

ACCELERATING INDUSTRY 4.0 WITH SMART CONNECTED SOLUTIONS

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VP, Strategy & Manufacturing Solutions



forum
europe

A WAVE OF TRANSFORMATION IS HERE

A faint, grey world map serves as the background for the slide.

Smart Manufacturing

Industrie 4.0

Made in China 2025

33% (majority) of IoT economic value will come from the “factories” setting

- McKinsey Global Institute, 2016

Manufacturing operations is the IoT use case that will see the largest investment

- IDC, 2017

1

Global competition is forcing manufactures to embrace Industry 4.0 and digital transformation, or risk becoming irrelevant.

2

Navigating the IT/OT convergence is increasingly critical for manufacturers today.

“IIoT is no longer hype, companies have broadly launched initiatives.”

– Matt Littlefield, LNS

“CIOs have the responsibility to lead their enterprises in exploiting information flows from digital technologies.”

– Kristian Steenstrup, Research VP and Gartner Fellow

MANUFACTURERS ARE LEANING IN!

60%

Have active pilots running

Source: Emerson

75%

Expect to Invest in IoT

Source: LNS Research 2016

86%

of pilot IoT projects met or exceeded expectations

Source: Penton Media 2017

THOUGHT LEADERSHIP IN INDUSTRIAL INNOVATION



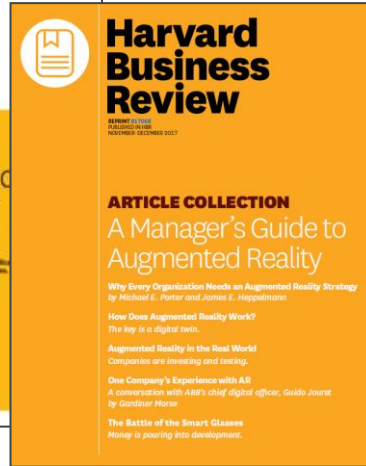
11/2014

“Smart, connected products raise a new set of strategic choices about how value is created and captured...”



10/2015

“Smart connected products are not only redefining competition but how we run companies across the value chain. “



11/2017

“There is a fundamental disconnect between the wealth of digital data available to us and the physical world in which we apply it.



04/2017

PTC collaborates with Acatech to publish a blueprint guiding German manufacturers on how to get value from Industrie 4.0



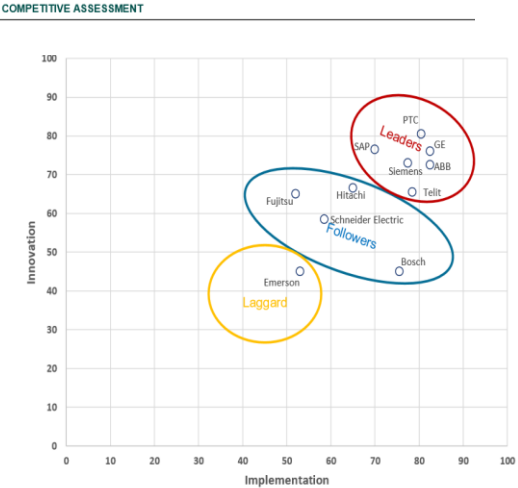
Spring, 2017

PTC and the China Ministry of Industry and Information Technology jointly publish a white paper guiding Chinese companies on how to adopt Made in China 2025

