

Enhancing trust in Industrial IoT

Enabled by distributed ledger technologies and enterprise connectivity

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Industry 4.0

State of the Union



Evolving and converging technologies (1/4)

Cloud + Hardware + Connectivity + DLT

1. Prevailing cloud technologies

- a) Elastic computing: Limitless servers
- b) Cost-efficient big data: Ingestion, Processing, Storage and Visualization

Evolving and converging technologies (2/4)

Cloud + Hardware + Connectivity + DLT

2. Enhanced hardware

- a) Cost-efficient, secure Micro Controller Units (MCU)
- b) Standard interfaces
- c) Reliable actuators, precise sensors
- d) Long-lasting batteries

Evolving and converging technologies (3/4)

Cloud + Hardware + Connectivity + DLT

3. Improved connectivity

- a) Personal Area Network (PAN): Bluetooth Low Energy, 6LoWPAN, NFC
- b) Wide Area Network (WAN): LoraWAN, 5G

Evolving and converging technologies (4/4)

Cloud + Hardware + Connectivity + DLT

4. Distributed ledger technologies

- a) Peer-to-peer transactions
- b) Token economy
- c) Smart contracts
- d) Self-sovereign identity

Understanding Industrial IoT

Characteristics, challenges lifecycle and usage



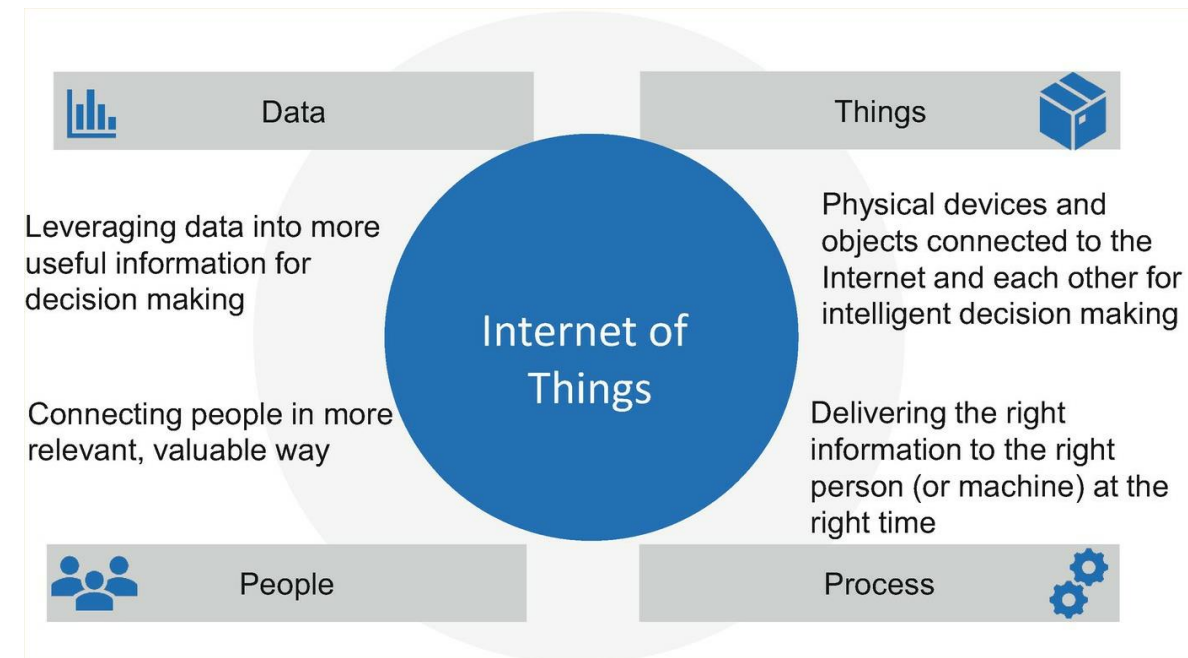
IIoT: Characteristics and ecosystem

It is expected that in 2025 there will be over 70 billion connected devices

IIoT characteristics

- Things or devices
- Connectivity
- Data
- Intelligence
- Action (incl automated action, e.g. smart contracts)
- Ecosystem (protocols, platforms, communities)
- Heterogeneity
- Dynamic changes
- Enormous scale
- Security & Privacy

