AUTODESK UNIVERSITY

Share your Bill of Materials: Connecting PDM, PLM and ERP SD500011

Christian Gessner

Technical Evangelist | COOLORANGE

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About the Speaker

Christian Gessner

Christian Gessner is a co-founder and Technical Evangelist at COOLORANGE. In this role, he helps customers and resellers to use the right technology and tools to successfully design, implement and customize Autodesk data management solutions.

He has over 15 years of experience in software development with a focus on Autodesk data management products and Microsoft development technologies.

Prior to COOLORANGE, Christian was member of the data management software engineering team at Autodesk.

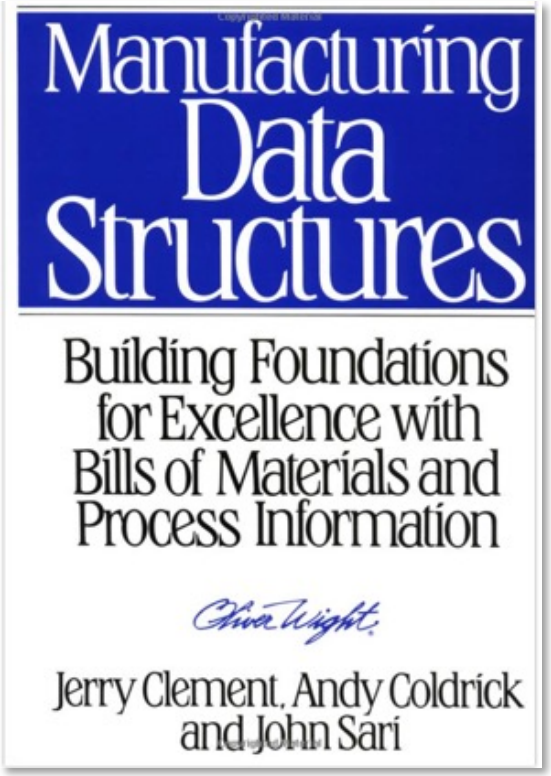
Share your Bill of Materials: Connecting PDM, PLM and ERP

Agenda

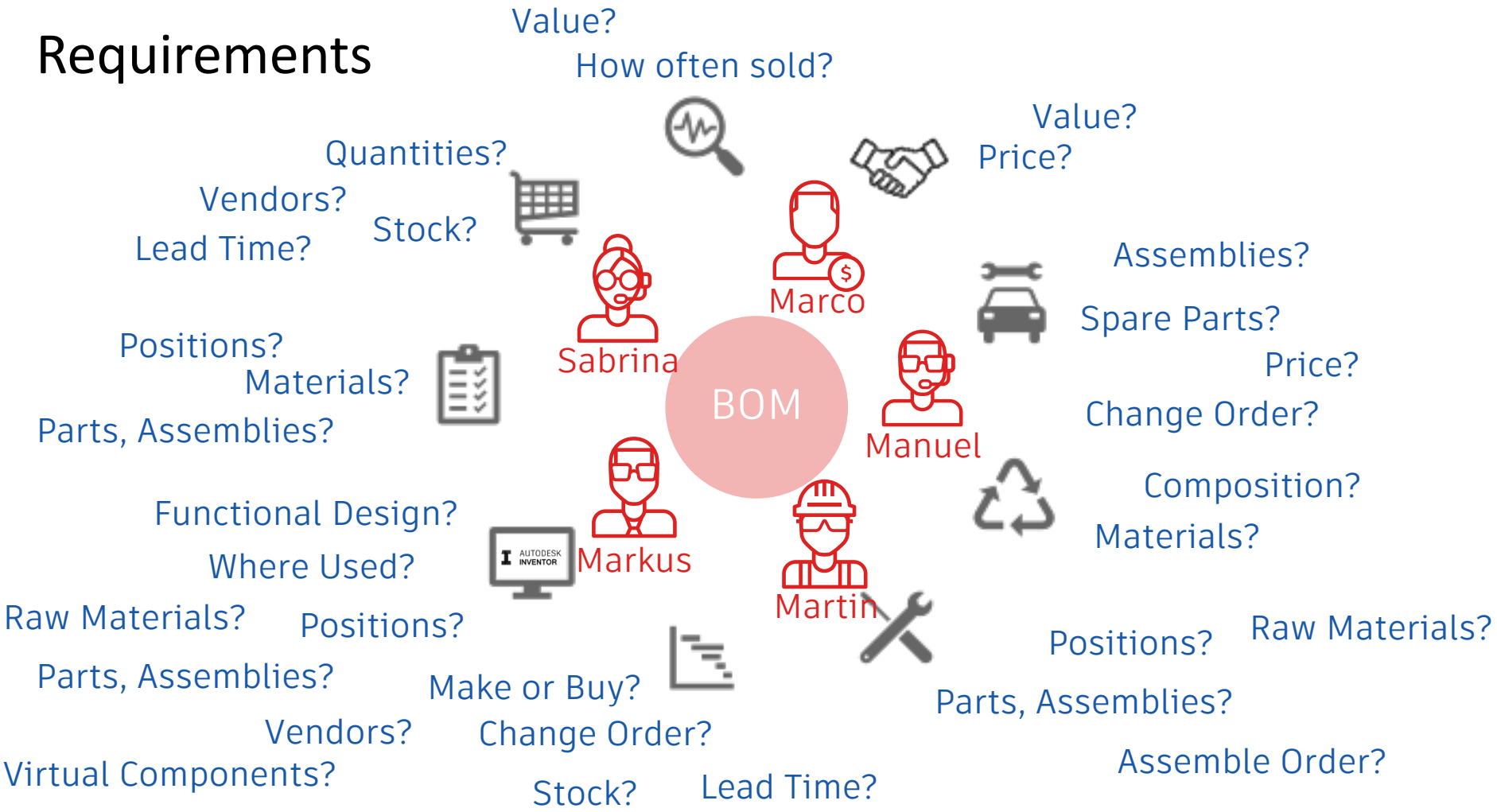
- Types of Bill of Materials
- Types of Applications
- Technical Challenges & Solutions
- Manufacturing BOM Editor (EBOM to MBOM)

