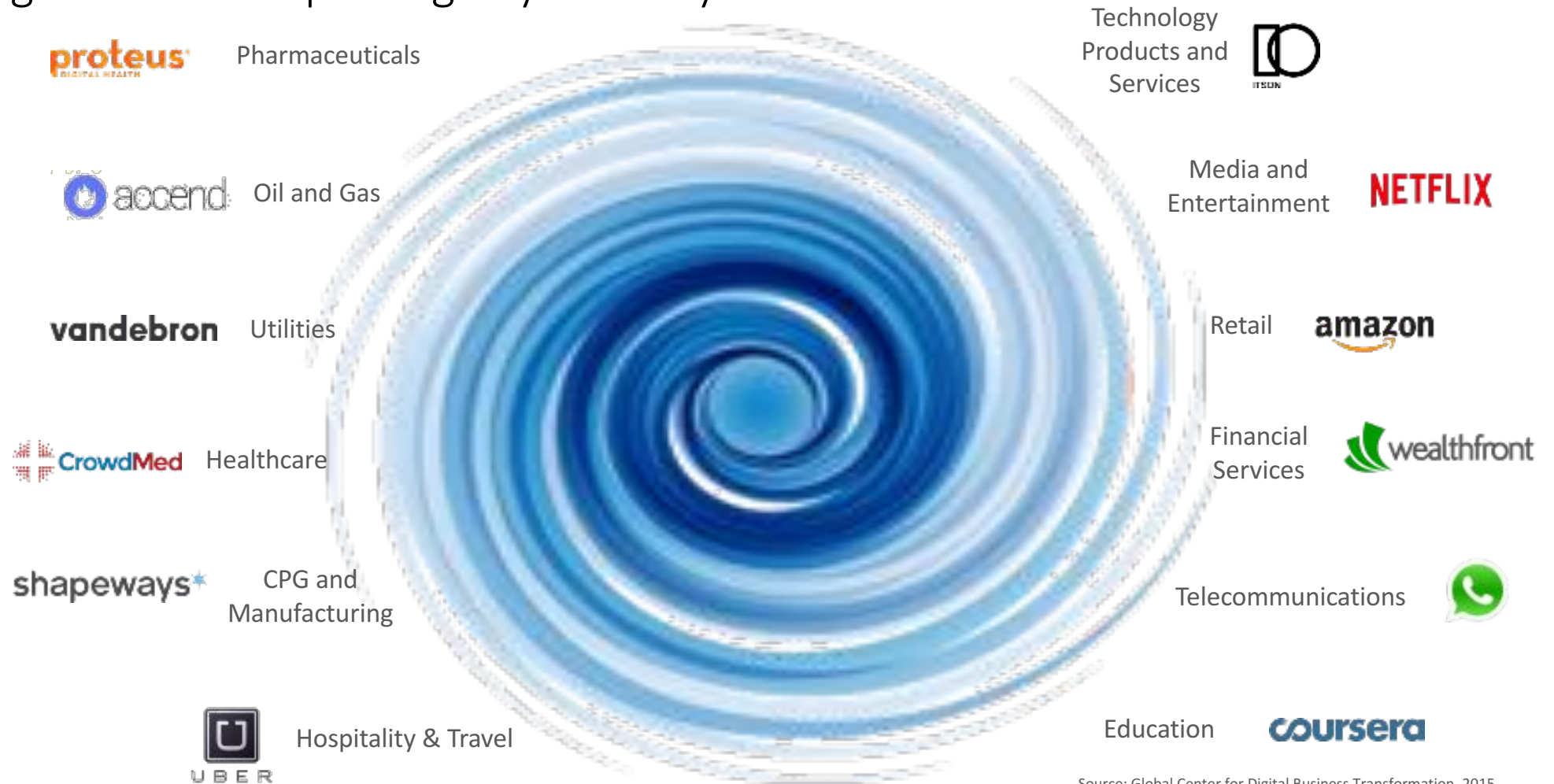# Industry4.0 / Smart Manufacturing
Digitization of Manufacturing

Masi Matteo

Sales Specialist – Industry 4.0

Digital Vortex impacting any industry

proteus — Pharmaceuticals

accend — Oil and Gas

vandebron — Utilities

CrowdMed — Healthcare

shapeways — CPG and Manufacturing

UBER — Hospitality & Travel

Technology Products and Services — ITSON

Media and Entertainment — NETFLIX

Retail — amazon

Financial Services — wealthfront

Telecommunications

Education — coursera

Source: Global Center for Digital Business Transformation, 2015

Industry 4.0 =
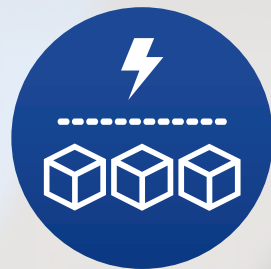# Digital Transformation of Manufacturing

The use of technology
to radically improve operations.

Industry4.0 - A New Industrial Revolution
Digitizing Manufacturing to Capture the Value of the Internet of Everything

Technology Progress

Smart Devices

18th Century
Steam

20th Century
Mass Production

70's
Robots

Today
Digitization + Smart Automation

It's all about combining technology to define new innovative solutions

Global Manufacturing Challenges Ahead...

