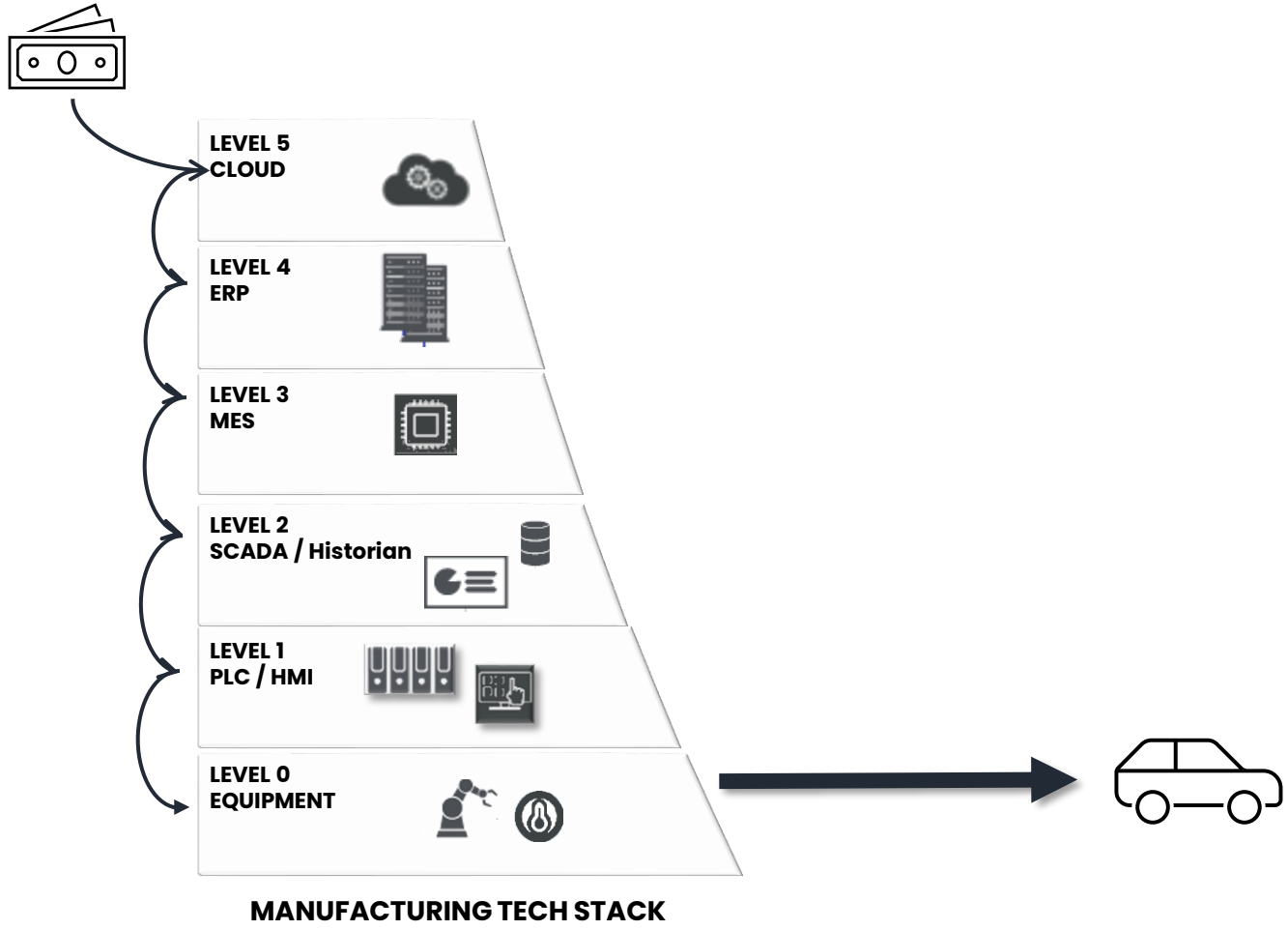
Novotek

Transforming Manufacturing with Industrial DataOps

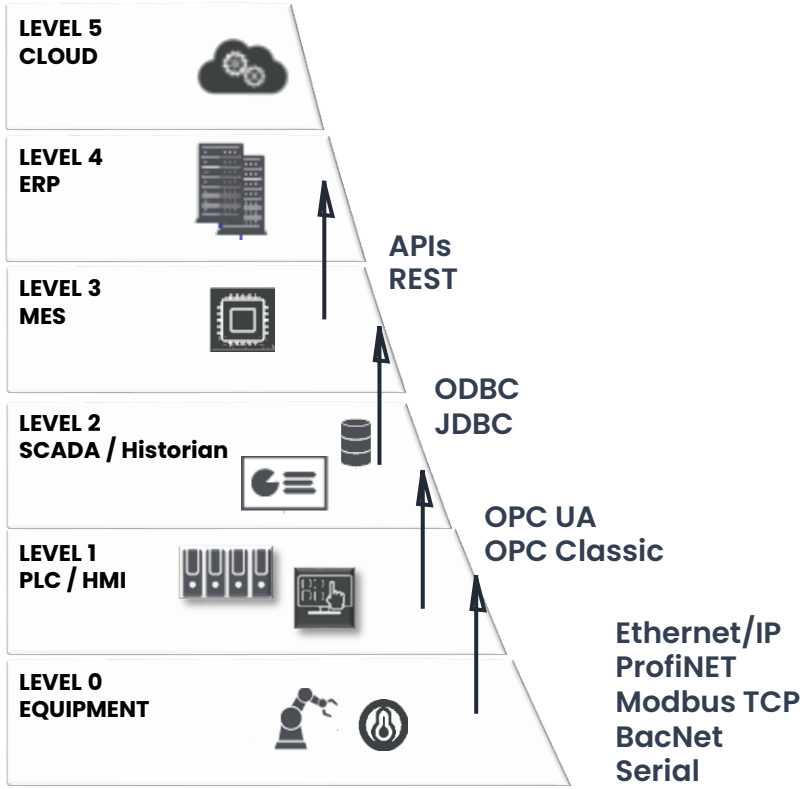
Driving Efficiency, Quality, Scale & Innovation

