



# QUALITY

## DIGITAL MANUFACTURING PLATFORMS FOR CONNECTED SMART FACTORIES

### Digital Reality in Zero Defect Manufacturing

European Zero-Defect Manufacturing (ZDM) Landscape: State of Play

08 July 2021

Jorge Rodriguez - ATOS Spain - Project Coordinator

Jorge Lopez - ATOS Spain - Innovation and Exploitation Manager

Angelo Marguglio - ENGINEERING Ing. Inf. - Technical Coordinator

[www.QUALITY-project.eu](http://www.QUALITY-project.eu)

Co-funded by the Horizon 2020 Programme of the European  
Union. Grant agreement ID: 825030



## QU4LITY in a Nutshell

Project No:	825030
Project Full Name:	Autonomous Quality Platform for Cognitive Zero-defect Manufacturing 4.0 Processes through Digital Continuity in the Connected Factory of the Future (QU4LITY)
Duration:	39 months
Start/End date:	January 1 <sup>st</sup> 2019 / March 31 <sup>st</sup> 2022
Partnership:	45 partners, 13 countries, 14 pilots
Strategic Objective:	DT-ICT-07 (Digital Manufacturing Platforms for Connected Smart Factories)
Total Eligible Cost:	19 520 535.28 EURO
EC Contribution:	15 998 180.54 EURO (1 M€ open call)

# Background & Motivation



# QUALITY



Up to **50%**

Production ends as scrap

## Zero Defect Manufacturing and Industry 4.0

- ✓ Costly & time consuming deployment
- ✓ Lack of digital continuity
- ✓ Poor SME engagement





Autonomous Quality for ZDM: Vision

QUALITY

## ZDM DIGITAL ENABLERS, INFRASTRUCTURES & MANUFACTURING EQUIPMENT



## DIGITAL FACTORIES 4.0 & AUTONOMOUS QUALITY ASSETS FOR ZDM

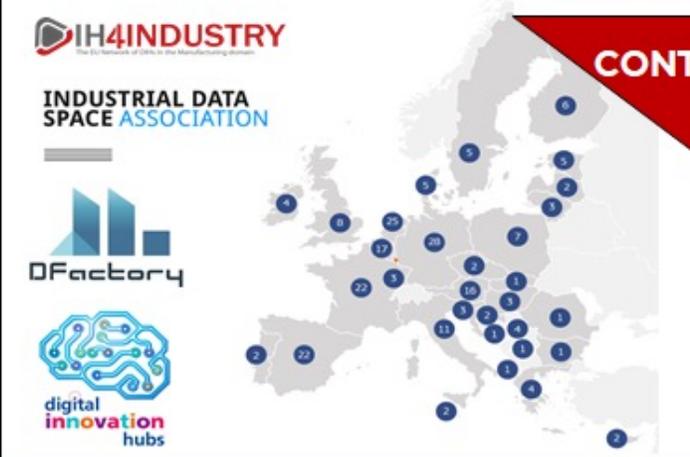


Reference  
architecture and  
blueprints  
for integrating AQ  
in the factory 4.0

Digital  
enhancements  
to state of the art  
ZDM equipment  
and processes



Pan-European  
innovation  
ecosystem  
for AQ ZDM  
solutions



## EUROPEAN ZERO-X MANUFACTURING ECOSYSTEM



## EUROPEAN INDUSTRIAL QUALITY DATA-DRIVEN OPERATIONS & SPACES

Digital  
Manufacturing  
Platform  
composition for  
AQ ZDM

A silhouette of a person sitting on a rock against a sunset sky. The sky transitions from dark blue at the top to orange and yellow near the horizon. The person is positioned on the left side of the frame, looking towards the right.

1

Improve **quality**  
of decisions

2

Reduce **time**  
to action

3

Make things **happen** as  
plan/predicted

Autonomous Quality: A Digital Challenge



# Digital Autonomous Factories 4.0

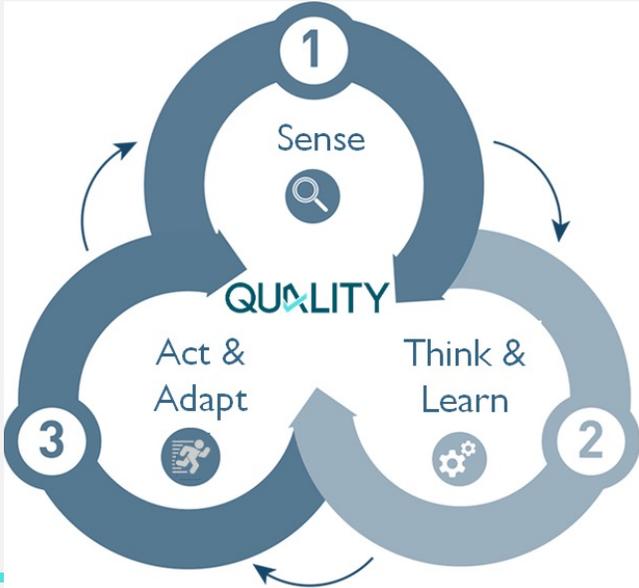
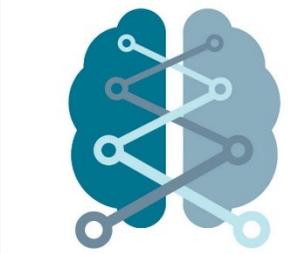


