Contact Elements interfaces

End-to-end processes thanks to open standards and technologies

CONTACT Software

Agenda

1

Challenges

Accommodate processes and make data available enterprise wide

2

Contact Elements interfaces

Connect IT systems and processes using open standards

3

Connect enterprise applications with Catalyst

Integrate PLM, ERP, CRM, ALM, etc.

4

Summary

Use cases, references, overview

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The reality is complex

Hundreds of engineers and parties involved in the process

Complex manufacturing processes

Numerous partners and suppliers

Faster innovation cycles thanks to digital transformation

Global collaboration

Multiple disciplines

Comprehensive compliance regulations

Countless spread-sheets and other documentation

Distributed knowledge in databases, intranets and documents

Avoid data silos

End-to-end integration of IT systems throughout the business processes

Openness is in our **DNA**

"The dream of a single system that can meet all requirements in a constantly changing global environment is – put simply – a waste of time and money.

We provide our customers with open, modular solutions that connect systems with each other."

Karl Heinz Zachries

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How we support openess

Commitment: cpo CODE of PLM OPENNESS OSLC

Positioning: We are not at the same time also a CAx or ERP system vendor. One of our customers' key requirements is the interoperability of their tools and systems.

Technologies: CONTACT Elements platform + Catalyst Web Services

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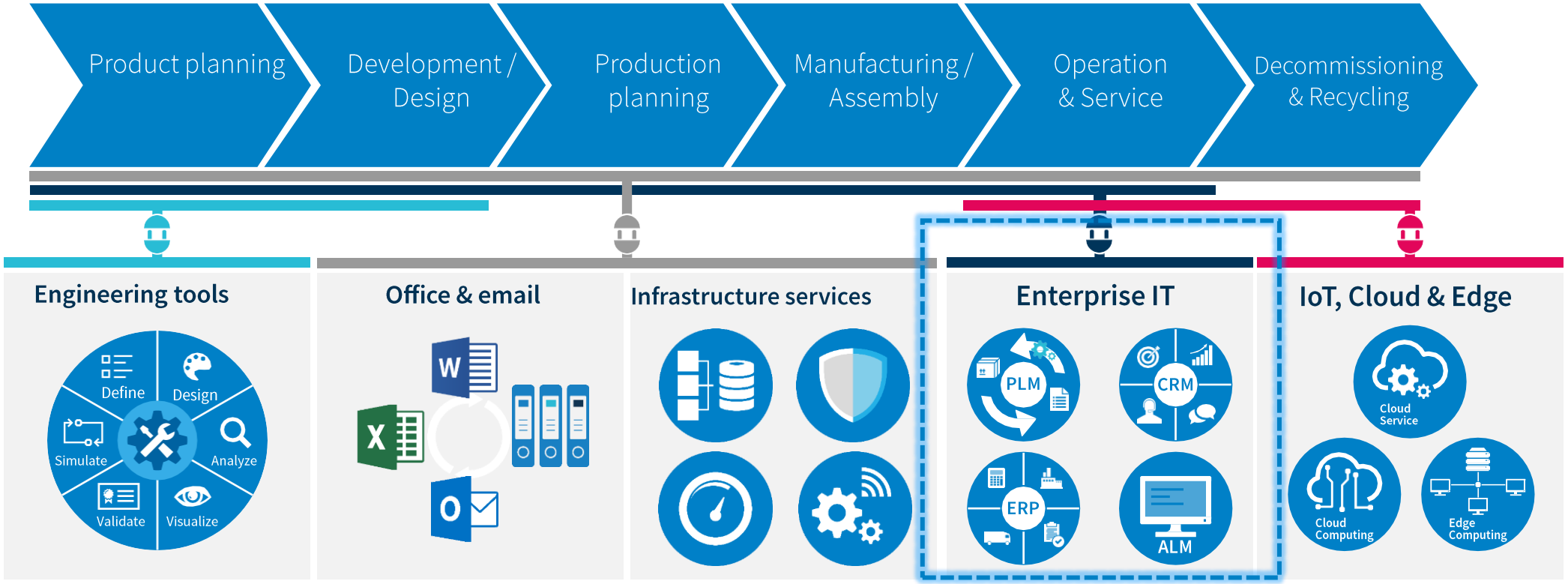
The primary aim of the digital transformation:
End-to-end processes throughout the digital thread



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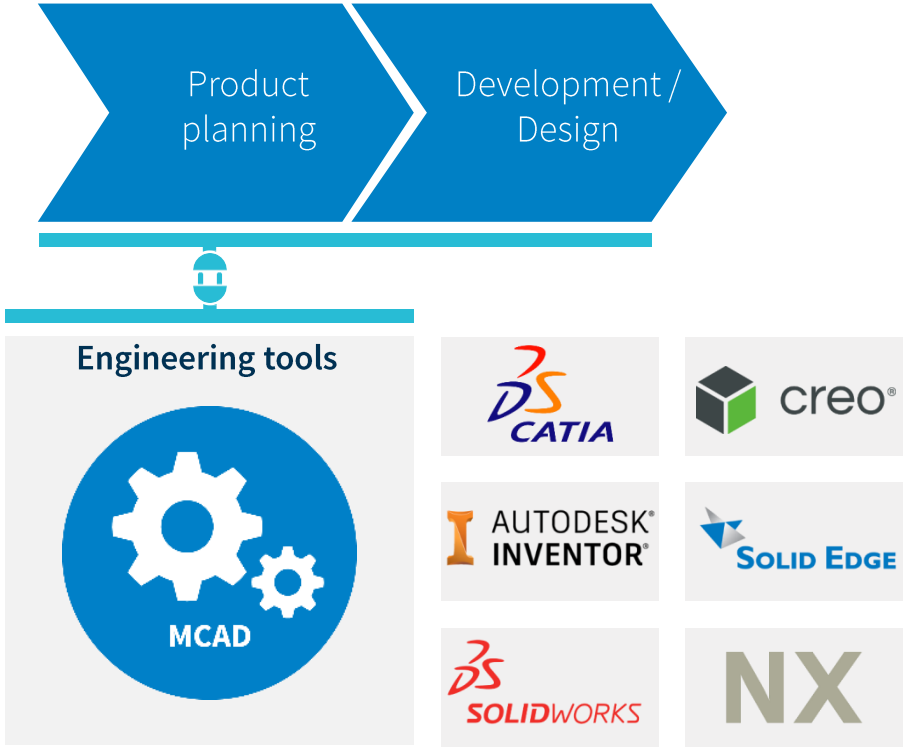
Integration of engineering tools
Comprehensive multi-CAD support

- Efficient interaction between CAD systems and Team Data Management systems
- Ideal working environment for teams and support for work-in-progress
  - Organization of work in teams with shared workspaces
  - Easy storage of drafts and interim statuses
  - Design not manage: avoid management overhead especially in the early idea generation and concept phase
- Easy management of work results (CAM or simulation files)
- Offline mode for mobile data management (e.g. at the customer's premises or on site).