INDUSTRY ANALYSTS ENDORSE PTC'S LEADERSHIP



Smart Manufacturing Platforms



ABIResearch®

IoT Software Platforms



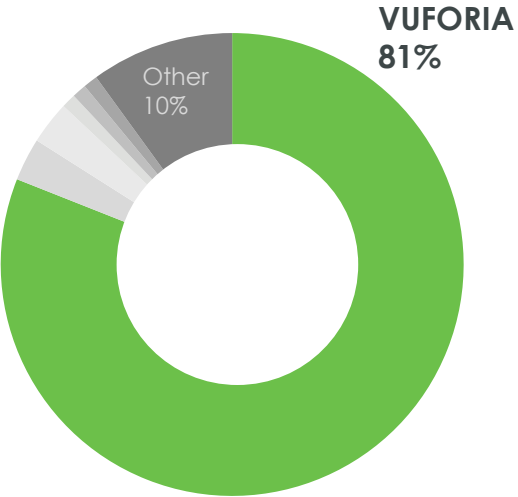
FORRESTER®

Industrial IoT Platforms Magic Quadrant



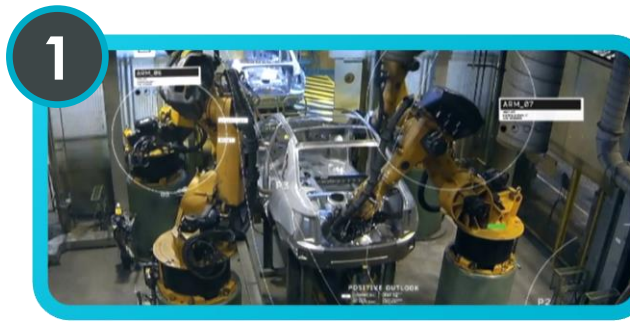
Gartner®

% of Apple and Android AR Apps

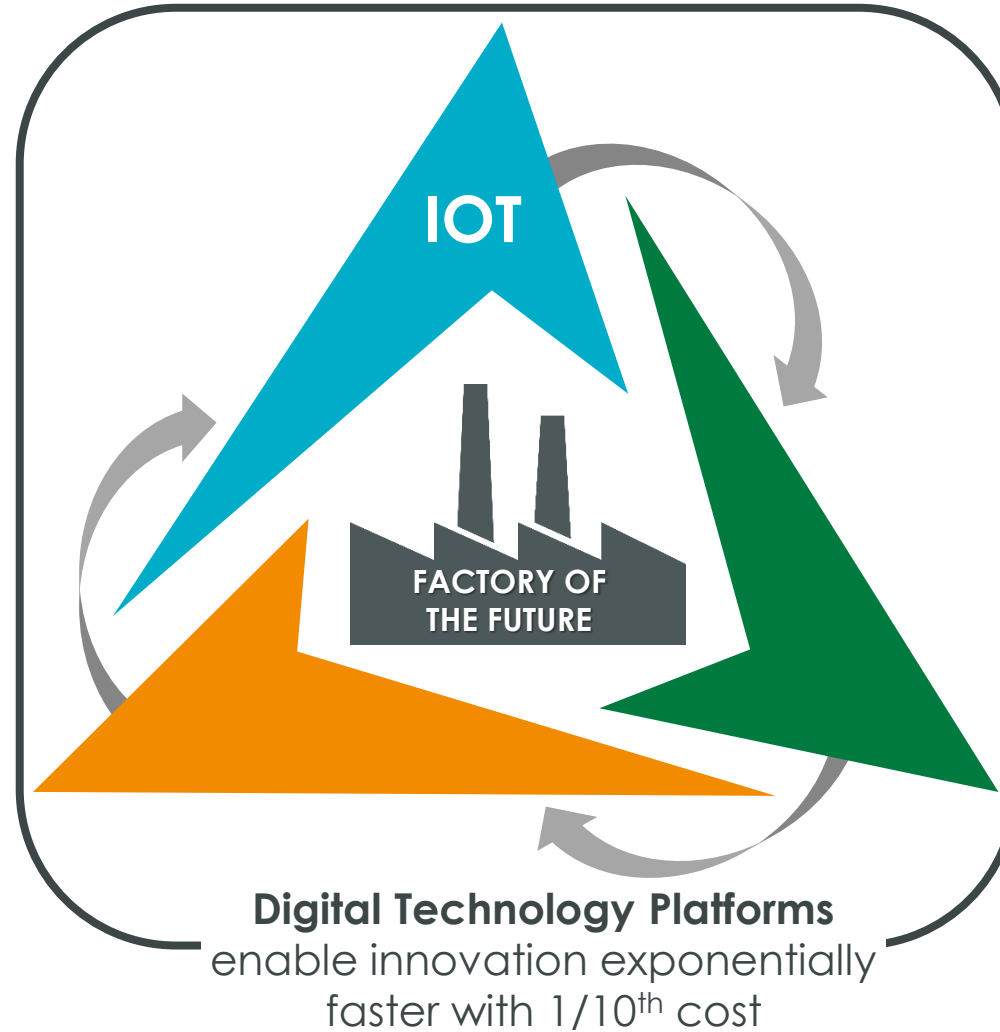


Aeon Mobile

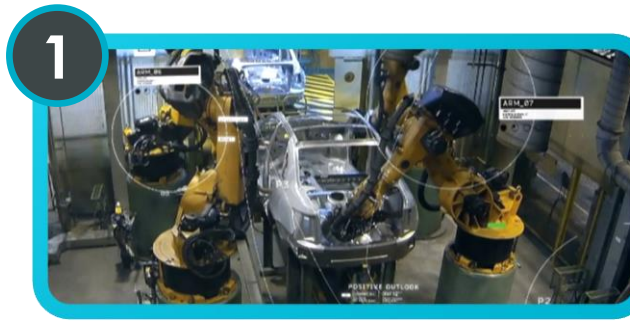
THE BIG 4...



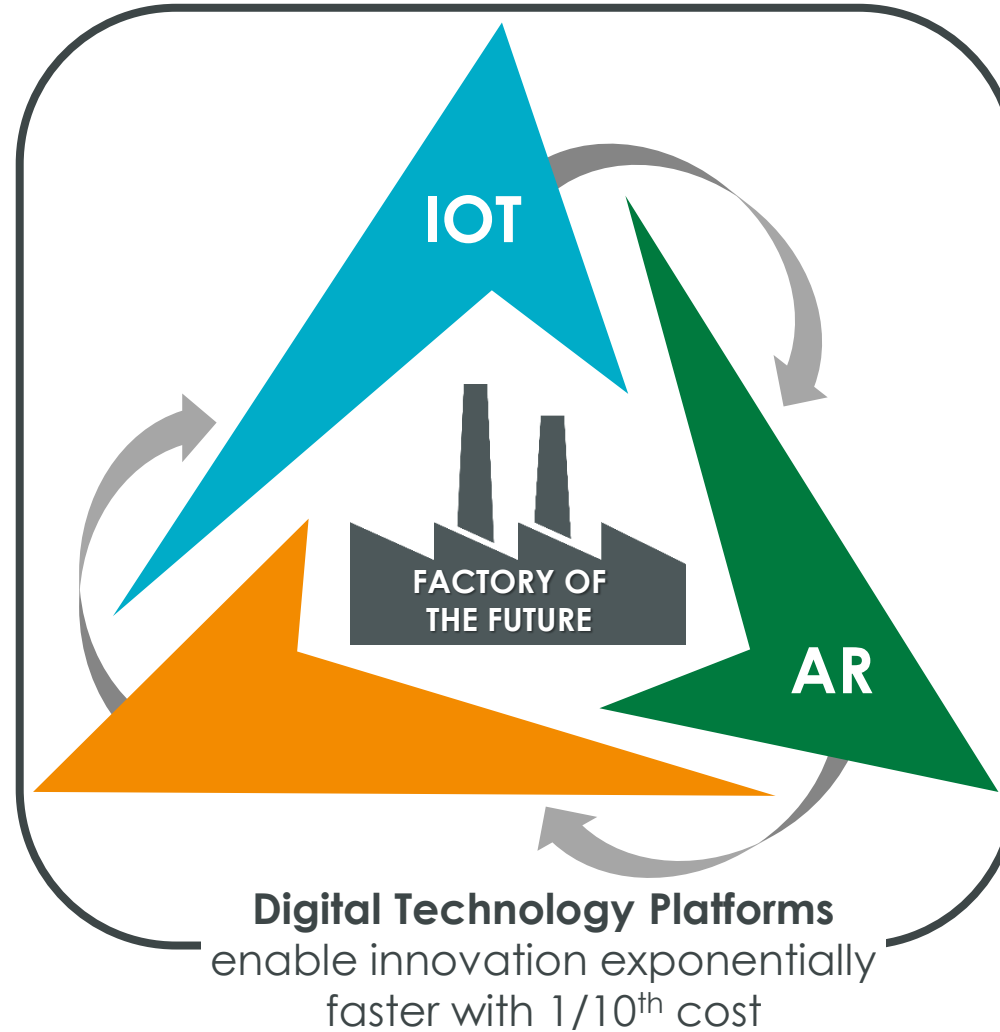
INDUSTRIAL IOT AND ANALYTICS drive IT/OT convergence across the value chain and increases automation and productivity up to 25%



THE BIG 4...

