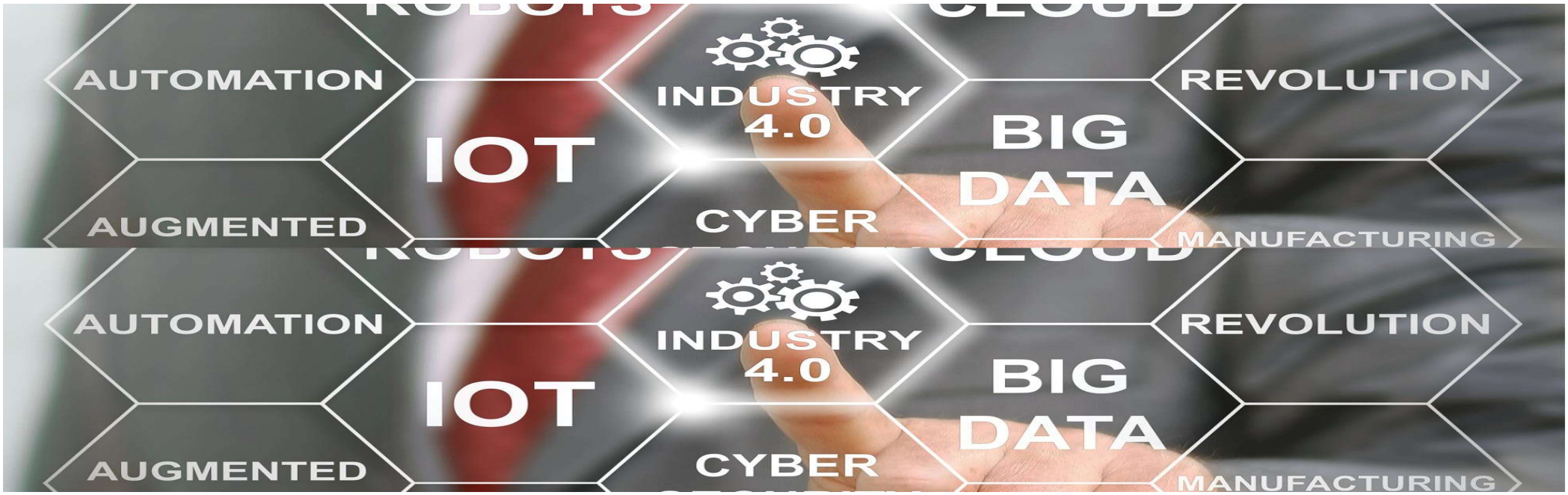


Leveraging Your Automation Systems moving into the Fourth Industrial Revolution

Glen Jacob – Food & Beverage Industry Manager – 10 September 2019

Rockwell Automation

WINERY ENGINEERING ASSOCIATION - LIMITED -

Agenda

Role of Automation Systems in Industry 4.0

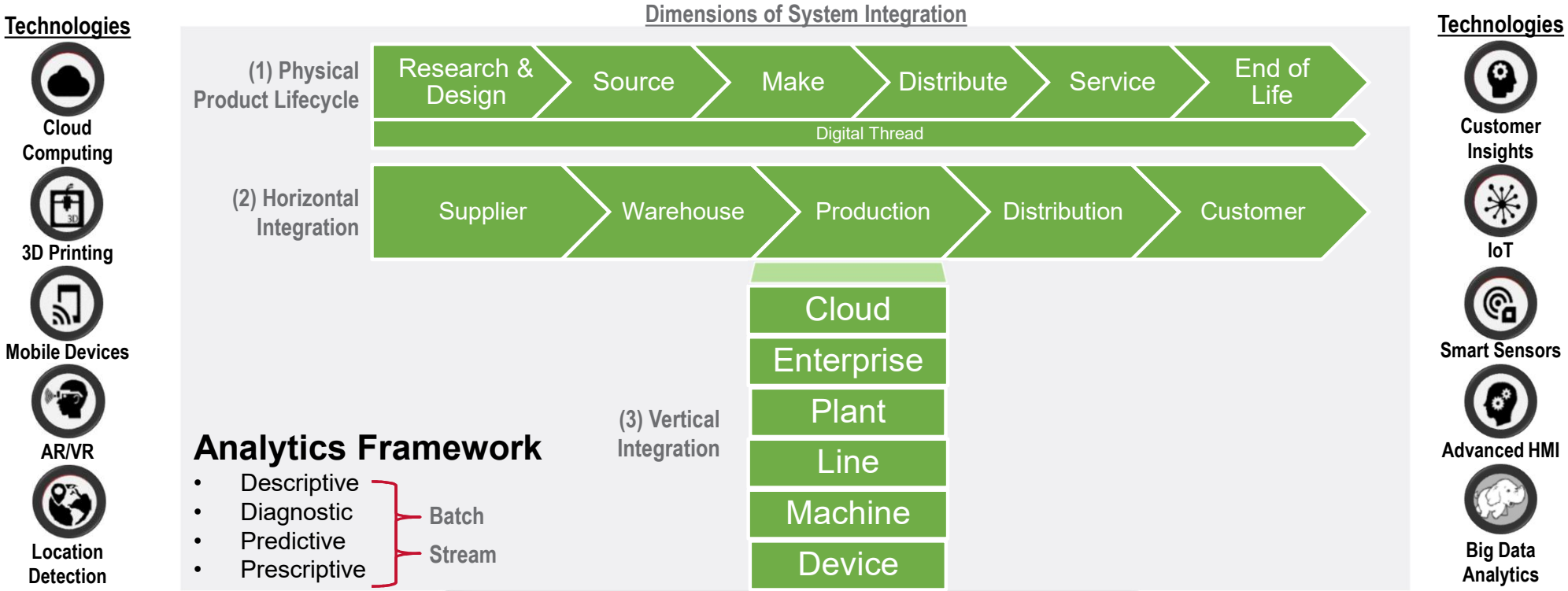
Expanding the Value of Automation Systems with an IIoT Platform

