

AAS4WH – Asset Administration Shell for the Wiring Harness

The vision of the end-to-end and interoperable value chain of the wiring harness in 2024
Transformations-Hub Leitungssatz, 27.09.2023, Dr. Alexander Salinas



ARENA2036

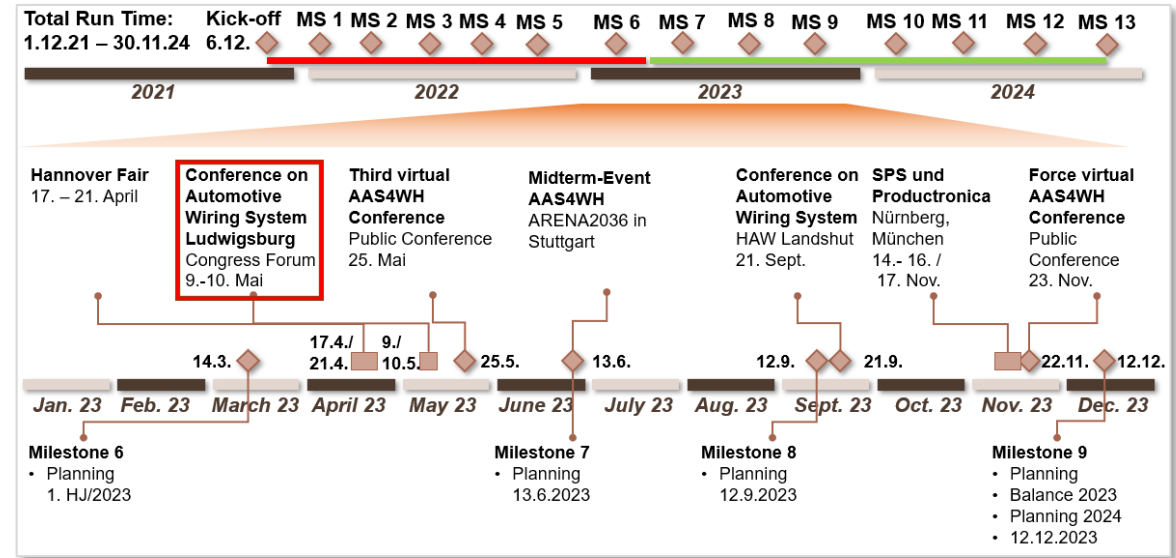


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 Bundesministerium
für Wirtschaft
und Klimaschutz
aufgrund eines Beschlusses
des Deutschen Bundestages

Key facts

- Participant of “35c-Konjunkturpaket”
- 10 Project partners over the hole value chain
- Total funding about 10 Mio.€
- 10 Subprojects with different scope
- Goal by using the Asset Administration Shell:
 - Interoperability
 - End-to-end digitization
 - Process automation

Tier 3 Maschinen	Tier 2 Komponenten	Tier 1 Konfektionäre
Software-Toolhersteller		



TP 2 Development Process of the Wire Harness	TP 3 Production Process of the Wire Harness	TP 4 Assembly Process of the Wire Harness
TP 1 Concept, Information model and Product description		
TP 5 Integration of the Composite Component		
TP 6 Automated Negotiation Processes		
TP 7 Data Business Policy, Data Governance and Monetization		
TP 8 Data Storage Policy, Security and Connection to Catena-X		
TP 9 Piloting, Testing, Demonstration		
TP 10 Transfer and coordination		



Cross-company Interoperability



Digital provision of information (data generation, storage and provision)



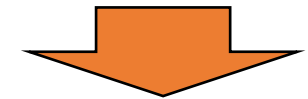
Semantic Description



Standardized exchange formats (reduction of proprietary formats)



Automation through digitalization



Autonomy

Self-determination and free scope for action guarantee competitiveness in digital business models.

- Technology development
- Security
- Digital infrastructure

Interoperability

Cooperation and open ecosystems permit plurality and flexibility.

- Standards and integration
- Decentralized systems and artificial intelligence
- Regulatory framework

Sustainability

Modern industrial value creation ensures high standard of living.

- Decent work and education
- Climate change mitigation and the circular economy
- Social participation

Asset

- Products, machines, components, supply material
- Documents that are exchanged (plans, orders)
- Orders
- Contracts
- ...