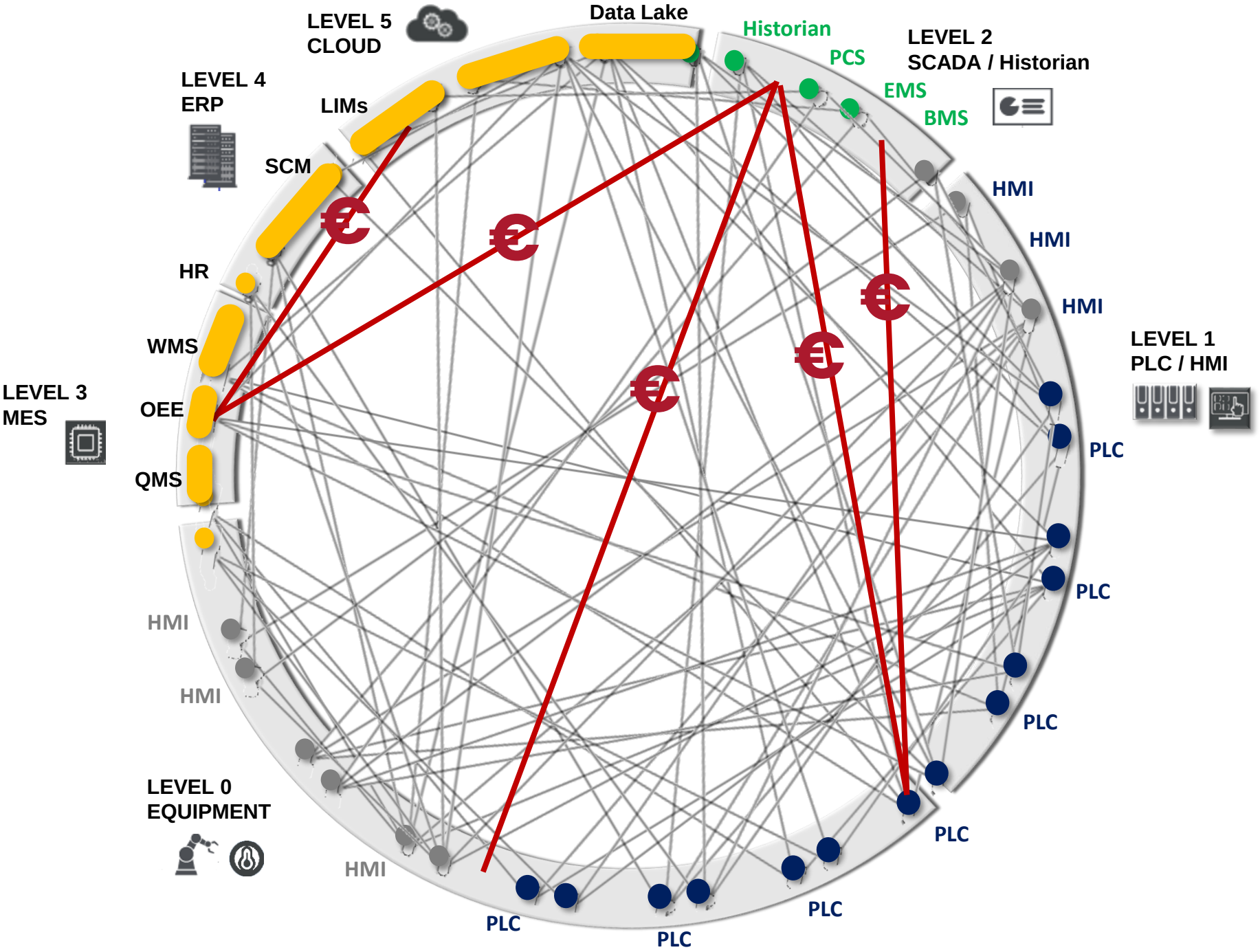
Sakari Aulanko | Novotek Oy

Why Industrial DataOps?

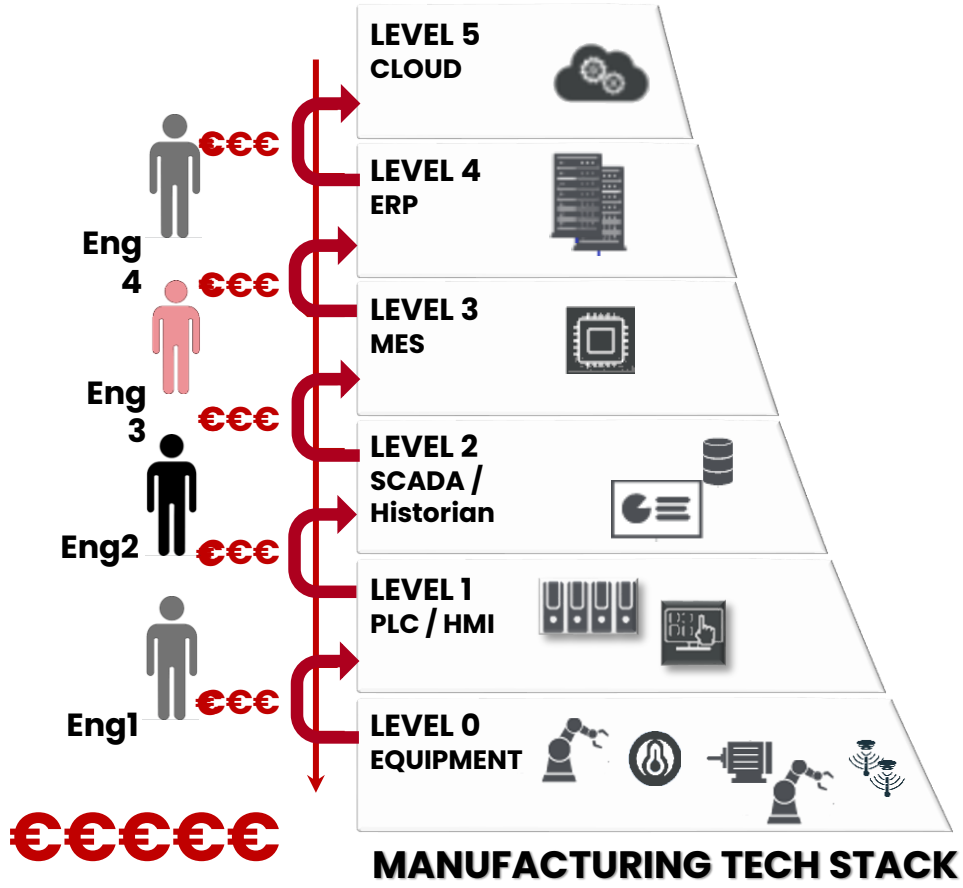


Why Industrial DataOps?



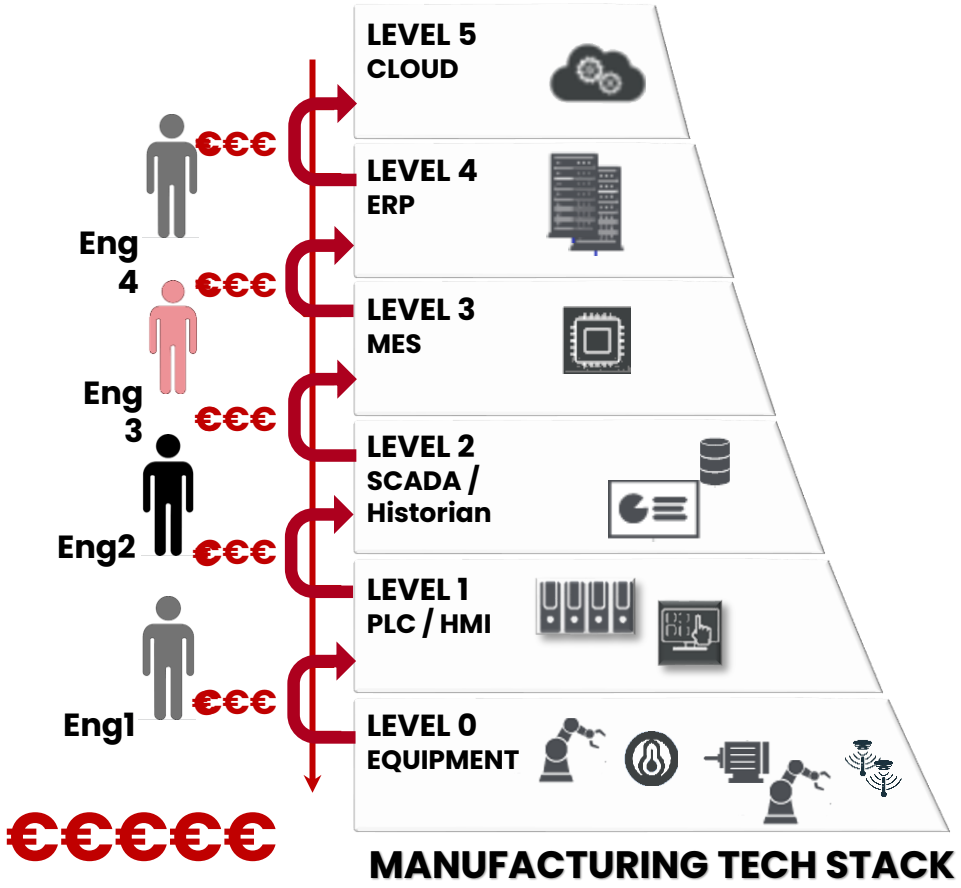

LEVEL 5
CLOUD
Data Lake
Historian
PCS
LEVEL 2
SCADA / Historian
EMS
BMS
LEVEL 4
ERP
LIMs
SCM
HR
WMS
OEE
QMS
LEVEL 3
MES
HMI
HMI
HMI
HMI
HMI
HMI
LEVEL 1
PLC / HMI
PLC
PLC
PLC
PLC
PLC
PLC
PLC
LEVEL 0
EQUIPMENT

Why Industrial DataOps?



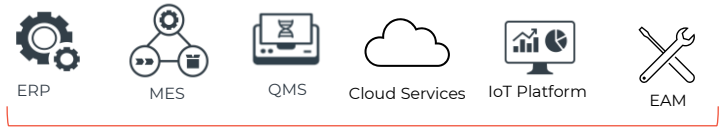
Why Industrial DataOps?

Traditional linear integration based on ISA95 / purdue model requires time and money.



Why Industrial DataOps?

In addition, the gap between data producers and consumers is huge, and refining wisdom from data is hard.



