DATA SOVEREIGNTY IN A MULTI-TENANT, TRUSTED (LOGISTICS) DATA SHARING INFRASTRUCTURE:

OPPORTUNITIES AND CHALLENGES FOR APPLYING BLOCKCHAIN TECHNOLOGY

TNO innovation for life

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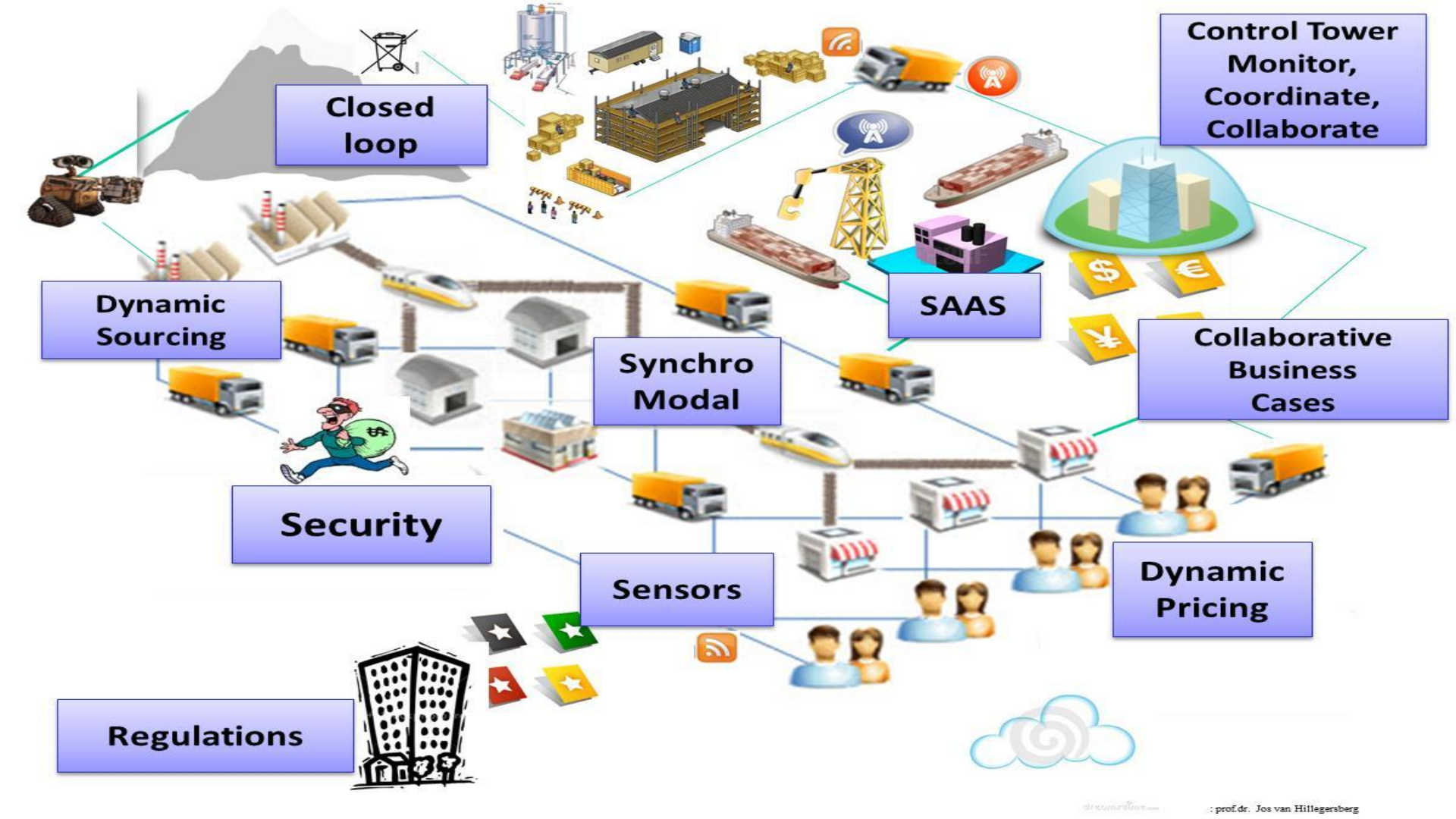
RESEARCH BACKGROUND

