



**ANSALDO  
ENERGIA**

Convegno

**INDUSTRY 4.0**

La Voce di chi Produce



**FESTO  
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Consulting**



**The Human Capital in the middle of  
Ansaldo Energia Digital Transformation:  
the Lighthouse Plant project**

*Luca MANUELLI - Chief Digital Officer*

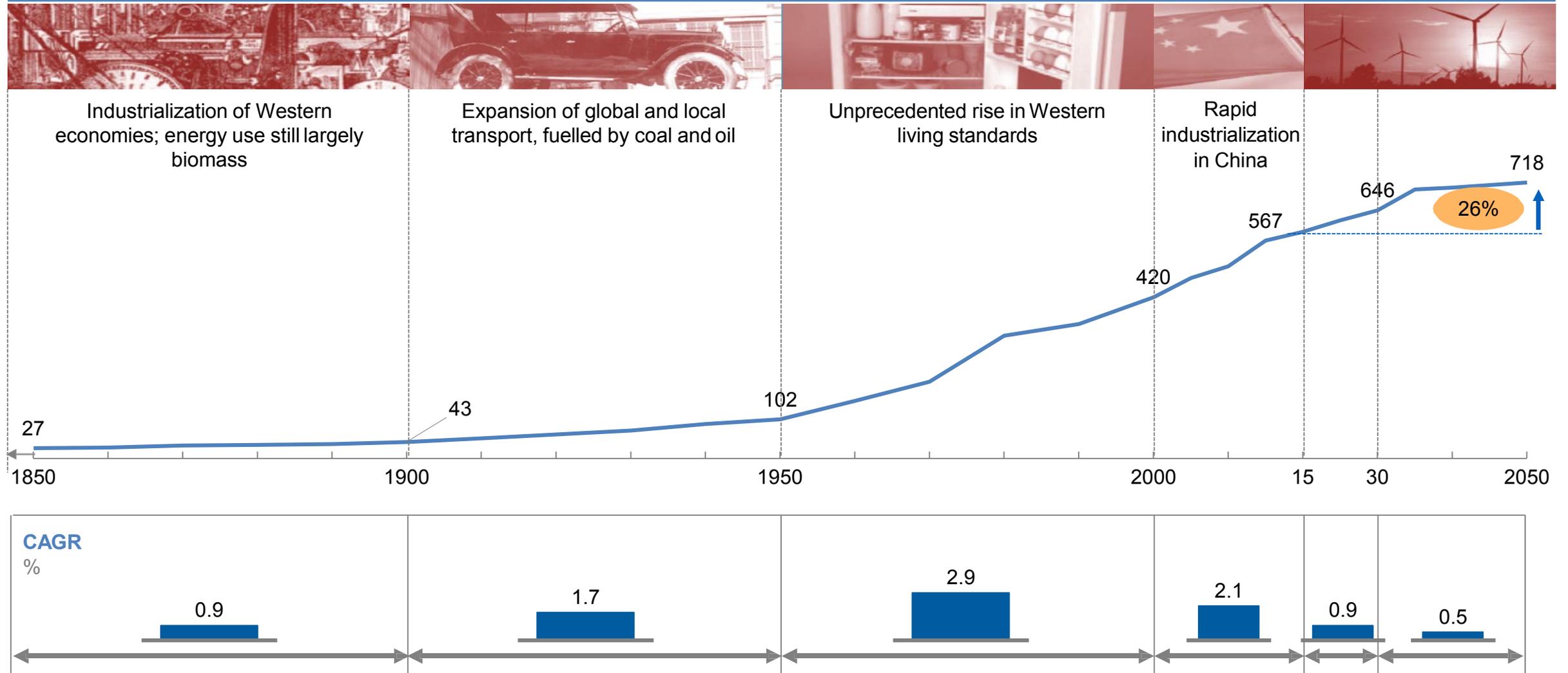
Milan 22/11/2018

# AGENDA

- a. Digital Energy Scenario**
- b. AEN Business and Digital Strategy alignment
- c. The Lighthouse Plant Project to support the empowerment of Manufacturing Processes
- d. The Human Capital in the middle of AE Digital Transformation

# ENERGY DEMAND TRAJECTORY: CONTINUED GROWTH, BUT THE RATE SLOWS

Global primary energy demand, Million terajoules



Source: McKinsey Energy Insights' Global Energy Perspective, December 2017; IEA Energy Balances (Historical)

# POWER GENERATION DIGITAL TRANSFORMATION SCENARIO

## The Future of Energy ... the 3Ds

*Energy will be cleaner, more accessible, intelligent, connected and responsive;  
Digital transformation will converge with business transformation.*



### DECARBONISATION

Shifting generation, transmission, distribution and usage towards a lower carbon future.

*Renewable energy, e-Mobility, energy efficiency, new and future fuels, demand side management, etc.*



**44%** of global generating capacity from renewables by 2025

**1,600 GW** of renewables capacity added between 2017 & 2025



### DECENTRALISATION

New DG models with a proliferation of distributed and connected generation, closer to the point of use.

*Distributed generation, energy storage, microgrids, prosumers, VPPs, P2P, etc.*



**12%** of global generating capacity from DG by 2025

**65%** of DG investments will be distributed Solar PV



### DIGITALISATION

Digital technologies to provide infrastructure for more flexible, intelligent, connected & responsive energy systems.

*Smart grid, asset optimisation, demand response, automated trading, active energy management, etc.*



**50 Billion** connected devices – or ‘things’ - globally by 2025

**>\$1 Trillion** economic value of IoT impact in energy by 2025

Source: Frost & Sullivan

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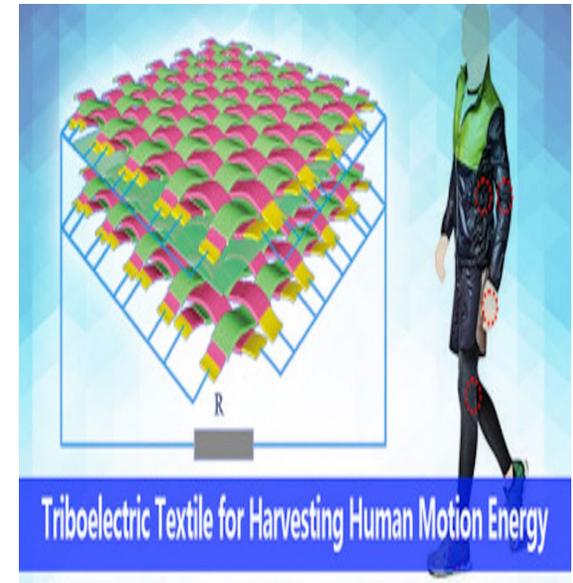
**Each of us will be able to generate, consume and trade energy exploiting new digitized distributed technology**

## THE TRIBOELECTRIC NANOGENERATOR, A NEW SOURCE OF ENERGY HARVESTING FOR WEARABLES

A collaborative research project between the *University at Buffalo* in the US and the *Institute of Semiconductors (IoP)* at the *Chinese Academy of Science (CAS)* has developed a small metallic tab that when attached to the body, can generate electricity from simple movements.

This, in theory, could mean that when the *triboelectric nanogenerator* is attached to the body, it can generate electricity from simple movements – including bending a finger. Although still early days, the triboelectric nanogenerator was **able to power 48 LED lights simultaneously**.

