DATA.ZERO

Zero Defect Manufacturing a key enabler to Manufacturing Systems including circularity

26. Septmeber 2023

Dr.Ing Odd Myklebust

DAT4.ZERO coordinatror

DAT4.Zero has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No. **958363**

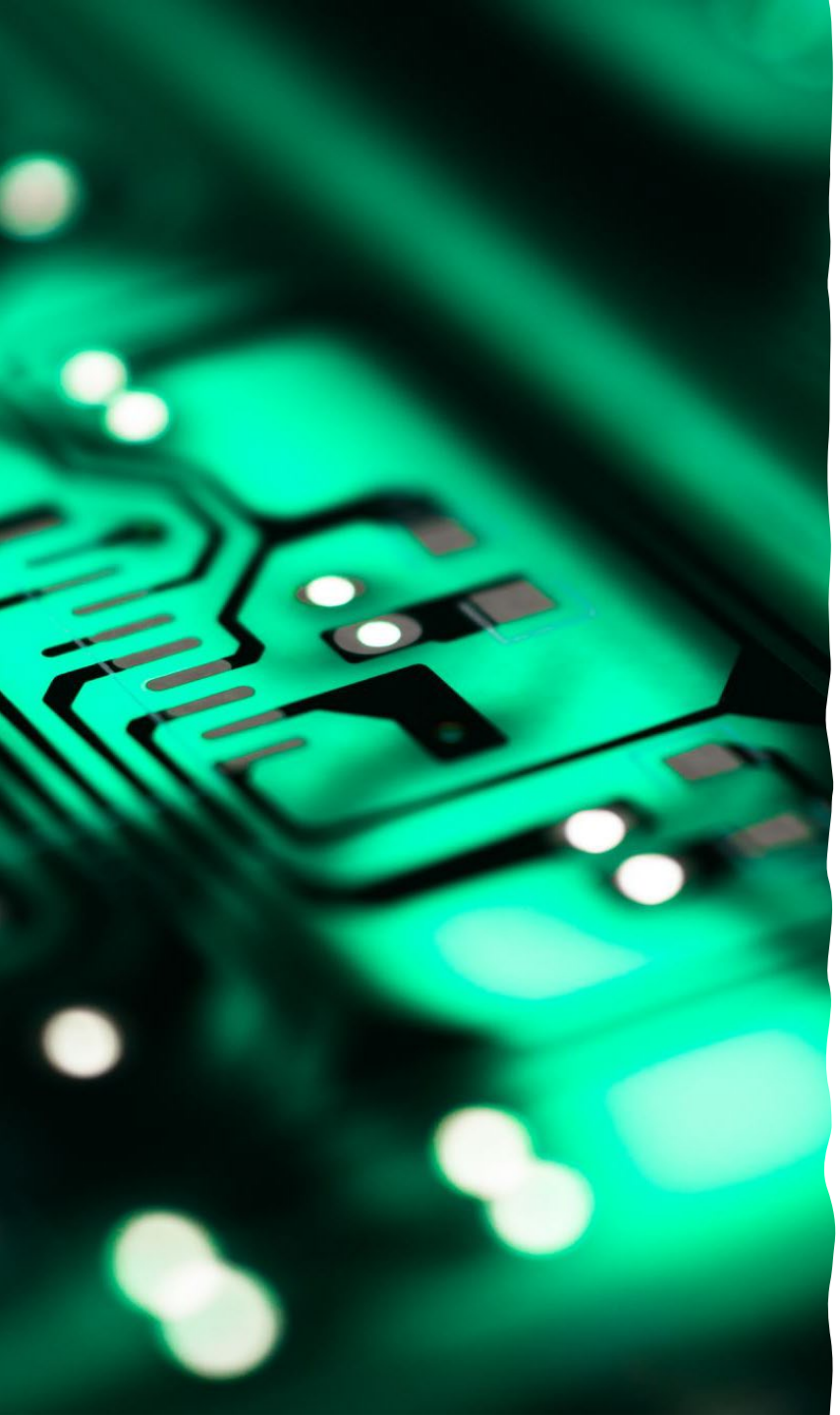
DATA.ZERO

DATA.ZERO

- DAT4.ZERO addresses the following primary objective:

To develop and demonstrate an innovative DQM system and deployment strategy for supporting European manufacturing industry in realizing a near-zero defect level of manufacturing in highly dynamic, high-value, high-mix, low-volume production contexts

IDEKO idletechs ITAINNOVA HOLONIX BRING THINGS TO LIFE Technology Transfer System
BENTELER BOSCH Dentsply Sirona ENKI engineering & manufacturing Fersa Bearings
TTTech Ensuring Reliable Networks INTERNATIONAL DATA SPACES ASSOCIATION DANOBAT KIT·AR TARAZ metrology
POLITECNICO MILANO 1863 The University of Nottingham KIT Karlsruher Institut für Technologie SINTEF



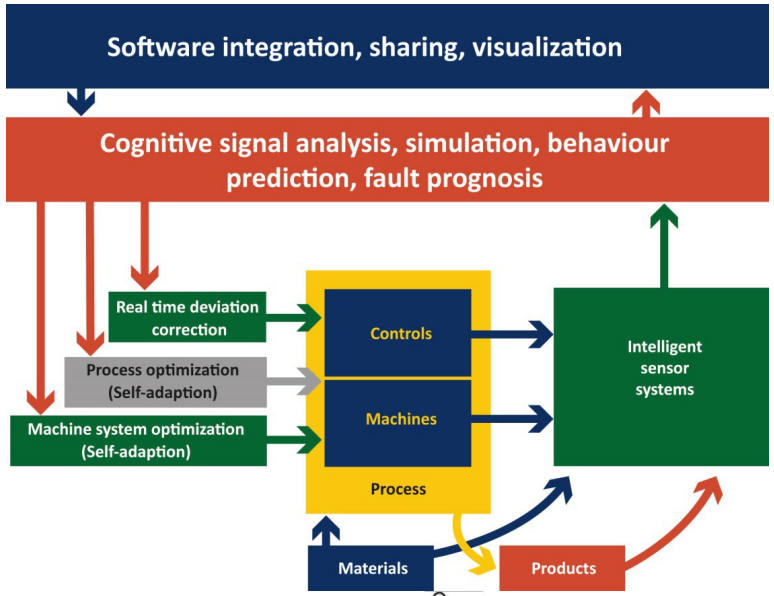
Zero Defect Manufacturing is a paradigm that goes beyond traditional quality approaches.

ZDM is a highly technology intensive and strategic manufacturing approach.

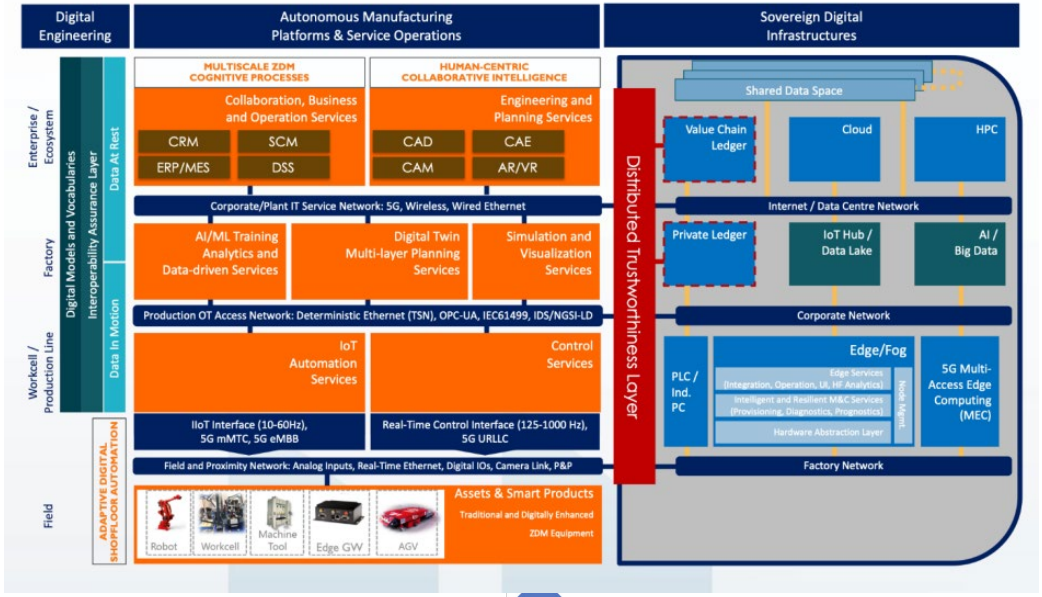
In ZDM, process and product knowledge, gathered with advanced digital technologies, is used to understand, analyze and derive system-level strategies.