Smart  
Factory

1010001101011  
1010110101000  
101000000011  
101000000011



Digital  
Factory



Distributed  
Cognitive  
Collaborative

Modular  
Flexible



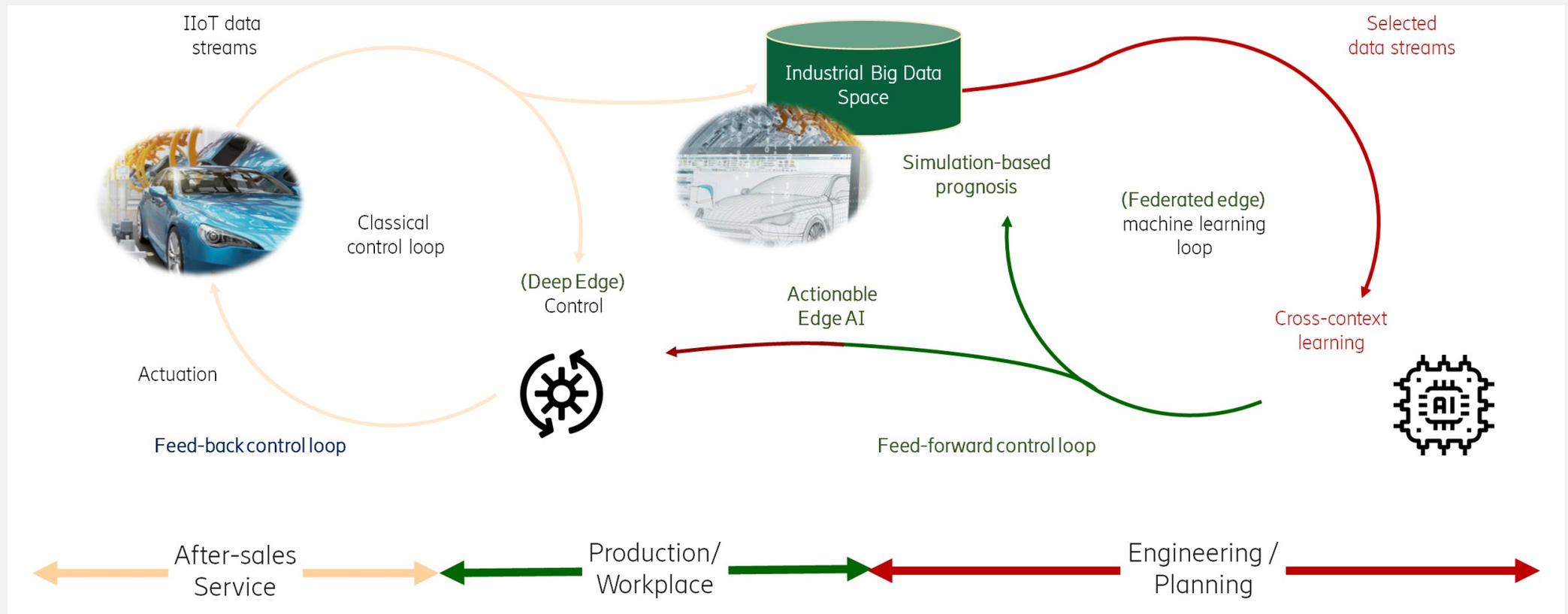
Autonomous Factory