After investigating a number of potential nanogenerators capable of producing the triboelectric effect, the breakthrough came when they used **two thin layers of gold, with polydimethylsiloxane** (also called PDMS, a silicon-based polymer used in contact lenses, Silly Putty and other products) **sandwiched in between. This causes electrons to flow back and forth between the gold layers: the more friction, the greater the amount of power is produced.**



# POWER GENERATION DIGITAL TRANSFORMATION SCENARIO

## Adoption of new technologies is accelerating

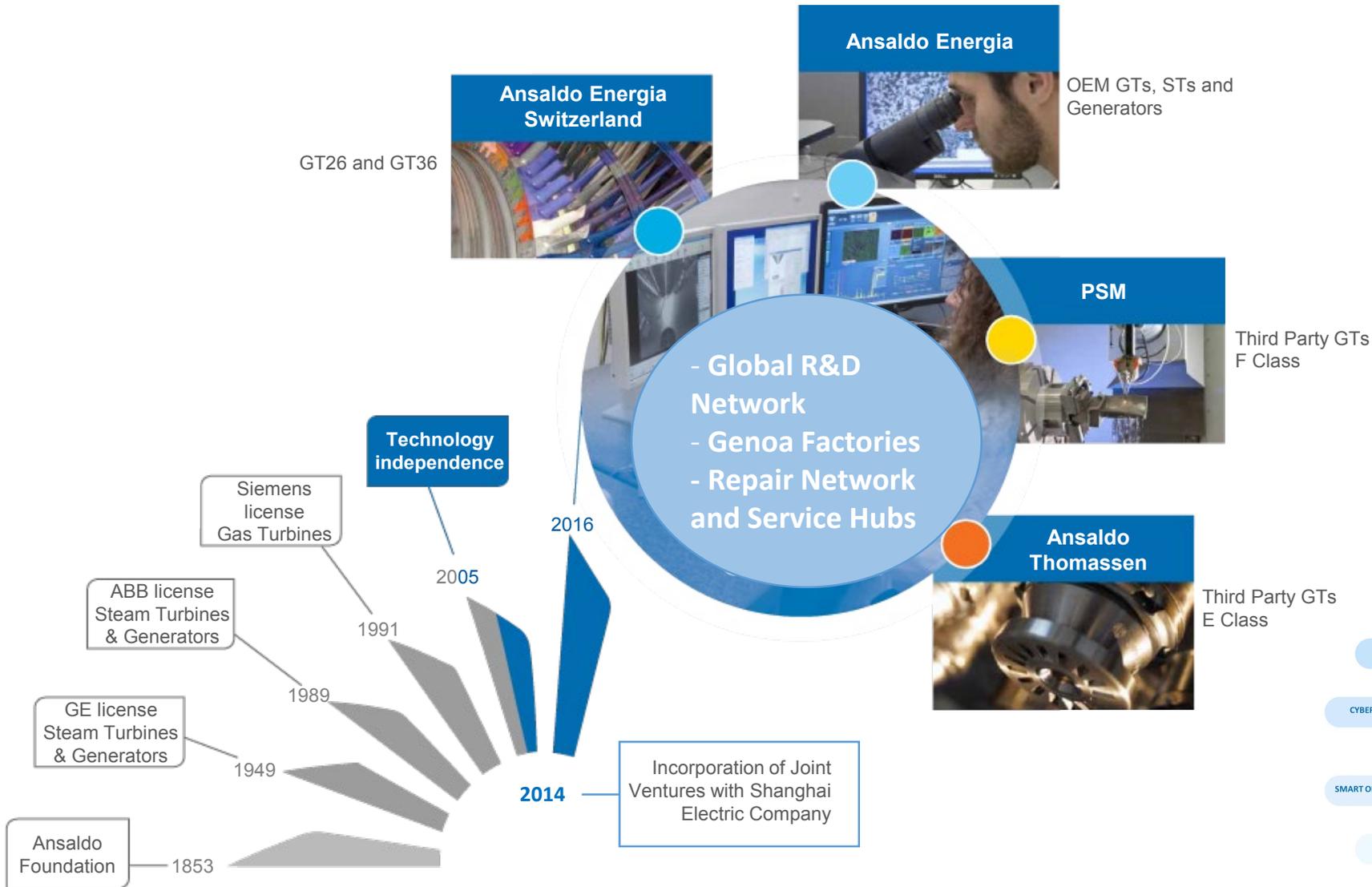
Time to reach 50 million users



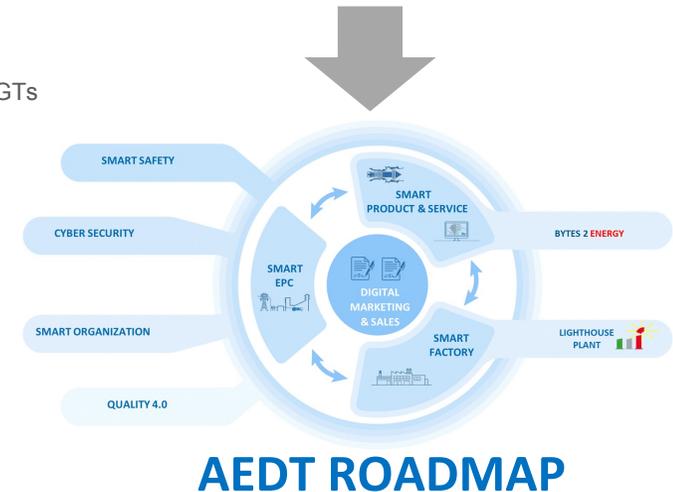
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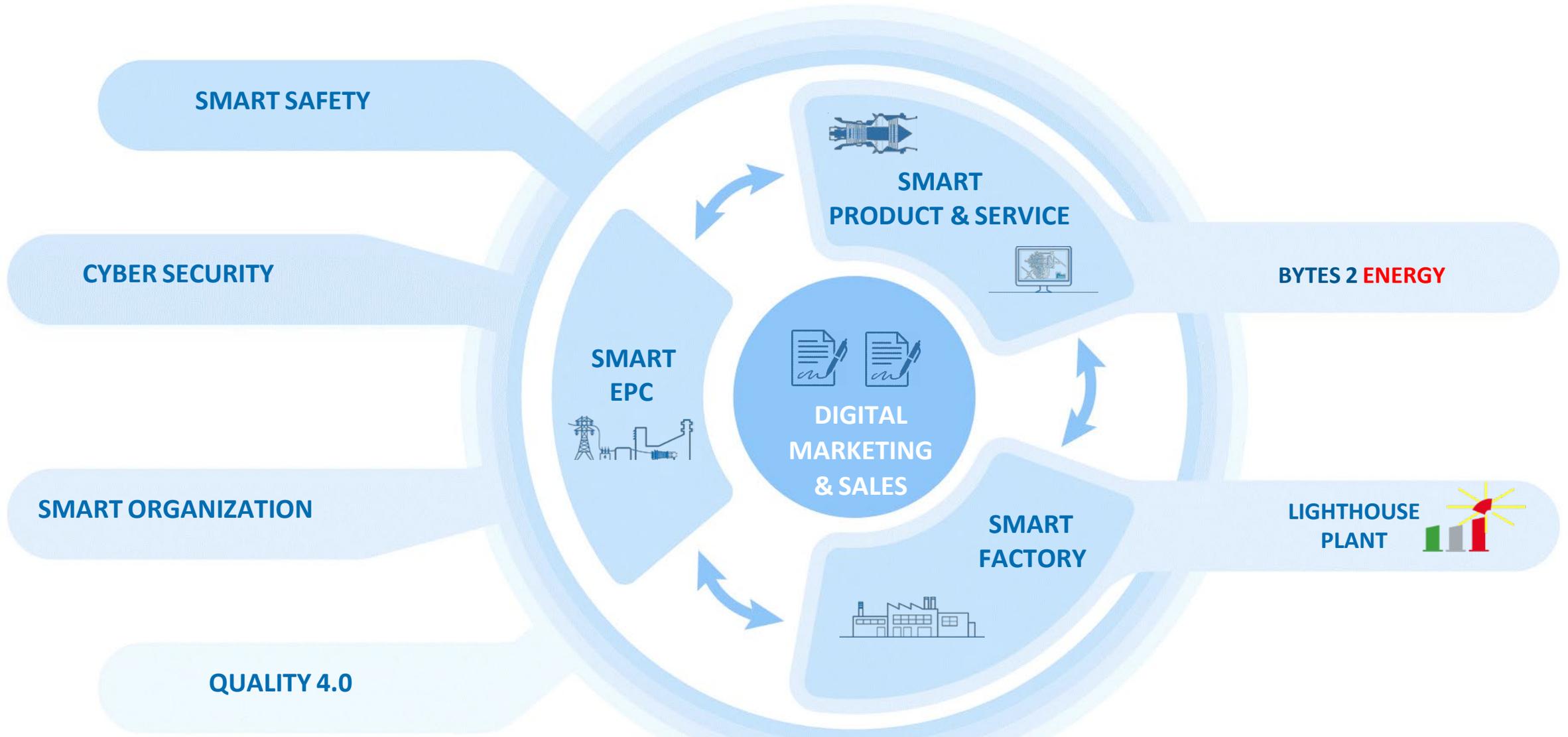
# BUSINESS STRATEGIC EVOLUTION