- Increasing Complexity
- Increasing Cost Pressure
- Diverging Markets
- Production Flexibility
- Value Chain Insight
- Product Servitisation
- Changing Customer Behaviors
- Competitive Landscape
- Technology Advances
- Innovations & Insights

Digital Manufacturing Driving Business Outcomes

Reduced Downtime	**Reduction in Defects**	**New Product Introduction**	**OEE Improvement**	**Improved Inventory**	**Reduction in Energy Use**
48%	49%	23%	16%	35%	18%
Unplanned downtime down	Defect rate down	New product introduction cycle time reduced	Average OEE improved	Inventory turns increased	Annual energy cost down

Industry4.0: The power of combination
Government plan

Investimenti innovativi: Benefici concreti per le imprese

Iperammortamento

Esempio:
Investimento in beni
I4.0 per 1.000.000 €

OGGI

Superammortamento: **140%** del valore ammortizzabile
→ riduzione tasse pagate in 5 anni pari a **96.000€**

DOMANI

Iperammortamento: **250%** del valore ammortizzabile beni I4.0
→ riduzione delle tasse pagate in 5 anni pari a **360.000€**

+275%

Credito d'imposta alla ricerca

Esempio:
Spesa incrementale
per 1.000.000 €
- 800.000 € interna
- 200.000 € esterna

OGGI

Credito d'imposta **300.000 €**
(In caso di spesa maggiore limite massimo a **5.000.000 €**)

DOMANI

Credito d'imposta **500.000 €**
(In caso di spesa maggiore limite massimo a **20.000.000 €**)

fino a
+300%

Finanza a supporto di I4.0, VC e start-up

Esempio:
Investimento per
1.000.000 € in start-up innovative

OGGI

Detrazione fiscale: 19%
Investimento massimo per contribuente: 0,5 €M
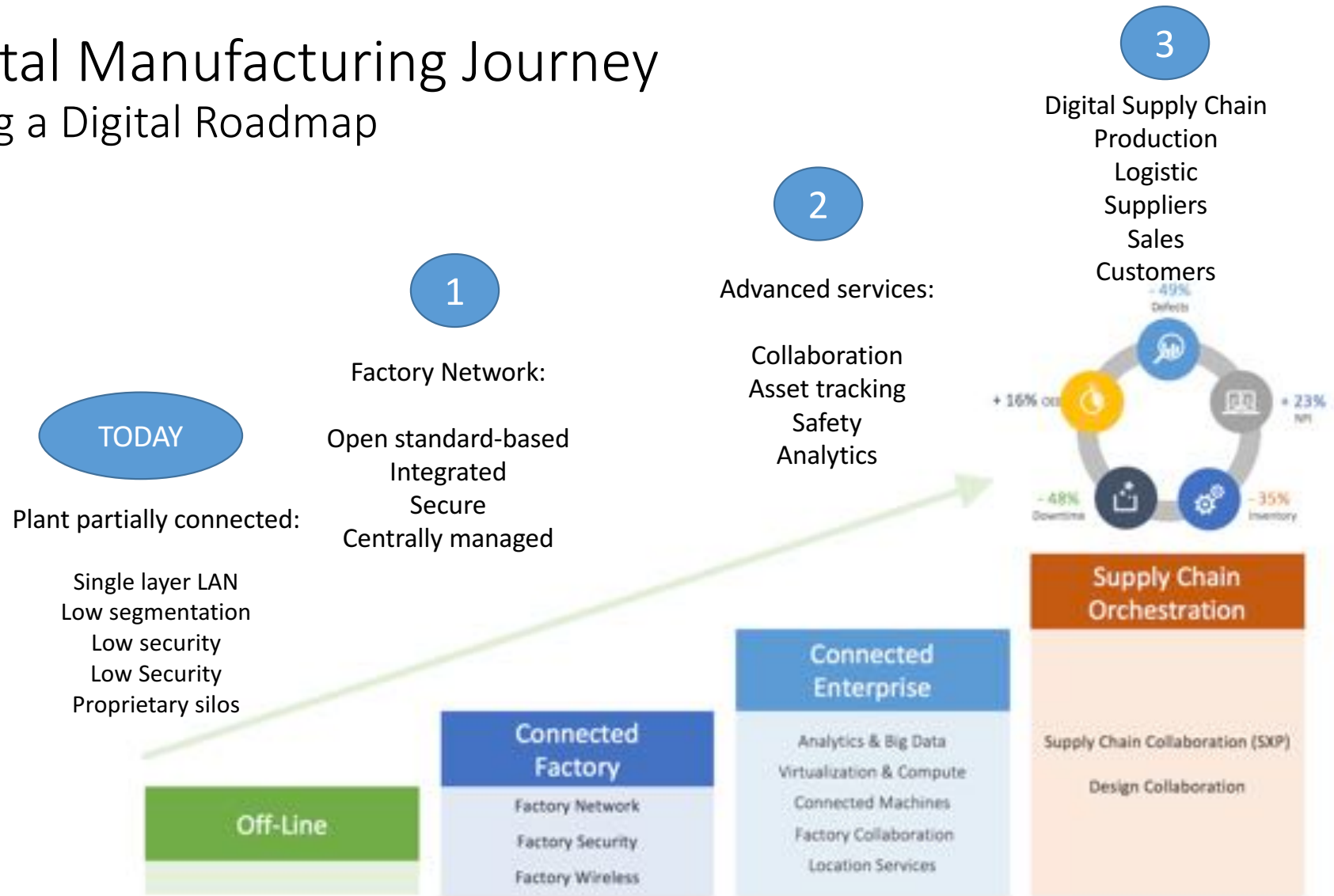→ Detrazione fiscale pari a **95.000 €/ anno**

DOMANI

Detrazione fiscale: 30%
Investimento massimo per contribuente: 1,0 €M
→ Detrazione fiscale pari a **300.000 € / anno**

+215%

Fonte: MISE

14

Digital Manufacturing Journey
Along a Digital Roadmap

TODAY

Plant partially connected:

Single layer LAN
Low segmentation
Low security
Low Security
Proprietary silos

1

Factory Network:

Open standard-based
Integrated
Secure
Centrally managed

2

Advanced services:

Collaboration
Asset tracking
Safety
Analytics

3

Digital Supply Chain
Production
Logistic
Suppliers
Sales
Customers

- 49% Defects
+ 16% on
+ 23% NPI
- 48% Downtime
- 35% Inventory

Supply Chain Orchestration

Supply Chain Collaboration (SXP)

