# Design-Driven Enterprise
# From Bid to Design & Procurement

For custom-engineered projects (ETO)

14.04.2022

# Our model company

**Conveyor Solutions AG** is a manufacturer of

- components
- equipments
- systems

for sorting and transporting of luggage or packages.

They

- configure to customers needs (CTO/MTS),
- design customer specific solutions (ETO, CTO+),
- manufacture in large quantities.

# Conveyor’s Challenge

Senior management would like to

- Become more **customer centric** and **agile**
- Reduce **cost** and **workload**

For their configurable business please see the three webinars for variant-rich businesses.

Now we focus on **their project business** unit. Here they would like to increase **efficiency** and **agility** without cutting back on their customer centricity.

So, they engage an external consulting company to propose **a new approach**.

# The challenges within the ETO process

Customer → Offer / Sales Phase → Project planning → Engineering → Procurement → Assembly → Delivery → Service → Customer

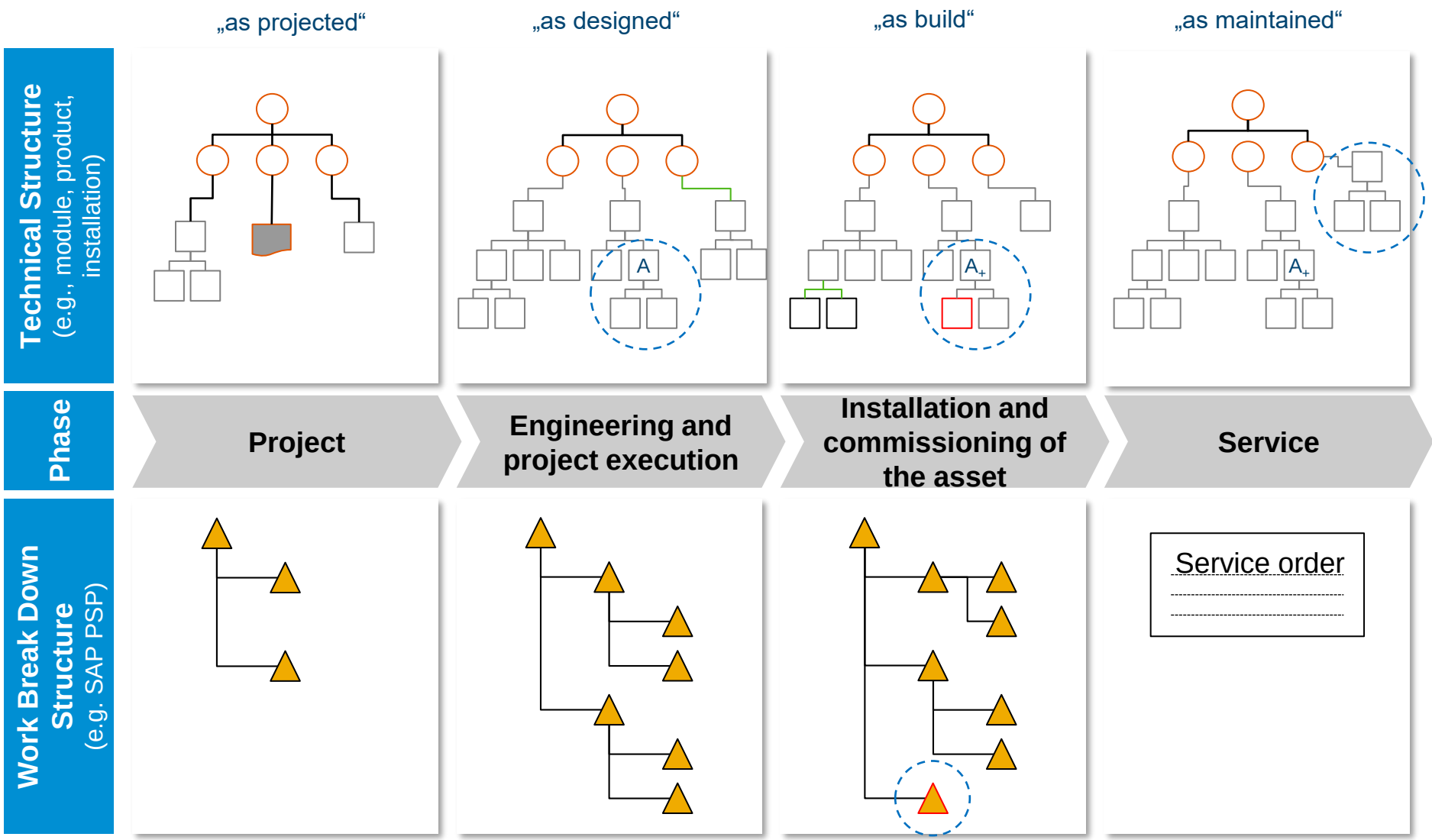
## Departments involved:

| | |
|---|---|
| Sales | project management |
| Development | Customer service |
| Production & Assembly | Controlling |
| Purchasing | Accounting |

## Challenges:

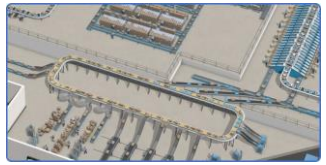
- Communication
- Lack of overview
- Silo mentality

# Each phase requires special structures



# DESIGN-DRIVEN ENTERPRISE

Engineer to Order (full scope)



**BID**
**PURCHASE**

***BID***
- Inquiry Intake
- Design Collaboration with Customer
- Quotation Specification
  - Receive und store customer requirements.
  - Create BID-TOS (from Template, from scratch or from Excel-Input).
  - Create Solution proposal (Drawings, Specs, etc) und send them to the Customer by Document Control Center (Collaboration).
  - Negotiation of the solution proposal.
- Quotation Costing
  - Start Easy-Cost Planning
  - Calculate cost
  - Create a SAP offer/bid (SD – based on commercial product) and do the pricing based on the calculated costs.

***PURCHASE***
- Design & Purchasing Collaboration with Supplier

**TECHNICAL PLAN**

***TECHNICAL PLANNING***
- Basic Design for all disciplines
- Create Layouts for the plant
- Proof the bid content
- Define activities for quality and material management

***ORDER FULFILLMENT***
- Create customer related to quotation
- Fine tuning of work breakdown structure, the TO and its links (Networks, Milestones)
- Detailed scheduling of the project (PS)
- Cost estimation based on networks and its activities
- Cash management, invoce and billing plans, down payment processing
- Budgeting
- Release of structures (Project versions)
- Execute first down payments (if required)

**ENGINEER**

***TECHNICAL DESIGN***
- Detailed Design for all disciplines
- 3D-mechanical engineering with PLM-direct integration
- Material take out
- Planning of production 6 procurement (PS)
- Collaboration with customer & suppliers
- Release of documents for next phase
- Manufacturing Work Instructions, Routing, Quality management
- Service-BOM, Documents, Planning

***ORDER FULFILLMENT***
- Release Advance Procurement
- Invoicing of Suppliers
- Confirm engineering hours
- Concurrent project costing
- Claim management

**PURCHASE PLAN**

***PLANNING***
- Release Engineering position in TOS for production or procurement (growing structure)
- Integration of TOS and project management creates automatically production and procurement orders
- Costing based on the now available product information
- Scheduling of production orders and procurement orders
- Capacity analysis and optimization of production (PS-PPDS)
- Hand-over production orders to MES
- Change Management
- Track procurement orders

**MANUFACTURE**

***ORDER MANAGEMENT***
Release of production orders

***ASSEMBLY***
Work Instruction

***INLINE QUALITY MANAGEMENT***
Recording of data collection in the product history record (digital twin)

***MACHINE INTEGRATION***

**DELIVER INSTALL INVOICE**

***DELIVERY***
- Delivery directly from the project
- Dispatch and transport processing
- Site Processing
- Confirmations
- Procurement of Installation Material and Services
- Project/Site Controlling
- Invoicing (vendor)
- Billing (Customer)
- Cash-Management

***ORDER FULFILLMENT***
- Release Advance Procurement
- Invoicing of Suppliers
- Confirm engineering hours
- Concurrent project costing
- Claim management
- Acceptance of the complete delivery by the customer
- Analysis based on POC (Percentage of Completion)
- Final Billing to Customer

**OPERATE**

***INTELLIGENT ASSET MANAGEMENT***
Providing Digital Twin (as installed, as maintained) to service providers and IOT services

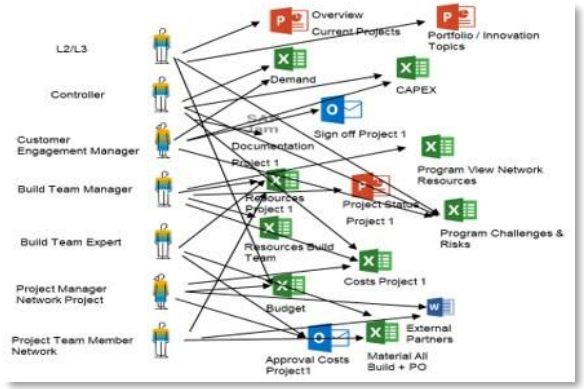
***SERVICE MANAGEMENT***
- Ticketing
- Service-Ausführung
- Service Order Execution
- Visual Spareparts
- Visual Service-Instructions
- Digital Twin Insight
- Digital Twin Monetarization

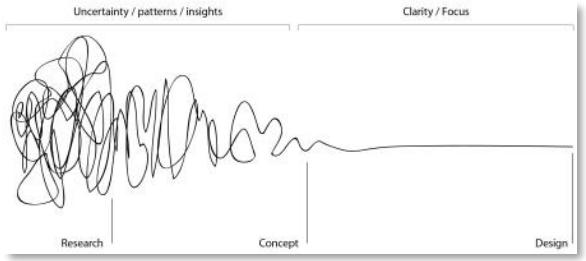
THE BEST RUN SAP

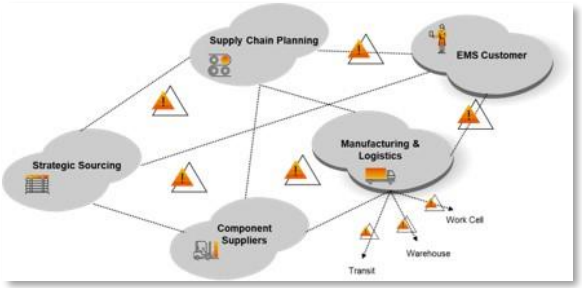
# What capabilities are required to solve Conveyors‘ business challenges?

# Design-Driven Enterprise today….

## Engineering, sales, service and manufacturing seamlessly integrated and operated smartly


| Bid & Customer Requirements | Plan & Execute | Design | Installation & Commissioning |
|---|---|---|---|
| **100%** Customer Influence on solution development | **Management** of customer requirements, schedule and cost | Reduction of design cost by **fast front loading of solutions templates and modular reuse**. | **Automated transformation** from the as-build structure to the as-installed solution. |

# Design-Driven Enterprise

## AGIL.EFFICIENT.CUSTOMER-CENTRIC

- **Increase the level of automation** in the process flow from engineering into sales, production, service via the **smart product structure**.

- **Increase the level of reuse** via templates and by embedding configurable modules and components in the **smart product structure.**

- Achieve a **high level of consistency, automation and accuracy** across all departments by utilizing **the smart product structure within the SAP core**.

