



# Manufacturing & the Internet of Things

## Two Worlds Coming Together

Senior Manager Connected Machines and Robots- Bryce Barnes

Sept 2016

# Agenda

A man in a dark suit and tie stands on a metal walkway or staircase, looking down at a tablet computer. The background shows a complex industrial structure with many metal beams and supports, possibly a factory or a large building under construction. The overall color scheme is blue and grey.

**Manufacturing is Changing**

**Two Worlds are Coming Together**

**Where are Machine Builders?**

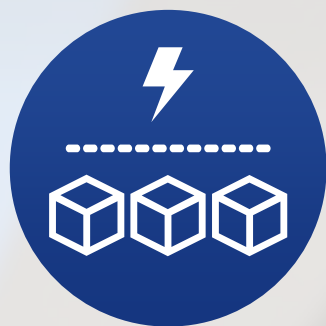
**What can we do together?**

# The Digital Revolution is a 4<sup>th</sup> Industrial Revolution

Digitizing Manufacturing to Capture the Value of the Internet of Everything



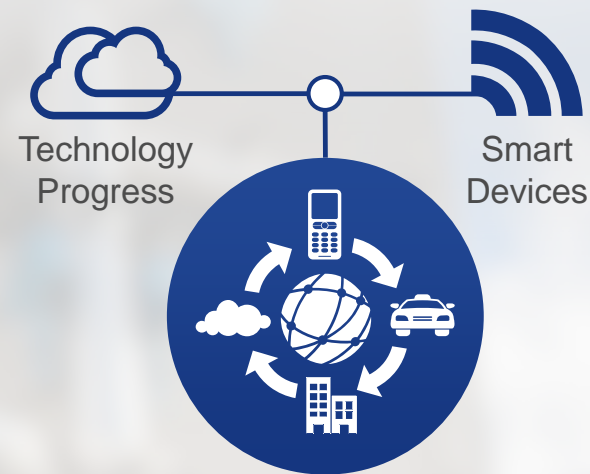
18<sup>th</sup> Century  
Steam



20<sup>th</sup> Century  
Mass Production



70's  
Robots



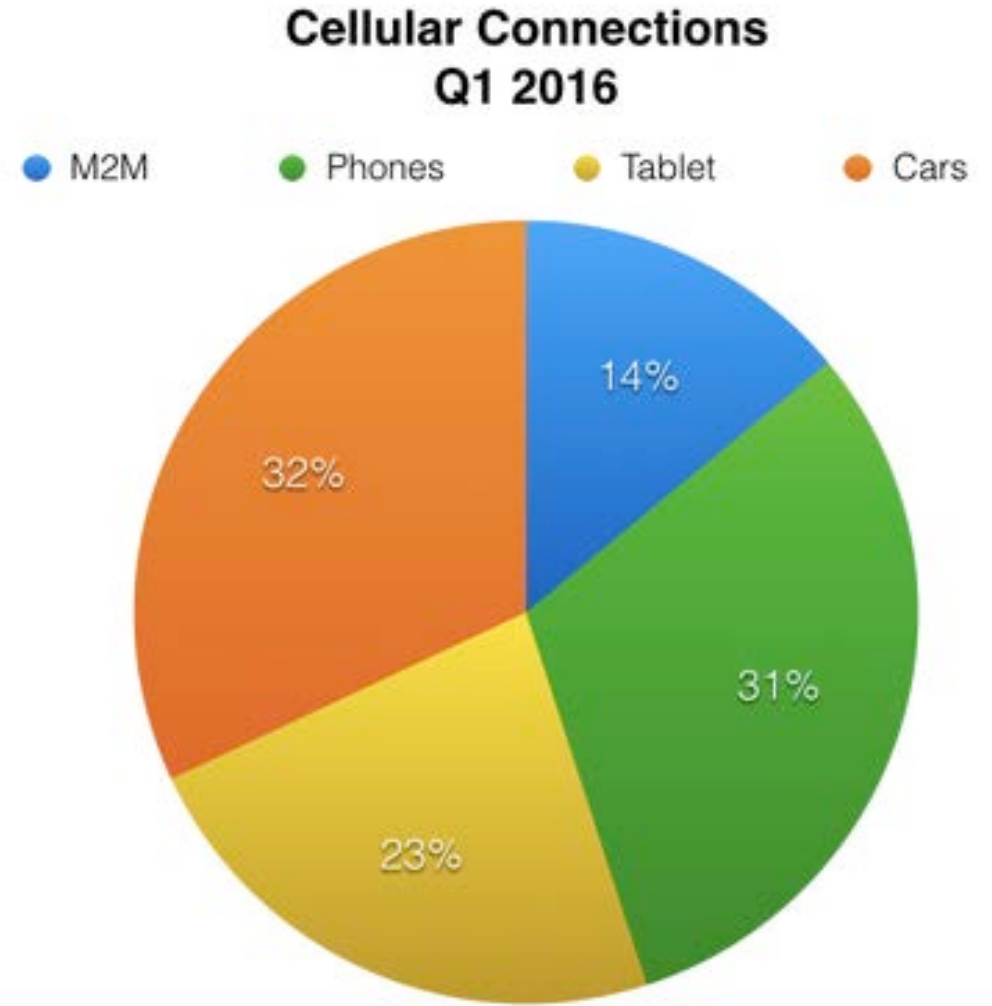
Today  
Digitization + Smart  
Automation