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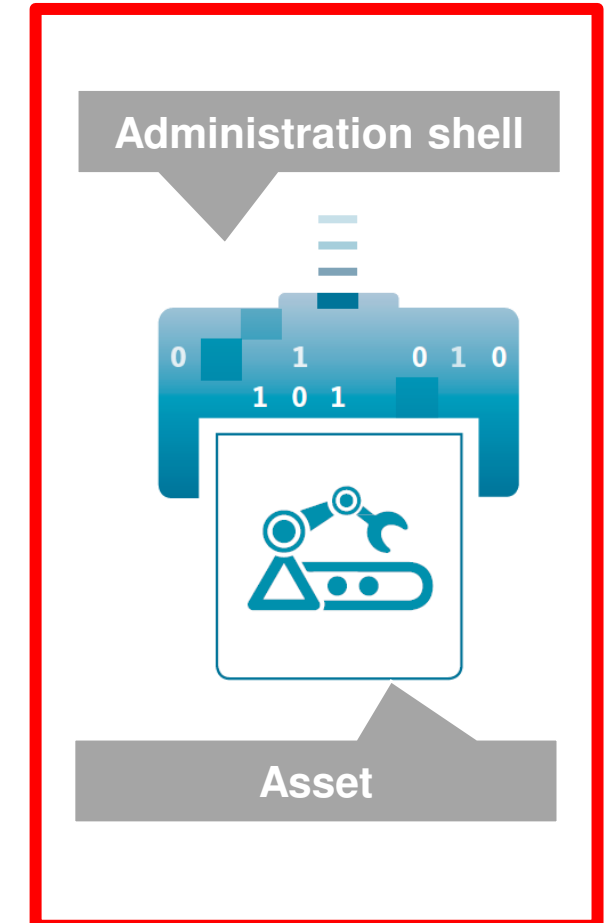
Asset Administration Shell (AAS)

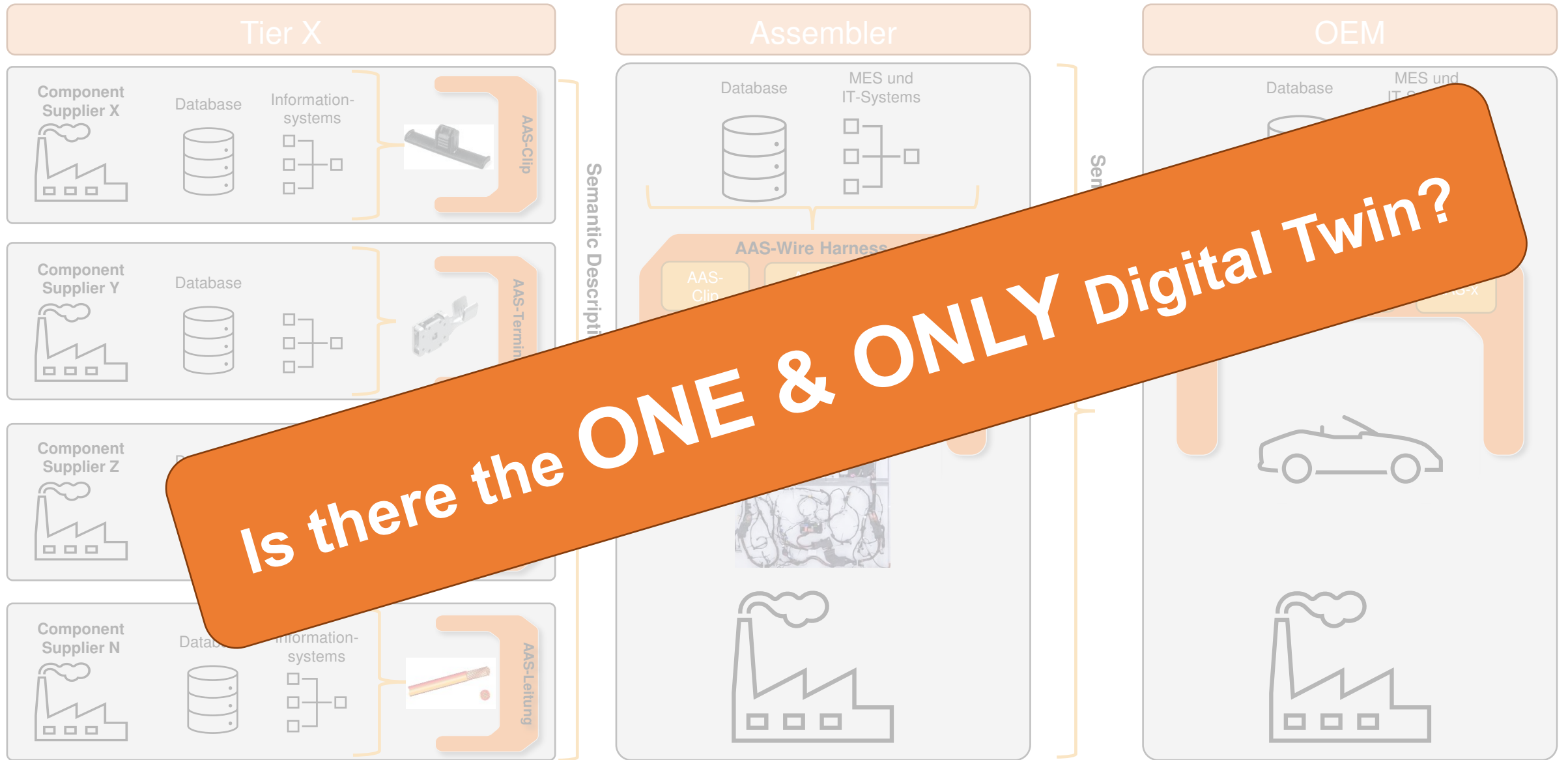
- Unique ID & nesting possibility
- Standardised product features, capabilities of the object
- Free manufacturer-specific features
- References to external data sources or files, as well as other asset administration shells
- Process variables and parameters, telemetry data
- ...