# We can't go on like we did in the past to manage this complexity...

## We have to change the way we collaborate, exchange, interact and deliver….

Moving from a **document centric, disconnected approach**

**To the design-driven enterprise with a model centric & integrated approach**

# We can't go on like we did in the past to manage this complexity...

## We have to change the way we collaborate, exchange, interact and deliver….

Moving from **document centric, disconnected approach to a model centric & integrated approach**

### PROCESSES

**Decoupling** of design and logistics or document delivery and increased flexibility and speed, efficient operation of all departments, better separation of responsibilities, well defined and transparent processes

**Clear distinction** between engineering planning and execution

**Consistent** process execution

**Flexible** processing (DOW, profit center planning and controlling, concurrent project cost planning) confirmation, partial exchange, customer requirements) through distinction between design and execution

### SYNERGY

Strong synergy effects leveraged by design-driven enterprise approach (MDM, Commerce, S4)

### TEAM

No silos

**cooperative** teamwork , open exchange, issue awareness

### BUSINESS MODEL

Full flexibility of the business model with a new level of **customer centricity**

Enable **digital Twin**

**Consistent data model** across business models **enables re-use**

### PROJECT

**Global project governance** is supported

Focus on the **project**

### STRUCTURE

Global structure for control of intercompany business

Technical structure includes all business units

Standardization of structures

Maintain global technical order structure based customer requirements at the lastest point of time of material master assignment

**Clear and simple** structure

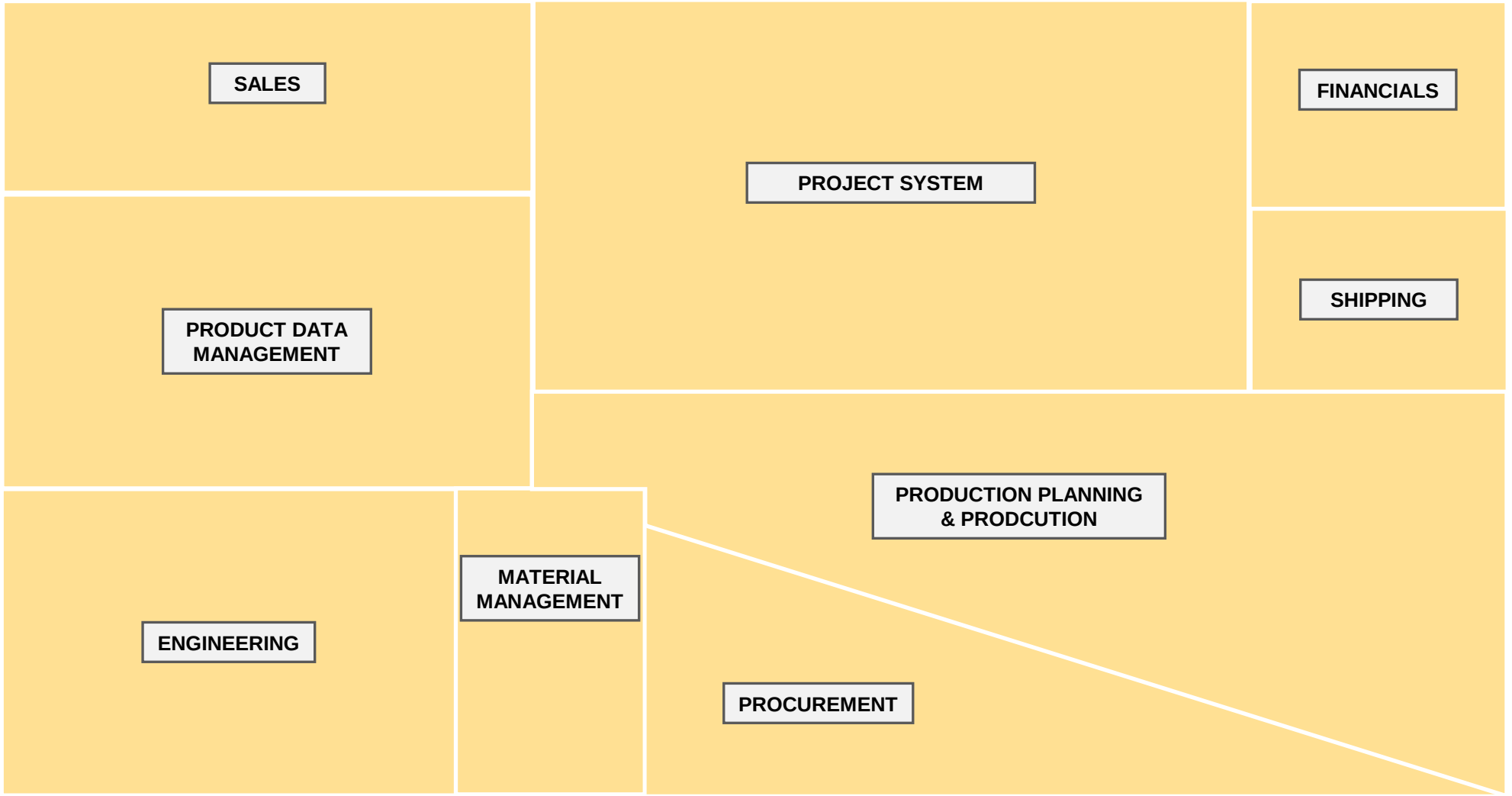
Link different views

### WAY OF WORKING

Improved assignment of work packages and products based on the **DOW indicator** (division of work) in the TOS (technical order structure). The DOW indicator can overrule the data of the material master regarding the procurement and production strategy.

**Standardization of working methods** across all business units and subsidiaries, optimization and standardization of the dataset

# Design-driven Enterprise Architecture for ETO



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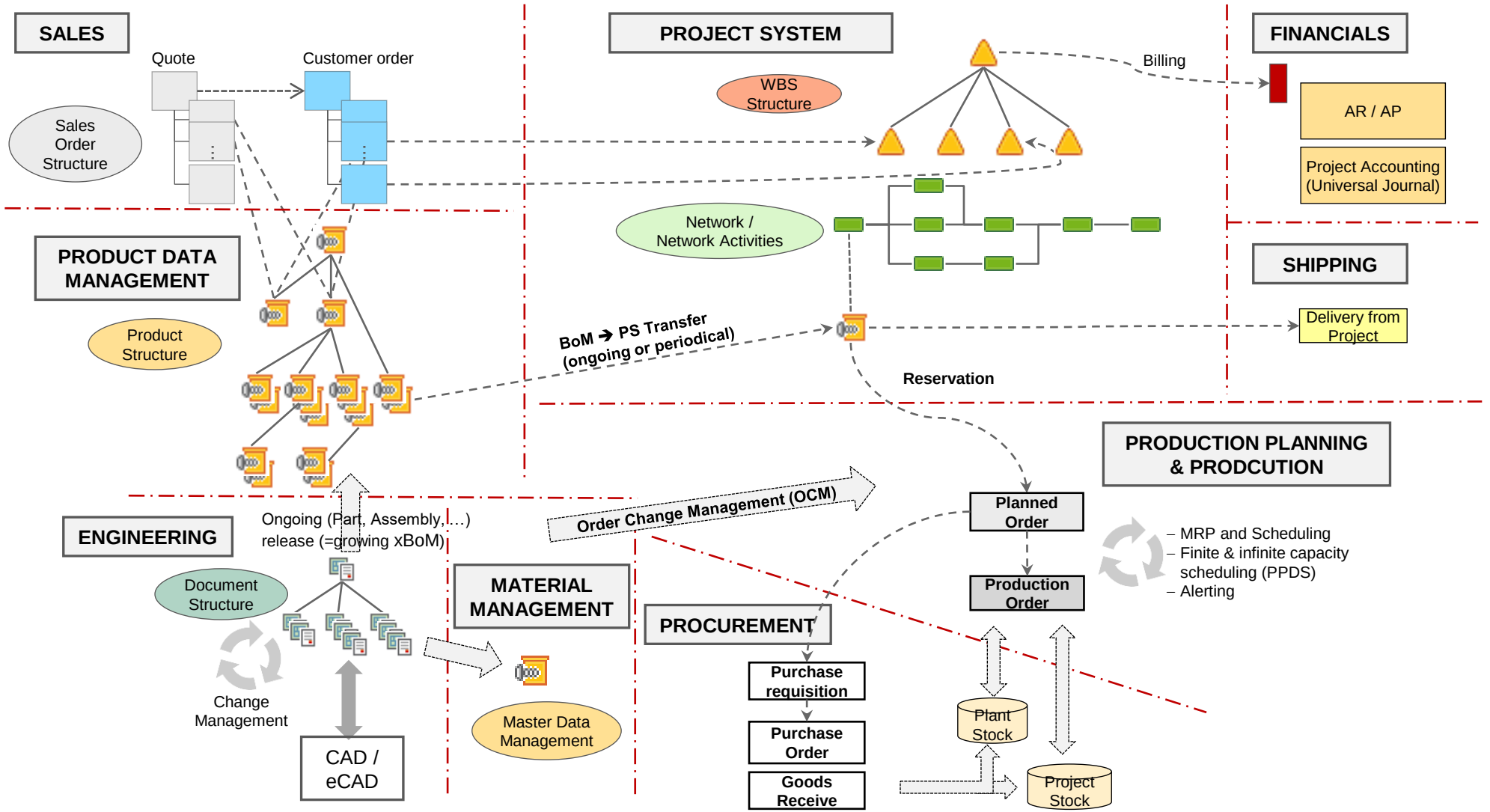
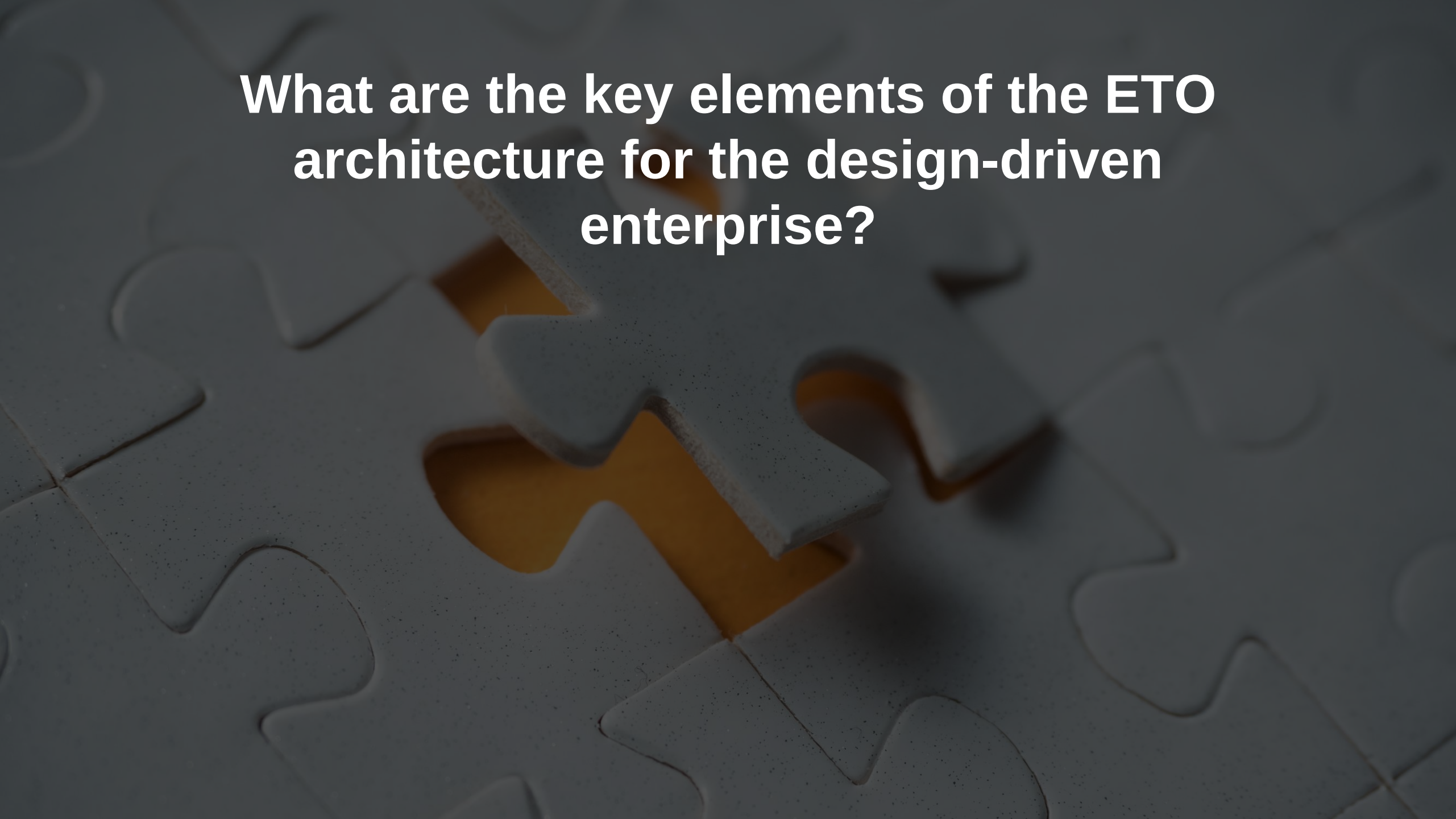
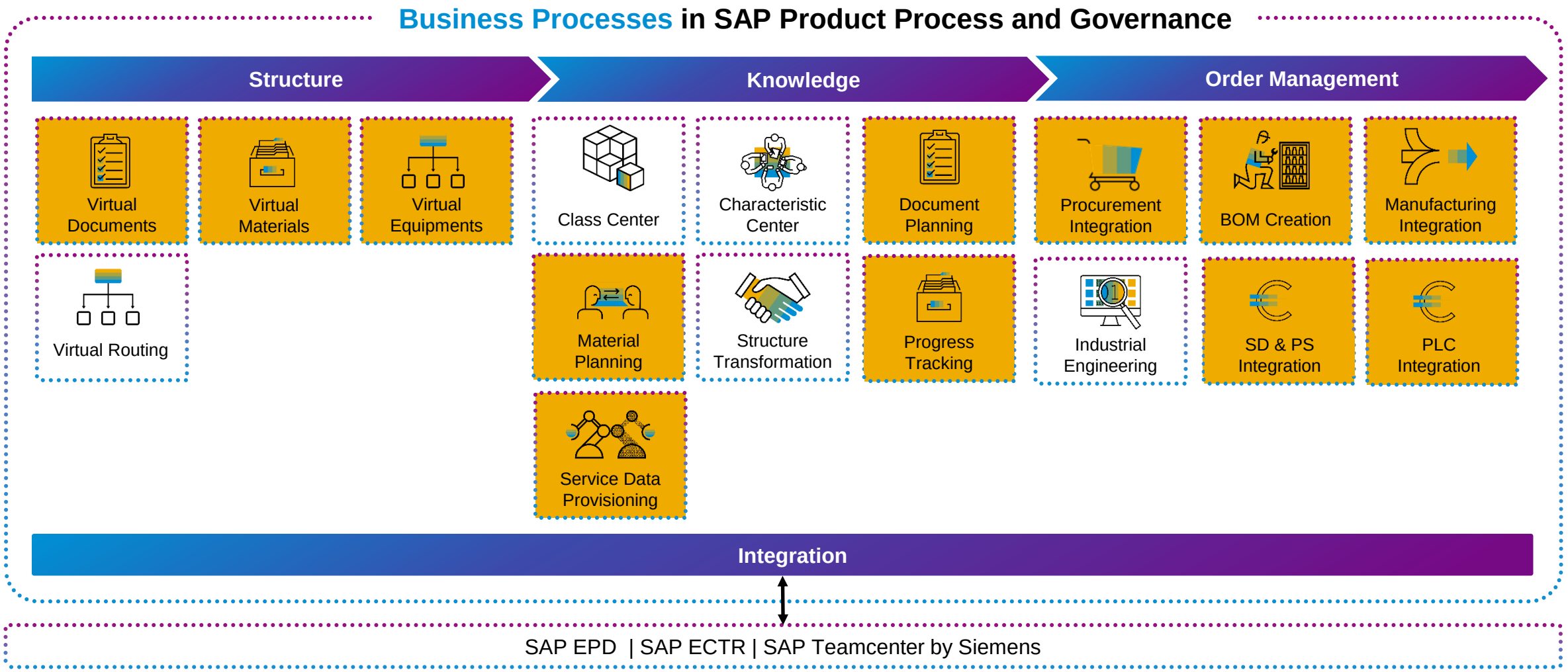


