



Digital Manufacturing

From Traditional Factory to Connected Factory

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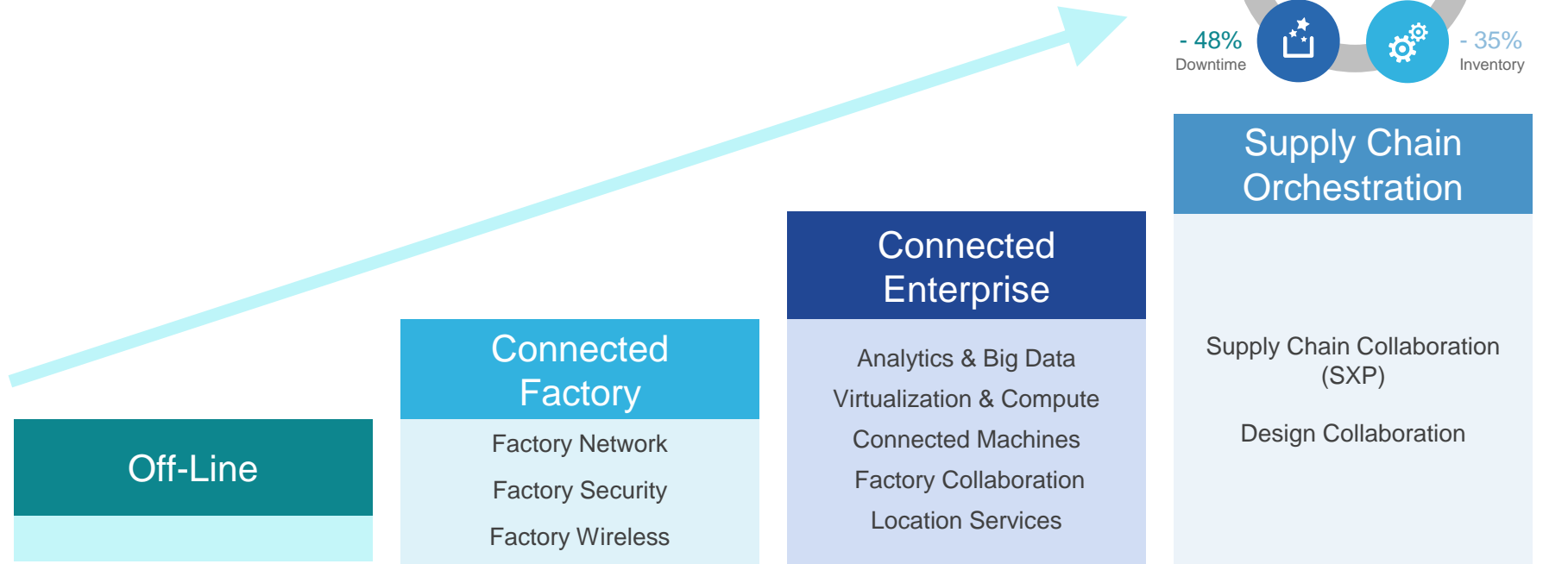
Cisco Systems – Manager Connected Industry & Energy Group - IoT Manufacturing