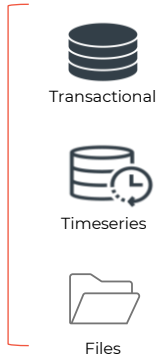
Language

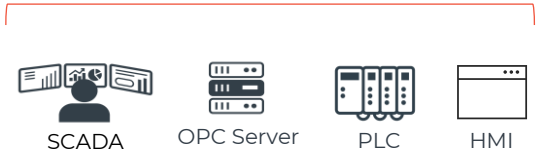
Vocabulary

Context

Audience

Cadence





Industrial DataOps

Where does it come from?

DevOps

Combining Development and Operations into single practise for speed (CI/CD).

DataOps

A DevOps approach of data pipelines management and delivery.

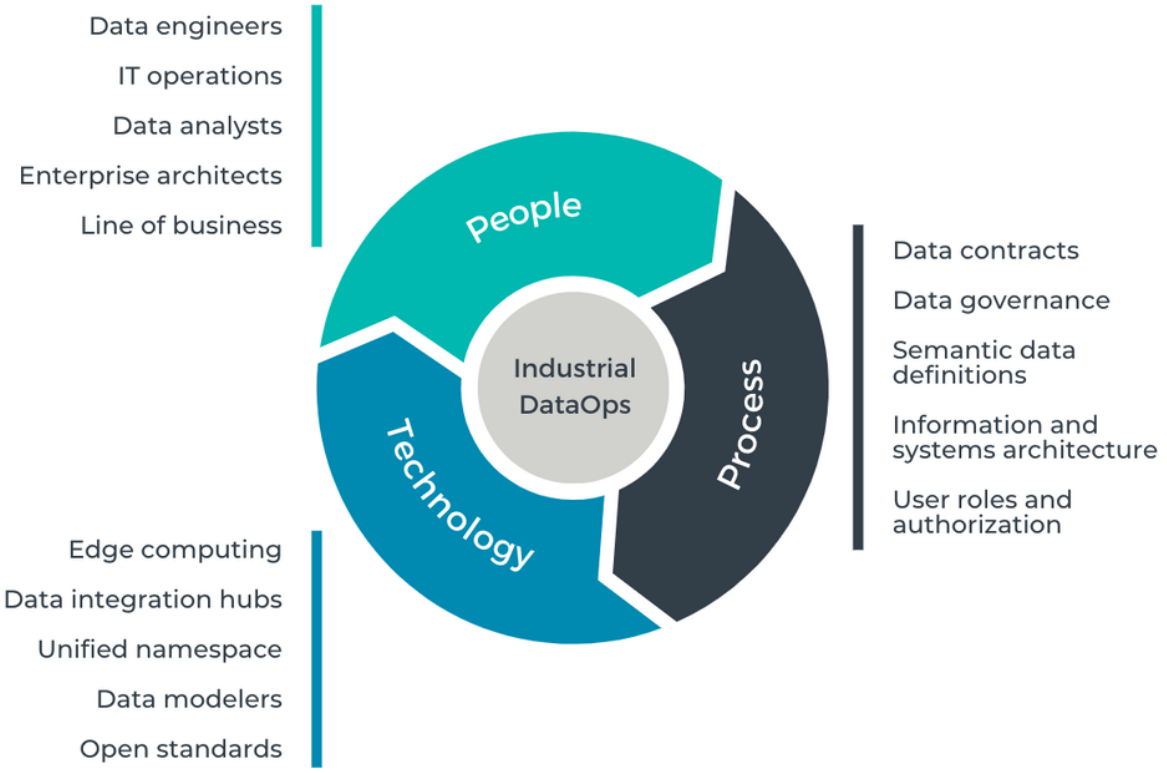
Industrial DataOps

Industrial data pipeline management practise, bridging the gap between IT/OT.

Industrial DataOps

Its the orchestration of people, processes, and technology,

To productize manufacturing data as **understandable**, **secure** and **available** information to all stakeholders at the **right time.**

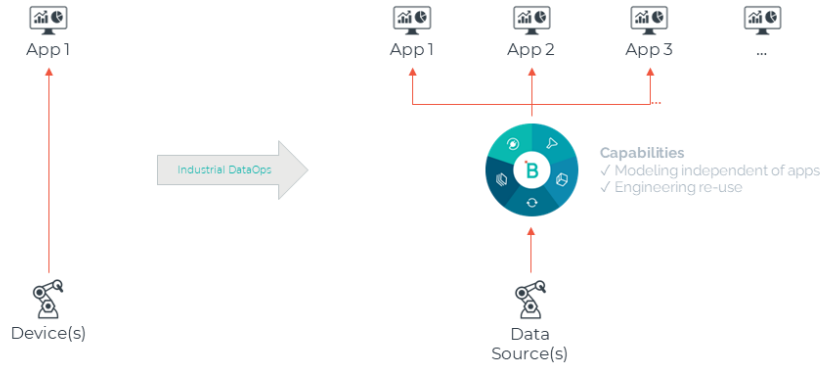


Industrial DataOps helps with

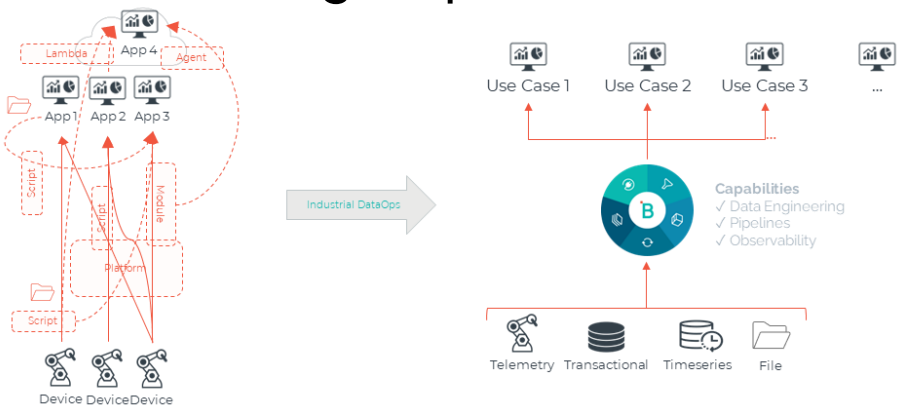
Efficiency	• Automation, utilizing existing namespaces. • From data infrastructure, to information infrastructure.
Quality	• Data produces understands better dependencies and how data is used. • Data producers can take control of the data and productize it to org.
Scalability	• Decreasing the dependencies thru information chains. • Use-cases are more rapidly deployed with lighter maintenance.
Innovation	• Relevant data is easily accessible from site to cloud, in understandable format for humans and machines.

When Industrial DataOps is needed?

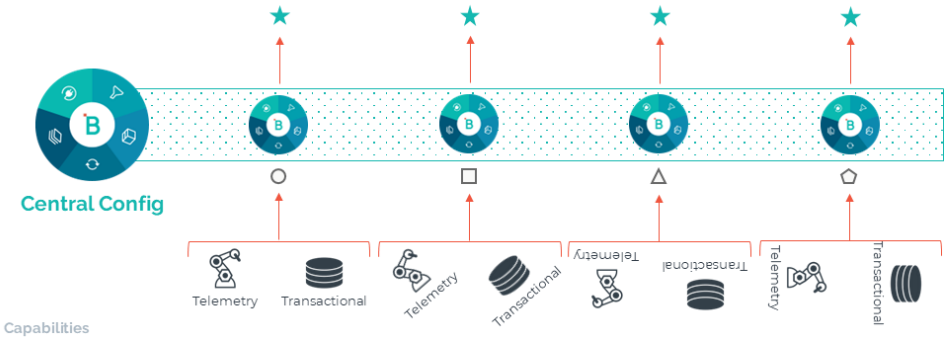
More than one application



Evolving requirements

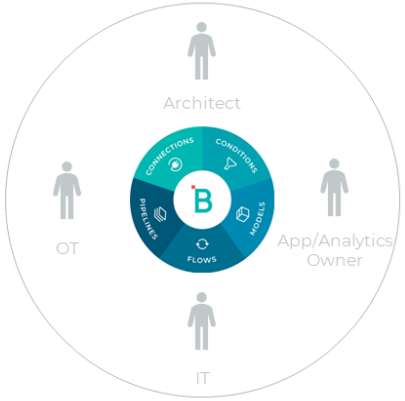


Data/operations difference between machines, lines, sites..



