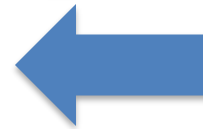
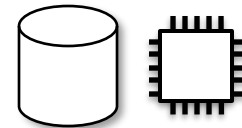
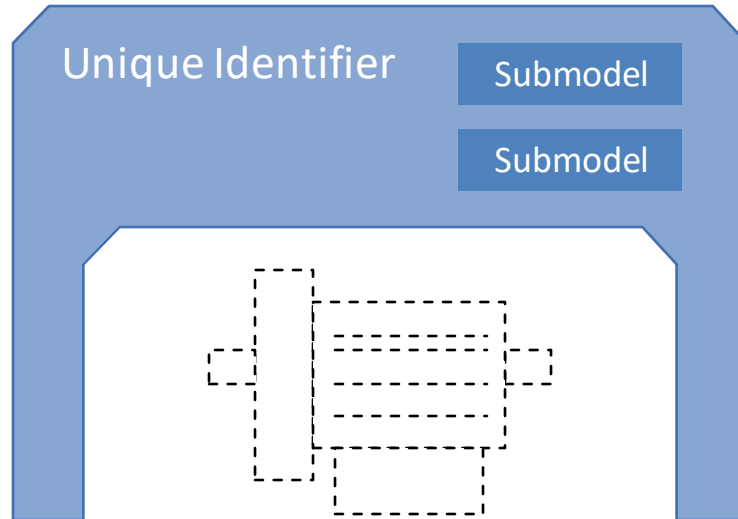
A blue-tinted, stylized background image of an industrial factory floor with various machinery and equipment.

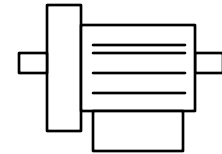
Secure Asset Administration Shell exchange with Distributed Ledger Technology

Andre Bröring, Alexander Belyaev, Henning Trsek, Lukasz Wisniewski, Christian Diedrich