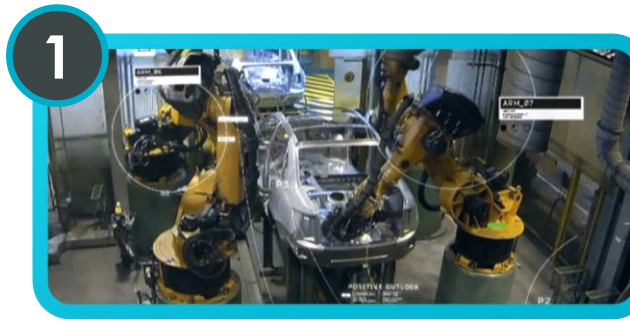


INDUSTRIAL IOT AND ANALYTICS drive IT/OT convergence across the value chain and increases automation and productivity up to 25%



AUGMENTED REALITY makes human labor 30-50% more efficient

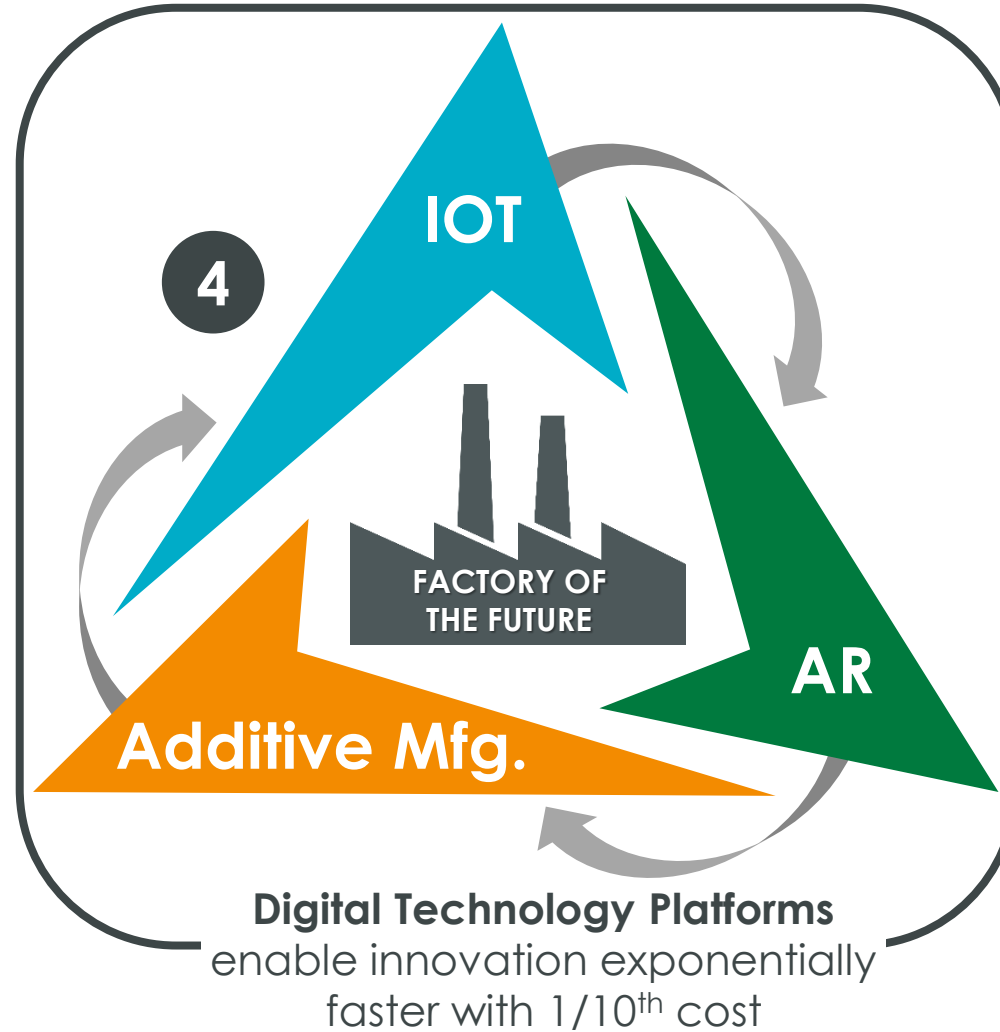
THE BIG 4...



INDUSTRIAL IOT AND ANALYTICS drive IT/OT convergence across the value chain and increases automation and productivity up to 25%



ADDITIVE MANUFACTURING radically transforms engineering, manufacturing and supply chain processes



AUGMENTED REALITY makes human labor 30-50% more efficient



ISA-95

**L4/
L5** Business Systems
(ERP, SCM, PLM)
Governance & planning

L3 Production Execution
(MES / MOM)

L2 Process Monitoring
(HMI-SCADA)

L1 Process Sensing,
Manipulating
(PLC)