IIoT ecosystem components

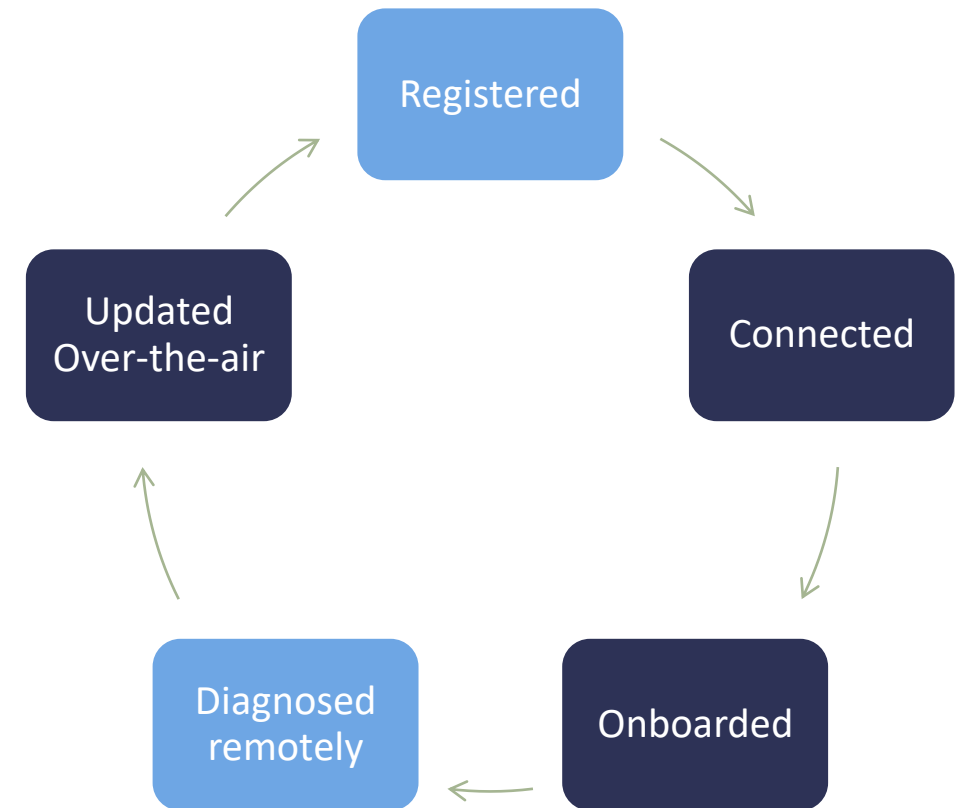


Source: *Intelligent Internet of Things* . Springer International Publishing. Kindle edition.

IIoT: Challenges and lifecycle

Challenges of adoption and complex lifecycle of smart devices

- Scale
- Heterogeneity
- Privacy
- Data ownership
- Cybersecurity
- Legal liability
- Sensors
- Networks
- Big data
- Analysis
- Interoperability



IIoT: Usage areas

Industries and use cases of industrial IoT

1. Manufacturing

1. Predictive maintenance
2. Prescriptive maintenance
3. Third-party failure diagnostics

2. City Government

1. Traffic
2. Parking
3. Public lightning
4. Waste management
5. Water quality & consumption

4. Retail

1. Geographic location for track & trace
2. Temperature controlled shipments
3. Tamper proof control

4. Energy

1. Smart meter metering
2. Solar panel monitoring
3. Grid stability
4. Microgrids
5. Self-consumption communities (nanogrids)
6. Weather conditions