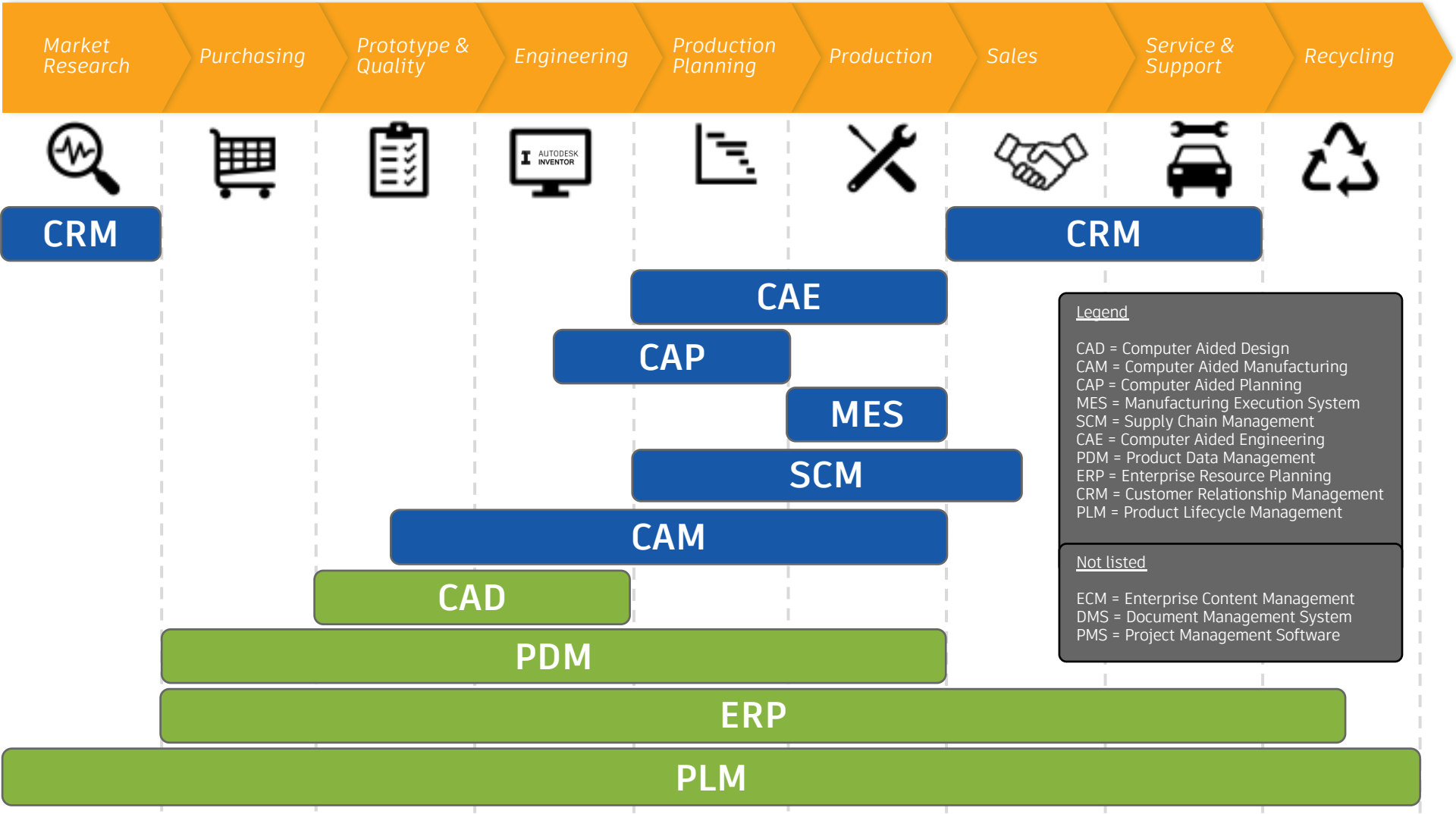
BOM ≠ BOM

BOM ≠ BOM

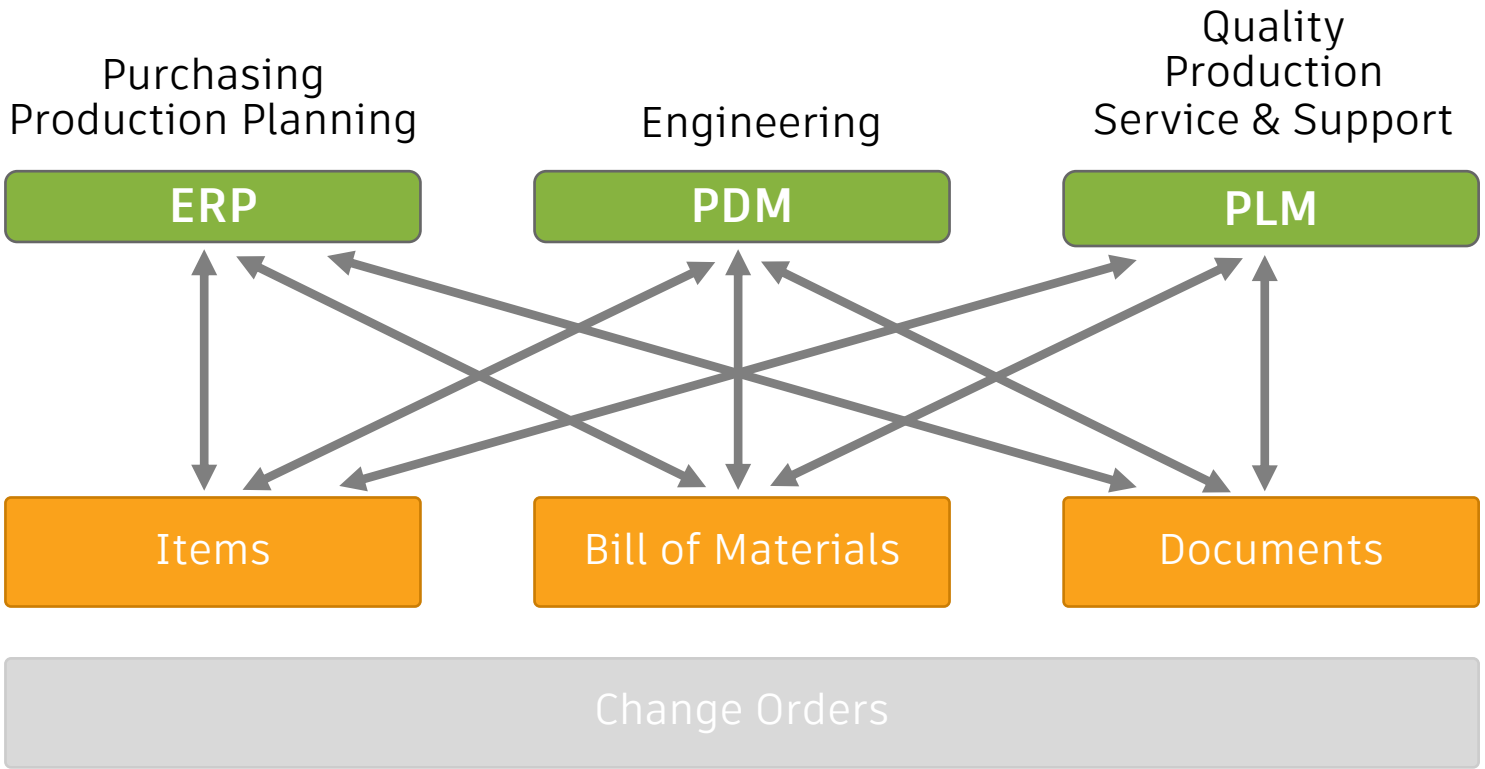

Manufacturing Data Structures
Building Foundations for Excellence with Bills of Materials and Process Information
Oliver Wight
Jerry Clement, Andy Coldrick and John Sari

Requirements




Market Research
Purchasing
Prototype & Quality
Engineering
Production Planning
Production
Sales
Service & Support
Recycling
AUTODESK INVENTOR
CRM
CRM
CAE
CAP
MES
SCM
CAM
CAD
PDM
ERP
PLM
Legend
CAD = Computer Aided Design
CAM = Computer Aided Manufacturing
CAP = Computer Aided Planning
MES = Manufacturing Execution System
SCM = Supply Chain Management
CAE = Computer Aided Engineering
PDM = Product Data Management
ERP = Enterprise Resource Planning
CRM = Customer Relationship Management
PLM = Product Lifecycle Management
Not listed
ECM = Enterprise Content Management
DMS = Document Management System
PMS = Project Management Software

Responsibilities



Type of Bill of Materials

Bill of Materials

The **Engineering BOM** reflects the way a product was functionally designed

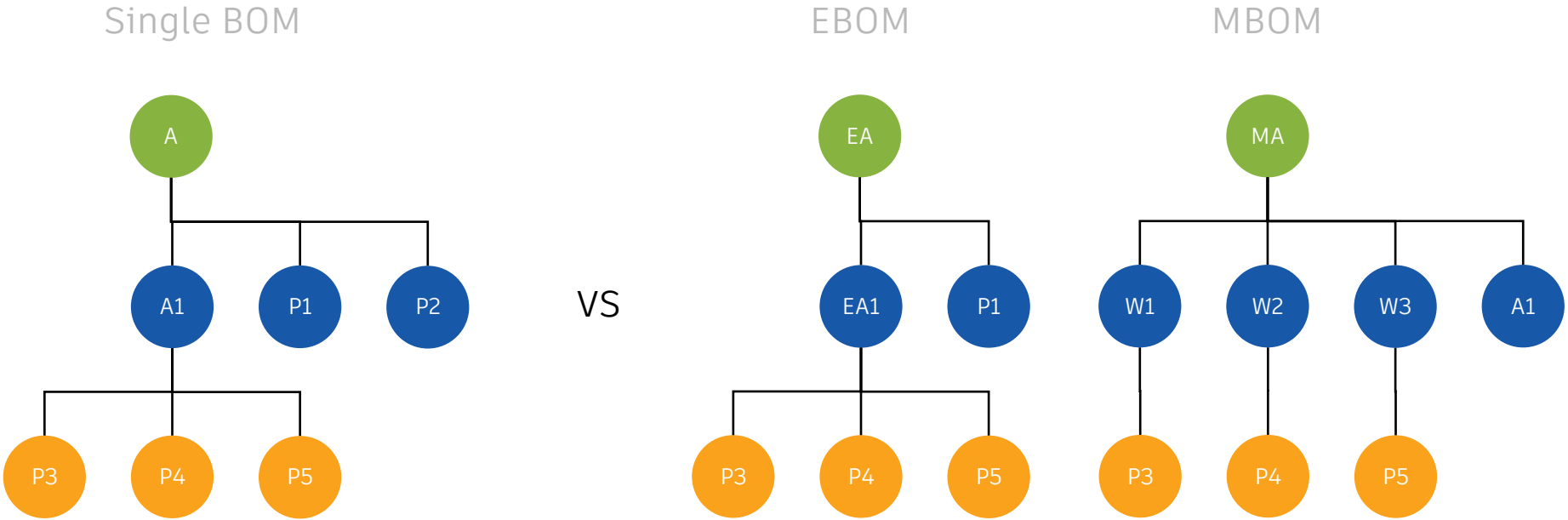
The **Manufacturing BOM** reflects the way a product will be manufactured

The **Procurement BOM**, WIP BOM that captures bought in components

The **Sales BOM** reflects the final sold and ordered product

The **Service BOM** is a list of all the serviceable parts needed to maintain an asset while it's in operation

