Interoperable Digital Twins enabled by AAS

A cross-company use case and its benefits

INDUSTRY FORUM 2023
9:30 – 10:00 AM

Constantin Liepert

Siemens Digital Industries Software
PreSales & Business Development

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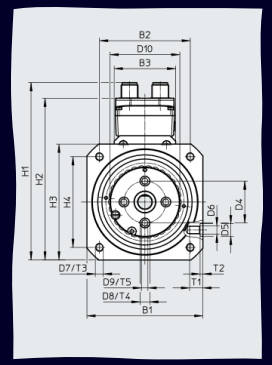
Introduction AAS

Evolution of component data support



Support Portal

AAS

MCAD

ECAD

Configuration

Behavior Model

Classification

PLC model

Documentation

2D

2D / PDF drawing

3D

3D model (e.g. STEP)

3D native CAD formats

+ E-CAD

+ documents

4D models

multidomain digital models

+ behaviour

+ interoperability

Data Smartness

2000s

2010s

2020s +

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Introduction AAS

What is the content of an Asset Administration Shell?

ID-Link

- Unique x-vendor standard for the identification of assets based of IEC 61406
- This asset ID is a worldwide unique string in the form of a web url, e.g.: ID-Link
- Behind the link the product information can be found

Engineering

- 3D geometry
- Drawings
- Simulation models
- Properties (e.g. via ECLASS)
- …

Documentation

- Installation and operating instructions
- Certificates
- Declaration of conformity
- …

Operation

- Order data
- Operating data
- Service notice (e.g. via OPC UA)
- …

static data

dynamic data

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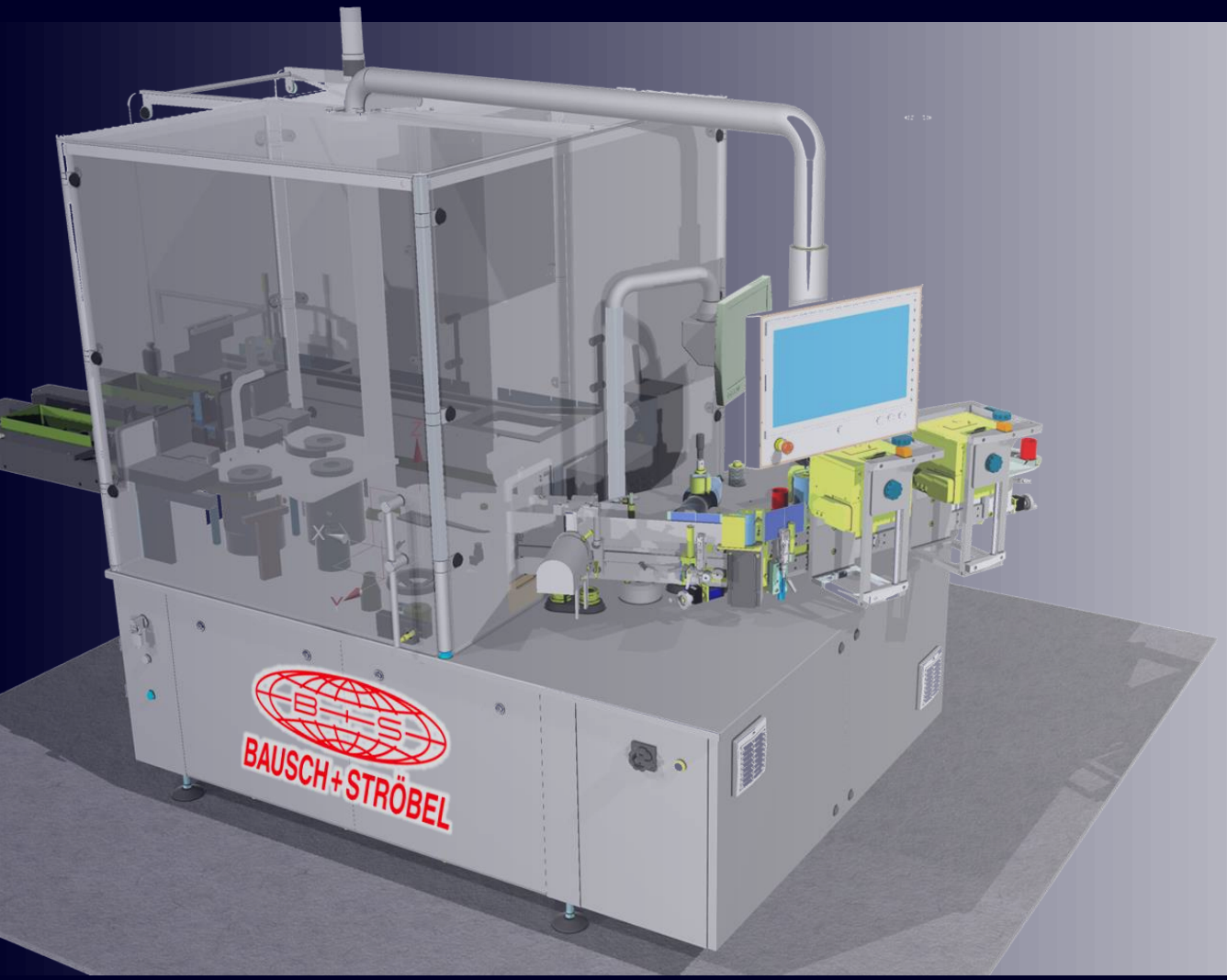
Cross-company AAS Use Case

Bausch+Ströbel labeling machine with different components



PHOENIX CONTACT

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WAGO

CADENAS

HARTING
Pushing Performance
Since 1945

FESTO

SICK
Sensor Intelligence.