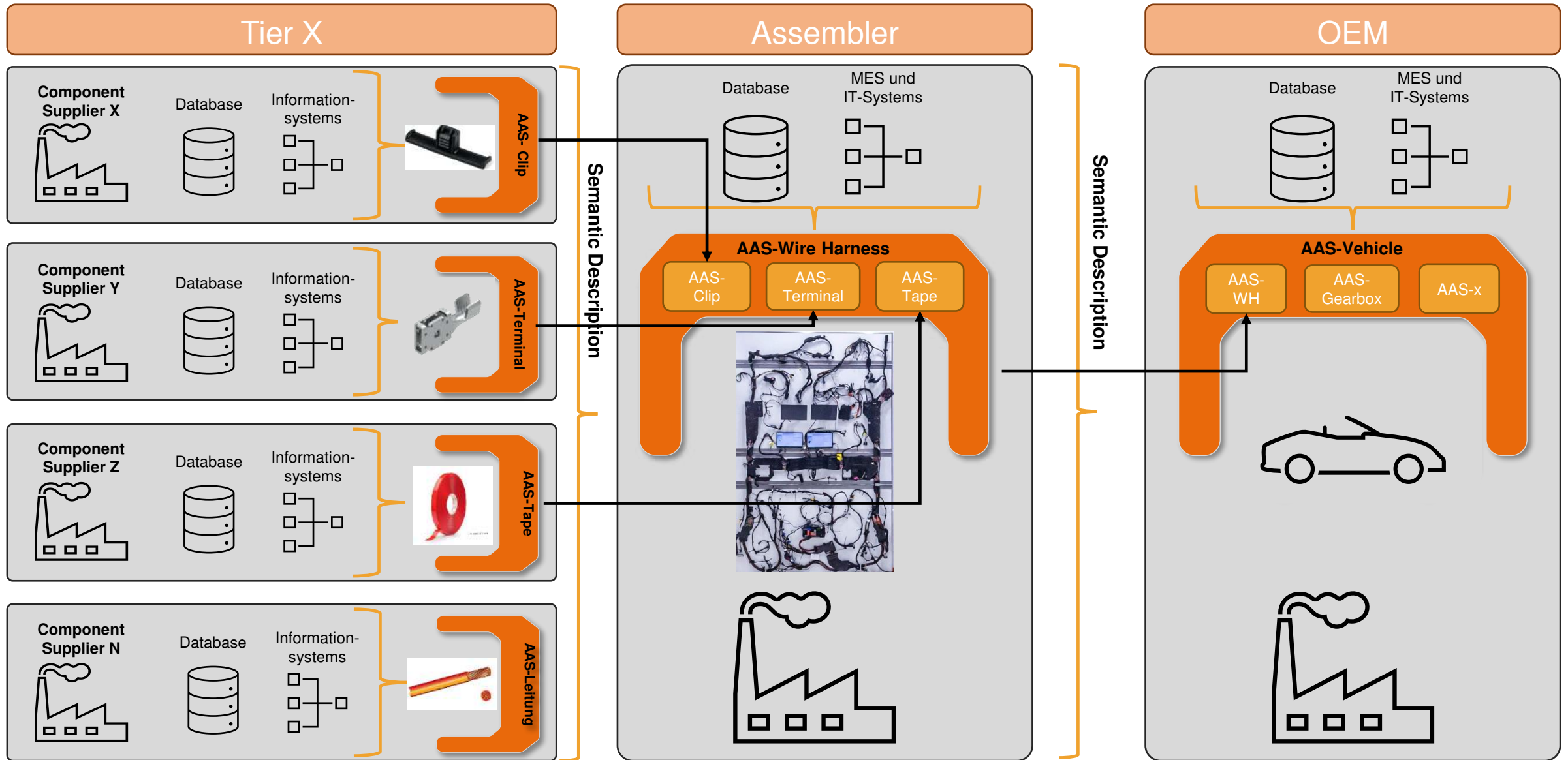
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