One BOM vs multiple BOMs



Engineering BOM vs Manufacturing BOM

EBOM

- CAD Design (Structure)
- Functionally designed
- Relationship between components
- Reflects the structure of the product
- Assemblies, subassemblies, parts

PDM

AUTODESK® VAULT PROFESSIONAL

PLM

AUTODESK® FUSION 360® MANAGE

MBOM

- List of parts
- Standard or purchased
- Process planning
  - How to get the components
  - How to assemble the components
    - In which order

PLM

AUTODESK® FUSION 360® MANAGE

ERP

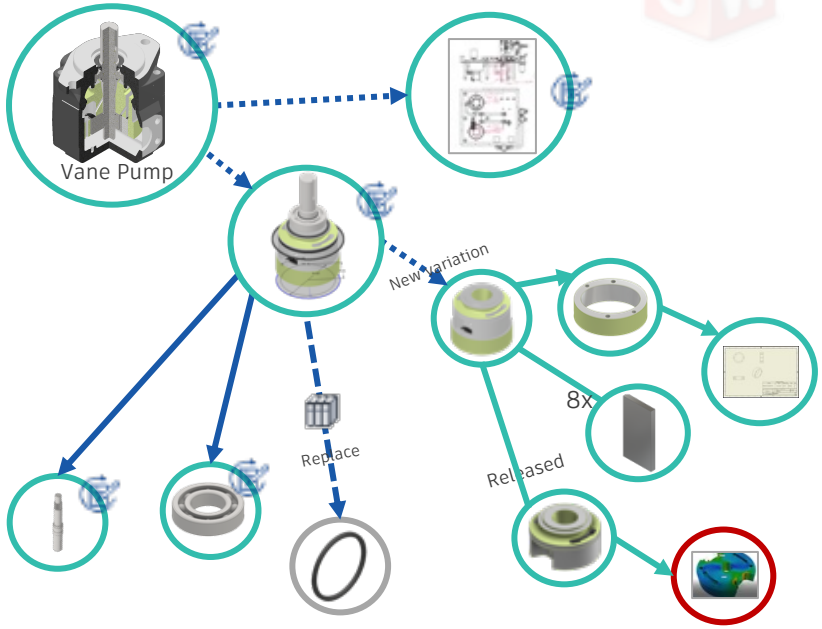
SAP

Microsoft Dynamics 365 Business Central

Different Apps… different BOMs

Vault: Engineering BOM (Item Master)

- Derived from CAD Data (Inventor, ACADM, ACADE, SWx) or built based on manually created items
- Item types: CAD vs Manual
- Linked and synched to Files in Vault
- Fully aware of **CAD BOM**
- Instance properties
- **Can contain multiple rows with same item number**

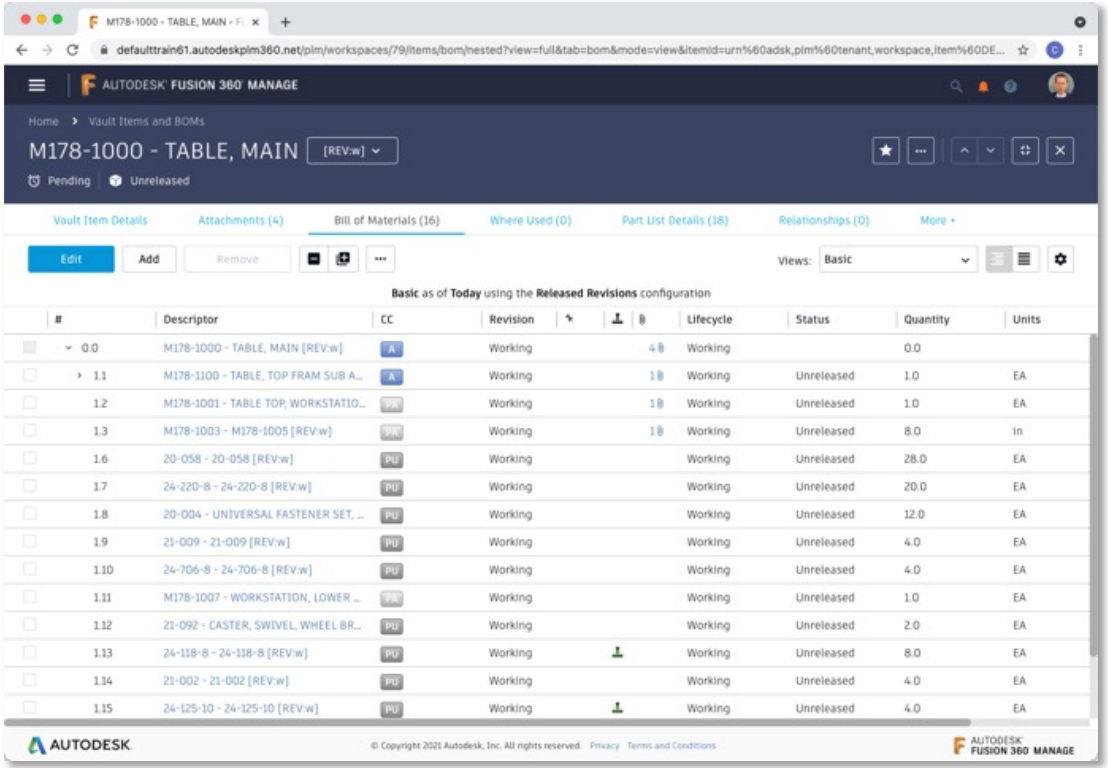


Vault Engineering BOM is derived from CAD Data (Inventor, ACADM, ACADE, SWx) and full integrated with CAD BOM incl. revision control
Support workflows like Long lead items and many others

Markus

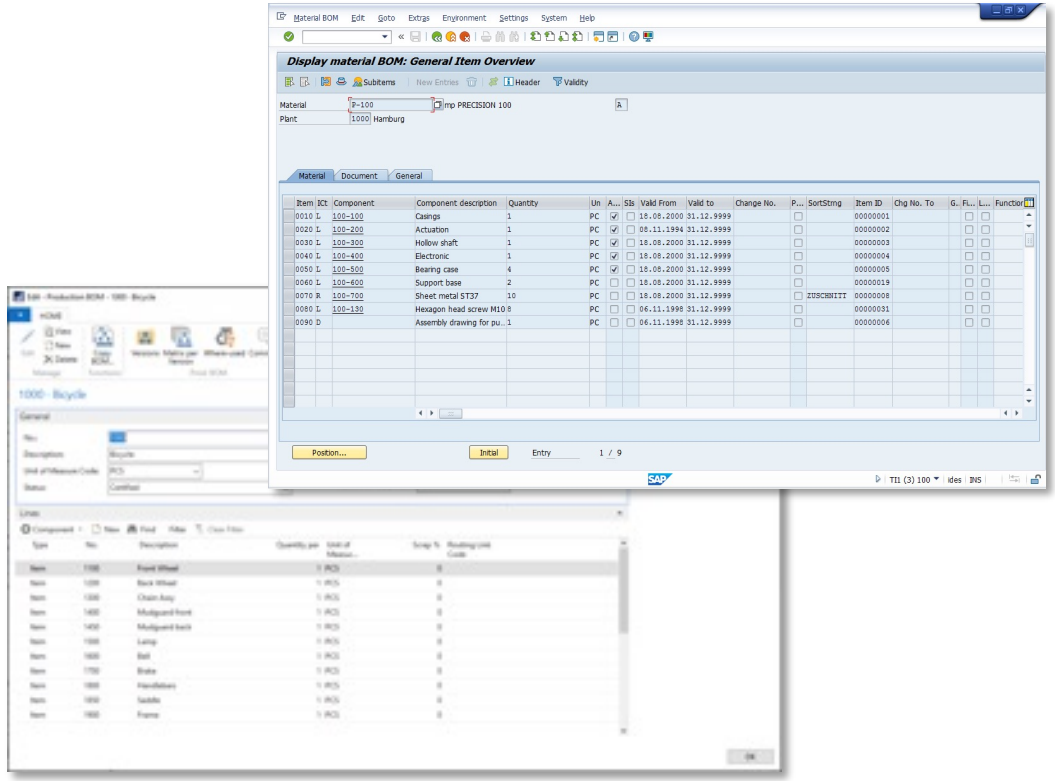
Fusion 360 Manage: Engineering BOM (+ MBOM)

- **Unique item number required**
  - even if position number is different
- Can link to latest revision or “pinned” version
- Different Views
- Suitable for EBOM and MBOM



ERP: Manufacturing BOM

- Item Numbers (Part Numbers)
- Manufacturing BOM (Production)
- Additional Information needed
  - Plant
  - Stock
  - Change Number
  - Valid From
  - Valid To