rexroth
A Bosch Company

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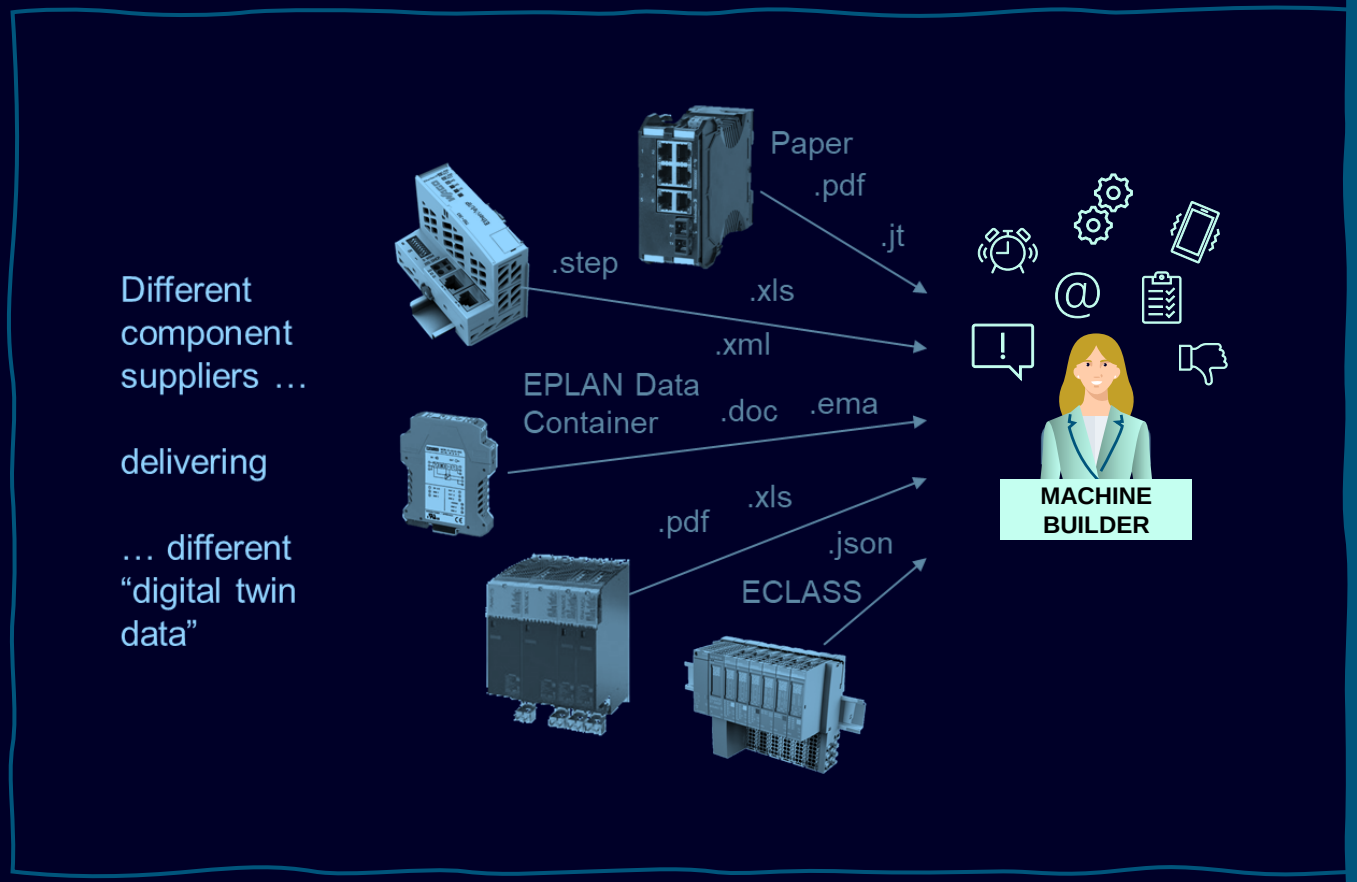
Cross-company AAS Use Case - Problem statement

“**High manual effort** required to exchange, search and integrate component data”



*“**Missing Interoperability** leads to …*

- ***inefficient** exchange*
- ***time consuming** identification*
- ***high effort** in structuring & completion*
- ★☆☆ ***lacking** quality*

*… of **digital twin** data”*

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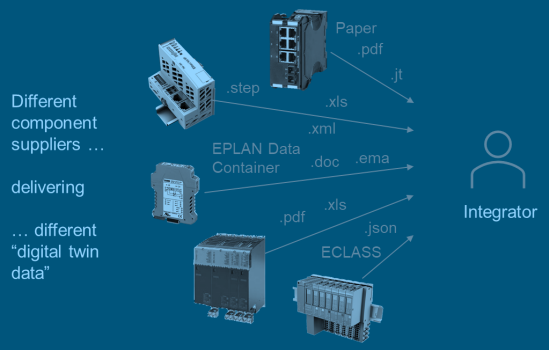
Cross-company AAS use case - Solution
Interoperable Digital Twin Data provided through PLM

Generic customer problem statement

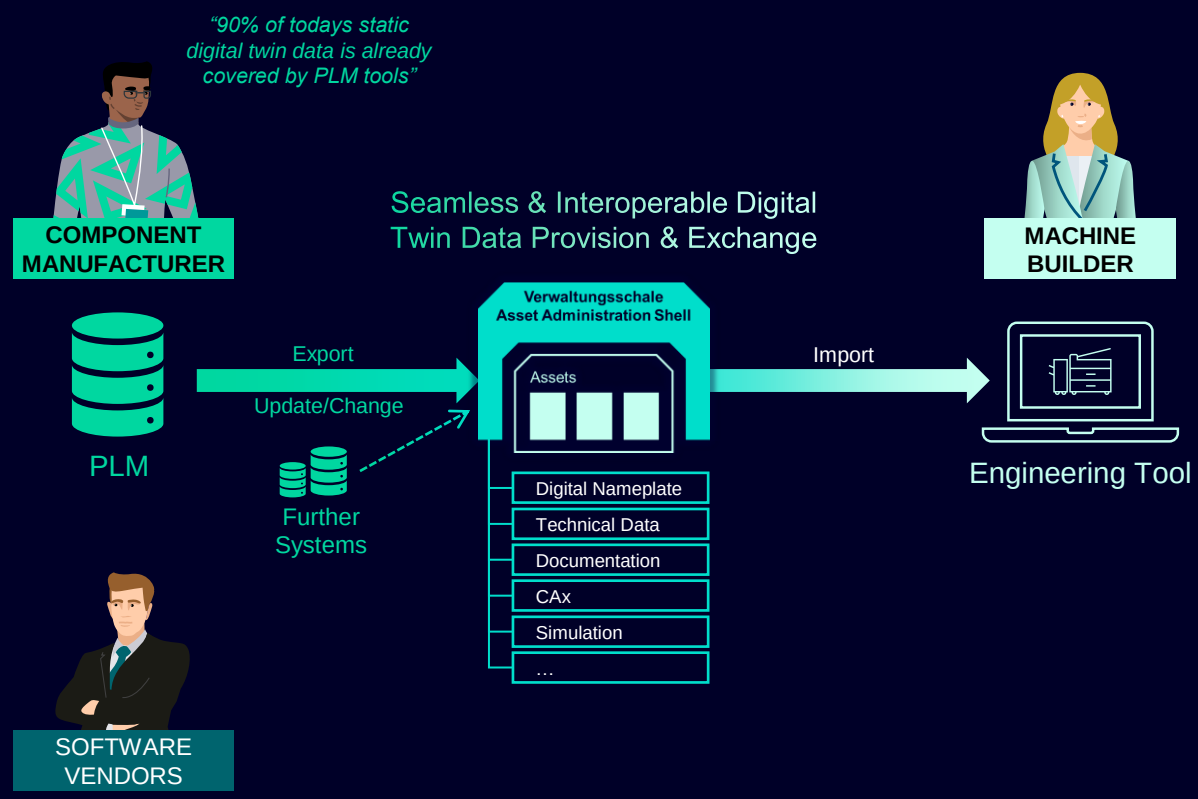
*"**Missing Interoperability** leads to …*



