

AutomationML Conference, Böblingen 09./10.05.2012

Re-configurability of Production Systems with AutomationML
COSMOS EU-Research Project 7th Framework



- 1 Motivation**
EDAG – COSMOS - Requirements

- 2 Automation ML**
Basic Concepts

- 3 Re-configurability Basic Concept**
Designing and Transferring Engineering data to MES

- 4 Adapter Realization**
Functionalities and Adapter concept

1 **Motivation** *EDAG – COSMOS - Requirements*

2 **Automation ML** *Basic Concepts*

3 **Re-configurability Basic Concept** *Designing and Transferring Engineering data to MES*

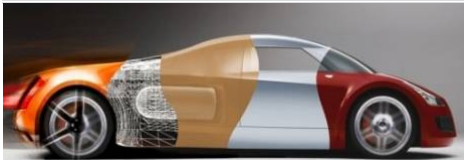
4 **Adapter Realization** *Functionalities and Adapter concept*

Λ ATON GMBH - Technology



Jörg Ohlsen (CEO) / Rainer Bauer (CFO)

EDAG GmbH & Co. KGaA
Product Development and Tool-/Vehicle Body Systems
Jörg Ohlsen



Locations: 13
Inland holdings:
EDAG Rail GmbH, Fulda
ELAN-AUSY (49%), Hamburg

Intern. Holdings:
EDAG USA, Detroit
EDAG Brazil, São Paulo
FFT EDAG China, Shanghai
EDAG Hungary, Győr
EDAG Malaysia, Kuala Lumpur
EDAG Japan, Yokohama

EDAG Production Solutions GmbH & Co. KG
Production Solutions
Rainer Wittich



Locations: 12

Intern. Holdings:
EDAG India, New Delhi
EDAG Czech Republic, M. Boleslav

WMU Weser-Metall Umformtechnik GmbH
Series Production
Rolf Klaas



Locations: 1

Intern. Holdings:
WMU Namibia, Walvis Bay

ED WORK GmbH & Co. KG
Personnel Services
Elmar Hoff



Locations: 35



Manfred Hahl (CEO) / Peter Walper (CFO)

FFT EDAG GmbH & Co. KG
Plant Construction
Manfred Hahl



Locations: 3
Inland holdings:
FFT, Fulda
Scherwo, Gauting
DEAS, Hamburg

Intern. Holdings:
FFT Spain, Valencia
FFT Mexico, Puebla Pue.
FFT Romania, Campulung
FFT EDAG USA, Detroit
FFT EDAG China, Shanghai

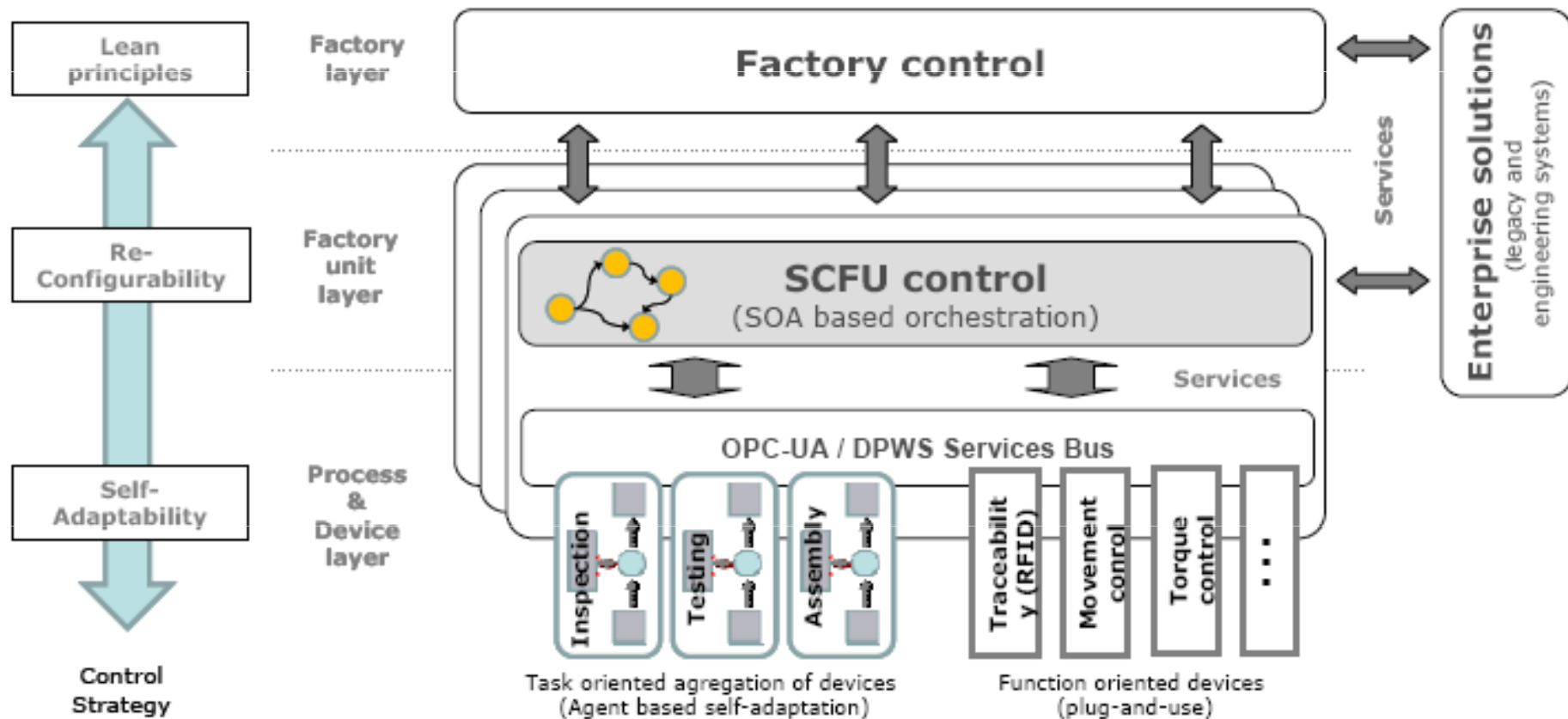
***COS**t-driven Adaptive Factory based on **MO**dular **S**elf-Contained Factory Units*

