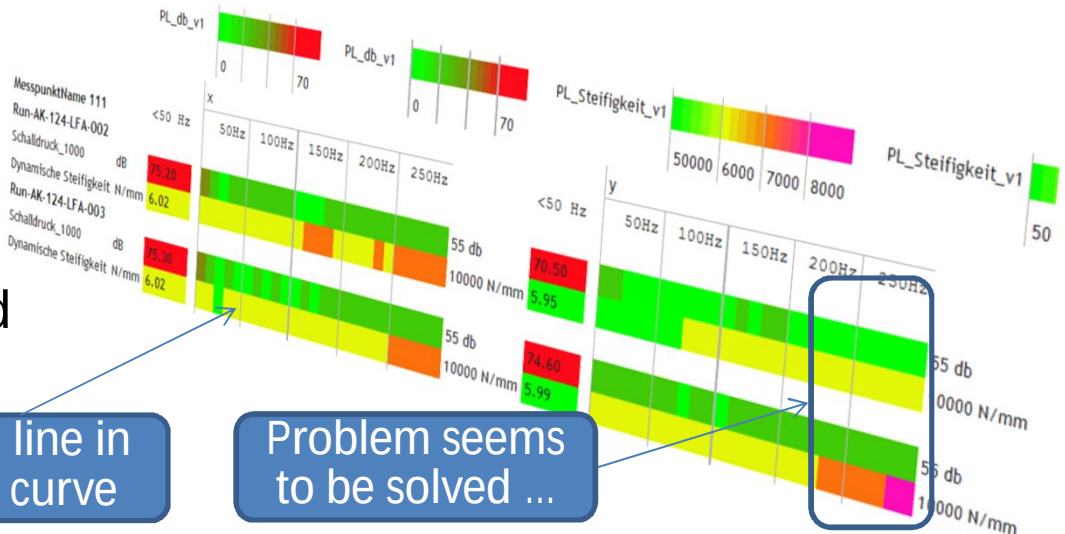
- Analogue handling to start comparison



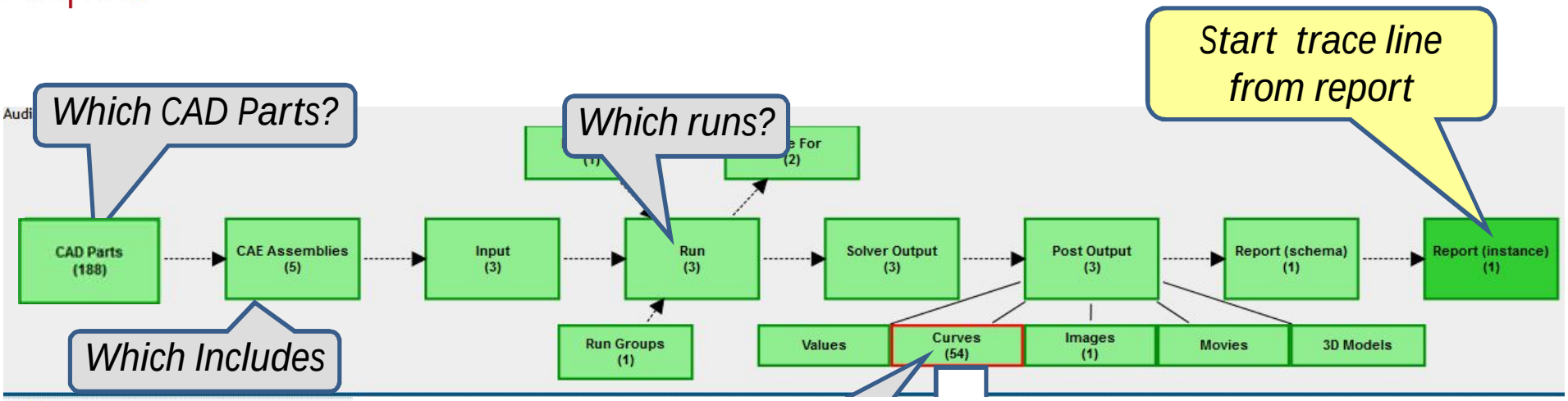
API and GUI for Definition of (Standard-)Reports

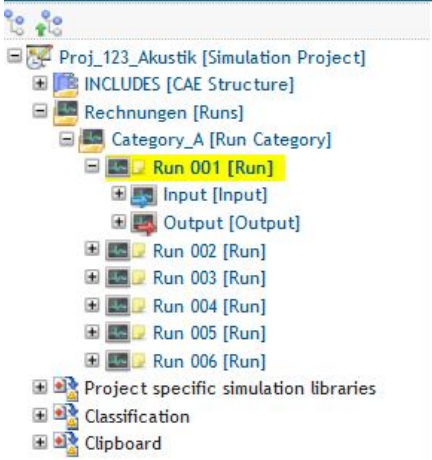
- GUI Editor and XML-API for definition of reports
- Comparison of multiple simulation runs based on report definition
- Several diagram types are supported
  - bar chart
    - for scalar values and tables
  - curve diagram
  - threshold analysis: compare many curves against threshold and see progress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