Big Data Analytics in Manufacturing

How to get Started on your Smart Manufacturing Journey

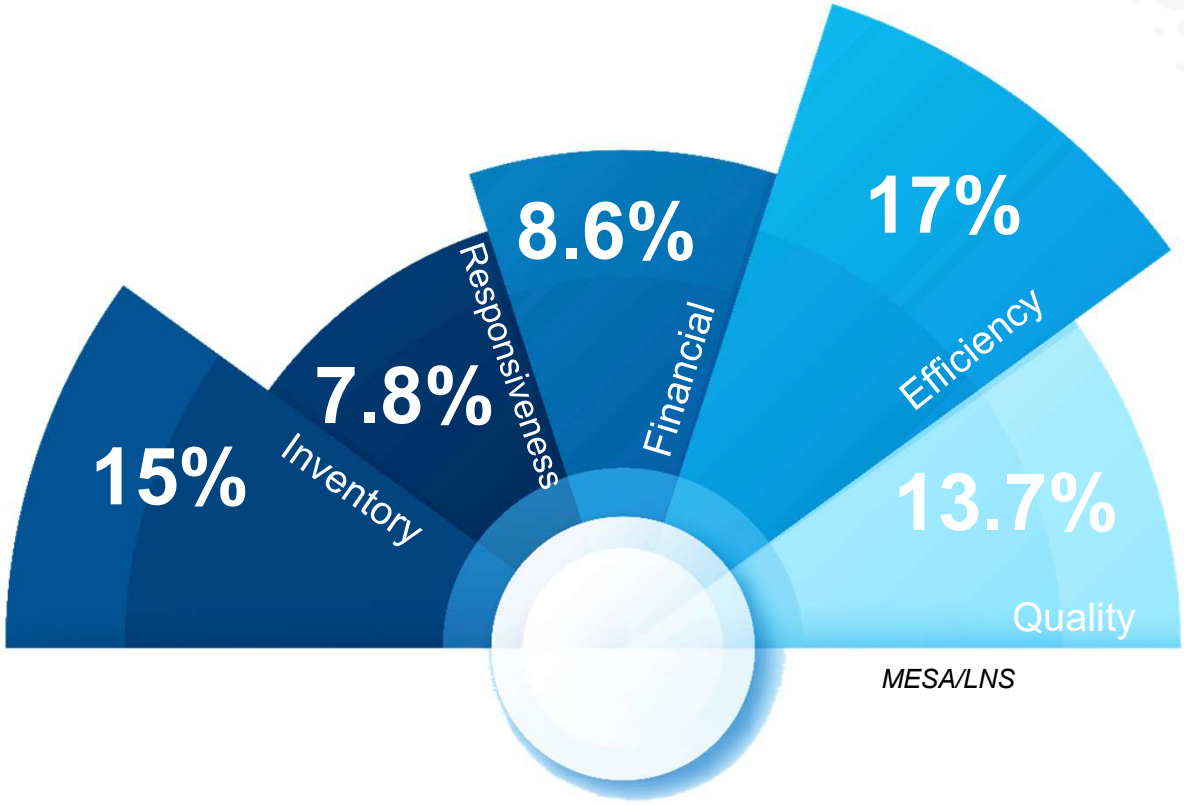
Industry 4.0 Dimensions of System Integrations

Industry 4.0 capabilities are supported by data analytics and 3 dimensions of system integration. All of which enabled by various core technologies.



Value Realisation in Digitisation and Vertical Integration

Significant improvements have been documented by the early adopters of digitalisation as reflected in both research and individual use case outcomes



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- CAPEX: 30% in Capital Avoidance
- Inventory: 120 days to 82 days
- On time delivery: 82% to 96%
- Lead times: reduced by 50%
- Quality: 40% RTYL improvement

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Digital Technologies Driving The Connected Enterprise

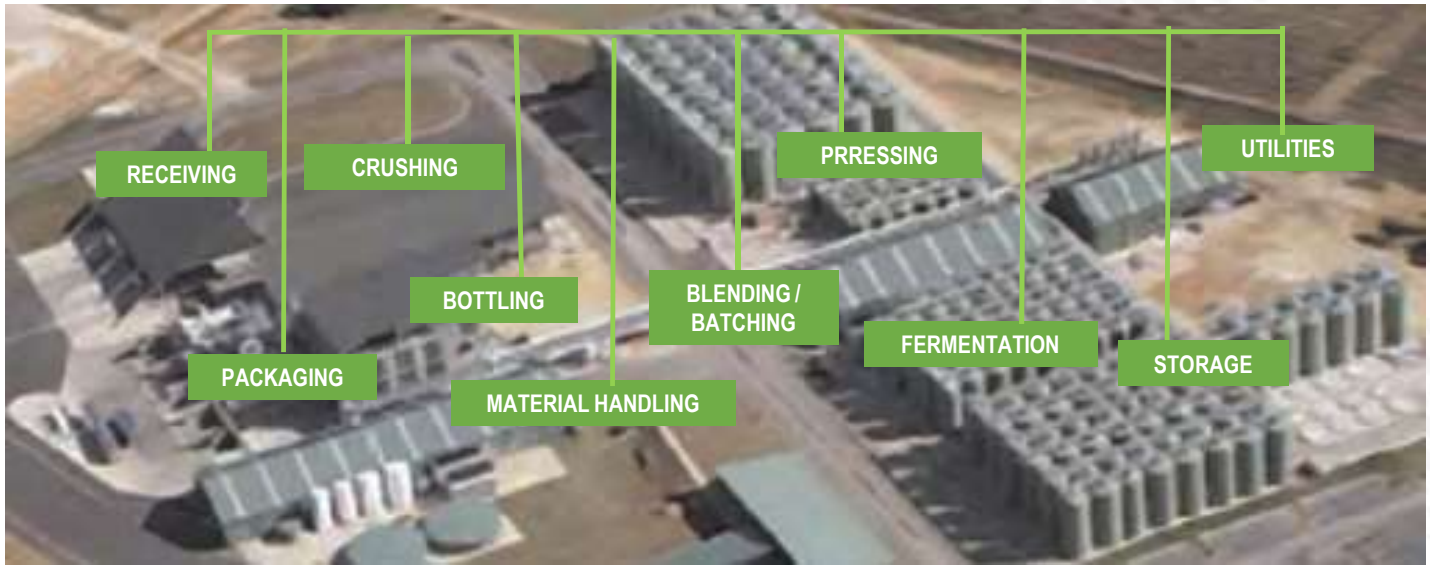
Technology changing faster than business processes