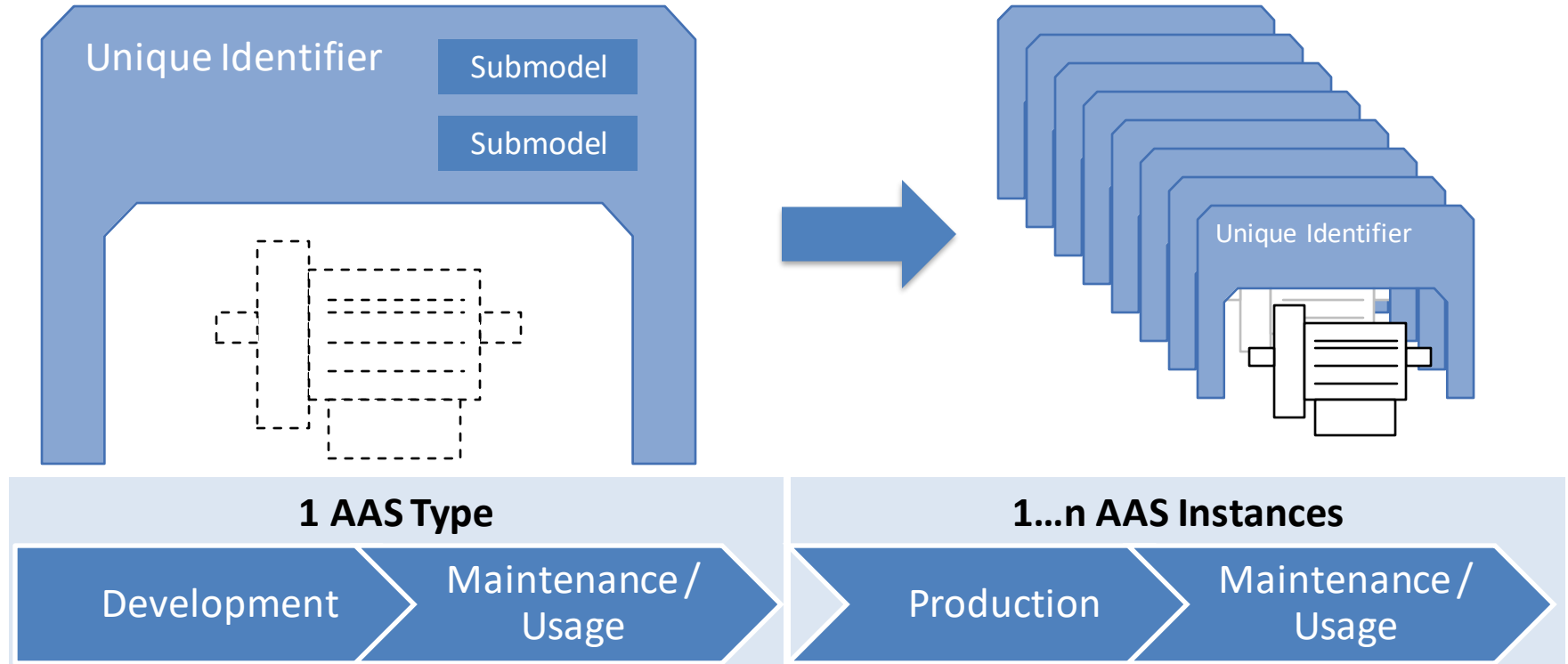
AAS Fundamentals



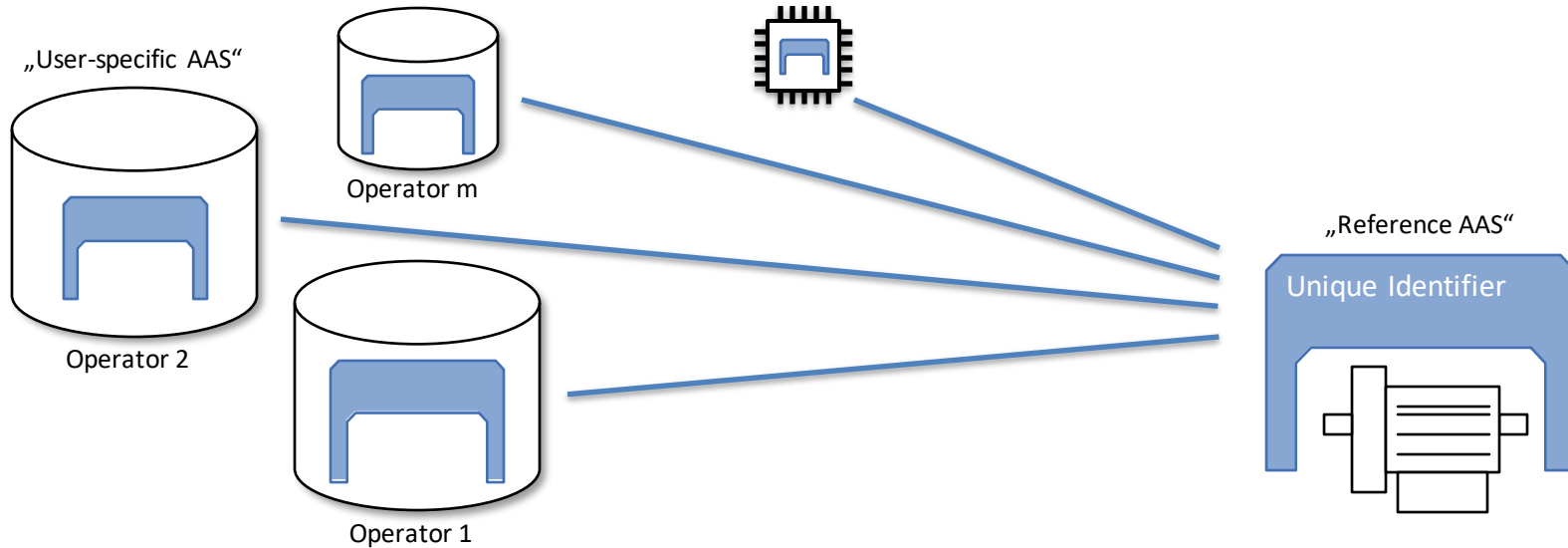
Digital Twin



AAS in Asset Life Cycle



AAS Instances

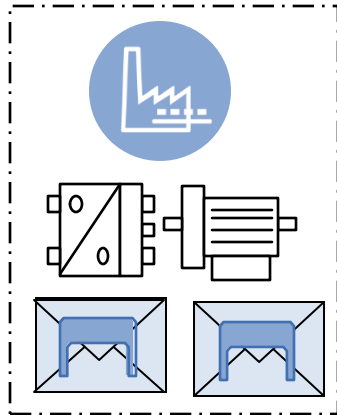