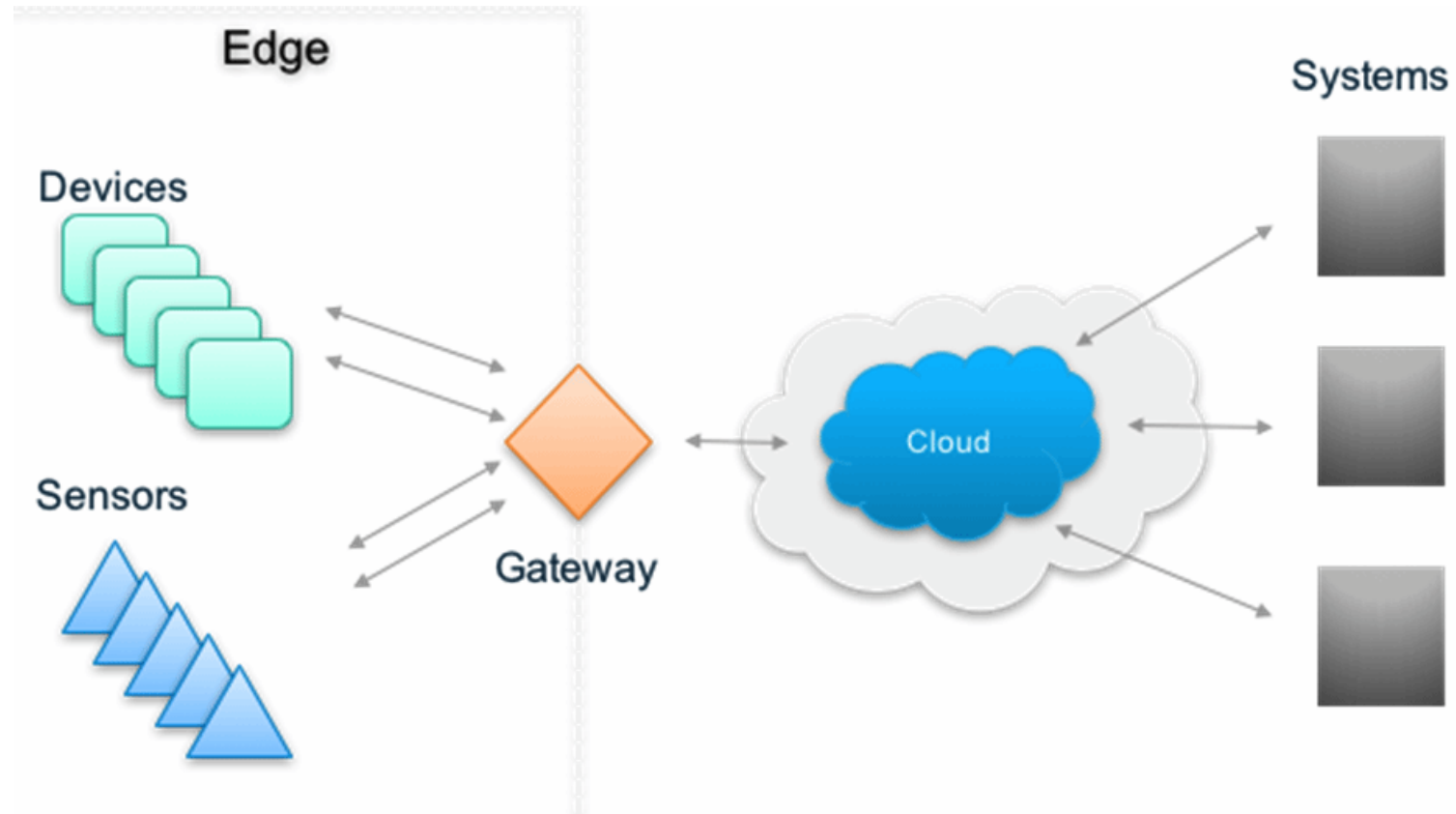
5. Work sites

1. Energy efficiency
2. Inventory
3. Physical access control

6. Healthcare

1. Patient monitoring
2. Clinical trial evaluations

Standard Industrial IoT architecture

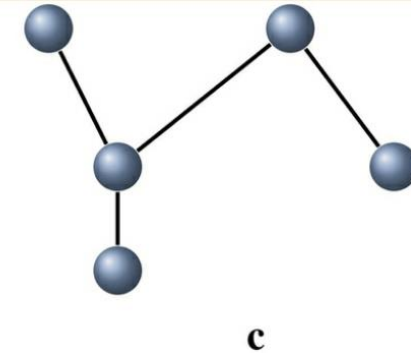
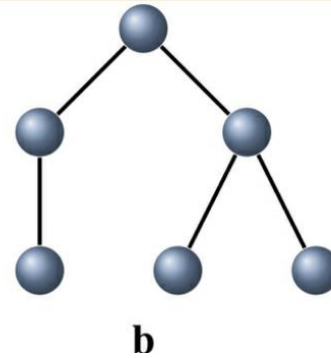
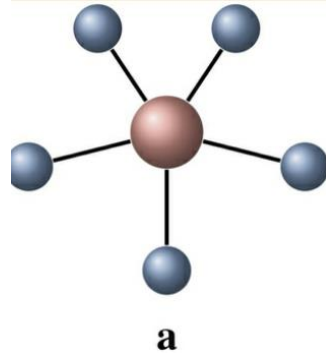


<https://www.computerweekly.com/de/meinung/IoT-Gateway-fuer-die-Cloud-Vernetzung-nutzen>

Comparison of network topologies

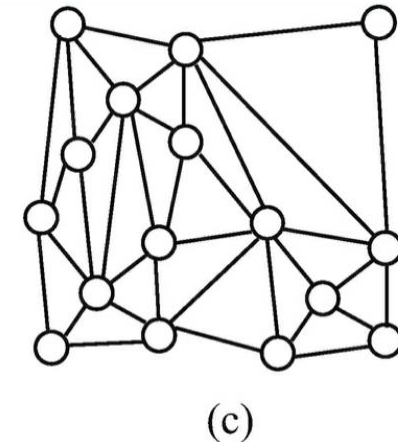
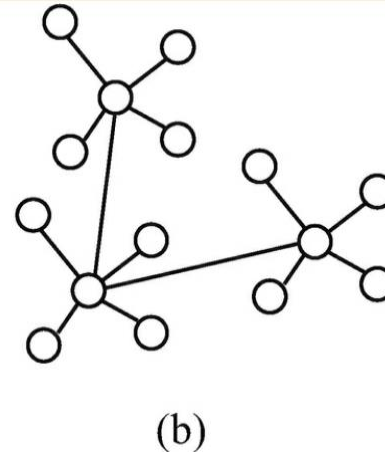
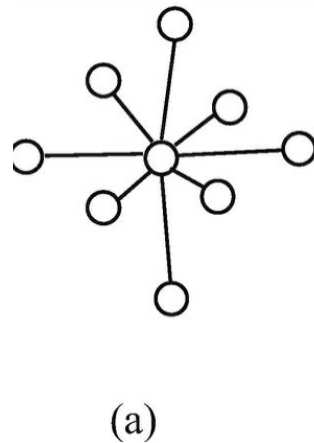
IoT networks:

- a) Star
- b) Tree
- c) Mesh



Network theory:

- a) Centralized
- b) Decentralized
- c) Distributed



Weaknesses of Industrial IoT

- This type of centralized structure has poor scalability
- Single point of failure with standard cloud services
- Limited resources to provide maintenance
- Vulnerable to data spoofing and corruption
- Resource-constrained computing devices (processing & storage)
- Lack of immutable records or trust of the data produced