Disparate equipment & data

Unique structures of data

Production sensitive networks

Rigid systems - costly to evolve

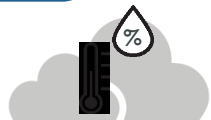
Rip and Replace Innovation



LOGISTICS



SUPPLIERS

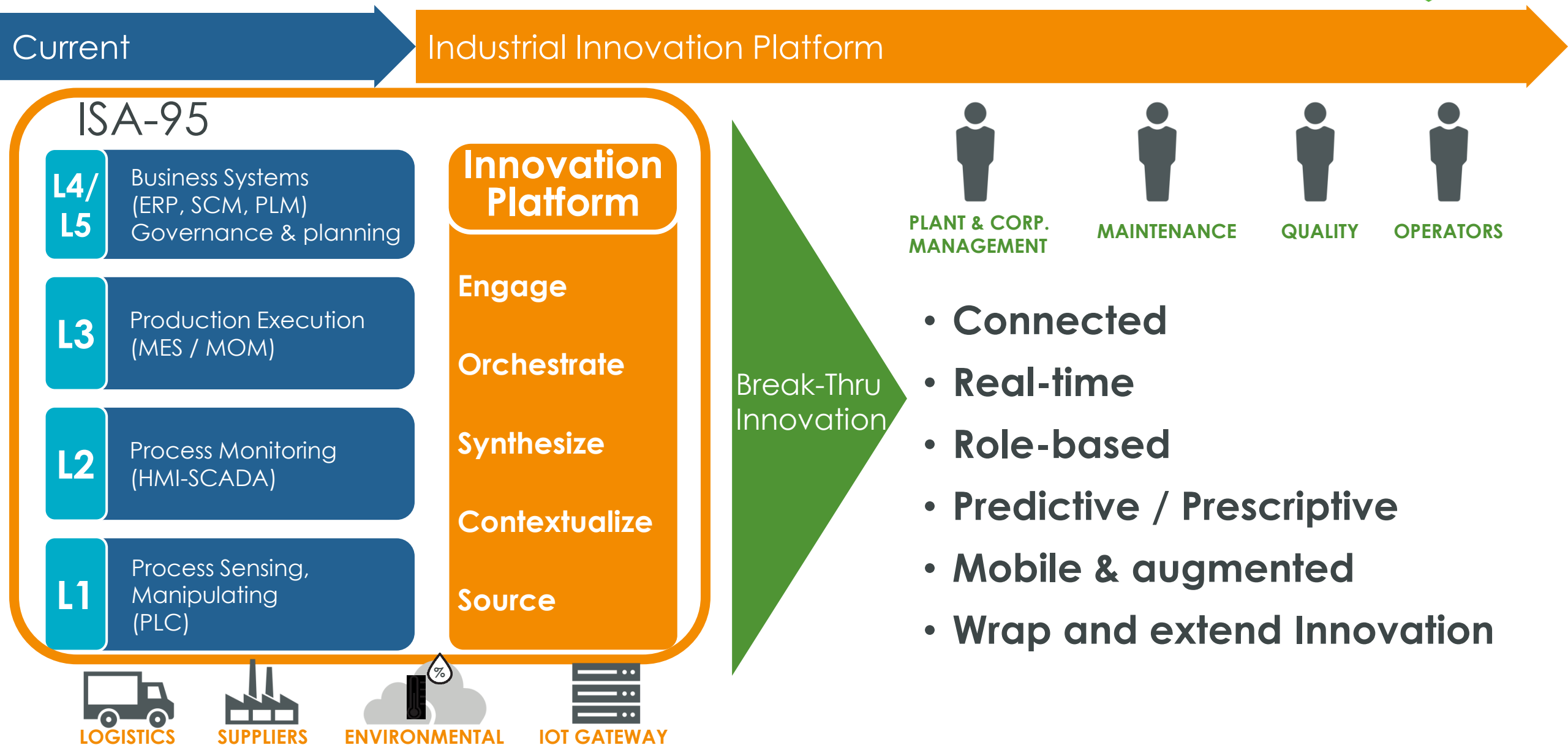


ENVIRONMENTAL



IOT GATEWAY

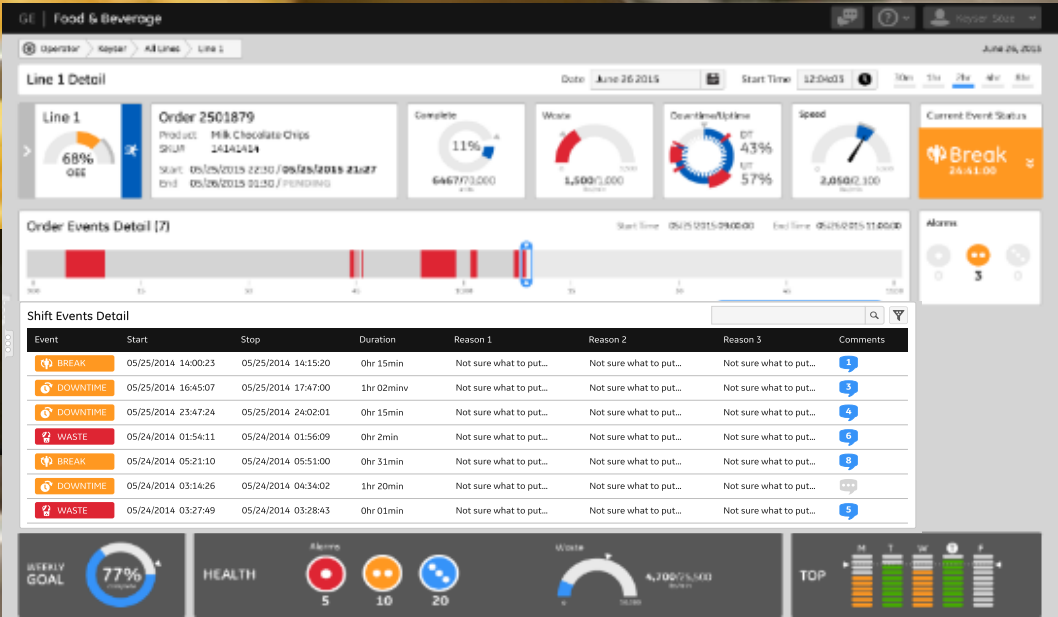
MANUFACTURING IS GOING DIGITAL



1 – INDUSTRIAL IOT & ANALYTICS



IT / OT convergence and real-time operational Intelligence drive 5 to 8% improvement in productivity



A background image showing a dense array of orange ABB industrial robotic arms in a factory setting, with various cables and mechanical components visible.

h HIROTEC

“X-Factory has been a great opportunity and a wonderful learning experience for HIROTEC, and I thank PTC for inviting us to partner with them.”

– Katsu Uno
HIROTEC AMERICA
Chairman and CEO

HIROTEC AMERICA IMPLEMENTS IoT: Enabling Timely Data Driven Decisions – Rapid Time to Value with 6 week IoT sprints

Tool change-related issues were causing downtime.

PTC solutions were used to collect, visualize and analyze tool settings, machining accuracy, cutting load and other factors, and their correlation with reduced uptime and variability.

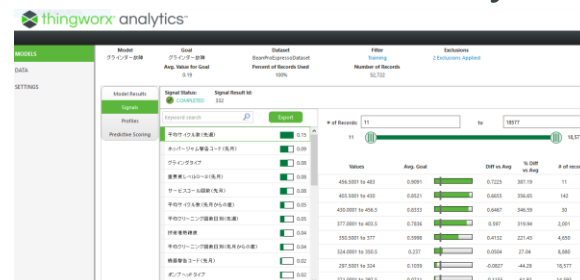
With this information, PTC solutions identified the cause of the problems before they occurred and recommended corrective action on physical machines.