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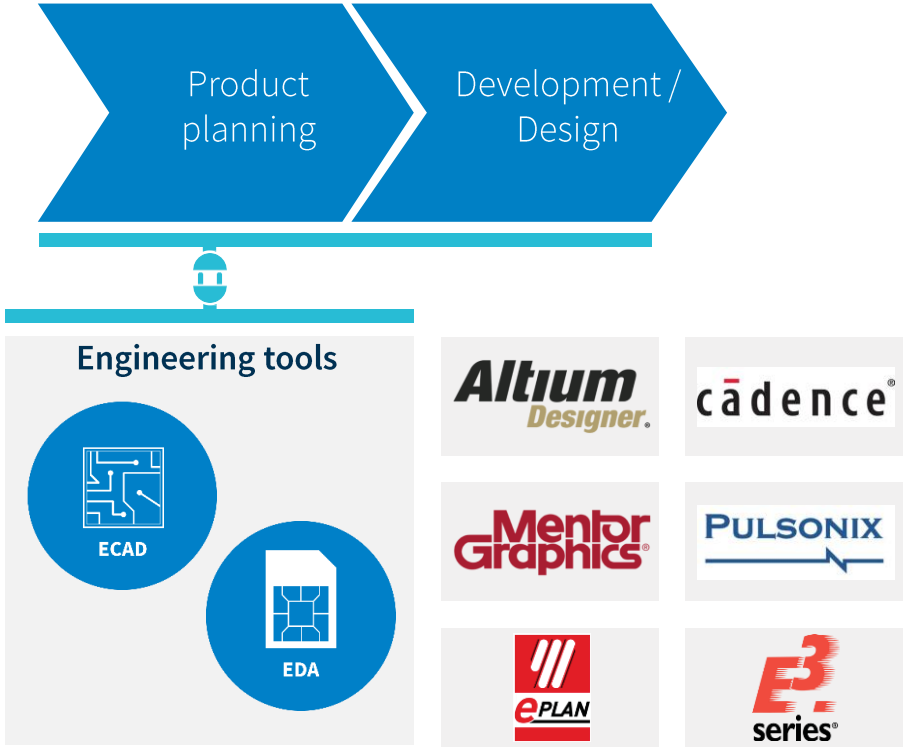
Integration of engineering tools

End-to-end development of mechatronic products

- Mapping workflows and approval processes
- Creation and editing of new designs and development projects
- Transparent view of functional and structural relationships between between electronics and mechanics
- Synchronization of parts and components
- Time savings thanks to the automation of routine tasks, such as creating BOMs and synchronization with ERP, and improved interdisciplinary development processes



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Integration of Office and e-mail | Add-ins for Word, Excel, Outlook, PowerPoint, MS Project and Visio

- Synchronization of metadata and process data
- Storage directly in the PLM system
- Differentiated storage of e-mails and attachments
- PowerReports for the simple and fast creation of reports using Excel
- Project and task synchronization via MS Project plans

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Integration of external infrastructure services
State-of-the-art authentication standards

- OpenID Connect as client
  - Delegation of authentication to external provider
  - Use of the **multi-factor authentication process provided by** the connected OpenID Connect provider is possible
  - Integration in SSO/cloud concepts (e.g. Azure AD, Microsoft ADFS) enables **federated identity management** with uniform access to all of a group's services and networks
- OpenID Connect as provider
  - Integration of OpenID Connect/OAuth2 clients that want to access CONTACT Elements' REST interfaces
- Support for the TLS 1.3 encryption protocol and the HTTP/2 web standard
- Support for Kerberos/SPNEGO and LDAP

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Integration of IoT and cloud applications

Data flow thanks to open technology and standards

- Installation and operation of the CONTACT IoT platform possible both on-premise and in the cloud
- Communication and data exchange via the standard IoT protocols MQTT, OPC UA or PPMP
- Due to a basic concept based on open platforms, support for additional protocols (HTTP, CoAP, AMQP, etc.) is possible without difficulty
- Cooperation with leading technology companies such as EUROTECH (developer of the IoT Edge Framework Kura)
  - EUROTECH gateways can read machine-to-machine protocols such as OPC UA, Profibus, Modbus, Profinet and convert the corresponding messages into MQTT messages

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Enterprise Application Integration (EAI)
Challenges

Harmonize complex IT landscapes and turn them into an overall solution for the value-added process

Connect systems and applications throughout the enterprise

Provide development, production and logistics with reliable data

Connect heterogeneous IT landscapes in the context of company mergers

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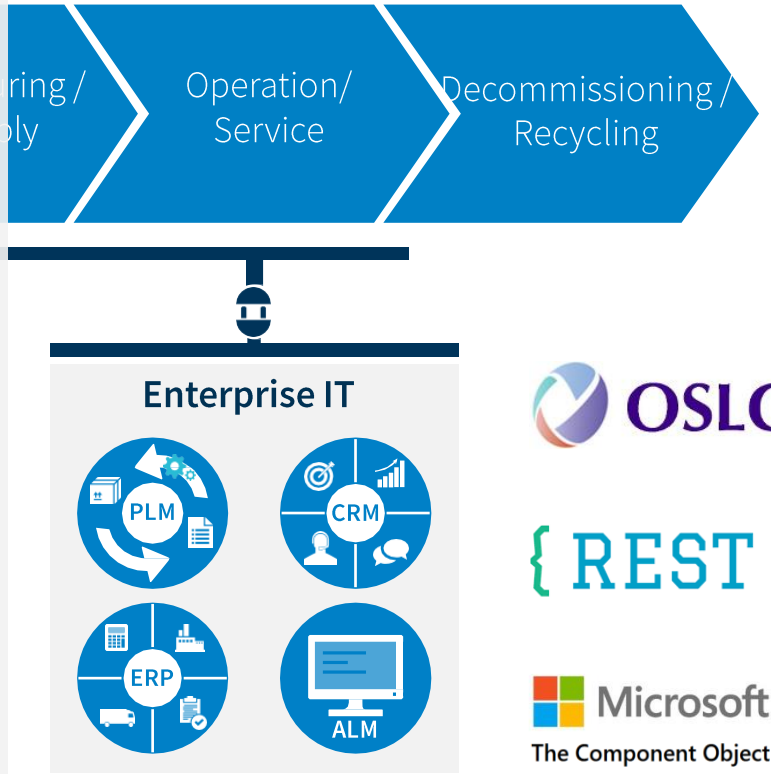
Catalyst
Reliably connect enterprise applications