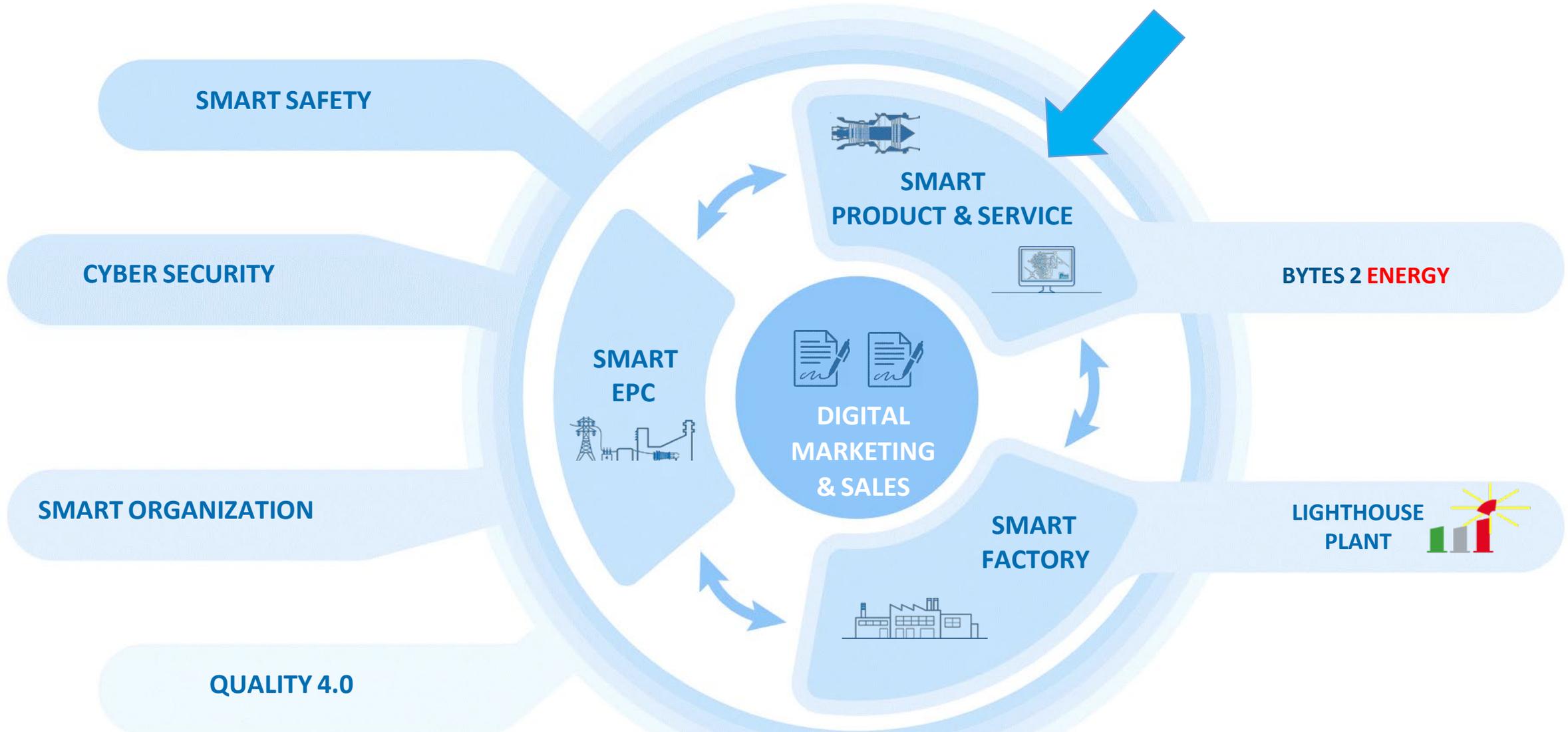
**2 PROPRIETARY TECHNOLOGIES SUPPORTED BY GENOA MANUFACTURING SITES**  
**+**  
**MANAGEMENT CAPABILITIES OF ALL «STATE OF ART» GT TECHNOLOGIES**  
**=**  
**3<sup>^</sup> PLAYER IN POWER GENERATION**



# ANSALDO ENERGIA Digital Transformation Roadmap



# SMART PRODUCT & SERVICE



# SMART PRODUCT & SERVICE

On site Repair  
HGP Refurbish.

Inspection  
Fact Finding

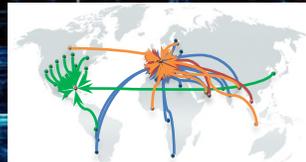
Maintenance  
operations

Design &  
historical data



**Maintenance**

Preventive  
Maintenance  
[Time based]



**Predictive  
Diagnostic**

Corrective  
Maintenance  
[Troubleshooting]



**PLM-> Field Service**

MRO/SBOM  
As Maintained

Remote  
Monitoring

Data Analysis &  
Diagnostic

Smart Alerts

Customized  
Maintenance

SBOM/As  
Maintained

Digital Spare Parts  
Catalogue

Configuration  
Management



**Predictive  
Maintenance**

Condition Based  
Maintenance  
[Adaptive]