Swisscom Blockchain

Our approach to enhance trust in **Industrial IoT** with DLT



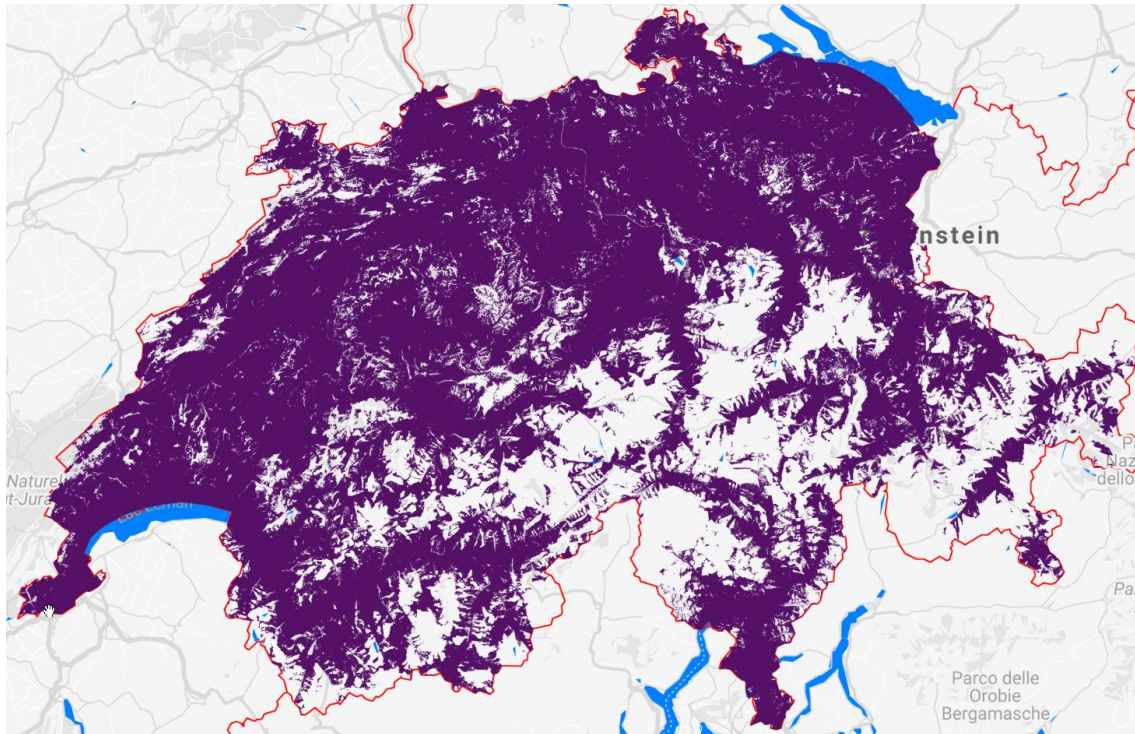
Use of distributed ledger technologies

Benefits of DLT

- Trustless, faster, cheaper interactions: peer-to-peer basis
- Verifiable and auditable data and transactions: transparency & integrity
- Automated, Transparent, Shared business logic: Smart contracts

Improved connectivity: Swisscom's Network Coverage Map

LoraWAN and 5G



Where 5G has gone live.

We are bringing 5G to the city, the country and everywhere in between.
90% of the Swiss population already enjoys 5G.