- Smart Supply Chain
- Connected Enterprise
- Smart Digitised Factory
- Smart Machines
- Smart Devices

→ The Connected Enterprise / Industry 4.0 / Smart Manufacturing

- Industrial Internet of Things (IIoT)
- Big Data Analytics
- AI & Machine Learning
- Mobile Devices
- Cyber Security
- Augmented Reality

Automation Applied in the Winery



VALUE of AUTOMATION

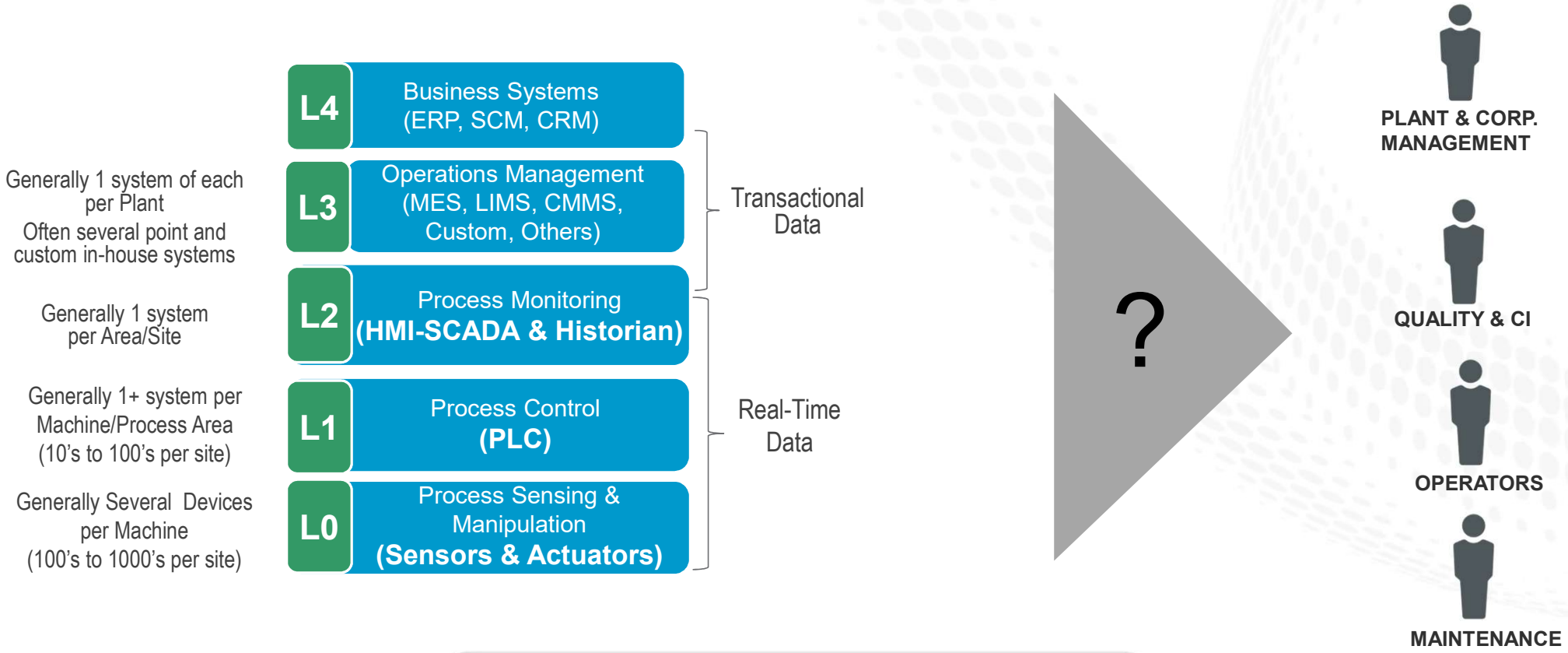
- **Control of the process**
  - Product consistency
  - Product quality
- **Improve Productivity**
  - Machinery effectiveness
  - Increased throughput
- **Reduce Costs**
  - Reduce Labor
  - Reduce Waste
- **Increased Safety**
  - Personnel Safety
  - Product Safety
- **Monitoring the process and access to information**

IIoT Platform

Expanding the Value of Automation Systems with an IIoT Platform

Automation Systems Generate a Lot of Data

ISA95 / Perdue Hierarchy of Systems



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IIoT is Transforming the Manufacturing Technology Landscape

Current → Industrial Innovation Platform

ISA95 -"**Systems of record**"

- **L4** Business Systems (ERP, SCM, PLM) Governance & planning
- **L3** Production Execution **(MES / MOM)**
- **L2** Process Monitoring **(HMI-SCADA & Hstorian)**
- **L1** Process Control **(PLC)**
- **L0** Process Sensing **(Sensors & Actuators)**

LOGISTICS · SUPPLIERS · ENVIRONMENTAL

IIoT

- Connectivity
- Edge & Big Data Analytics
- Hybrid/Cloud
- Mobile
- Application Enablement
- Augmented Reality

IOT GATEWAY

"Wrap and Extend"

Break-Thru Innovation

"System of engagement"

PLANT & CORP. MANAGEMENT · MAINTENANCE · QUALITY & CI · OPERATORS

- Connected
- Real-time
- Role-based Visibility
- Predictive
- Flexible
- Mobile & augmented