Capabilities
✓ Data Governance
✓ CI/CD
✓ Remote Config
✓ Config Sync/Compare

Involving a team



No Code / Low Code UX
Multi-role Data Engineering

App/Analytics Owner
✓ Models
✓ Connection Outputs

OT
✓ Connection Inputs
✓ Model Instances
✓ Branching

Architect
✓ Templating
✓ Dynamic Parameters
✓ Global Functions
✓ System Variables
✓ Pipelines
✓ Config API

IT
✓ Logs
✓ Role-based access
✓ Certificates/Secrets
✓ Containers
✓ Security

The Industrial DataOps Solution

Digital infrastructure for scale, pace, and agility

INDUSTRIAL DATAOPS APPLICATION

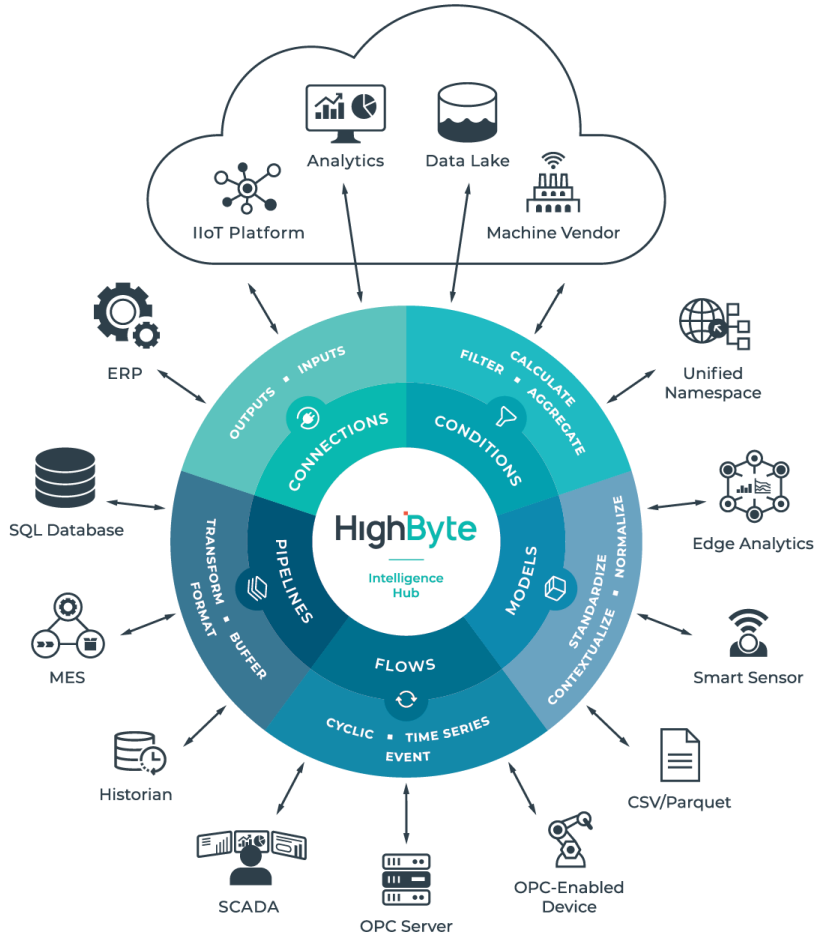
- Change connection paradigm to Hub-and-Spoke
- Establish a data modeling and management abstraction layer
- Merge **machine** data, **transactional** data, and time series (**historical**) data from a variety of edge data sources
- Standardize and contextualize information models in real time
- Create information flows and monitor data pipelines

COMPETITIVE ADVANTAGE

✓ Built for industrial data

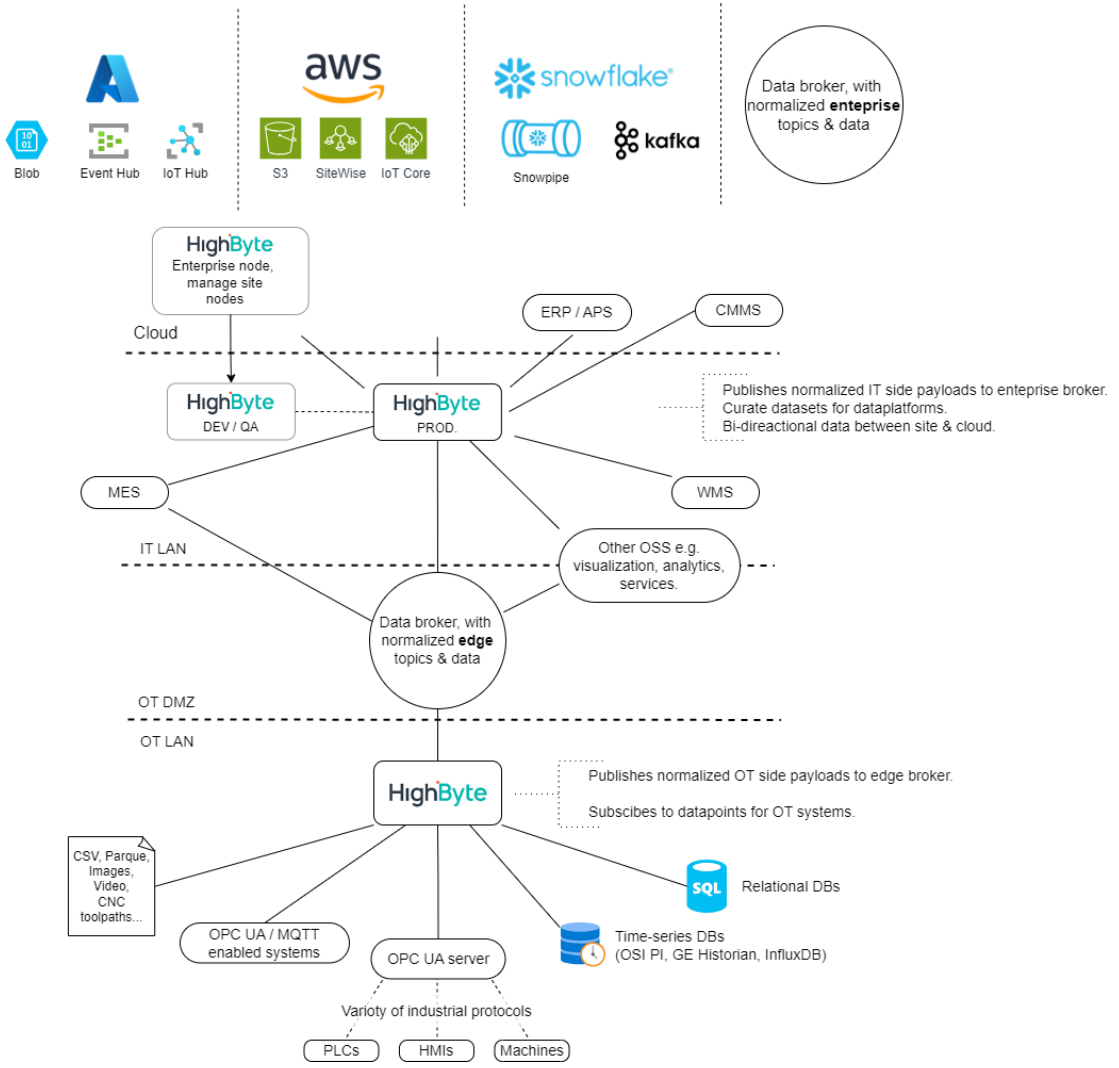
✓ Codeless UI eliminates need for development, speeds time to value