Lützelflüh



Bern



Davos



Nyon



Zurich



Burgdorf



Basel



St. Moritz



Estavayer

Adoption of new powerful hardware

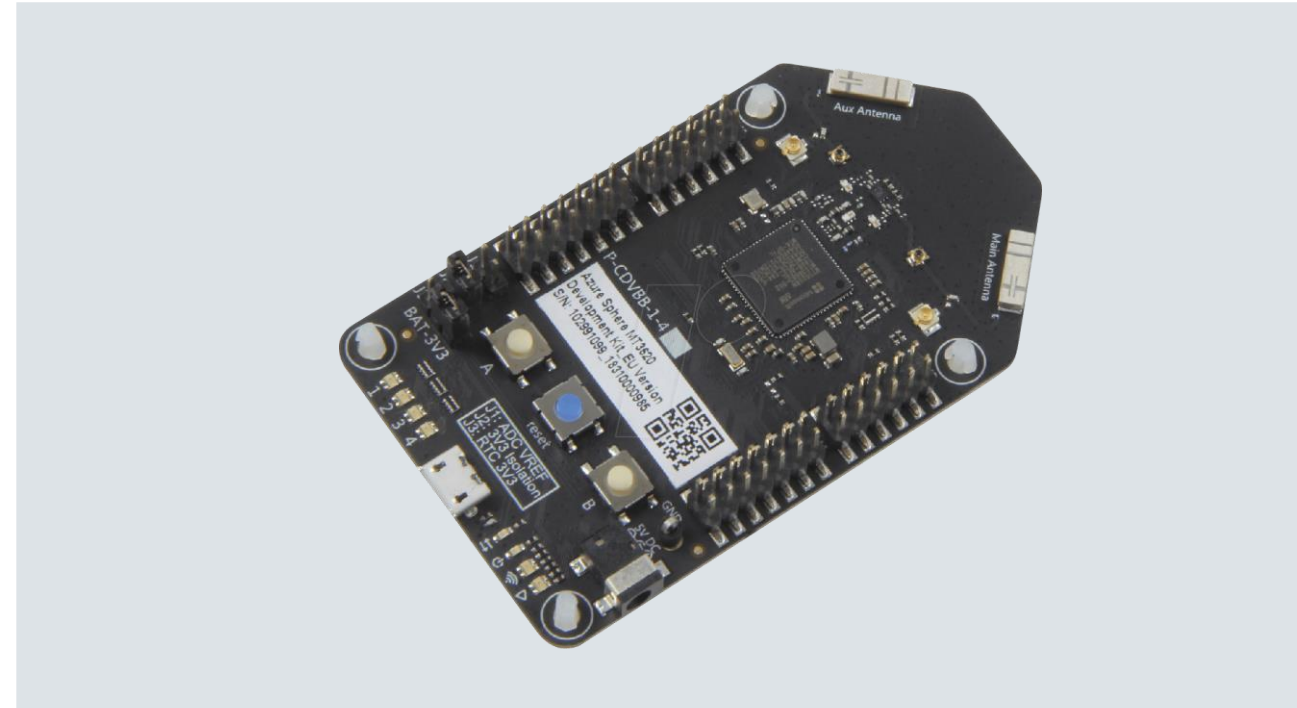
Cloud-native, secure MCU paired with a blockchain SDK

Microsoft Azure Sphere is a **IoT security solution** that includes **hardware, OS, and cloud** components in one device and:

- Is designed for security
- Ensures device integrity with defense in depth
- Automates OS and security updates
- Runs only signed, authentic software

This technology enabled us to close the gap between blockchain and IoT, specifically the IoT device and/or edge device is now able to create blockchain-based signatures of data obtained by sensors.

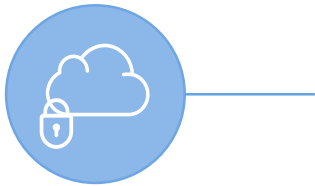
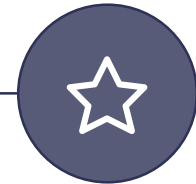
No trust on intermediate software or external process is needed anymore.



Providing Decentralized ID as a Service: SSI Gate

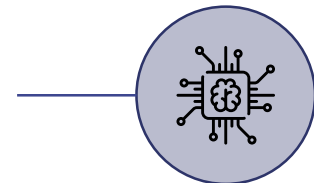
Enterprises now have a safe and convenient way to use and store their decentralized ID

Enterprise grade solution compatible with enterprise identity & access management software.