RESULT: improved uptime

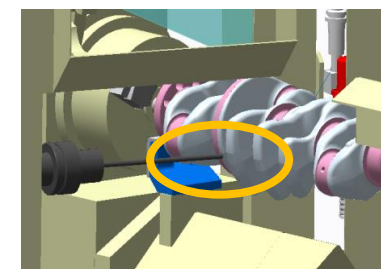
Improve line visibility

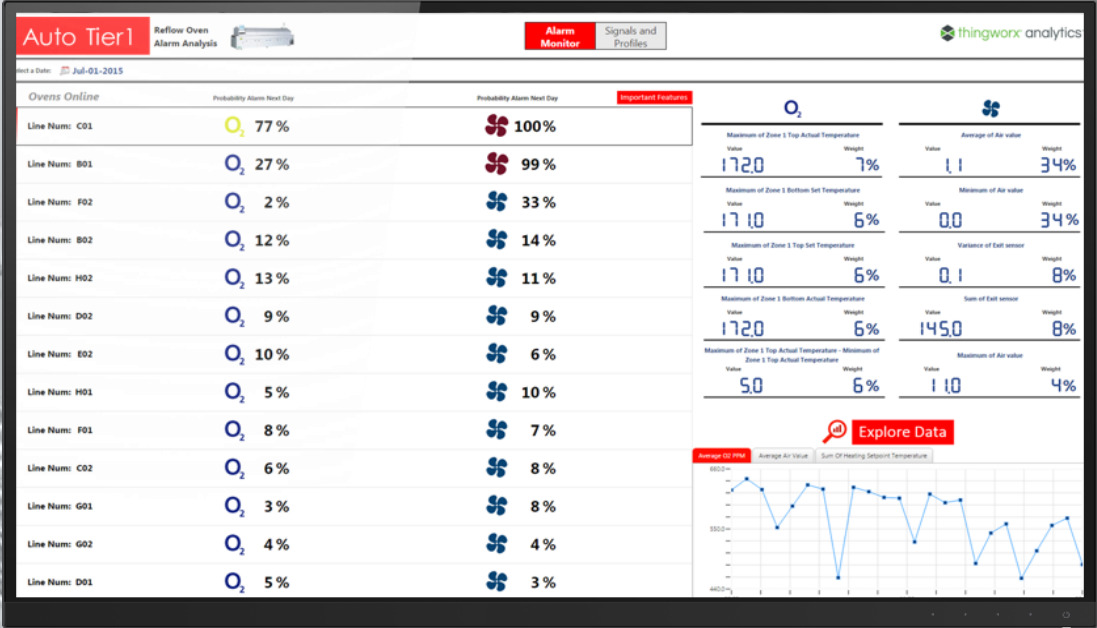


Predictive cause analysis



Identify location & take action before issue occurs.



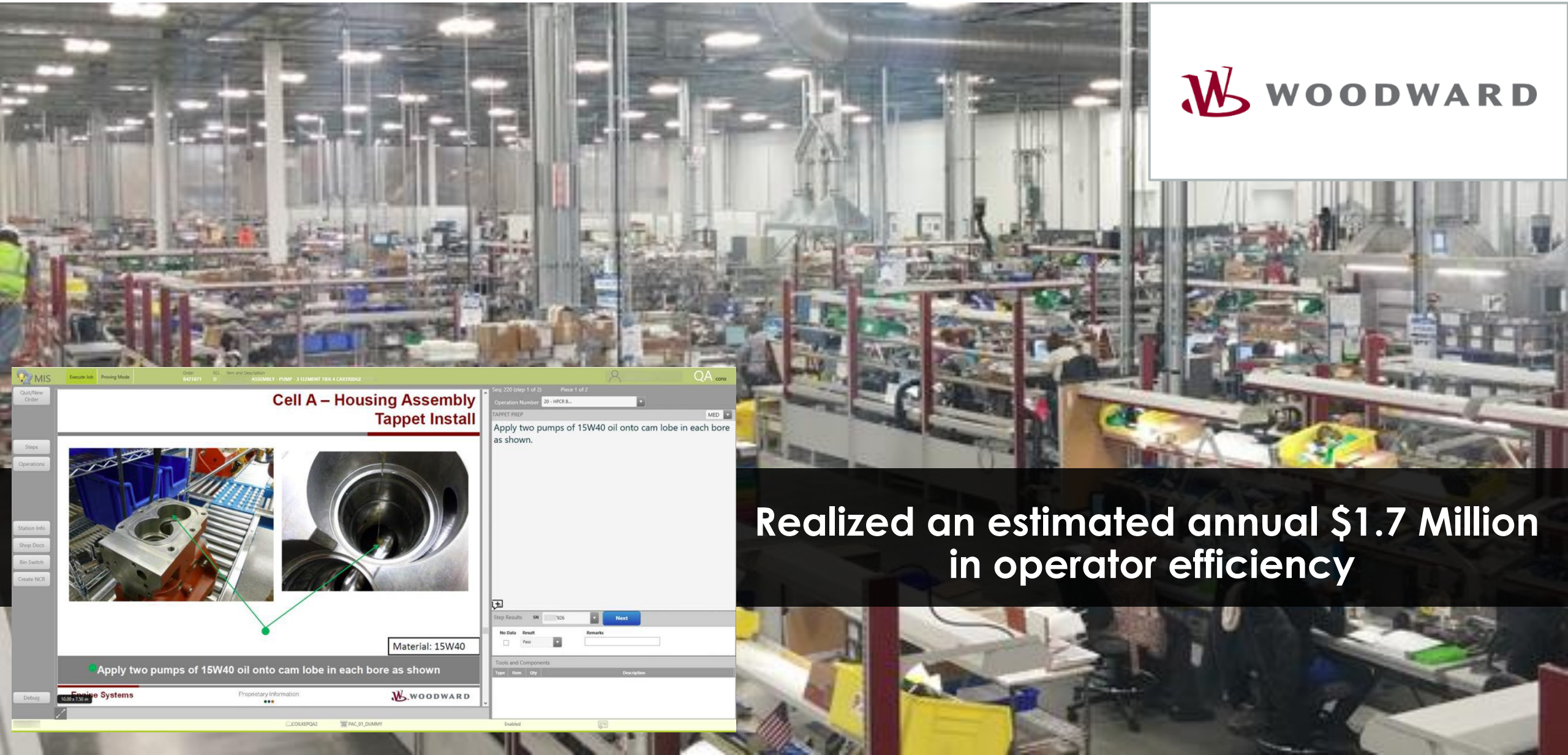


IoT WITH ANALYTICS REDUCE DOWNTIME:
Predicting alarms 24 hours in advance, with a 91% accuracy

IIOT AND ANALYTICS FOR OPERATOR INSTRUCTIONS



Realized an estimated annual \$1.7 Million
in operator efficiency



MIS

Execute Job

Proving Mode

Order: 8421871

Item and Description: ASSEMBLY - PUMP - 3 ELEMENT TIER 4 CARTRIDGE

QA

cons

Cell A – Housing Assembly

Tappet Install



Material: 15W40

Apply two pumps of 15W40 oil onto cam lobe in each bore as shown

Freeze Systems

Proprietary Information

WOODWARD

Seq: 220 (step 1 of 2)

Piece: 1 of 2

Operation Number: 20 - HPCR 8...

TAPPET PREP

Apply two pumps of 15W40 oil onto cam lobe in each bore as shown.