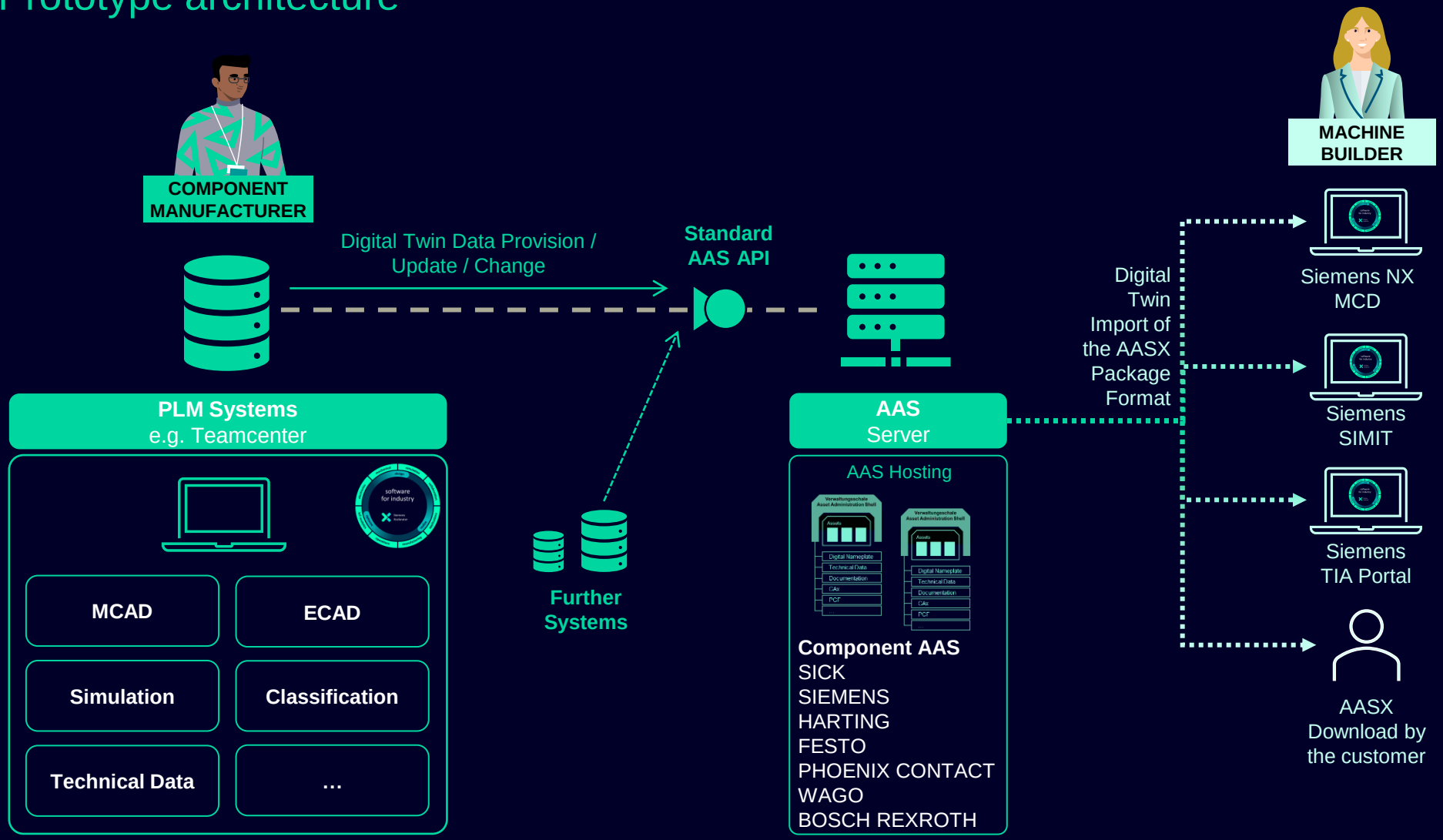
- ***inefficient** exchange*
- ***time consuming** identification*
- ***high effort** in structuring & completion*
- ***lacking** quality*

*… of **digital twin** data"*

Proposed solution utilizing AAS (illustrative)



Cross-company AAS use case
Prototype architecture



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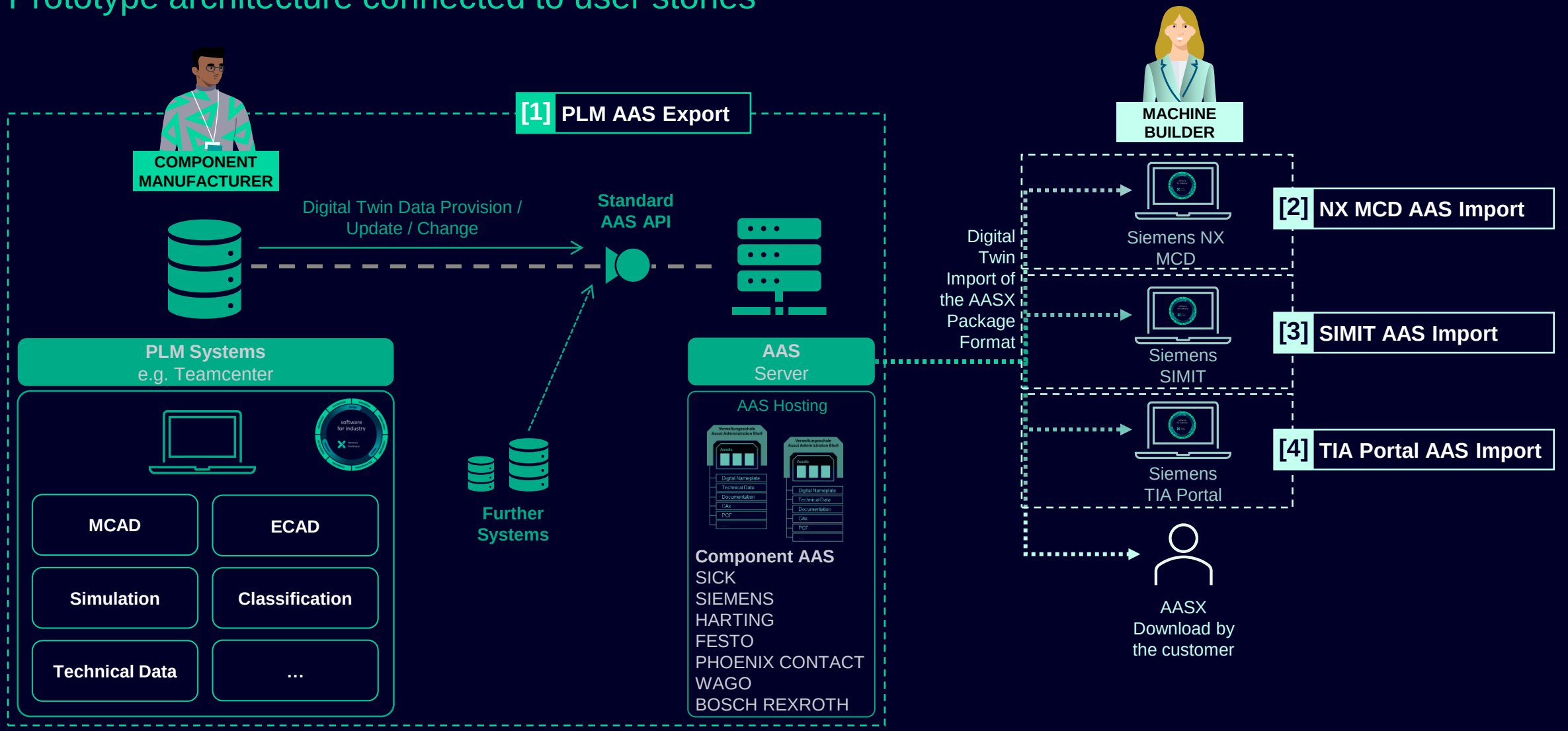
Cross-company AAS use case