# What are the key elements of the ETO architecture for the design-driven enterprise?



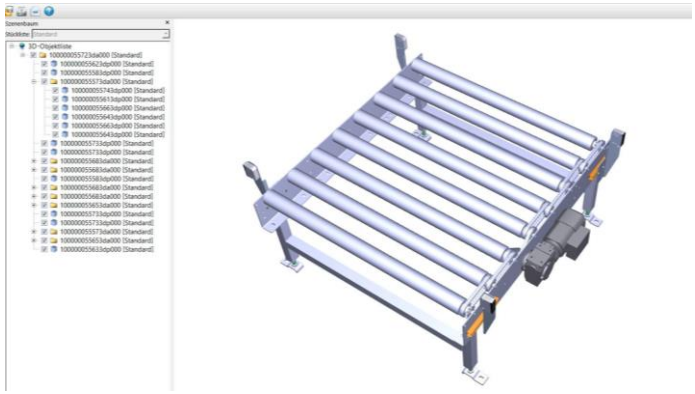
# The business processes in SAP PPG are designed to help our customers address the needs of the design-driven enterprise.



# Relationship between CAD, Classic BOM and Product Structure

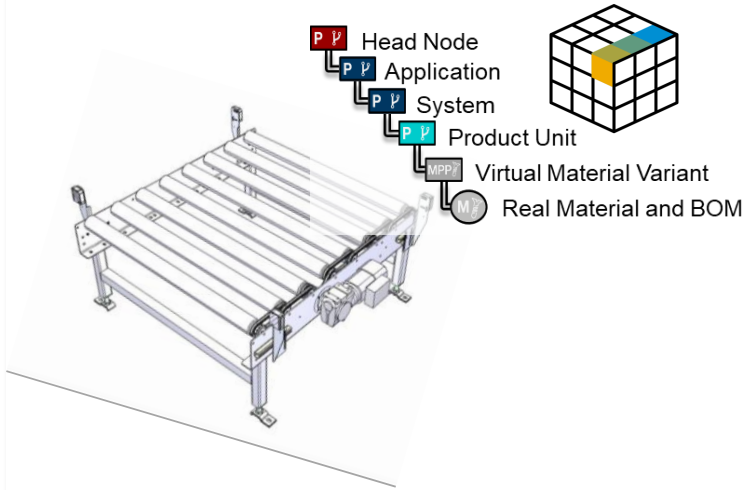
Why can‘t I use the CAD or Classic BOM instead?

## CAD Structure



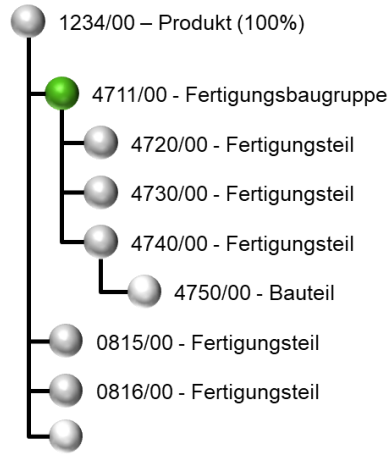
The **CAD Structure** describes the geometrical relationships between the BOM elements. The **variance** therefore is **implicitly described**.

## Product Structure



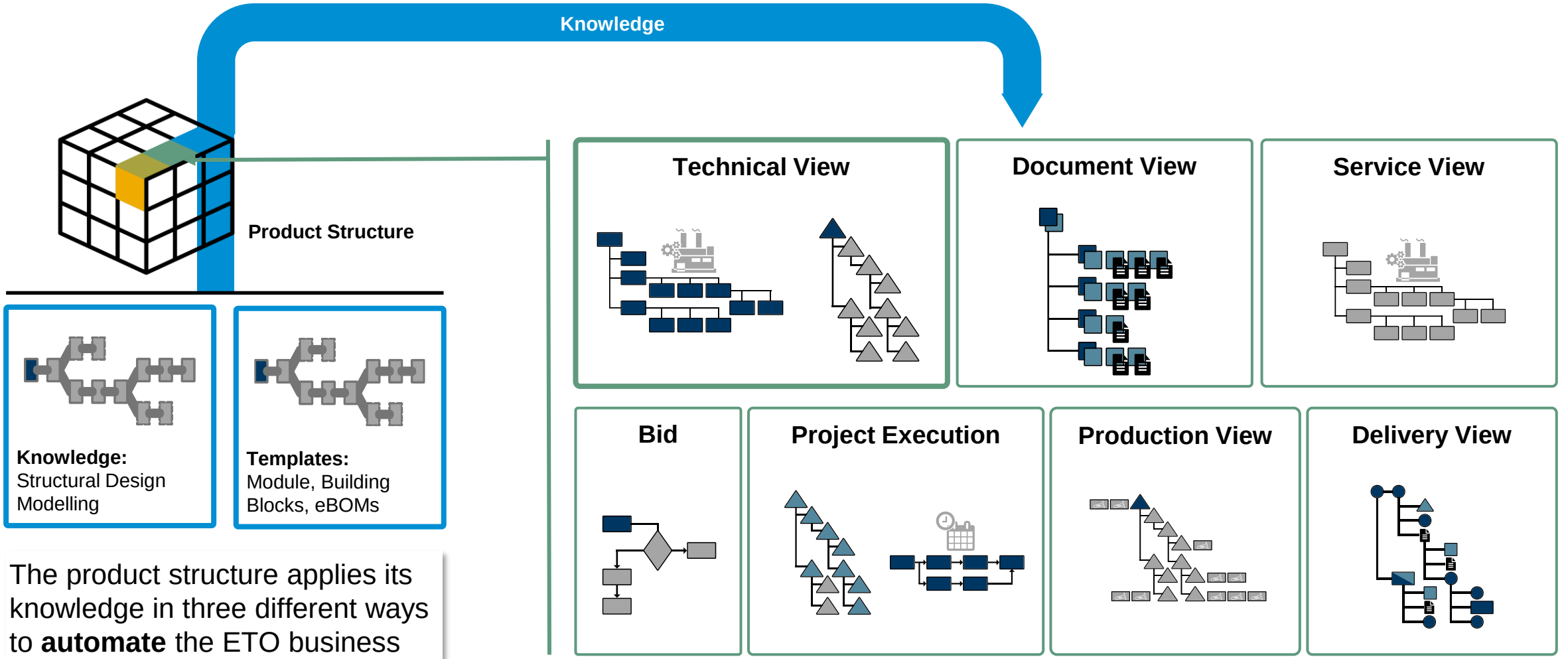

The **Product Structure** models **templates** to accelerate and to safeguard the solution **process**.

## Classic BOM



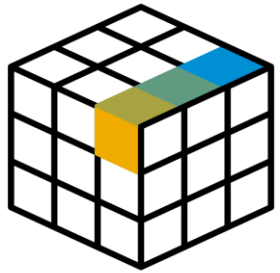

The **Classic BOM models** variance on a material level and therefore **does not scale very well**.

# Design-Driven Enterprise: Product Structure Automation

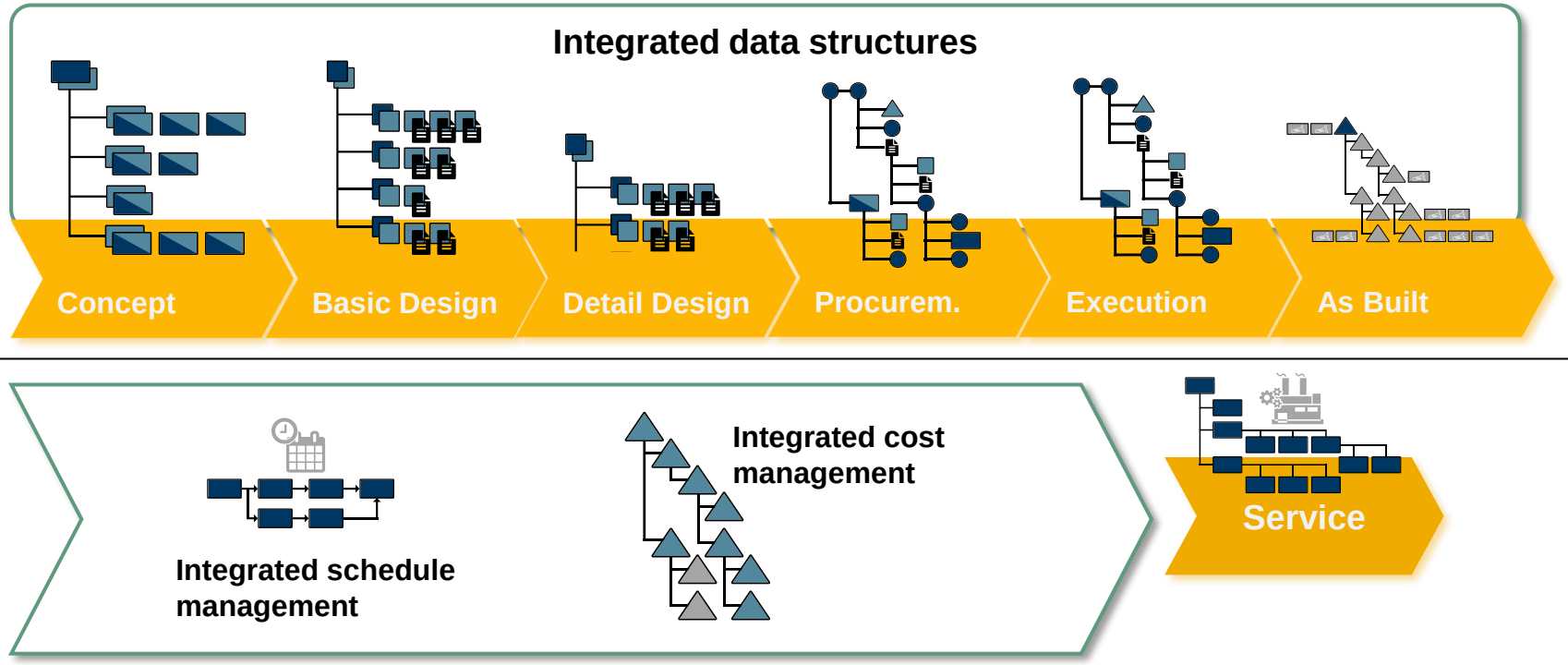



The product structure applies its knowledge in three different ways to **automate** the ETO business processes.