Stop Results

SN: X06

Next

No Data

Result

Remarks

Tools and Components

Type

Item

Qty

Description

2 – AUGMENTED REALITY UNLEASHES A STEP-CHANGE IN WORKFORCE EFFICIENCY



"PTC's AR has allowed us to create better work instructions to deliver to our production floor within hours, at 1/10 the cost, enabling operator product assembly 30%-40% more efficiently."



ON PREMISE | CLOUD | HYBRID

ThingWorx Platform

INDUSTRIAL CONNECTIVITY

FOUNDATION

ANALYTICS

AUGMENTED REALITY

ACCLERATORS (SCP / SCO)

ThingWorx Apps

THINGWORX NAVIGATE

THINGWORX CONTROLS ADVISOR

THINGWORX ASSET ADVISOR

ThingWorx Developer Zone

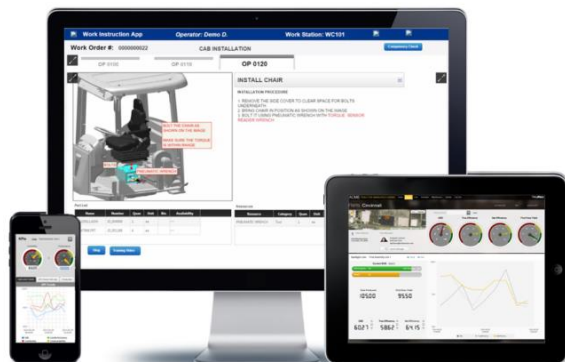
PTC Marketplace

OFFERINGS IN THE MARKET TODAY



For Operations

Market-leading industrial innovation platform to drive digital transformation for increased operational performance and agility across all factories



For AR experiences

Industry-Leading augmented reality development tools to improve workforce efficiency and training



For Production

Unified suite integrating production management, analytics, paperless shop floor and execution to drive efficiency across production



ANALYTICS: SCALABLE EACH STEP OF THE WAY

ENTERPRISE



MACHINE



DEVICE





LARGE AUTOMOTIVE MANUFACTURER

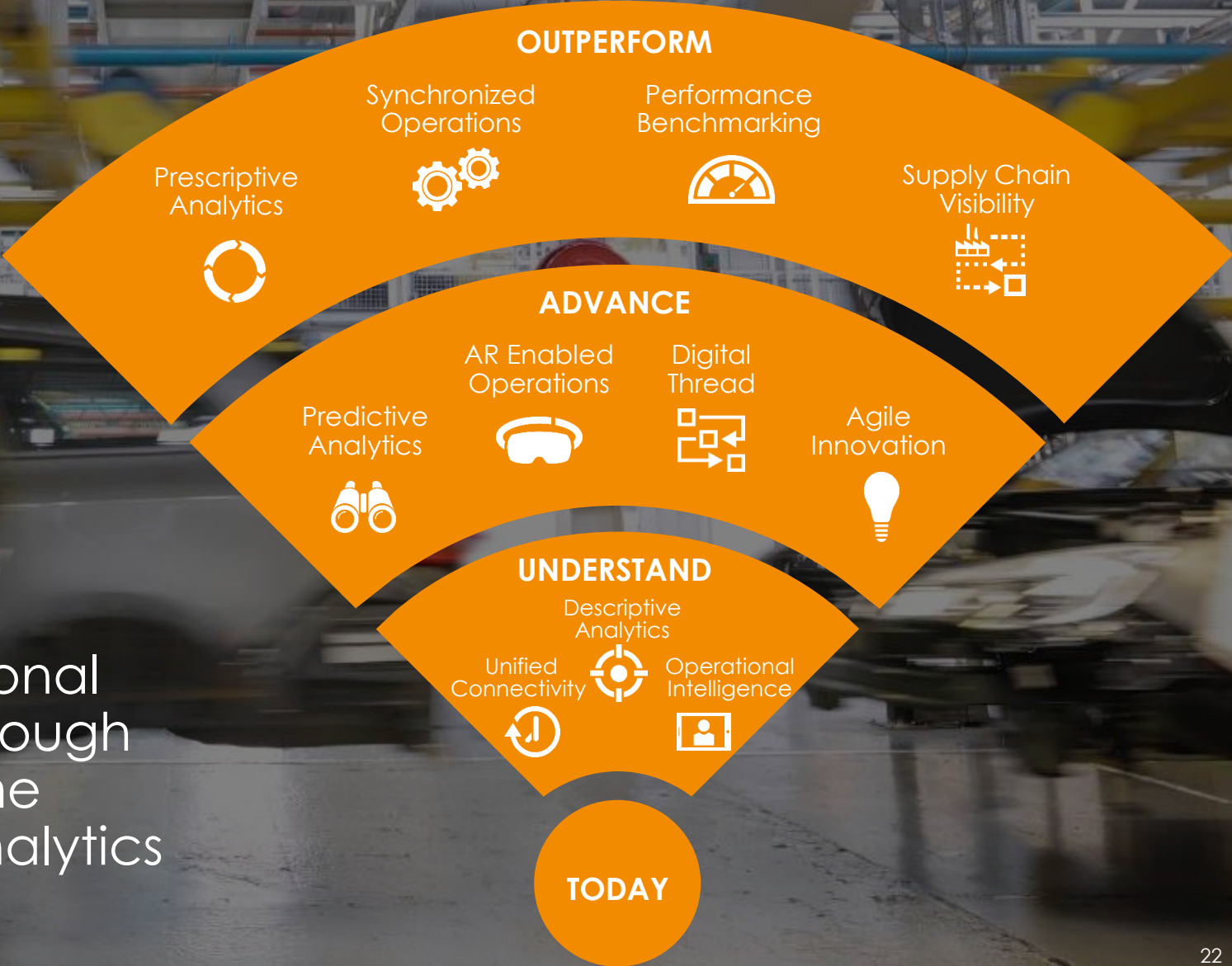
Challenge:

- Improve performance and costs of use of the riveting guns
- Improve the throughput of the engine block line