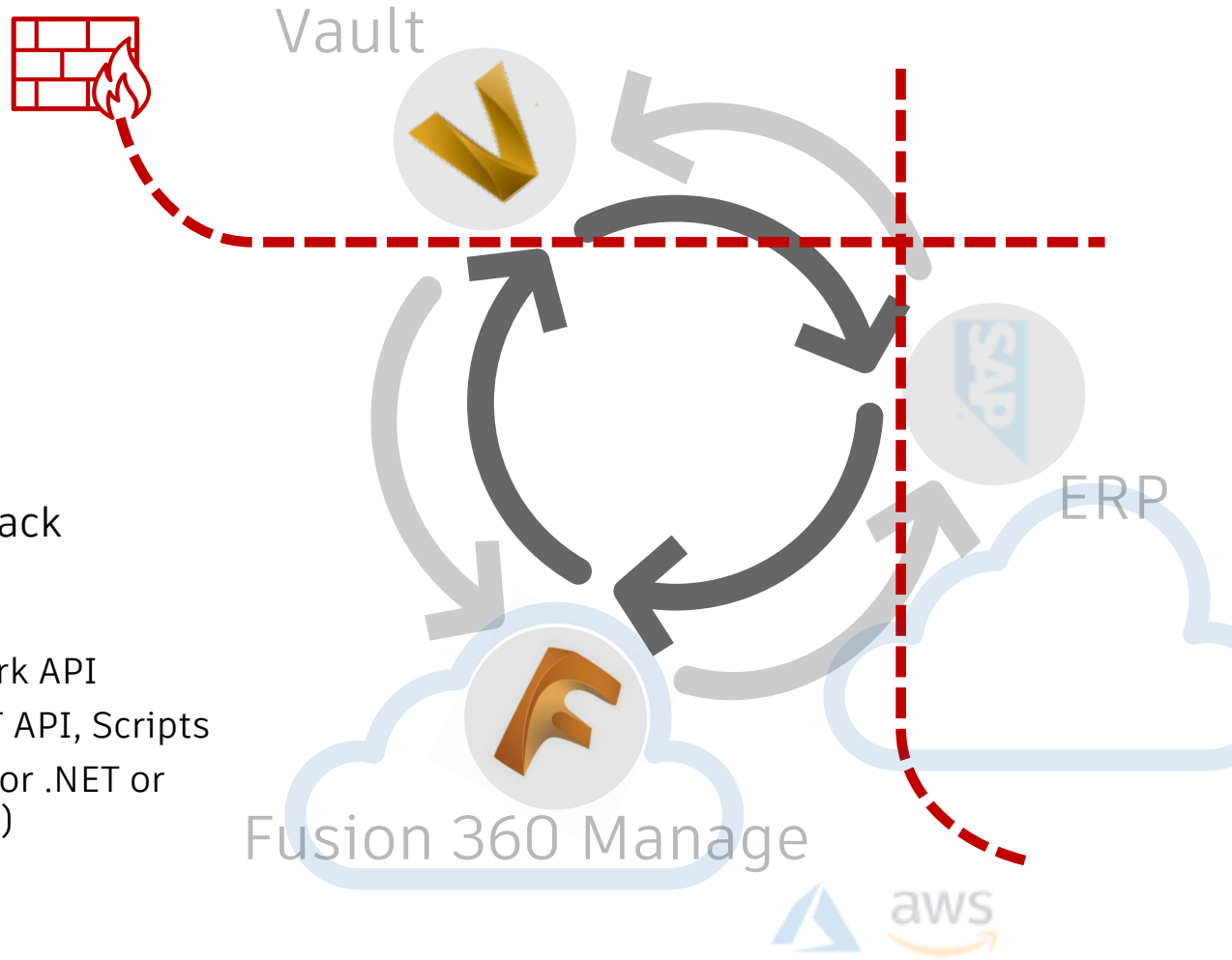
Sabrina
Marco
Manuel

Technical Challenges & Solutions

Challenges

Hybrid IT Landscape

- Cloud & On-Prem
- Firewalls & VPN
- Inbound & Outbound
- Polling & Webhook / Callback
- Different APIs
  - Vault SDK: .NET Framework API
  - Fusion 360 Manage: REST API, Scripts
  - ERP: SOAP or REST or DB or .NET or other APIs (e.g. SAP BAPI)



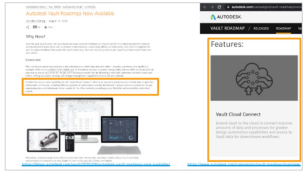
Technology

APIs and Solutions

.NET Framework API

Connecting Vault + ERP

Connecting to Vault from outside a Firewall



SOAP API

REST API

Database Access

.NET API

Other APIs (e.g. SAP BAPI)

Connecting Vault + Fusion 360 Manage

REST API

Forge Webhooks

Scripting

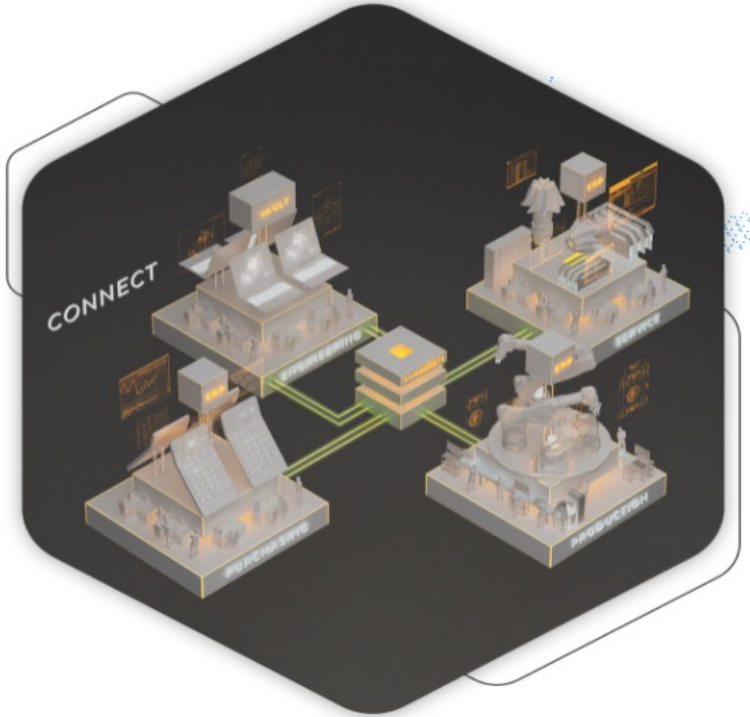
COOLORANGE

POWER UP YOUR DATA

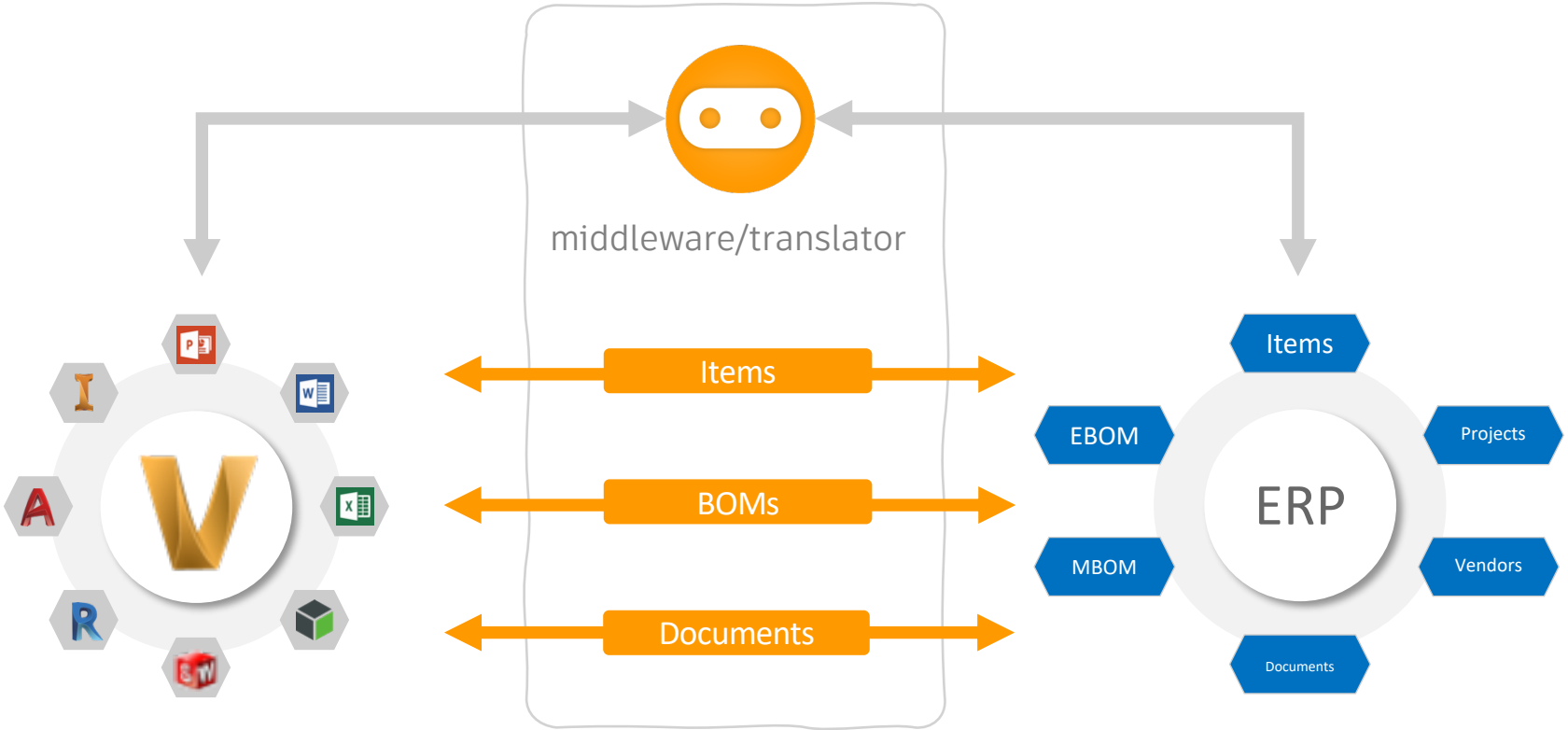
Connecting Autodesk Vault to your ERP system with powerGate