Speed & Flexibility

InnovationSuite powered by PTC

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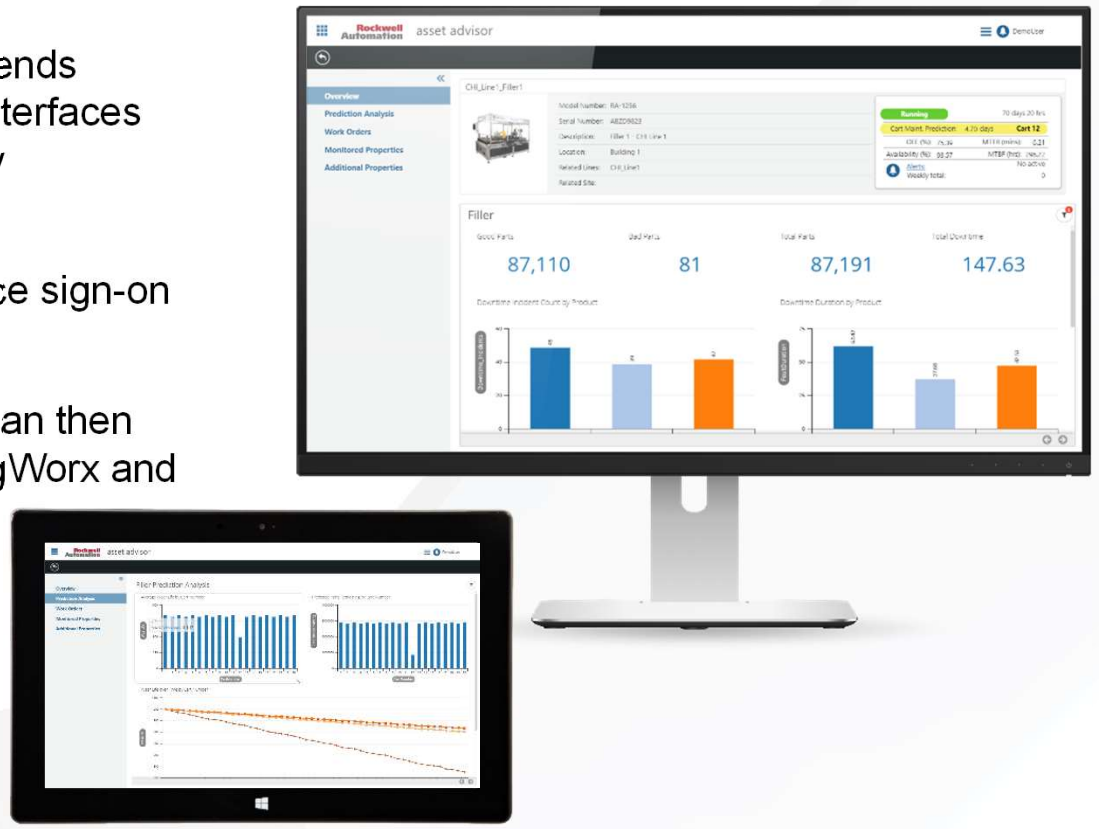
Production and performance monitoring

Connect users and information

- Data presented in context from disparate systems
- No need to switch between different environments
- Visibility extended to assets inside and outside the plant

- Wraps and extends existing user interfaces and technology
- Single workforce sign-on
- ThinManager can then distribute ThingWorx and other Visuals



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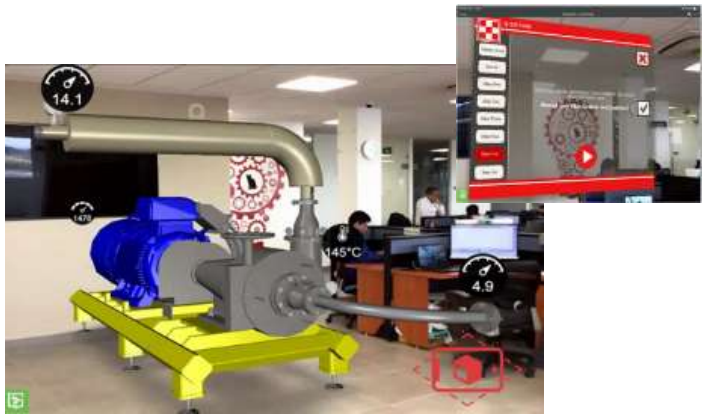
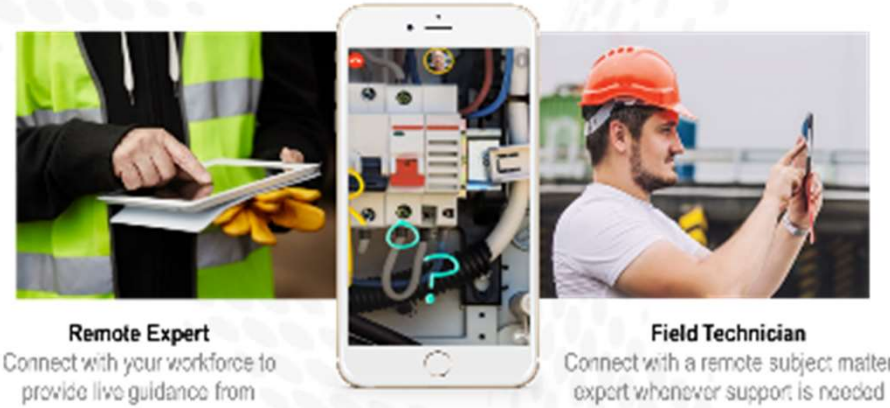
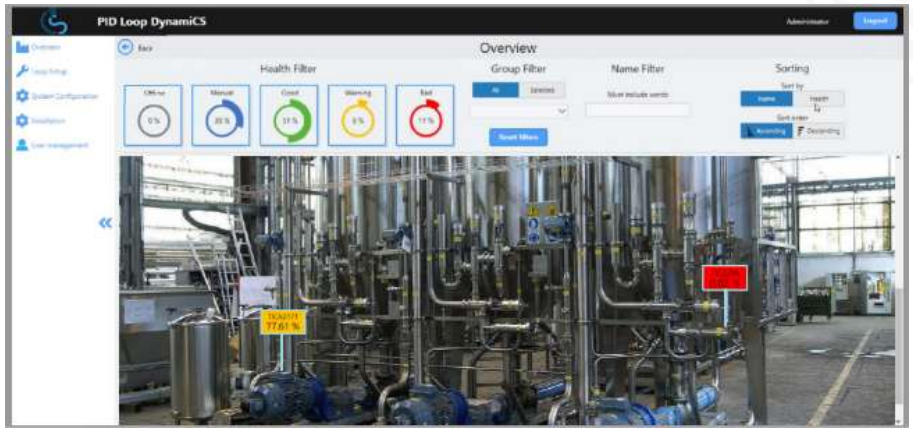
Enabling Augmented Reality Experience