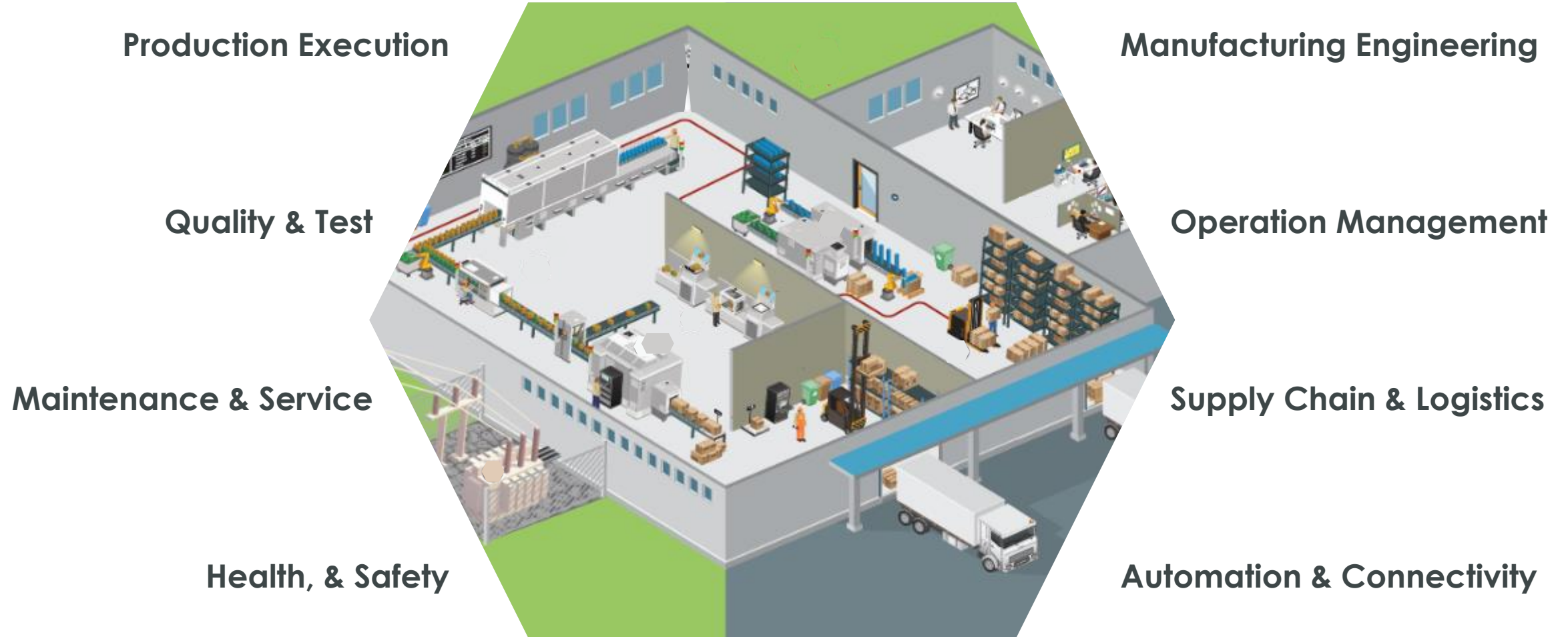
Different Systems, Different Data One Source of Truth:

- Aggregates data from three key manufacturing data sources for Production Managers to access **real-time and predictive analytics in context** and on mobile devices
- **Quality concerns** shown based on specific VIN Codes
- **React in real time** to manufacturing issues and gain insights from aggregated time-synchronized data
- Allows users to **look at real time data** and as much as 4 weeks in the past

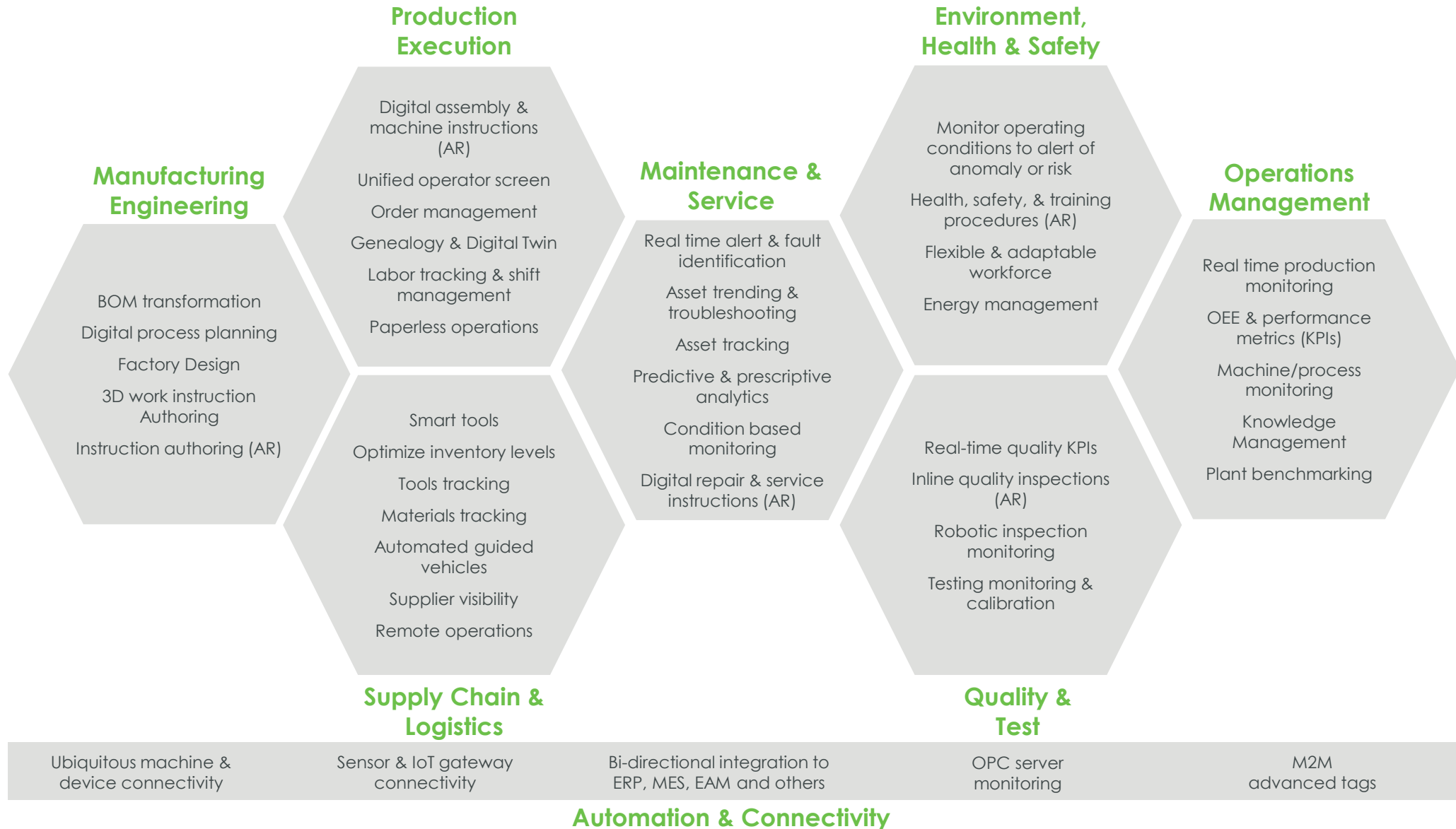
Continuously improve operational performance and flexibility through digital manufacturing, real-time intelligence and predictive analytics