Digital Manufacturing Priority Investments #1 Analytics | #2 Connectivity | #3 Automation | #4 Mobility

Source: SCM World/Cisco "Smart Manufacturing & the Internet of Things 2015" survey of 418 Manufacturing Business Line Executives and Plant Managers across 17 vertical industries.

# IOT is Accelerating

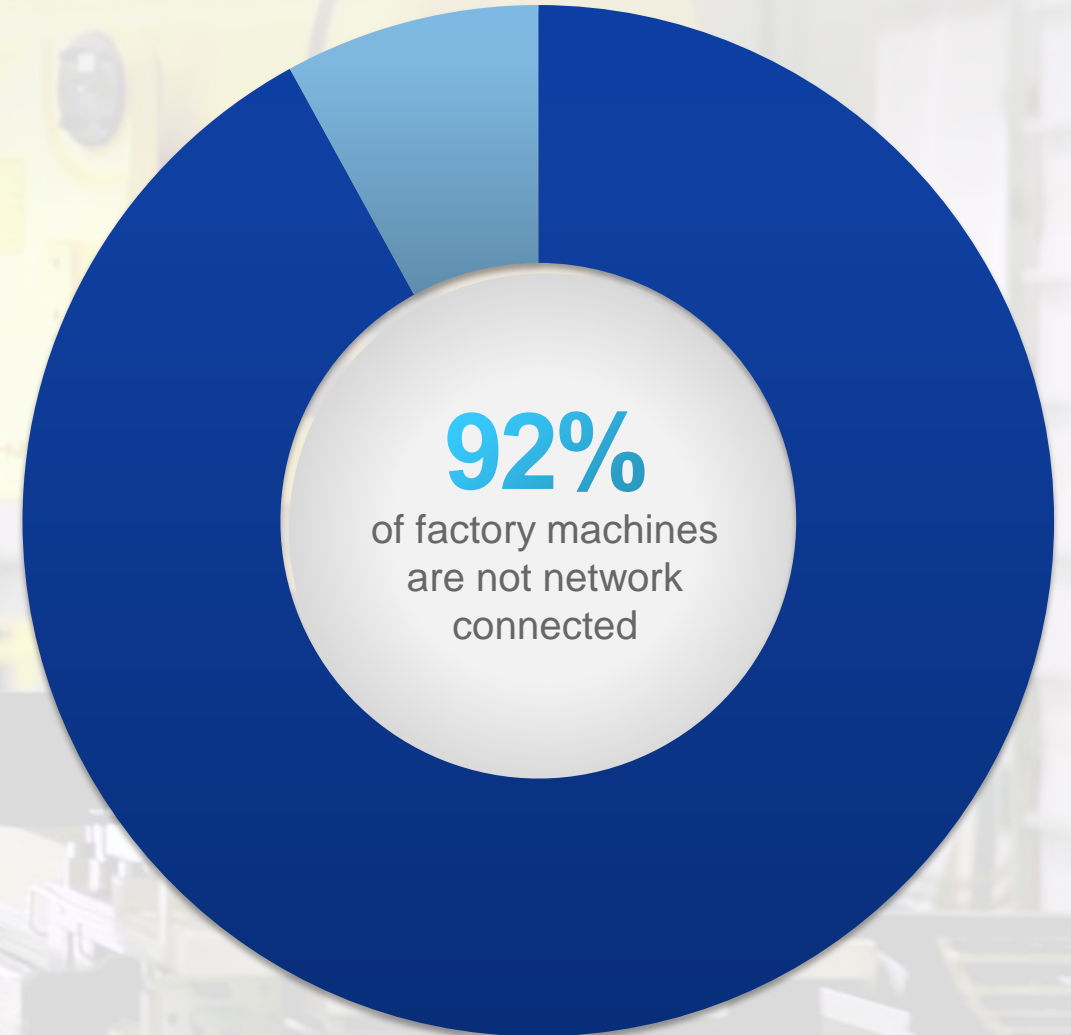
50% of all New Cellular Connections in the first Quarter of 2016 are M2M & Cars