# Autonomous Control & Decision Workflows

A product and process lifecycle perspective – Digital Thread



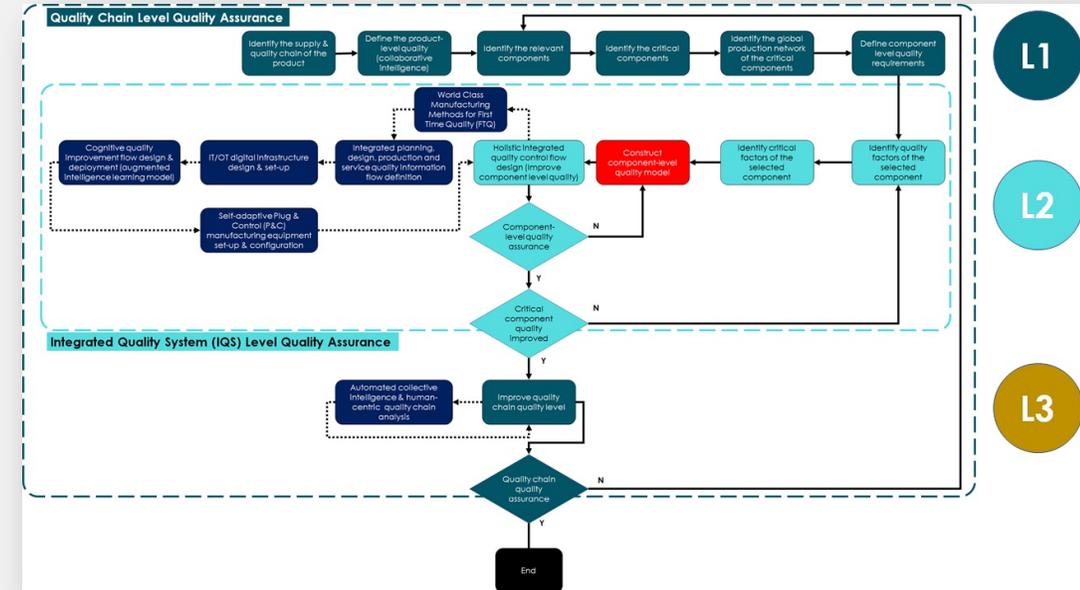
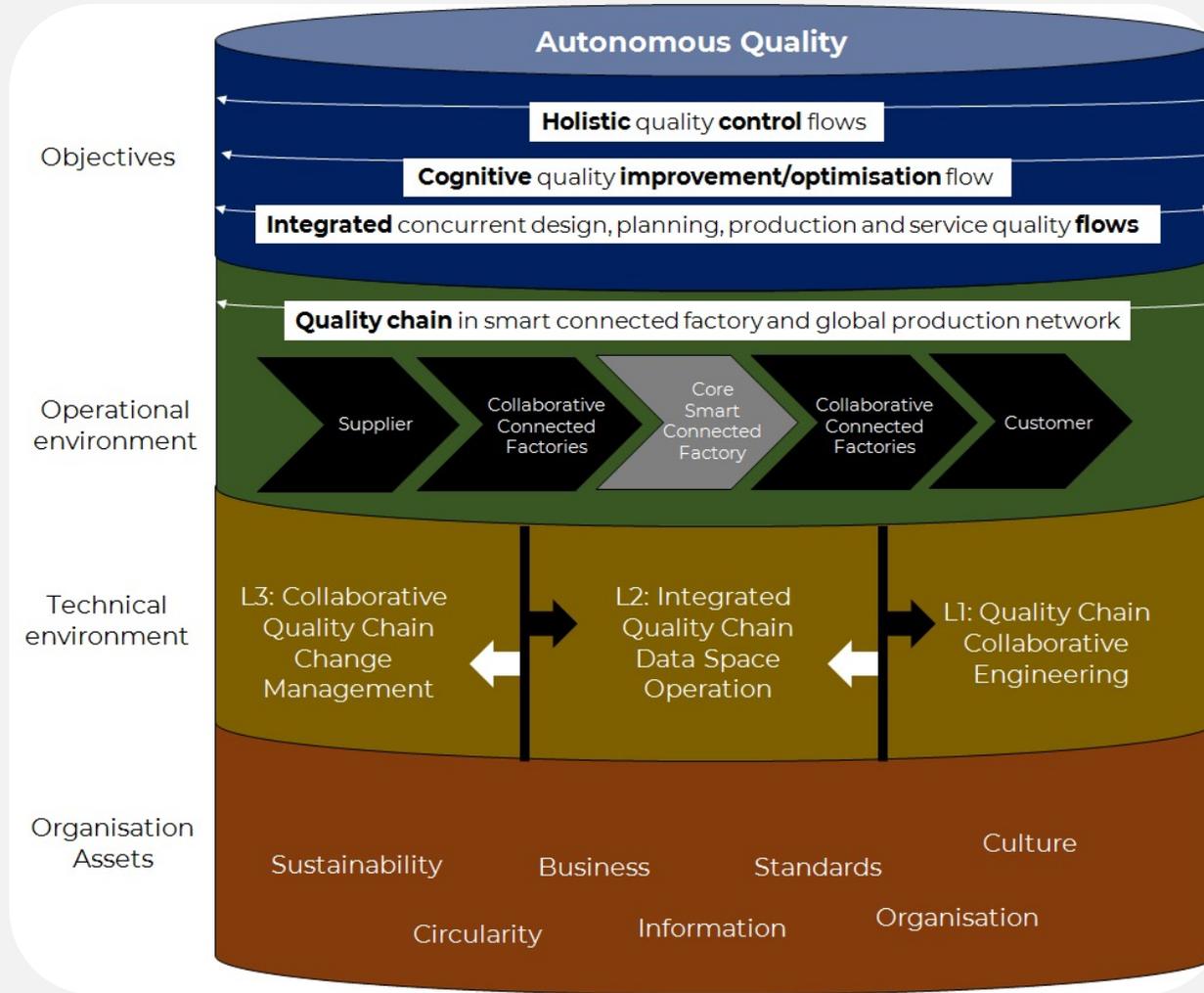
Possibility to implement feedback and feedforward control loop