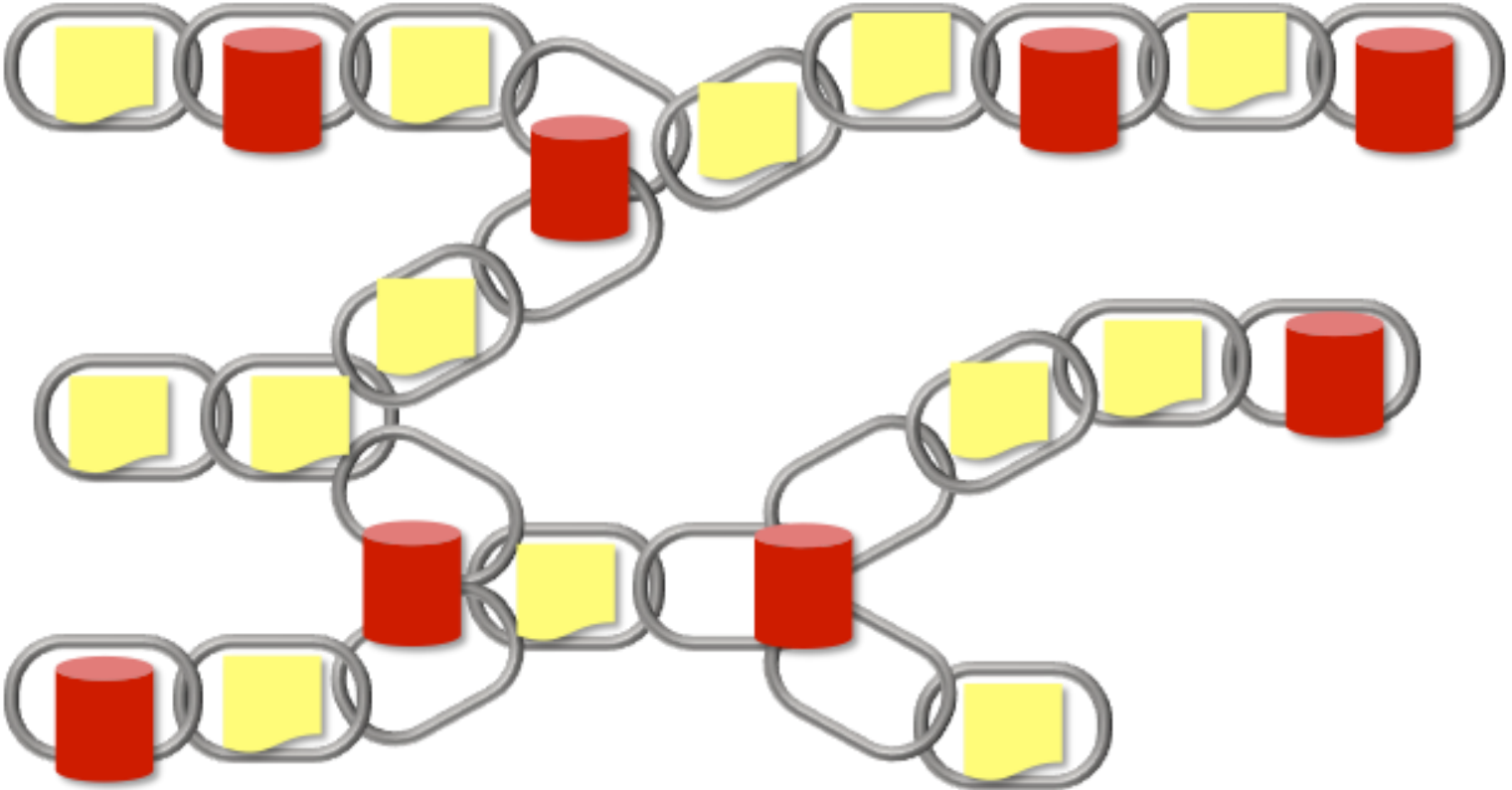
- Inefficiency in road freight transportation (fragmented market)
- High percentage of empty kilometers
- 43% load truck factor
- 70% of LSPs in Benelux plan to implement horizontal cooperation in the next 5 years
- Collaboration is crucial in the supply chain, however it is complex and challenging
- Monitoring/steering collaboration is seen as challenging by practitioners.