Traceability: From Report to Runs (curves, images), Includes, and even CAD





Feature Highlights of SimData Manager (1)

- SDM Sync-Tool for easy data synchronization between SDM and local work space
- SDM Console: use of the SimData Manager through the command shell
- Fast access to large files enabled by SDM View-Vault
- Comparison of simulation model variants, solver models and key results
  - graphical and tabular, incl. export to MS Excel
- Viewing & geometrical comparison of CAD geometries
- Python-API: automation of customer specific process steps and provision as SDM functionality (→ add to the menu)

Feature Highlights of SimData Manager (2)

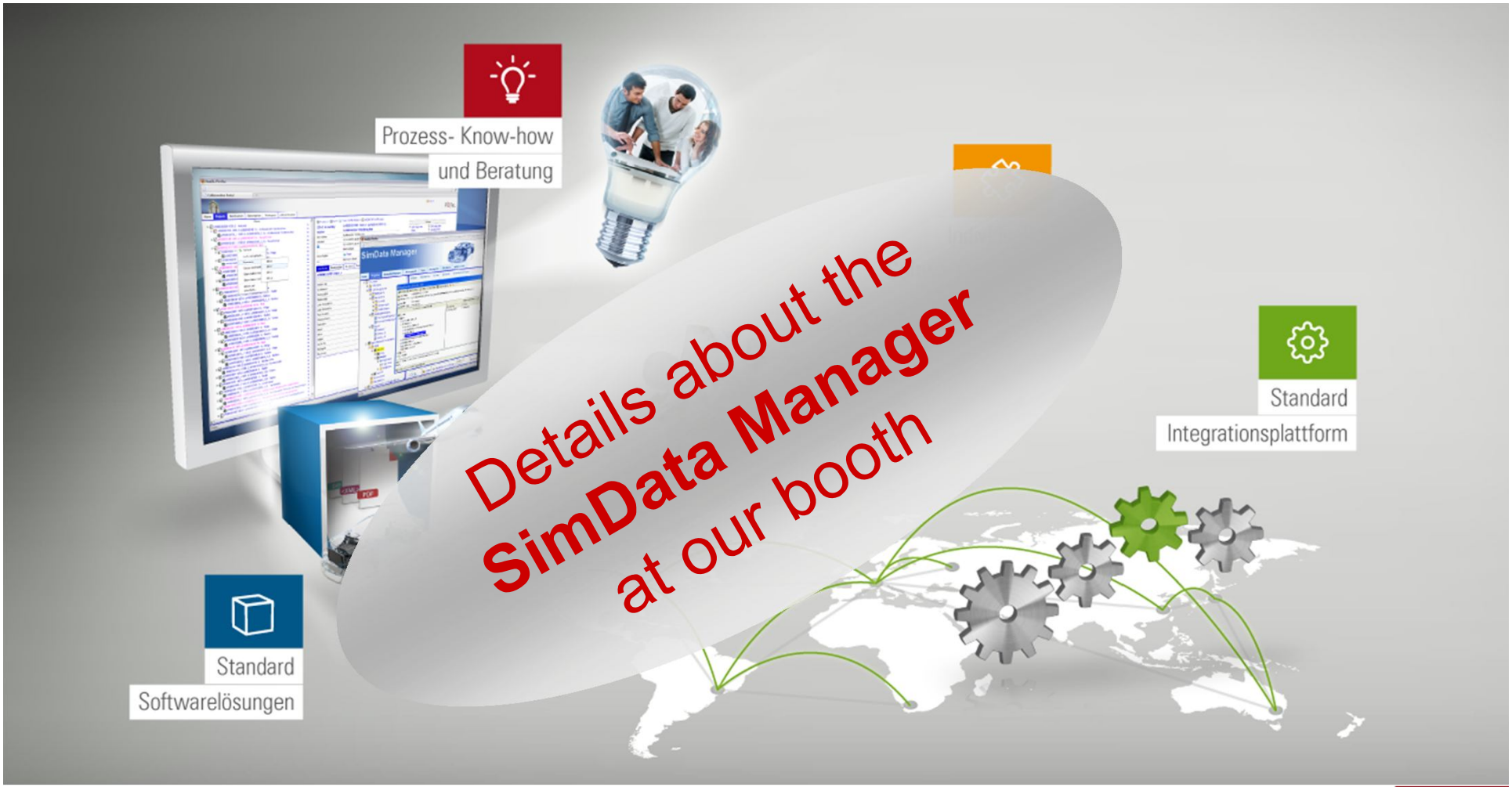
- Transparent, bidirectional connection between CAD and CAE world
  - trace back to the input data (e.g. CAD data), that was used as the basis for a simulation result
  - find the simulation models that may need an update due to a change in input data (e.g. CAD geometry)
- Intelligent rule based assignment of CAD models to CAE nodes
- Easy definition of solver models by drag & drop
- Report generation engine
- Generic archiving mechanism
- Definition of lifecycle for SDM objects (e.g. release life cycle)
- Automation of tasks through build in workflow engine

Benefits (Excerpt)

- 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

Summary and Conclusions

- Tough challenges for Automotive suppliers
  - many varying requirements needs to be addressed by CAE departments of Automotive suppliers
- SimData Manager is a standard software for the efficient and professional management of simulation processes and data
  - provides many out of the box features and functionalities, including interfaces to PDM systems
  - if necessary: can be easily adapted and extended by skilled users of the CAE department
  - cost effective solution with respect to
    - license costs, customization, operation and maintenance of the software
  - high-power solution with respect to
    - effectiveness, efficiency, and harvesting synergies
- Allows to master the Challenge of CAE-Data Management for Suppliers



PIDITec.