# Connected Machines Represent Huge Opportunity

92% of Machines are not connected

64 Million Machines



# What is Driving IOT for Machine Tools?

IOT potential for the Machine industry is Enormous

## Value

Asset Utilization  
Is 60% for best in class  
The average operations  
Is way below this  
  
As well as....  
  
Job Costing  
Consumables  
Automation  
Visibility  
Process Optimization  
Machine Optimization

## Flexibility

How does the machine  
Integrate?  
  
Factory?  
Cell?  
  
Upstream  
Downstream  
  
Material  
Lifecycle  
Tooling  
  
Continuously

## Outcomes

Manufacturers are pushing  
the limits and driving new  
production models  
  
Quality  
  
Predictable Costs  
  
Loss Reduction  
  
Unplanned outage  
reduction

# What is Preventing IOT adoption for Machine Tools?

The Barriers to IOT connected Machines are real

## Fear

## Platform

## Business Model

Security

Manufacturers will resist  
100 Different IOT platforms  
In their factories

Digital Machine is a New  
Business Model

IT Policy

Control Policy

Machine Builders  
Tend to be proprietary

New Revenue that  
requires New Thinking

Risk

Life Cycle  
Orchestration  
Management

Services and the way  
we have always done it

Craft vs. Automation

Data Extraction

DIY

# Agenda

Two Worlds are coming Together





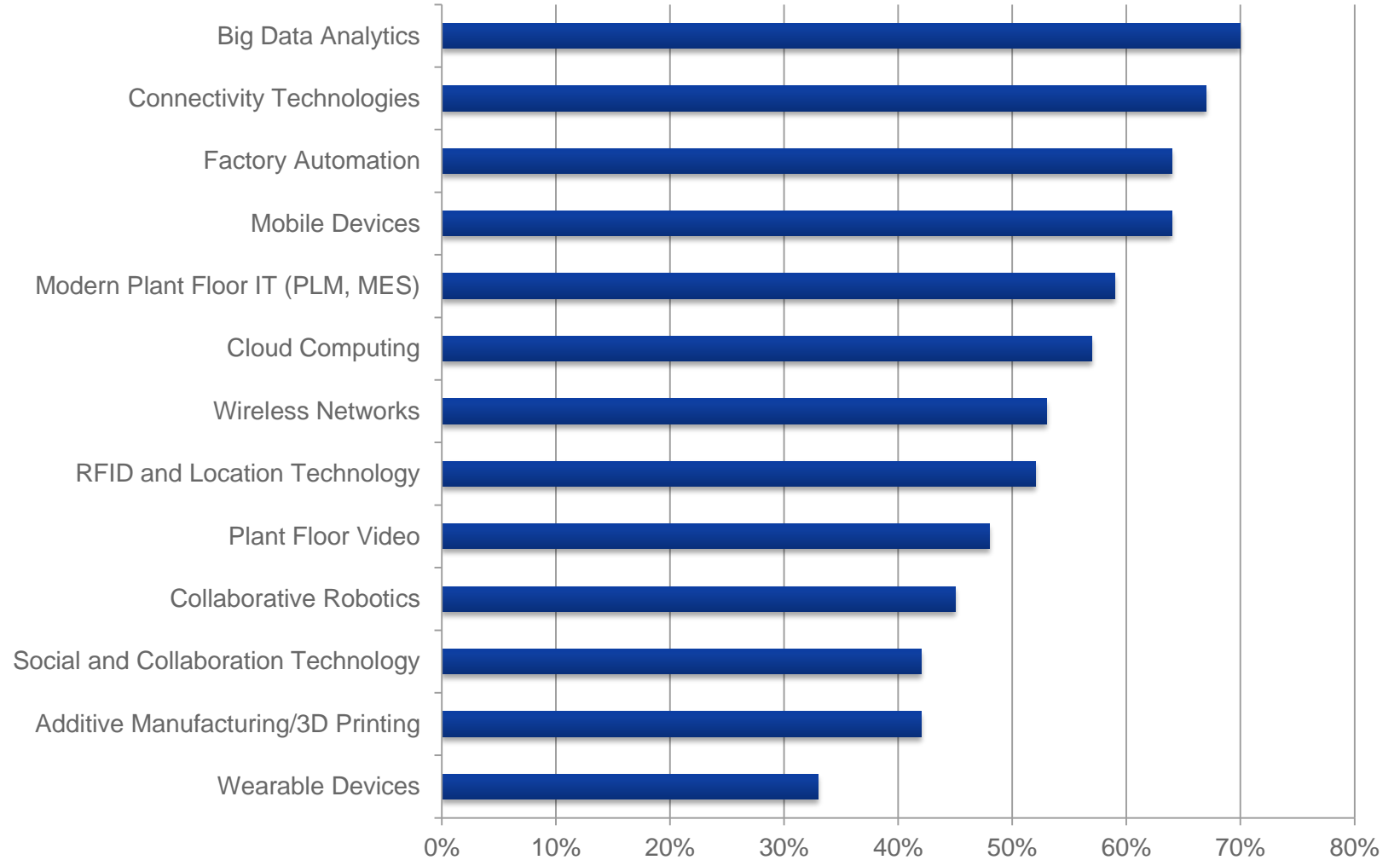
# Analytics is the Number one focus... But you need Data

**#1**  
Analytics

**#2**  
Connectivity

**#3**  
Automation

**#4**  
Mobility



# Digital Trends in Manufacturing and Machines

- Most CNC machining is still operator driven...Craft driven
- Movement from Build at any cost to Efficiency is accelerating
- As a service strategies are evolving but not fast enough
- Mechanical & Process innovation are essential but not enough...



# The Race To Cloud

## A New Way of Thinking

### Factory



### Marketplace / Ecosystem



Business alignment



Platform / Applications



Security



Integration / Connectivity



### IT



Cloud Services



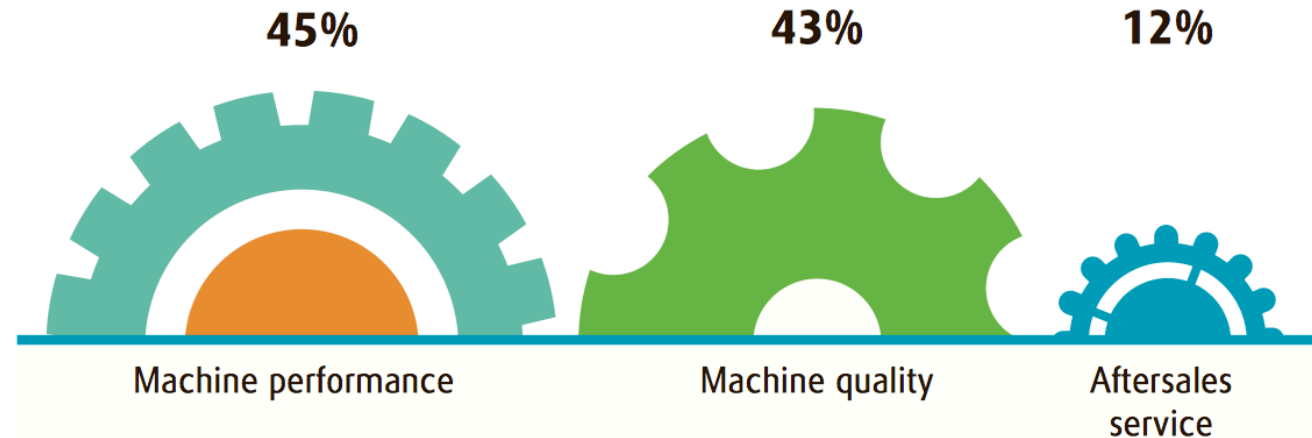
# Supply Chain Already sees the Cloud Opportunity for Machines