BENEFITS OF MULTI-TENANT COLLABORATION

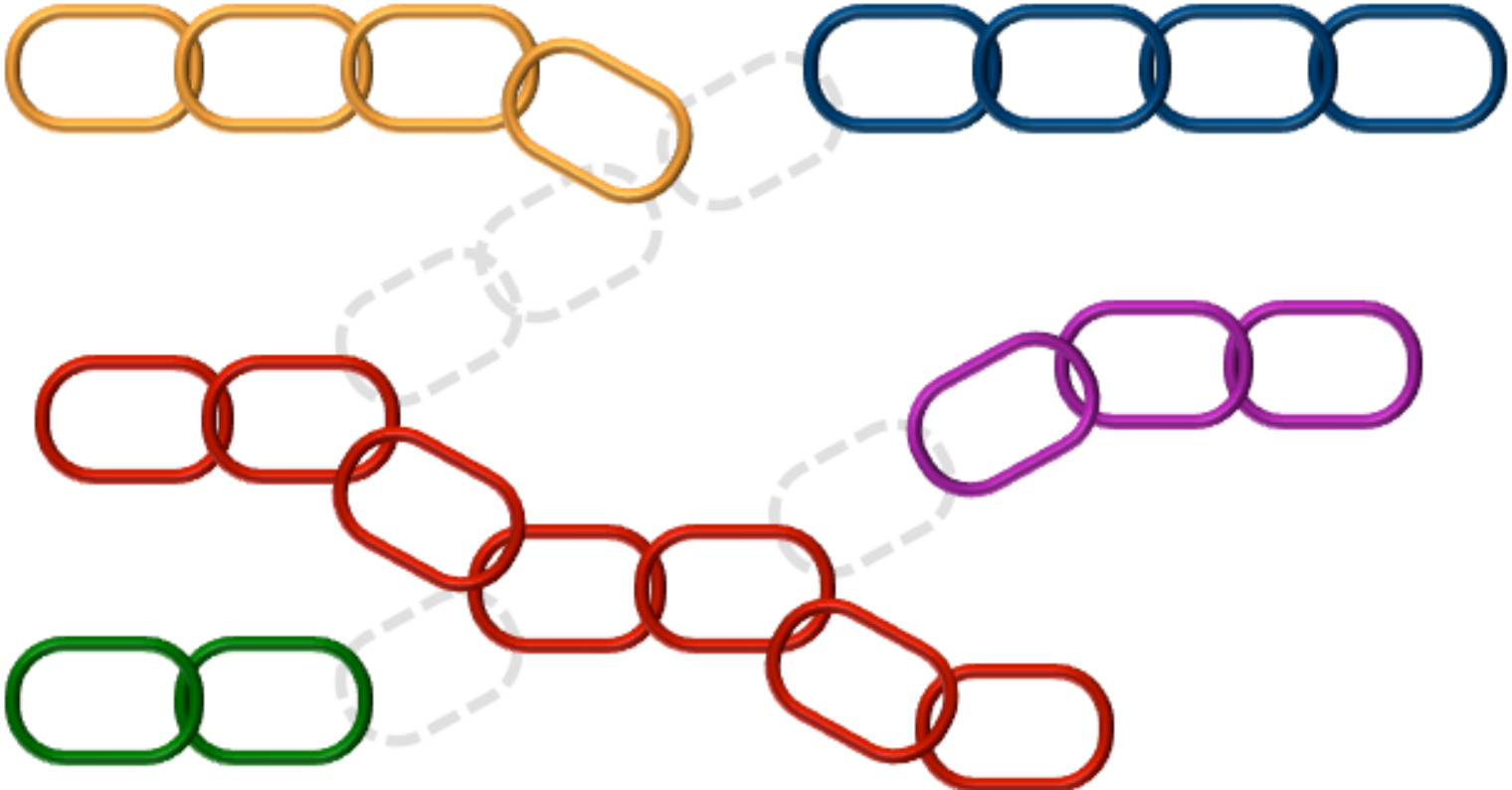
- Prakash and Deshmukh (2010) who illustrate that collaboration is mainly optimized within single organizations and that collaboration in supply chains mainly takes the form of vertical collaboration.
- Frisk et al. (2010) demonstrate that better planning systems and processes within companies can result in a saving of 5%.
- And that collaboration with supply chain partners can add another 9%, which accumulates to a total of 14%.
- Similar numbers are reported by Palmer and McKinnon (2011), who derive to a reduction of nearly 18% external cost and 14% CO2 reduction.