**Improved  
Maintenance**

MRO Plus/ Smart  
Maintenance

Neural Networks  
Machine Learning

Advanced Sensors

Internet of Things  
Cyber security

Plant Digital Twin

3D Robotics

SLM Additive  
manufacturing

Augmented  
Reality

Smart Tracking

Smart Safety

Flexible & Technology - Value creation -

Swift & Competitive - Efficiency -

Yesterday

Today

Tomorrow

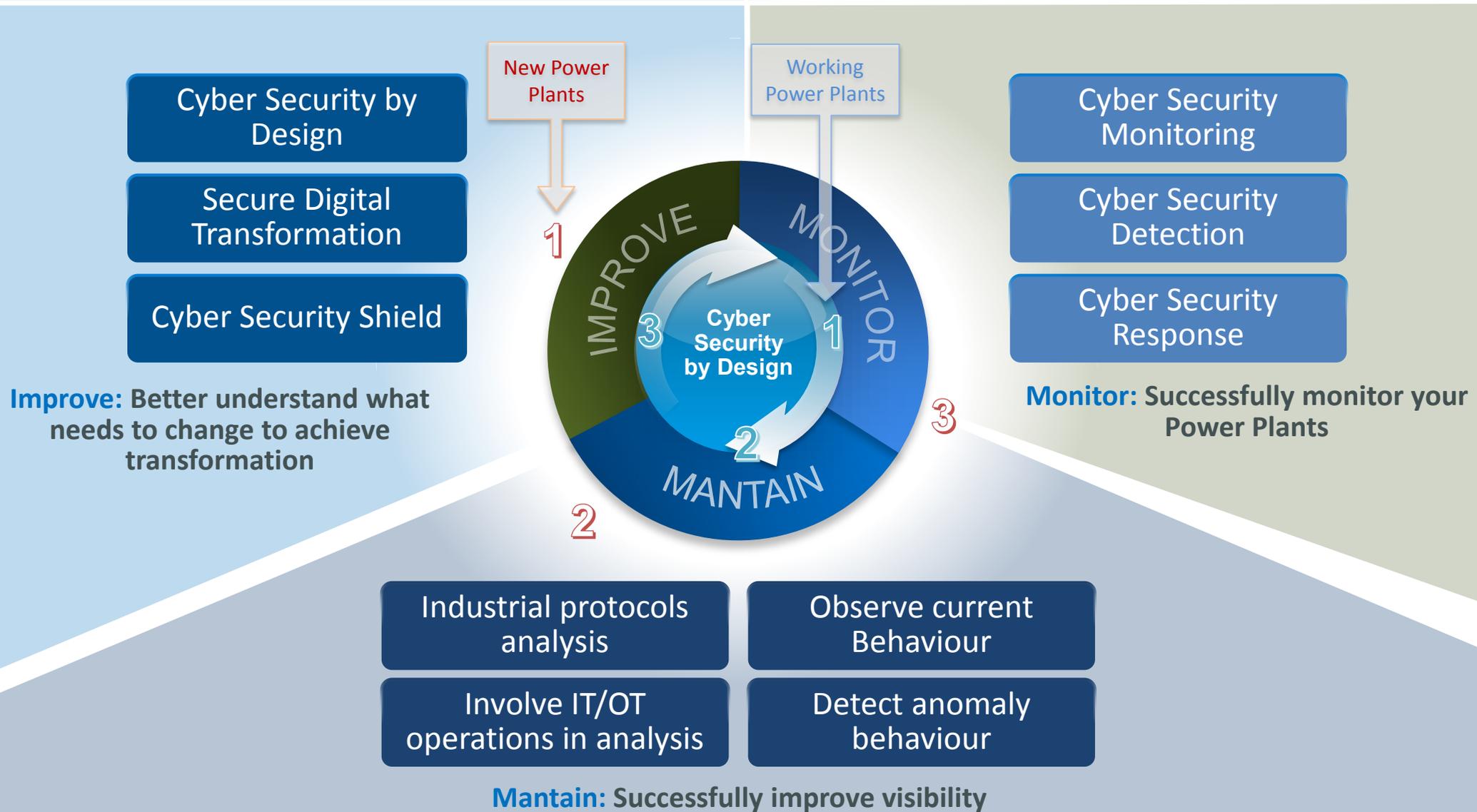
Road Map

# SMART PRODUCT & SERVICE - BYTES 2 ENERGY SCOPE

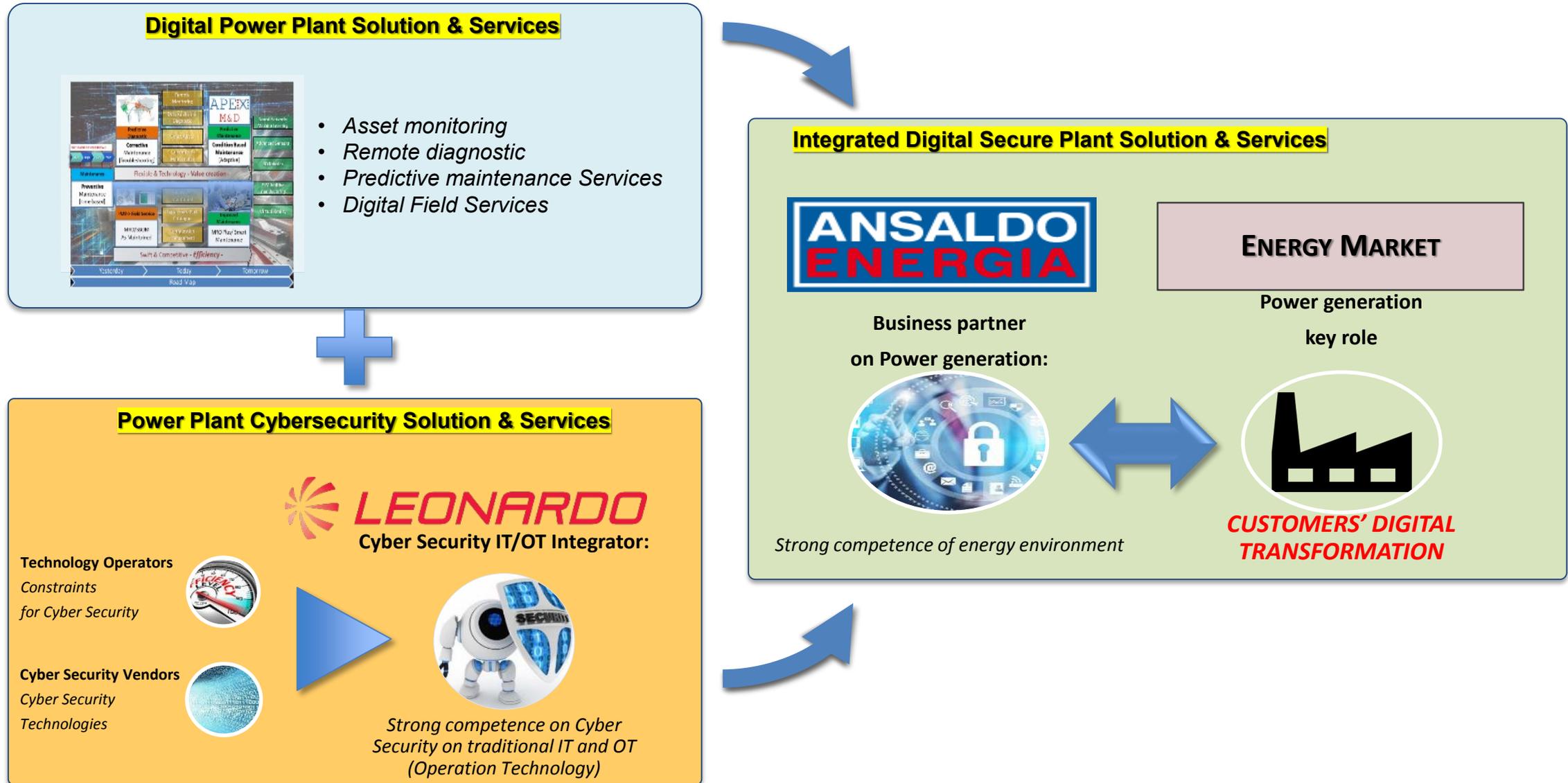


**AGENDA DIGITALE Funding MISE:**  
 DM 15 ottobre 2014 e DM 24 luglio 2015  
 Duration : 36 months (2018-2020)  
 Total Investment:12,5M€