✓ Edge-native, light-weight, system agnostic



The Industrial DataOps Solution

Digital infrastructure for scale, pace, and agility

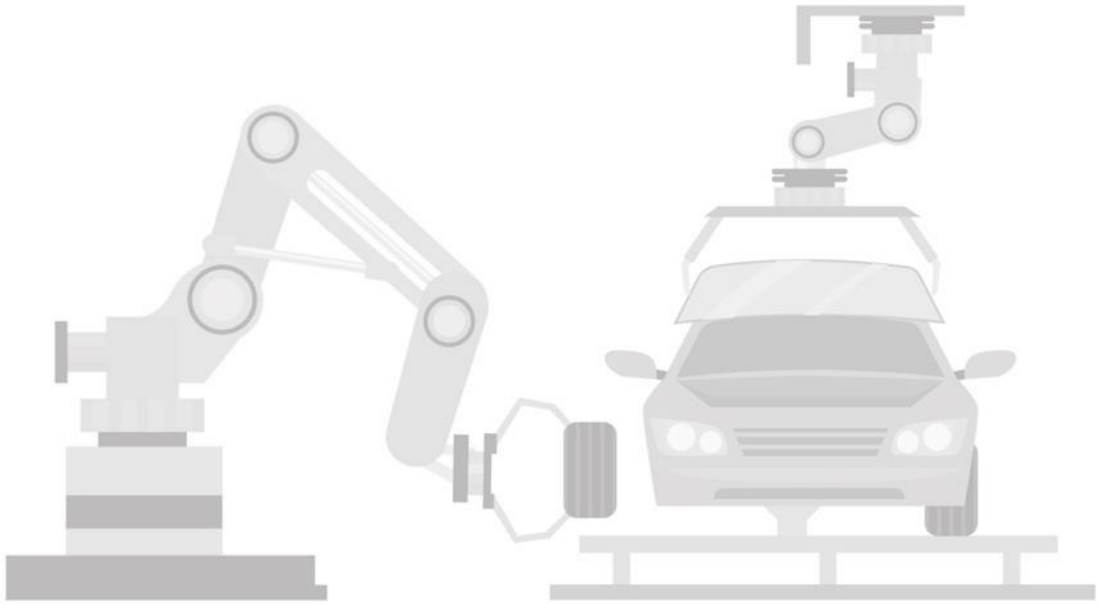


Industrial UNS

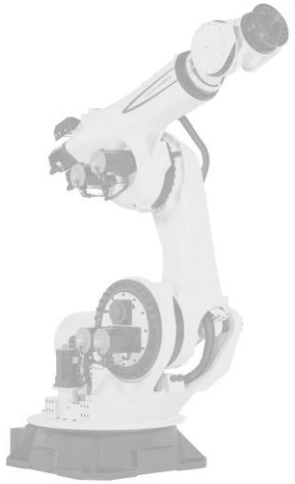
Asset (ISA-95) hierarchy

Site
Helsinki

Line
Line01