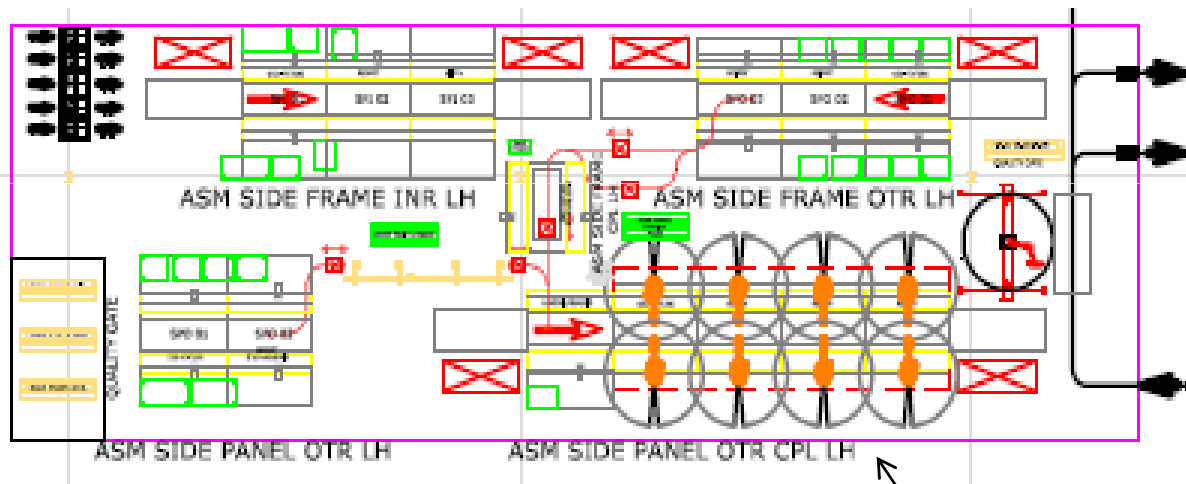
Benef. Number	Beneficiary name	Beneficiary short name	Country
1	Ibermática S.A. ¹	IBERMATICA	(E) Spain
2	Phoenix Contact Electronics GmbH	PHOENIX	(D) Germany
3	ASCOLAB GmbH	ASCOLAB	(D) Germany
4	Oxford Sensor Technology Ltd.	OXFORD	(UK) United Kingdom
5	REIS GmbH & CO. KG MASCHINENFABRIK	REIS	(D) Germany
6	EDAG Design GmbH & Co KGaA	EDAG	(D) Germany
7	HOLOS SOLUÇÕES AVANÇADAS EM TECNOLOGIAS DE INFORMAÇÃO, S.A.	HOLOS	(P) Portugal
8	GAMESA INNOVATION AND TECHNOLOGY S.L.	GAMESA	(E) Spain
9	Fundación Tekniker	TEKNIKER	(E) Spain
10	King's College London	KCL	(UK) United Kingdom
11	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN	WZL	(D) Germany

Budget:
5.165 T€

Period:
Sept. 2010 – Aug. 2013

Target Industry:
Large 6 heavy
Part Assembly , s.a.
Wind Turbine Manufacturing

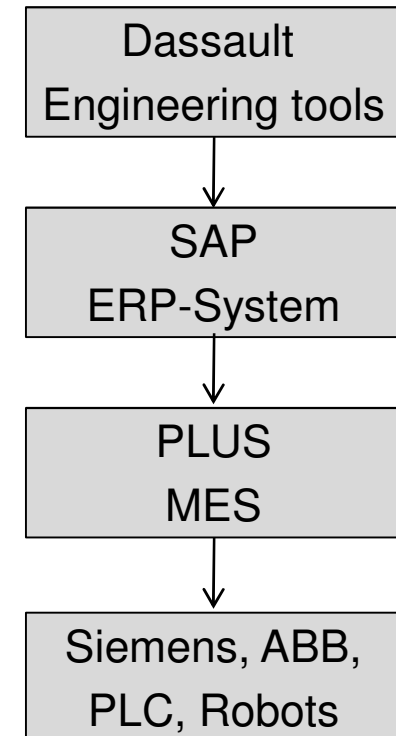




Bodyshop: Line Sidepanel Left
Designed for Model CF11

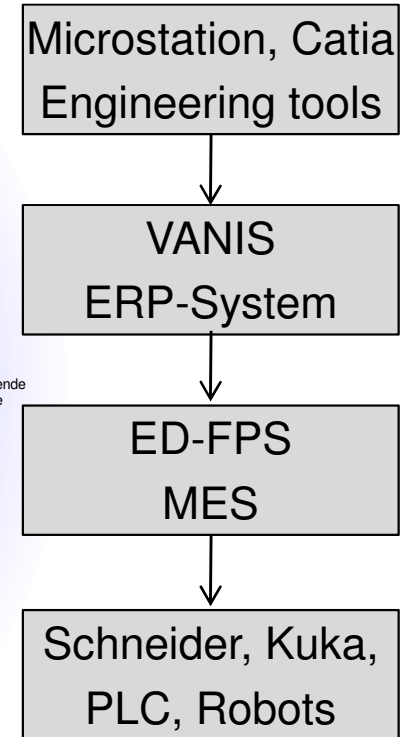
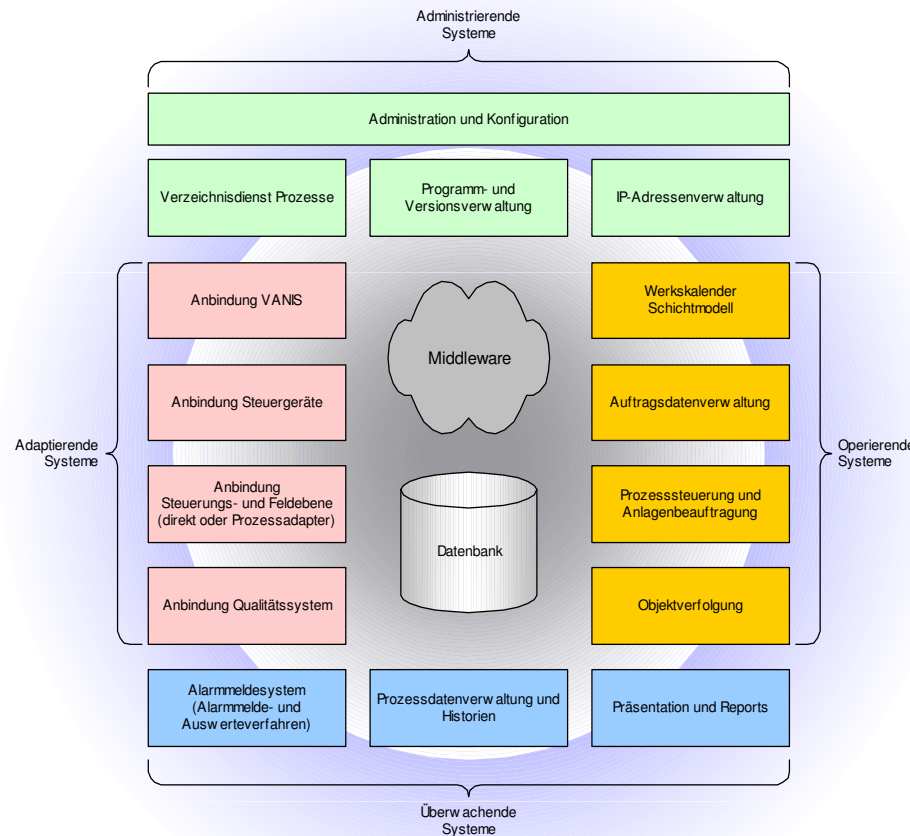
Integration of Robot, Fixtures,
Weld guns Material boxes, etc

In future: Integration of CF 14 and CF 16





Rohbau, Lack, Endmontage
 65.000 Varianten im Rohbau
 Taktzeit: 90 s.
 Seit 2006 produktiv
 Ca 400 x SPS, 450 x Roboter