1...m operator specific AAS Instances

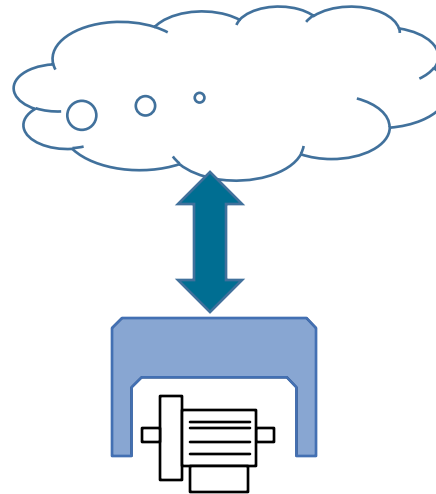
1 AAS Instance

Forms of AASs

Passive AAS
AAS as a file

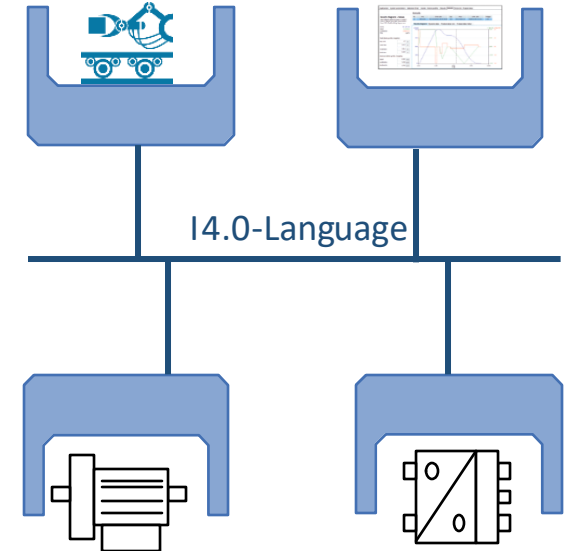


Re-active AAS
AAS with API