# AE APPROACH FOR CYBER SECURITY – NEW vs RETROFITTING



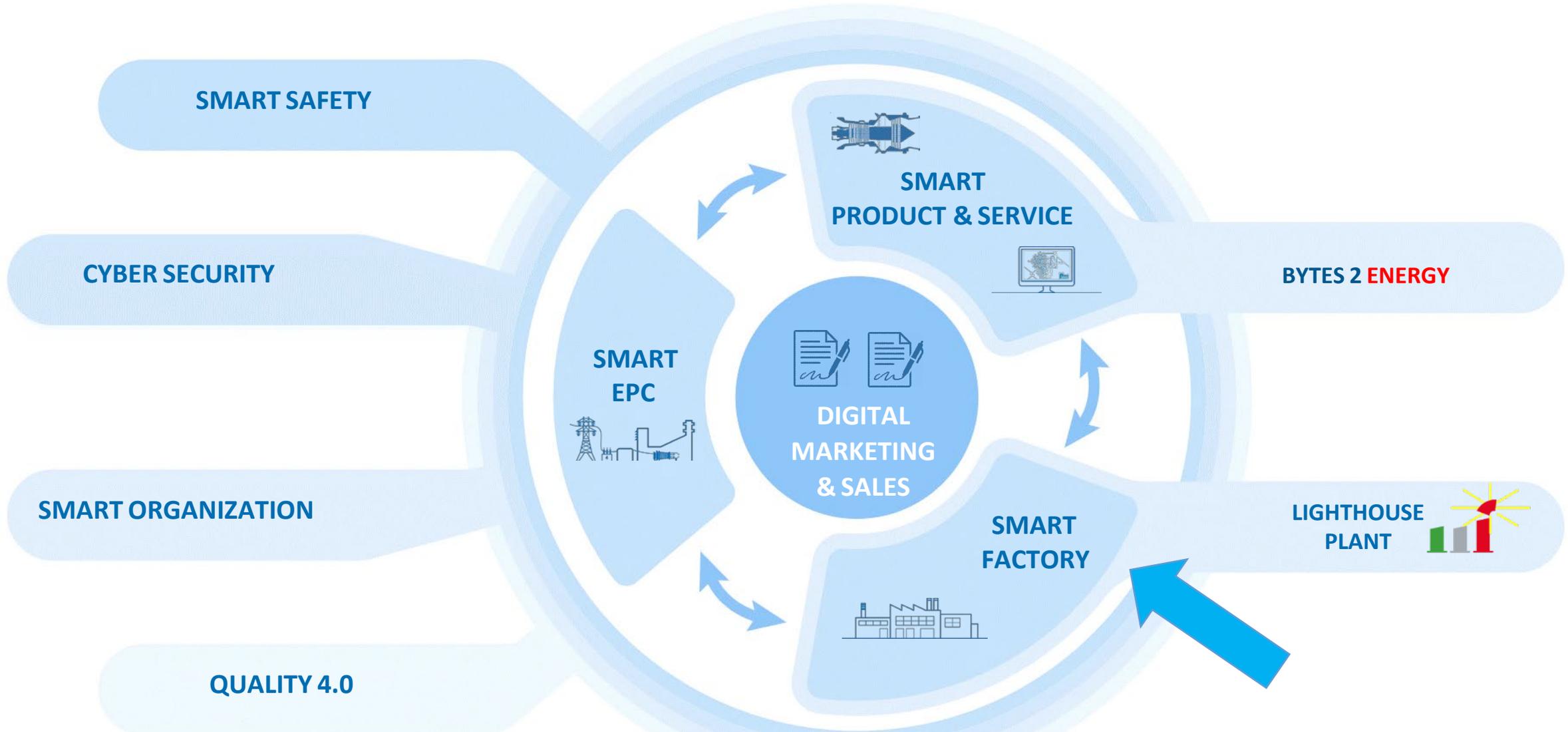
## AE APPROACH FOR CYBER SECURITY – PARTNERSHIP



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# SMART FACTORY





# First Lighthouse Plant of the Enterprise 4.0 Plan



IOT



BIG DATA

HORIZONTAL  
VERTICAL  
INTEGRATIONADDITIVE  
MANUFACTURING

- The Smart Factory Cluster managed the identification, on behalf of **MISE**, of the **Enterprise 4.0 Plan Lighthouse Plants**, leading to the selection of **Ansaldo Energia as the first Lighthouse Plant**.
- Since July 2018, Ansaldo Energia has started to **invest** a total of **€14m** in a **three-year Industrial Research and Development Plan**, based on the development and application of the **main digital technologies covered by the Enterprise 4.0 Plan** to the entire manufacturing process at its **two Genoa production sites** (Campi and Cornigliano).
- The terms of the **Innovation Agreement** finalised by **MISE** and the **Liguria Regional Administration** mean that **Ansaldo Energia's investment** - in addition to the incentives provided by the Enterprise 4.0 Plan - will be **eligible for a grant equal to 25% of the total** (20% MISE and 5% Liguria Regional Administration).