Adapted from Siemens

# Autonomous Quality (AQ): Zero-X Control Blueprints

## Multi Layered ZDM Control Model



### Multi-Layered ZDM Control Model

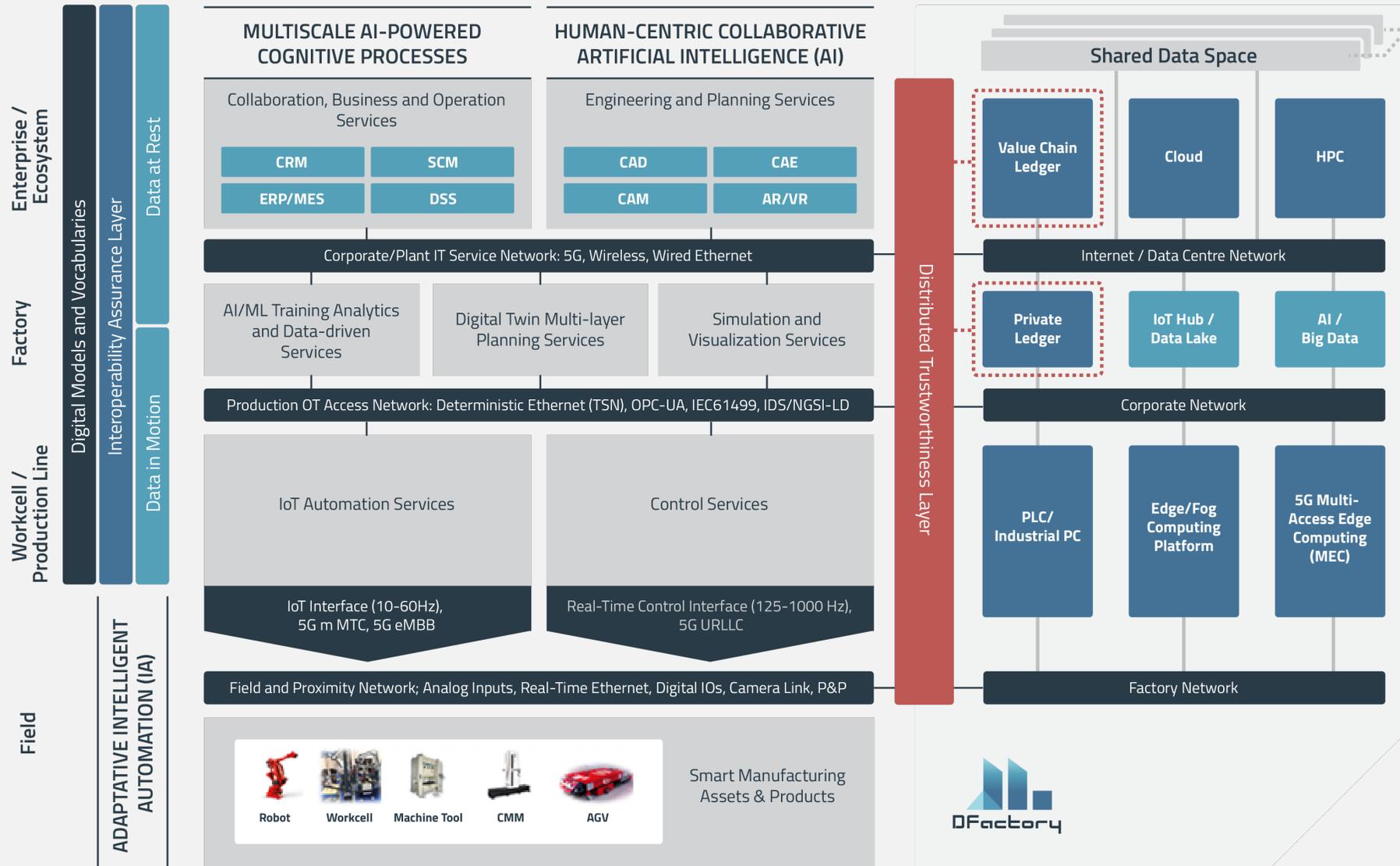
- Layer 1: Quality Chain Collaborative Engineering
- Layer 2: Integrated Quality System Operation
- Layer 3: Collaborative Intelligence Quality Chain Change Management