SOA -Architektur
 Steuerung mit Baumuster + Codes
 an Roboter und SPS

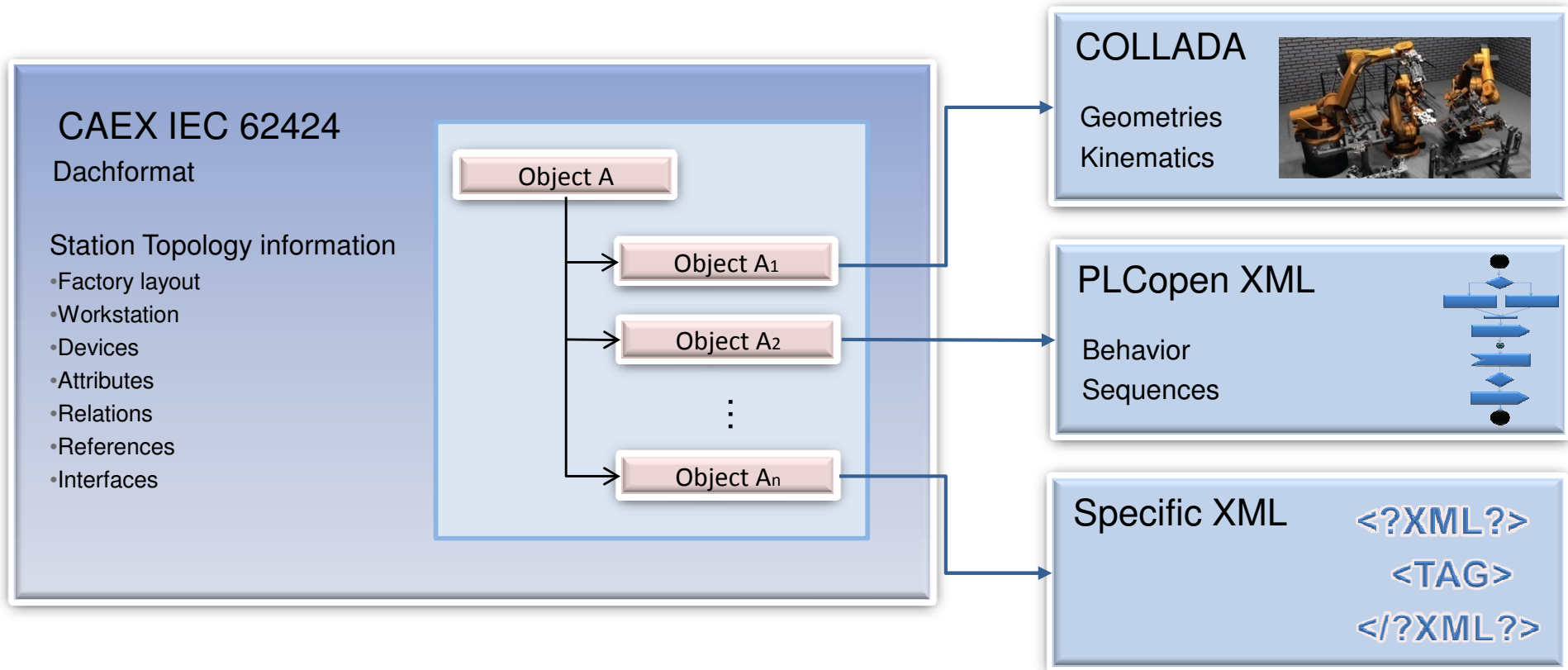
1 **Digital Factory**
Basic Concepts and Problems

2 **Automation ML**
Basic Concepts

3 **Re-configurability Basic Concept**
Designing and Transferring Engineering data to MES

4 **Adapter Realization**
Functionalities and Adapter concept

5 **Concept Verification**
Verification on Gamesa Assembly Scenario



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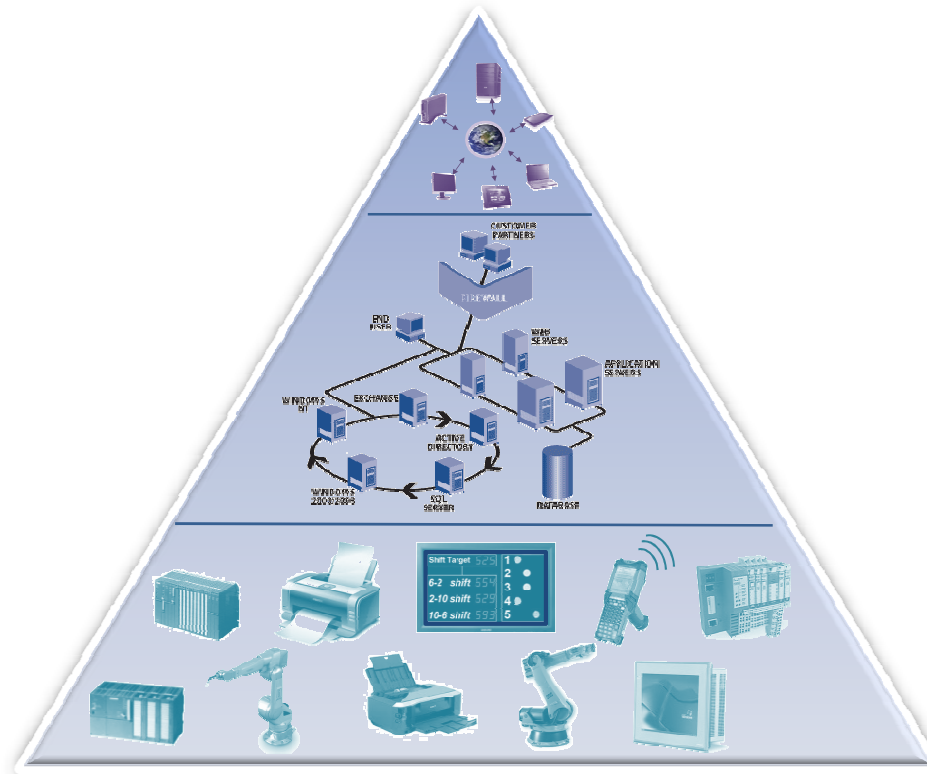
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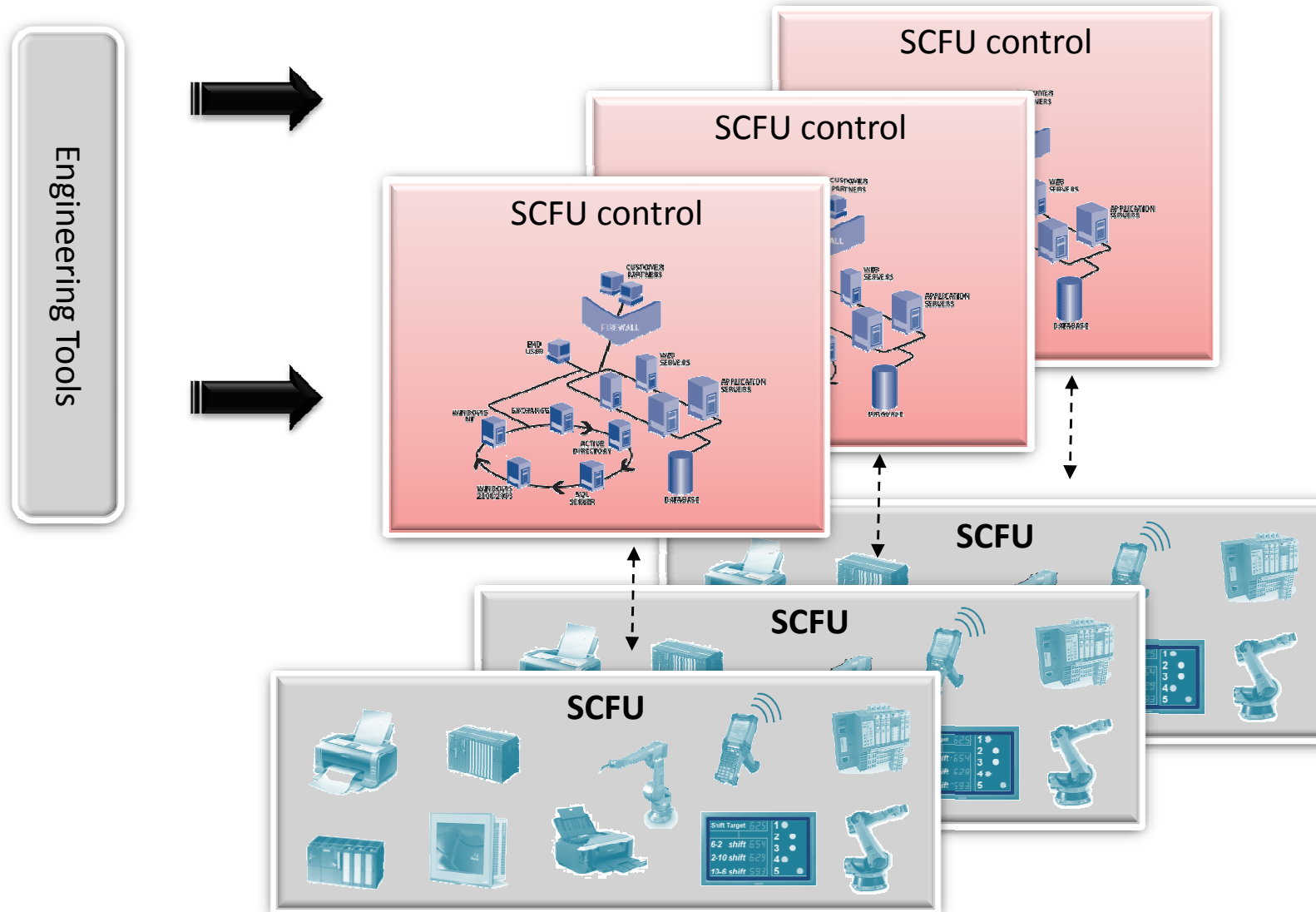
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Verification on Gamesa Assembly Scenario

