Condition Monitoring

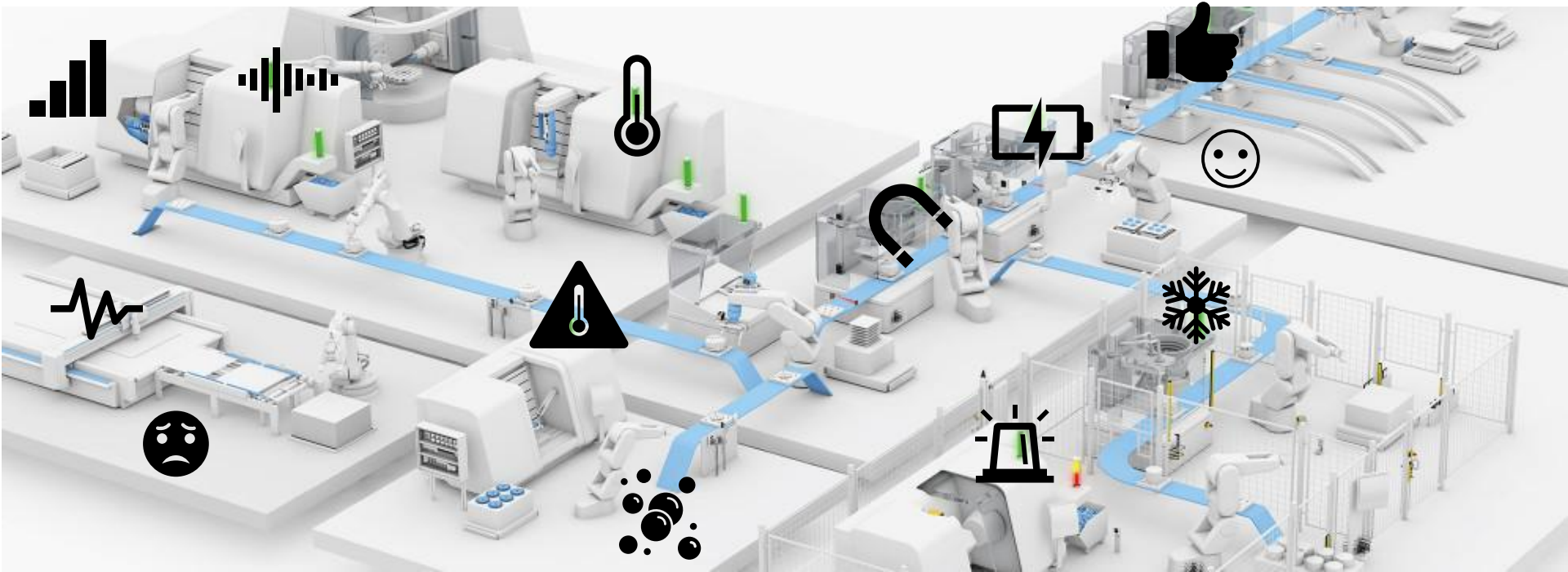
Fabio Rosso

Maintenance Strategies

REACTIVE	• Failure triggers Maintenance • Machine Downtimes
PREVENTIVE	• Time Schedule triggers Maintenance • Spare Parts
PREDICTIVE	• Analysis and Prediction triggers Maintenance • Algorithms and Models
CONDITION BASED	• Condition triggers Maintenance • Condition Monitoring System

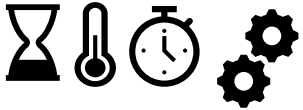
Condition Monitoring

Condition Monitoring involves observing one or more parameters of the state of a component or group and the environment around it, in order to highlight any significant changes that are precursors to a failure, a malfunction in a machine downtime or a change that could affect the quality of the production itself