Safe Cloud Storage for your Identity Wallets. No risk of losing your wallet, we manage it (custodial and non-custodial approach available)

Personal Cloud Agent interacts with **multiple decentralized identity networks** to handle the requests and **transfers of identity proofs.**



Providing Blockchain Nodes as a Service: Dappi

Connect to the most popular public blockchain networks

1. Build dAPP



Company's product or services
interacts with blockchain

2. Call DAPPI



One common REST API that connects
decentralized applications to
Blockchain nodes

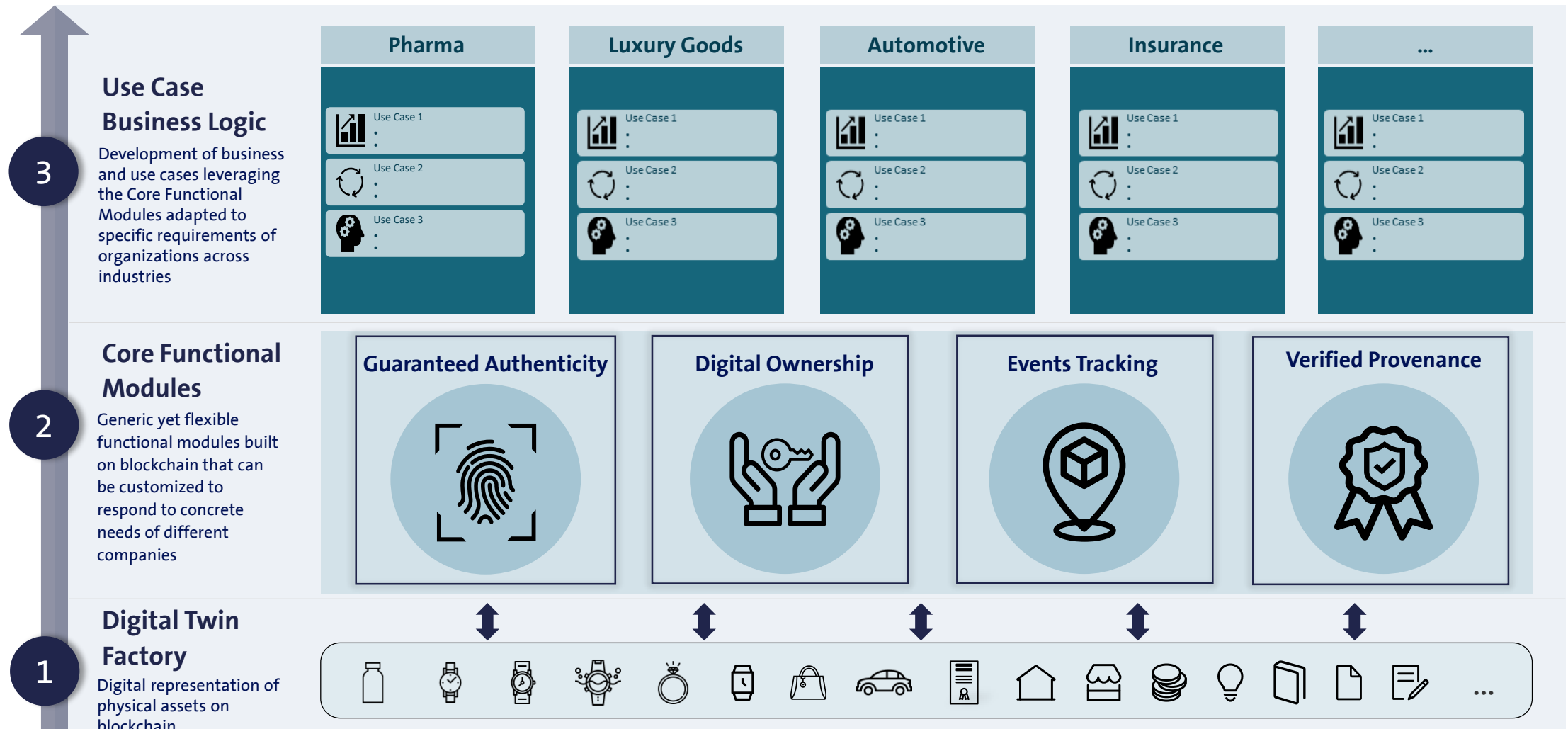
3. Connect & transact based on Blockchain protocols