- Open technologies and APIs for reliable process-oriented data synchronization
- Connect CONTACT Elements with other enterprise applications such as PLM, ERP, CRM, SCM, ALM or PIM using asynchronous server/server interfaces that run in the background
- Controlled and thus reliable process logic thanks to shared object lifecycle management
- Standard "out-of-the-box" interfaces for selected systems such as SAP



OSLC

{ REST }

Microsoft
The Component Object Model

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Catalyst example: **tool integration**

- Connect PLM systems and requirements engineering tools such as Polarion or Doors
- ReqIF: standard for the model-based exchange of requirements
- Use case: record requirements in the RE tool and integrate them in the enterprise-wide processes (assessments, evaluation, monitoring, validation) in CIM Database PLM

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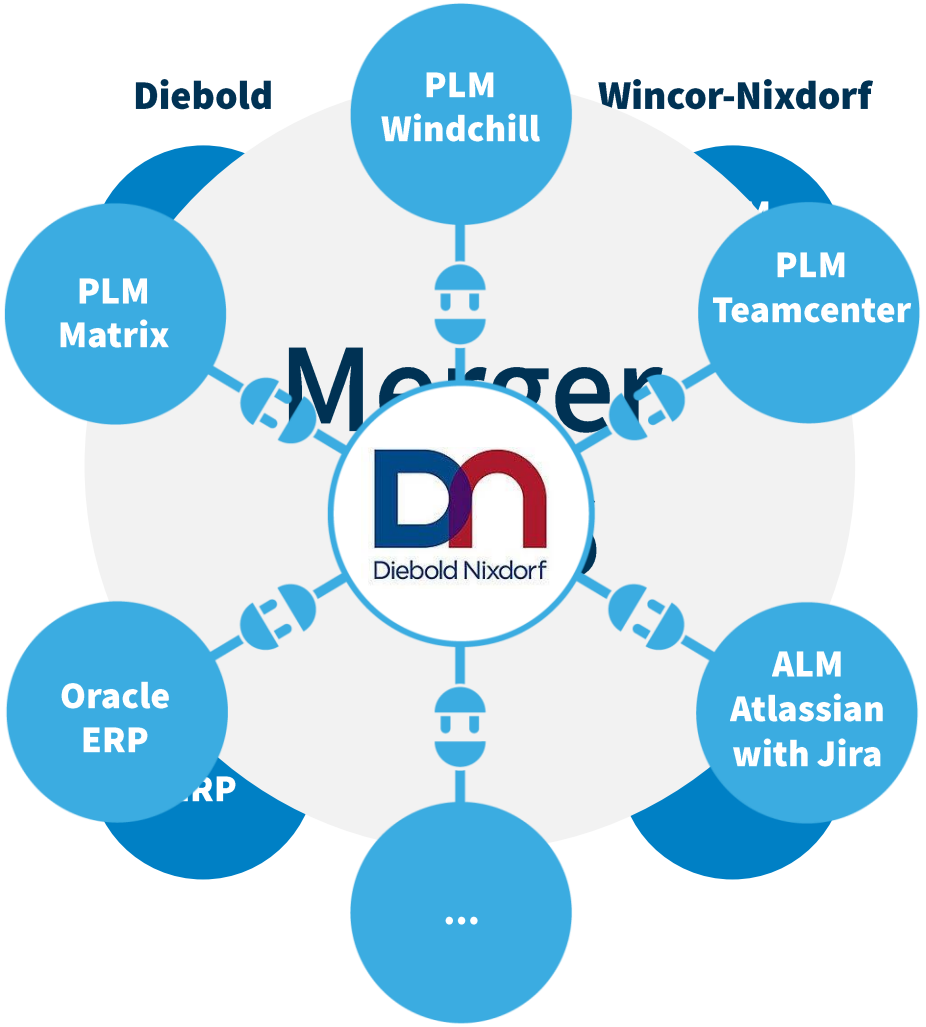
Catalyst example: **PLM-PLM integration**

The US company Diebold merged with the German company Wincor-Nixdorf in 2016.

- Connection of multiple PLM systems
- Largely automated, workflow-controlled data exchange
- Standardization of the processes
- CONTACT Elements technology as intelligent middleware for implementing business logic in a process-controlled manner
- Integration of ERP and ALM is being planned



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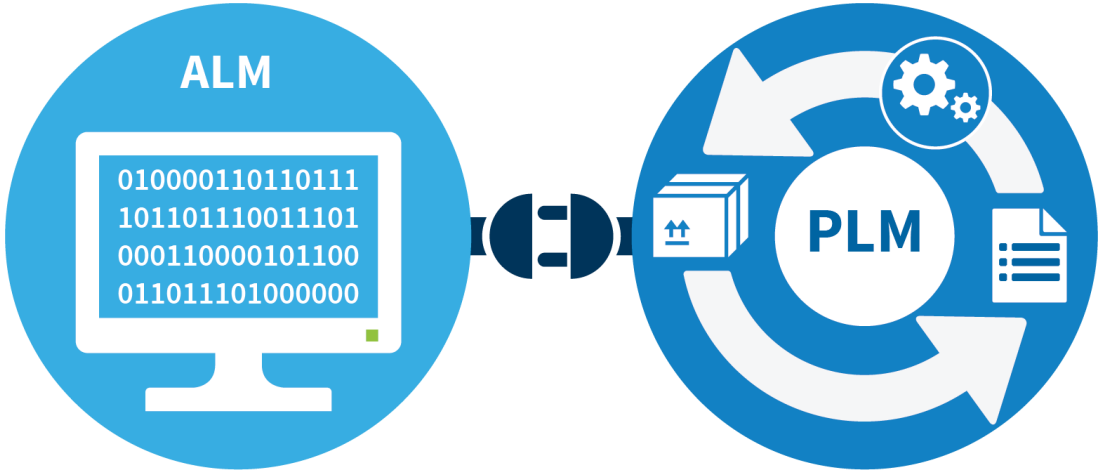
Catalyst example: **PLM-ALM integration**

Integration of processes and objects

- Mapping of software in a mechatronic BOM (software as a part) with the option of controlling the validity of individual software releases
- Use of existing BOM functionality such as variant management for software parts
- Linking of engineering change management (PLM) and issue management (ALM) processes
- Linking requirements in the direction of ALM



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Catalyst example: **ERP integration**

Data synchronized between the PLM and ERP systems makes end-to-end processes possible.