Design Collaboration

Connected Enterprise

Analytics & Big Data
Virtualization & Compute
Connected Machines
Factory Collaboration
Location Services

Connected Factory

Factory Network
Factory Security
Factory Wireless

Off-Line

Manufacturing Digitization Across The Value Chain

Connected Assets

Optimize Business Operations · Manage Risk · Personalize Customer Experiences

Insights into asset performance, usage patterns, and utilization

Improve response times by knowing the location / condition of critical assets

Connected R&D

Enable Workforce Innovation · Personalize Customer Experiences

Connected products providing innovate insights

Global, Virtual, 3D, Collaborative

Connected Factory

Optimize Business Operations · Manage Risk

Plant-floor platform providing converged connectivity

Advanced capabilities to streamline process

Supply Chain Security & Visibility

Manage Risk · Optimize Business Operations

Visibility enabling informed and fast decision making

Security to enable traceability and confidence

Connected Customer

Personalize Customer Experiences · Enable Workforce Innovation

Intelligent customer care through connected products

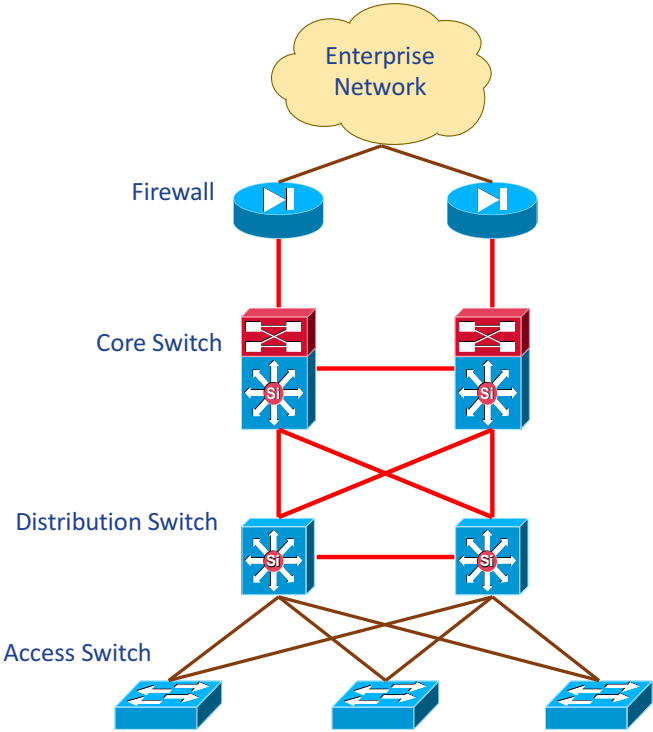Empowered sales to reach the right customer at right time

CISCO

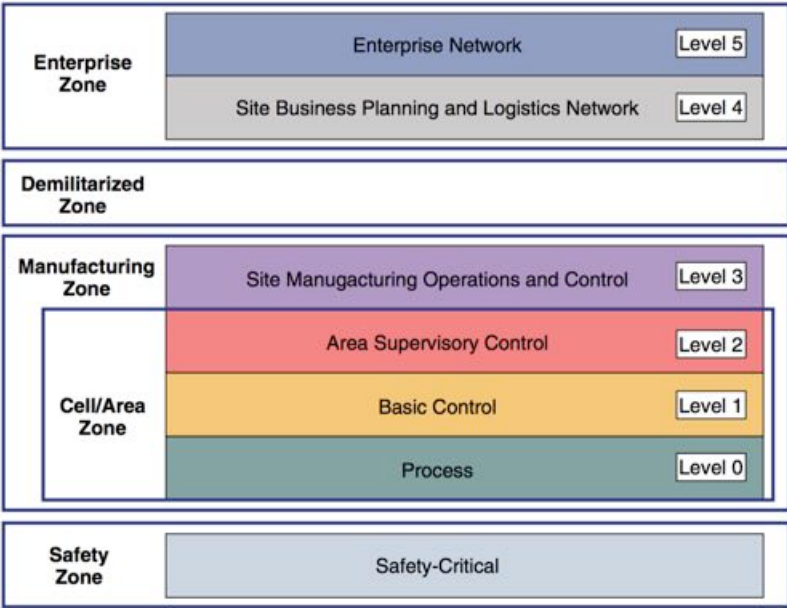# Cisco to create the ecosystem to drive the roadmap