CONDITIONS MONITORING ASPECTS

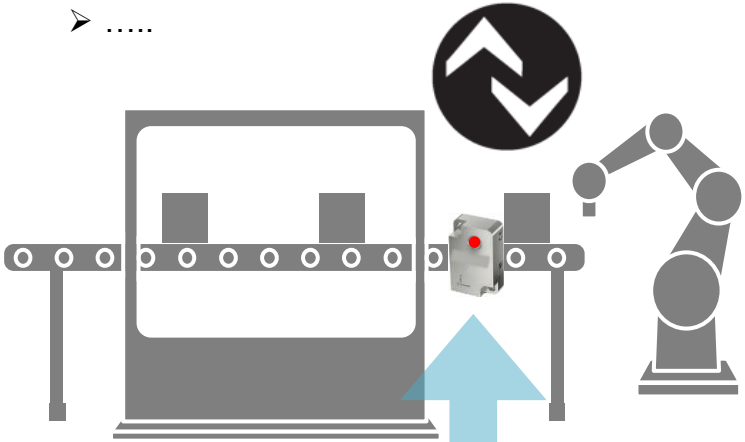
The Device monitors itself
(Self Awereness)



- Operating life
- Internal temperature
- Number of ignitions
- Stability index
- Load level
- Stress index
- Time elapsed since last maintenance
- ….

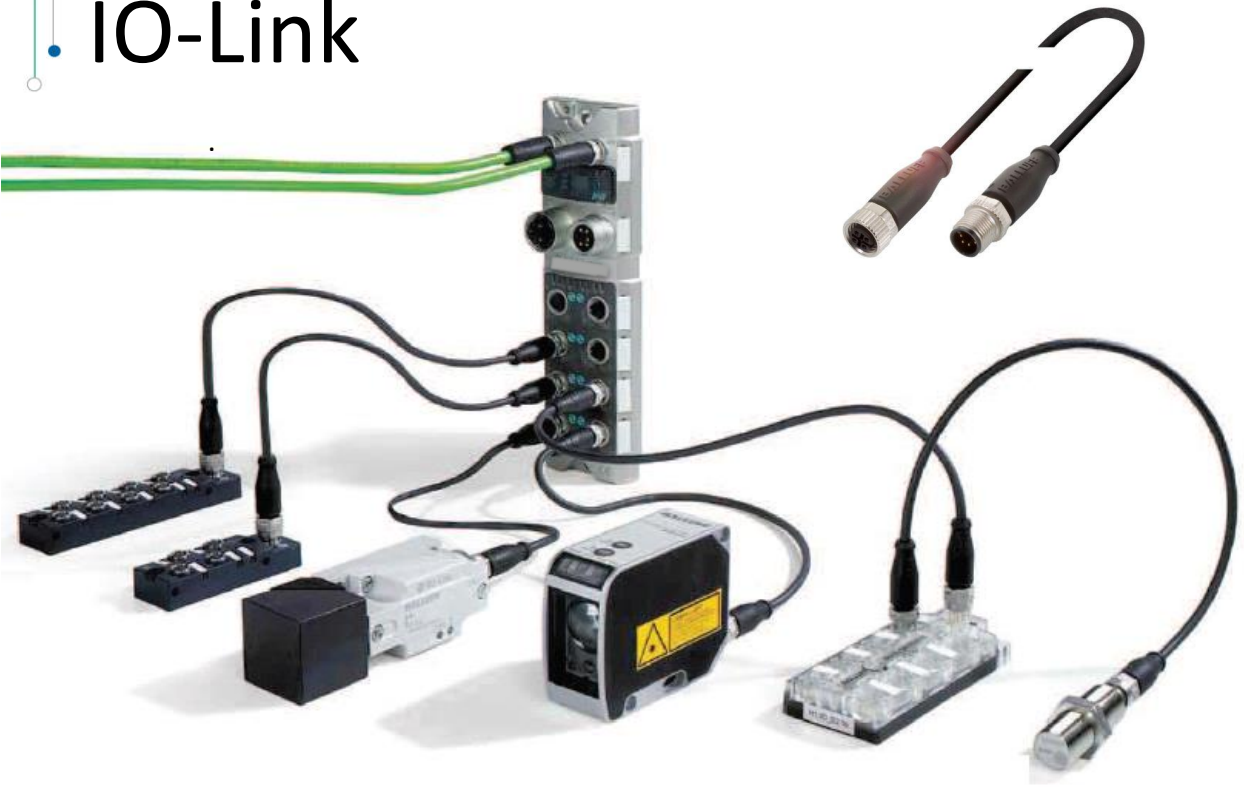
Use IO-Link
Universal · Smart · Easy

- Vibration
- Contact temperature
- Humidity
- Pressure
- Magnetic fields
- …..