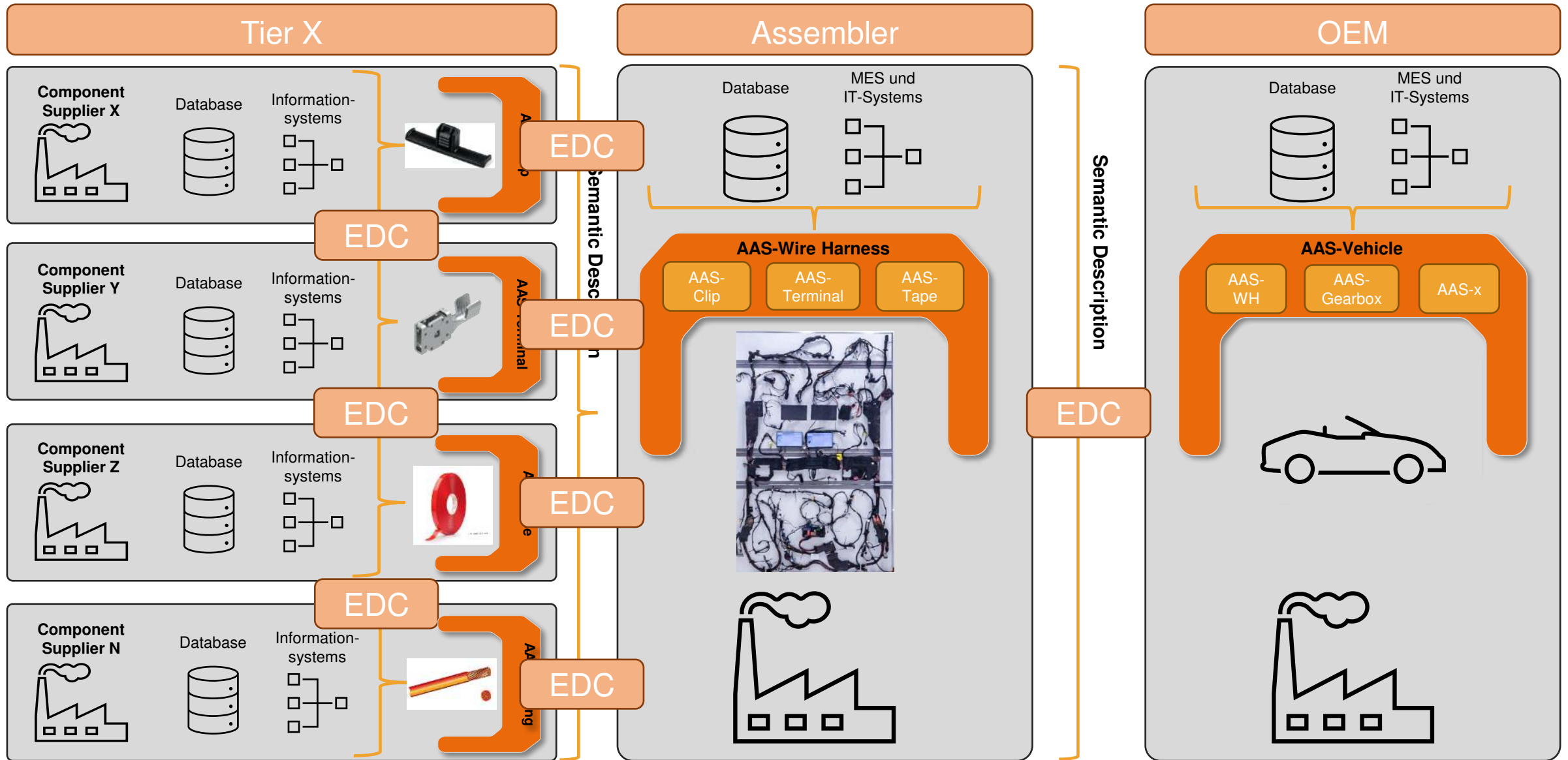
Industry 4.0 Component