# Design-Driven Enterprise: Product Structure Integration



The product structure knowledge results in a **seamless integration and automation** of the ETO process.




View: **functions**

View: **documents**

View: **material**

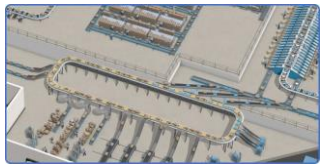
View: **schedule**

View: **costs**

View: **customer**

# Design-Driven Enterprise: Product Structure Reuse

**ETO Solution System**

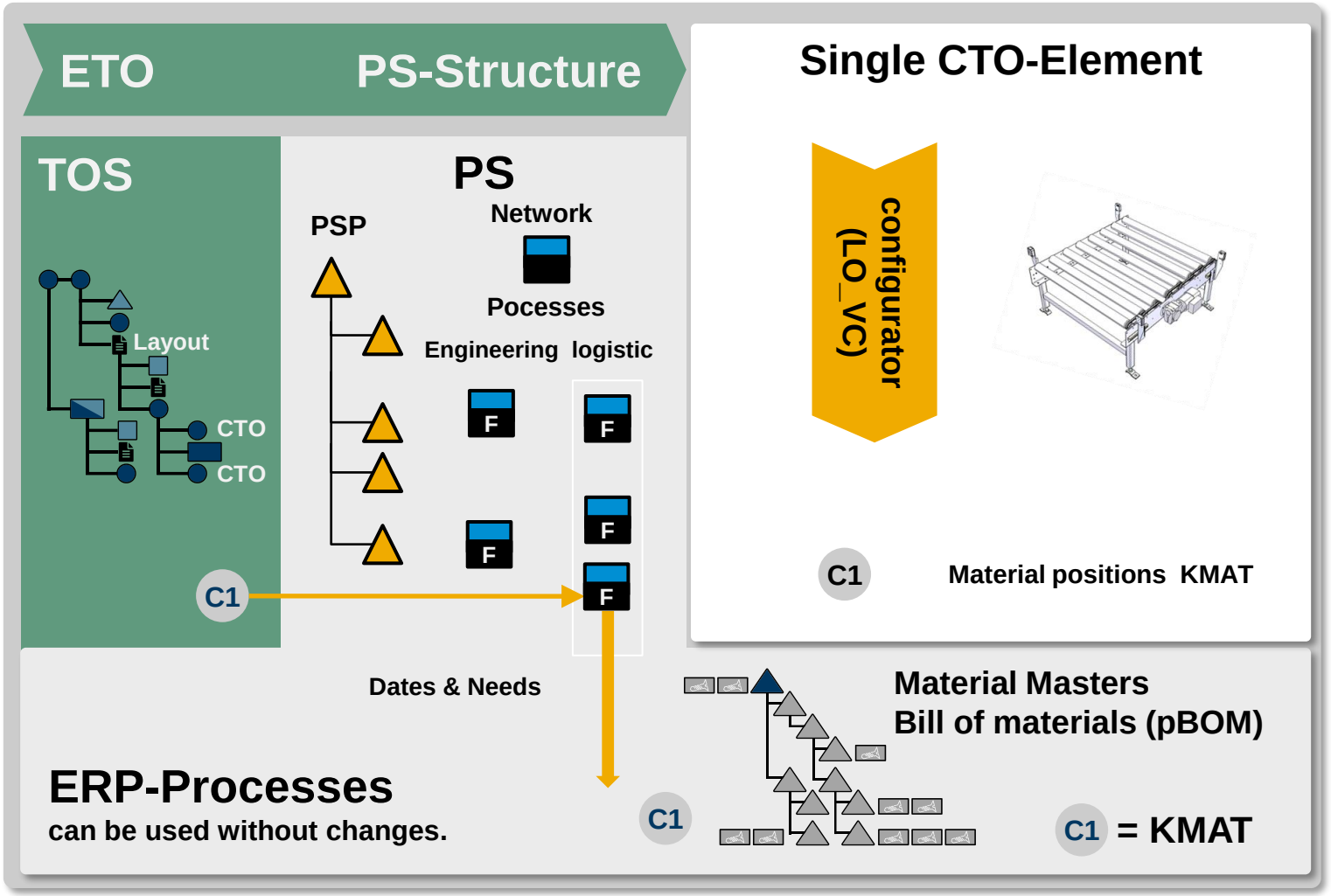


**Reusable component „C1“**

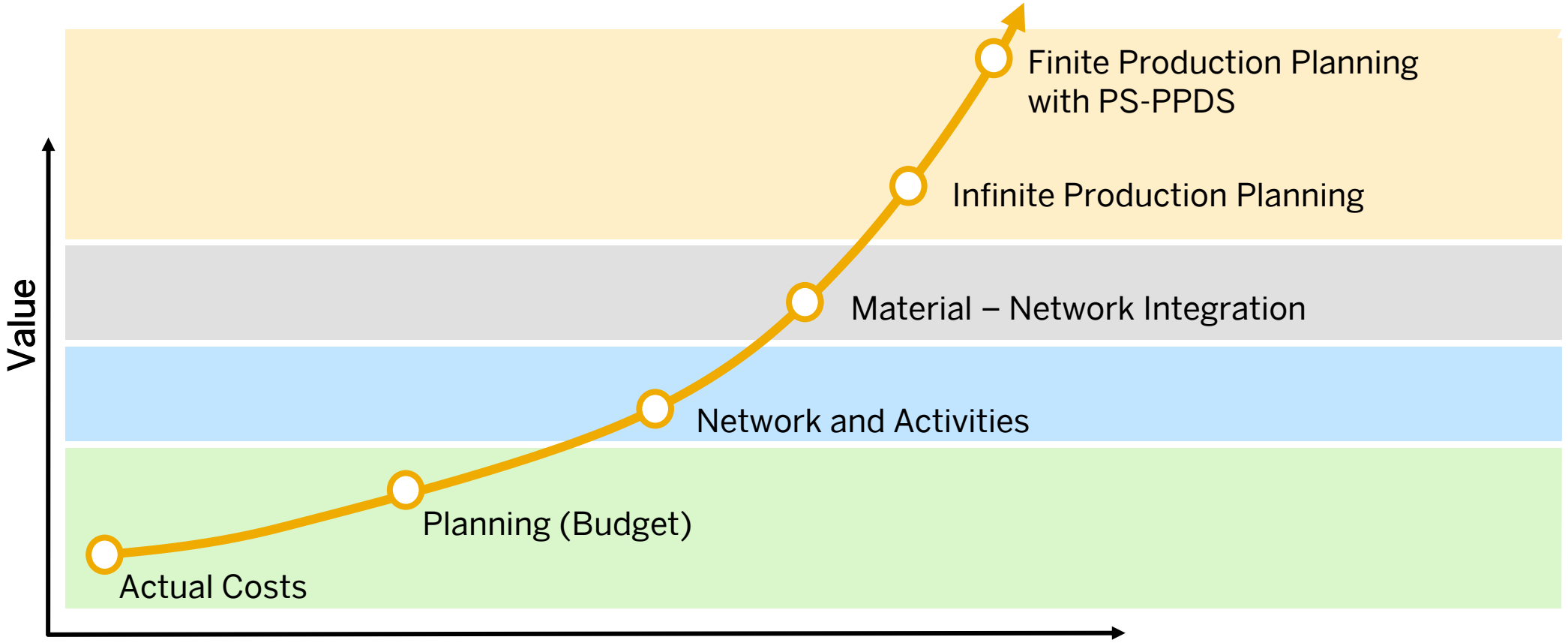
**Configurator (See Webinar CTO)**

**The component C1 can be reused**

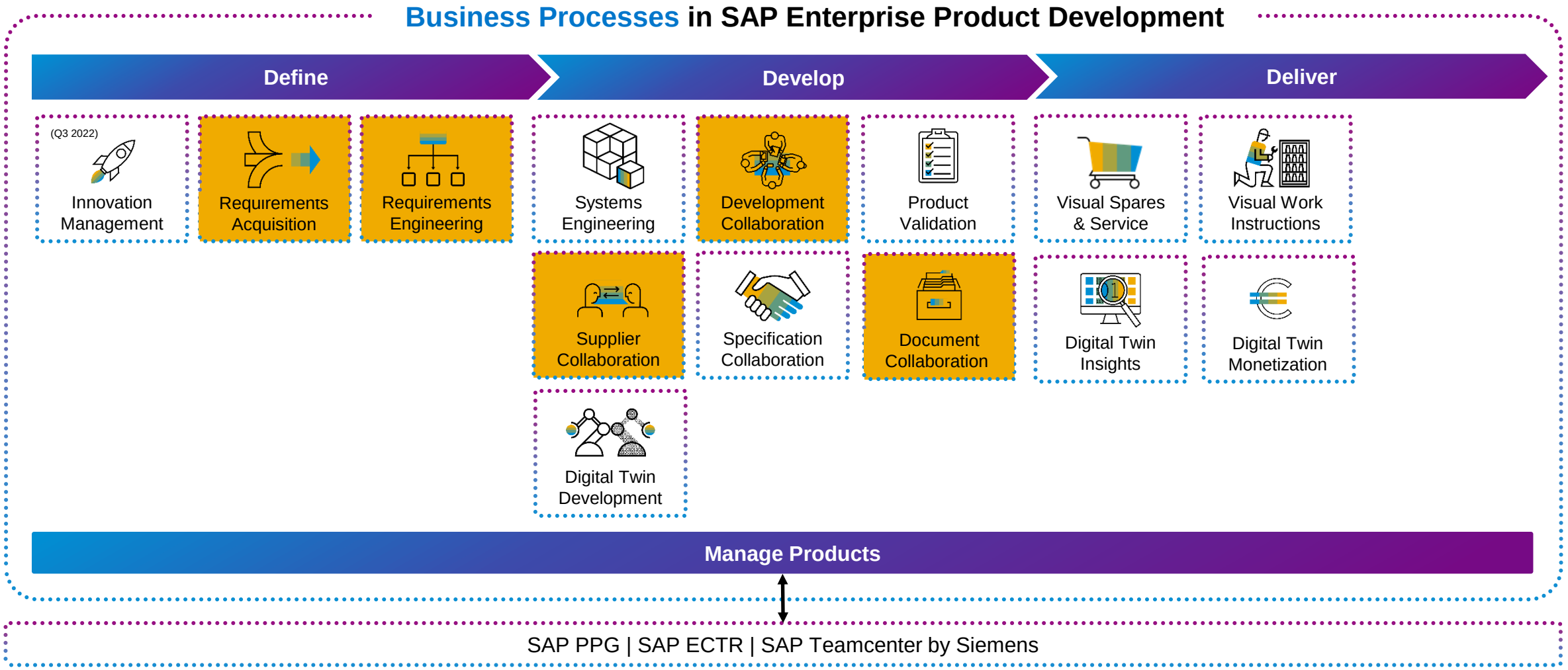
- in the SD order - as a directly configurable order item
- in the plant structure (TOS) as a configurable module



**The business processes in SAP PS as part of ERP or S/4HANA are designed to help our customers address the needs of project management in ETO.**

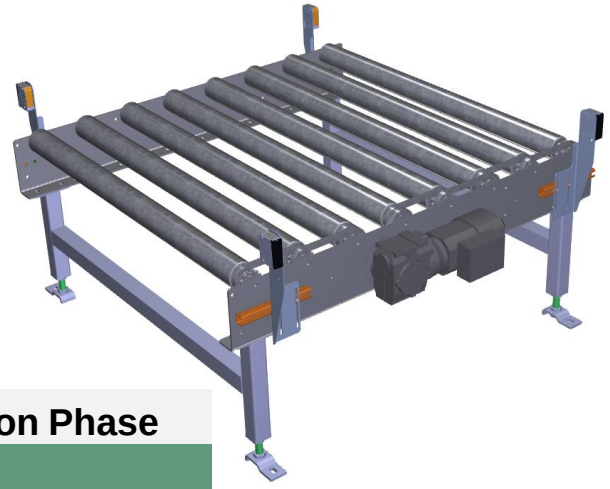


# The business processes in SAP EPD are designed to help our customers address the needs of digital product development organizations.