- Training
- Simulation





- Calibration
- Tuning
- Commissioning
- Troubleshooting

Big Data Analytics

Basics and Some Best Practice

The “Hidden” Factory

64% Rely more on experience when addressing key business issues

25% Using data for proactive purposes

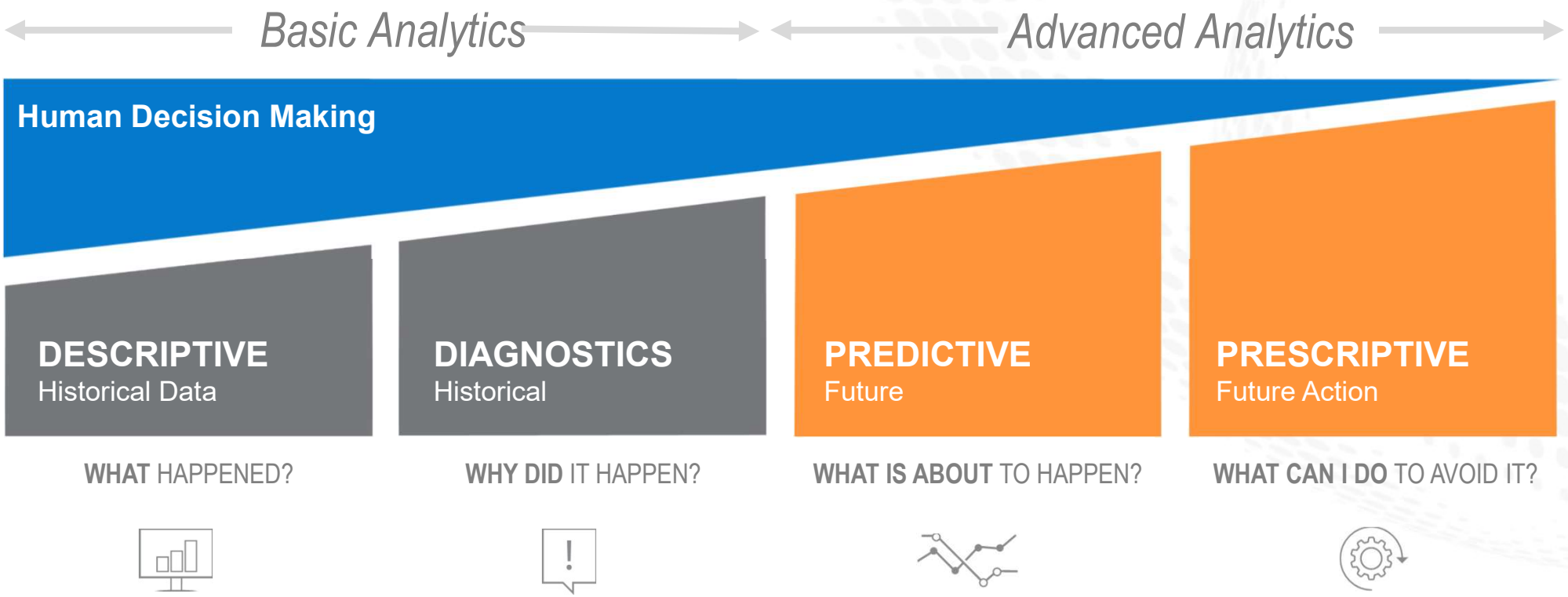
57% Using spreadsheets to analyze data

THE PROBLEM ISN’T A LACK OF DATA

IT’S A LACK OF CONNECTIVITY

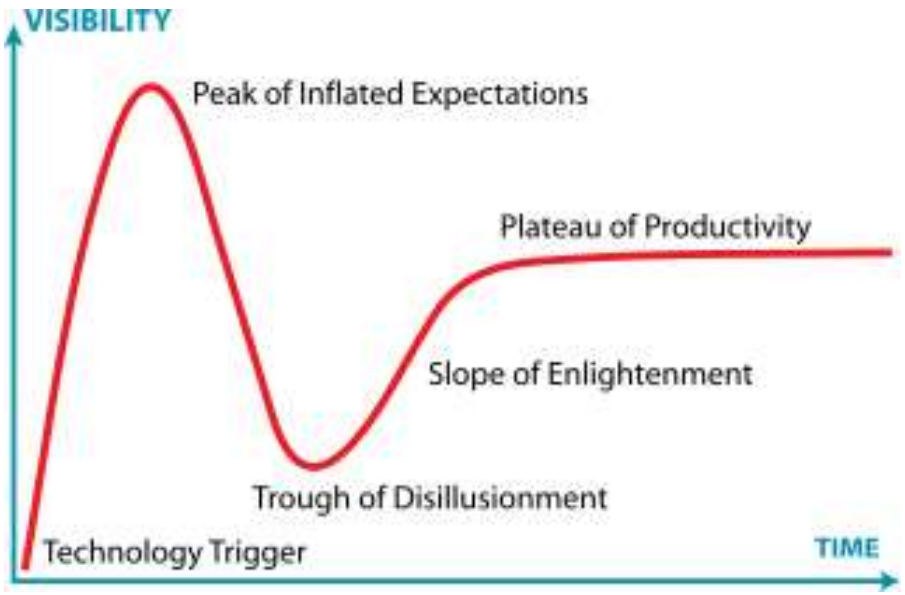
Sources: IndustryWeek, MESA, ARC

Analytics Continuum



Gartner Technology Hype Curve

Avoiding the Trough of Disillusionment of Big Data Analytics



Tips to Accelerate Time to Value from Analytics

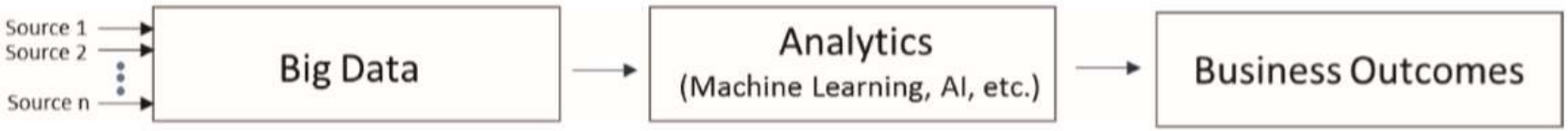
1/ Understand the difference between
Big Data and Smart Data