Transactions are pushed to or
information is retrieved from several
blockchains

Swisscom Blockchain Vision: The marketplace 4.0

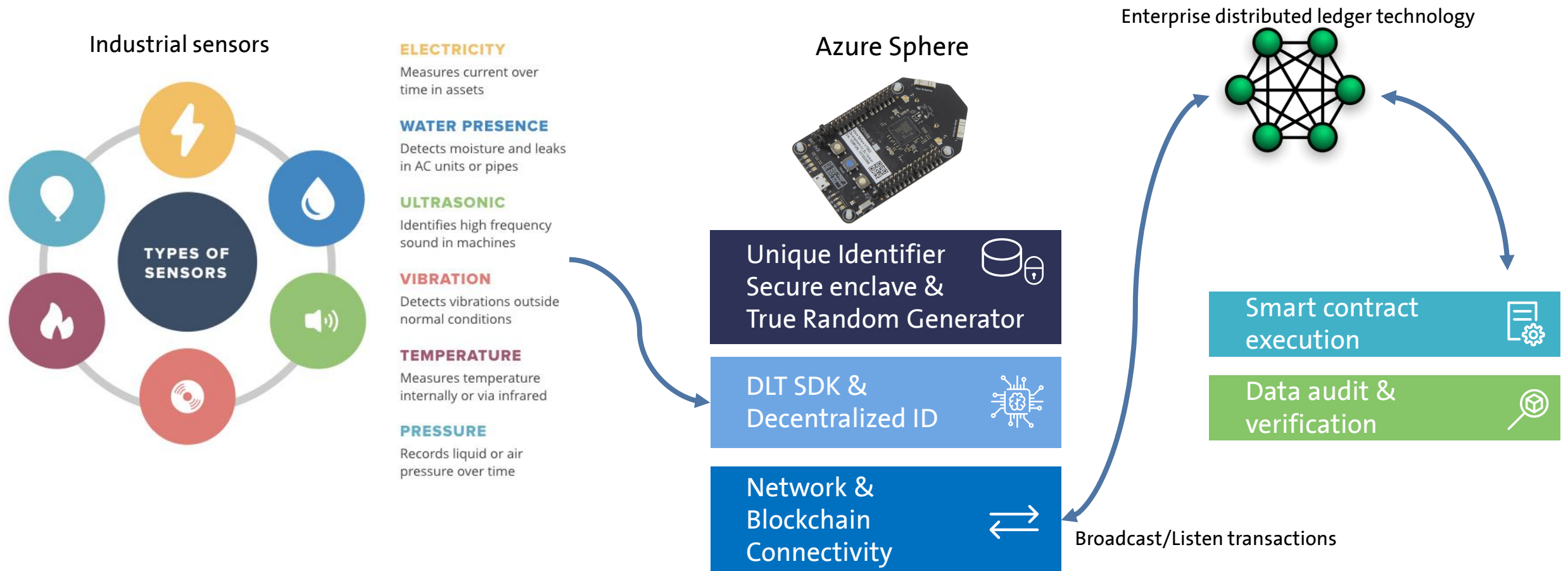
Building Blocks for a sound marketplace in Blockchain



Showcase: Swisscom IoT Day 2020



Industrial IoT, Network connectivity and Distributed ledger technologies



THANK YOU!