Scope of this presentation

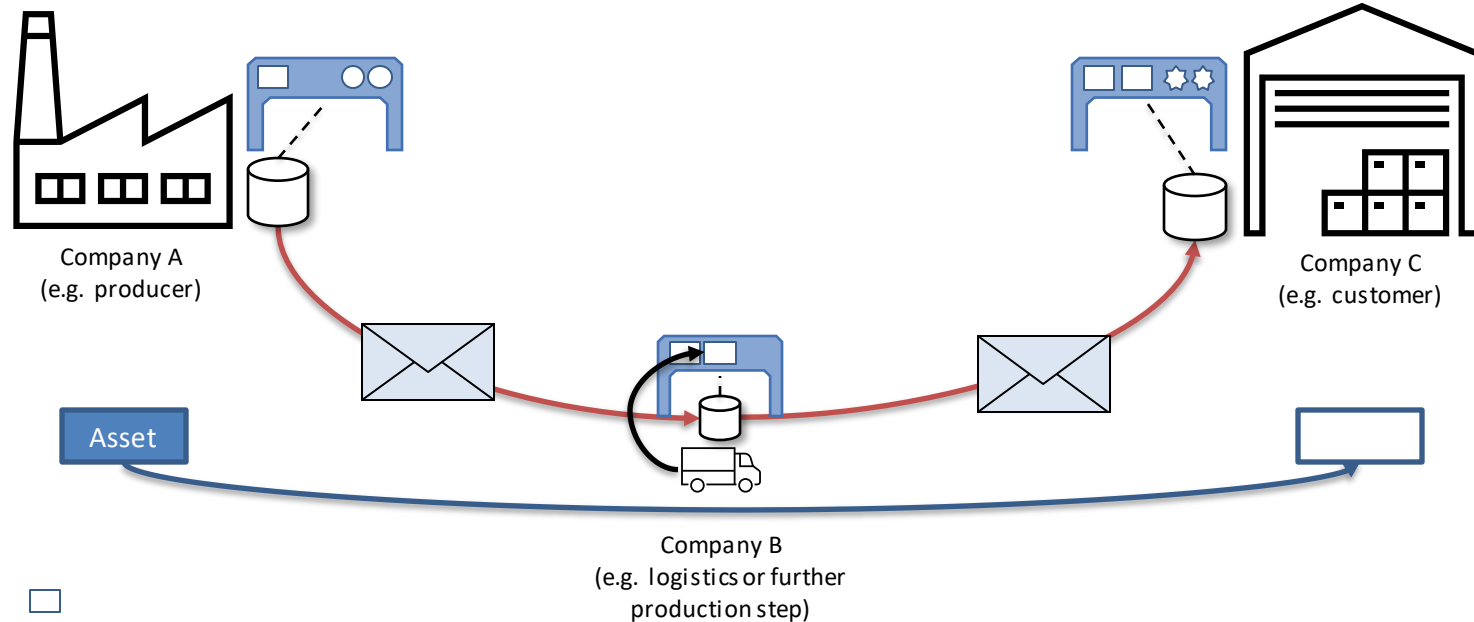
Pro-active AAS
Autonomously interacting



State of the art

AAS Exchange on file basis

Passive AAS



Objective:
Track all asset
life cycle data

Public Submodel