## Aftersales or afterthought?

One-third of midsize industrial machinery manufacturers say that up to 75% of their profitability comes from parts, service and consumables; 78% say their customers' expectations for aftersales services are rising. However, only 12% consider aftersales and service important differentiators for their businesses (Figure 1).

Figure 1:

? What is your top competitive point of differentiation for all of the machines that you sell?



Source: March 2015 UPS Survey of 77 Industrial Machine Manufacturers with \$10-\$50 million revenue.  
[http://www.manufacturing.net/sites/manufacturing.net/files/newsletter-ads/Final\\_Industrial\\_Manufacturing\\_Whitepaper.pdf](http://www.manufacturing.net/sites/manufacturing.net/files/newsletter-ads/Final_Industrial_Manufacturing_Whitepaper.pdf)

# Agenda

**Where are Machine Builders?**



# Challenges for Machine Builders

## Standards

How to converge  
on a common  
language for  
Visualization and  
Integration

## Platform

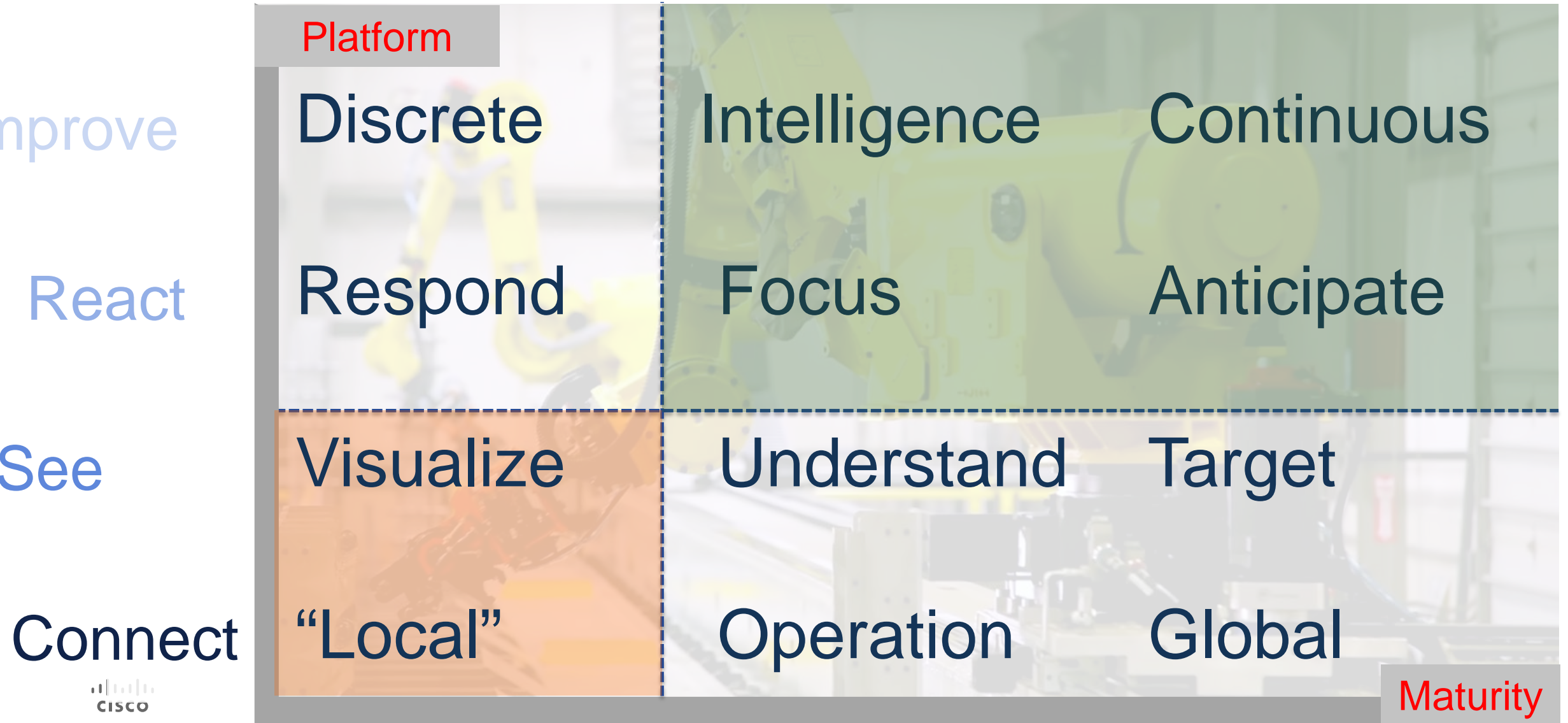
Machine  
to  
Digital Platform

## Innovation

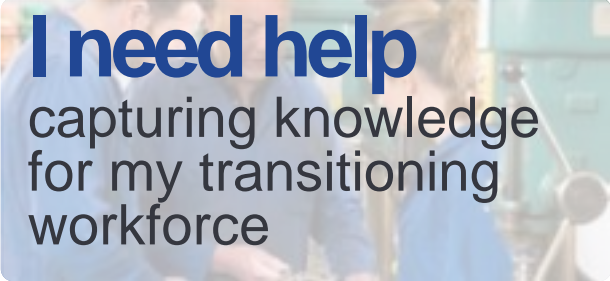
Mechanical + Process  
to  
Mechanical + Process  
Powered by Digital



# Connected Machine Journey: Where are we?



# Manufacturers are Grappling with...



**I need help**  
capturing knowledge  
for my transitioning  