Closed loop
Control Tower Monitor, Coordinate, Collaborate
Dynamic Sourcing
SAAS
Synchro Modal
Collaborative Business Cases
Security
Sensors
Dynamic Pricing
Regulations
: prof.dr. Jos van Hillegersberg

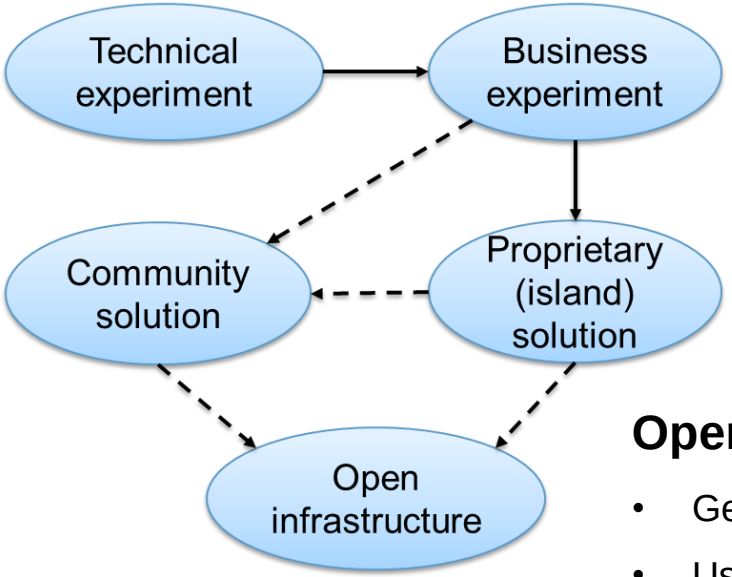
THE *IDEAL* INFORMATION NETWORK



THE *CURRENT* INFORMATION NETWORK



THE AMBITION
OPEN INFRASTRUCTUE FOR TRUSTED SUPPLY CHAIN DATA EXCHANGE



Open infrastructure:

- Generically applicable to multiple use cases / scenarios
- Usability and connectivity not constrained to specific communities
- Based on open (non-prorietary) solutions and technology
- Seperation of concerns / functionality (modular)