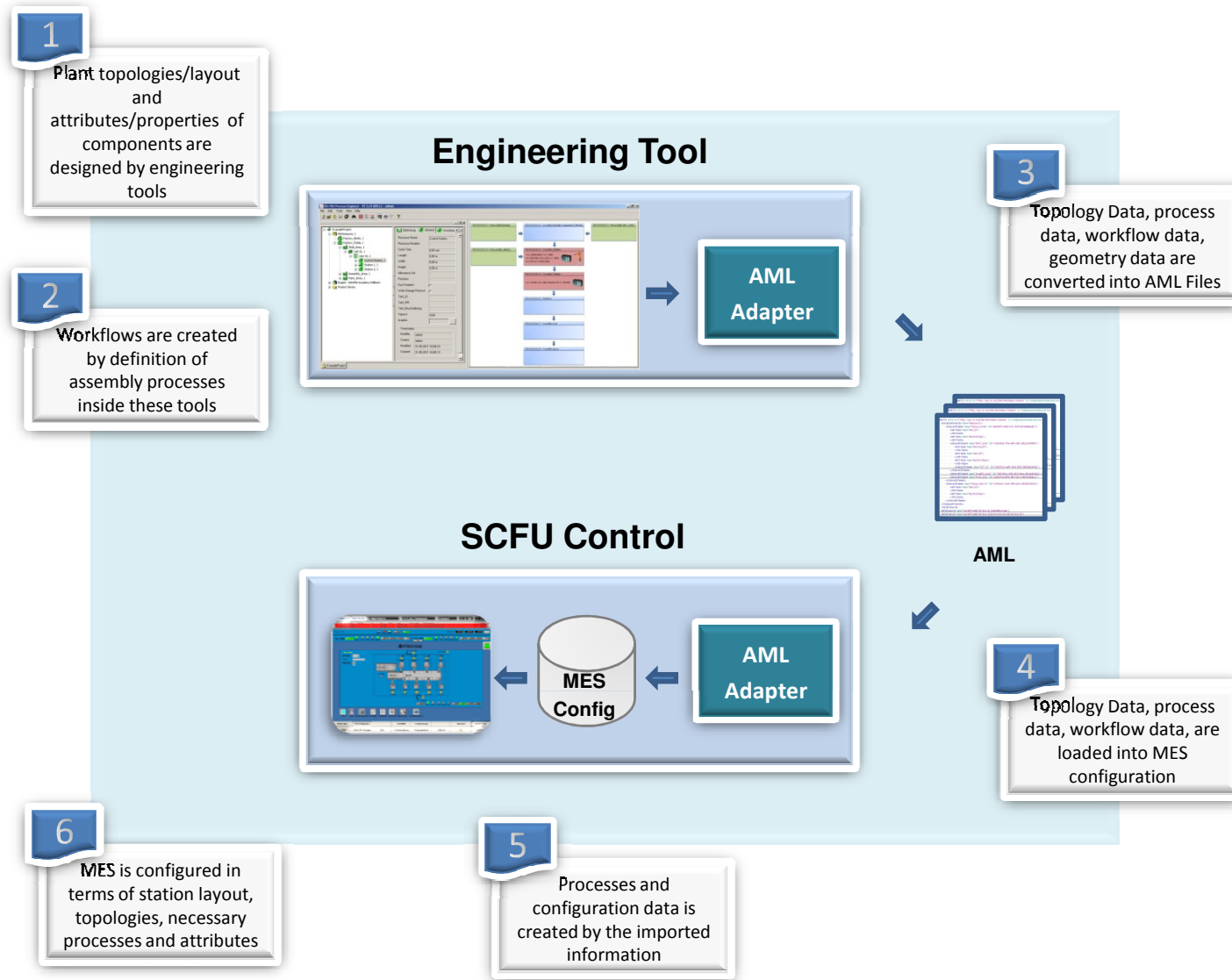
ERP

MES

Process
control







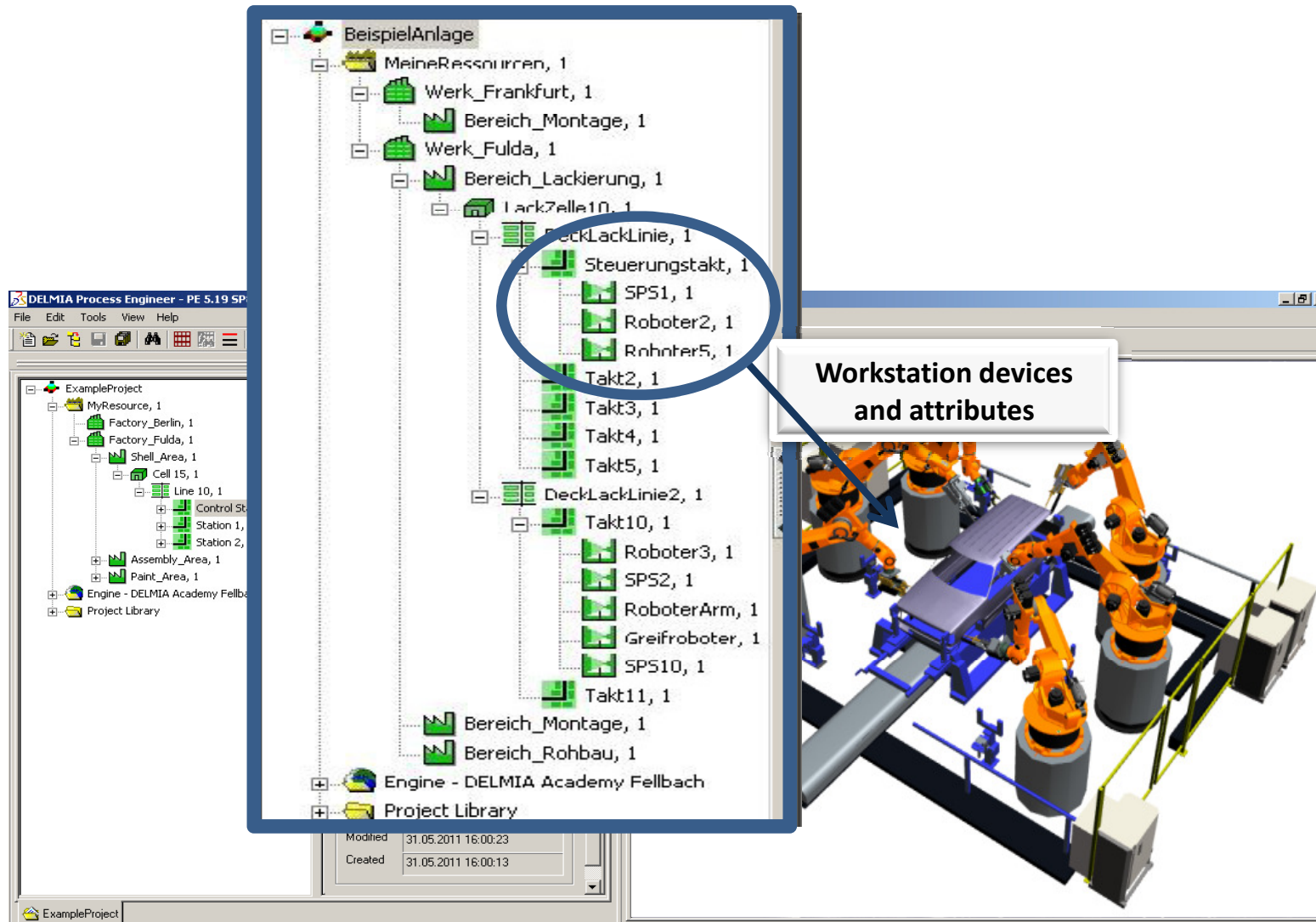
1 **Digital Factory**
Basic Concepts and Problems

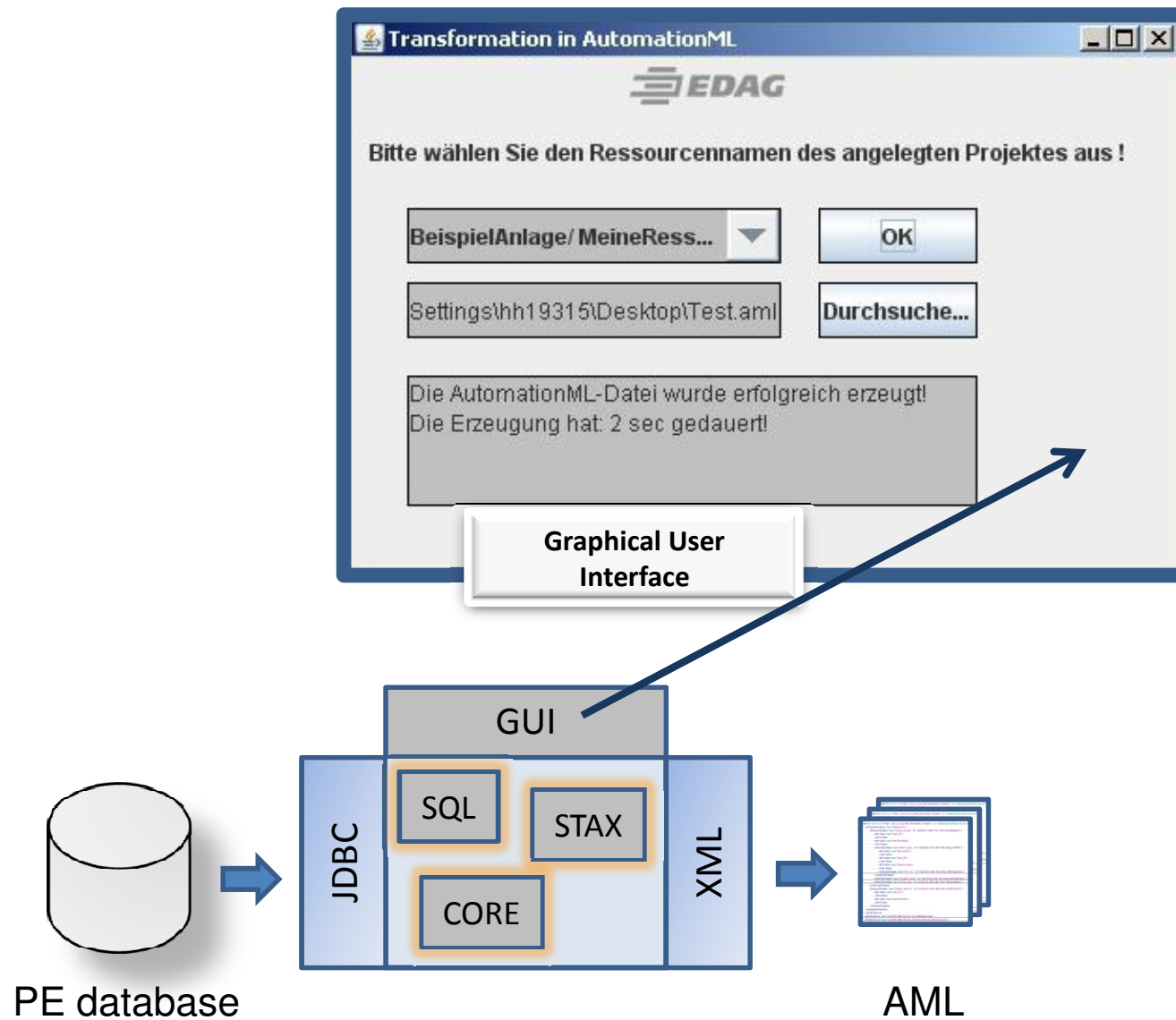
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Basic Concepts

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Designing AML in DELMIA Process Engineer