“Fabbrica Futuro” – Bologna, 14 March 2017

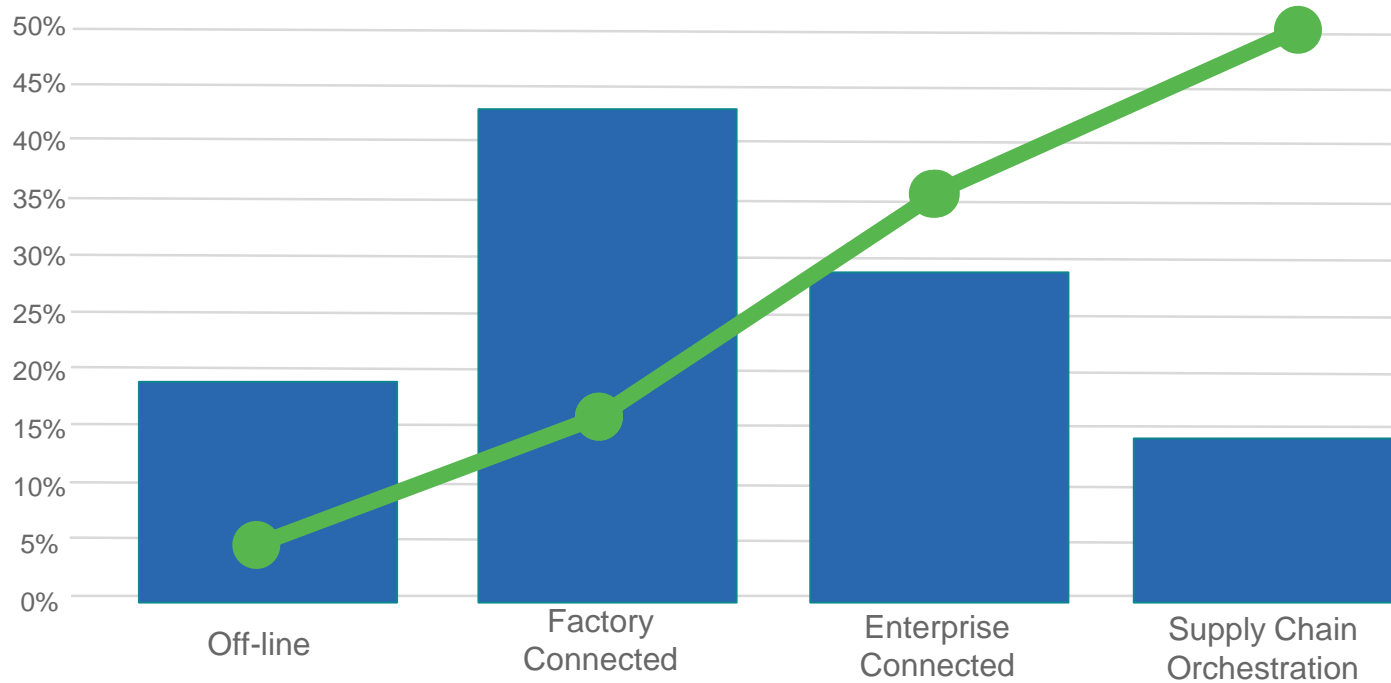


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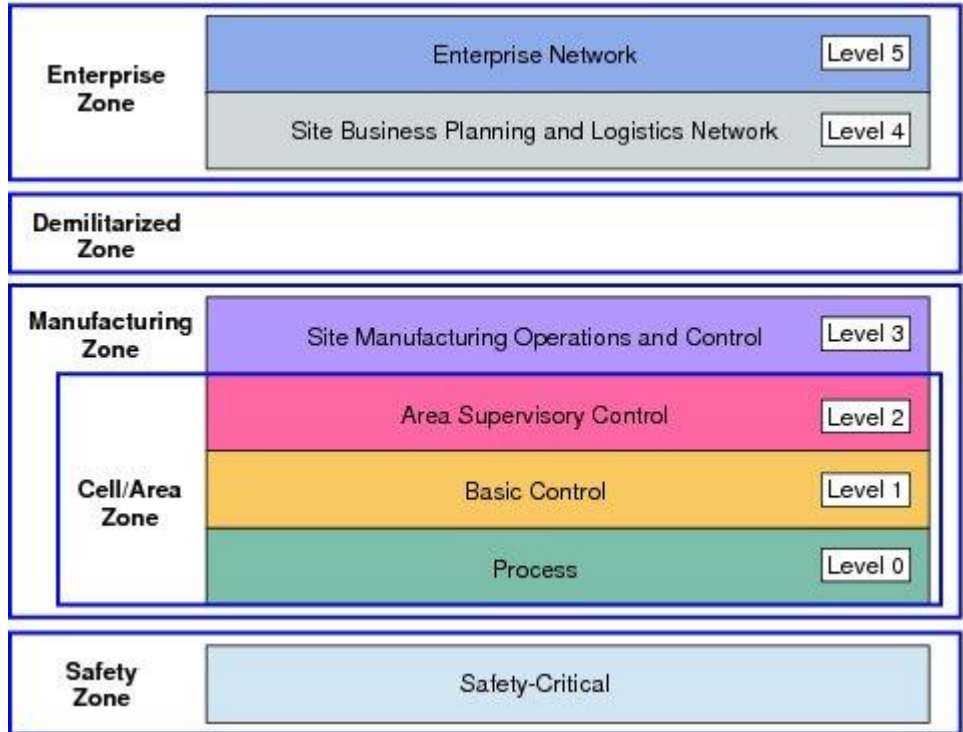
Digital Manufacturing Journey