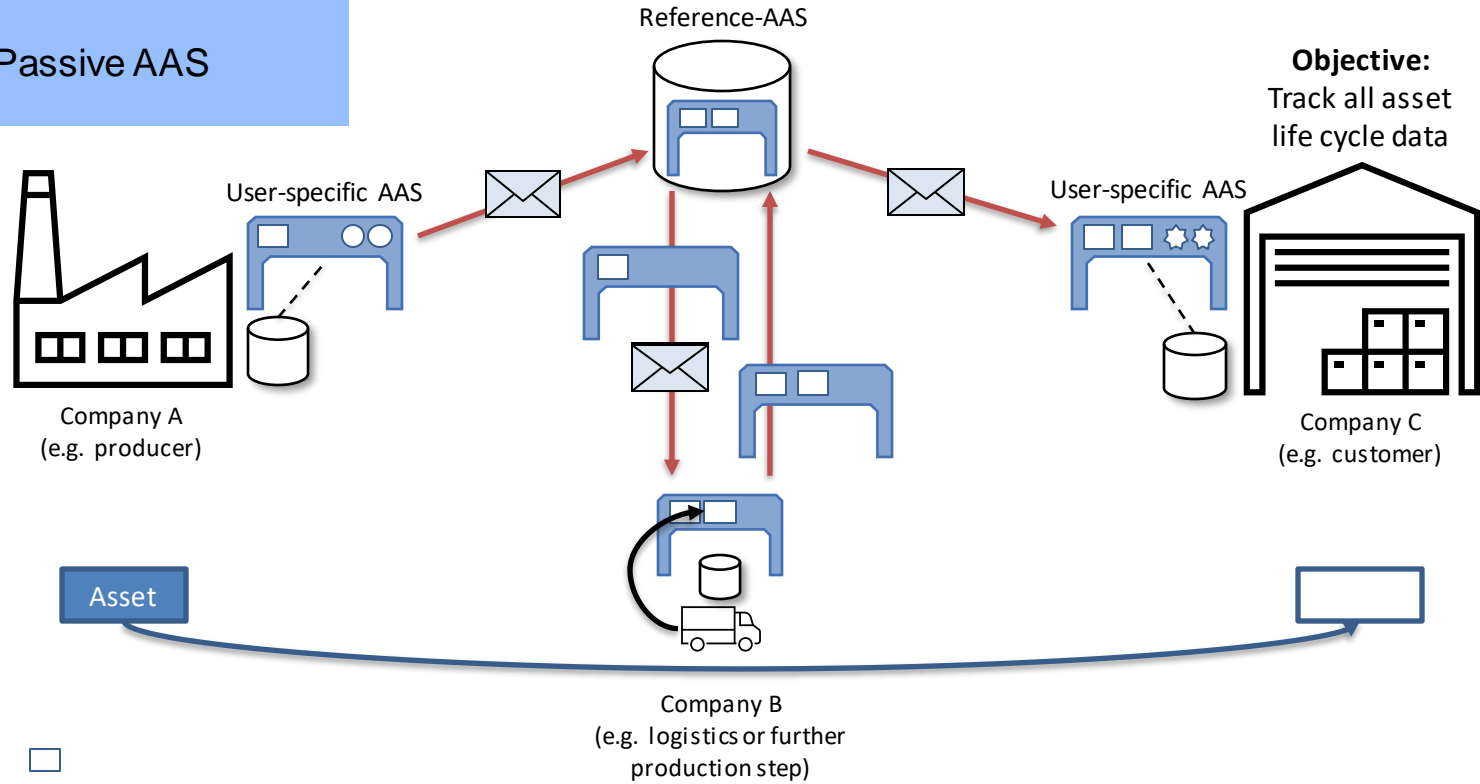


Private Submodel



State of the art AAS Exchange on file basis

Passive AAS



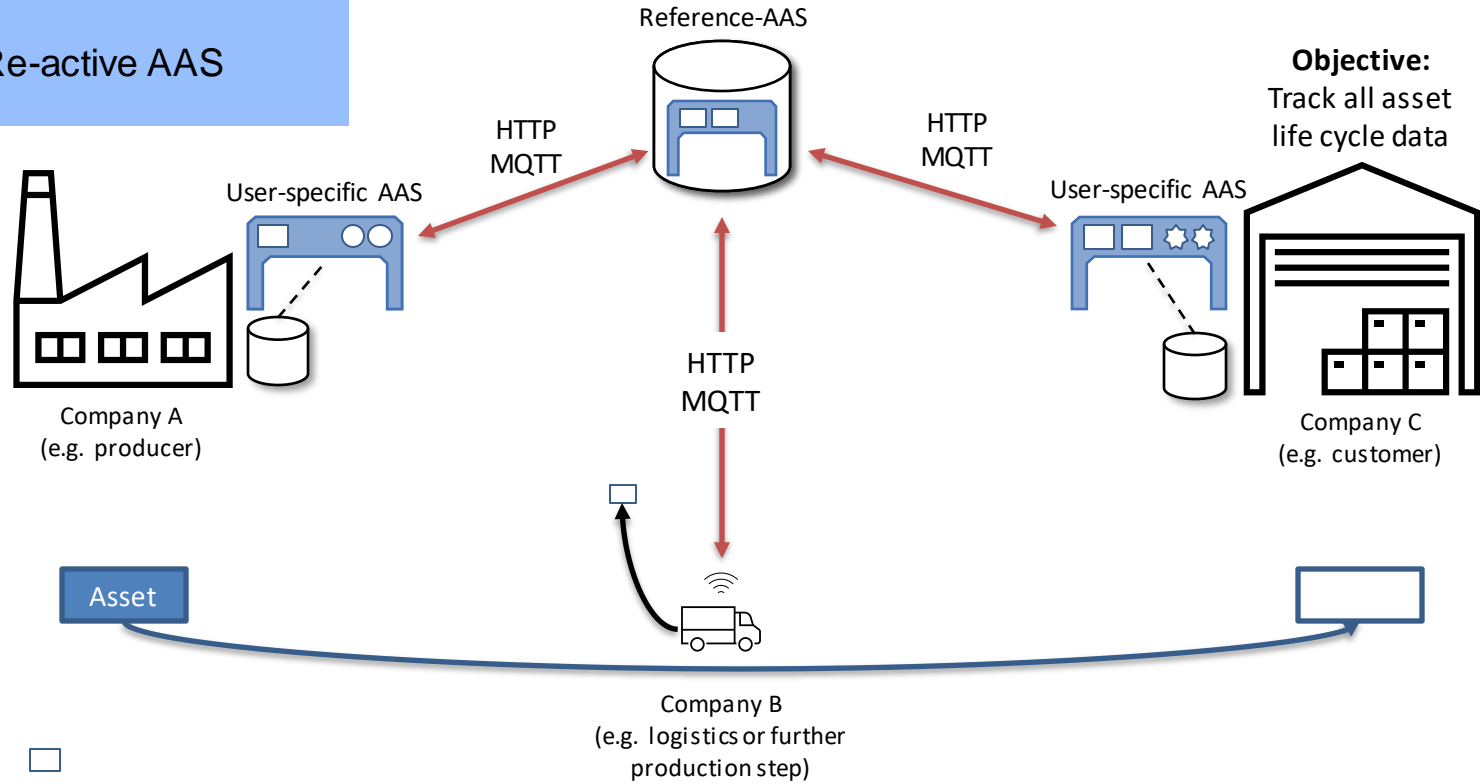
Objective:
Track all asset
life cycle data