# How will Conveyor work within SAP in the future?

# From Design to Sales: Detailed Process Flow



**Bid Phase** | **Order Execution Phase**

PPG | EPD-Engineering | PPG

**Create** bid structure

**Daniel**
Sales Rep

**Manage** customer requirements

**Barbara**
Systems Engineer

**Create** product structure

**Create** technical order structure

**Lars**
Project Engineer

**Order Execution Phase**

EPD-Collaboration | ERP MM, PS & PPG

**Handover** documents to supplier

**Manage** purchase order

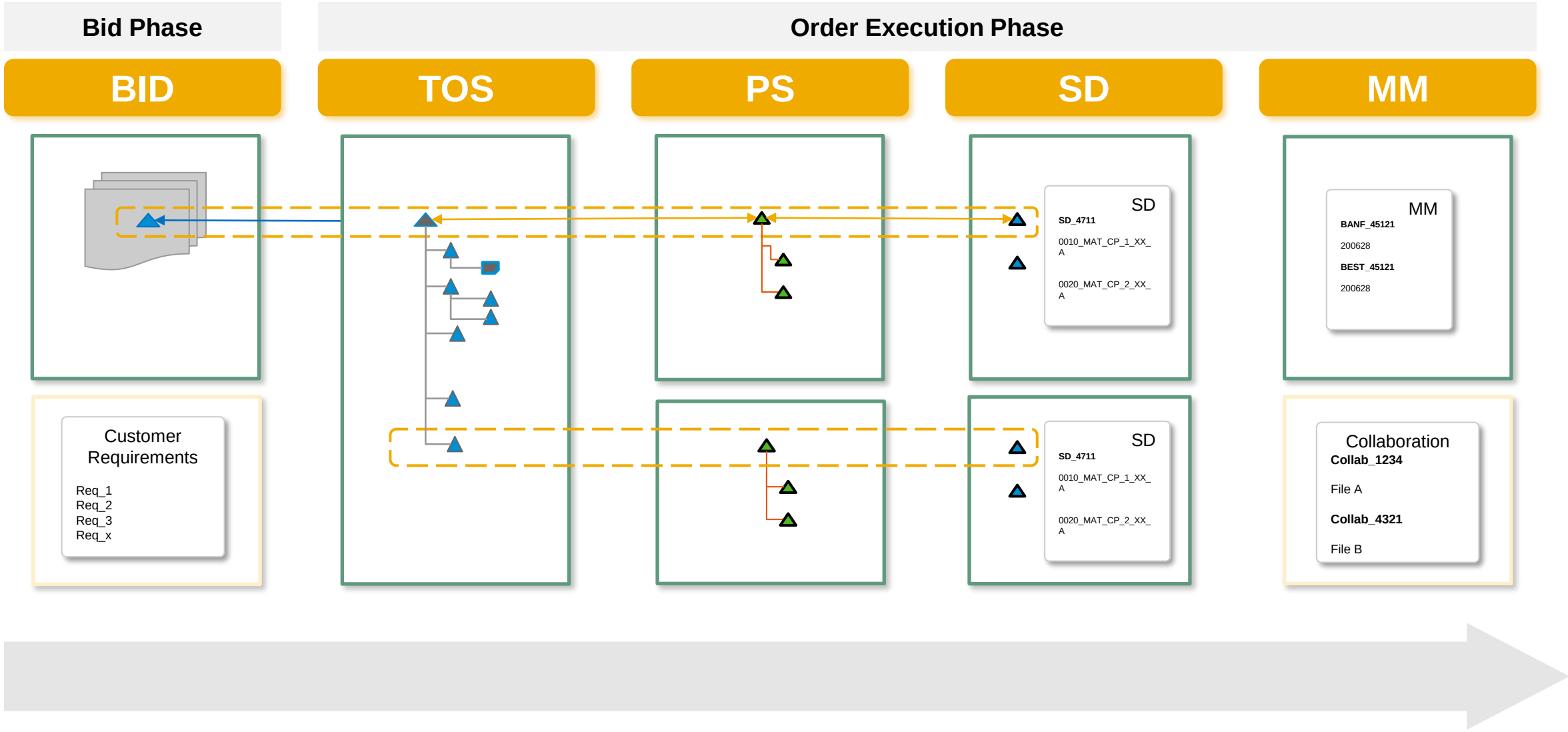
**Mara**
Technical Buyer

**Start** procurement

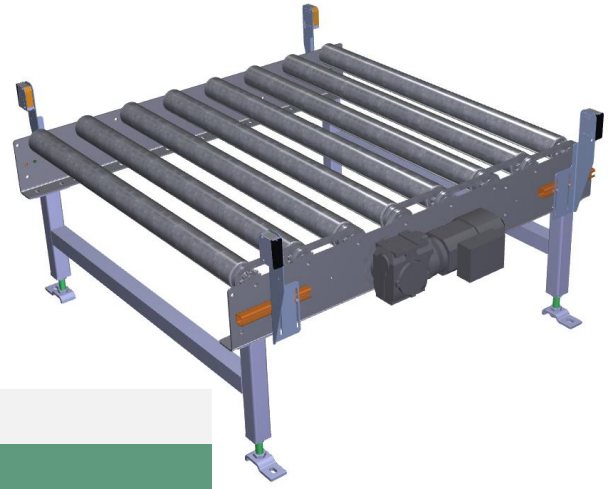
**Manage** project

**Lars**
Project Engineer

# Data Structures & Flow



# From Design to Sales: Detailed Process Flow



| Bid Phase | Order Execution Phase | |
|---|---|---|
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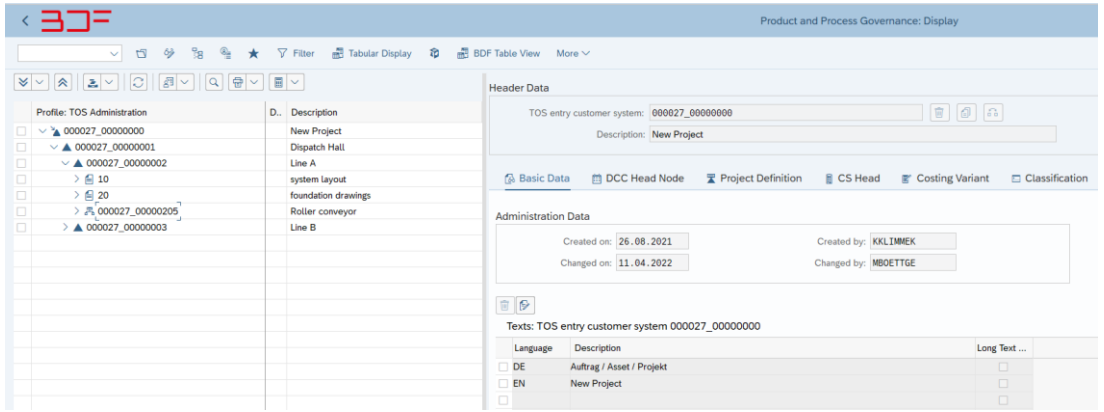
# PPG Bid Structure

## Business Outcomes

*“As an **Sales Rep**, I want to accelerate the bid process by leveraging modularization and templates for buildings, plants, systems, machines, ...”*

**Daniel**
Sales Rep




## Process Highlights & Benefits

**Fast front** loading through modularization and templates for buildings, plants, systems, machines, ...

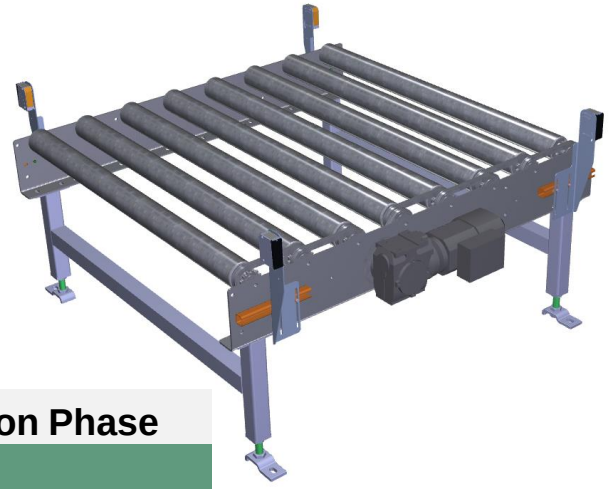
**Start** of the structure development up to a defined level without the force to have SAP Material Masters

**Open interface** for connecting all engineering, quotation and project planning tools.

**The document supply chain** can already be planned and scheduled.

**Support** of SAP product and project costing.

# From Design to Sales: Detailed Process Flow



**Bid Phase**

PPG | EPD-Engineering

**Order Execution Phase**

PPG

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EPD-Collaboration | ERP MM, PS & PPG

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**Manage** project

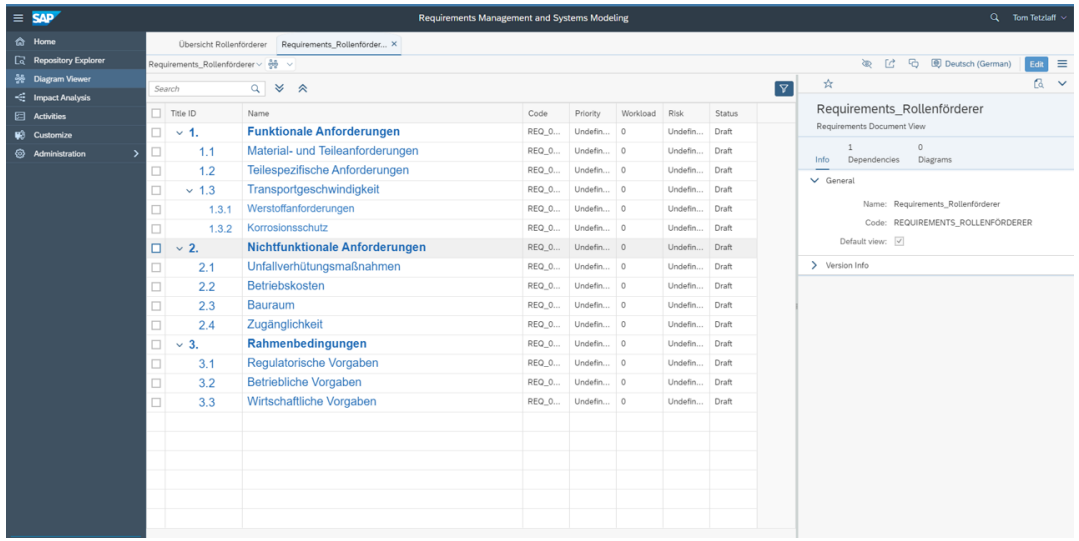
**Lars**
Project Engineer

# Manage customer requirements

## Business Outcomes

*"As a **Systems Engineer**, I want to match the requirements with product data so that downstream processes can be executed automatically."*

**Barbara**
Systems Engineer




## Process Highlights & Benefits

**Manage requirements** in a central repository and share requirements with suppliers & business partners

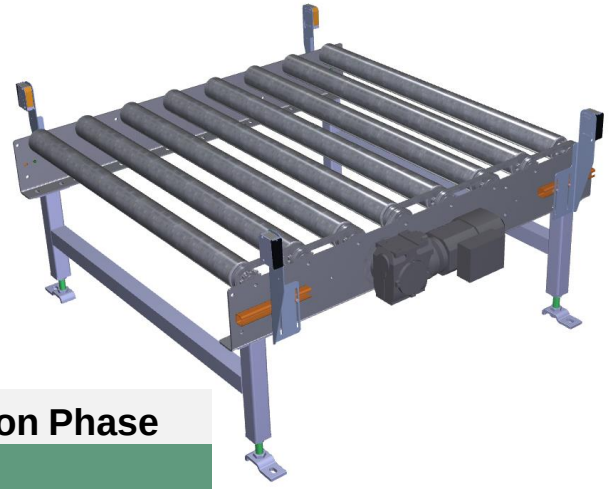
Assess the **quality of requirements** based on defined criteria

**Launch an impact and lineage analysis** on requirements, model objects and associated objects

**Edit one requirement model concurrently** across the extended enterprise

**Import and export requirements** based on standard formats, like Requirements Interchange Format

# From Design to Sales: Detailed Process Flow



**Bid Phase** | **Order Execution Phase**

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**Create** bid structure — **Manage** customer requirements — **Create** product structure — **Create** technical order structure