THINGWORX DELIVERS VALUE FOR ALL MFG FUNCTIONS



SELECT IIOT MANUFACTURING USE CASES



ACCELERATE YOUR TRANSFORMATION



ThingWorx Platform

INDUSTRIAL CONNECTIVITY

FOUNDATION

ANALYTICS

AUGMENTED REALITY

ACCELERATOR & APPS

THINGWORX NAVIGATE

THINGWORX CONTROLS ADVISOR APP

THINGWORX ASSET ADVISOR APP

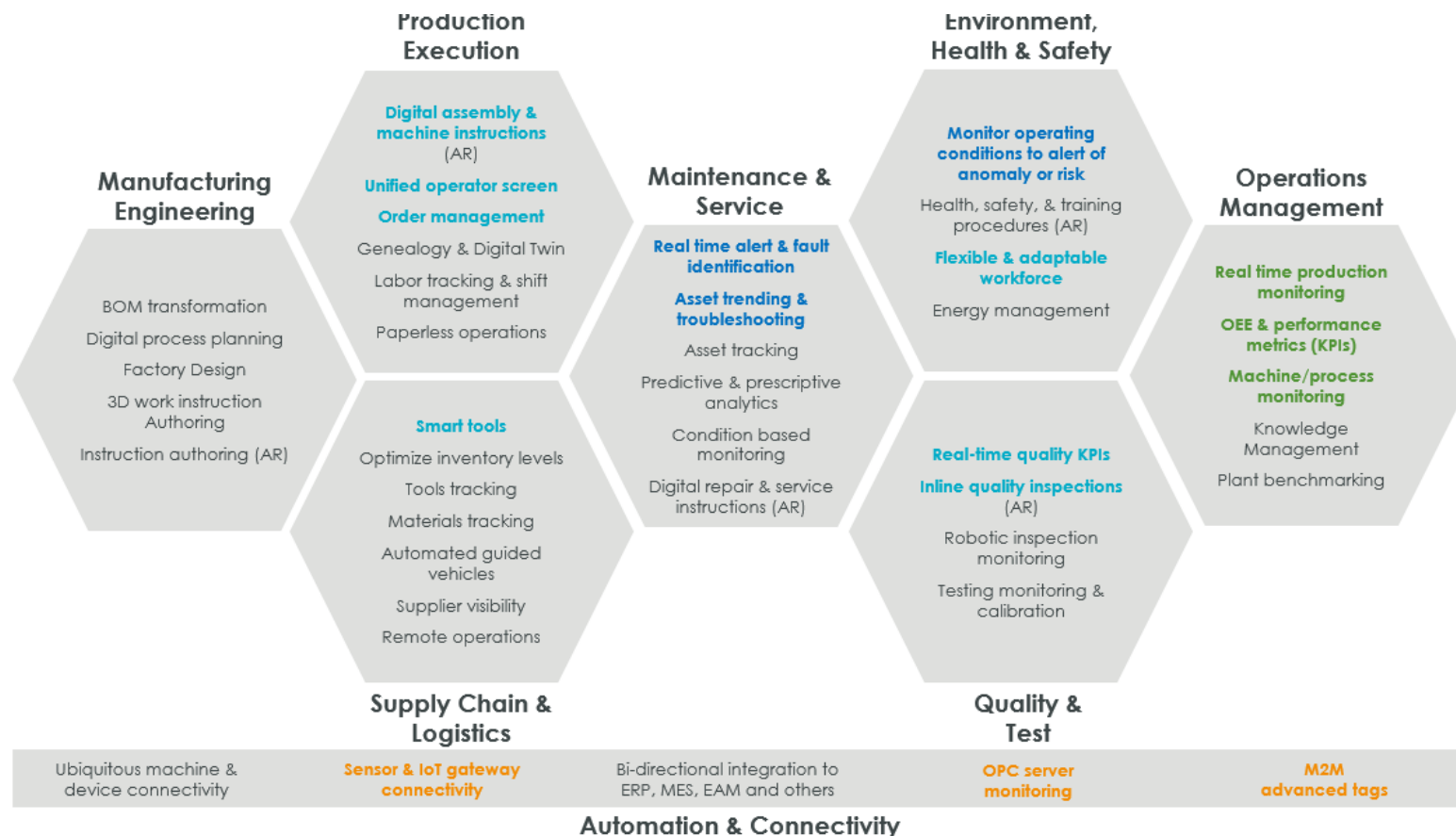
PRODUCTION KPI ACCELERATOR

OPERATOR SCREEN ACCELERATOR

(Beta June 2018)

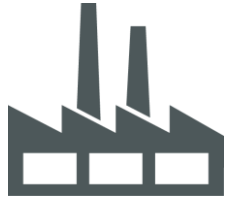
ThingWorx Developer Zone

ThingWorx Marketplace



QUICKLY & EASILY DEVELOP, DEPLOY & EXTEND
TO DELIVER UNMATCHED TIME-TO-VALUE !

IOT PLATFORM VALUE DRIVERS



Purpose-Built for
Industrial
Innovation



Quickly Create
and Deploy
Industrial Apps &
AR Experiences



Agile &
Flexible



Wrap & Extend
Existing Technology



Expansive
Ecosystem



thingworx®

THANK YOU



30 year heritage in the
DIGITAL definition,
software, digital
manufacturing and
lifecycle management
of things



\$1B technology
investment connects to
the **PHYSICAL** world and
enables new experiences



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Technologists

240+
Breakout Sessions

300+
Industry Experts

100+
Product Demos



THINGWORX MANUFACTURING ACCELERATOR & APPS



Jumpstart your digital manufacturing transformation journey

ThingWorx Controls Advisor



Controls Engineer



ThingWorx Asset Advisor



Maintenance



Partner apps



Customer apps



THINGWORX
MFG
APPS

Integrations		ThingModels		Business Logic		Widgets	
MES	Quality	Job Order	Assets	KPIs	SPC	OEE	Trending
ERP	Smart Tools	Crew	Shift	Re-order	APM	Work instr.	Asset view

THINGWORX
MFG
ACCELERATOR



/ SOURCE / CONTEXTUALIZE / SYNTHESIZE / ORCHESTRATE / ENGAGE /

THINGWORX
PLATFORM