- Public Submodel
- Private Submodel

State of the art

Data Exchange via IP-based interfaces

Re-active AAS



Objective:
Track all asset
life cycle data

Public Submodel □
Private Submodel ○ ☆

Challenges

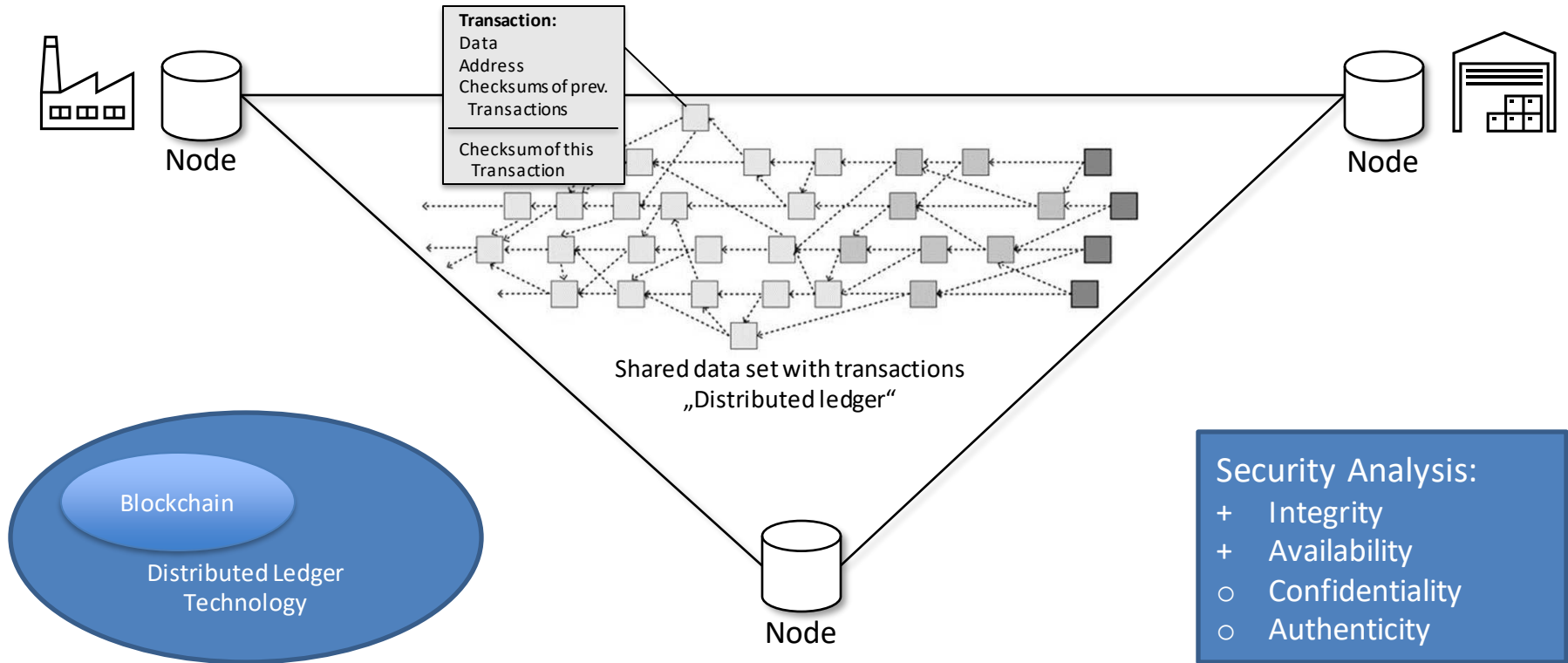
Store all relevant data from different supplier in the AAS