The Device monitors its environment
(Environmental Awereness)

IO-Link



Use IO-Link
Universal · Smart · Easy

IO-Link is the world's first standardized I/O technology (**IEC 61131-9)** for communication with sensors and actuators.

It is a robust point-to-point serial communication based on the classic **3-wire cables** widely used in automation...

IO-Link, the USB interface of automation

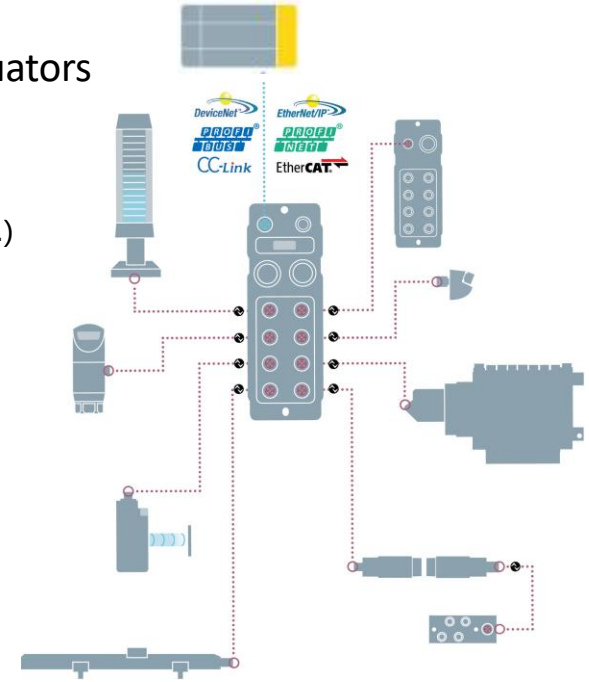
Benefits of IO-Link

IO-Link elevates the communication capabilities of sensors and actuators

PROCESS DATA: Cyclical and deterministic, Max 32 bytes IN / 32 bytes OUT
(discrete digital I/O, measurements, distances, commands, etc.)