workforce



How can  
**innovation**  
drive profits?



I need to  
improve  
**product**  
**quality**



I need to achieve  
**real-time**  
**visibility**



**How do I**  
improve  
workforce  
productivity?



How can I  
**reduce**  
**downtime?**



**How can I**  
introduce new  
products faster?



How do I achieve  
**sustainability?**



How can I  
better manage my  
**global supply**  
**chain?**

Machine Builders respond  
with repeatable, scaled platforms...



# Agenda

A man in a dark suit and tie stands on a metal walkway or bridge structure, looking down at a tablet device. The background shows a complex metal framework and a clear sky. The left side of the image is overlaid with a solid blue color.

What can we do together?

# One Language shared by all Machine Tools...



## **FACTORY WIDE COMMUNICATIONS**

- Unified Communications Framework
- High Level Flexible, generic data model
- Support for Binary, Hybrid, or Web Services
- Interoperability
- Service Oriented
- Platform Independence
- High Availability

Context

Machine, Tooling, Process, State



## **MACHINE TOOL COMMUNICATIONS**

- Complete Data dictionary
- All Data Items are Time Stamped (UTC).
- Uses today's Internet standards (HTTP / XML)
- Common Language
- Implied Semantics
- Better Streaming Analytics
- More secure IOT protocol