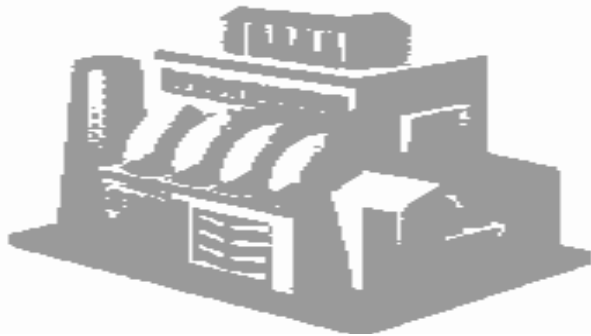
Where Are You Today? Where in 2020?



The Traditional Factory – The Purdue Model

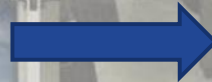


Connected Factory Approach



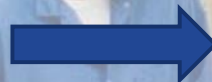
TRADITIONAL FACTORY

- **Separate Enterprise & Factory Networks**
- **Manufacturing Processes not Supported by IT Systems**
- **Proprietary Platforms**



CONNECTED FACTORY

- **Advanced Automation Through Improved Security & Data Virtualization**
- **Re-engineered Manufacturing Processes Utilizing Industrial Location & Collaboration**
- **Connected Supply Chain**



Connected Factory Architecture

Advanced Automation

Industrial Location

Unified Collaboration

Advanced Automation

Industrial Location

Unified Collaboration

Cloud

Enterprise
(Levels 4-5)

Enterprise Network

Enterprise Applications

Asset Management Applications

Wi-Fi Network Applications

Collaboration Applications

Level 3.5
iDMZ

Automation Security

iDMZ Network

Wireless Security

Factory
(Level 3)

Factory Network

SCADA/MES Servers

Data Mgmt. Servers

Controllers

Access Points

Level 2.5
Fog

Distributed Applications

Fog Network

Floor
(Levels 0-2)

IE Switches

HMI

Controller

Drive

Distrib. I/O

Smart Phones

RFID Tags

Exciters

Video

Laptops

Phones

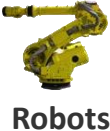
Collaboration

Video


cisco

Connected Factory Reference Model

Reduce Costs (Optimize Operations)		Increase Revenues (More Capabilities)		Meet Responsibilities (Environmental, Safety, Regulatory)	
Production Automation	Product Enhancement	Quality Control	Inventory Management	Workforce Enablement	Cost Management
Predictive Maintenance	Predictive Maintenance	Video Analytics	Supply Chain Management	Worker Training	Energy Management
Connect AGVs	Digital Thread/Twin			Employee Communications	
Secure Operations	Connect Equipment	Quality Analytics	Location Analytics		
Plant wide Security	Locate Equipment			Customer Communications	Time & Motion Studies
Wireless Automation	Secure Operations	Locate Test Equipment	Locate Equipment	Worker Safety	
Connecting the Unconnected	Device Security			Worker Mobility	
	Connecting the Unconnected	Video Expert	Locate Work in Process		Activity Based Costing
Applications & Analytics					
Advanced Automation		Industrial Location		Unified Collaboration	



Advanced Automation Approach: Security

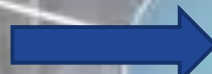
Advanced Automation

Industrial Location

Unified Collaboration

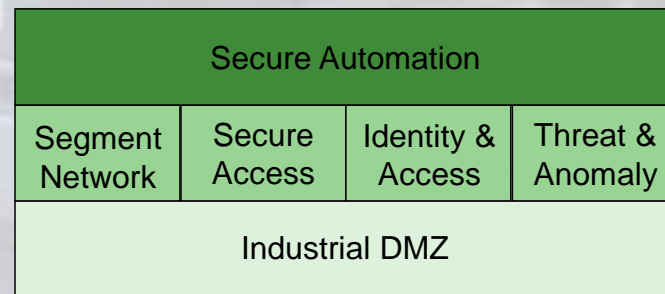
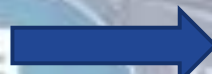