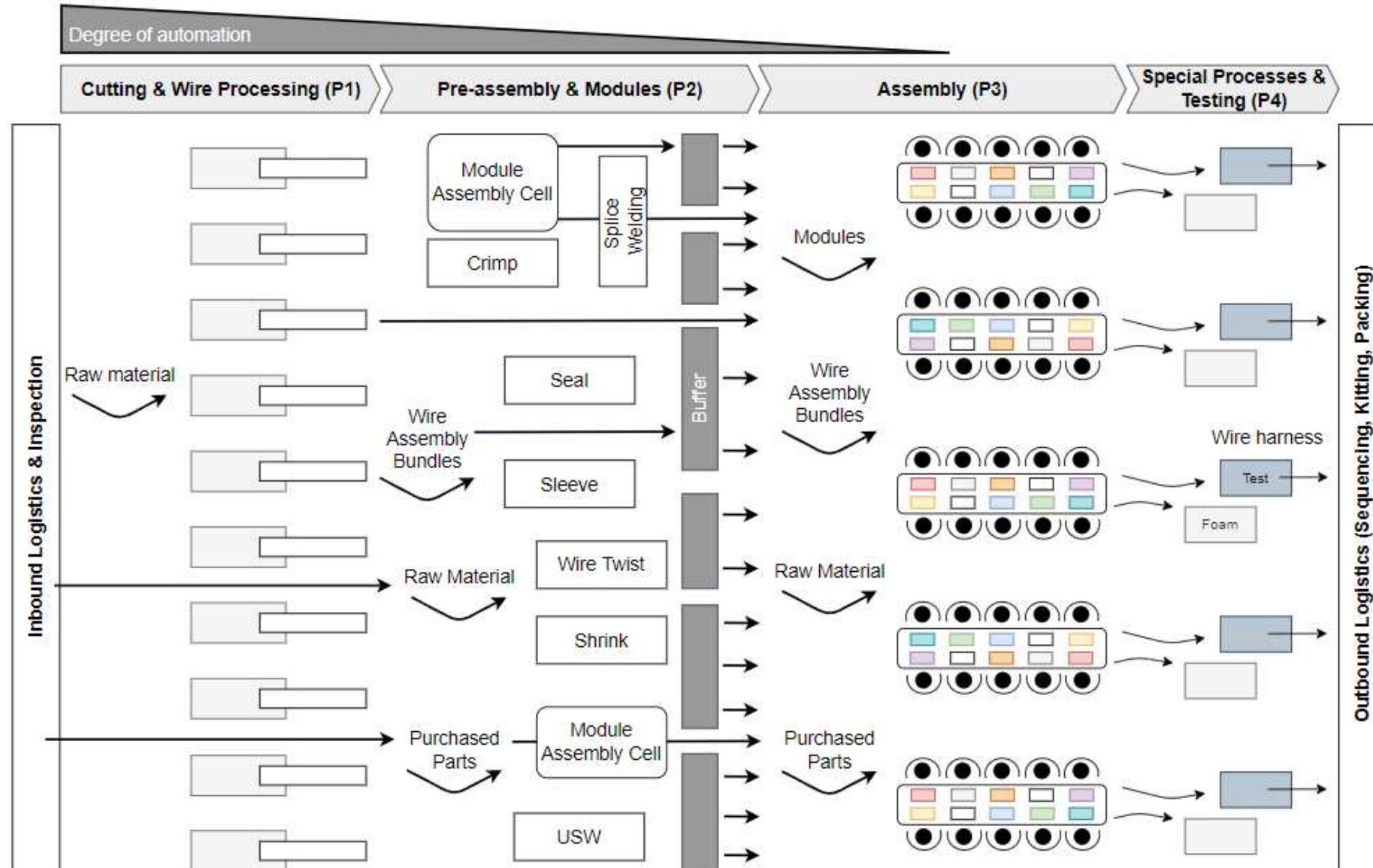




AAS4WH: Implementation of the AAS in the Value Chain of the Wiring Harness







Technical Data Sheets from OEM

Technische Daten

Vibe	mit Hinterradantrieb				
Typen	109 CDI	111 CDI	115 CDI	120 CDI	126
Motor	OM 646 DE22LA	OM 646 DE22LA	OM 646 DE22LA	OM 642 DE30LA	M 272 E 35
Anzahl der Zylinder/Ventile	4/4	4/4	4/4	6/4	6/4
Anordnung	in Reihe	in Reihe	in Reihe	V 72°	V 90°
Bohrung [mm]	88,0	88,0	88,0	81,0	92,2
Hub [mm]	88,3	88,3	88,3	92,0	86,0
Hubraum [cm³]	2148	2148	2148	2987	3498
Verdichtung	18 : 1	18 : 1	18 : 1	18 : 1	10,5 : 1
Nennleistung [kW/PS]	70/95	85/116	110/150	150/204	190/258
bei Drehzahl [1/min]	3800	3800	3800	3800	5900
Nenn Drehmoment [Nm]	250	290	330	440	340
bei Drehzahl [1/min]	1400-2600	1600-2600	1800-2400	1600-2400	2500-5000
Kraftstoffart	Diesel				Super Meifrei (95 Oktan)
Kraftstoffaufbereitung	elektronisch gesteuerte Direkteinspritzung mit Common Rail, Ansaugventilator und Ladeluftkühlung, mit Piezo-Einspritztechnik				Saugrohreinjection
Tankinhalt (Reserve) [l]	75 (9)	75 (9)	75 (9)	75 (9)	75 (9)
Kraftstoffverbrauch ¹⁾ [l/100 km] Schaltgetriebe/Automatikgetriebe					
Bei Abgasnorm EU 4 ohne Dieselpartikelfilter ¹⁾					
innerorts	11,7/-	10,5/11,4	10,5/11,4	-	-/16,3
außerorts	7,3/-	6,7/7,0	6,7/7,0	-	-/9,4
kombiniert	8,9/-	8,1/8,6	8,1/8,6	-	-/11,9
CO ₂ -Emissionswerte ²⁾ kombiniert [g/km]	237/-	215/229	215/229	-	-/284
Bei Abgasnorm EU 4 mit Dieselpartikelfilter ¹⁾					
innerorts	11,8/-	10,6/11,4	10,6/11,4	-/11,9	-
außerorts	7,4/-	6,9/7,0	6,9/7,0	-/7,5	-
kombiniert	9,0/-	8,2/8,7	8,2/8,7	-/9,2	-
CO ₂ -Emissionswerte ²⁾ kombiniert [g/km]	239/-	218/231	218/231	-/244	-
Batterie [V/Ah]	12/74	12/74	12/74	12/74	12/74
Generator [V/A]	14/180	14/180	14/180	14/180	14/150