AUGMENTED  
REALITYVIRTUAL  
REALITY

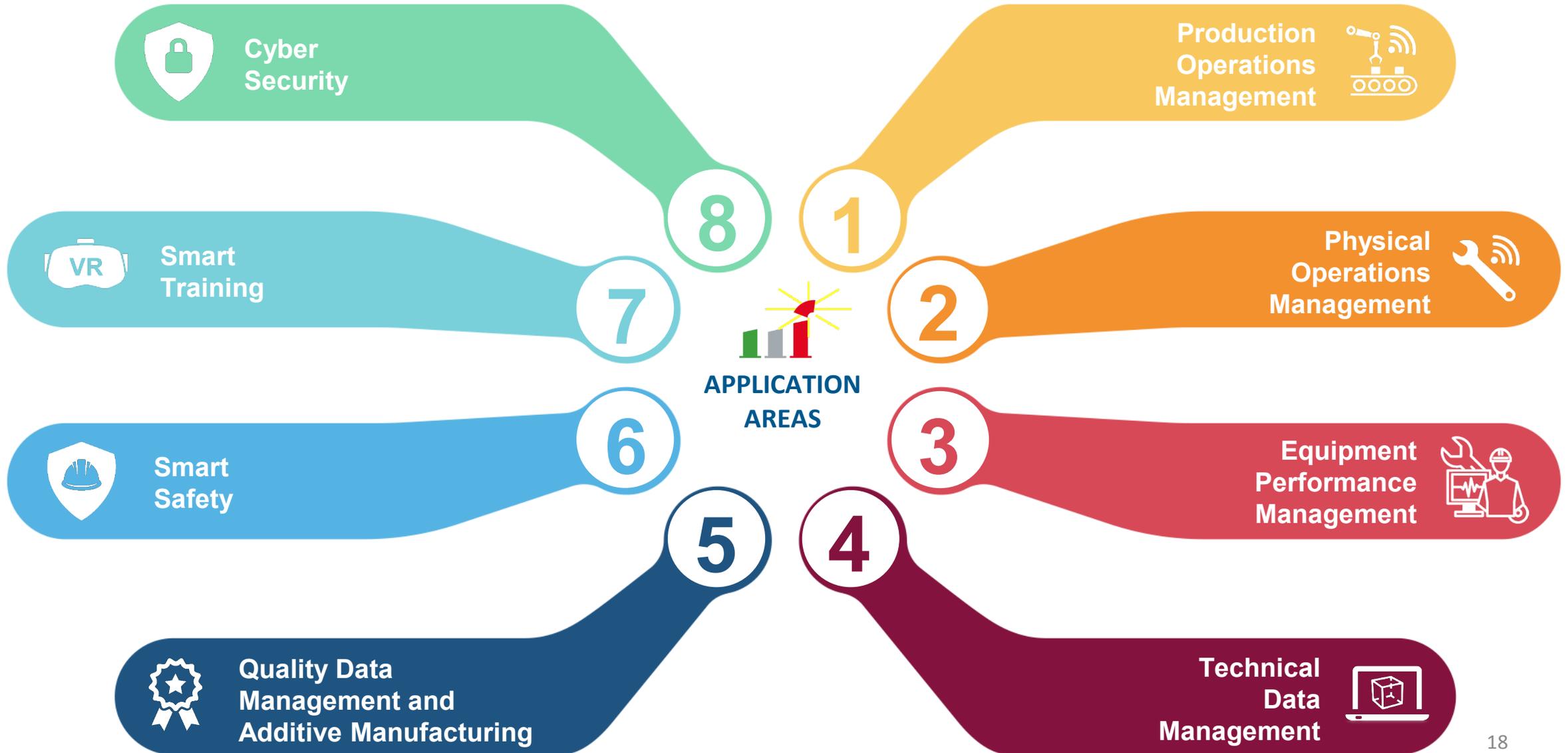
SIMULATION



CLOUD

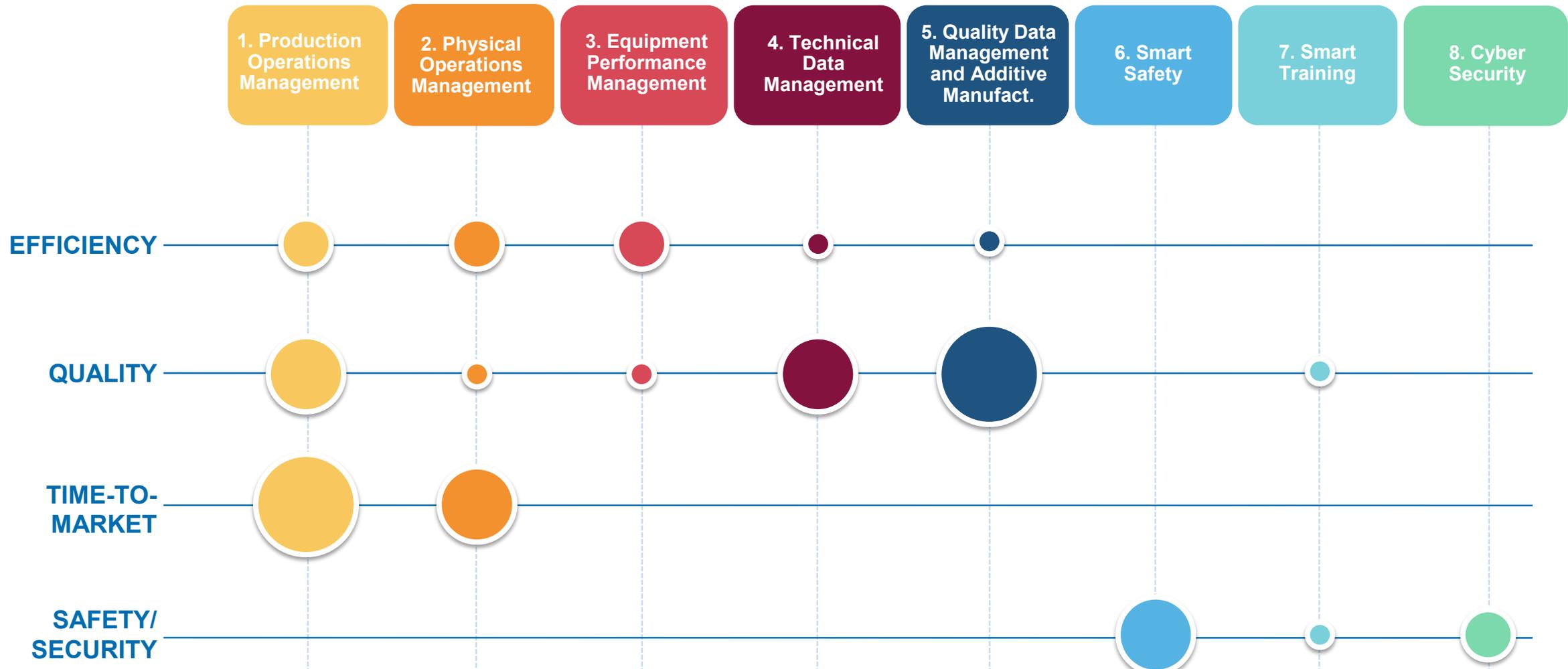


# ANSALDO ENERGIA Lighthouse Plant Scope





# Expected Benefits by Application Area





## Lighthouse Plant extension to other AE Group Key Process



### Smart EPC



### Smart Factory

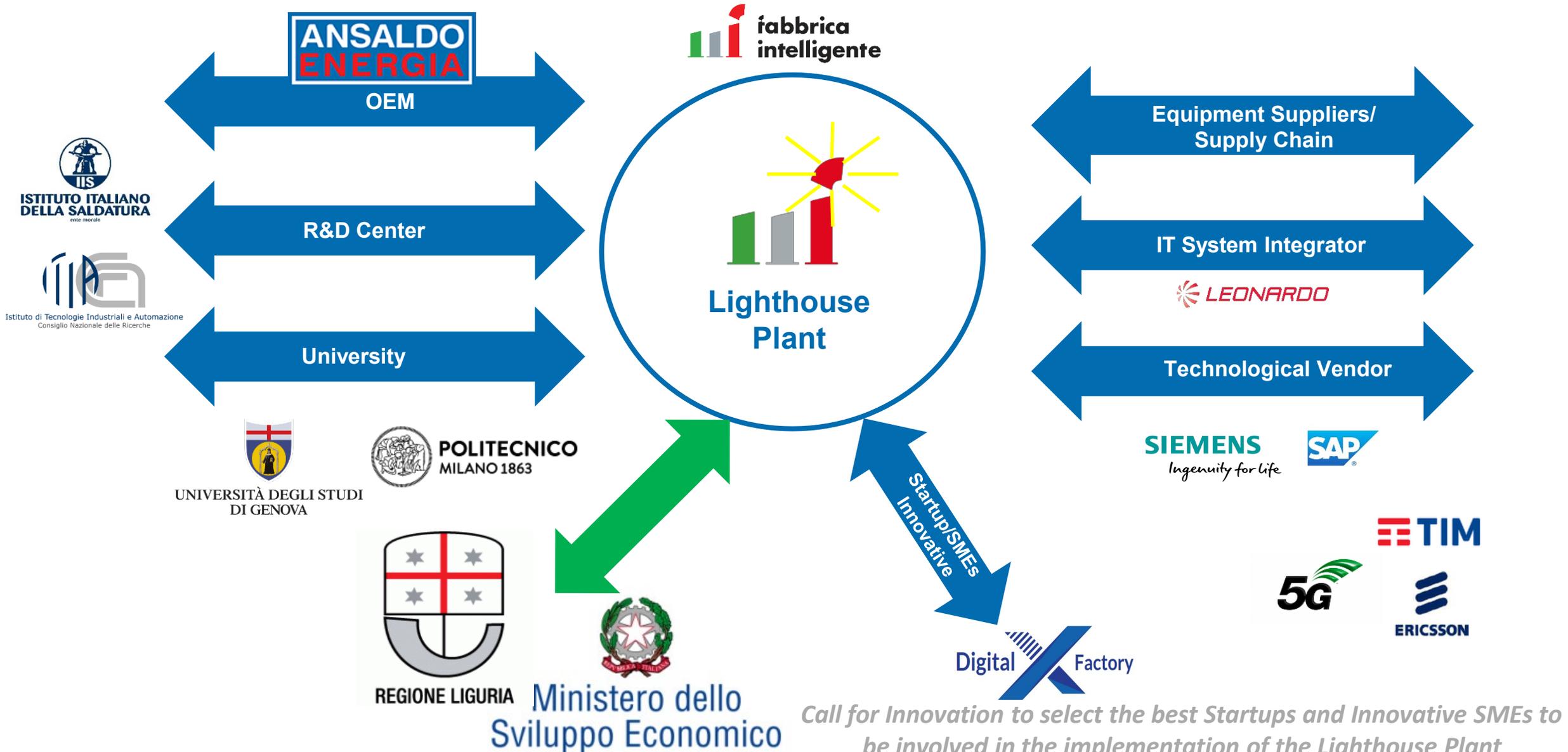


### Smart Product & Service

	Big Data	IOT	Augmented Reality	Simulation	Additive Manuf.	Cloud		Big Data	IOT	Augmented Reality	Simulation	Additive Manuf.	Cloud
Production Operations Management		✓							✓				
Equipment Performance Management								✓	✓		✓		✓
Technical Data Management			✓							✓			
Quality Data Management	✓					✓		✓					✓
Additive Manufacturing												✓	
Smart Safety		✓							✓				
Smart Training			✓	✓						✓	✓		
Cyber Security	✓					✓		✓					✓



# Lighthouse Plant Key Partners



*Call for Innovation to select the best Startups and Innovative SMEs to be involved in the implementation of the Lighthouse Plant*