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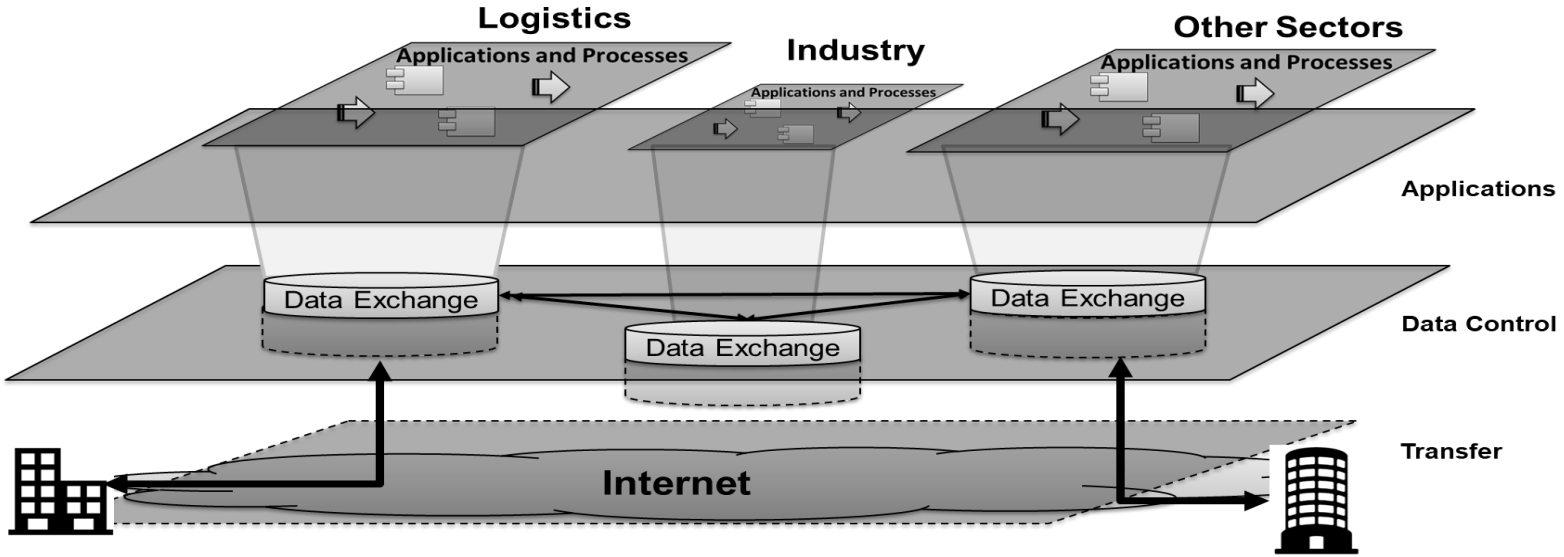
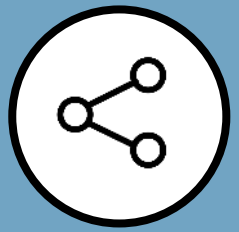


Key requirements:

- Trust, trust, trust,…
- ‘Open’ infrastructure

INDUSTRIAL DATA SPACE ASSOCIATION

Industrial Data Space Approach:
SELF DETERMINED CONTROL OF DATA FLOWS



Endless **Connectivity**

standard for data flows between all kinds of data endpoints

Trust between different security domains

Comprehensive security functions providing a maximum level of trust

Governance for the data economy

usage control and enforcement for data flows

FUNCTIONAL ARCHITECTURE OF THE INDUSTRIAL DATA SPACE

1. TRUST

- Roles
- Identity management
- User certification
- Governance

2. SECURITY AND DATA SOVEREIGNTY

- Authentication & authorization
- Usage policies & usage enforcement
- Trustworthy communication & security by design
- Technical certification

3. ECOSYSTEM OF DATA

- Data source description
- Brokering
- Vocabularies

4. STANDARDIZED INTEROPERABILITY

- Integration of existing vocabularies
- Handling of different data formats
- Connection of clouds and platforms

5. VALUE ADDING APPS

- Processing of data
- Remote execution

6. DATA MARKETS

- Clearing & billing
- Domain-specific broker and marketplaces
- Use restrictions and legal aspects (contract templates, etc.)