Anhängelast [kg] gebremst/ungebremst	2000/750	1500-2000/750	1500-2000/750	2000/750	2000/750
Zul. Gesamtgewicht [kg]	4600	4440-4940	4440-4940	4940	4940
Anhängelast [kg] erhöht als Sonderausstattung, gebremst	-	-/2500	2500/2500	-/2500	-/2500
Schaltgetriebe/Automatikgetriebe	-	-/2500	2500/2500	-/2500	-/2500
Zul. Gesamtgewicht [kg] erhöht als Sonderausstattung	-	5300	5300	5300	5300

Technical Data Sheets in AAS



- AAS** "AAS_MLK_1_2_VW" [https://www.volkswagen.de/ids/aas/5164_8091_6032_1132] of [https://www.volkswagen.de/ids/asset/5164_8091_6032_1132]
- AAS** "AAS_MLK_1_2_OEM2" [https://oem2.com/ids/aas/5164_8091_6032_1132---6BDE3725] of [https://oem2.com/ids/asset/5164_8091_6032_1132]
- AAS** "AAS_MLK_1_2_Kroschu" [https://www.kromberg-schubert.de/ids/sm/5320_4102_6032_7017] of [https://www.kromberg-schubert.de/ids/asset/5320_4102_6032_7017]
- AAS** "AAS_MLK_1_2_Draexlmaier" [https://example.com/ids/sm/1364_5050_7032_5510] of [https://www.draexlmaier.com/ids/asset/9474_8091_6032_5870]
- AAS** "AAS_MLK_1_2_Kostal" [https://example.com/ids/sm/6293_7002_6032_5042] of [https://www.kostal.com/ids/asset/9474_8091_6032_5870]

AssetInformation Delete

Kind (of AssetInformation):
Check for kind setting. 'Instance' is the usual choice.

kind:

globalAssetId:
globalAssetId: Generate Input Rename Add existing Delete

Actions: Print asset code sheet ...

specificAssetId:
specificAssetId: Add blank Add preset Add from clipboard Delete last

Pair 1: partNumber

semanticId: Add existing Add blank

key:

value:

externalSubjectId: Add known Add existing Add blank

Pair 2: partNumberOEM1

semanticId: Add existing Add blank

key:

value:

externalSubjectId: Add known Add existing Add blank

Pair 3: partNumberOEM2

semanticId: Add existing Add blank

key:

value:

externalSubjectId: Create data element!