powerGate is the best-in-class connection software for Autodesk Vault customers, helping engineers and designers **cut the time on creating, updating and transferring engineering BOM's to the ERP System** while improving the quality and accessibility of the documentation needed by other teams.

powerGate connects Vault to ERP in just a few weeks, offering complete flexibility in terms of customization.



powerGate


middleware/translator
Items
BOMs
Documents
Items
EBOM
Projects
ERP
MBOM
Vendors
Documents

Autodesk Vault Professional 2021

Sign In

File Edit View Go Tools Actions Help

New Standard File ... | Edit File Datasheet ... | powerJobs | Report... | Plot... | Check In... | Find... | Share View | Download from Cloud Drive | Search Help

Default View | Layout | Workspace Sync... | Change Category... | Change State... | Change Revision...

Home

- Vault - Administrator
  - Duplicates Dashboard
  - Change Order List
  - Item Master
  - Project Explorer ($)
    - Content Center Files
    - Designs
      - Car Seat
      - Demo
    - Libraries
    - test
  - My Search Folders

My Worklist

My Shortcuts

Add new group

Home
Duplicates Dashboard
Project Explorer
Item Master
Change Order List

Car Seat

Search Car Seat

Name	State	Revision	Part Numb...
File			
_Car Seats.iam	Work in Progress	A	_Car Seats
Car Seat.iam	Released	A	100-00
Car Seat.idw	Work in Progress	A	100-00
Handle.ipt	Released	A	100-01
Spring Holder Pin_MIR.ipt	Work in Progress	A	100-01
Side Handle Pivot Pin_MIR.ipt	Work in Progress	A	100-02
Spring Holder Pin.ipt	Released	A	100-02
Bell Crank Side Handle_MIR.ipt	Work in Progress	A	100-03
Side Handle Pivot Pin.ipt	Released	A	100-03
Bell Crank Side Handle.ipt	Released	A	100-04
Rear Pivot Lock Plate_MIR.ipt	Work in Progress	A	100-04
Rear Pivot Lock Plate.ipt	Released	A	100-05

History | Uses | Where Used | Change Order | Preview | SAP BOM | SAP DIR | SAP Material | SAP Search

Number of versions: 7 (Local = Version #7)

Number of revisions: 2

Show all versions

Thumbnail	File Name	Revision	State (Historical)	Created By	Checked In	Comment
	Car Seat.iam	A	Released	Administrator	10/20/2020 12:1...	Released to manufacturing
	Car Seat.iam			Administrator	9/29/2020 7:05 ...	Autoloader upload to Vault

Properties

Car Seat.i...

- System
- User Defined

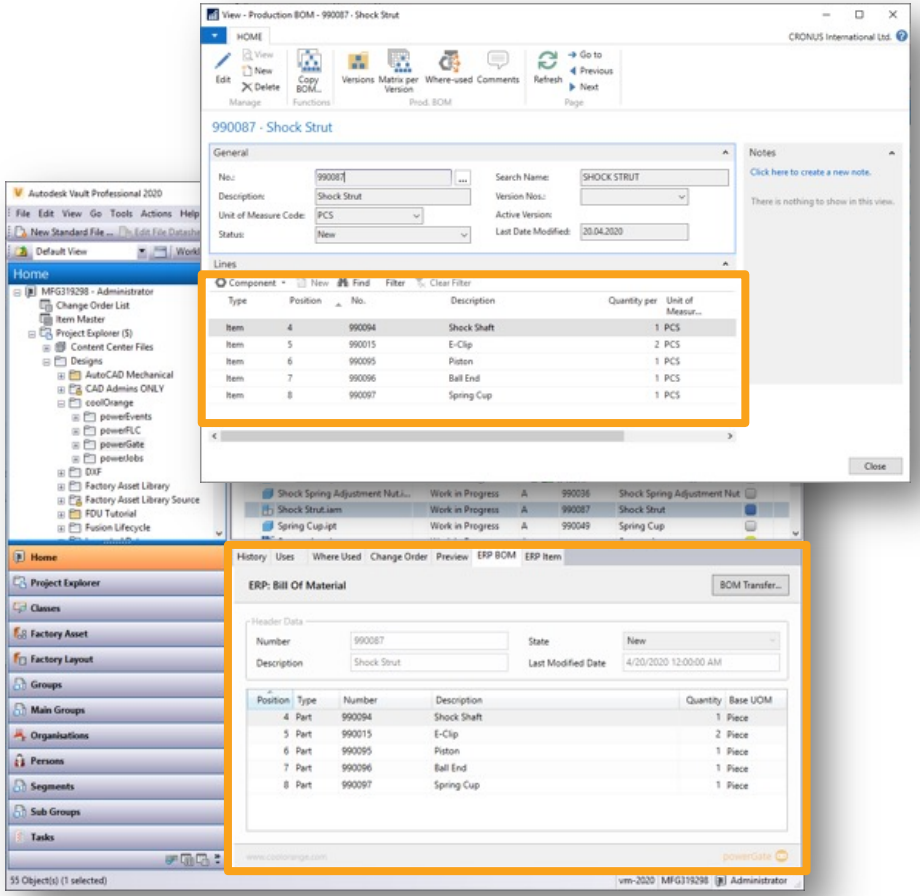
Applicatio...	2021 (Build 25...
Author	Inventor
Checked By	
Comments	
Company	Autodesk Inc.
Cost	
Description	SUPER CAR DR...
Designer	Autodesk Inc.
DWG Type	
Engineer	
Engr Appro...	
Keywords	
Manager	
Material	
Mfg Appro...	
Part Number	100-00
Project	
Raw Number	
Raw Quant...	
Stock Num...	
Subject	
Title	

148 Object(s) (1 selected)

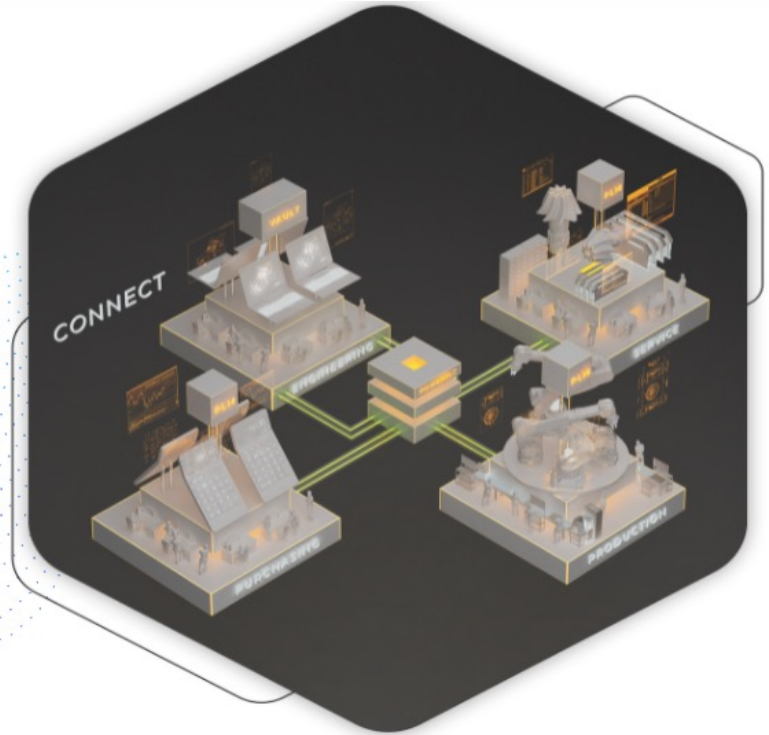
localhost | Vault | Administrator

powerGate – Summary

- Integrated in Vault + Inventor workflows
- Brings ERP data into Vault + Inventor (bi-directional and live)
- Synchronizes Items and BOMs
- Ensures data integrity
- Works with Vault Workgroup or Vault Professional
- Customizable