ZDM has the wider vision of fostering the interest and care for European manufacturing among people.

ZERO Defect Manufacturinhg, Systems and architectures

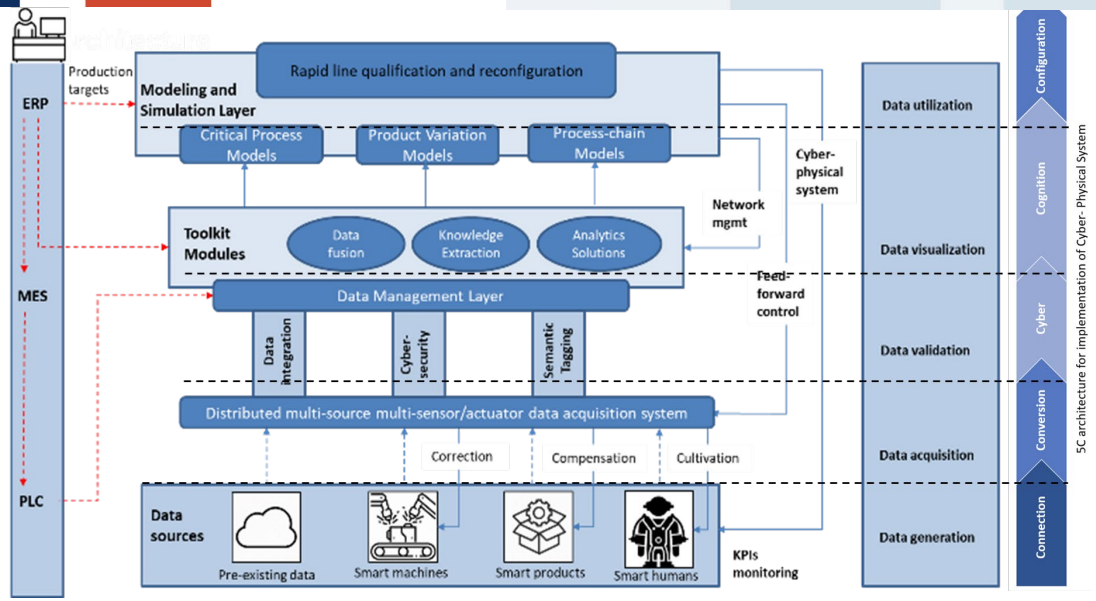


Ifacom 2012 – 2015
Process oriented



QU4LITY 2019 -2022
Platform oriented

Together these 3 projects have 34 industrial demos



Dat4.ZERO 2020 -2024
Value Chain oriented

System oriented Use cases in DAT4.ZERO

ENKI is a producer of one-of-a-kind customized micro-intravascular catheters.