Prototype architecture connected to user stories



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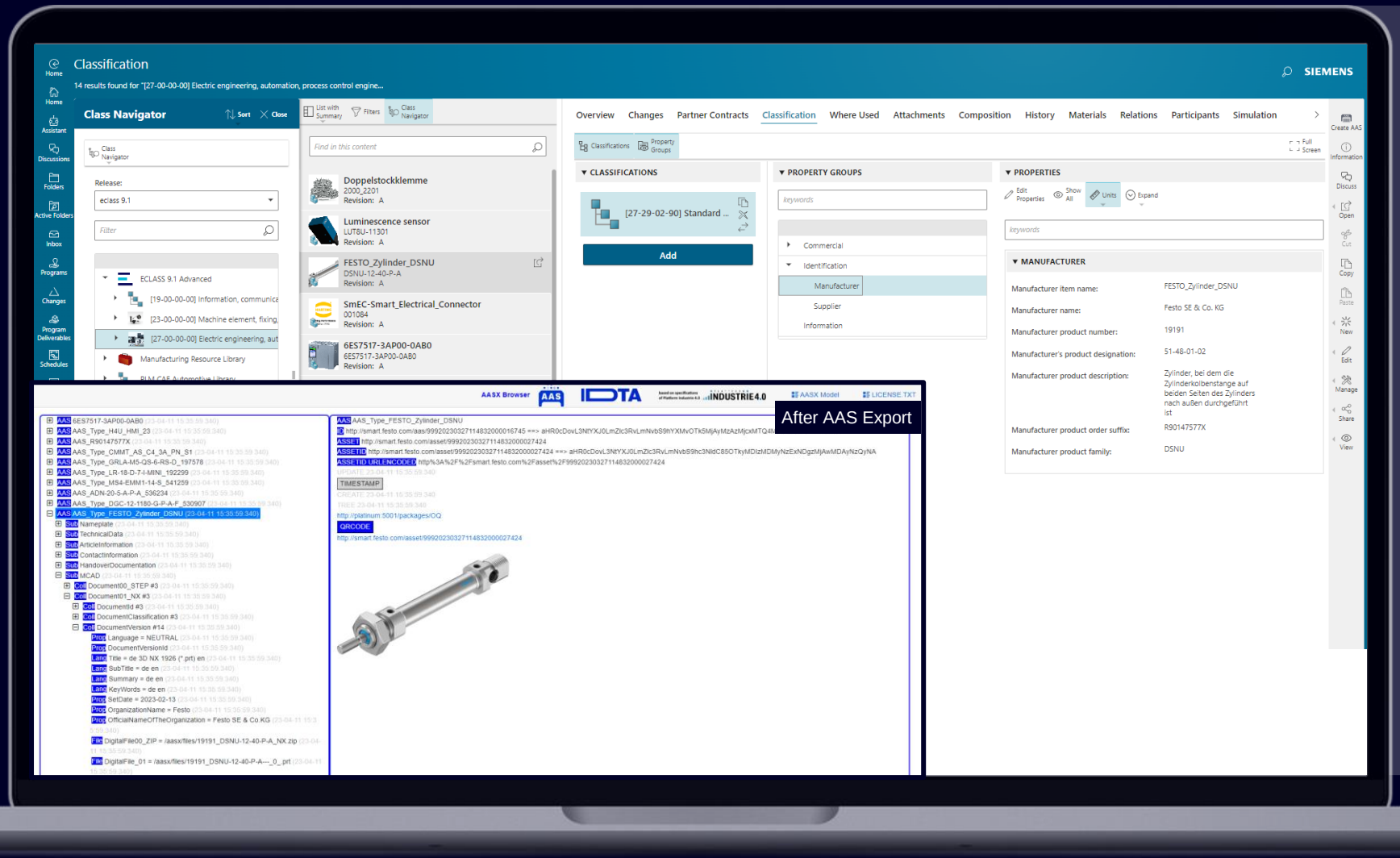
[1] PLM AAS Export



VALUE PROPOSITION

- **Time savings** through easy digital twin data provision
- **Reduction of data silos** PLM as single source of truth for all digital twin
- **Long term availability** for all valuable design knowledge

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Teamcenter AAS Export Prototype Addin

Teamcenter - Classification | AasxServerBlazor

Not secure | http://platinum:3000/#/showClassification

Classification

11 results found for "[27-00-00-00] Electric engineering, automation, process control engine...

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Class Navigator

Sort | Close

Class Navigator

Release: eclass 9.1

Filter

- ECLASS 9.1 Advanced
  - [19-00-00-00] Information, communica
  - [23-00-00-00] Machine element, fixing,
  - [27-00-00-00] Electric engineering, aut
- Manufacturing Resource Library
- PLM CAE Automotive Library

List with Summary | Filters | Class Navigator

Find in this content

SmEC-Smart_Electrical_Connector
001084
Revision: A

6ES7517-3AP00-0AB0
6ES7517-3AP00-0AB0
Revision: A

6ES7215-1HF40-0XB0
6ES7215-1HF40-0XB0
Revision: A

6AV2124-0QC24-1AX0
6AV2124-0QC24-1AX0
Revision: A

Data connector
1414586
Revision: A

6ES7512-1CK01-0AB0
6ES7512-1CK01-0AB0
Revision: A

6ES7131-6BF00-0AA0
6ES7131-6BF00-0AA0
Revision: A

2900300
2900300
Revision: A

6ES7144-5KD00-0BA0
6ES7144-5KD00-0BA0
Revision: A

6ES7193-6BP00-0BA0
6ES7193-6BP00-0BA0
Revision: A

Dummy Rev
001075
Revision: A

Overview | Changes | Partner Contracts | Classification | Where Used | Attachments | Composition | History | Materials | Relations | Participants | Simulation

PROPERTIES

ID:	001084
Revision:	A
Name:	SmEC-Smart_Electrical_Connector
Description:	
Type:	Item Revision
AAS ID:	
AAS Package:	
Variability Scope:	
Release Status:	
Date Released:	
Effectivity:	
Owner:	Constantin Liepert (cliepert)
Group ID:	Engineering
Last Modifying User:	Constantin Liepert (cliepert)
Checked-Out:	
Checked-Out By:	
Current Location Code:	

CLASSIFICATION

ECLASS 9.1 Advanced > [27-00-00-00] Electric engineering, automation, process control engineering > [27-44-00-00] Connector system > [27-44-02-00] Connector component > [27-44-02-05] Contact insert for industrial connectors