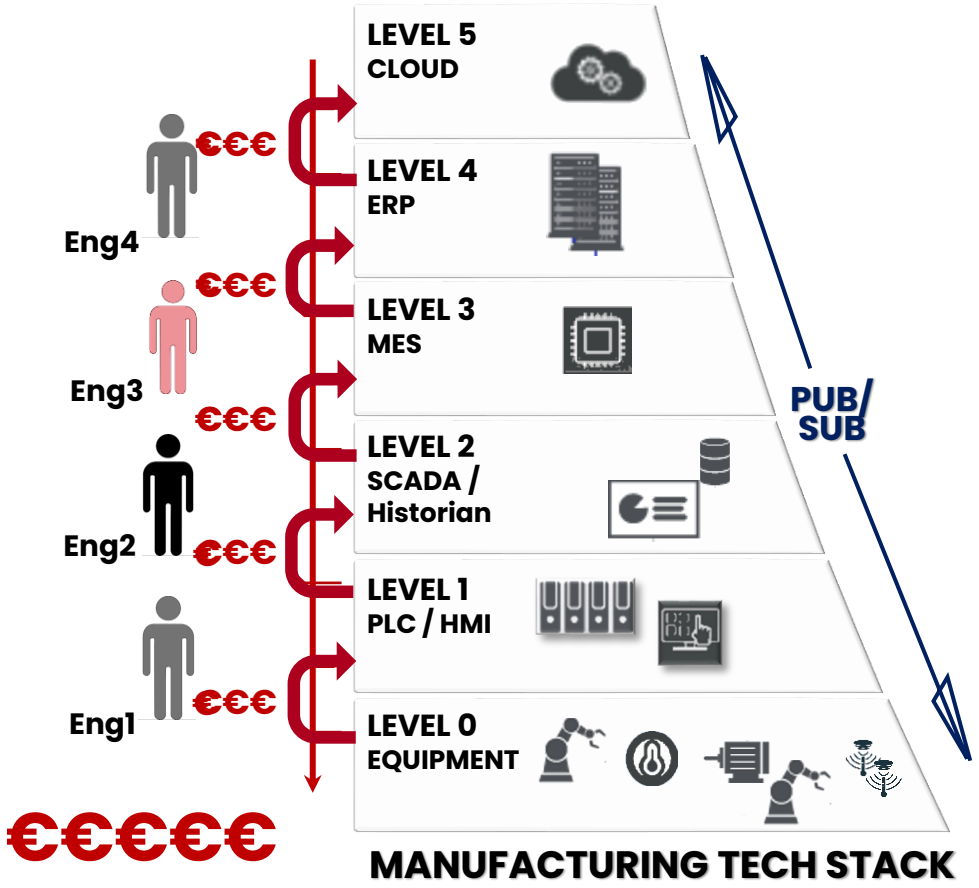
Asset
Robot01



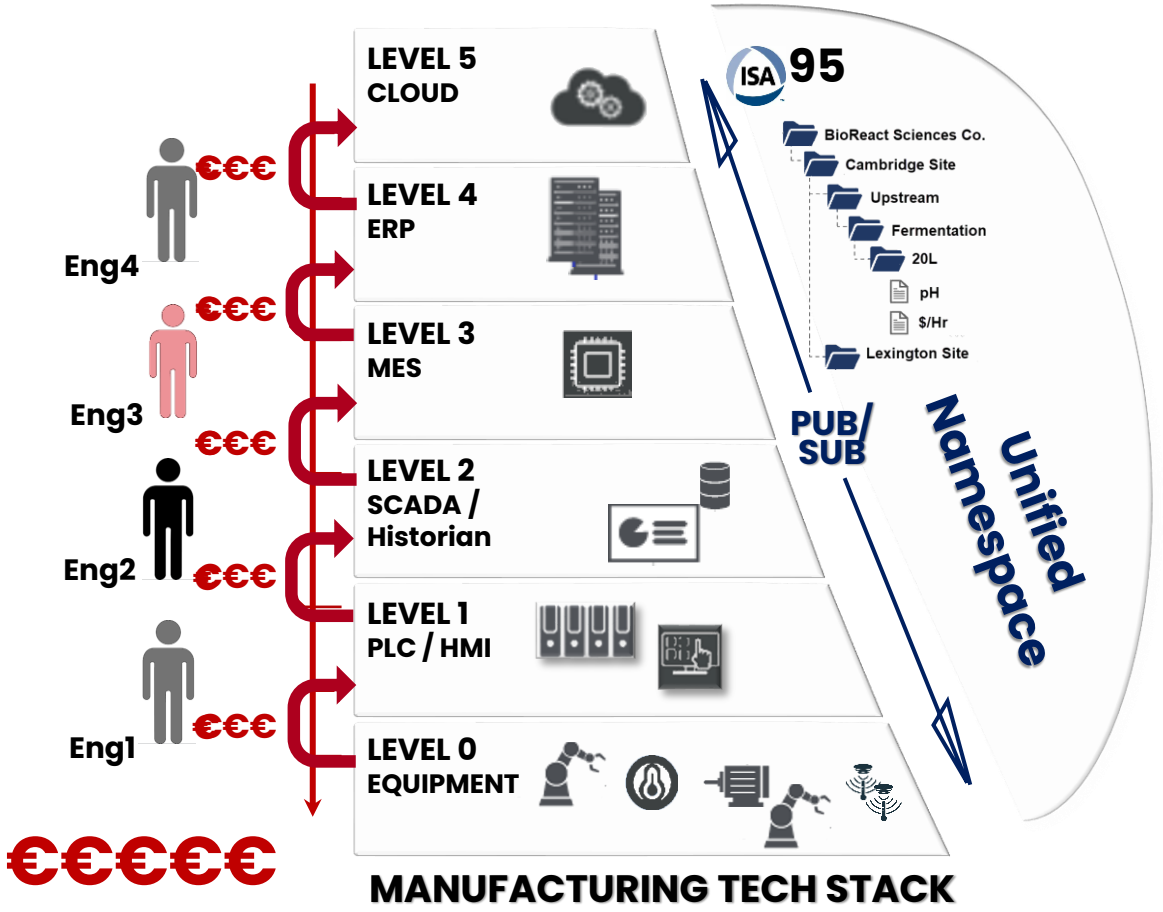
Sub-System
Pneumatics01

Data
Air_Pressure

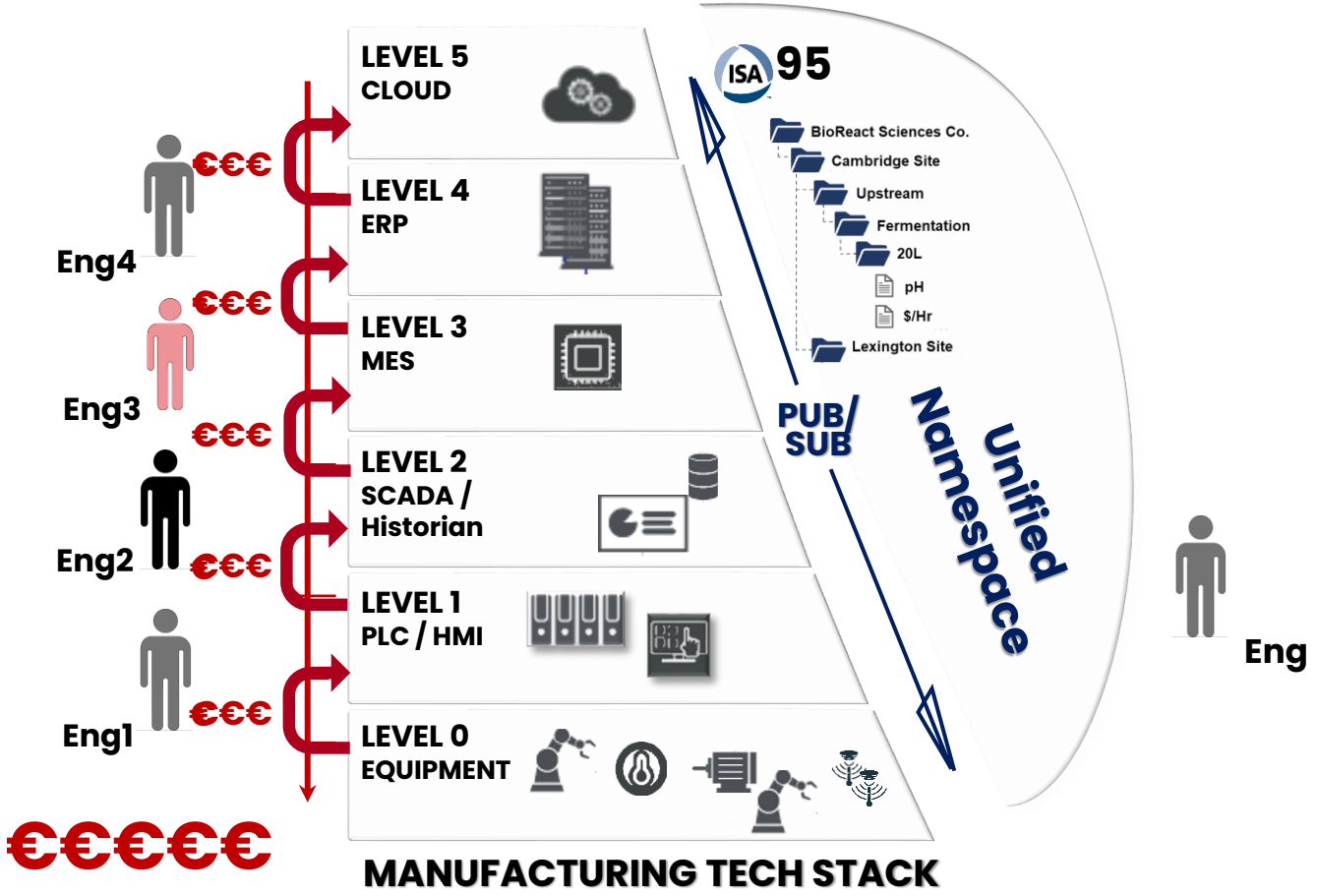
Industrial Unified NameSpace (UNS)



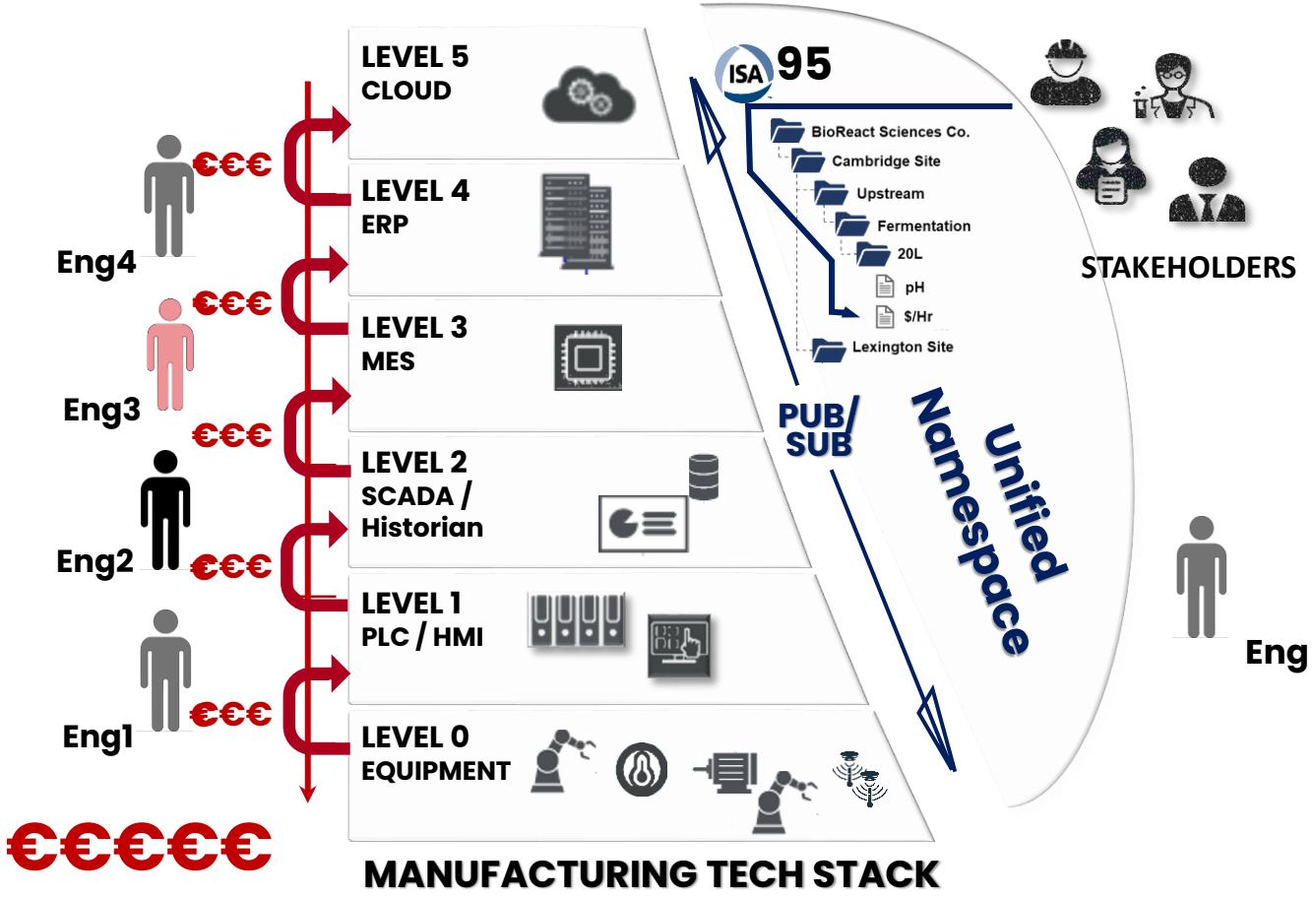
Industrial Unified NameSpace (UNS)