THE AMBITION
OPEN INFRASTRUCTUE FOR TRUSTED SUPPLY CHAIN DATA EXCHANGE

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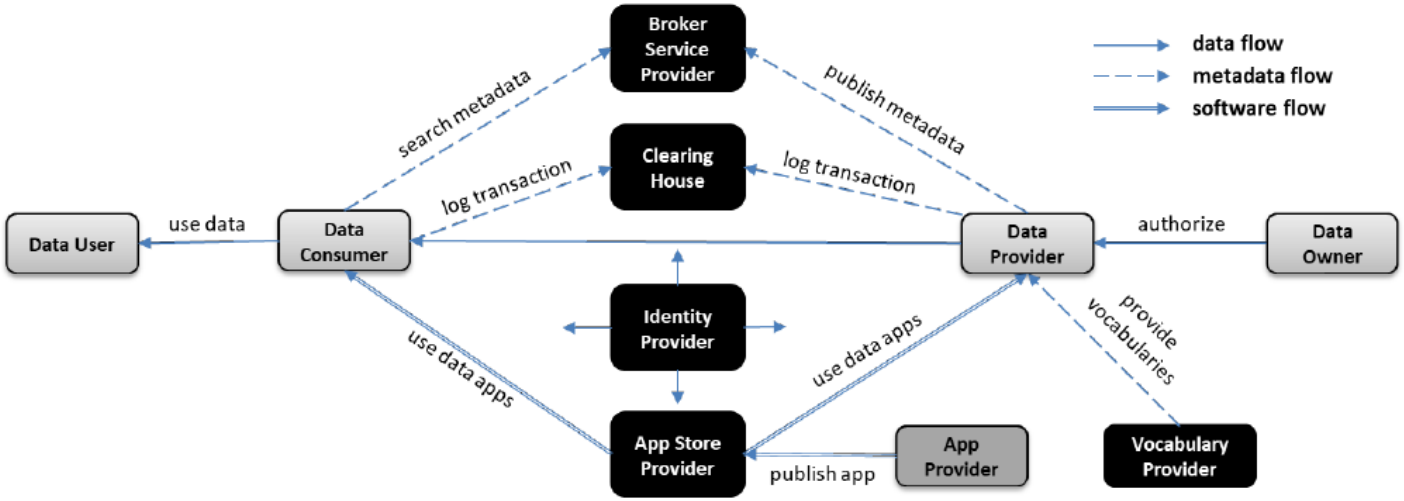
To design an open, trusted (secure, accountable, …), digital infrastructure to support an ecosystem where companies and stakeholders can share data in a secure and controlled way, as enabler for supply chain collaboration between companies and sectors at a global scale.

ROLES & INTERACTIONS IN THE INDUSTRIAL DATA SPACE



IDENTITY PROVIDER

- **Existence.** *Users must have an independent existence.*
- **Control.** *Users must control their identities.*
- **Access.** *Users must have access to their own data.*
- **Transparency**. *Systems and algorithms must be transparent*
- **Persistence.** *Identities must be long-lived.*
- **Portability.** *Information and services about identity must be transportable*
- **Interoperability.** *Identities should be as widely usable as possible.*
- **Consent.** *Users must agree to the use of their identity.*
- **Minimalization.** *Disclosure of claims must be minimized.*
- **Protection.** *The rights of users must be protected.*

Christopher (Allen, 2018)