PROJECTS

LICENSES

PREVIEW

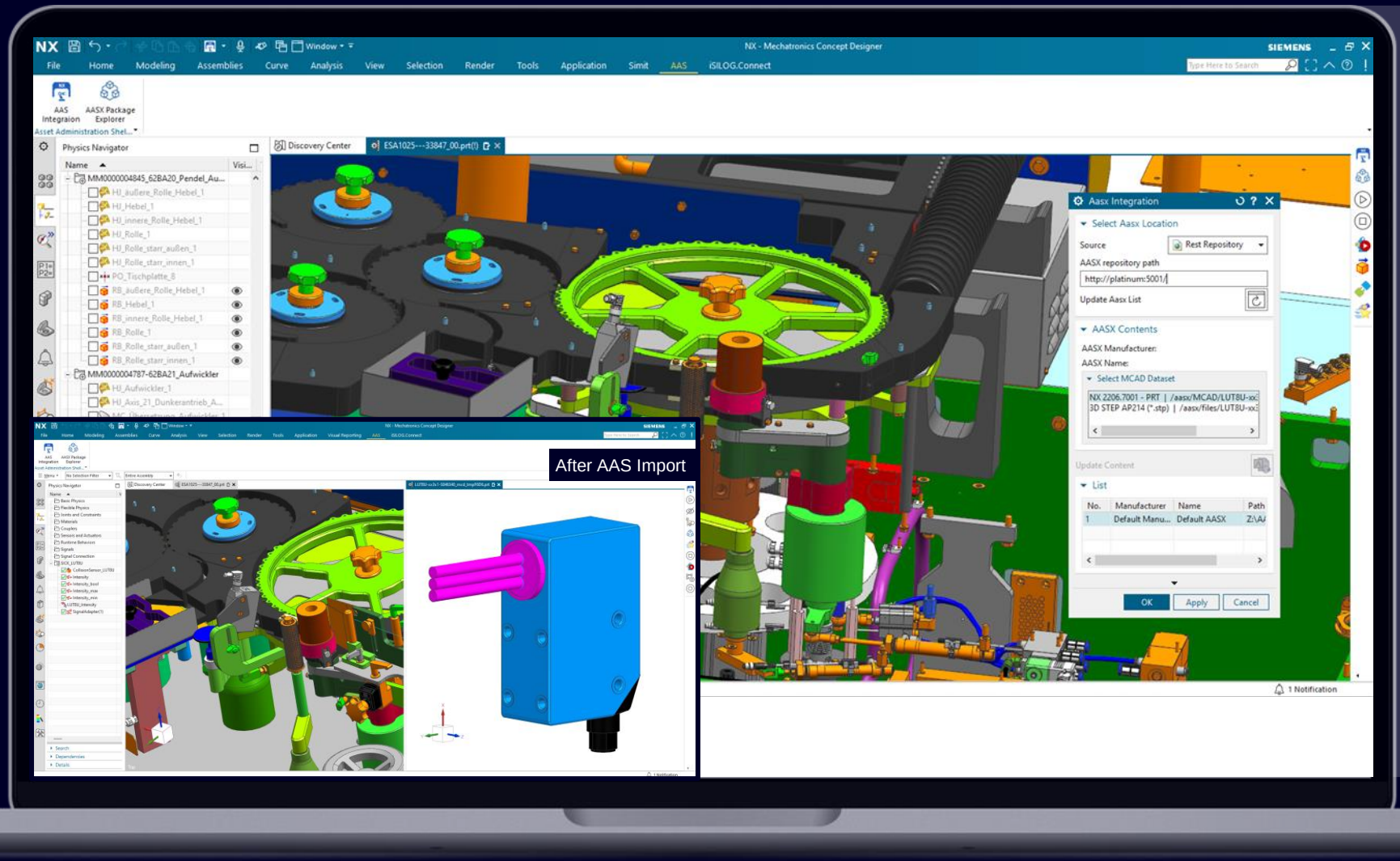
SmEC_PreviewPicture | Image | 08-Apr-2023 | 436 Kb

Show Markups | Markup Panel | Highlight Markup | Freehand Markup | Markup Shapes | Stamp Panel | Print Markups | Checkout | Full Screen

Home | Assistant | Discussions | Folders | Active Folders | Inbox | Programs | Changes | Program Deliverables | Schedules | Schedule Tasks | Reports | Favorites | Alerts | Help | No Active Change

Create AAS | Information | Discuss | Open | Cut | Copy | Paste | New | Edit | Manage | Share | View

[2] NX MCD AAS Import



VALUE PROPOSITION

- **Time savings** through automatic import ensuring always the right model and easy updating
- **Full kinematic models** for efficient design and validation of motions
- **Extended traceability** by linkage to digital twin in different authoring systems

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NX - Mechatronics Concept Designer

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File | Home | Modeling | Assemblies | Curve | Analysis | View | Selection | Render | Tools | Application | Visual Reporting | AAS | iSILOG.Connect

Type Here to Search

Requirement | Function | Logical | Dependency — Systems Engineering

Sketch | Extrude | Unite | Block — Mechanical Concept

Play | Stop | Monitor | Envelope | Graph | Interference — Simulate

Rigid Body Color | Rigid Body | Collision Body | Basic Joint | More — Mechanical

Collision Sensor | Position Control | Symbol Table — Electrical

Operation | Electronic Cam | Runtime NC | Symbol Table — Automation

Add Component | Export to ECAD | Export Load Curve | Export Cam Profile — Design Collaboration

Mechatronics Concept Designer Preferences — Preference

AAS Import

Menu | No Selection Filter | Entire Assembly

Assembly Navigator

Descriptive Part Name | Info

- Sections
- ESA1025---33847_00 (Order:...
  - Constraints
  - ESA1025-33847-00_00
  - ESA1025-33847-20_00
  - ESA1025-33847-22_00
  - ESA1025-33847-39_00
  - ESA1025-33847-62_00
  - ESA1025-33847-90_00
  - ESA1025-33847-92_00
  - ESA1025-33847-93_00
  - TUL-ESA1025-33847_00