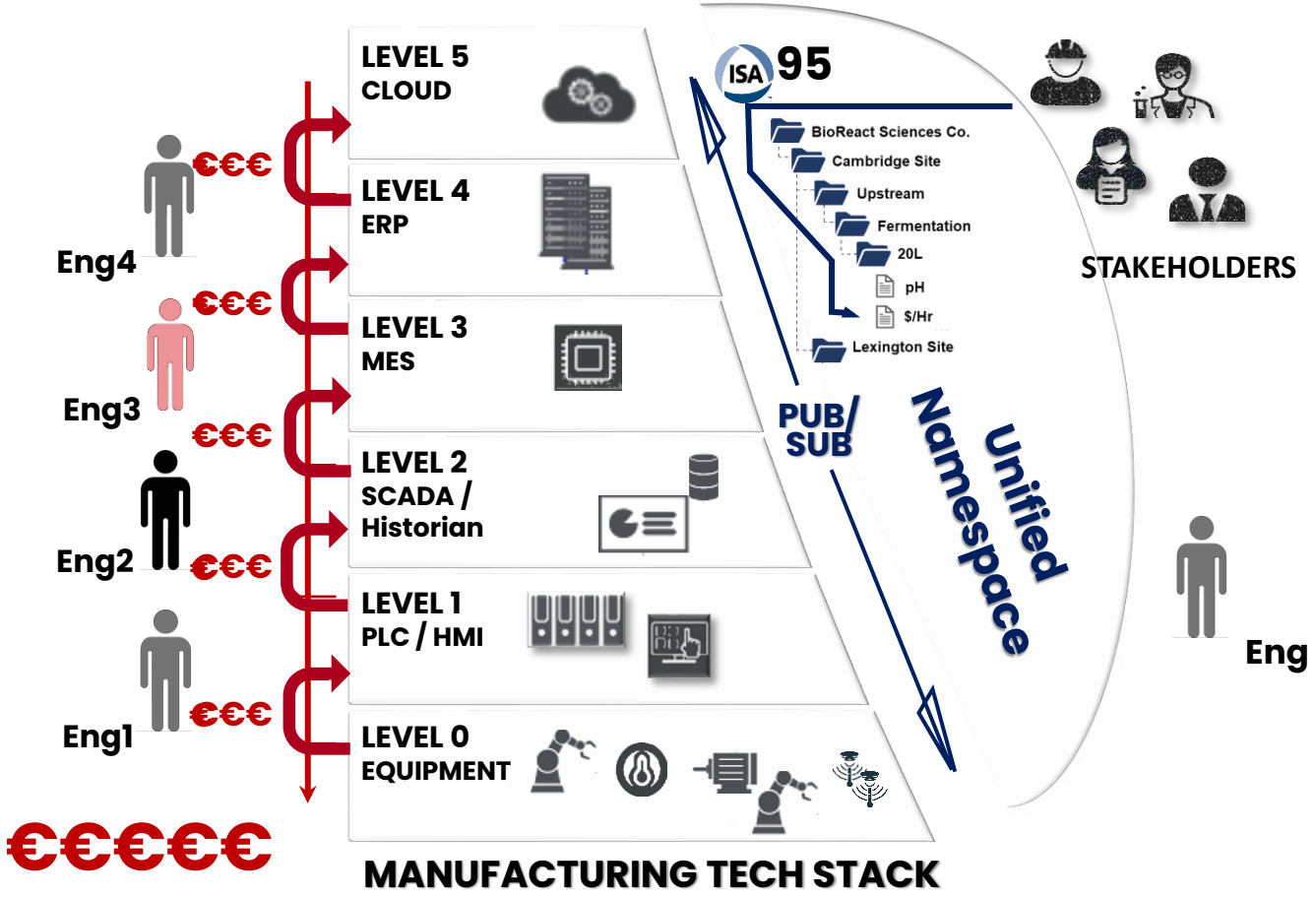
Industrial Unified NameSpace (UNS)

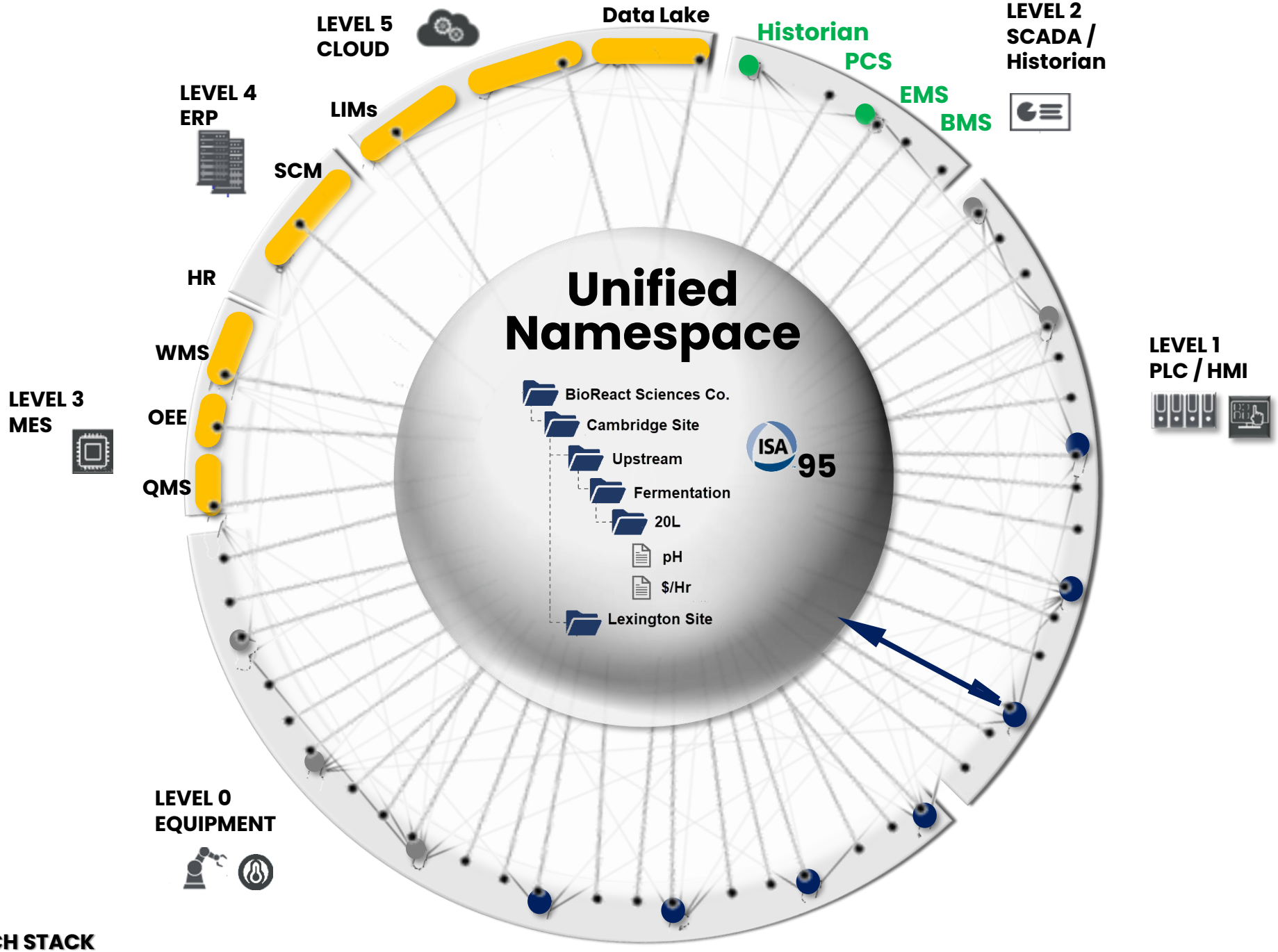


Industrial Unified NameSpace (UNS)



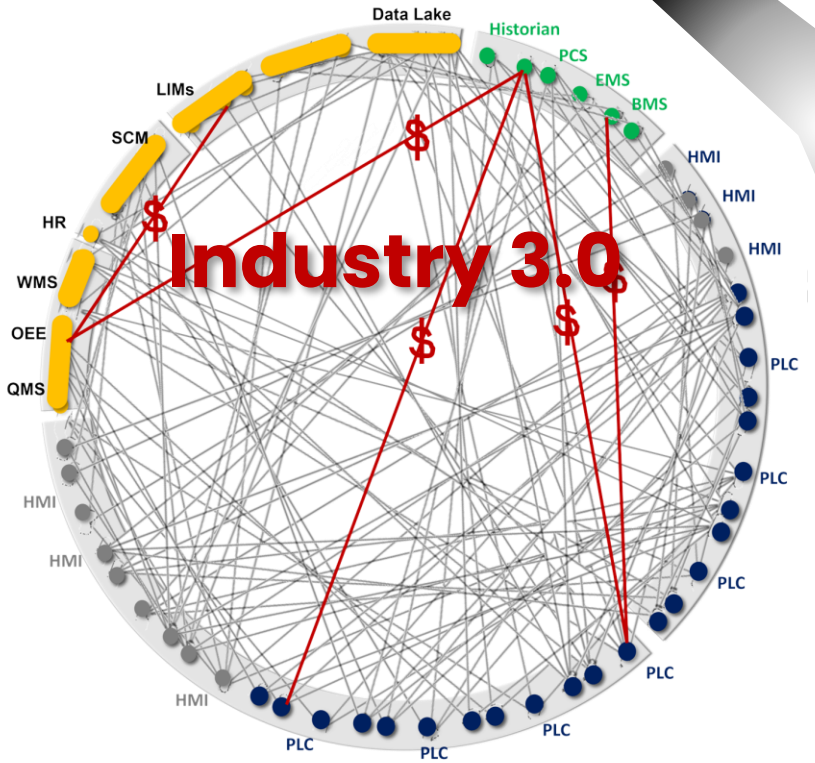
Industrial Unified NameSpace (UNS)