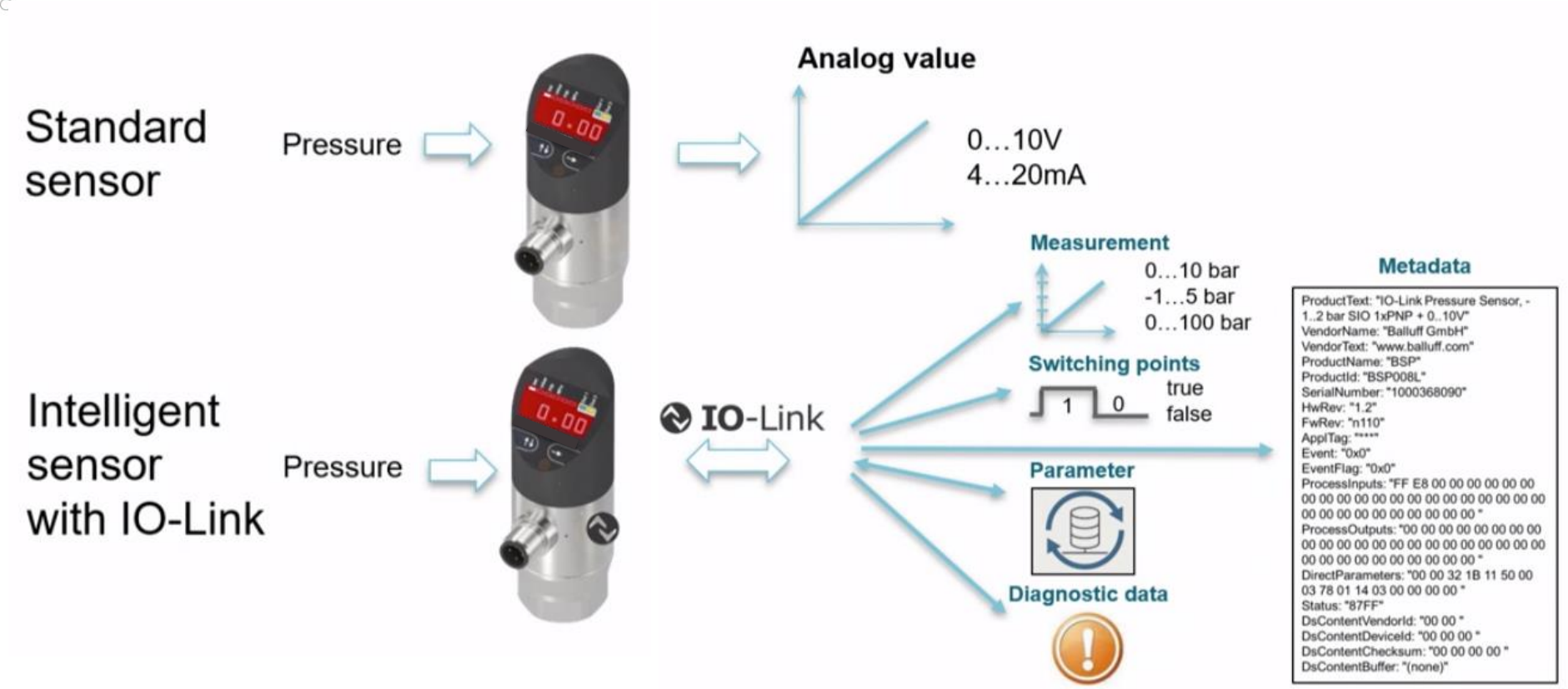
SERVICE DATA: Acyclic (SPDUs) are interrogated by the user as needed.
Read or write device parameters.
(configurations, identification, additional information)

EVENTS: Information transmitted by the device automatically.
(diagnostics, anomalies, warnings, errors)