# Autonomous Quality (AQ): Reference Architecture

## Digital Service Engineering

## Digital Manufacturing Platforms & Service Operations

## Sovereign Digital Service Infrastructures



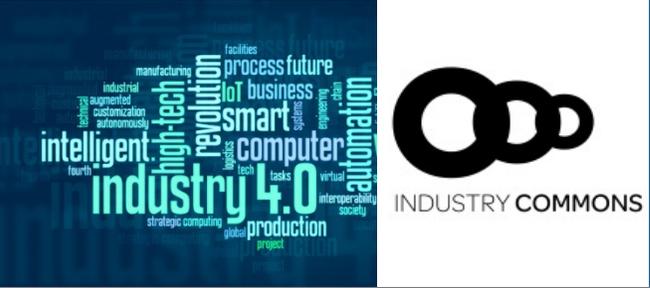


Autonomous Quality for ZDM: Enablers

QUALITY

# Autonomous Quality for ZDM

## Digital Framework



Vocabulary, Models, Standards



Digital Infrastructures

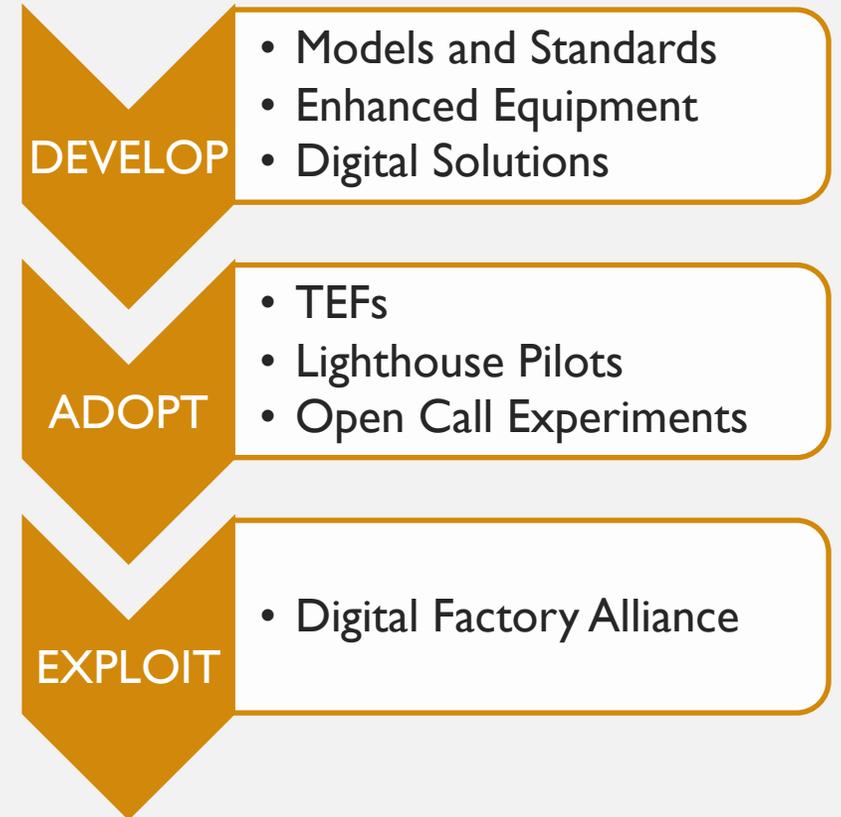
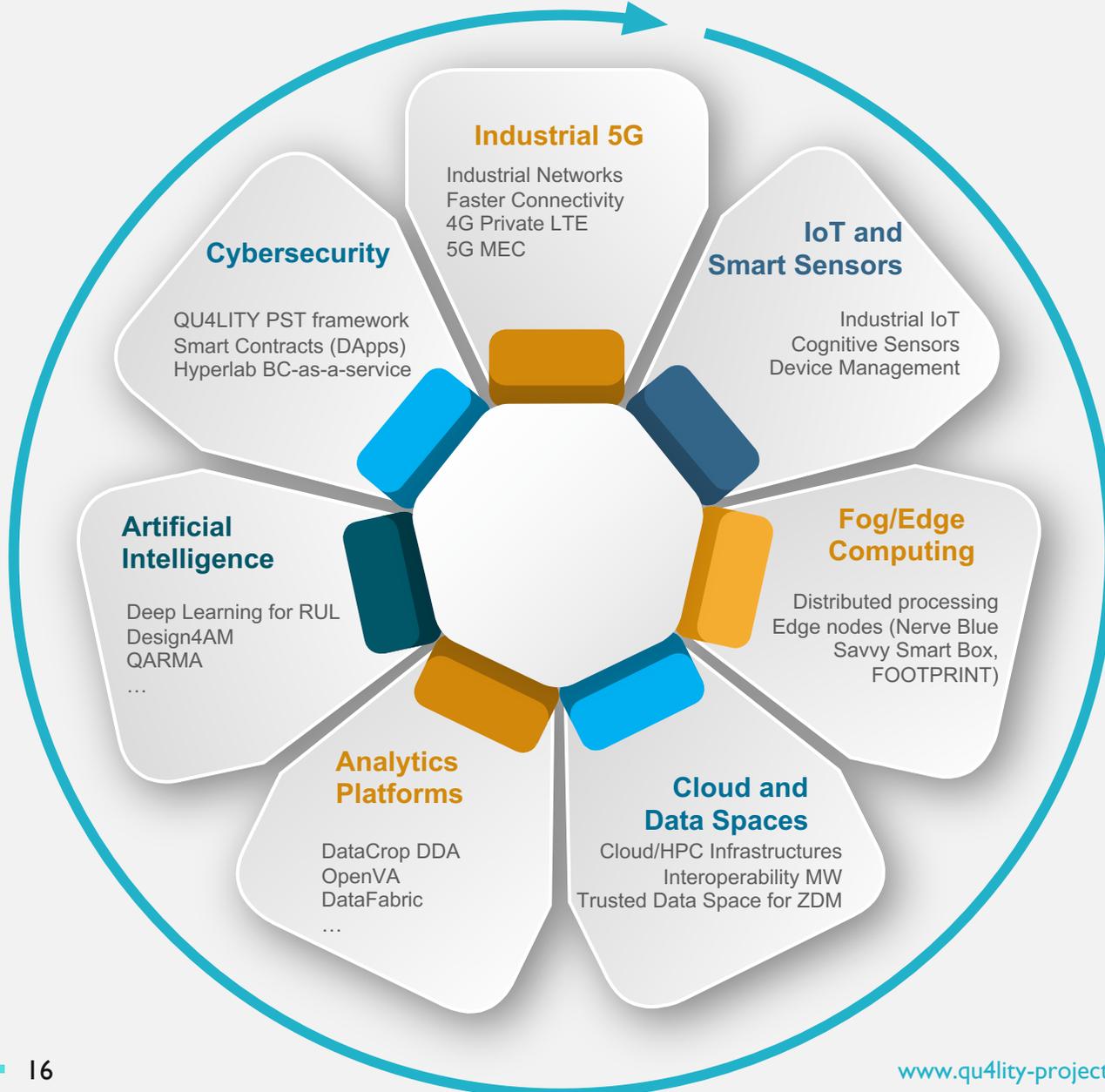