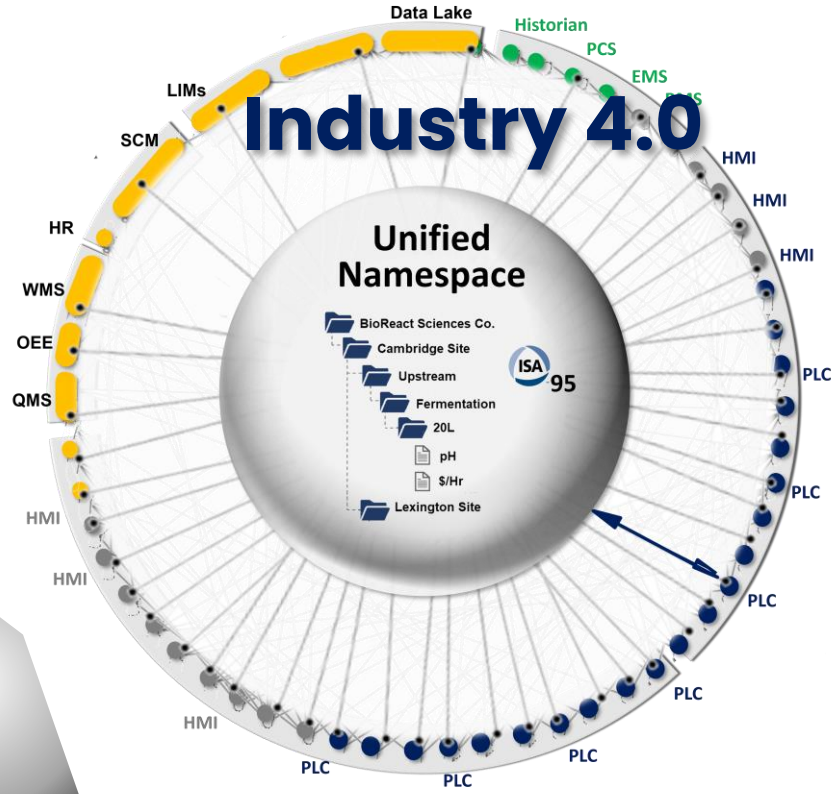




MANUFACTURING TECH STACK

- Single-Source-of-Truth Ecosystem
- Agile Manufacturing
- People Empowered to Solve Problems
- Agile-Driven Innovation
- Cross Functional Citizen Development
- Future Proof – Increasing Value

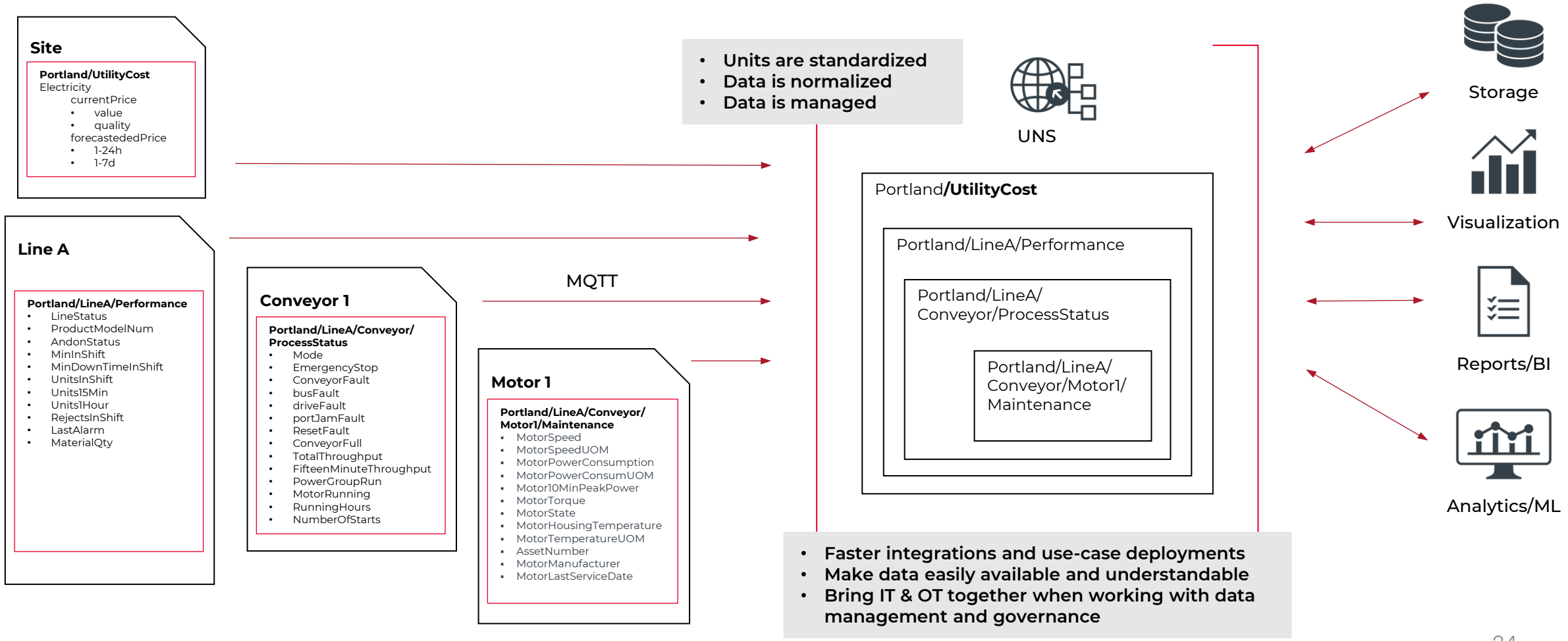




- Data Siloes
- Legacy small SKU Manufacturing
- Disablement of People
- Graveyard where Agility Dies
- Many Specialists
- Increasing Total Cost of Ownership

Industrial Unified NameSpace (UNS)

Data easily available from edge to cloud in standardize or use-case modelling.



The Data Vision

High quality normalized information in context,
should be available for all assets, processes and people,
as foundation for digital transformation.

Industrial DataOps demo

Demo setup

Data platforms

Analysis, reporting, enterprise utilization.

Planning & scheduling (ERP /MES)

Order data from ERP/MES

Maintenance (CMMS)

Planned maintenance activities.

Industrial DataOps & Edge UNS (Highbyte)

Data engineering
* Template connections and data instances

Data modelling
* Support for different modeling frameworks
* Utilize existing namespaces and metadata

Flow/pipeline management
* From simple flows to Many-to-Many pipelines
* Central management

Unified dataset
Instances

Use-case datasets
Instances

OSS applications / services

Line display, operator display, analytics, etc.

Plant floor systems

Process data from PLCs

SCADA

Alarms data.

Packaking_Line_1 | Packaking_Line_2

Example of normalized data in UNS.

Company
Factory Vantaa
Packaking
Packaking_Line_1
Machine / Workcell

```
Edge { Raw source namespace }
Status {
  cycleTime : 12
  temp01 : 22
  status : AUTOMATIC }
SCADA {
  currentAlarmList[] }
MES
 Orders {
   plannedOrders[] }
OEE
  CurrentOrder {
    no : ABX123
    goodParts : 1234
    badParts : 0
    A : 92,5
    P : 90
    Q : 100
    OEE : 83.25}
CMMS {
  Services [
    type : Major
    time : 2021-10-18 15:15:00
    runningTime : 345] }
```


Novotek