# DIGITAL X FACTORY – Call for Innovation for Startups e Innovative SMEs



1 NOVEMBER

20 NOVEMBER

10-23 NOVEMBER

01 DICEMBER

CALL  
START

CALL  
END

SCREENING &  
INVITATIONS

PITCH

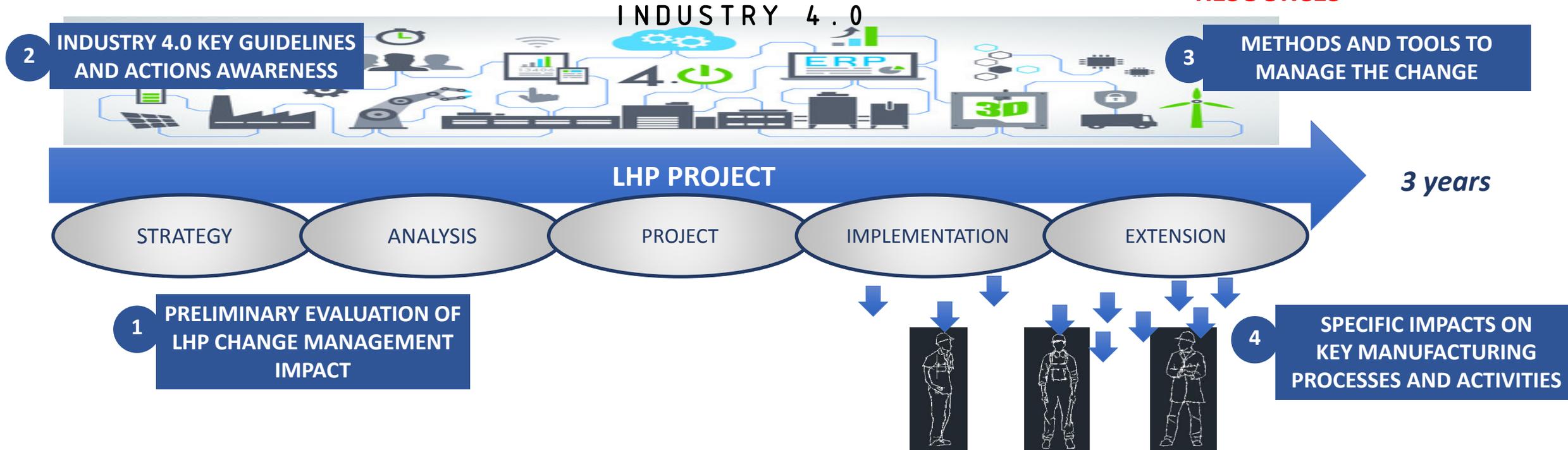
**160 responding, 90 projectual proposal received,  
11 Startups and Innovative SMEs selected for the final Pitch  
and 6 involved in the AEN Lighthouse Plant implementation**



# Lighthouse Plant Project – Change Management

## CHANGE MANAGEMENT APPROACH

**TARGET → 1.000  
RESOURCES**



### LHP Change Management Key Guidelines

- **EXHAUSTIVE** → to address a full alignment about Industry 4.0, Smart Factory and Lighthouse Plant Project
- **STRUCTURED** → to plan and promptly deliver the action plan
- **FLEXIBLE** → to adapt the plan to the day-by-day project activities (deliverables and variances)
- **PRAGMATIC** → to prepare people strongly impacted by the change to adapt their skills and capabilities
- **COLLABORATIVE** → to create a two-way process able to detect weak signals from the field to be processed and fed-back