Element	Content
Kind (of AssetInformation):	kind: Type
globalAssetId:	globalAssetId: https://oem2.com/ids/asset/5164_8091_6032_1132
assetType:	assetType:
specificAssetId:	<p>Pair 1: partNumber</p> <p>semanticId: (GlobalReference) 0173-1#02-AAO676#003</p> <p>key: partNumber</p> <p>value: oem2-ABCD</p> <p>externalSubjectId: (GlobalReference) https://oem2.com</p>
DefaultThumbnail:	Resource element

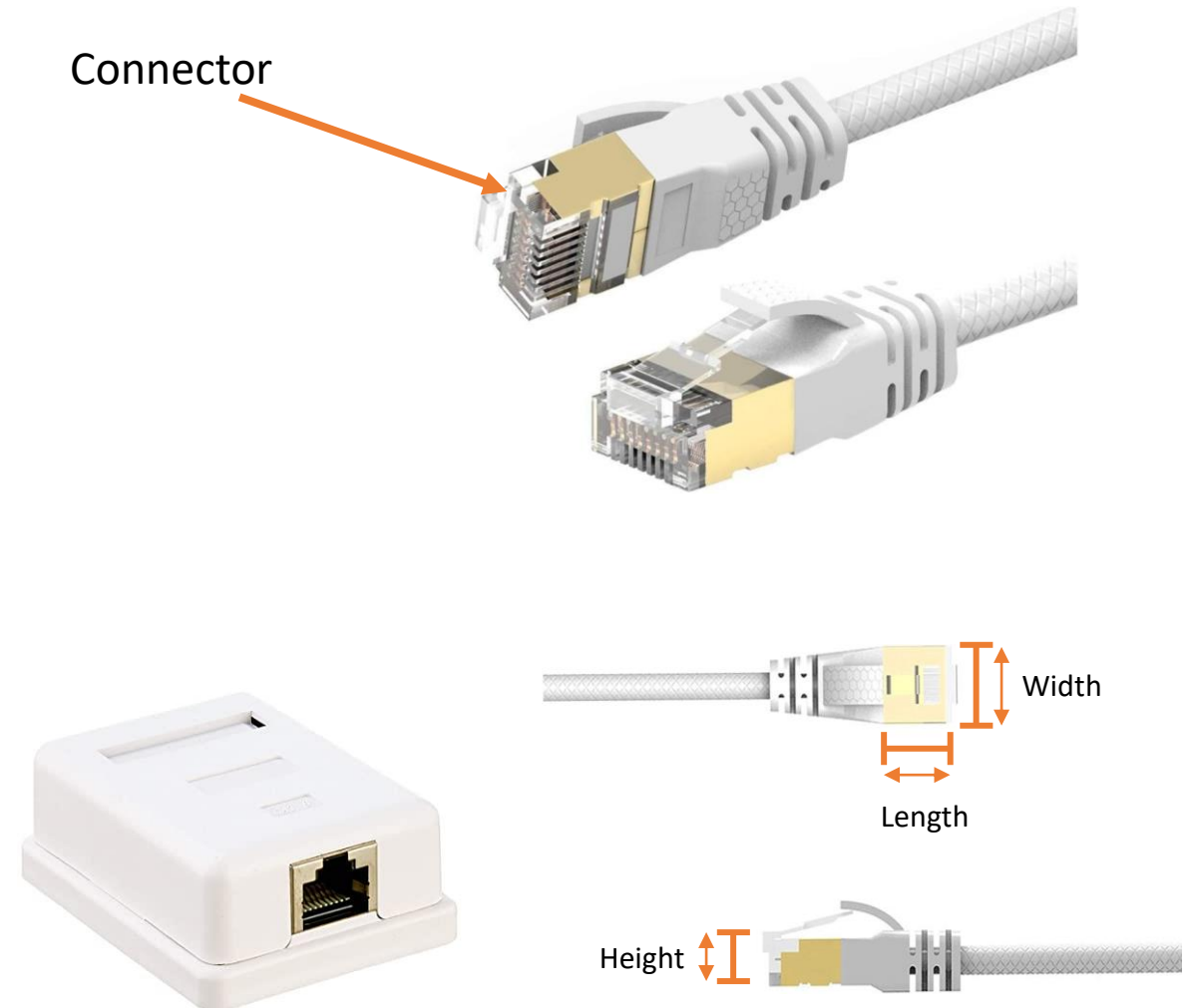
Current Situation

- Test adapter are required for the final test of a wiring harness
- Connector are supplier parts
- Some assemblers manufacture their own test adapters
- To be able to manufacture test adapters, connector information (e.g. dimensions of the connector) are needed
- The dimensions of a connector are measured manually