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Sales Rep

**Barbara**
Systems Engineer

**Lars**
Project Engineer

**Order Execution Phase**

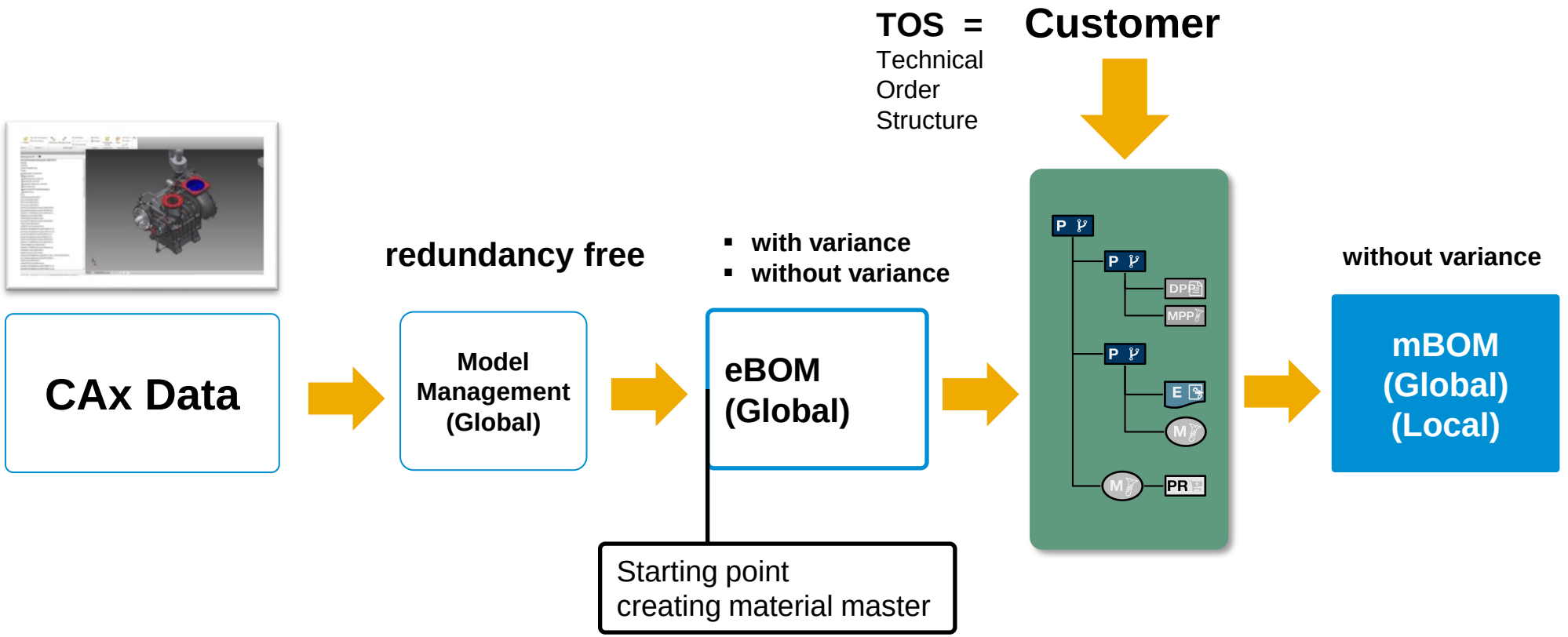
EPD-Collaboration | ERP MM, PS & PPG

**Handover** documents to supplier — **Manage** purchase order — **Start** procurement — **Manage** project

**Mara**
Technical Buyer

**Lars**
Project Engineer

# Create eBOM



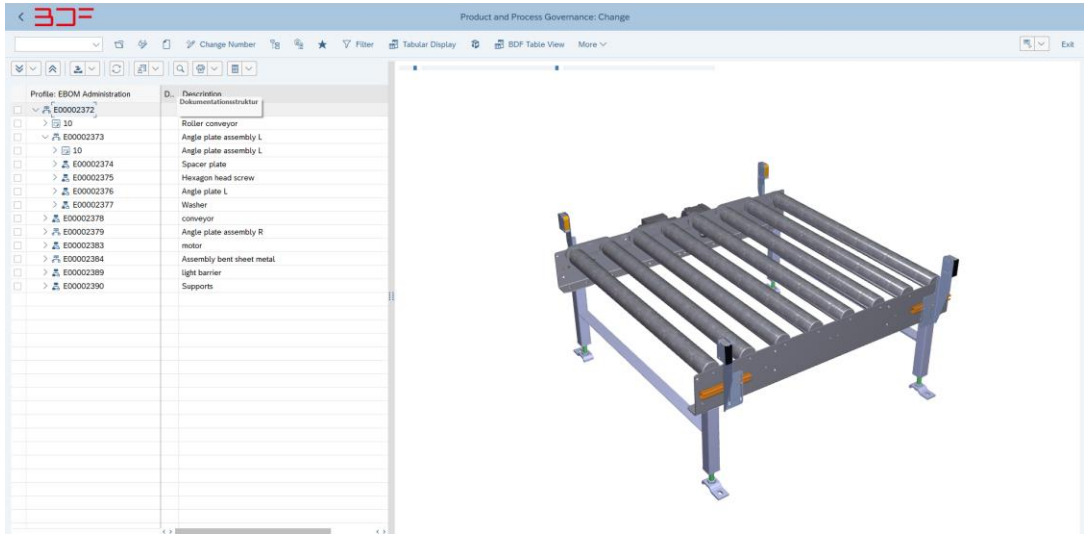

- Automated transfer and processing of CAx data in document BoM, parts lists and product structures
- Little effort for customer-specific order and conversion into project structure
- Full integration into the logistic processing

# Create product structure

## Business Outcomes

*"As a **Systems Engineer**, I want to create and design new products freely and still integrate them in the digital supply chain!"*

**Barbara**
Systems Engineer




## Process Highlights & Benefits

**Reduced** time to integrate the designed product into logistic handling

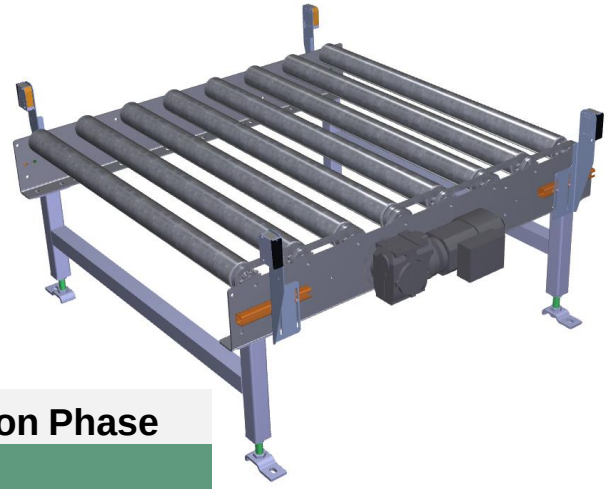
**Easy** product development because you do not need a material master in this phase

**Automated** document and material generation when necessary

**Provide** product information for supplier requests in an early phase

**Integrate** the design process into digital supply chain

# From Design to Sales: Detailed Process Flow



**Bid Phase** | **Order Execution Phase**

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**Create** bid structure — **Daniel**, Sales Rep

**Manage** customer requirements — **Barbara**, Systems Engineer

**Create** product structure

**Create** technical order structure — **Lars**, Project Engineer

**Order Execution Phase**

EPD-Collaboration | ERP MM, PS & PPG

**Handover** documents to supplier

**Manage** purchase order — **Mara**, Technical Buyer

**Start** procurement

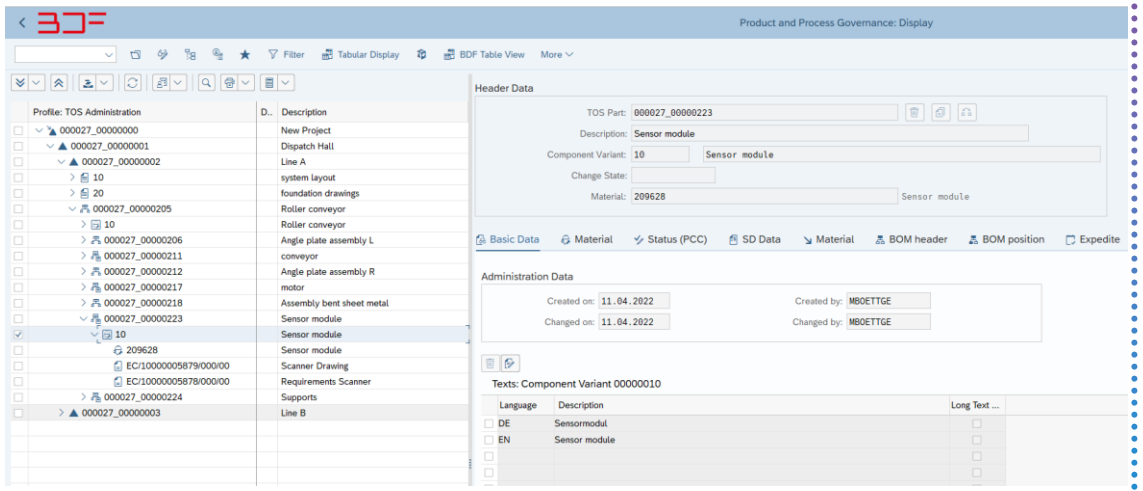
**Manage** project — **Lars**, Project Engineer

# Create technical order structure

## Business Outcomes

*“As an **Project Engineer**, I want to create the product data so that downstream processes can be executed automatically.”*

**Lars**
Project Engineer




## Process Highlights & Benefits

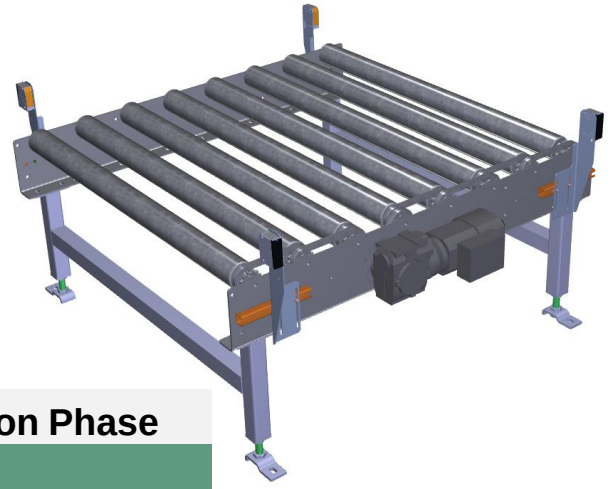
**In the technical order structure (TOS)** the allocation of the scope of supply and services (LLU indicator) is planned.

The TOS determines which items are **to be procured where and how:**

- Procurement: own / external (procure / make) / customer
- Engineering: internal / external / customer
- Differentiation of the individual locations and all combinations