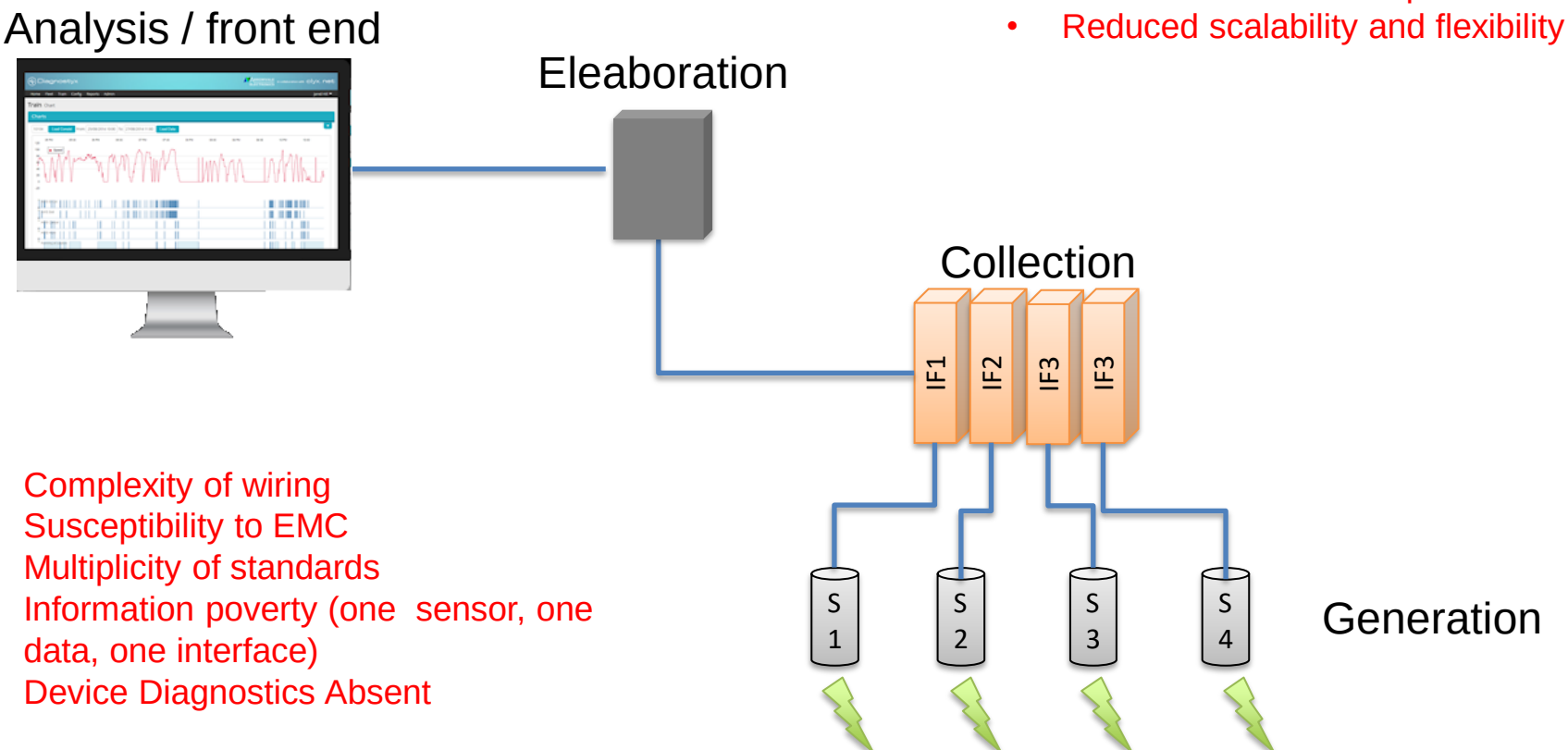
COM 1=4.800 baud / COM 2=38,400 baud / COM 3=230,400 baud