Digital Enablers



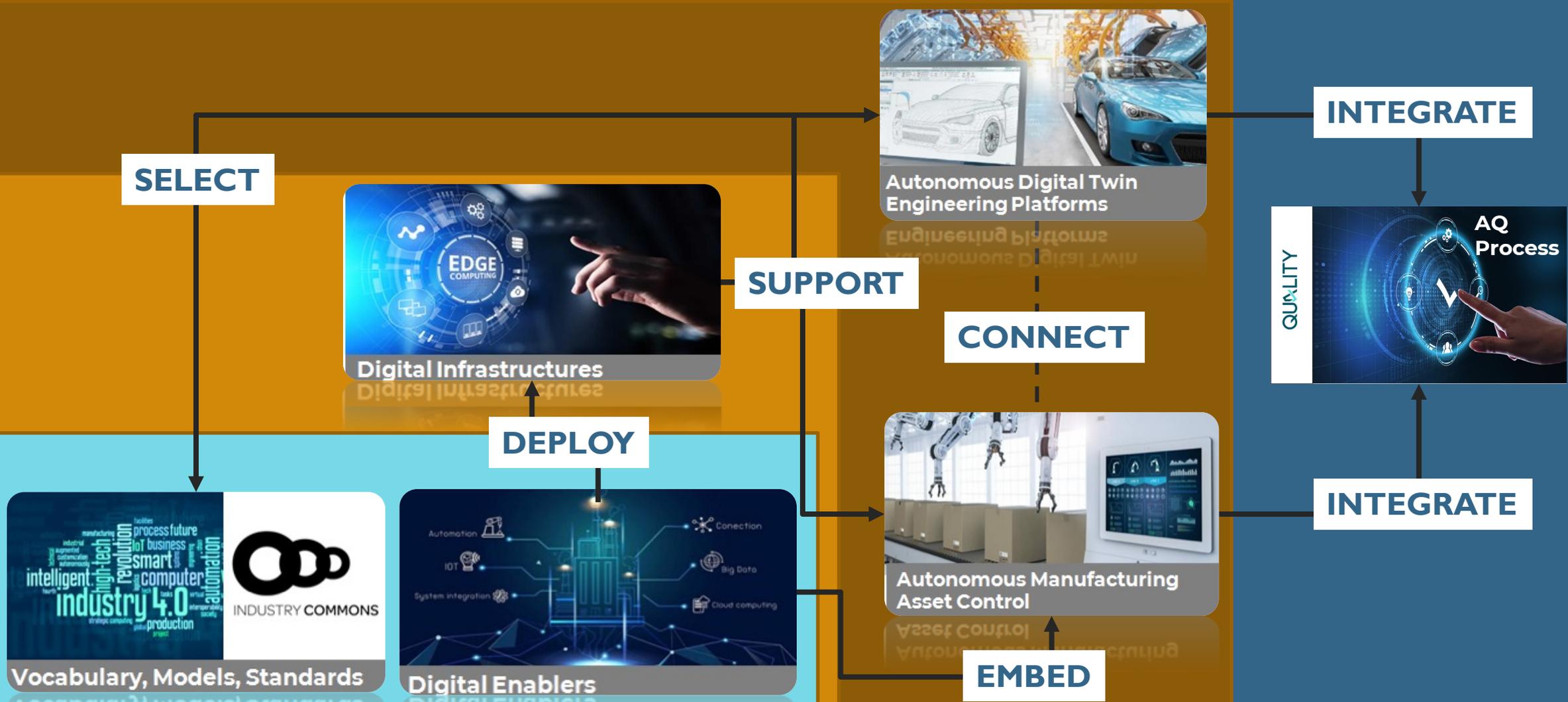
# Autonomous Quality

## Sovereign Digital Infrastructures and Enablers for Next Generation Equipment and Factories



# Autonomous Quality

AI-powered ZDM Processes





Autonomous Quality for ZDM: Large Scale Pilots

QUALITY