Preview

Dependencies

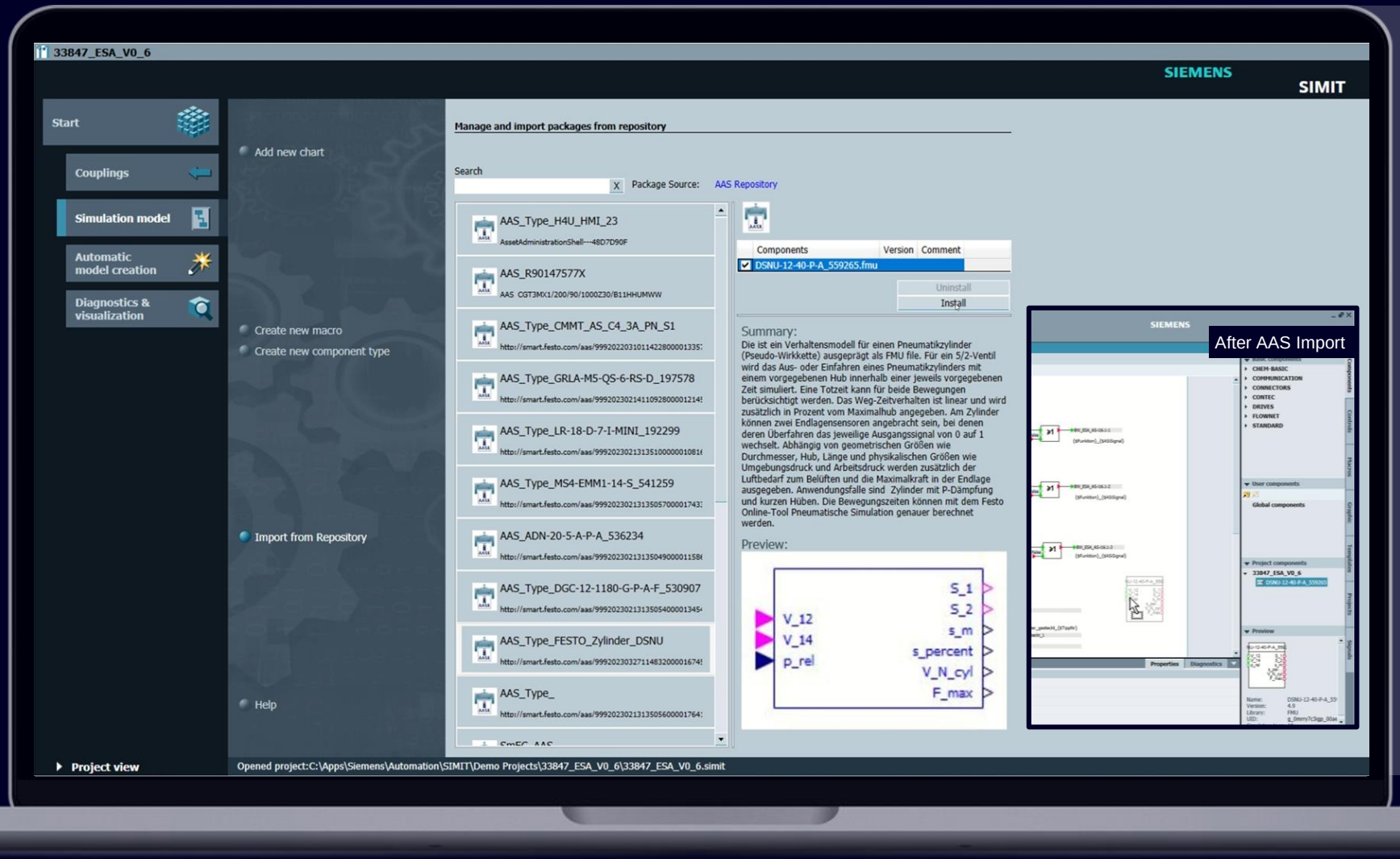
Discovery Center | ESA1025---33847_00.prt(!)

Top WORK

Select objects and use MB3, or double-click an object

1 Notification

[3] SIMIT AAS Import



VALUE PROPOSITION

- **Fast find & retrieval** of consistent simulation models for components
- **Easy composition** of specific machine simulation models
- **Use of standard formats** for efficient workflows for virtual commissioning and simulation

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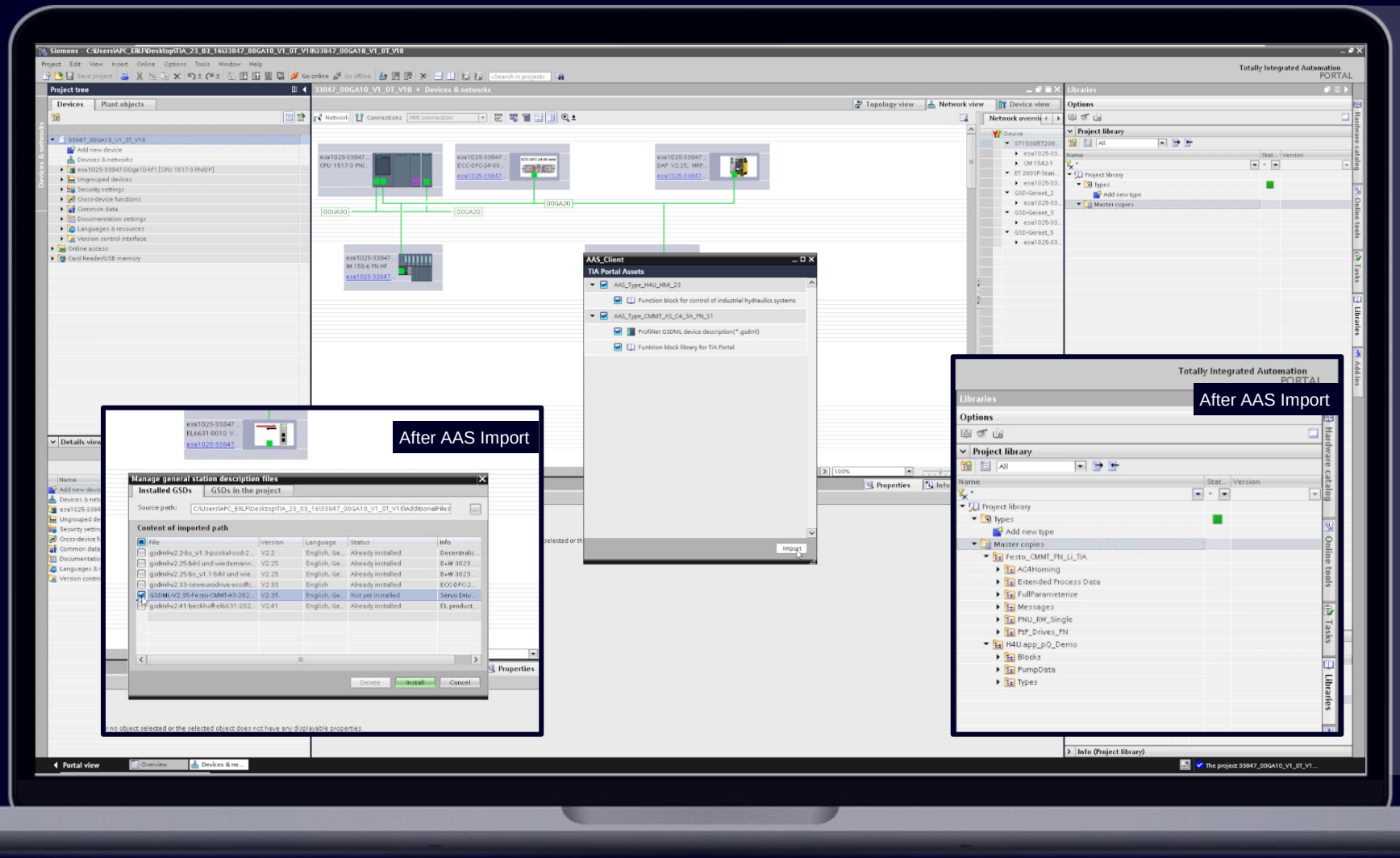
[4] TIA Portal AAS Import