Thank you for your attention

Dr.-Ing. Günter Staub
Dr.-Ing. Alexander Mahl

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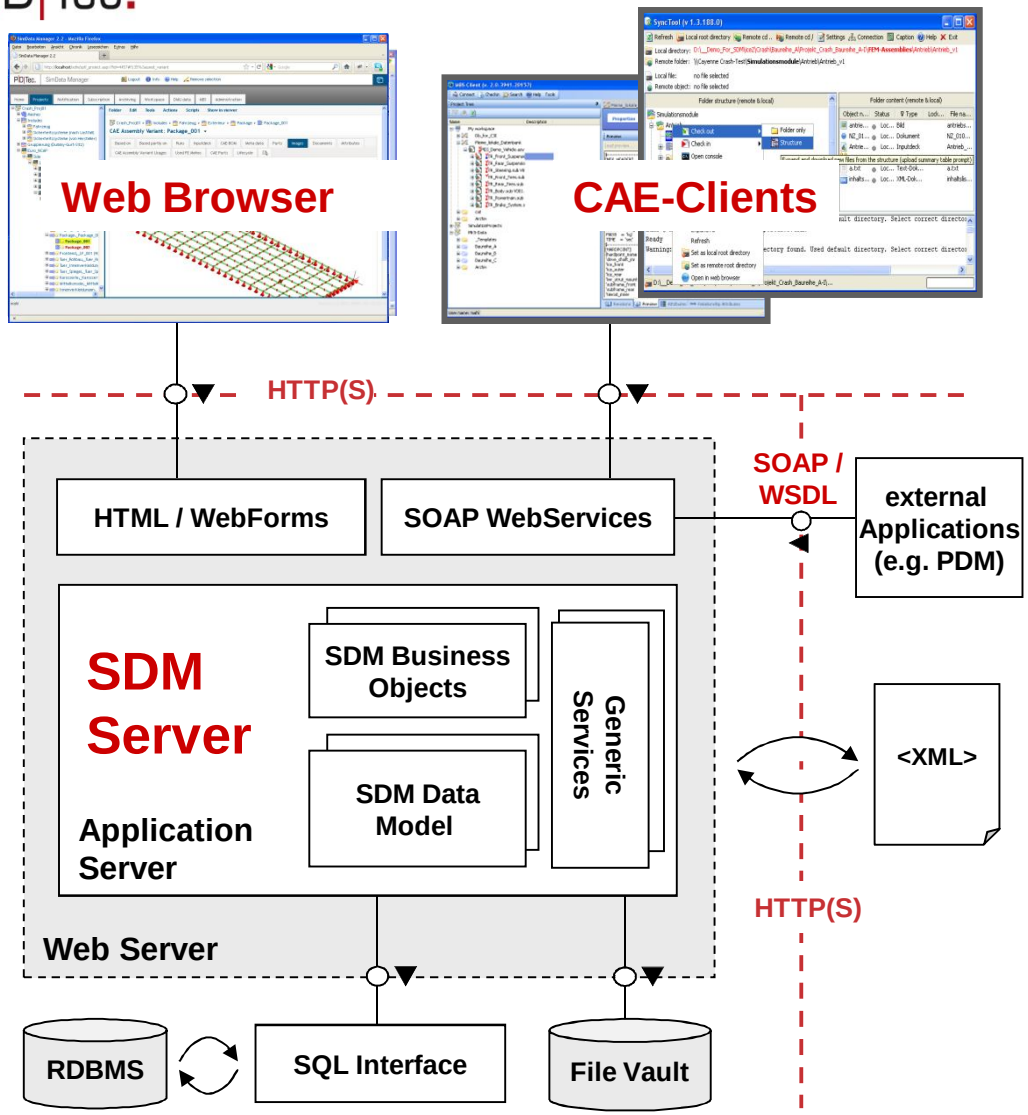
June 9-12 2013

Principle System Architecture



- Service oriented (SOA)
- SDM Application Server
- User Interface
  - Web-Browser (over http(s)) and/or
  - Rich Clients (using SOAP)
- Integration
  - external applications (e.g. PDM) through SOAP
  - office tools (Excel, Word, ...)
- Storage of the managed CAE data
  - ORACLE or MS SQL Server
  - one ore more file vaults for the storage of the native CAE data