- Extremely tight tolerances on the diameters of the microtubes and hence strict quality control requirements in the processes to avoid defects and waste.
- Critical processes include extrusion of the tubes, and assembly.

DENTSPLY develops and produces high-precision gears for dental applications

- Components only a few millimeters in size and extremely strict tolerances of a few micrometers, hence high-quality requirements.
- Reduce the noise created by dental rotary tools with head shaft and chuck as the major contributor components.
- Critical processes include the micro-grinding and micro-milling of the metal components, the assembly of parts to the final product.

BENTELER is a producer of aluminium structural components and chassis parts, supplied to the car manufacturers.

- Quality defects are usually a result of issues appear in combination of manufacturing processes including extrusion of aluminum profiles, forming, punching, cutting and machining processes to make a final component before assembly.
- Critical characteristics and tolerances of the products are monitored at quality gates of production stages to assure the quality of the product at the end of the long value chain.

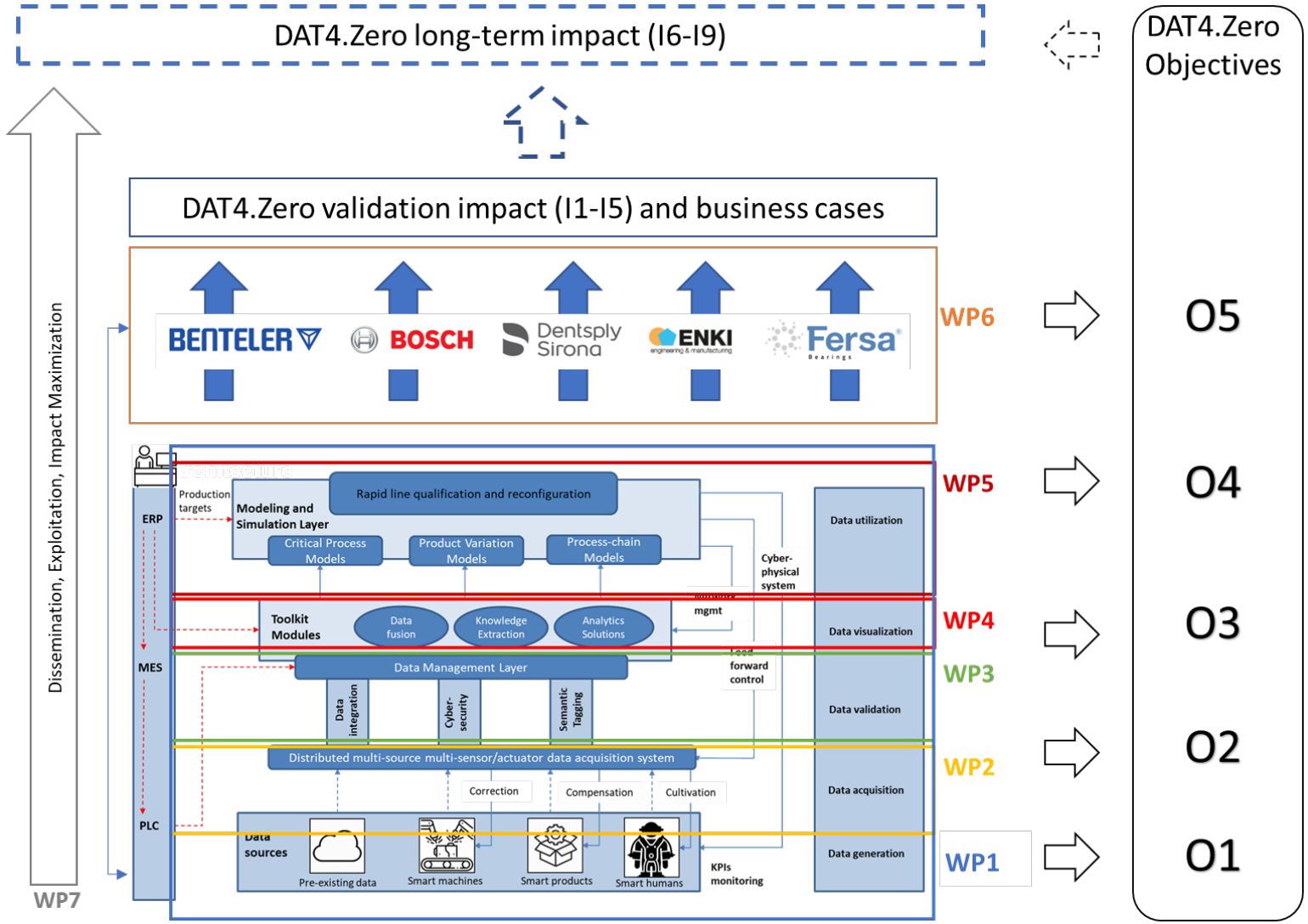
FERSA Bearings designs, develops, manufactures, and distributes high-quality bearing solutions to customers from various sectors such as commercial vehicles, automotive, and agricultural vehicles.