PLM

- Ideas
- Error messages
- Change requests
- Models
- Development BOM
- …

- Requirements
- Documents
- Changes
- Articles
- Customer data
- Manufacturing BOM
- …

ERP

- Contracts
- Manufacturing sites
- Suppliers and orders
- Production plans
- …

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Catalyst example: **ERP integration**

For SAP, PSI and IFS as certified interface product available, all other ERP systems could be integrated by CATALYST it selves

SAP® Certified
Integration with SAP Applications

IFS

PSI
PSIPENTA

PLM

- Ideas
- Error messages
- Change requests
- Models
- Development BOM
- …

- Requirements
- Documents
- Changes
- Articles
- Customer data
- Manufacturing BOM
- …

ERP

- Contracts
- Manufacturing sites
- Suppliers and orders
- Production plans
- …

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Catalyst example: **ERP integration**

SAP® Certified
Integration with SAP Applications

Standard, certified solution for communication via RFC/BAPI.

For integration to SAP PI/PO or communication via XML, IDOCs, JSON, … standard Catalyst Integration would be used.

PLM

- Ideas
- Error messages
- Change requests
- Models
- Development BOM
- …

- Requirements
- Documents
- Changes
- Articles
- Customer data
- Manufacturing BOM
- …

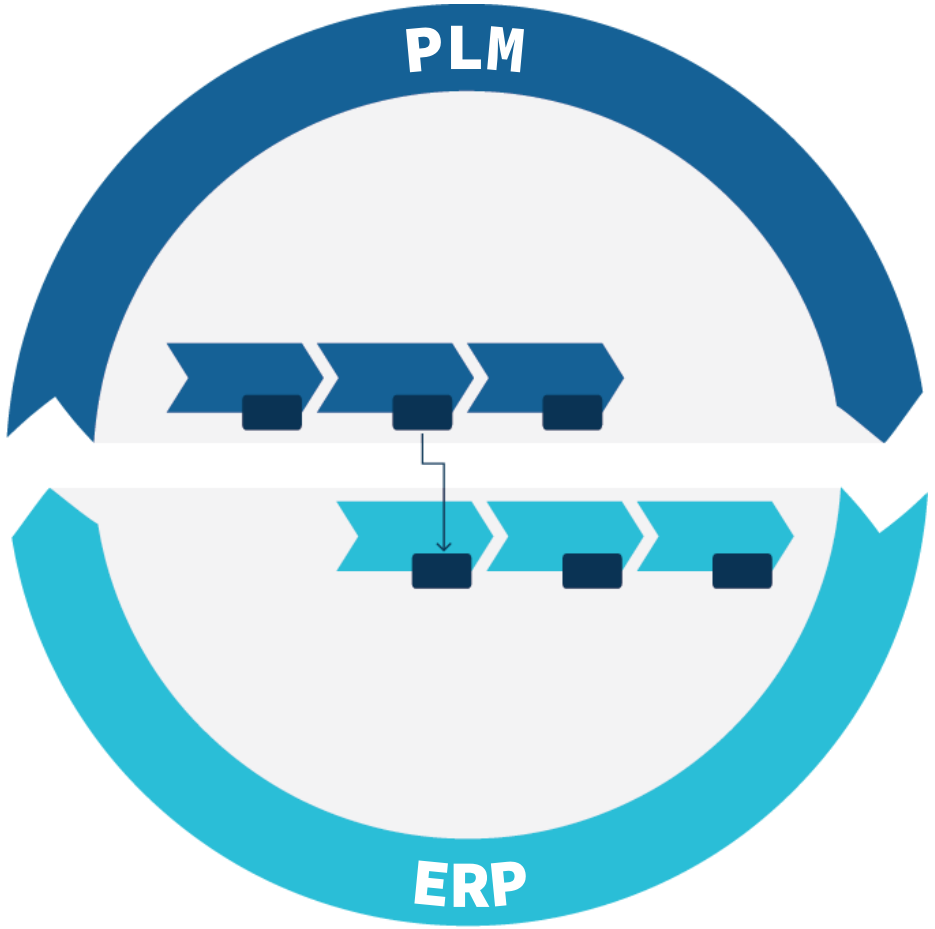
ERP

- Contracts
- Manufacturing sites
- Suppliers and orders
- Production plans
- …

Catalyst technology
Shared object lifecycle management

Process-controlled synchronization

- Bidirectional, asynchronous data synchronization
- Triggered by workflow, status network, project control or object-specific attributes
- Typical scenario: The status network and its control over the data object determine the synchronization process



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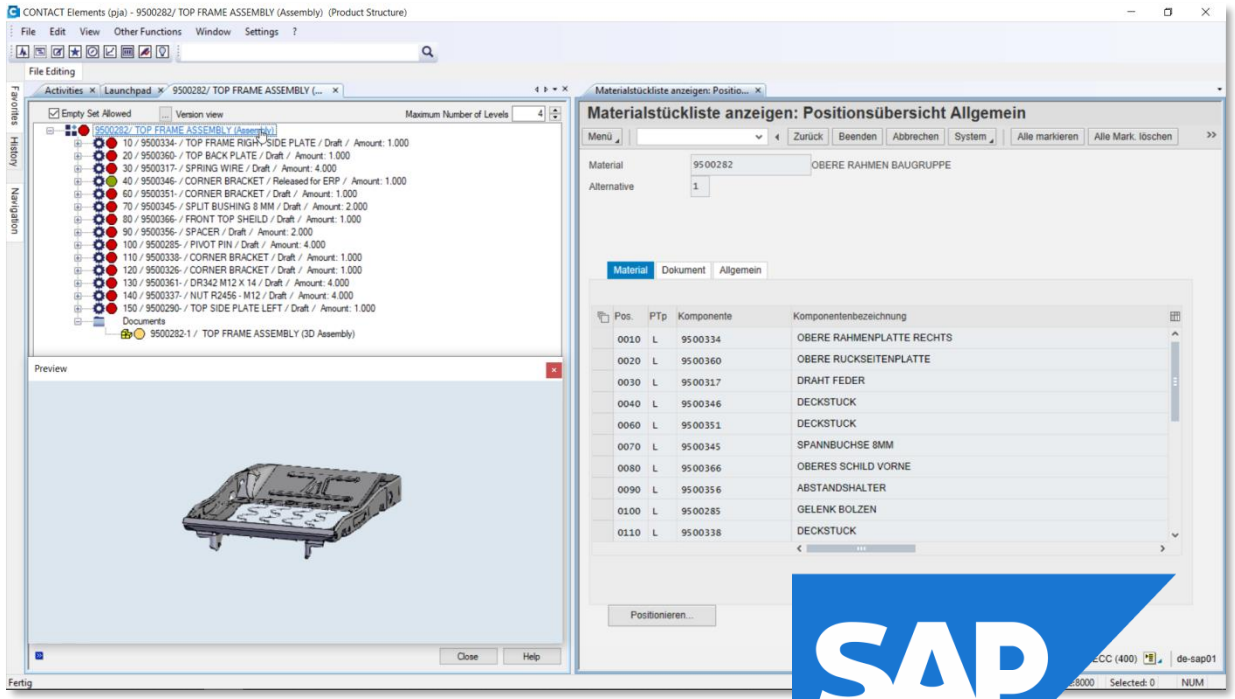
Catalyst technology
Mashups – display dialogs from third-party systems