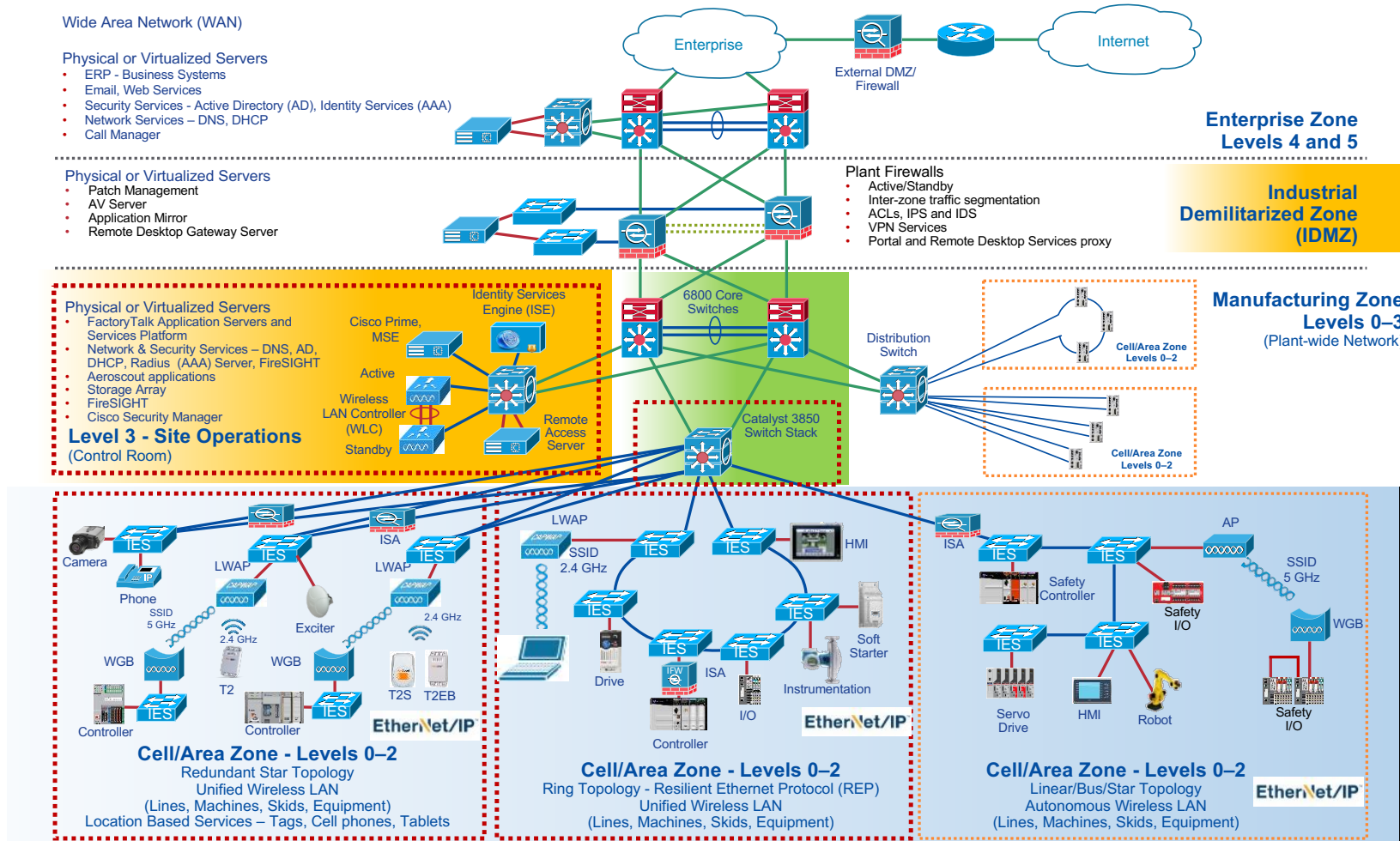# Converged Plantwide Ethernet Architecture

Enterprise Network reference model

IACS (Industrial Automation and Control Systems) reference model
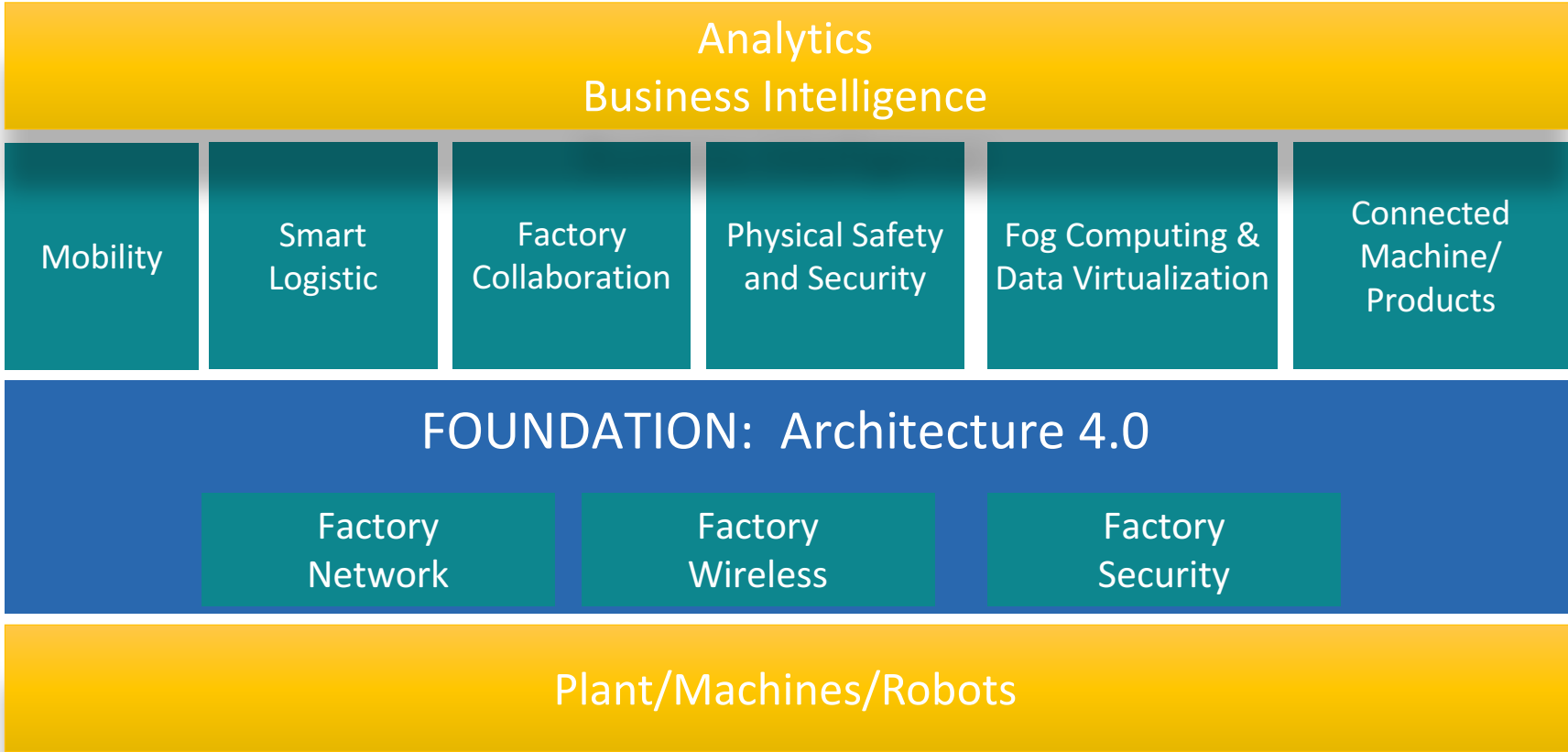
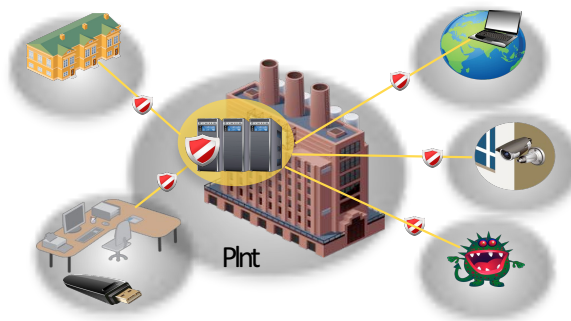# Converged Plantwide Ethernet Architecture (CPwE)