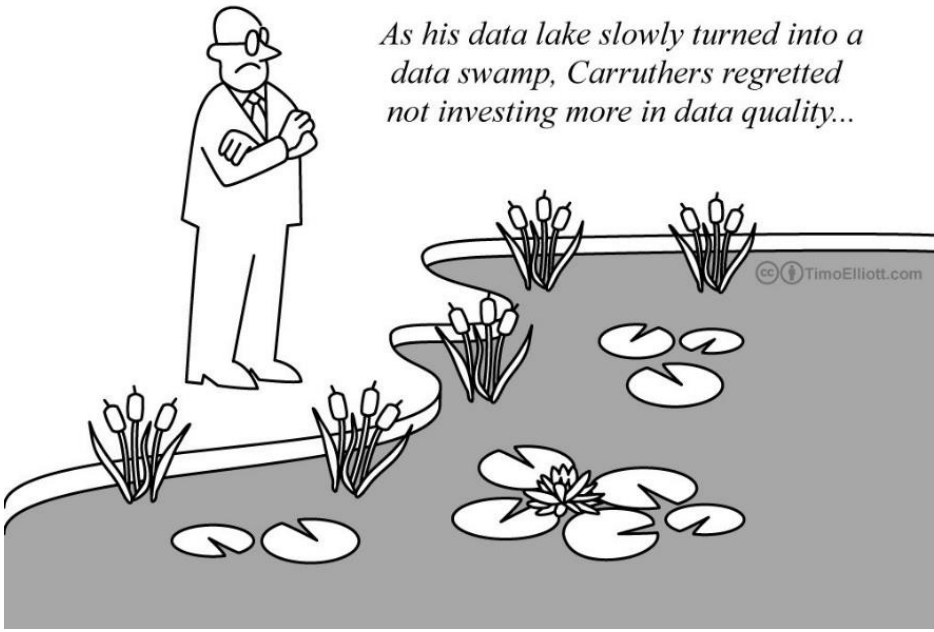
2/ The 5 Fundamental elements of
Manufacturing Data Enablement

3/ Performing Analytics at the right level
Closest to the Source

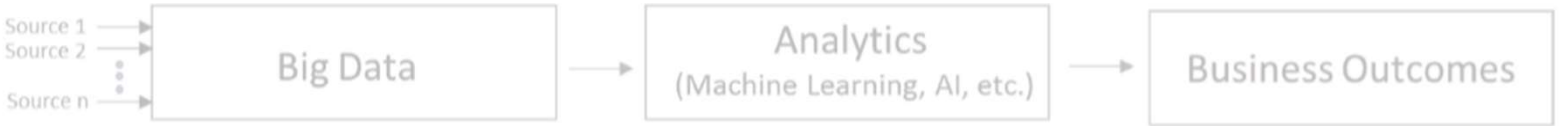
Big Data versus Smart Data

Common Approach to Extracting Business Value from Data





Smart Data versus Big Data



Common Approach to Extracting Business Value from Data

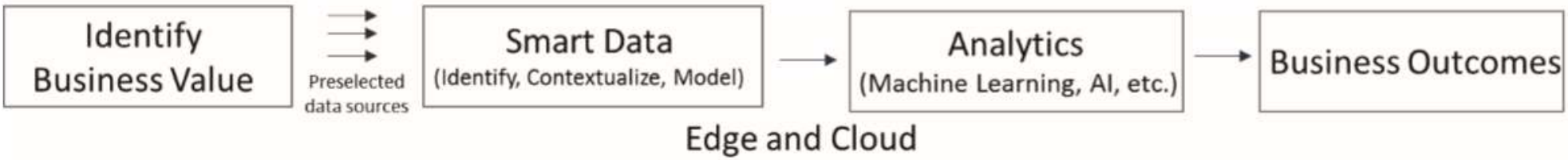
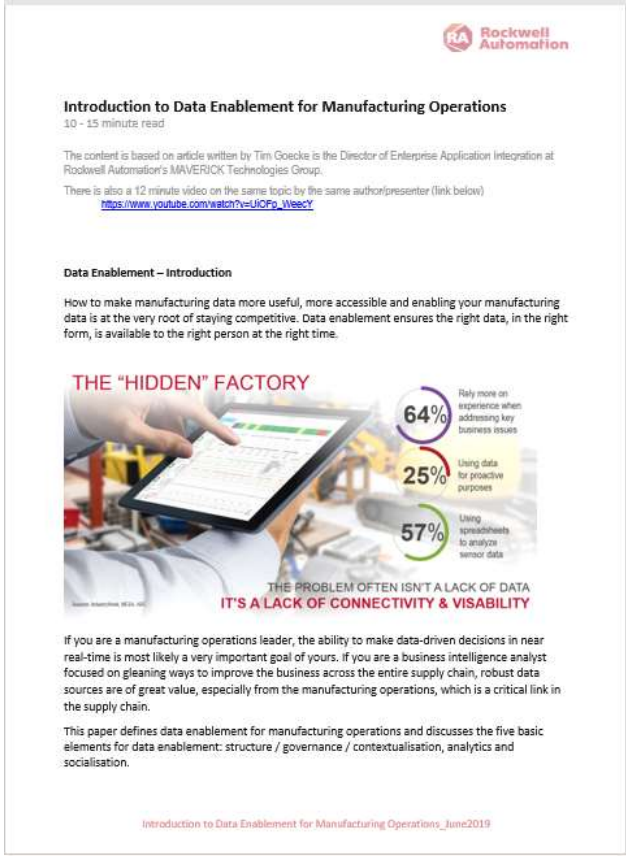


Figure 2. Industrial IoT: Approach for Faster time to Value from Data and Analytics

Manufacturing Data Enablement

Whitepaper and YouTube Webinar Available



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Introduction to Data Enablement for Manufacturing Operations

10 - 15 minute read

The content is based on article written by Tim Goecke is the Director of Enterprise Application Integration at Rockwell Automation's MAVERICK Technologies Group.