- High precision tight geometrical tolerances, excellent surface quality, and minimum friction.
- Critical processes include machining of the inner and outer rings, washing, assembling of rings with rollers and cages, and quality controls, including dimensions (e.g., height, outer and inner dimensions).

BENTELER Dentsply Sirona ENKI engineering & manufacturing Fersa Bearings

DATA.ZERO

Dat4.ZERO System architecture towards the project work packages and industrial pilots



ZDM future relevant aspects

More use of Ontologies in ZDM

Use of AI

Human aspects

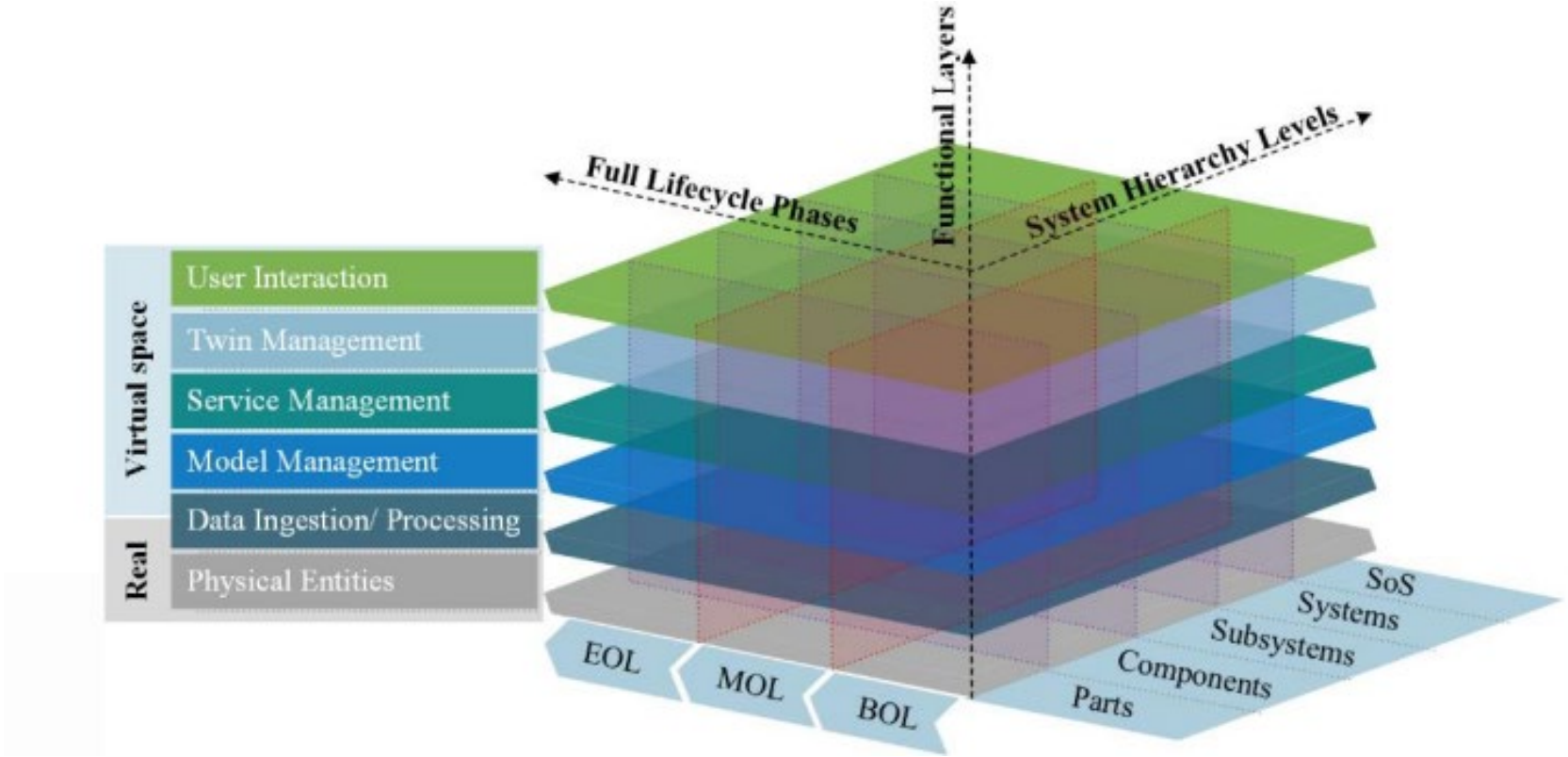
Framework and Platform solutions

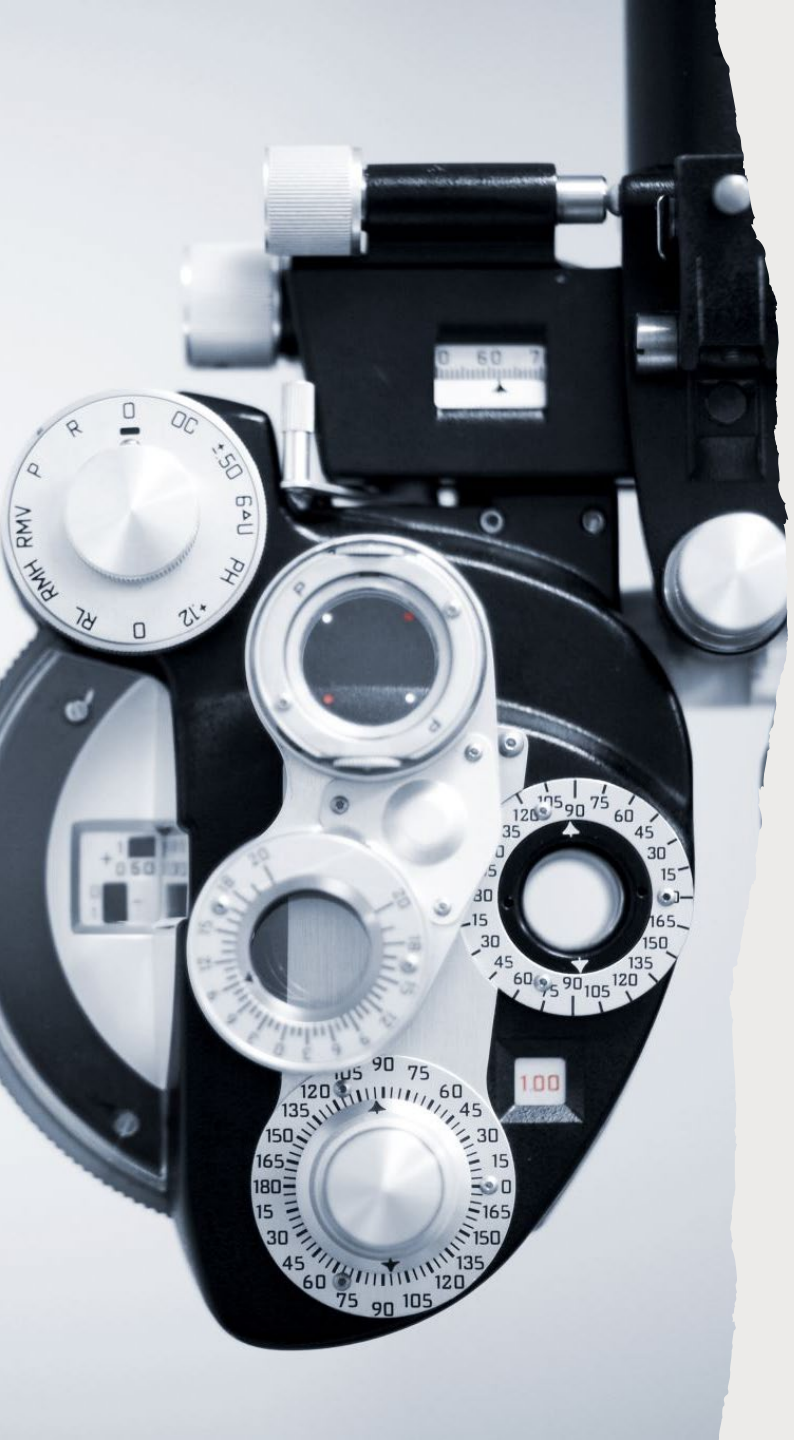
Standardization