Industry4.0 Infrastructure and Solutions

Analytics Business Intelligence					
Mobility	Smart Logistic	Factory Collaboration	Physical Safety and Security	Fog Computing & Data Virtualization	Connected Machine/ Products

FOUNDATION: Architecture 4.0

Factory Network	Factory Wireless	Factory Security

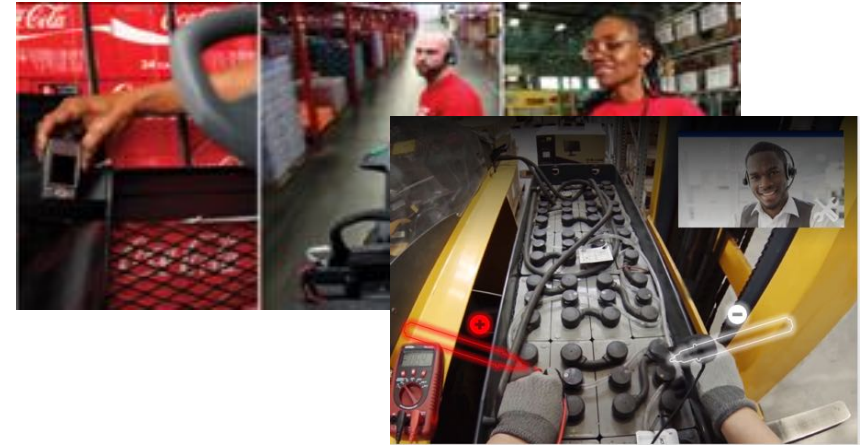**Plant/Machines/Robots**

Factory 4.0

Security 4.0

Mobility & Collaboration 4.0

Assett 4.0

People 4.0

Safety &
Security

Virtualization 4.0

Connected Machines

Connected Products

Architecture 4.0 – Factory Network
Foundation between Automation Layer and Enterprise Network

- 1 Network
    - Open, Standard-based, Secure, Scalable
- Integrates Manufacturing Systems + Business networks
- Enables real time visibility to business applications
- Reduce downtime
- Improved OEE and productivity
- Increase safety

Case history

Security 4.0 / Factory Security

- Plant safety, availability, integrity, intellectual property defense

- Business continuity

- Quick crisis management and response

- Reduce risk of inadvertent plant downtime

- Implement new business models such as remote maintenance and remote collaboration

- Improved productivity with Any-time secure and encrypted access to the Industrial Zone for Employees, Contractors and Vendors

- Zone based and Granular security policies based on plant roles, device, location, and time
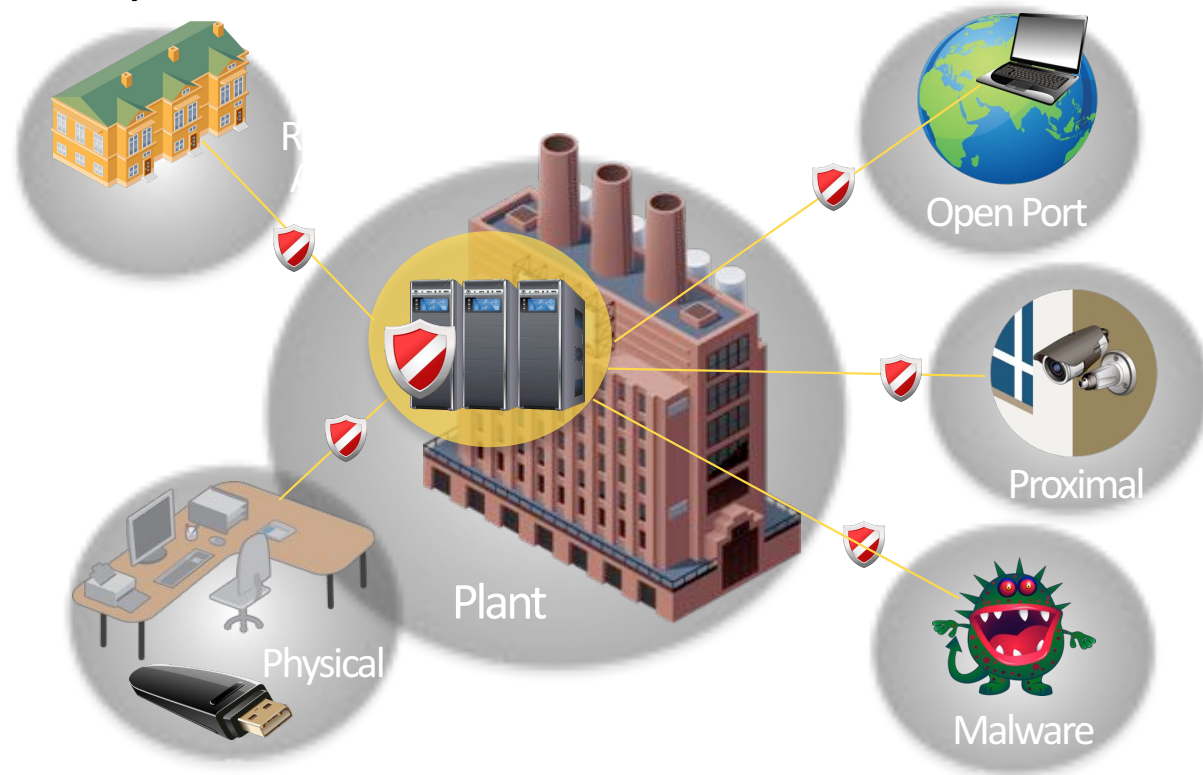
Mobility 4.0