- Direct access to data and dialogs from third-party systems thanks to embedded UIs
- Example: documents (purchase order texts) for a material that already exist in the ERP system
- Example: plant-specific views of the manufacturing BOM for a product or material



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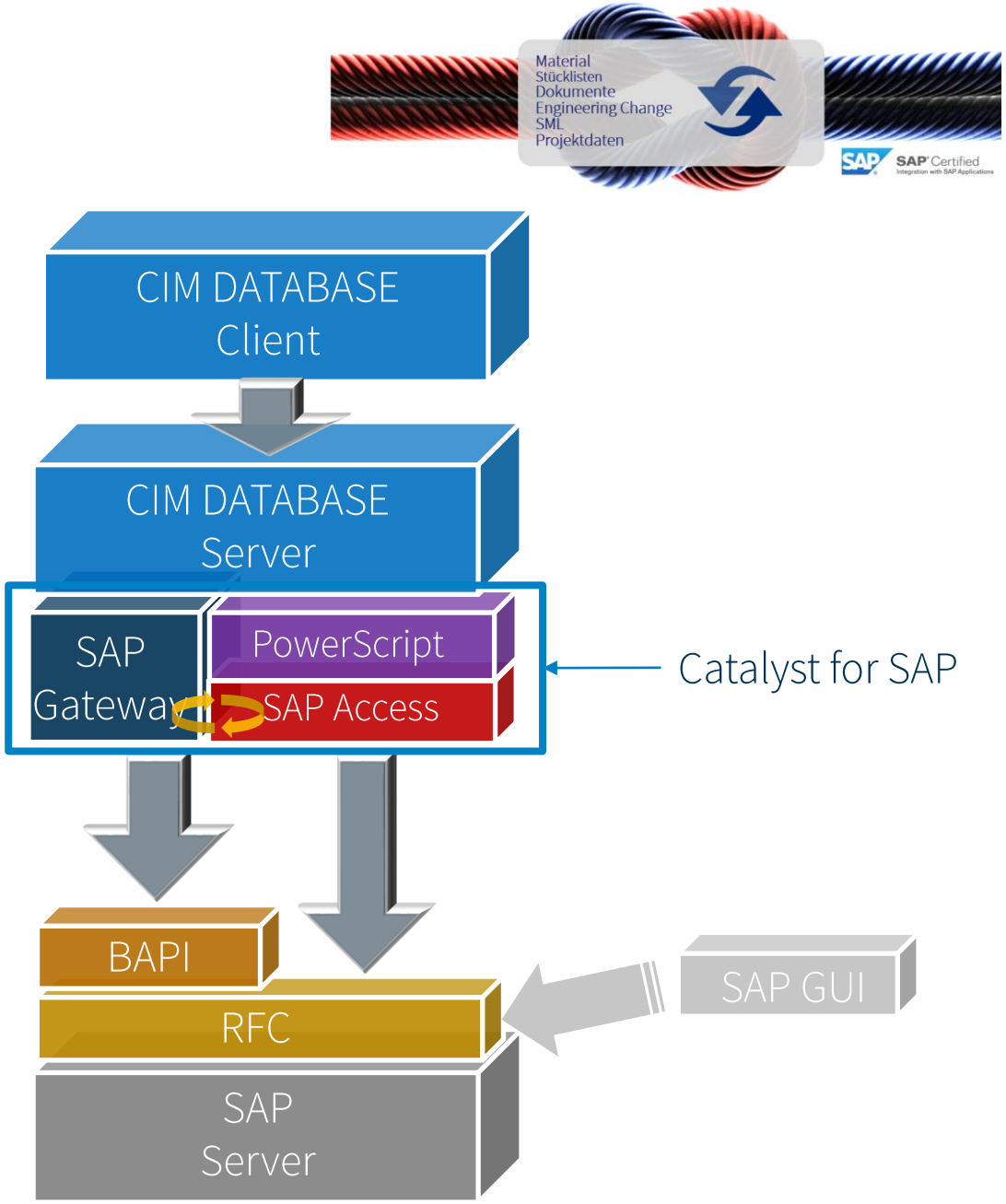
Catalyst for SAP: Standard Architecture

- Service based on the CONTACT Elements
- Separated into a Gateway and a SAP Access module
- Bidirectional
- Communicates with SAP using the RFC protocol
- Is able to call RFC-Functions as well as BAPI's