# Autonomous Quality for ZDM

## Large Scale Pilot Typology

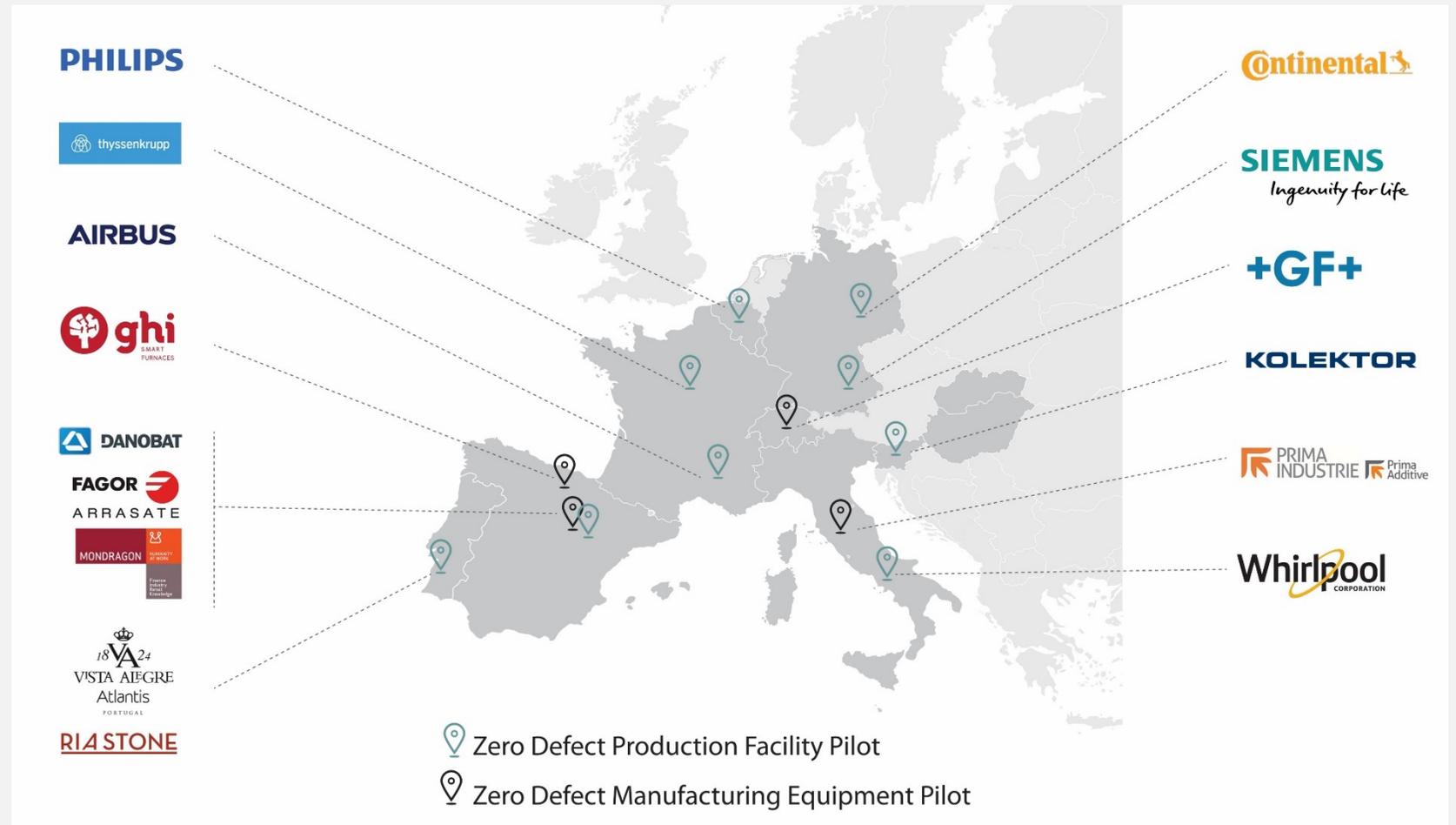
### FACTORIES 4.0

#### 9 ZDM Pilot Factories

- Automotive & electronics (4)
- White Goods & Appliances (2)
- Aero (1)
- Railway (1)
- Ceramics (1)

#### 5 ZDM Equipment Pilots

- Milling machines
- AGVs
- Stamping Press
- Additive Manufacturing/Laser Systems
- Industrial Furnace