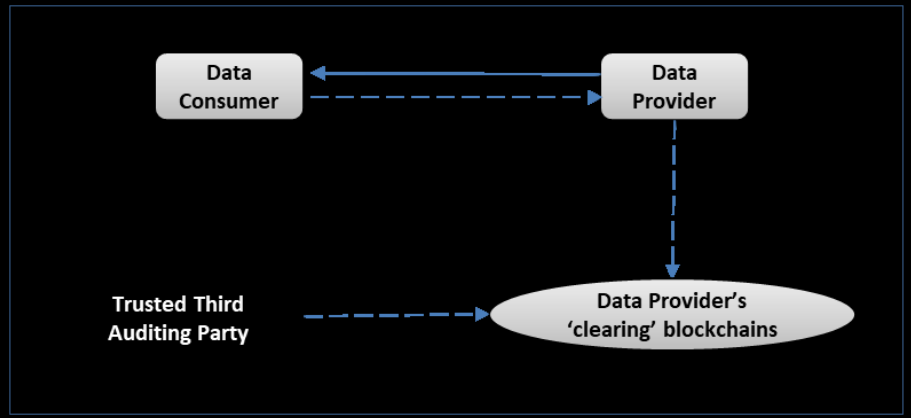
CLEARING HOUSE

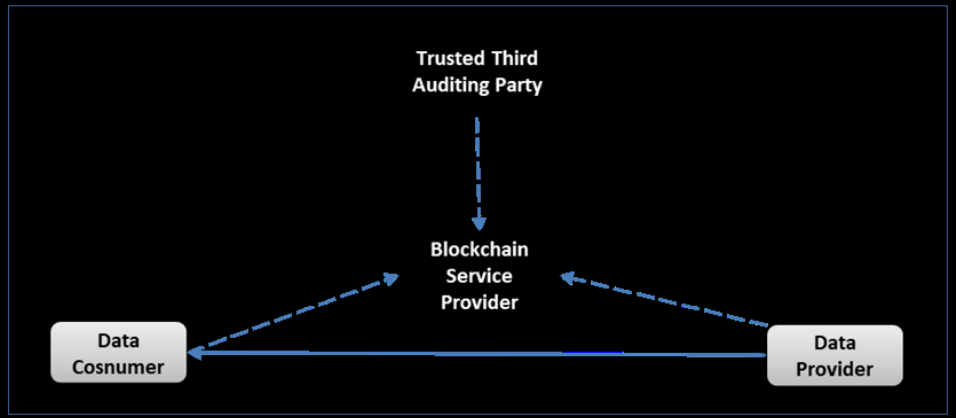
- *Clearing / Transaction Logging*
- *Settlement / Billing*
- *Conflict Resolution*

Blockchain implementation

- Instances of data transaction ‘clearing’ blockchains being initialized by the data provider for logging specific data sharing sessions;
- The receipt of trusted data sharing transactions is acknowledged by means of secured data receipt records, preferably with (reference to) the legal agreements / terms of use under which these data sharing transaction has been done;
- The secured / certified data receipt records are inserted in the data transaction ‘clearing’ blockchain.

ROLES & INTERACTIONS IN THE INDUSTRIAL DATA SPACE





CONCLUSIONS & FUTURE WORK

- Currently there aren’t successful implementations of a heterogenous trusted data sharing infrastructure due to all kind off reasons (trust, IT, cost, competition), however with the speed of the adoption of the blockchain we foresee some progress on some of these factors.
- Instead of having central roles and actors this can help to build trust amongst partners and not having a single point of failure.
- Setting up a business experiment


80+
Companies and Organisations
15+
Countries
25+
Use Cases
1
Ecosystem
Allianz
TATA
Atos
BAYER
Logata
Digital Solutions
UNITY
Boehringer Ingelheim
catkin
ADVANEO
eccenca
LOGENIOS
BOSCH
INDUSTRIE 2025
Cybus
agmadata
Fraunhofer
DATATRONIQ
DATA AHEAD
Audi
CTU
Deloitte.
Insight
HUAWEI
DR. SCHNEIDER
GS1
inovalia
denodo
SIEMENS
Ingenuity for life
i2cat
mtc
SAP
GateHouse
inmation:
CDQ
FIWARE
komsa
universität
DB SCHENKER
pwc
koppermann
minnoSPHERE
QuinScape
REWE GROUP
SETLOG
SICK
LOSEC
nicos AG
UNIKLINIK RWTH AACHEN
SINTEF
SALZGITTER AG
SCHAEFFLER
DXC.technology
VOLKSWAGEN
tecnalia
TNO innovation for life
palbox
RITTAL
ZVEI:
thyssenkrupp
TÜV NORD GROUP
UNISCON
VTT
Fastems
POLITECNICO MILANO 1863
VDMA
msg
CHALMERS
CAICT 中国信通院

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