CAEX File in XML editor

```

<InternalElement Name="Factory" ID="{1a8b8788-8432-4532-ba23-5877998a6ce}">
  <Attribute Name="Factory_ID" Value="1a8b8788-8432-4532-ba23-5877998a6ce"/>
  <Attribute Name="Description" Value="Factory" />
  <InternalElement Name="Area" ID="{a1c1340-4dc4-42c-ba5-7aed78679323}">
    <Attribute Name="Area_ID" Value="a1c1340-4dc4-42c-ba5-7aed78679323"/>
    <Attribute Name="Description" Value="Area" />
    <InternalElement Name="Cell" ID="{71a97228-29df-43b9-b3b6-7d3b42fc934}">
      <Attribute Name="Cell_ID" Value="71a97228-29df-43b9-b3b6-7d3b42fc934"/>
      <Attribute Name="Description" Value="Cell" />
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        <Attribute Name="Line_ID" Value="80f99ab5-4444-47ab-93ab-85b036067c2"/>
        <Attribute Name="Description" Value="Line" />
        <InternalElement Name="Workstation 1" ID="{80f99ab5-4444-47ab-93ab-85b036067c2}">
          <Attribute Name="Workstation_ID" Value="80f99ab5-4444-47ab-93ab-85b036067c2"/>
          <Attribute Name="Description" Value="Workstation 1" />
          <Attribute Name="Followers" Value="0" />
          <Attribute Name="Type" Value="0" />
          <Attribute Name="Buffer_Time" Value="0" />
        </InternalElement>
      </InternalElement>
    </InternalElement>
  </InternalElement>
</InternalElement>
    
```

Topology data -> Factory modules

Device attributes

Attributes		
Entity_ID	Name:	Entity_ID
Group_ID	Value:	010
MAC_Address	Ref Semantic:	
Description	Constraint(Value)	
IP_Address	Default Value:	
Standardgateway	Description:	
Subnet_mask		

Additional Properties

RefBaseSystemUnitPath:

ChangeMode:

AML AutomationML Editor 2.0.0

Back to normal view

Warning: Current file i

Consistency c...

Factory

Area

Cell

Line

Workstation 1

Workstation 2

Workstation 3

Workstation 4

OI-System

Self-Adaptive Sub-System

Function Block MLD

Function Block SWT

Function Block DEF

Function Block SRV

Function Block NAM

Function Block OVC

Function Block OVS

Function Block BRM

Printer

PLC

Function Block MLD

Function Block SWT

Function Block DEF

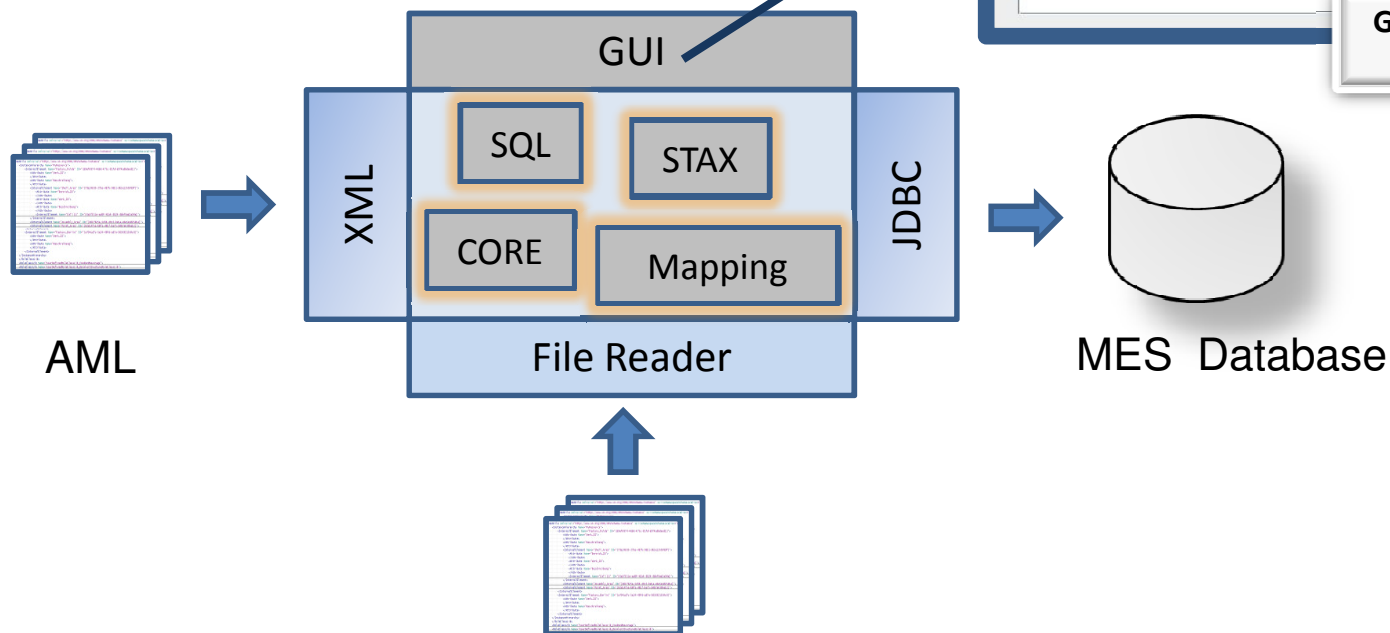
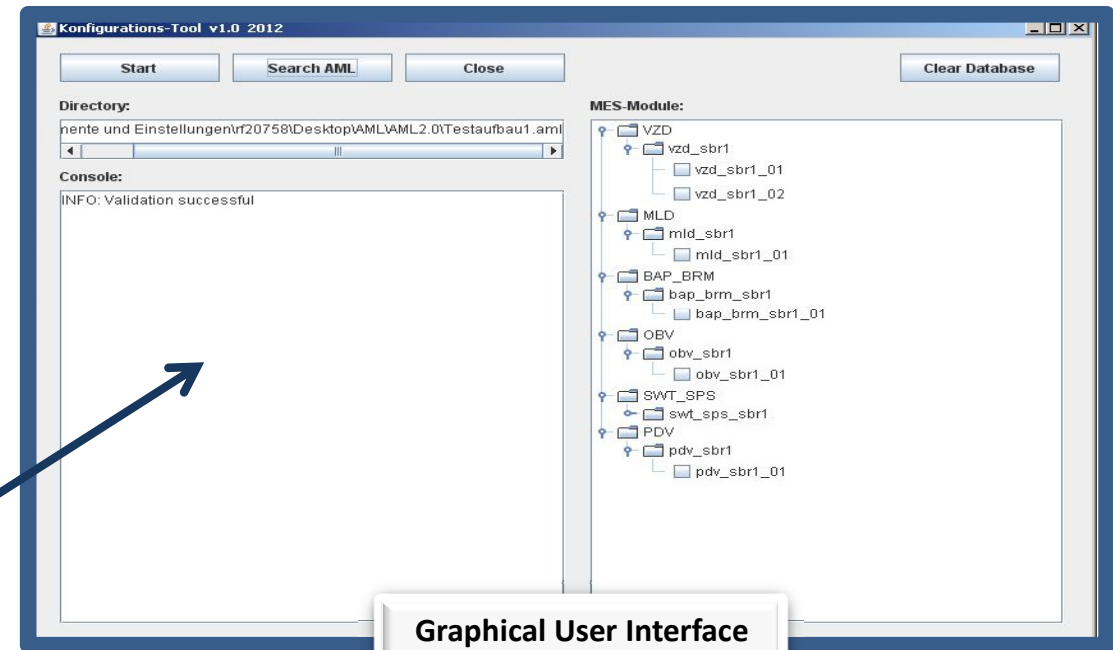
Function Block SRV