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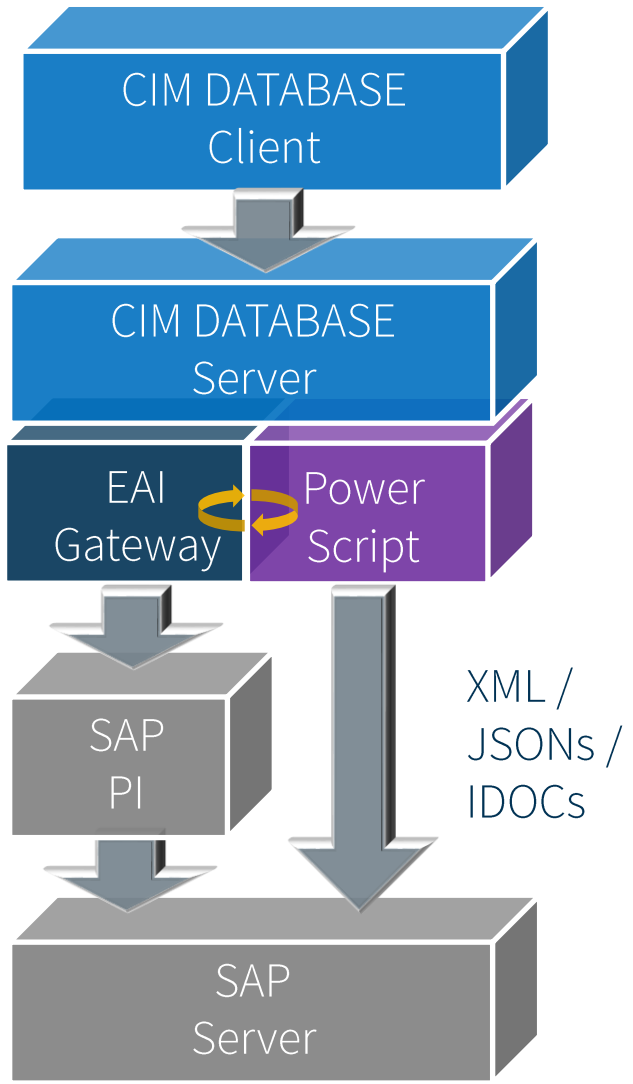
Further possibility to access SAP: Architecture e.g for SAP PI

- Service based on the CONTACT Elements
- Separated into a Gateway and a ERP Access module
- Bidirectional
- The certified Catalyst for SAP interface supports direct communication using SAP RFC/BAP
- Some of our customers likes to transfer information based on XML / JSONs / IDOCs or using SAP PI as Integration platform thererfore we use our standard CATALYST interface



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Configuration of the Catalyst for SAP

- CDB Attributes are mapped to (multiple) Fields in the EAI-Abstraction
  - This is the same for every Gateway based on our EAI-Platform (cs.erp).
- These EAI fields can be used to fill the parameters of SAP RFCs.
  - A Single field can be used to fill multiple different parameters (e.g. for different operations)
- A single CDB Attribute can be used to fill multiple SAP Parameters for different operations in different manners.

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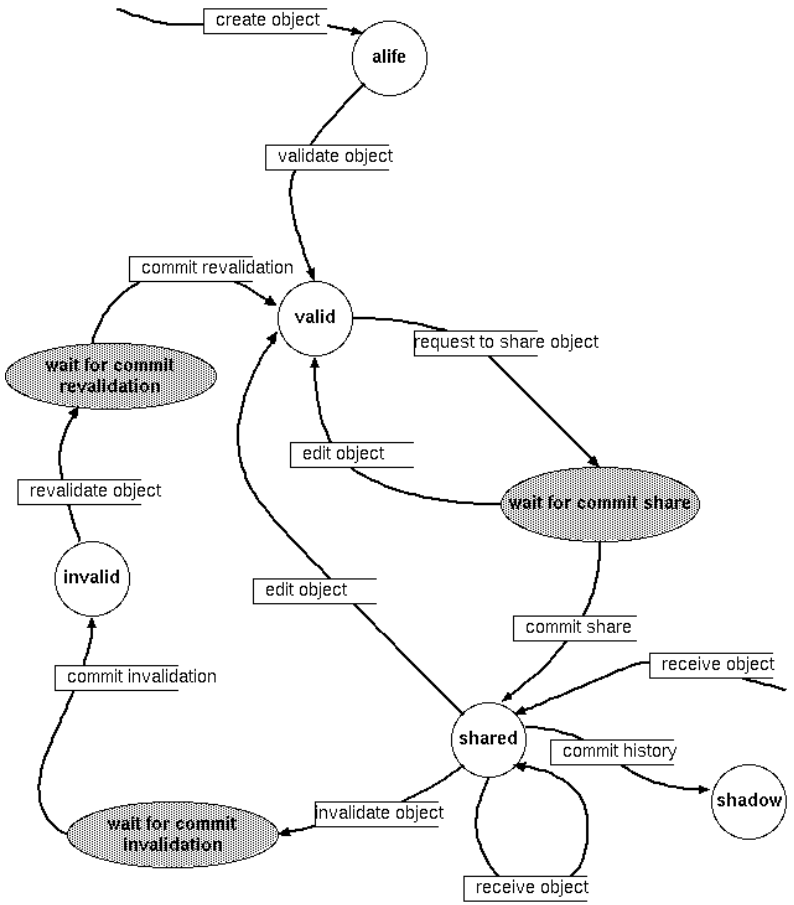
Primer: Shared-Object Lifecycle

- An additional, special Lifecycle
- Stores the synchronization status of the objects in CONTACT Elements.
- Is used to determine which objects need to be synchronized and whether they have already been synchronized with the target system
- Bound to the target system: One Lifecycle per target system



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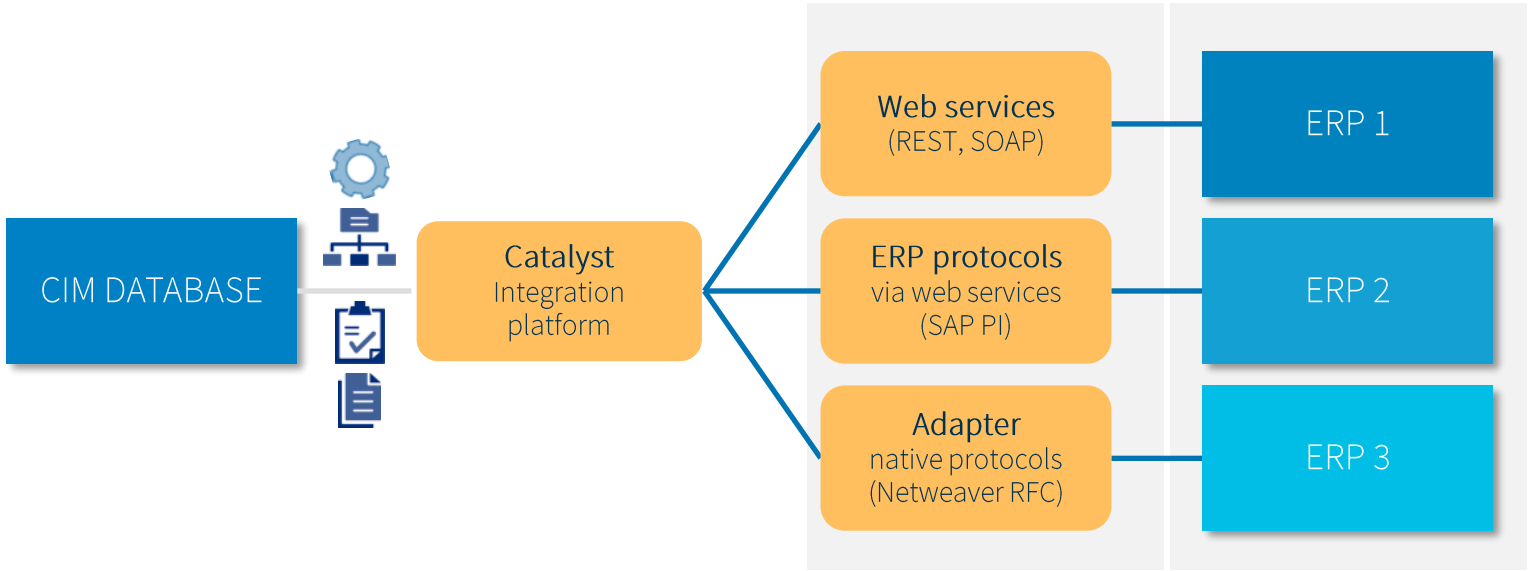
CATALYST integration platform to ERP