TRADITIONAL FACTORY



CONNECTED FACTORY

Basic Security



Advanced Automation Architecture

Advanced Automation

Industrial Location

Unified Collaboration



- **Challenge: Improve OEE**

- Improve automation network reliability & uptime
- Reduce costs through improved data visibility
- Protect the factory from external threats
- Drive Zero Down Time

- **IoT Solution: 166% RoI**

- Implemented the CPwE architecture
- Implement robust security (Level 3.5 iDMZ, etc) for factory & enterprise network separation.
- Data Virtualization (Level 2.5 Fog, etc) to support distributed applications for predictive maintenance



Enterprise (Levels 4-5)

Level 3.5
iDMZ



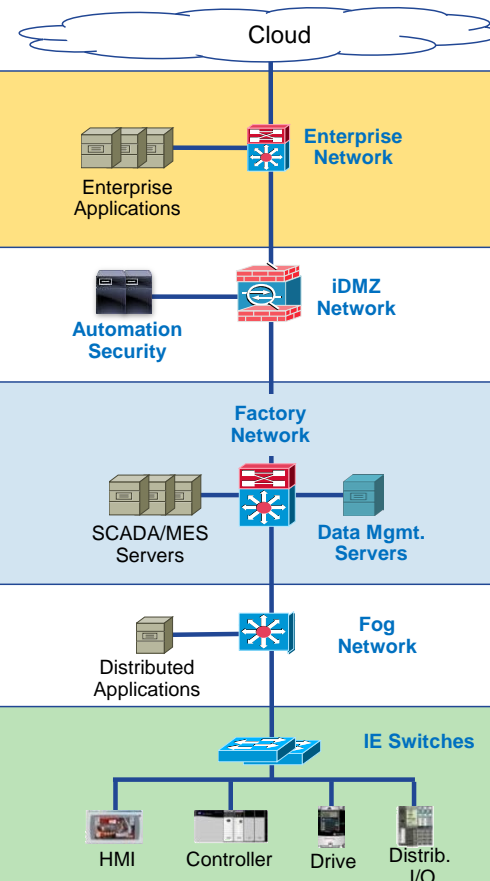
Factory (Level 3)

Level 2.5
Fog



Floor (Levels 0-2)

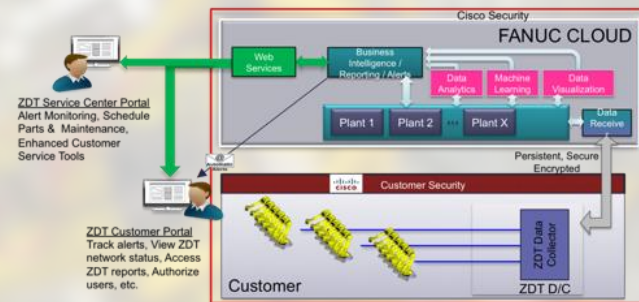
CONNECTED FACTORY



Big Data and Analytics at FANUC



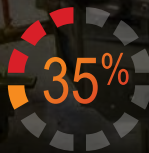
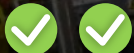
- Data Collection
- Edge Compute
- Predictive Analytics
- Proactive Part Replacement



FANUC

[Watch Video](#)

CELL 07



REPLACE
BEARINGS



TRADITIONAL FACTORY



CONNECTED FACTORY



Plant Floor Wireless

Enhanced Process

Material
Management

Asset
Management

People
Management

Plant Floor Wireless



- **Challenge: WIP Handling**

- Reduce scrap due to lost carriers & material handling inefficiencies
- Locate WIP anywhere on the plant floor
- Optimize labor utilization by reducing indirect labor
- Platform that can be extended to additional material/asset & people location use cases