There is also a 12 minute video on the same topic by the same author/presenter (link below)
https://www.youtube.com/watch?v=UiOFp_WeecY

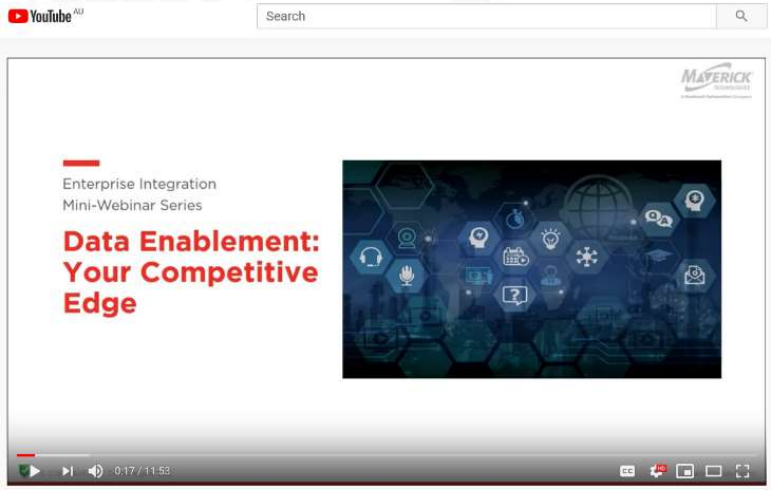
Data Enablement – Introduction

How to make manufacturing data more useful, more accessible and enabling your manufacturing data is at the very root of staying competitive. Data enablement ensures the right data, in the right form, is available to the right person at the right time.

If you are a manufacturing operations leader, the ability to make data-driven decisions in near real-time is most likely a very important goal of yours. If you are a business intelligence analyst focused on gleaning ways to improve the business across the entire supply chain, robust data sources are of great value, especially from the manufacturing operations, which is a critical link in the supply chain.

This paper defines data enablement for manufacturing operations and discusses the five basic elements for data enablement: structure / governance / contextualisation, analytics and socialisation.

Introduction to Data Enablement for Manufacturing Operations_June2019



Data Enablement Mini Webinar

https://www.youtube.com/watch?v=UiOFp_WeecY

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Manufacturing Data Enablement

Basic Definition and 5 Basic Elements

Types of data:

- Process Data
- Instruments
- Sensors
- Equipment Performance
- Materials
- Quality
- Process Orders
- Log Sheets
- Maintenance

Roles:

- Operations
- QA
- Product Design
- Sourcing
- Supply Chain
- R&D
- Maintenance
- Continuous Improvement

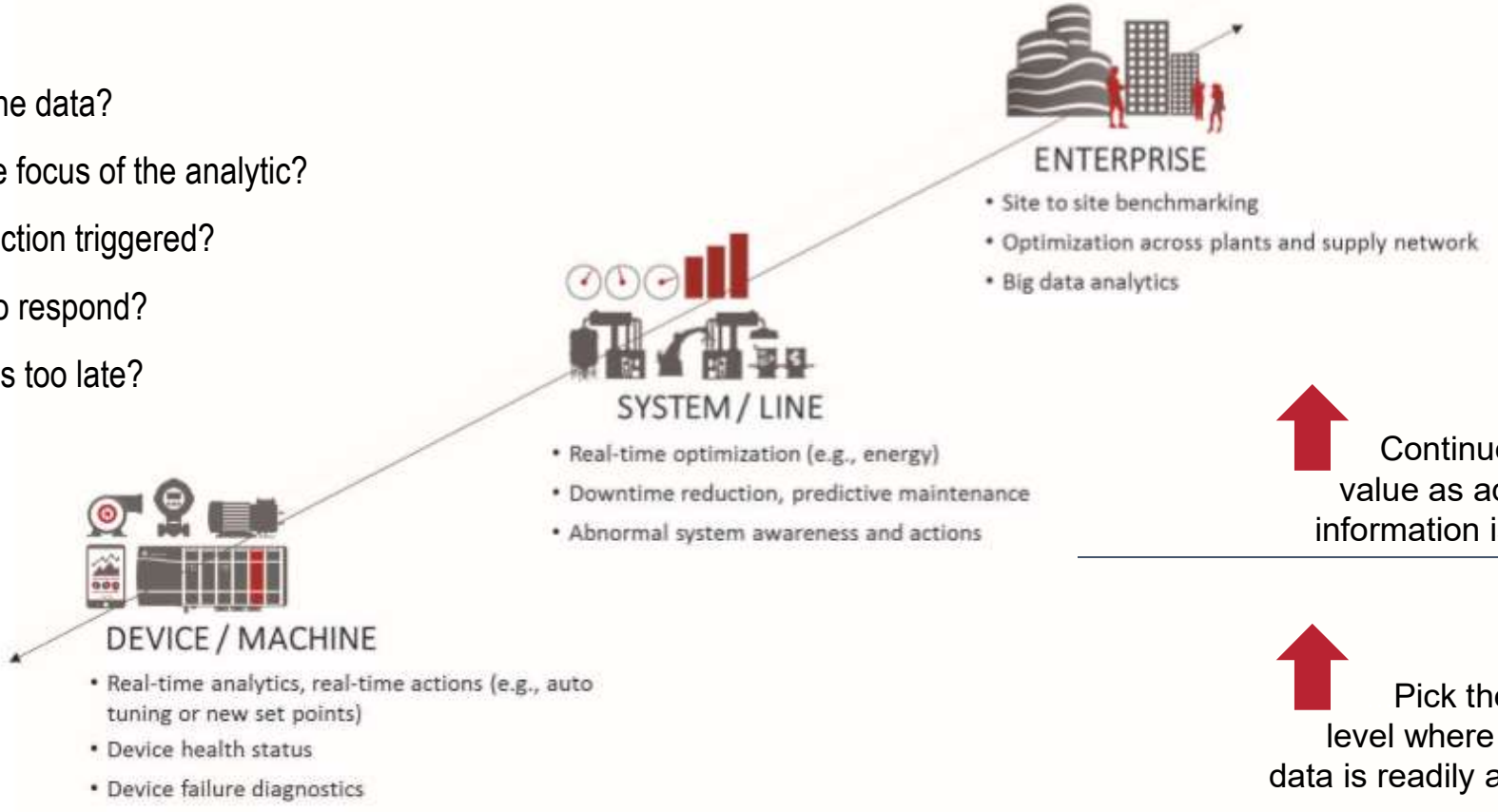
Data Enablement entails five basic elements:

1. Collection
2. Structure
3. Contextualisation
4. Analyse
5. Socialisation

Scalable Processing of Data for Value

Analytics and Machine Learning - RUN WHERE IT MAKES SENSE

- Where is the data?
- What is the focus of the analytic?
- Where is action triggered?
- Who has to respond?
- How slow is too late?