VALUE PROPOSITION

- **Quick integration** of intelligent components with device files, function blocks, user dialogues, ...
- **Extended functionality** without programming by using predefined functions
- **Automatic code generation** possible by availability of BOM

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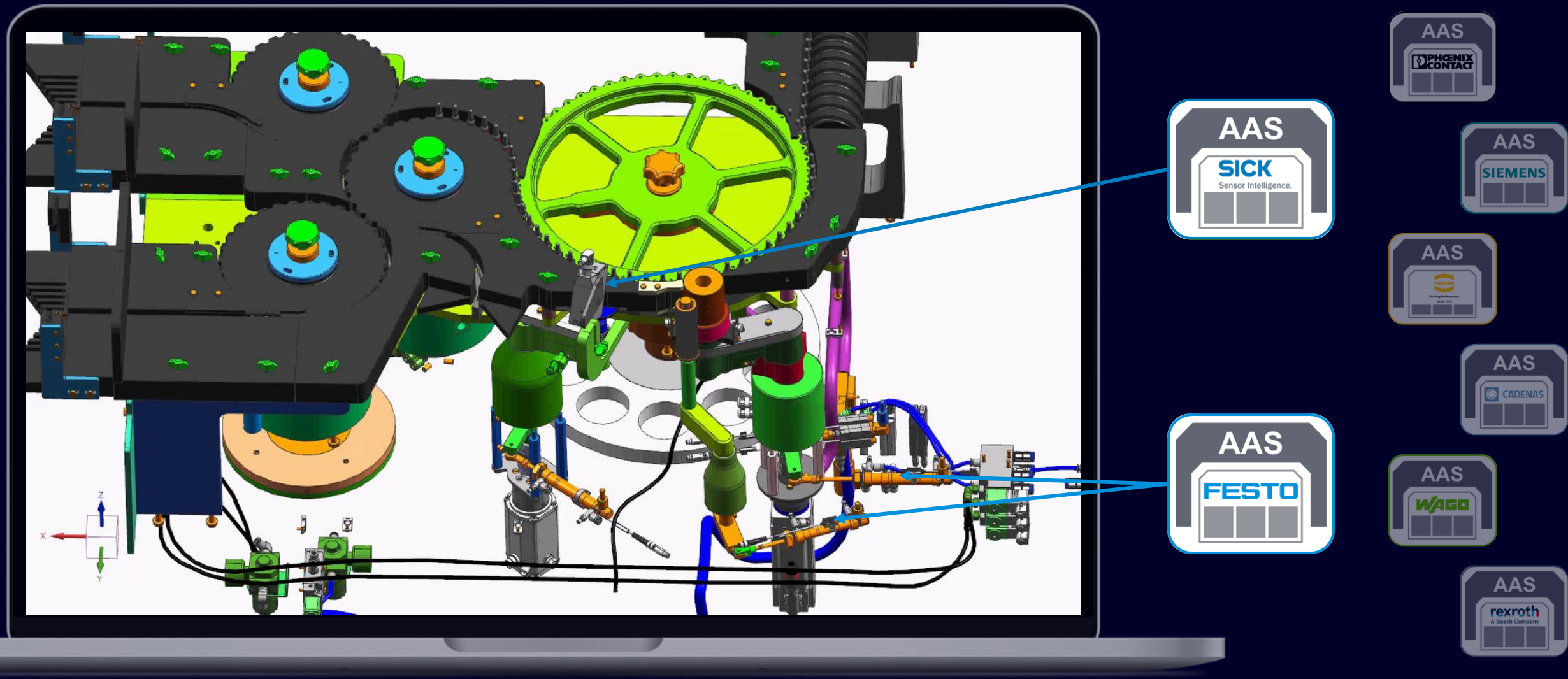
RESULT Bausch+Ströbel labeling machine with intelligent components



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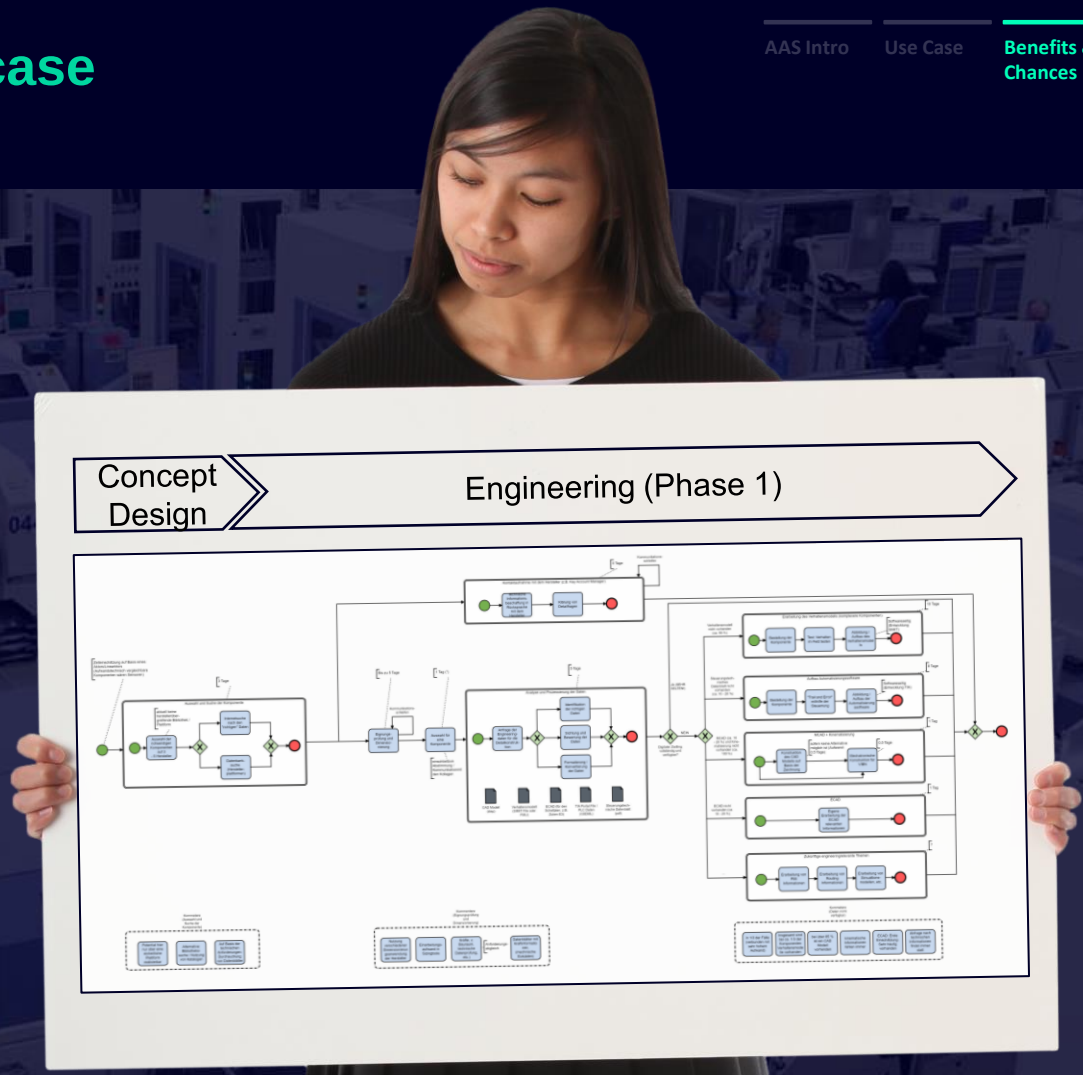
Benefits of the AAS within the customer use case
Bausch+Ströbel value proposition