- **IoT Solution: 20% Loss Reduction**

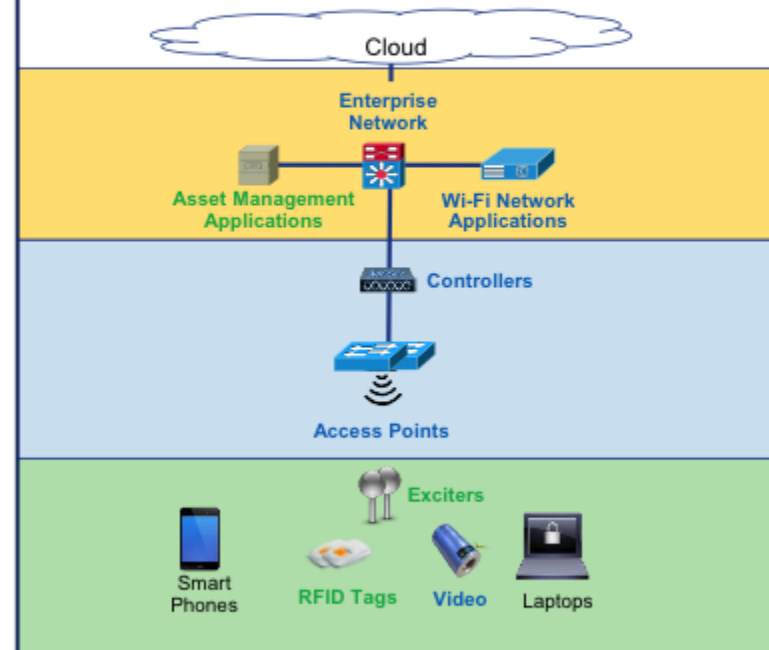
- High density Wi-Fi for location accuracy & industrial process support
- RTLS solution including a single pane of glass for business applications
- Location-based analytics

Enterprise (Levels 4-5)

Factory (Level 3)

Floor (Levels 0-2)

CONNECTED FACTORY



Factory Wireless at Continental Tire

Challenge



Long Tire Assembly Search Times by Operators
Increased Cycle Times, Decreased Labor
Optimization, and Noncompliance with
Production Schedules. High Scrap Rate
Associated with Lost Carriers.

Solution



Implement LBS Solution to Track All Carriers in
Real-time Using T2 Tags and Cisco Unified Wi-Fi
network

Allow Material Handlers/Truckers and Managers
to Search for Component by ID, Tread Number,
Material Code (FIFO)

Business Outcomes



Continuous Real-time Visibility Across Entire Plant



20% Reduction of Breaker Component Tire Loss

Increase in tire machine utilization ensuring
increased production and overall equipment
efficiency (OEE)



Continental 



TRADITIONAL FACTORY

Plant Floor Telephony



CONNECTED FACTORY

Process Integration

Voice & Data

Video

Wearables

Plant Floor Collaboration



- **Challenge: Workforce Efficiency**

- Implement High Performance Work Teams (HPWT) methods
- Real-time OEE visibility across the plant-floor
- Improve worker efficiency through plant-floor collaboration
- Utilize collaboration platform for customer visits

- **IoT Solution: 90% Labor Utilization**

- Collaboration platform that includes unified voice, video & messaging
- Multi-function digital displays to support plant operations & visits
- Integrate collaboration platform with

MRP & MES Systems

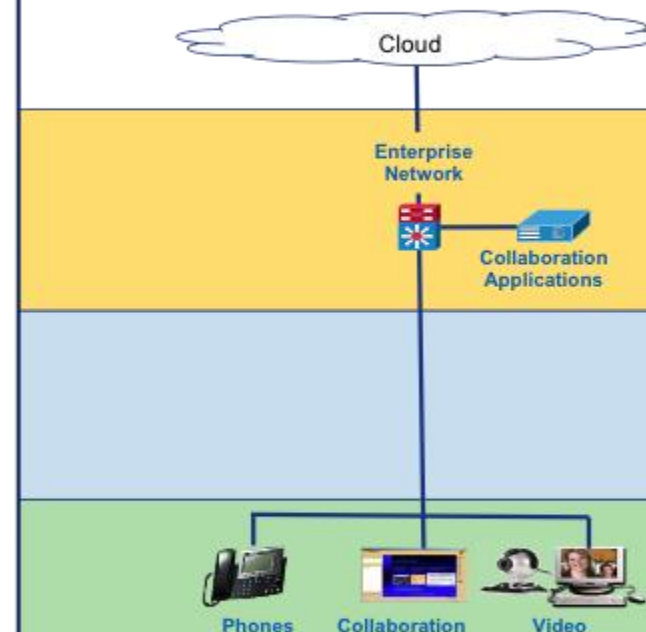


Enterprise
(Levels 4-5)

Factory
(Level 3)

Floor
(Levels 0-2)

CONNECTED FACTORY



Human Connectivity & The Future of Work



Connected



Secure



Flexible



Efficient

Thank you.

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