- Faster Assembly Line, Material Flow Efficiency

- Enable BYOD/Mobile workforce productivity

- One network for Barcode readers, VoIP and VoIP picking, Data, Video, Collaboration

- Locate people in case of emergency to Improve Safety, Avoided incident management costs and penalties

- Physical Access Security, Movement of contractors and visitors

- Locate technicians based on skills

- Integrated Maintenance and Improved

Case history SUB-ZERO
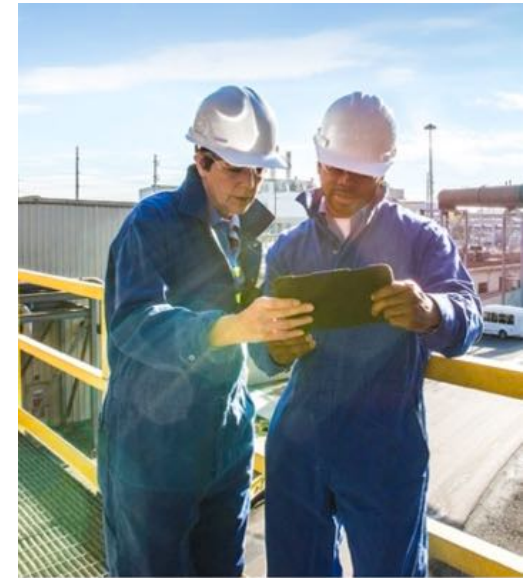
Safety & Security 4.0
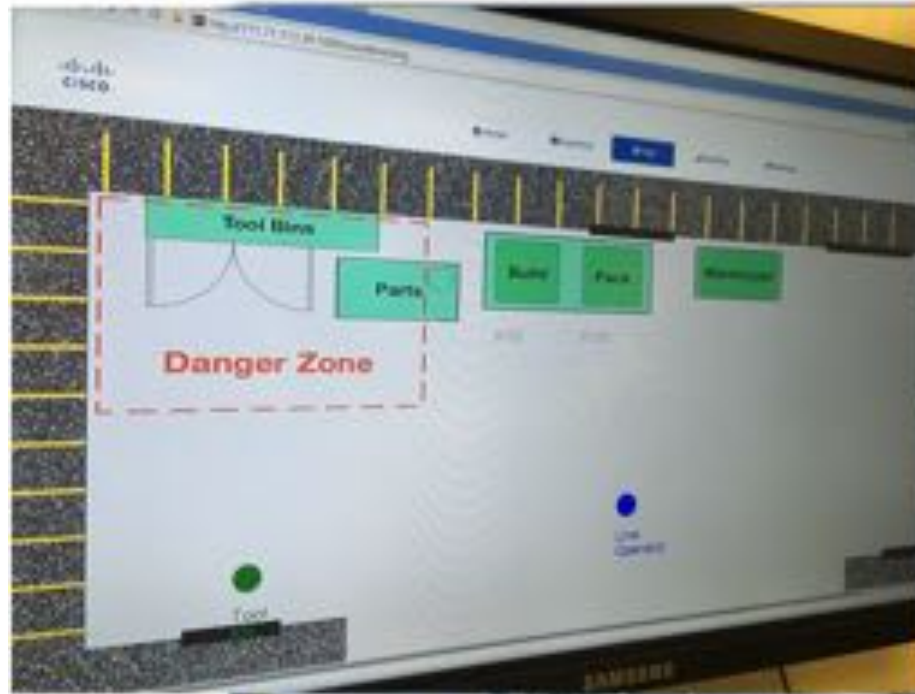
Asset 4.0

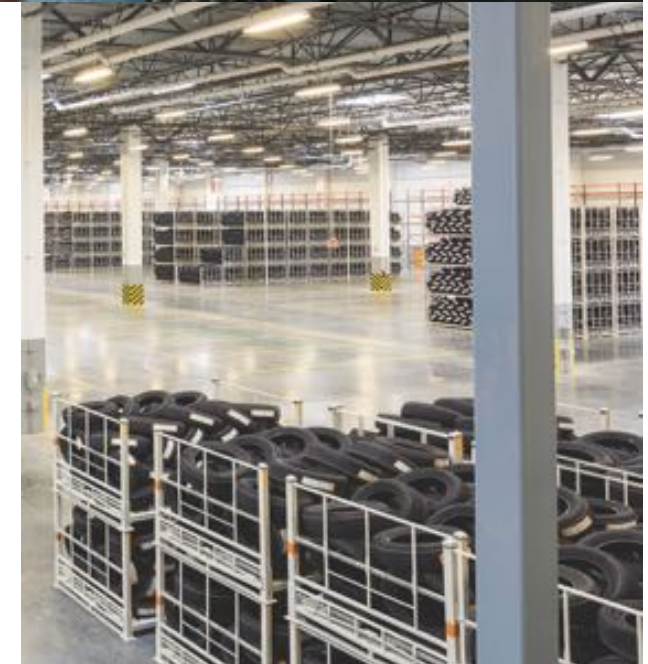- Real time Equipment and Asset visibility, location, condition