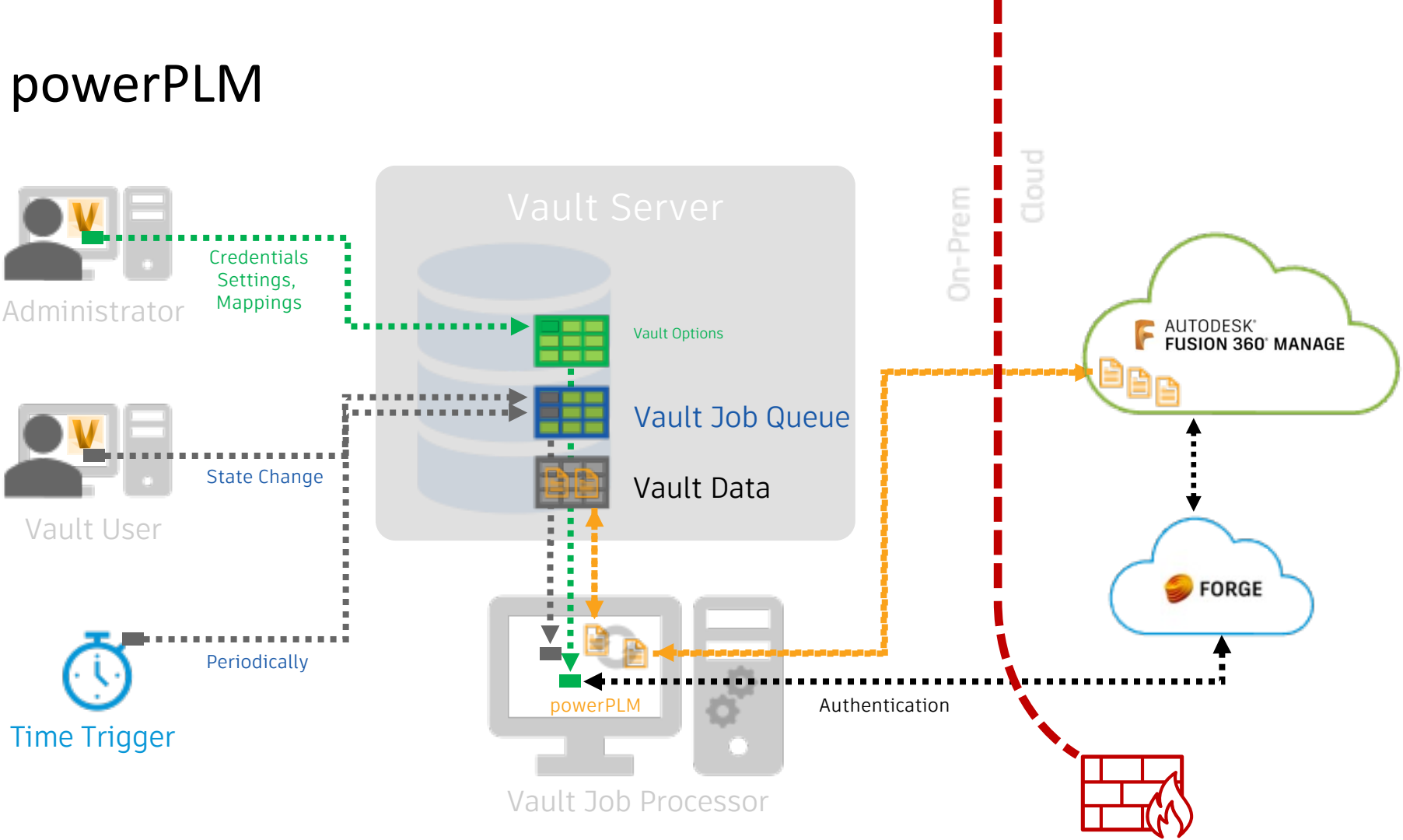
COOLORANGE
POWER UP YOUR DATA



Connecting Autodesk Vault to PLM with powerPLM

powerPLM is the 100% Autodesk-focused solution deeply integrated with engineering tools such as Autodesk Inventor and Autodesk Vault, with direct connection to Autodesk Fusion 360 Manage.

powerPLM


Administrator
Credentials
Settings,
Mappings
Vault Server
Vault Options
Vault Job Queue
Vault Data
Vault User
State Change
Periodically
Time Trigger
powerPLM
Vault Job Processor
On-Prem
Cloud
AUTODESK
FUSION 360 MANAGE
FORGE
Authentication

Autodesk Vault Professional 2021

File Edit View Go Tools Actions Help

New powerJobs Report... Plot... Check In... Go to: Enter an item number Find... Share View Download from Cloud Drive Search Help

All Items Workspace Sync... Change Category... Change State... Change Revision...

Home

- Item Master
- Project Explorer ($)
  - Content Center Files
  - Designs
    - AutoCAD Mechanical
    - CAD Admins ONLY
    - coolOrange
    - DXF
    - Factory Asset Library
    - Factory Asset Library Source
    - FDU Tutorial
    - Fusion Lifecycle
    - Imported Data
    - Inventor Sample Data
      - Car Seat
      - Fishing Rod Model
      - Inventor CAM
      - Inventor TolAnalysis
      - Jet Engine Model
      - Models
        - 3D Annotation
        - AEC Exchange
        - Assemblies
          - Blower
          - Engine MKII
          - Metal Container
          - Personal Computer
          - Scissors

My Worklist

ECO-000002 (7/31/2018)

My Shortcuts

- Documentation
- M178-1000.iam
- M178-1000

Add new group

Home

Duplicates Dashboard

Project Explorer

Item Master (Search Results)

table

Number	Revision	State	Title (Item,CO)
M178-1001	B	In Review	TABLE TOP, WORKSTATION
M178-1000	B	In Review	TABLE, MAIN
M178-1003	B	In Review	M178-1005
M178-1100	B	In Review	TABLE, TOP FRAM SUB ASSY

General | History | Bill of Materials | Where Used | Change Order | View

Revision: Latest In Review

Number: M178-1000

Title: TABLE, MAIN

Description: TABLE, MAIN

Units: Each

Category: Assembly

Lifecycle State: In Review

Last Updated By: Administrator

Last Updated: 10/18/2020 2:52 PM

Associated files:

File Name	Version
M178-1000.idw	4
M178-1000.iam	6
M178-1000.dwg	3
Assembly Instructions.pdf	1

Properties:

Name	Value
Equivalence Value	M178-1000

Properties

Assembly Instructions.pdf

System

Category Name	Other Files
Category Name (Historical)	Other Files
Change Order State	
Checked In	10/18/2020 12:45 PM
Checked Out	
Checked Out By	
Checked Out Local Spec	
Checked Out Machine	
Classification	None
Comment	
Controlled By Change Order	False
Created By	Administrator
Current Owner	VM-2021\AUTODESKVAULT
Date Modified	10/8/2020 2:16 PM
Date Version Created	10/18/2020 12:45 PM
File Extension	pdf
File Name	Assembly Instructions.pdf
File Name (Historical)	Assembly Instructions.pdf
File Replicated	True
File Size	1945481
Folder Path	$/Designs/Inventor Sample Da...
Has Drawing	
Has Parent Relationship	False
Hidden	False
iLogicRuleStatus	
Initial Approver	
Initial Release Date	
Item Assignable	True
Latest Released Revision	False
Latest Version	True
Leased Until	10/18/2020 12:45 PM
Lifecycle Definition	
Lifecycle Definition (Histori...	
Linked to Item	False

4 Items (1 selected)

vm-2021 MFG463684 Administrator

Type here to search

powerPLM – Summary

- **Vault Item centric**
  - Vault Item BOM derived from CAD Data
  - Triggered on Vault item release
- **Publish Vault Item metadata**
  - Item metadata
  - Primary linked file metadata
  - Vault thin- and thick client links
- **Publish engineering BOMs**
  - Merged BOM rows (Inventor “Part Number Row Merge Settings”)
  - Rows manually added in Fusion 360 Manage
  - Cutting list (Part List Details)
  - Raw materials
  - Virtual Components
- **Upload Vault Item attachments and associated files attachments**
- **Fusion 360 Manage App (workspace) available**

AUTODESK VAULT - ALL POSTS AUTODESK VAULT - UPDATES

Autodesk Vault Roadmap Now Available

Jon den Hartog August 11, 2020

(0) Save

Why Now?

Over the past several years, the Vault team has made customer feedback an integral part of the product development process. Our development team meets with customers at their facilities, in Autodesk offices, at conferences, and online throughout the year to capture feedback from across the Vault community. Plans for upcoming releases are shaped by market needs more than ever before.