Function Block NAM

Function Block OVC

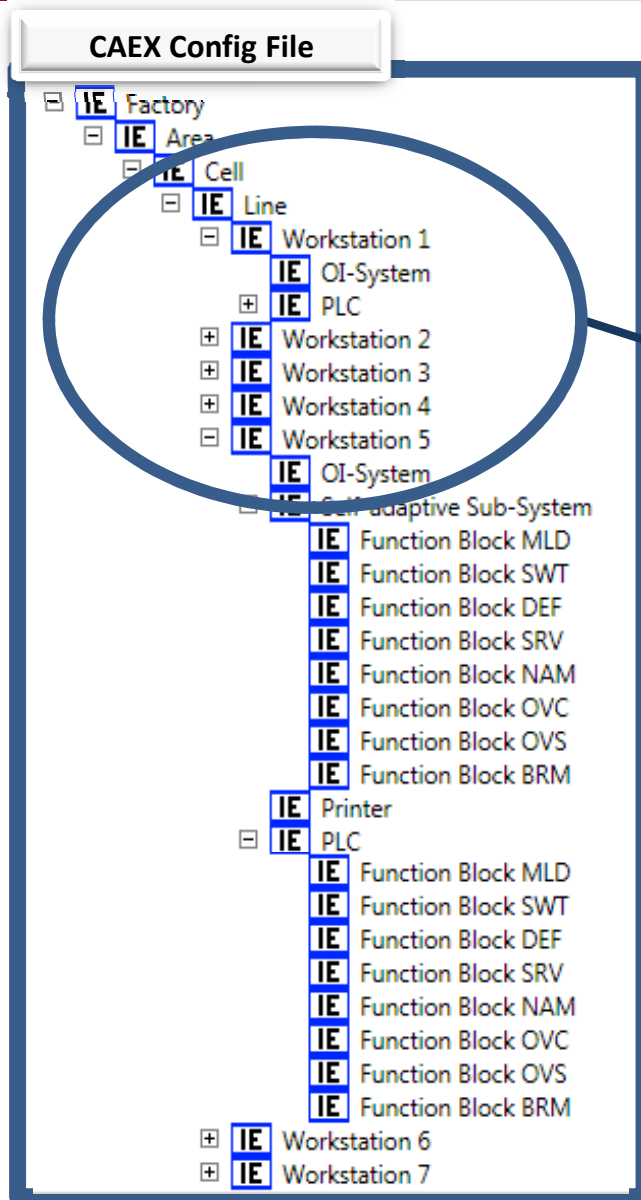
Function Block OVS

Function Block BRM

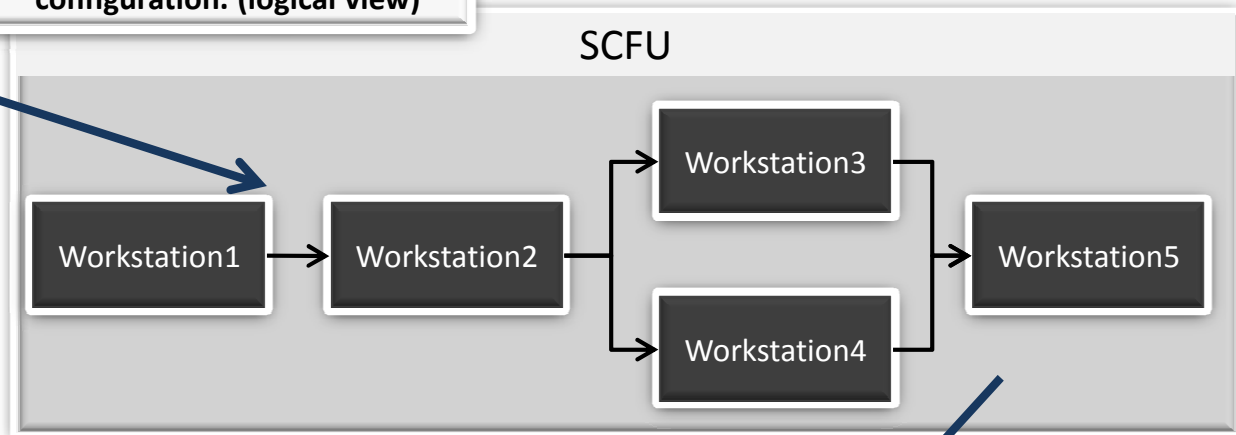


MES Config Data

Phase 1 – Topology Data import



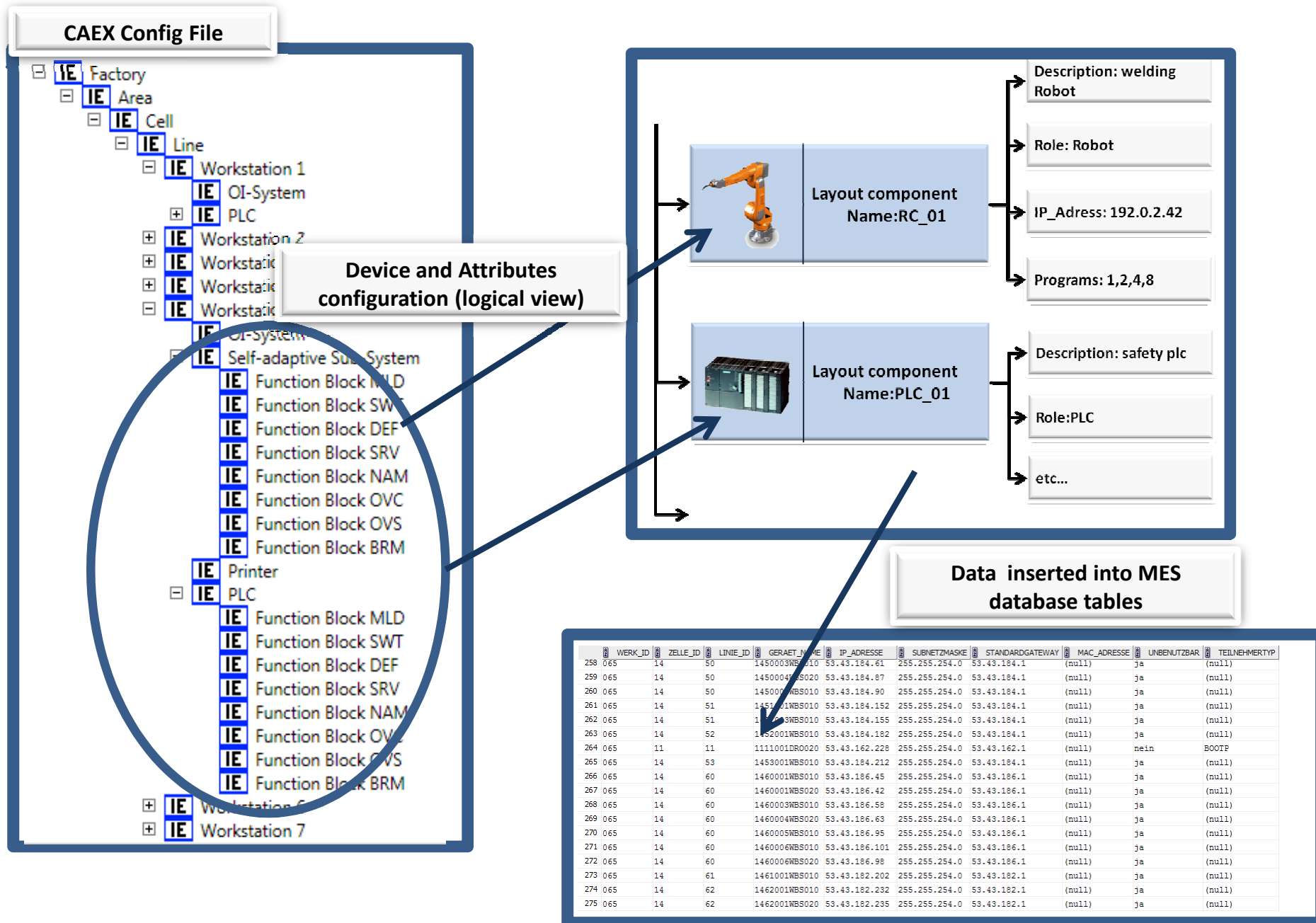
Topology and workstation chaining transfer to MES configuration. (logical view)