Circulaer Economy – Re manufcturng – Life cycles

Manufacturing As a Service MaaS

RAMI4.0 – a reference framework for digitalisation

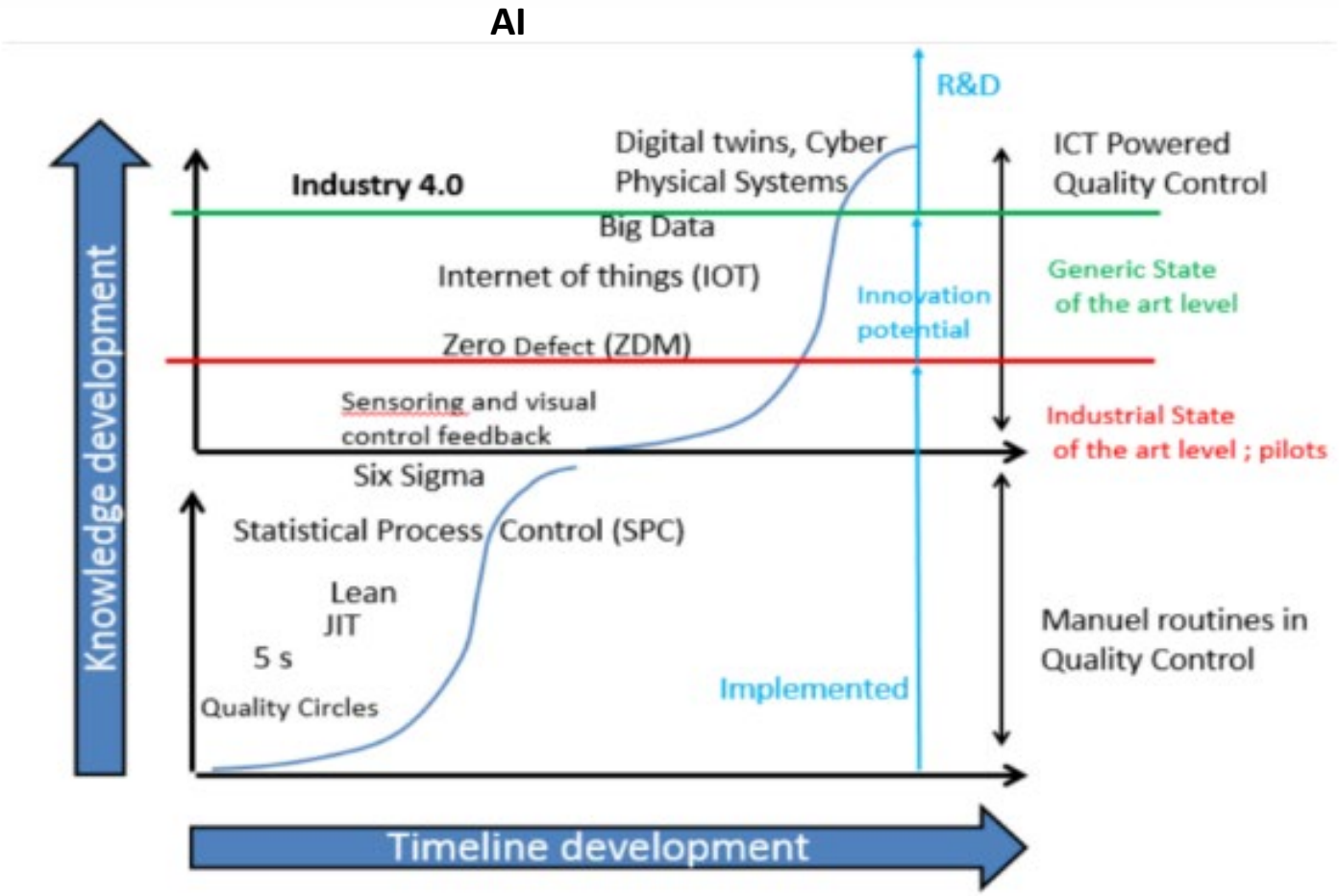




Standardization applicable for ZDM?

- ISO 704, Terminology work — Principles and methods
- ISO 860, Terminology work — Harmonization of concepts and terms
- ISO 10241, Terminological entries in standards — Part 1: General requirements and examples of presentation
- ISO 13372 Condition monitoring and diagnosis of machinery
- ISO 22514 Statistical methods in process management which describes the fundamental principles of capability and performance of manufacturing processes