Connected

This is all about connecting Vault users and collaborators to their data and each other – anytime, anywhere. One significant example of this is the Autodesk Vault mobile app. In November last year, customer surveys indicated over 60% are looking for an easy way to access data while on the go. We're looking to enable that by delivering a rich Vault experience on both phones and tablets, with great search, viewing, and change management capabilities on both iOS and Android.

Another big one is a new capability we call "Vault Cloud Connect," which is an option to extend access to Vault data to specified collaborators of interest, including different suppliers or collaborators outside the firewall. It allows users to continue to manage engineering data and collaborate when outside of the office network, providing greater flexibility and extensibility when they need it.

Nowadays, everyone needs to be able to access their data at any time, anywhere. Vault is becoming increasingly web-enabled and extending to new platforms with native apps for phones and tablets.

https://blogs.autodesk.com/vault/2020/08/autodesk-vault-roadmap-now-available/

autodesk.com/campaigns/vault-roadmap/overv

AUTODESK.

VAULT ROADMAP / RELEASED ROADMAP VA

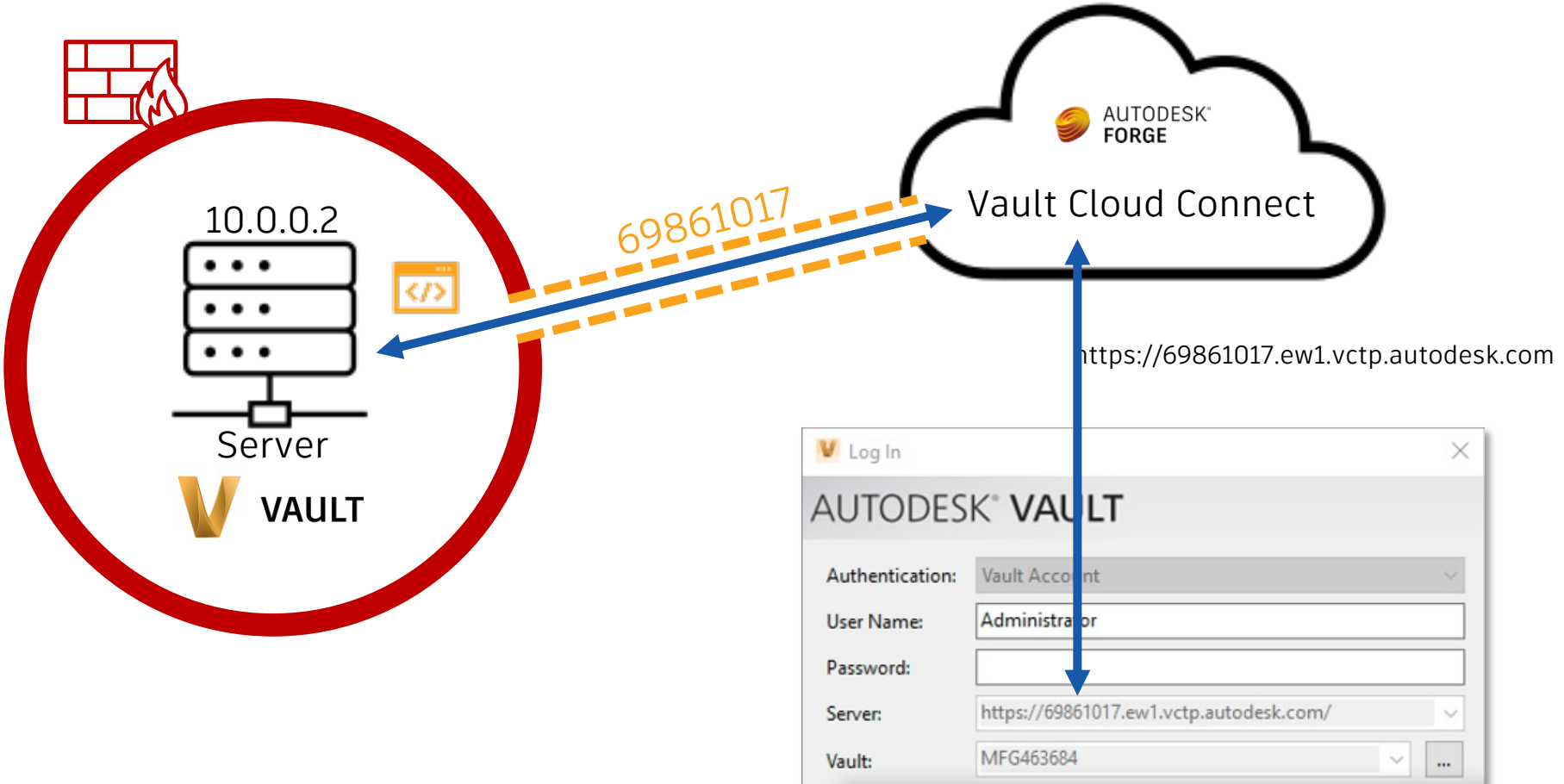
Features:

Vault Cloud Connect

Extend Vault to the cloud to connect massive amounts of data and processes for greater design automation capabilities and access to Vault data for downstream workflows.

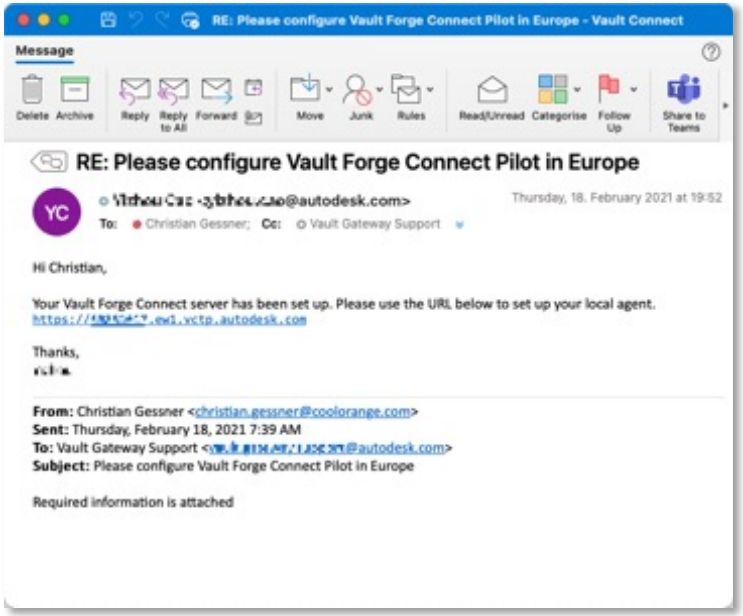
https://www.autodesk.com/campaigns/vault-roadmap/overview

Autodesk - Vault Cloud Connect



Autodesk – Vault Cloud Connect Summary

- Technology Preview – Invitation only by Autodesk Vault dev team
- Needs to be enabled / registered by Autodesk Account Team
- All Clients and Add-Ins supported
- A.K.A.
  - Vault Gateway
  - Vault Forge Connect
  - Vault Data Cloud Connect
  - Vault Cloud Connect
- Contact Autodesk Vault development team



Manufacturing BOM Editor

Manufacturing BOM Editor

CAD-1248 - table plate assembly

Engineering BOM

CAD-1248 - table plate assembly [REV:w]

CAD-1205 - Anti backla...	8	300	Add
CAD-1218 - flat head sc...	8	300	
CAD-1241 - Base table [...	1	000	
CAD-1201 - 90 aluminu...	12	300	
CAD-1204 - Anti backla...	1	100	Add
CAD-1227 - nylon Nut ...	8	100	Add
CAD-1251 - sku-465-wh...	4	100	Add
CAD-1237 - sku-465 be...	8	100	Add
CAD-1216 - Low Profile ...	3	100	Add
CAD-1215 - Low Profile ...	3	100	
CAD-1209 - build plate ...	1	100	
CAD-1206 - Anti backla...	1	100	

Manufacturing BOM

000070 - CAD-1248 - table plate assembly [REV:w]

CAD-1241 - Base table...	1	000
CAD-1218 - flat head s...	8	300
CAD-1201 - 90 alumin...	12	300
Backplate Assembly		100
CAD-1209 - buil...	1	100
CAD-1215 - Low ...	3	100
CAD-1206 - Anti ...	1	100