**Provide** digital twin foundation early in design phase

# From Design to Sales: Detailed Process Flow



**Bid Phase** | **Order Execution Phase**

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Project Engineer

**Order Execution Phase**

EPD-Collaboration | ERP MM, PS & PPG

**Handover** documents to supplier

**Manage** purchase order

**Mara**
Technical Buyer

**Start** procurement

**Manage** project

**Lars**
Project Engineer

# Automated PS-Integration

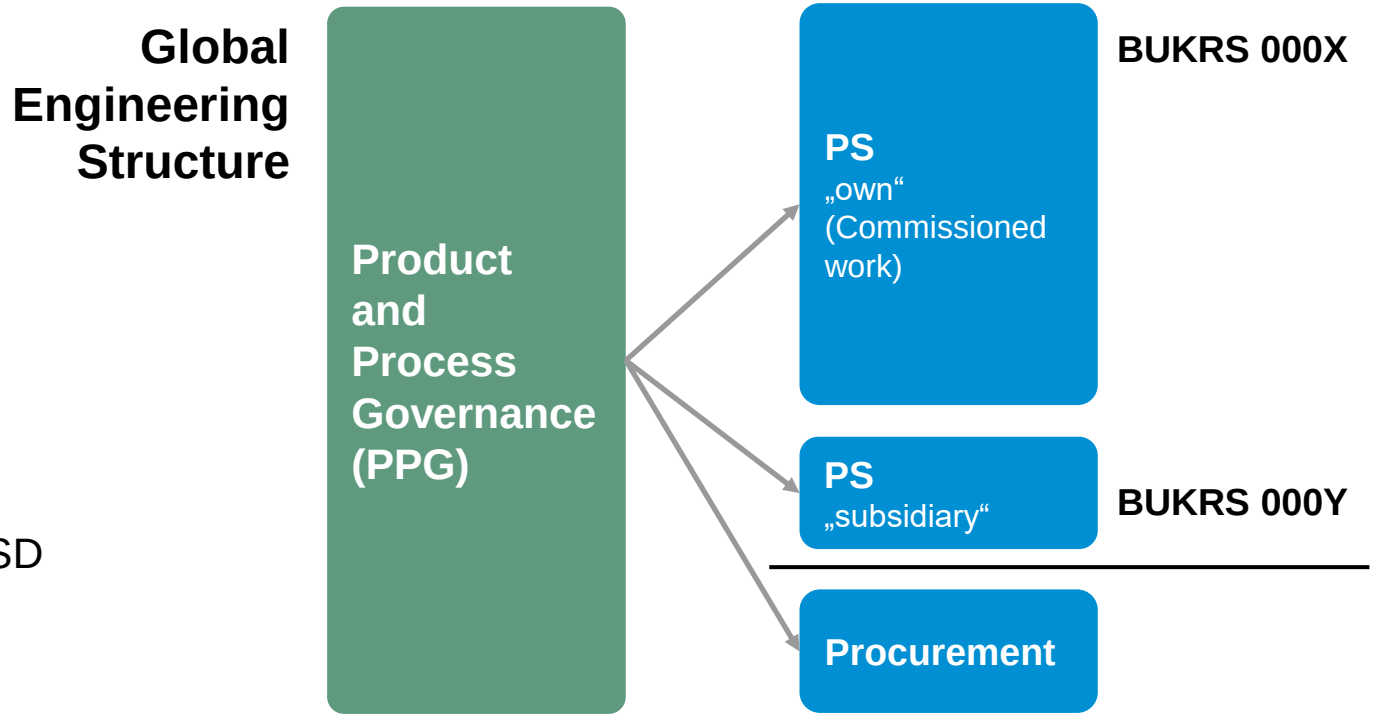
Example: Global cross-company code supplies and services determination

Control indicator:

- **Purchasing** **(1000)**
- **Engineering** **(2000)**
- **Manufacturing** **(9000)**

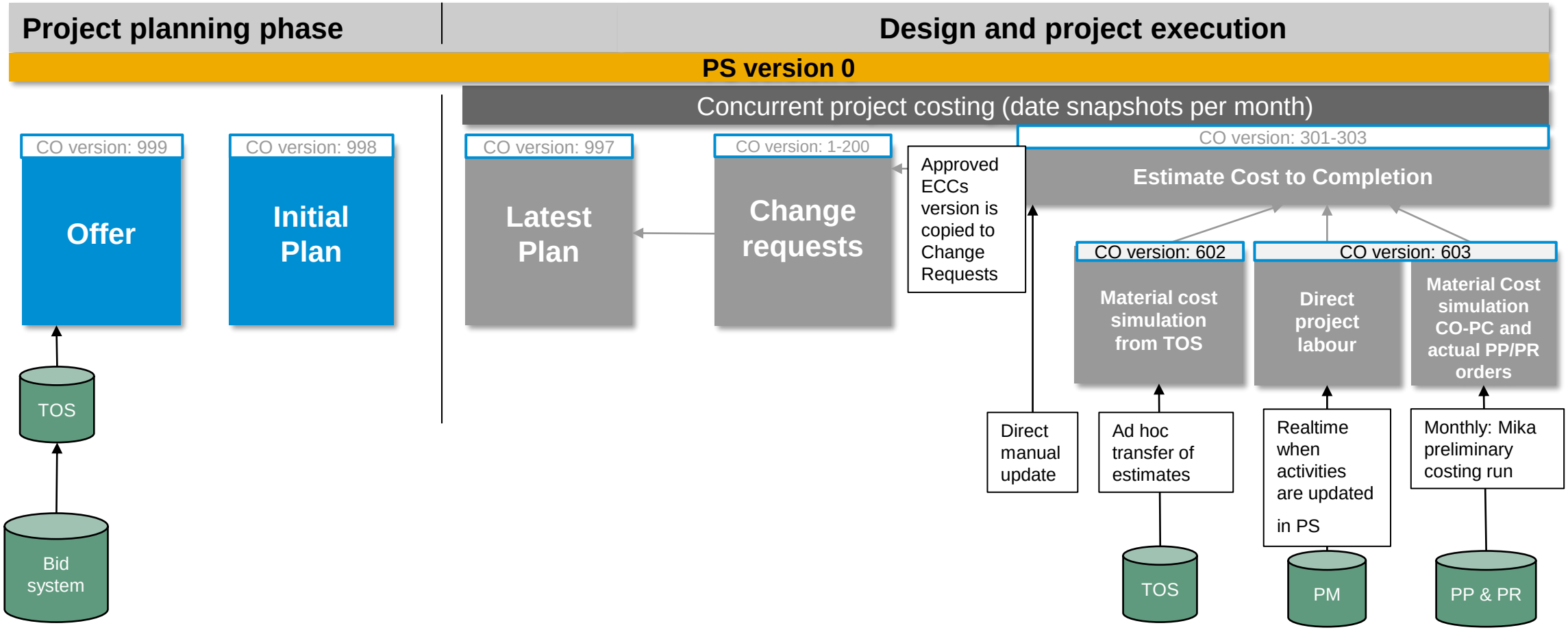
Assignment of different projects and SD orders

Global Project Management



# Concurrent Project Costing

## Global project controlling / cost view

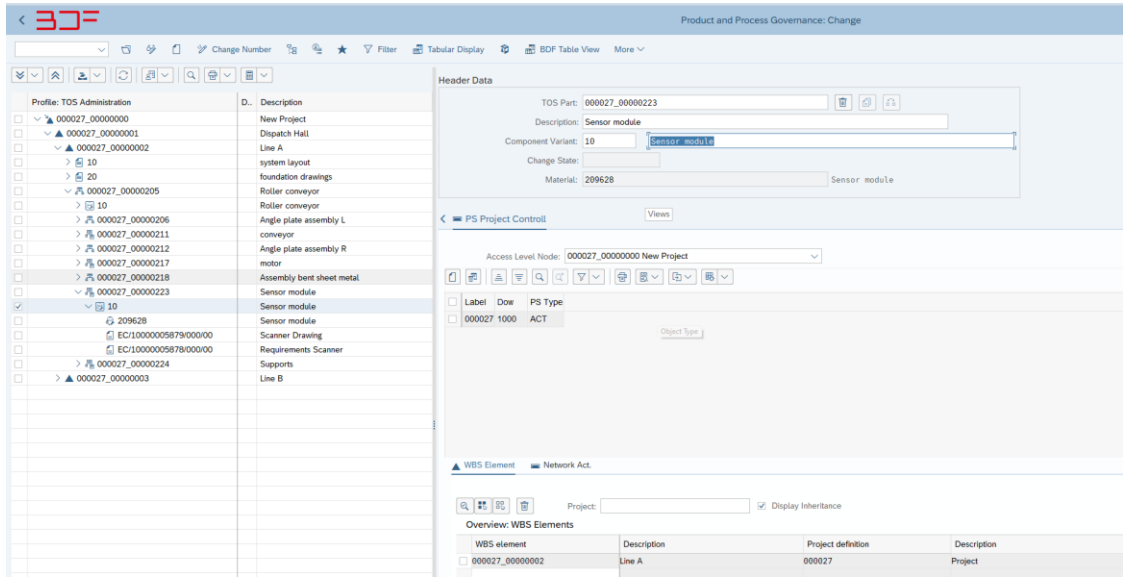


# Review Product & Project Structure

## Business Outcomes

*"As an **Project Engineer**, I integrate project management with product structure **to automate the process execution.**"*

**Lars**
Project Engineer




## Process Highlights & Benefits

**Provide integrated Information of** product development disciplines including mechanical, electronic/electrical & software structures into one product definition

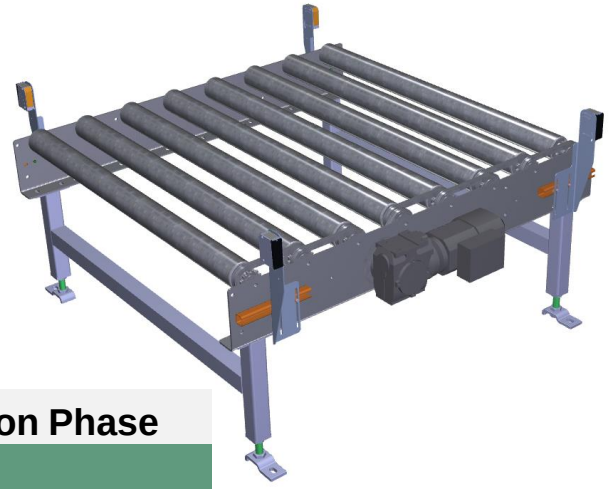
**Plan the missing production data** production aids, production documents, working instructions, …..

**Synchronize** product data, structures, access and documents across the extended enterprise

**Provide and assign scheduling data for production and procurement**

**Better decision-making** due to the execution of concurrent project costing

# From Design to Sales: Detailed Process Flow



**Bid Phase** | **Order Execution Phase**

PPG | EPD-Engineering | PPG

**Create** bid structure

**Manage** customer requirements

**Create** product structure

**Create** technical order structure

**Daniel**
Sales Rep

**Barbara**
Systems Engineer

**Lars**
Project Engineer

**Order Execution Phase**

EPD-Collaboration | ERP MM, PS & PPG

**Handover** documents to supplier

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**Start** procurement

**Manage** project

**Mara**
Technical Buyer

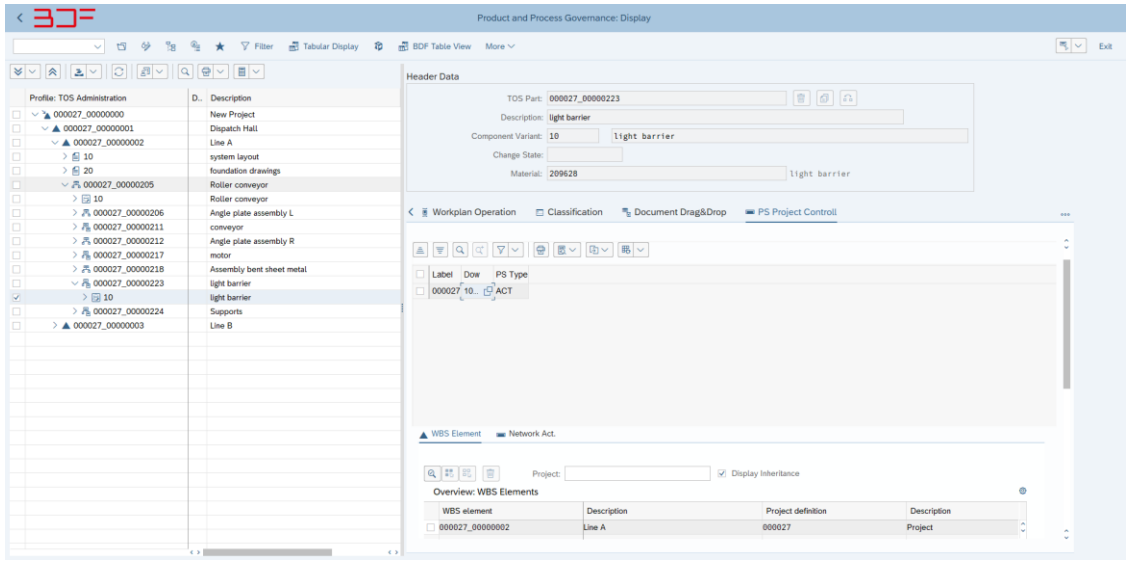
**Lars**
Project Engineer

# Start Procurement

## Business Outcomes

*"As an **Project Engineer**, I want to manage the scope of supply and required delivery resources in a central and flexible way."*

**Lars**
Project Engineer




## Process Highlights & Benefits

**Provide integrated Information of** product sourcing disciplines including production, procurement, EWM & QM into one product definition

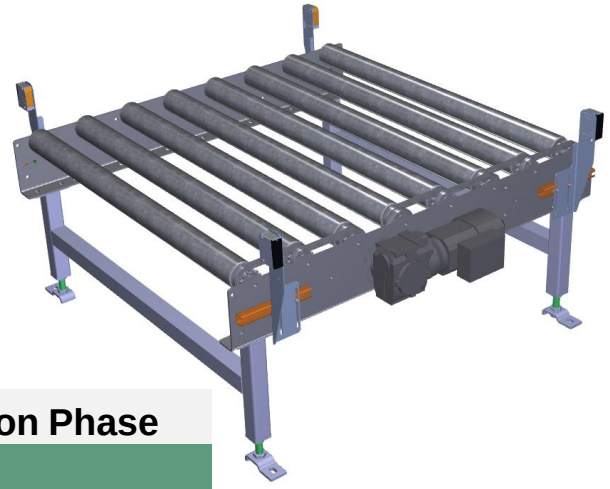
**Plan and track the missing documents, materials and personal resources** production aids, production documents, working instructions, …..