- ISO 3534 Statistics—defines the applied statistics terms and expresses them in a conceptual framework per ISO normative terminology practice
- ISO 9000: Quality management systems—describes the fundamental concepts and principles of quality management which are universally applicable;

ZDM in the Quality deployment development



Human centered Manufacturing, Industry 5.0

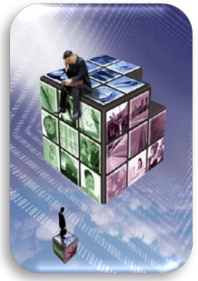
- Sustainable, human-centric and resilient industry
- Reinforcing the role and the contribution of industry to society
- Wellbeing of worker at the centre
- Prosperity beyond jobs and growth respecting the planetary boundaries
- Human-Machine interaction
  - AI aided human decision making
  - Skilling / reskilling / upskilling
  - New educational paradigms- The Teaching Factory approach

Zero Defect Manufacturing; the concept is applicable for all kind of industries as a system oriented approach

DATA.ZERO

Megatrends and some Research trends
Zew ZDM Roadmap to be completed by March 2024

DATA.ZERO



Emerging markets

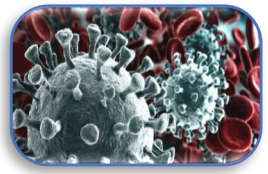
Demographic change

Acceleration of Technological innovation

MEGATR END

Resource scarcity

Climate & environmental change



Covid 19 & other emergencies

- Complex manufacturing systems
- Digitalization & technology adoption
- Sustainability (Zero defect, zero waste, zero carbon)
- Human-centric manufacturing

DAT4.Zero has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No. **958363**

DATA.ZERO