# Manufacturing Marketplace Place enabled by Cloud

IoT Applications and Services

## Cloud Services

Scale

Security

Analytics

Outcomes

Automation

Orchestration

Partnership



Application Enablement Tools

Third Party Open Source Tools

Network Performance Metrics

Outcomes

Basic Cloud Resource Monitoring

Deployment/Management Tools, PaaS

Federated Network & Security Policies

Scale

Network/Device Management



Up-Level Sovereignty, Privacy Policies

Building Blocks

Analytics

Data Ingest

Data Virtualization

Automated Private VPN Connectivity

Automation



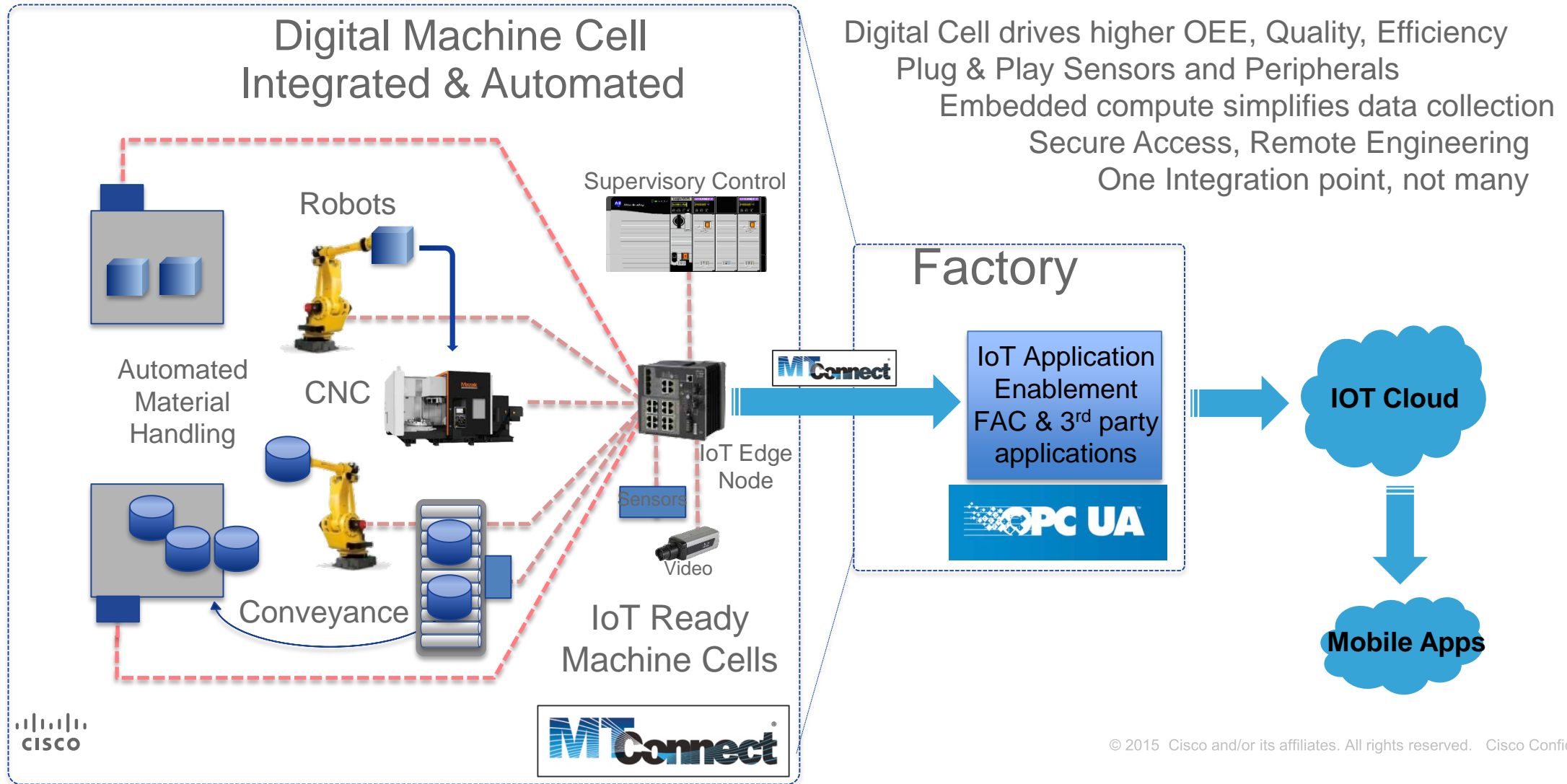
Intercloud Fabric support for heterogeneous environments



Managed Public + Private Cloud

# Fully Automated Machine Cells

Common Data Model for Machine Cells Drives visibility, productivity, and lower cost





**CISCO**

*TOMORROW starts here.*