# Autonomous Quality for ZDM

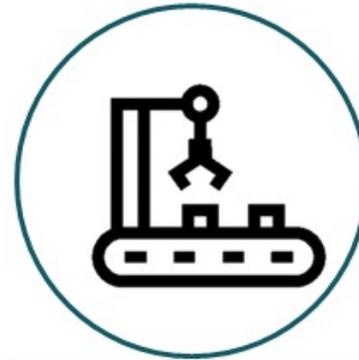
## Products



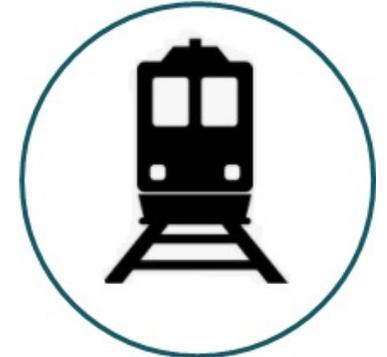
Aeronautics



Washing Machine



Machine Tool & Automation



Railways



Automotive



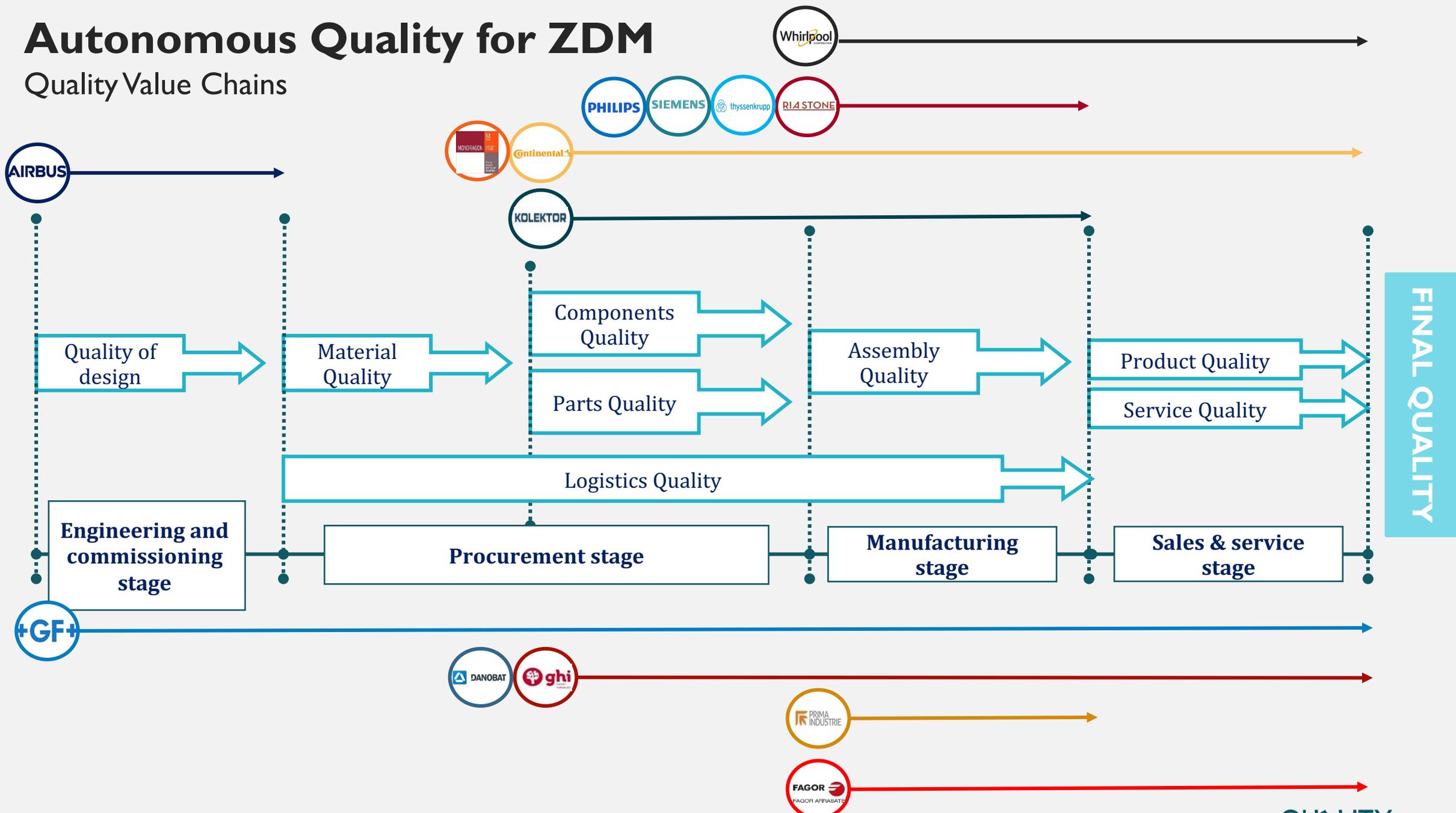
Healthcare



Ceramics

# Autonomous Quality for ZDM

## Quality Value Chains



# QUALITY

Thank you for your attention !!



Qu4lity



@EuQu4lity

[www.QU4LITY-project.eu](http://www.QU4LITY-project.eu)

Co-funded by the Horizon 2020 Programme of the European Union. Grant agreement ID: 825030