- Track supplies in transit

- Inventory accuracy

- AGV control

- Improved equipment utilization

- Real time push notification

- Correlate location of asset and operator to minimize down time

Case history **Continental**

Collaboration 4.0
Real-time location-based profile-based Communication

- Workforce Management to Improve Safety and Physical Access Security

- Locate and contact nearest people with specific skills

- Voice commands for pickup

- Real-time push notification

- Real-time dialogue with the machine or Remote expert for Maintenance
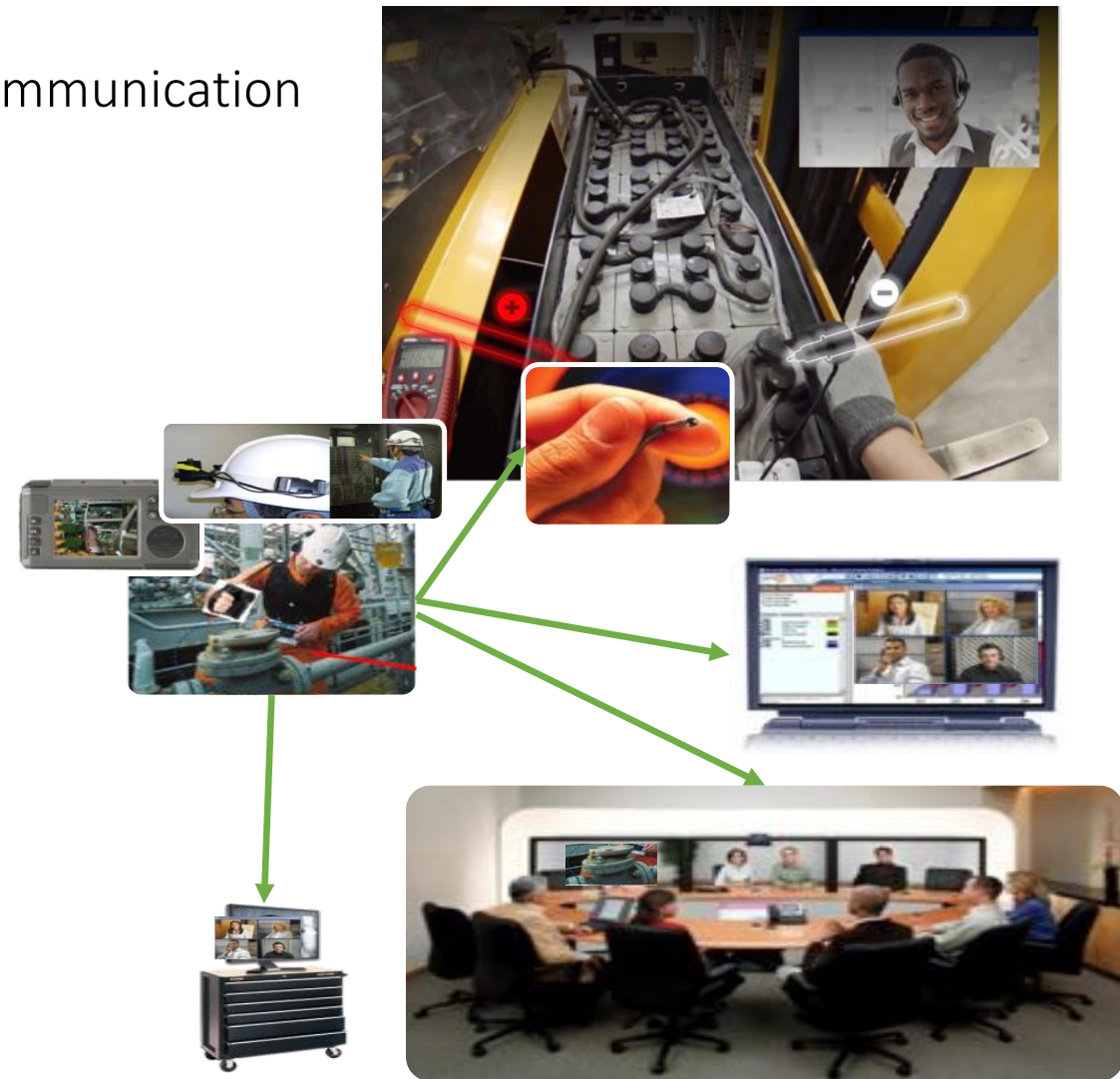
Case history