Type new component name | Qty

Type new component name | Qty

Add Operation | Title | Code

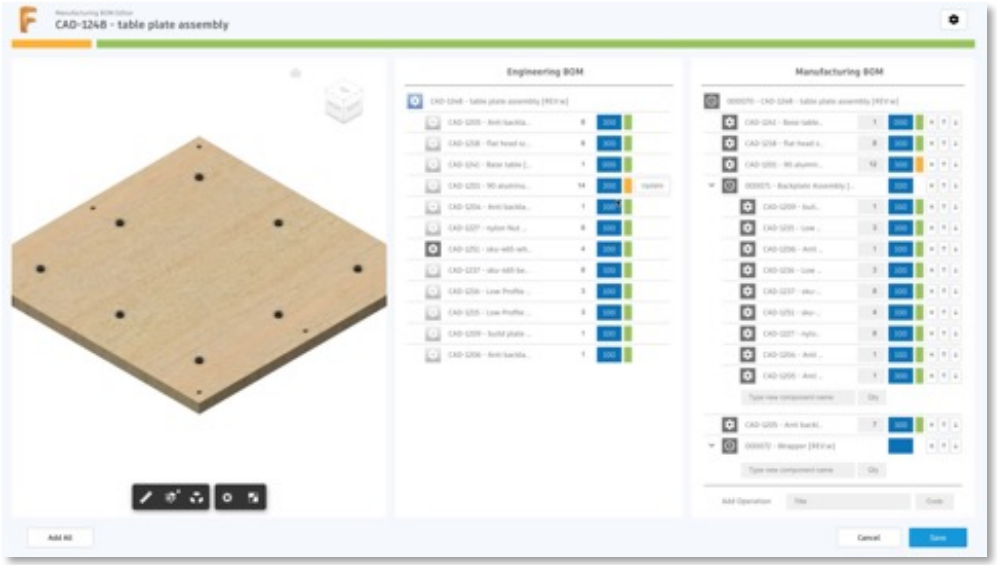
Add All

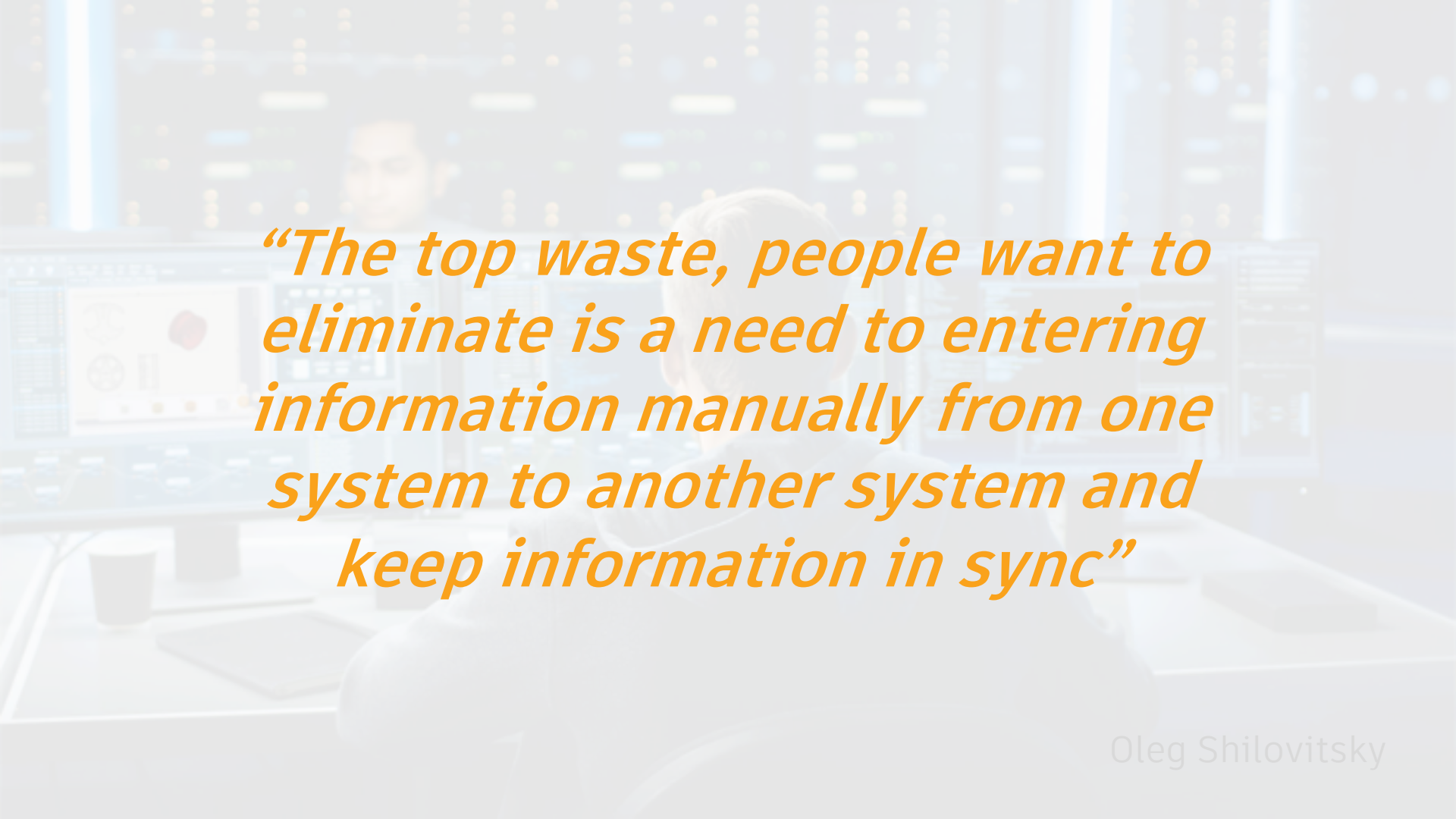
Cancel | Save

EBOM to MBOM

Manufacturing BOM Editor

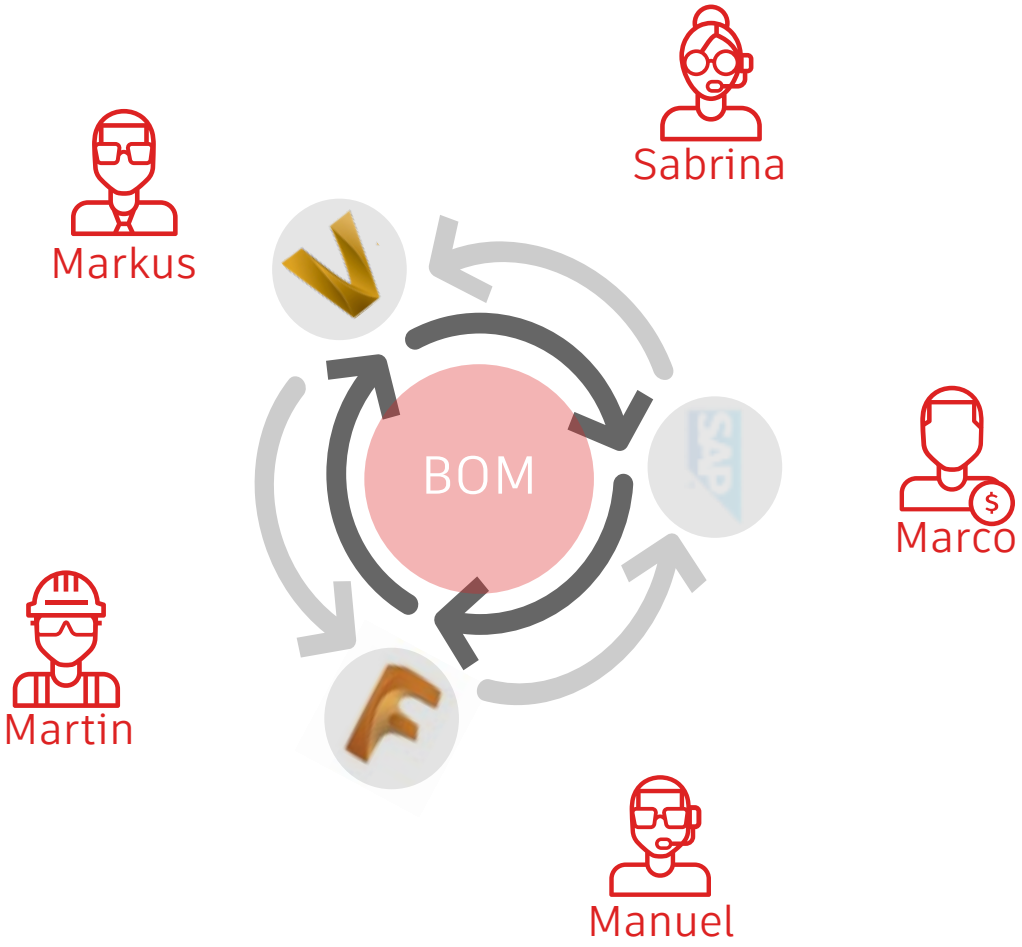
- https://www.autodesk.com/autodesk-university/class/BOM-transforming-Align-Engineering-and-Manufacturing-Bill-Materials-2021
- BOM transforming: Align Engineering and Manufacturing Bill of Materials
- Class ID: MFG500071
- Sven Dickmans (Autodesk)





“The top waste, people want to eliminate is a need to entering information manually from one system to another system and keep information in sync”

Oleg Shilovitsky


Markus
Sabrina
BOM
Marco
Martin
Manuel

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