- Dedicated web service interfaces (REST) and integration platform
- Connection of synchronization points by linking to other SOA platforms (SAP XI/PI, Microsoft BizTalk)
- Adapters to integrate native protocols such as Netweaver RFC and "legacy" technologies such as MS COM
- Standard for process synchronization points and synchronization contents



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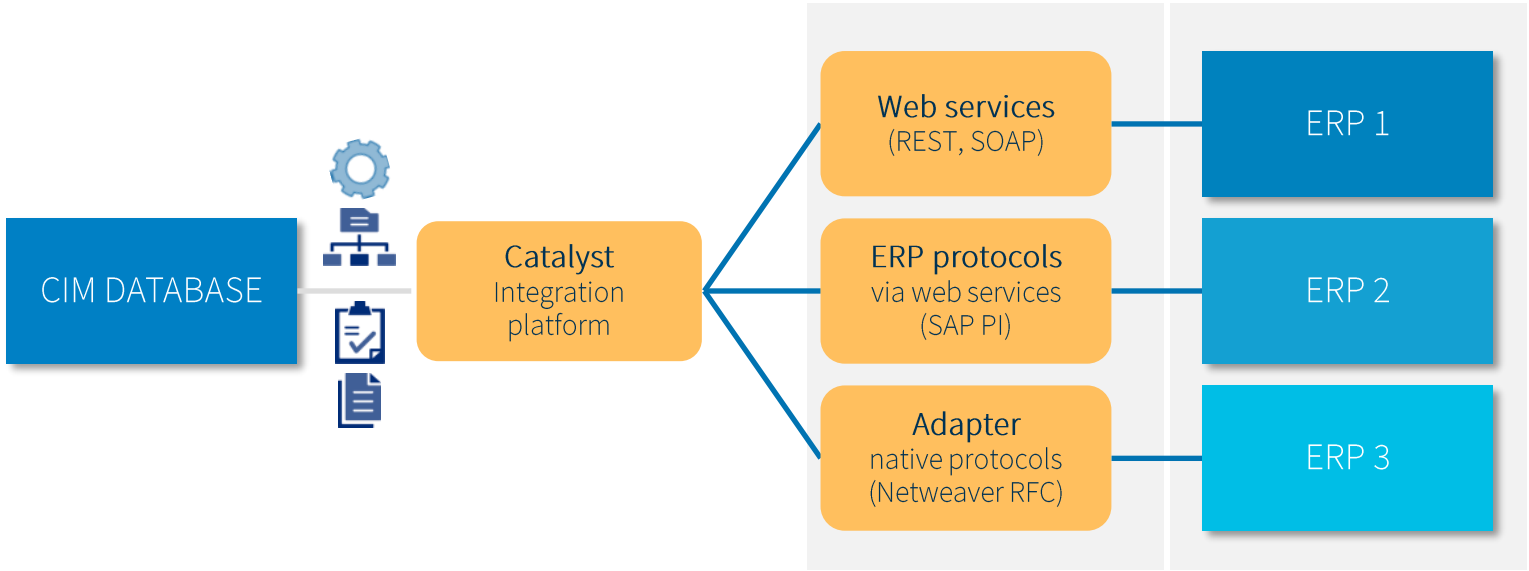
CATALYST integration platform to ERP

- SAP ESB PI/PO use other functions than the Standard SAP interface
- Synchronization with SAP via XML, IDOC, JSON, … could be established by using the standard CONTACT CATALYST platform
- This is implemented by different customers but is not the SAP certified way to do it



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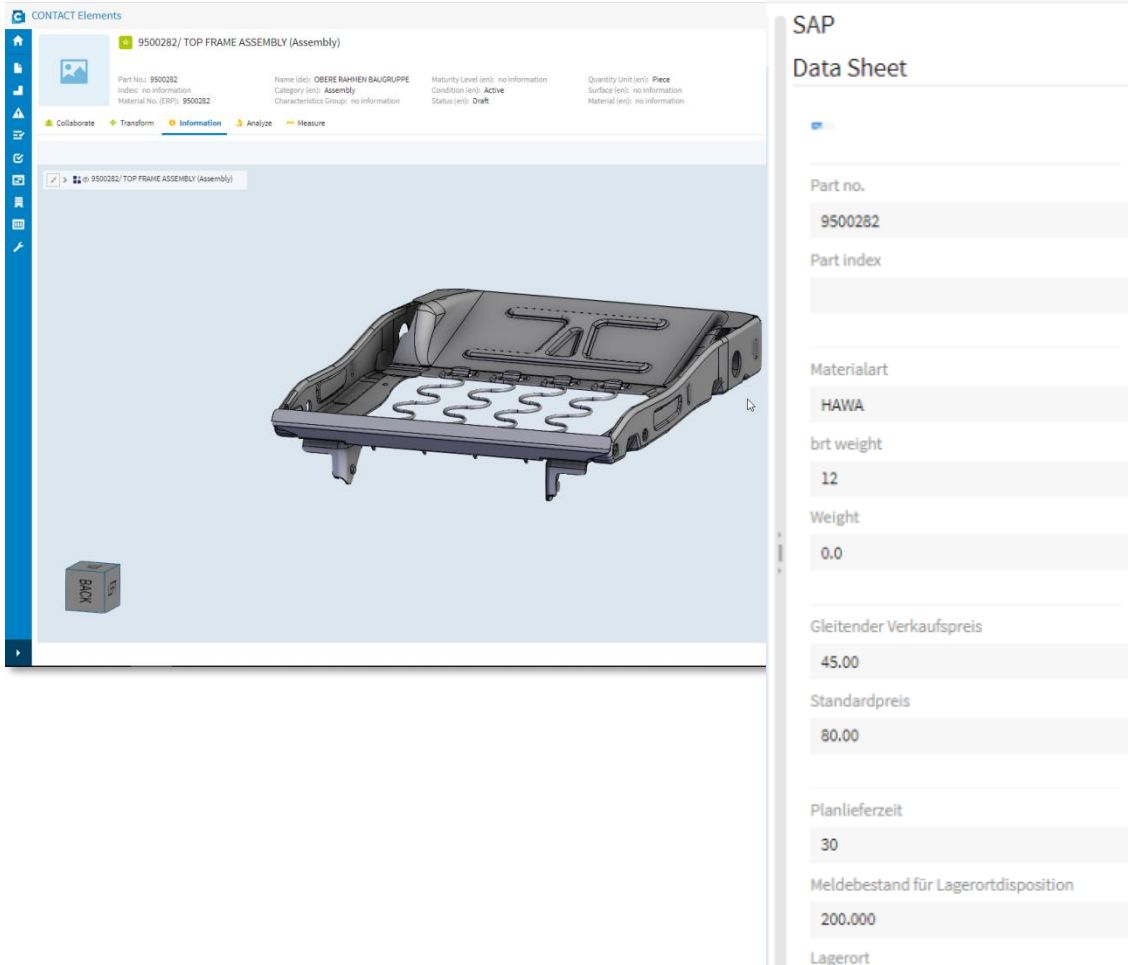
Catalyst technology
Data views – display data from third-party systems