Lösung

- Get the Digital Twin from the connector manufacturer
- Realizing a digital product twin via asset administration shell

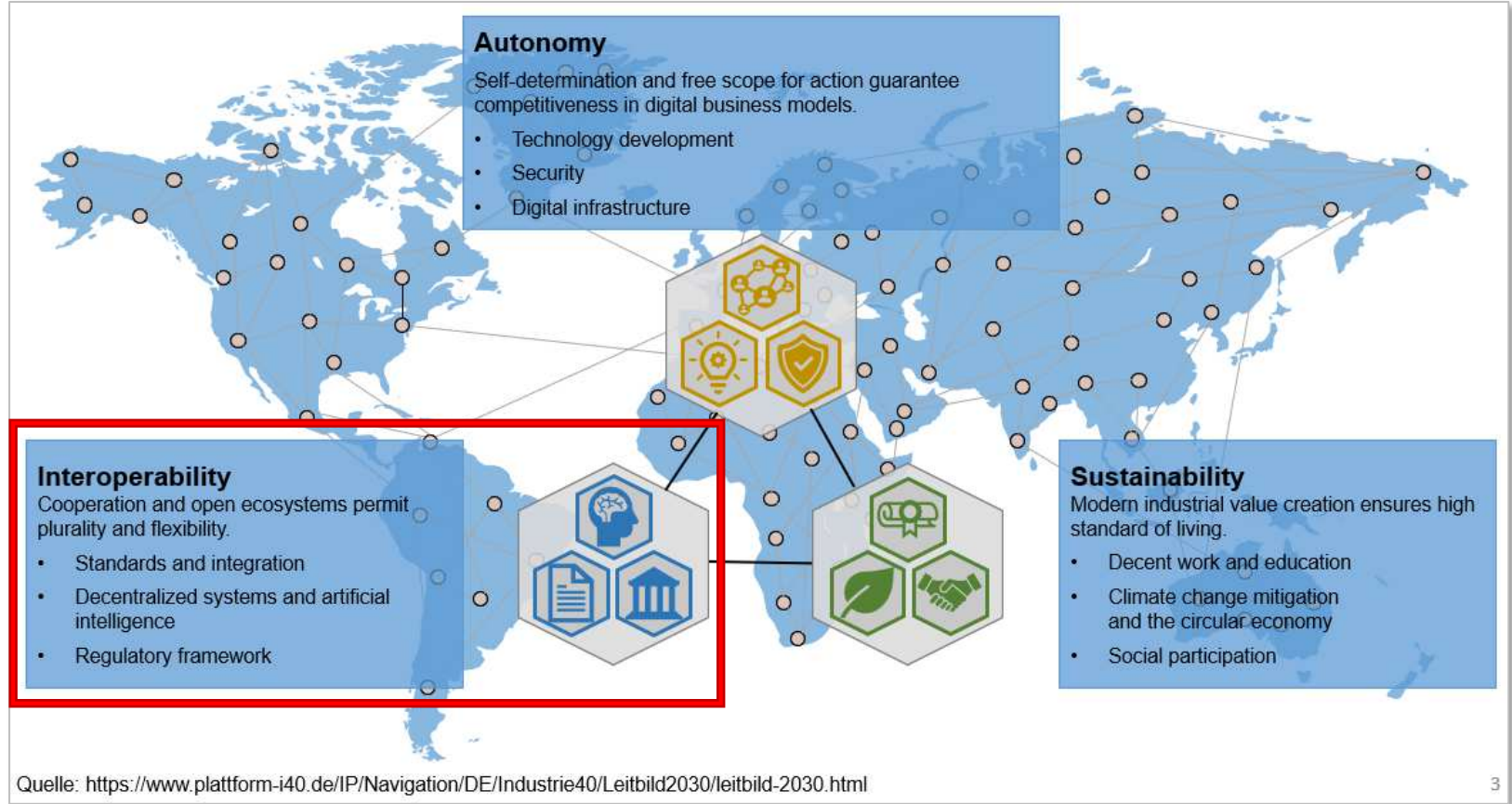
Connector



Test adapter (exemplary)

Advantages

- Rethought cross-company Interoperability
- Standardized digital provision of information
- Semantic description
- Standardized exchange format
- Handling of industry-established data standards (KBL, VEC and OPC-UA Comp. Spec)
- Standardized AAS-Submodels for Engineering, Production and Assembly



Interoperability is the enabler from intra-enterprise optimization, to value chain optimization.