Multi data-point

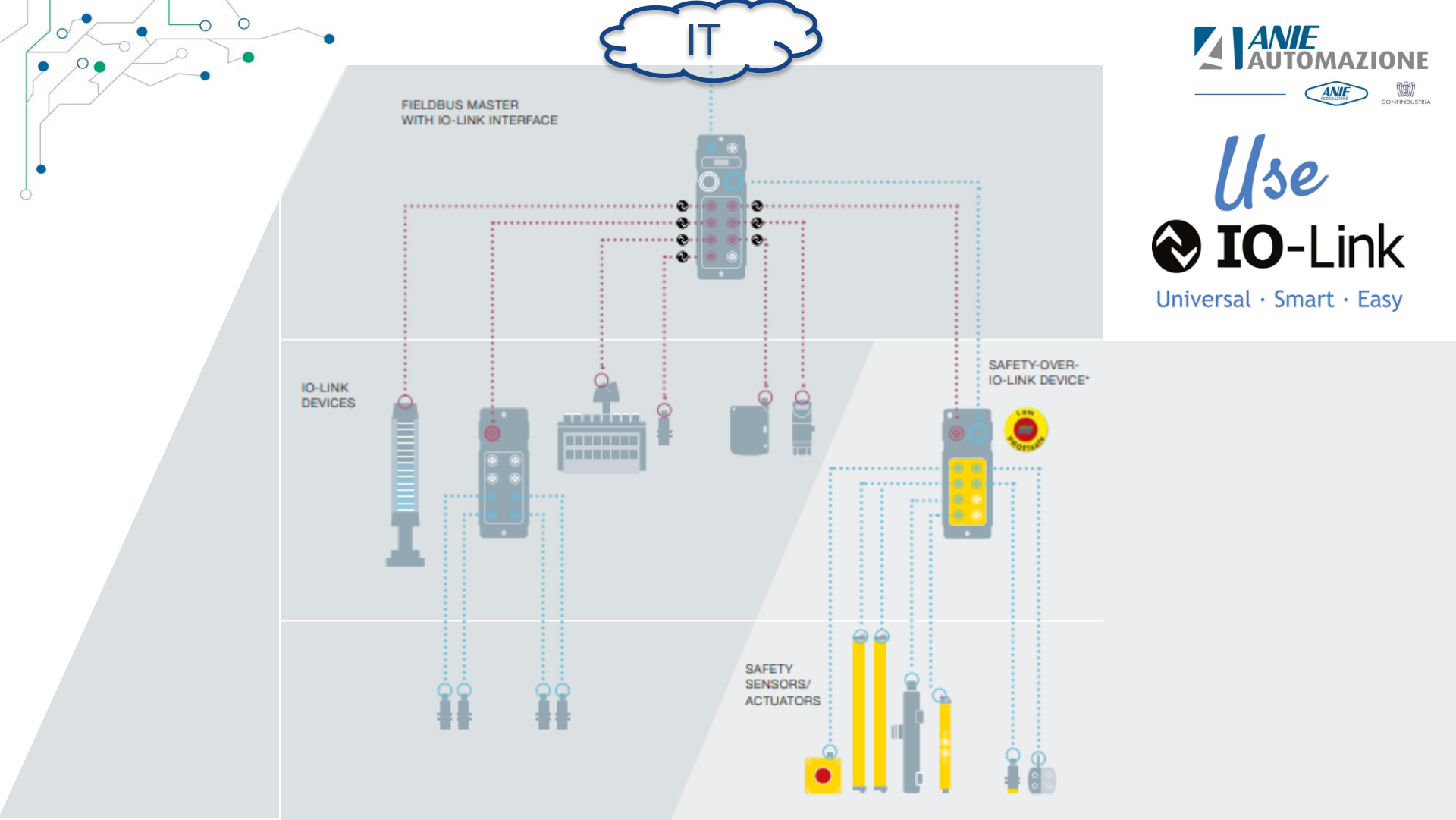


Traditional architecture

- Proprietary interfaces
- Data to scale and interpret
- Reduced scalability and flexibility



- Complexity of wiring
- Susceptibility to EMC
- Multiplicity of standards
- Information poverty (one sensor, one data, one interface)
- Device Diagnostics Absent



ANIE AUTOMAZIONE

Use IO-Link

Universal · Smart · Easy

SYSTEM OVERVIEW

Configuration

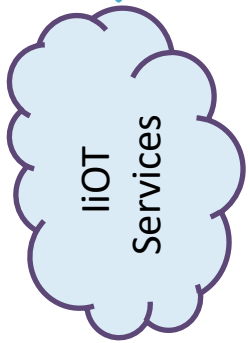
Process Data

Service Data

IIoT Interface

Fieldbus

Service info



Sensors
Actuators

IO-Link Masters

Process Controller /
Edge Gateway

OT : Operational Technology

IT : Information Technology

IIOT READINESS LEVEL CLASSIFICATION

ACCESSABILITY

6	GLOBAL CYBERSPACE INTERCONNECTIVITY
5	IT NETWORK COMMUNICATION WITH NETWORK SERVICES
4	IT NETWORK COMMUNICATION
3	INDUSTRIAL DATA COMMUNICATION
2	SENSOR DATA PROTOCOL
1	PHYSICAL DATA SIGNAL
0	PHYSICAL DATA

CAPABILITY

6	MACHINE LEARNING AND SOFTWARE SERVICES
5	DATA AGGREGATION AND ANALYTICS
4	ON-BOARD DATA ANALYTICS
3	ON-BOARD DATA INTERPRETATION AND VALIDATION
2	DATA PROVIDER
1	SIGNAL SOURCE
0	PASSIVE ELEMENT

Condition Monitoring