- Look up supplementary data or views from a third-party system like SAP
- In real time, so to speak
- Example: material, sales price, stock levels in the ERP system
- User experience as if "in a single system" – user does not notice any difference.



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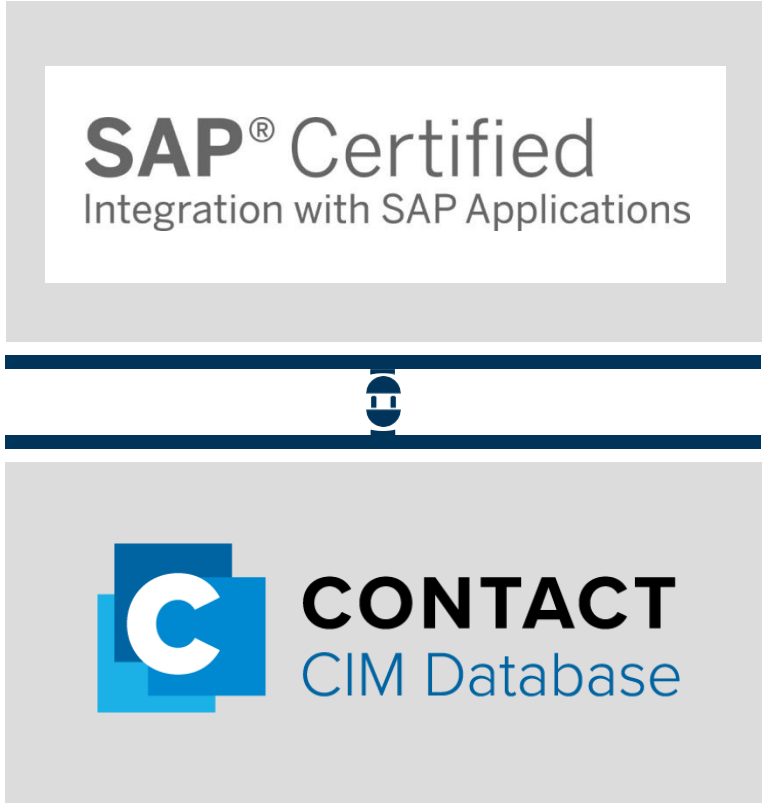
Catalyst SAP integration
Key performance features at a glance

- Maintained and certified SAP interface verification process Cross Application PLM 4.7
- Deep integration via NetWeaver adapters with comprehensive synchronization – prepared for standard classes:
  - Material: synchronization of stock, complementary maintenance
  - BOM: transfer of plant-independent engineering BOMs
  - Documents, engineering changes, characteristics, project data, etc.
- Outstanding adaptability: attributes, classes, etc.



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Catalyst IFS integration
Key performance features at a glance

- Maintained IFS interface
- Bidirectional exchange and controlled redundancy
- Prepared for standard objects:
  - **Articles:** automatic creation and modification of design parts, control of article revisions in IFS
  - **BOMs:** create, change and delete engineering BOMs in the ERP system
  - **Documents:** automatic provision of drawings, 3D models and Office documents as PDFs following approval
- Up-to-date warehouse information in PLM and ERP
- Can be expanded to include other attributes and object classes

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Catalyst PSIpenta Integration

Key performance features at a glance

- Maintained PSIpenta interface
- Bidirectional exchange and controlled redundancy
- Prepared for standard objects:
  - **Articles:** automatic creation and modification of design parts, control of article revisions in IFS
  - **BOMs:** create, change and delete engineering BOMs in the ERP system
  - **Documents:** automatic provision of drawings, 3D models and Office documents as PDFs following approval
- Status synchronization, catalog synchronization
- Expandable to include other attributes and objects

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"CIM Database, GIS and SAP PM contribute to the fact that we are one of the most efficient network operators in Germany."

Thomas Kindervater, head of Documentation Technology, EWE Netz

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Customer references with SAP integration

ANDRITZ
AUTOMOTIVE LIGHTING
BASF We create chemistry
BALLUFF
BOSCH
Eberspächer
ENERCON ENERGY FOR THE WORLD
EWE
Hengst AUTOMOTIVE
HONDA 新大洲本田
HUBER+SUHNER
HYMER
KIRCHHOFF AUTOMOTIVE
KOSTAL
KOMET GROUP
MAN
MANN+HUMMEL
OLYMPUS
RECARO
SIG
SSB
thyssenkrupp
Weidmüller
... and many others

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Summary of CONTACT Catalyst

- Harmonize heterogeneous IT landscapes, break down data silos and ensure end-to-end processes
- Reliably connect enterprise systems and applications such as PLM, ERP, CRM, ALM and others throughout the enterprise
- Provide development, production and logistics with reliable data thanks to standard ERP interfaces (SAP and others)
- Open technologies and interfaces as well as controlled process logic for reliable process-oriented data synchronization
- Easy adaptability and extensibility of IT architectures, e.g. for fast implementation of digital business models

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