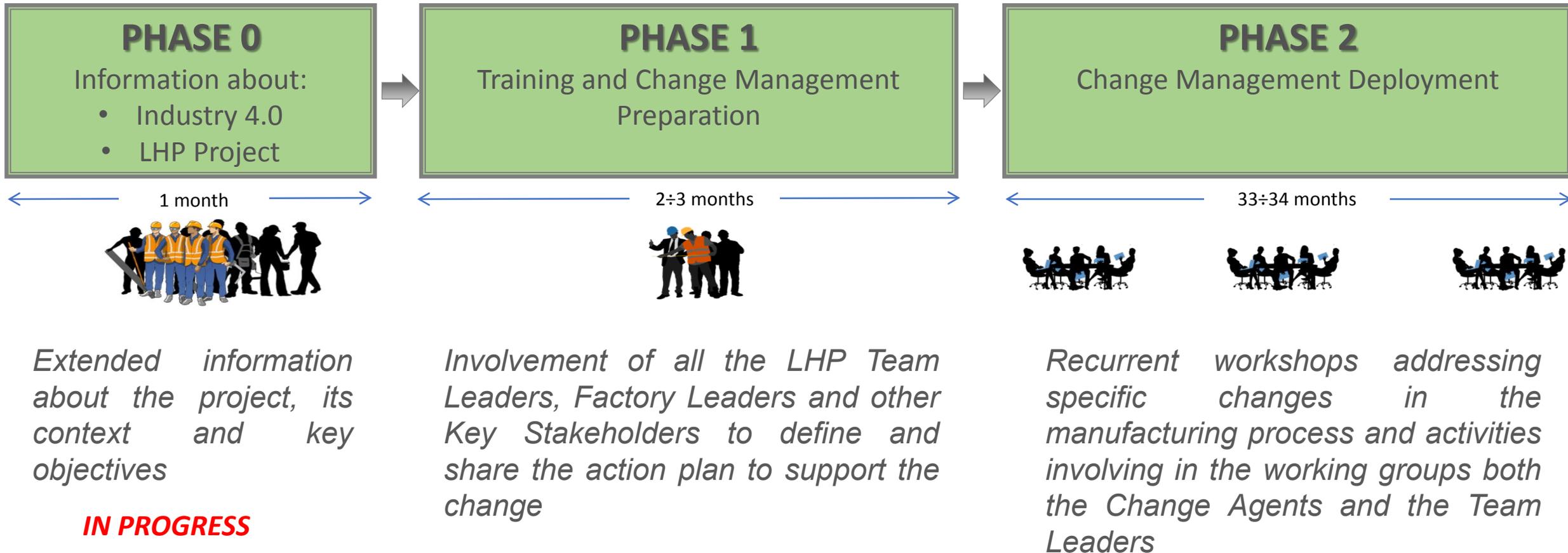


# Lighthouse Plant Project – Change Management

## CHANGE MANAGEMENT PLAN

**TARGET → 1.000  
RESOURCES**

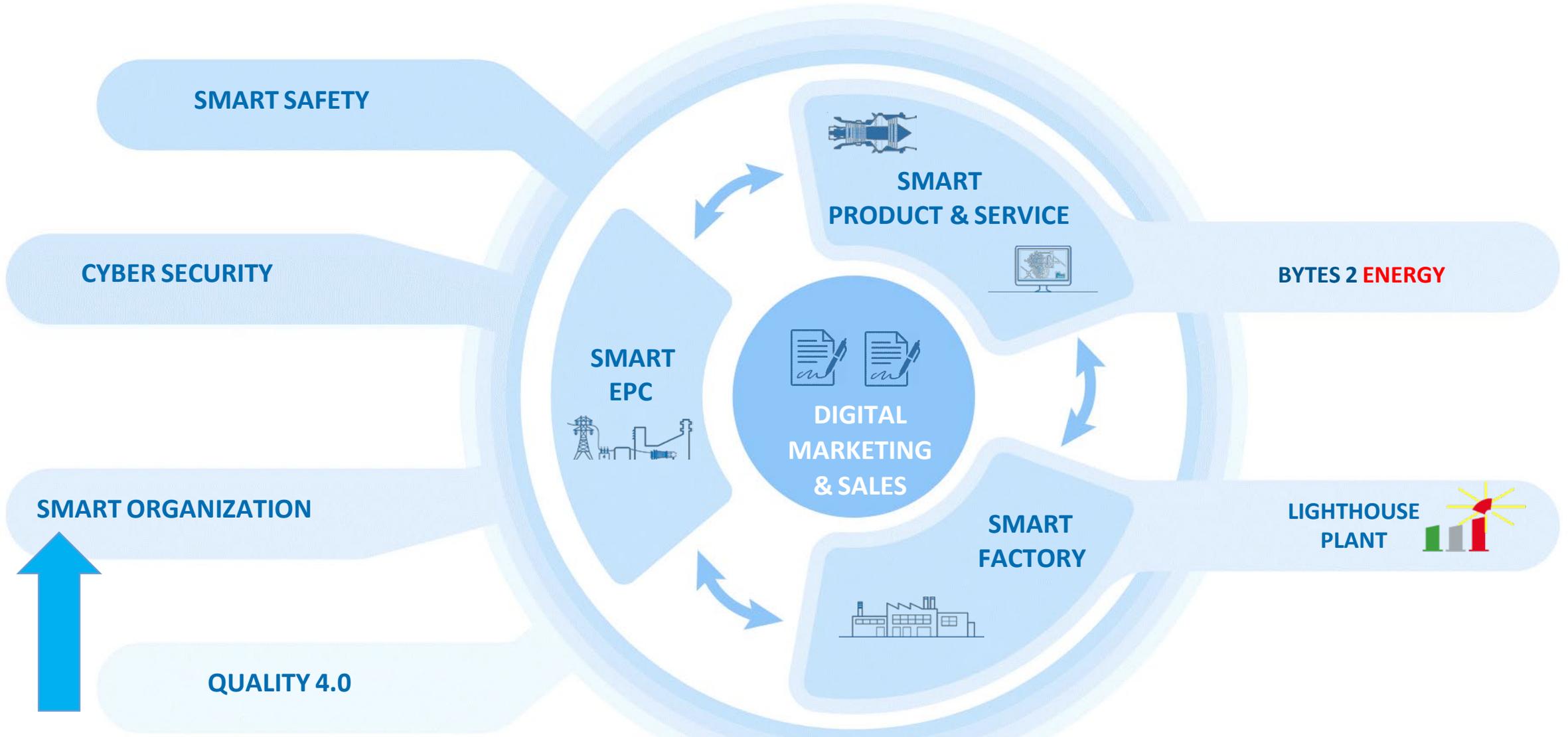
Change Management Plan based on 3 phases



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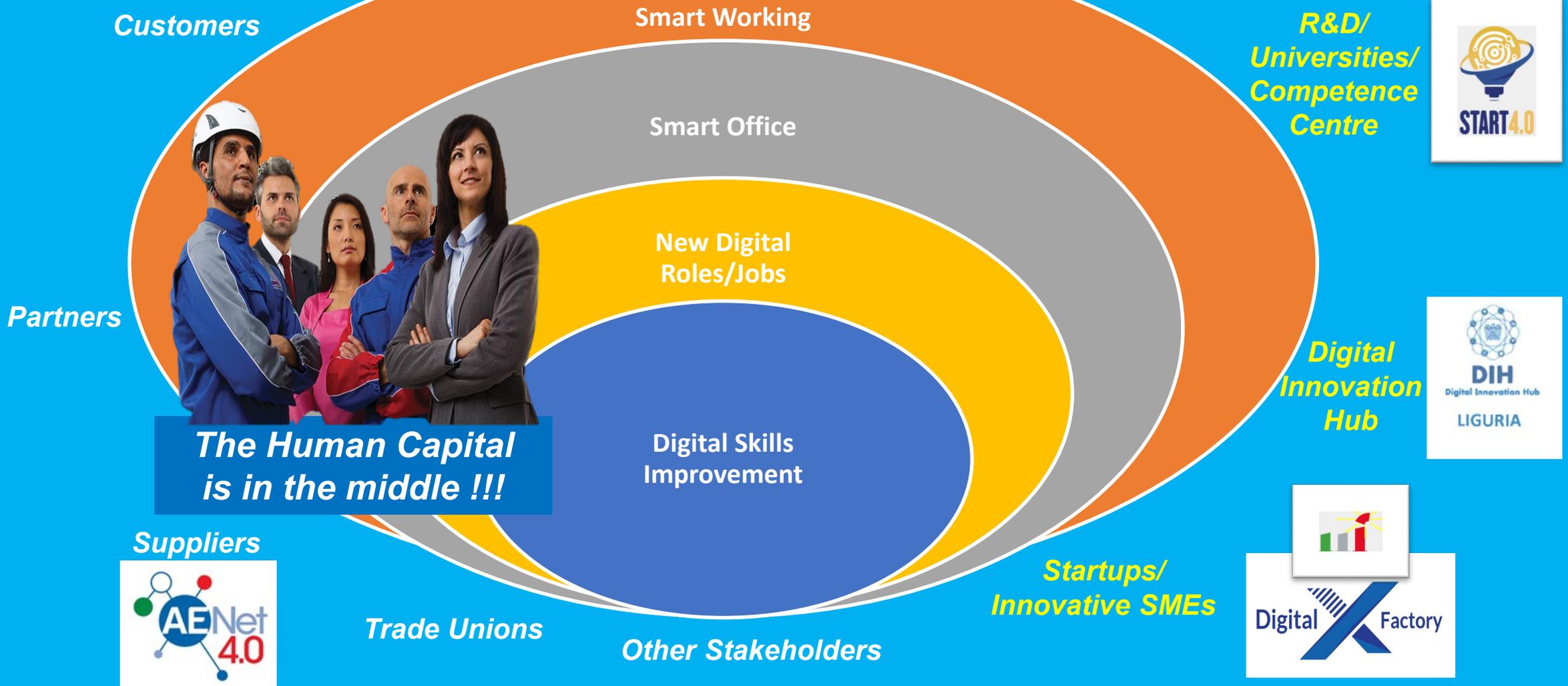
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# ANSALDO ENERGIA Digital Transformation Roadmap



# ANSALDO ENERGIA Digital Transformation

## DIGITAL ECO-SYSTEM





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**Q&A**

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