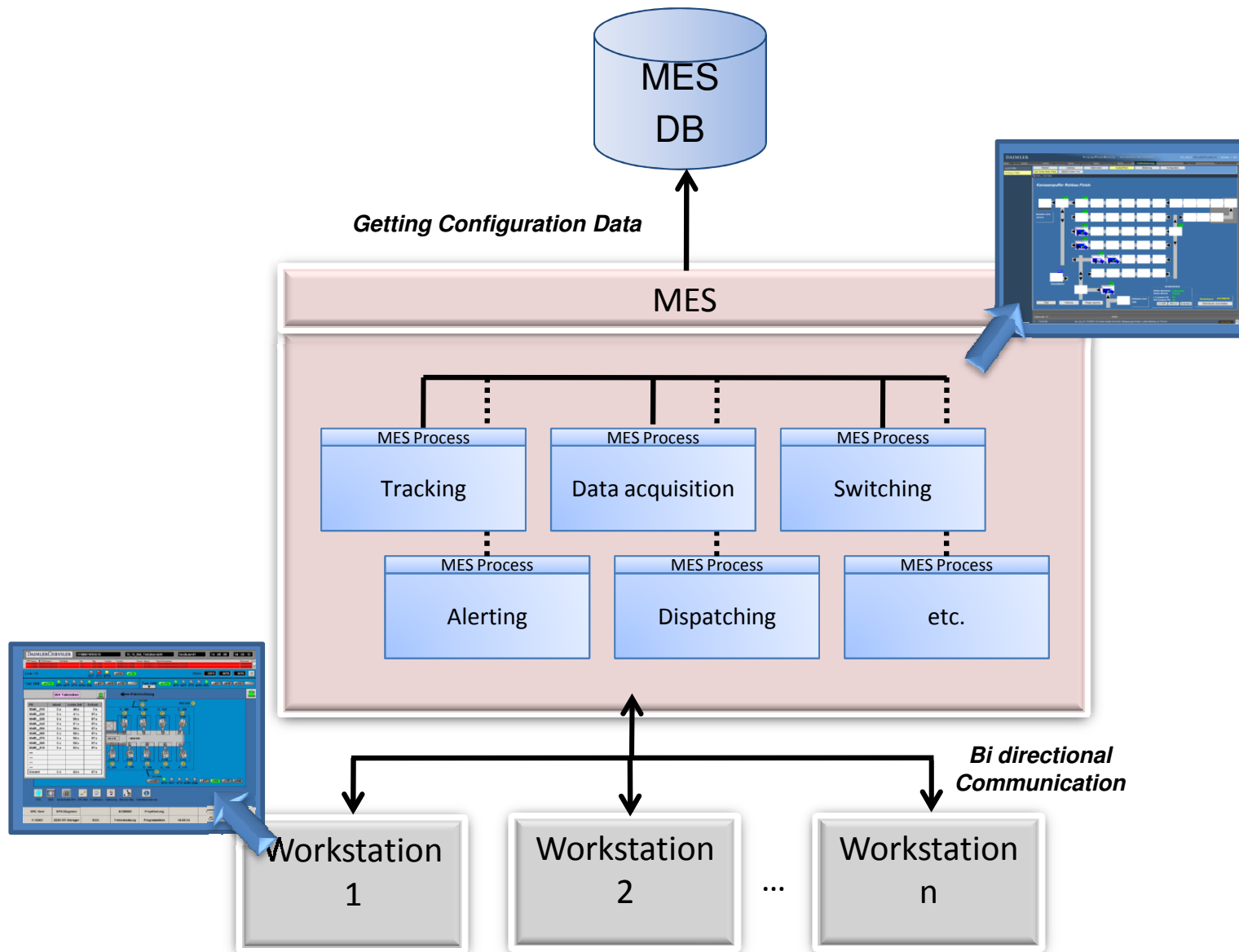


Data inserted into MES database tables

	TAKT_BEZEICHNUNG	TAKT_NAME	BAG_ID	EINSCHLEUSEN	AUSSCHLEUSEN	VERLOEBUNG_GEAENGE	PUFFERTYP	TAKTTYP	BESCHREIBUNG
109	2101005T_4000	T_4000	0.0	0	0	0	SCHIEBEREGISTER GESCHOBEN	(null)	
110	2101005T_4001	T_4001	0.0	0	0	0	SCHIEBEREGISTER DIREKT_GEMELDET	(null)	
111	2101005T_4002	T_4002	0.0	0	0	0	SCHIEBEREGISTER DIREKT_GEMELDET	(null)	
112	2101005T_4013	T_4013	0.0	0	0	0	SCHIEBEREGISTER DIREKT_GEMELDET OK 4010		
113	2101005T_4014	T_4014	0.0	0	0	0	SCHIEBEREGISTER DIREKT_GEMELDET OK 4010		
114	2101005T_4015	T_4015	0.0	0	0	0	SCHIEBEREGISTER DIREKT_GEMELDET OK 4010		
115	2101005T_4016	T_4016	0.0	0	0	0	SCHIEBEREGISTER DIREKT_GEMELDET OK 4010		
116	2101005T_4017	T_4017	0.0	0	0	0	SCHIEBEREGISTER DIREKT_GEMELDET	(null)	
117	2101005T_4020	T_4020	0.0	0	0	0	SCHIEBEREGISTER DIREKT_GEMELDET	(null)	
118	2101005T_4111	T_4111	0.0	0	0	0	SCHIEBEREGISTER GESCHOBEN	(null)	
119	2101005T_4112	T_4112	0.0	0	0	0	SCHIEBEREGISTER GESCHOBEN	(null)	
120	2101005T_4140	T_4140	0.0	0	0	0	SCHIEBEREGISTER GESCHOBEN	(null)	
121	2101005T_4141	T_4141	0.0	0	0	0	SCHIEBEREGISTER GESCHOBEN	(null)	
122	2101006T_4021	T_4021	0.0	0	0	0	SCHIEBEREGISTER GESCHOBEN	(null)	
123	2101006T_4022	T_4022	0.0	0	0	0	SCHIEBEREGISTER GESCHOBEN	(null)	
124	2101006T_4023	T_4023	0.0	0	0	0	FALLREGISTER GESCHOBEN	(null)	
125	2101006T_4024	T_4024	0.0	0	0	0	FALLREGISTER GESCHOBEN	(null)	
126	2101006T_4025	T_4025	0.0	0	0	0	FALLREGISTER GESCHOBEN	VW 4025	
127	2101006T_4026	T_4026	0.0	0	0	0	SCHIEBEREGISTER GESCHOBEN	(null)	

Phase 2 – Device import and specific functions







Thank you for your kind attention