**Usage of early watch capabilities** in order to identify bottlenecks early

**Integrated Document supply chain** for transferring and receiving documents supports a proper claim management

**Better decision-making** due to up to date information of the status of each single position in the project

# From Design to Sales: Detailed Process Flow



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Systems Engineer

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**Order Execution Phase**

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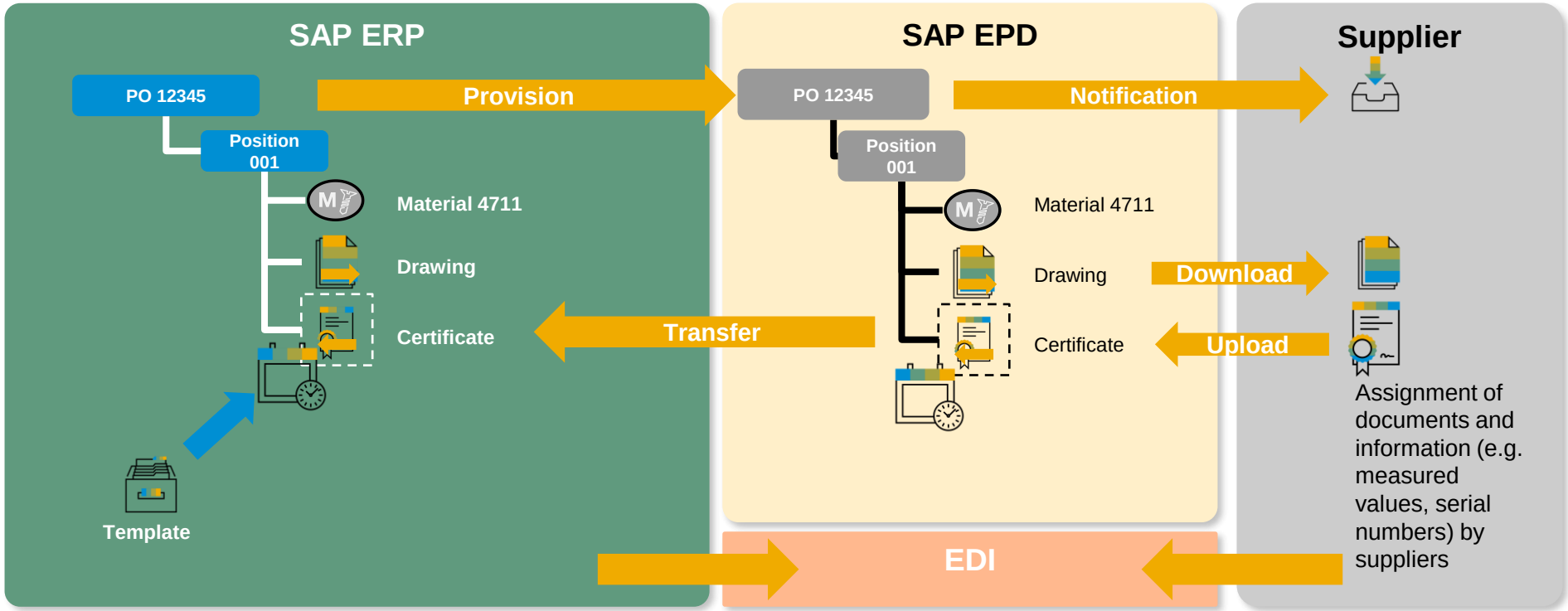
Project Engineer

# Digital Procurement




Folder structures for managing document templates and purchasing processes

Traceability and control through external progress tracking and extended workbench

Automatic document detection and -generation in inquiry, order, delivery schedule

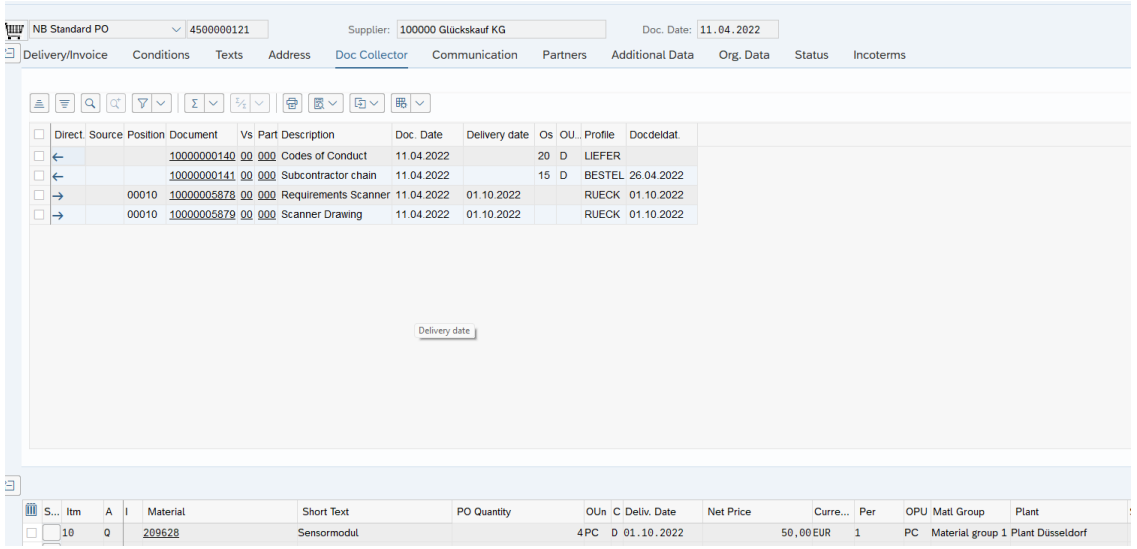
Mapping of complex systems for external maintenance by system suppliers

# Manage purchase order

## Business Outcomes

*"As a **Technical Buyer**, I want to see the outgoing and incoming documents and a desired delivery date from the project."*

**Mara**
Technical Buyer




## Process Highlights & Benefits

**Provide integrated Information of** of the sourcing process for each position within the project

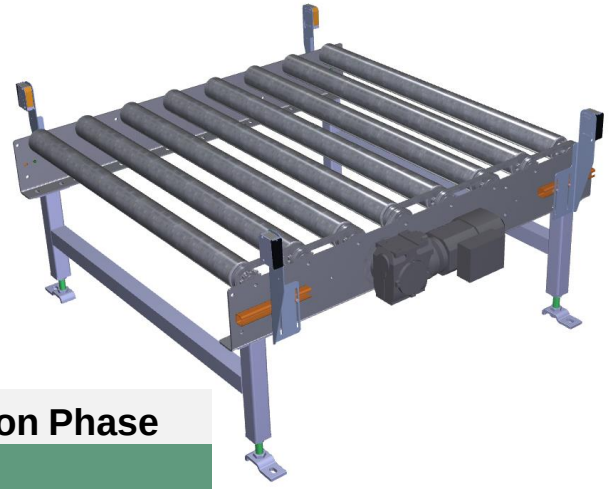
**Plan standardized incoming documents** such as certificates, material tests, codes of conducts, …..

**Synchronize** the time schedule of the project with the delivery dates of the purchase order

**Provide** outgoing and incoming documents for each position

**Better decision-making** due to accurate definition of the products to buy and their time schedule

# From Design to Sales: Detailed Process Flow



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**Handover** documents to supplier

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**Mara**
Technical Buyer

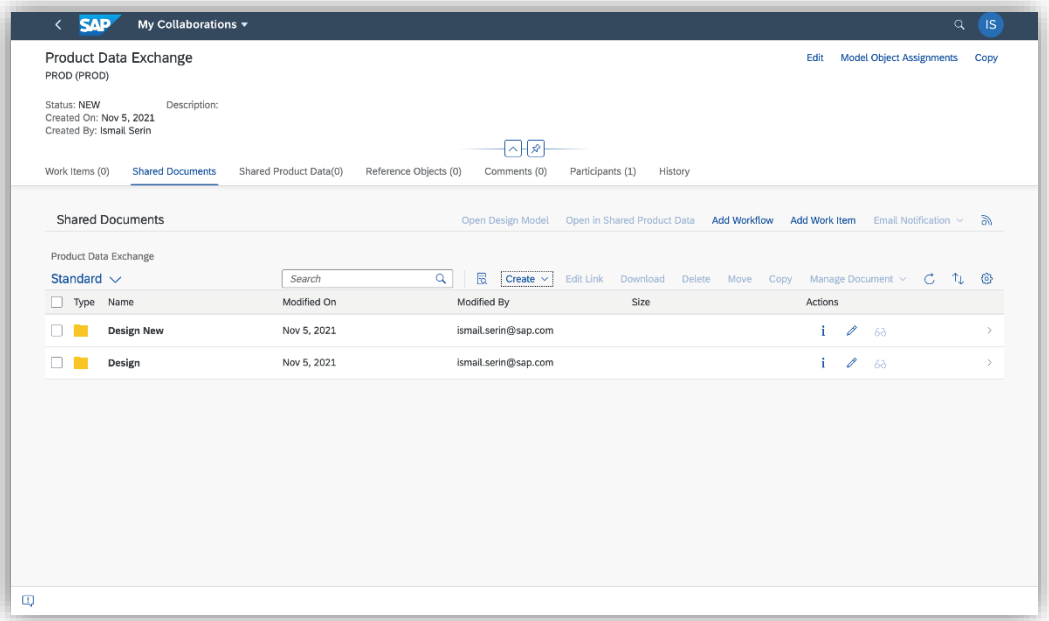
**Lars**
Project Engineer

# Handover documents to supplier

## Business Outcomes

"As a ***Technical Buyer***, I want to **exchange product data** (e.g., BoM's, 3D models, documents) and manage the RFx process to **lower product costs**."

**Mara**
Technical Buyer




## Process Highlights & Benefits

**Create collaborations** and invite suppliers to exchange product data

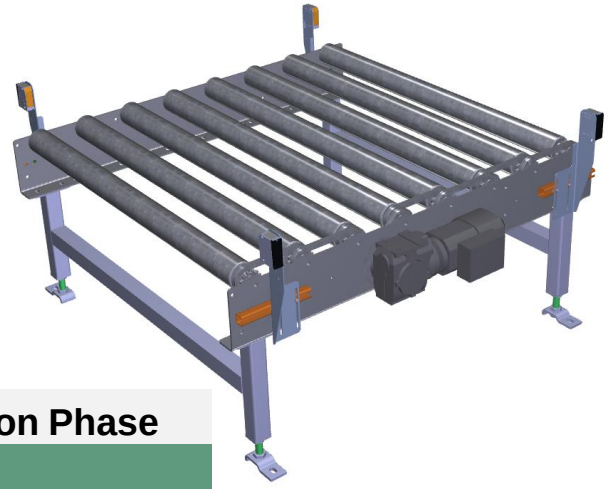
**Link collaborations** to purchase orders

**Flexible search and filter** options to navigate to the right collaboration across multiple suppliers

**Workflow driven collaboration** with suppliers for safe exchange of information

**Bi-directional exchange** of documents from S/4HANA Document Management System

# From Design to Sales: Detailed Process Flow



**Bid Phase** | **Order Execution Phase**

PPG | EPD-Engineering | PPG

**Create** bid structure — **Daniel**, Sales Rep

**Manage** customer requirements — **Barbara**, Systems Engineer

**Create** product structure

**Create** technical order structure — **Lars**, Project Engineer

**Order Execution Phase**

EPD-Collaboration | ERP MM, PS & PPG

**Handover** documents to supplier

**Manage** purchase order — **Mara**, Technical Buyer

**Start** procurement

**Manage** project — **Lars**, Project Engineer

# Summary

**The Design-Driven Enterprise is AGIL.EFFICIENT.CUSTOMER-CENTRIC**

- ✓ **Increase the level of automation** in the process flow from engineering into sales, production, service via the **smart product structure**.
- ✓ **Increase the level of reuse** via templates and by embedding configurable modules and components in the **smart product structure.**
- ✓ Achieve a **high level of consistency, automation and accuracy** across all departments by utilizing **the smart product structure within the SAP core**.

# Design-Driven Enterprise

## From Project Start to Manufacturing & Procurement for the Project Business

22.04.2022

# Thank you & see you soon.

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Digital Supply Chain

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