Looking at the current engineering process & effort



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Benefits of the AAS within the customer use case

Bausch+Ströbel value proposition

TODAY

~ 5 days
Contact with supplier for technical information exchange (communication loops)

~ 3 days
Searching for suitable components & reduction to 3 - 5 manufacturers

~ 5 days
Suitability tests & sizing (+ requirements analysis)

~ 6 days
Final selection of component, analysis & processing of the detailed engineering data

~10 days	Engineering of behavioural models [90 %]*
~ 8 days	Design of automation software [10-20 %]*
~ 1 day	Engineering of MCAD model [10-20 %]* & kinematics [100 %]*
~ 1 day	Engineering of ECAD model [10-20 %]*
+ days	Future engineering relevant data (e.g. PMI, routing, simulation, etc.)

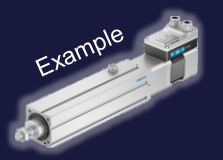
~ 30 days

(up to **39 days**)

Assumptions for the effort estimation

→ based on the example of a linear actuator

→ assuming the digital twins are fully described by the AAS (including MCAD, kinematics, ECAD, simulation and automation data)



*[Evaluation of the probability in % regarding the necessity of this work]

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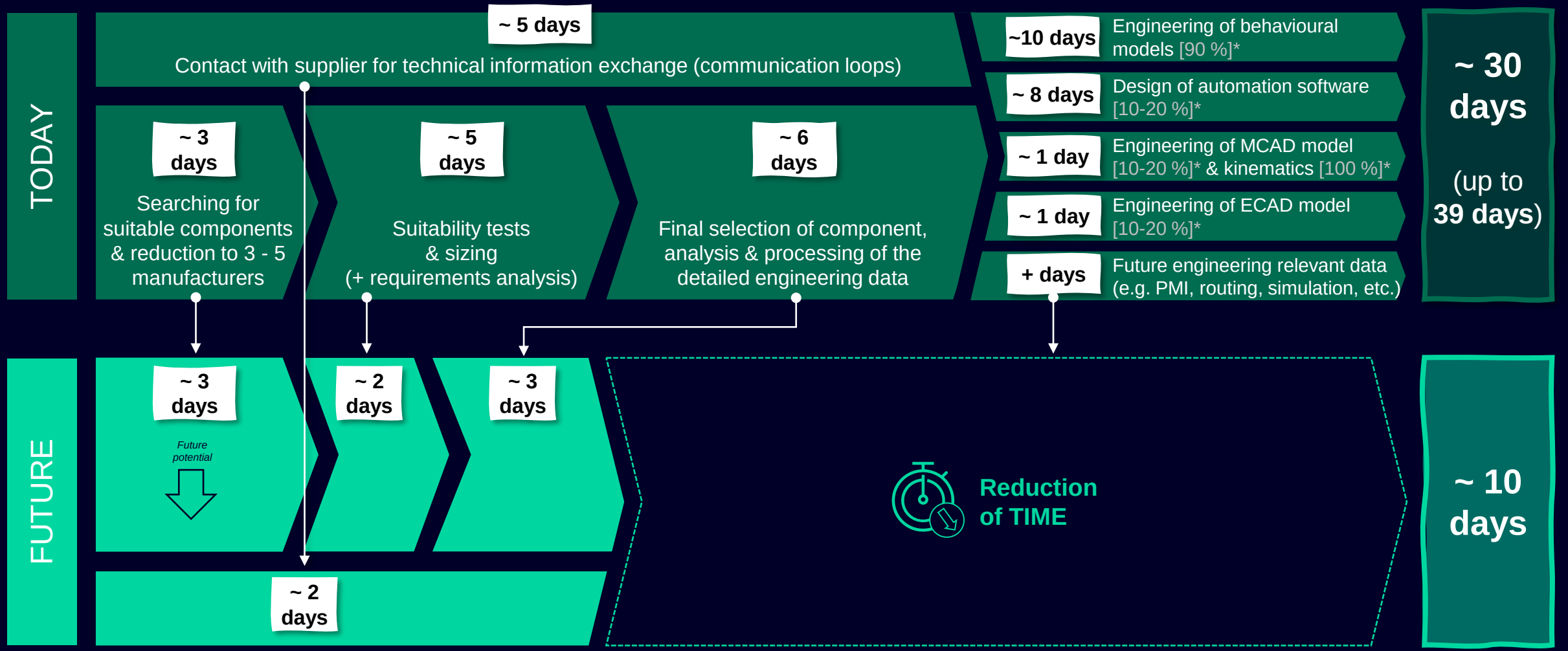
Benefits of the AAS within the customer use case

Bausch+Ströbel value proposition



*[Evaluation of the probability in % regarding the necessity of this work]

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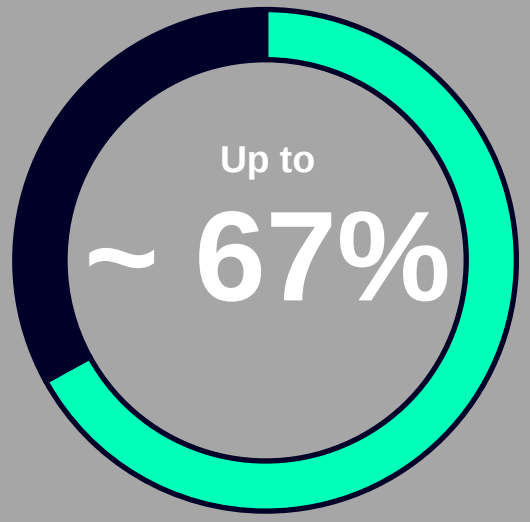
Benefits of the AAS within the customer use case
Bausch+Ströbel value proposition

Effort



Time Reduction
within the analysed process

BAUSCH+STRÖBEL

"There is **no** longer any **need to modify**, **search** for, and **complete the data**, so we can **directly begin our value-creating activities**," says Erich Bauer, Vice President of Research & Development at Bausch+Ströbel.
"Thanks to the asset administration shell standard, the data is also of **higher quality** because, for example, we no longer have to reformat them."

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Key Takeaways and summary

The AAS as the digital twin standard helps to **increase efficiency and data quality** within engineering

Siemens Xcelerator portfolio offers the basis for making the **AAS manageable**

Work united for more valuable I4.0 use cases

Join the **IDTA** to be prepared for **digital twin business**

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GET INVOLVED!

Questions
Let´s discuss!