Create single source of truth for asset data

Avoid write-access and direct connections to AASs in repositories

No central organizations with monopolistic positions

Distributed Ledger Technology - Fundamentals



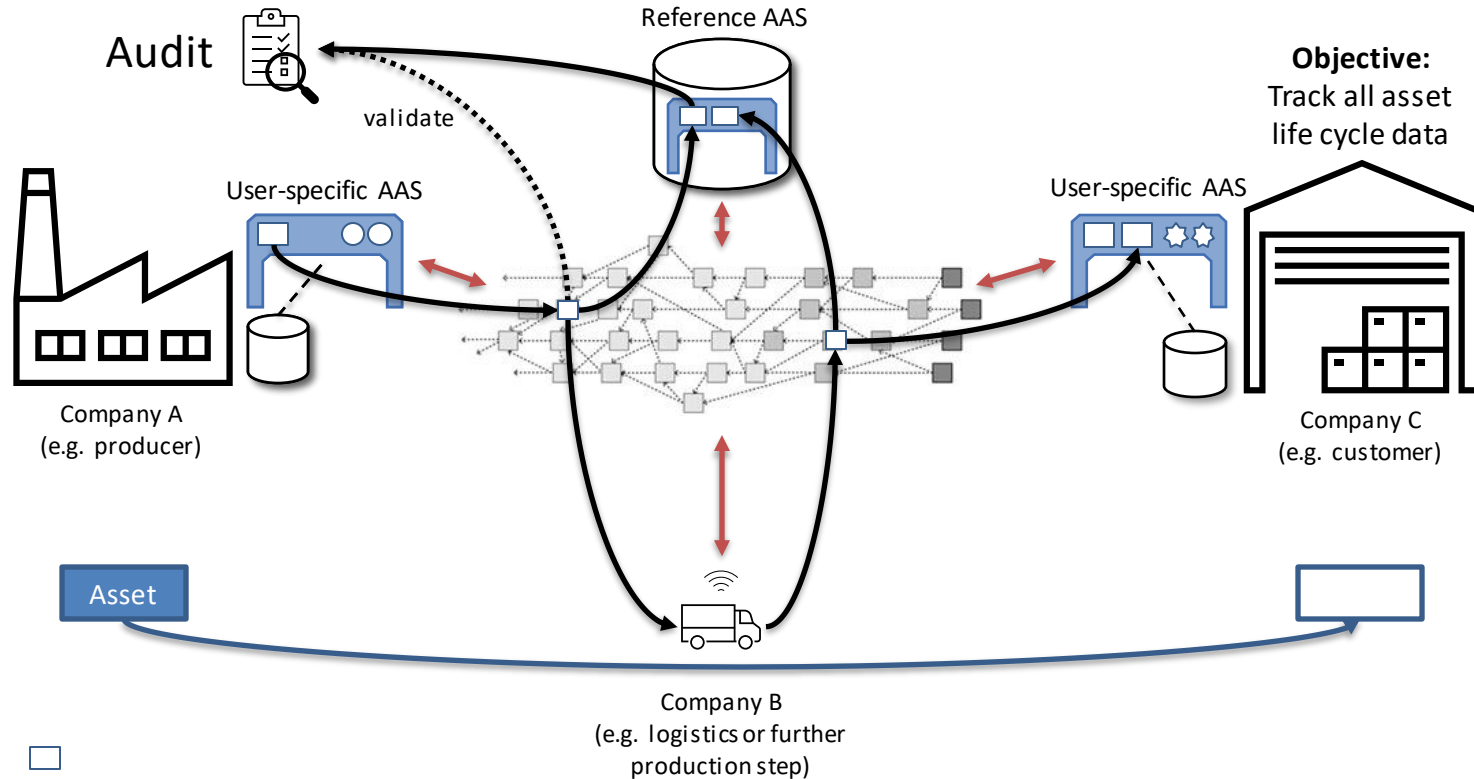
Decentral, tamper-proof database
Blockchain ∈ Distributed Ledger

Security Analysis:

- + Integrity
- + Availability
- Confidentiality
- Authenticity

Solution proposal

Secure exchange of AAS content using DLT



Objective:
Track all asset
life cycle data

- Public Submodel
- Private Submodel

Conclusions

- DLT as decentralized buffer for submodels with life cycle data
- No direct connection, no write access for AAS
- No central organization with monopolistic position
- High availability and integrity
- AAS remains data centre
- DLT as shared data set is single source of truth



Vielen Dank / Thank you



LEHRSTUHL
INTEGRIERTE AUTOMATION



Institut für industrielle
Informationstechnik
Institute Industrial IT



Andre Bröring
Working Group Computer Networks
Institut für Industrielle Informationstechnik (inIT)
Technische Hochschule Ostwestfalen-Lippe
Campusallee 6,
D-32657 Lemgo
andre.broering@th-owl.de