Fog Computing & Data Virtualization 4.0
to enable Edge Analytics

- Enables monitoring, analyzing and reporting, all on a single platform
- Support analytics for IoT environments, handles massive volumes and high velocity of data, enabling analytics at the edge
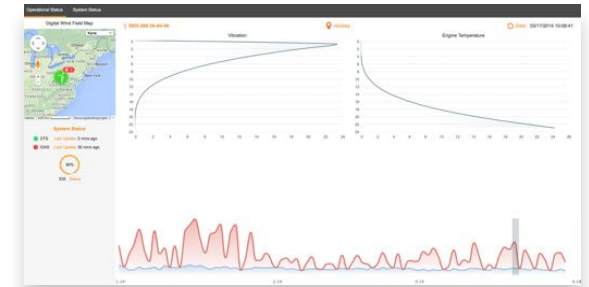
Analyze Data in the 'Right' Place by Distributing Analytics from Cloud to Edge
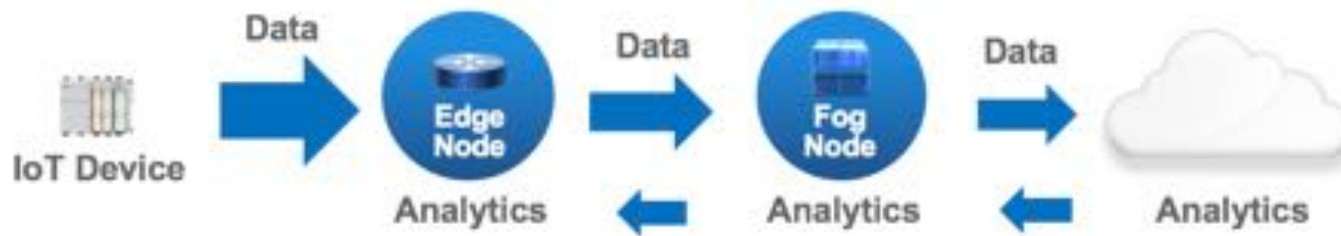
Connected Machine / Connected Products

Business model shift from Product to Services

- New revenue stream thanks to new services (predictive maintenance, zero downtime, machine running, Data Analytics, remote support)
- Machine-As-A-Service
- Time to market, Innovation, quality assurance
- Real-time inventory

Retrofit
Creating Value for Zero Defects Factories

Industrial Asset → **End Point Connectivity** → **Industrial Networking** → **Machine Learning**

CISCO

End Point Connectivity
- Small Form Factor WiFi based End Node with a low cost of installation and easy to manage
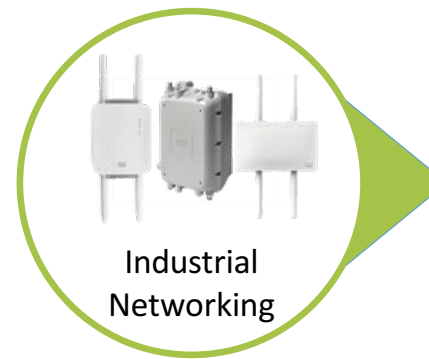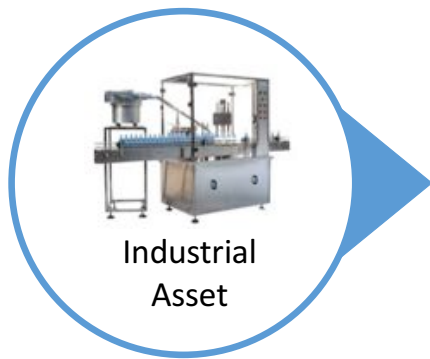- Connect securely to the network every industrial machines and sensors via physical ports (RS485, RS 232) and standard industrial protocols, such as ModBus, CANBus, OPC-UA
- Pre built configuration for a faster and easier integration to the Analytics Platform

Industrial Networking
- Factory Network is the Foundation, the essential first step of the digital journey, between automation layer and the Enterprise a connectivity
- Connects manufacturing systems and integrates factory floor with business networks
- Enables real time visibility to business applications
- Reduce risk of inadvertent plant downtime and risk intellectual property loss

Machine Learning
- Advanced Machine Learning Platform able to self-learn the behaviors of the machines to anticipate increasingly earlier possible losses of processes and quality
- Specific pre-built algorithms and data models to address faster the 6 big losses of the Overall Equipment Effectives (OEE)
- Deployed in different operational models : Cloud, On Premise, Hybrid

la marzocco
handmade in florence

la marzocco

linea pb

LaMarzocco 12:31
6.8 0 0 0.0

Solenoid Valve   Solid State Relay   Solenoid Valve   Solid State Relay   Solenoid Valve   Solid State Relay   Solenoid Valve

Flow Meter   Temperature   Flow Meter   Temperature   Flow Meter   Temperature   Solid State Relay
0   98.40°C   0   188.00°C   0   188.00°

Load Cell   Load Cell   Load Cell   Temperature
6.80   0.00   0.00   124.20°C

history

06.10.2016 – 13.10.2016   Coffee Boiler 1 Temperature   Flow Meter 1

100,00°
99,50°
99,00°
98,50°
98,00°
97,50°
97,00°
96,50°
96,00°
95,50°
95,00°

Località la Torre, 16, 50032 Scarperia FI, Italy

Human- Machine Interaction

Predictive Maintenance at work

Analytics

Data Storage

Data Collector

Data analysis detects failing component from historical data and notifies customer.
-Action Required-

❖ Replacement component automatically sent to the customer

Alert message sent to the customer and machine producer

Component changed during weekend

Predictive Maintenance at work

PLANT

Zone	Control Network	DMZ	Private/Public cloud

Internet

Cell — Switch — PLC — Cell — Switch

Secure Portal

Key Functions

Robot Switch – Managed
Open Cell Architecture – Non blocking
Connected routing – Analytics Access
Security
Identity - Enforcement through the robot and Zone switch
Robot participates in customer IT security framework

Key Functions

Data Collection
Data Buffering
Application Host
Virtual Compute
Monitoring
Data Integrity
Authorization
Deep Packet Inspect.

Key Functions

Confidentiality
Encryption
VPN
Connectivity to Cloud
Secure Internet
Connectivity

Key Functions

Business Intelligence
Analytics
Reporting
Monitoring
Security
Data Integrity

Why Cisco?

**Strong Ecosystem
Technology Partners
System Integrators
Startup**

**Validated Designs
Proven and tested architectures to reduce deployment risk, speed time to market and reduce time for PoC**

**One Unified Converged IP Network
Open standards vs. proprietary
Reduced TCO, simplified management**

End-to-end network that enables more than Just connectivity
**Computing from Edge to Cloud
Supports Big Data and Analytics
Centralized management of everything
Security across entire platform
Built for the future and flexible growth**