Continue to add value as additional information is added

Pick the lowest level where needed data is readily available

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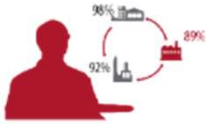
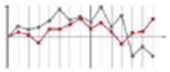
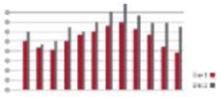
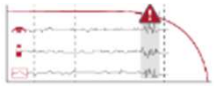
Scalable Analytics – A Key Differentiator

	DESCRIPTIVE	DIAGNOSTIC	PREDICTIVE	PRESCRIPTIVE
ENTERPRISE	 Which facility performed the best?	 Why is Site A throughput behind plan?	 I predict that Site A will be behind plan soon.	 What action should I take to avoid Site A from falling behind plan?
SYSTEM	 Is Line 1 running ok?	 Why is Line 1 quality poor?	 I predict that Line 1 quality is moving out of tolerance.	 What action should the operator take to avoid poor quality?
DEVICE	 Am I running ok?	 Why did a fault happen?	 I predict a fault will happen soon.	 What action should be taken to avoid the fault?

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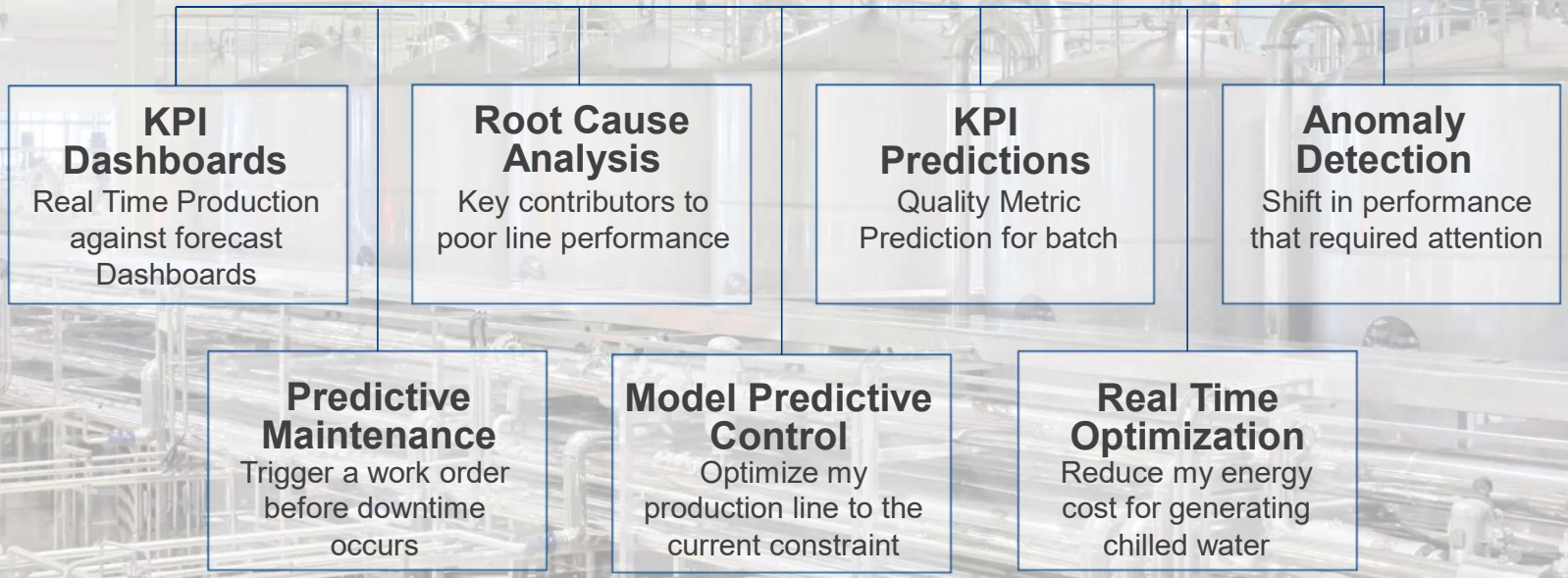
ANALYTIC OUTCOMES

IN FOOD & BEVERAGE PROCESSING



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Building a Strategic Plan for Digital Transformation

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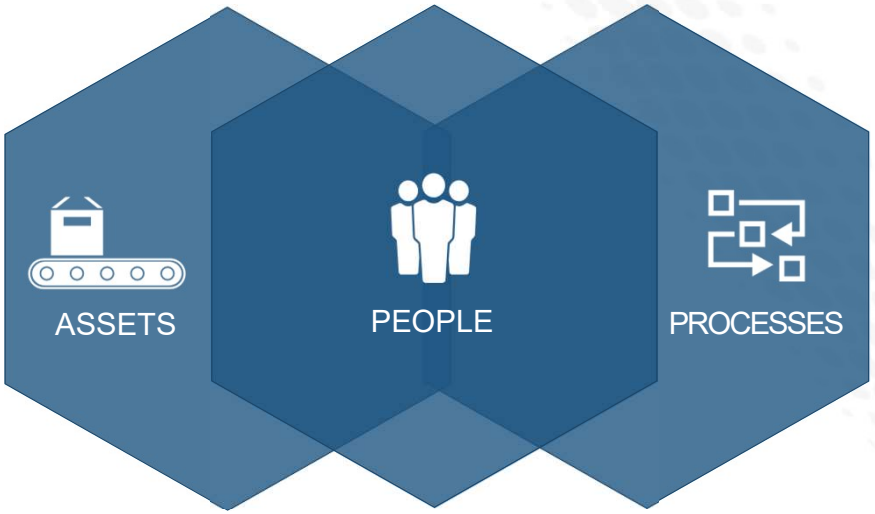
Transformation drives competitive outcomes

Smart Connected Assets Drive Step-change Improvements in Utilisation & Reliability



Smart Connected Processes Enable Breakthroughs in Operational Effectiveness

Smart Connected People
Make Workforce Productivity and Safety Soar

Building a Manufacturing Digital Transformation Strategy

- Where do I start?
- What is the business case?
- What is the Roadmap?
- Where do I invest?
- How and what to prioritise?

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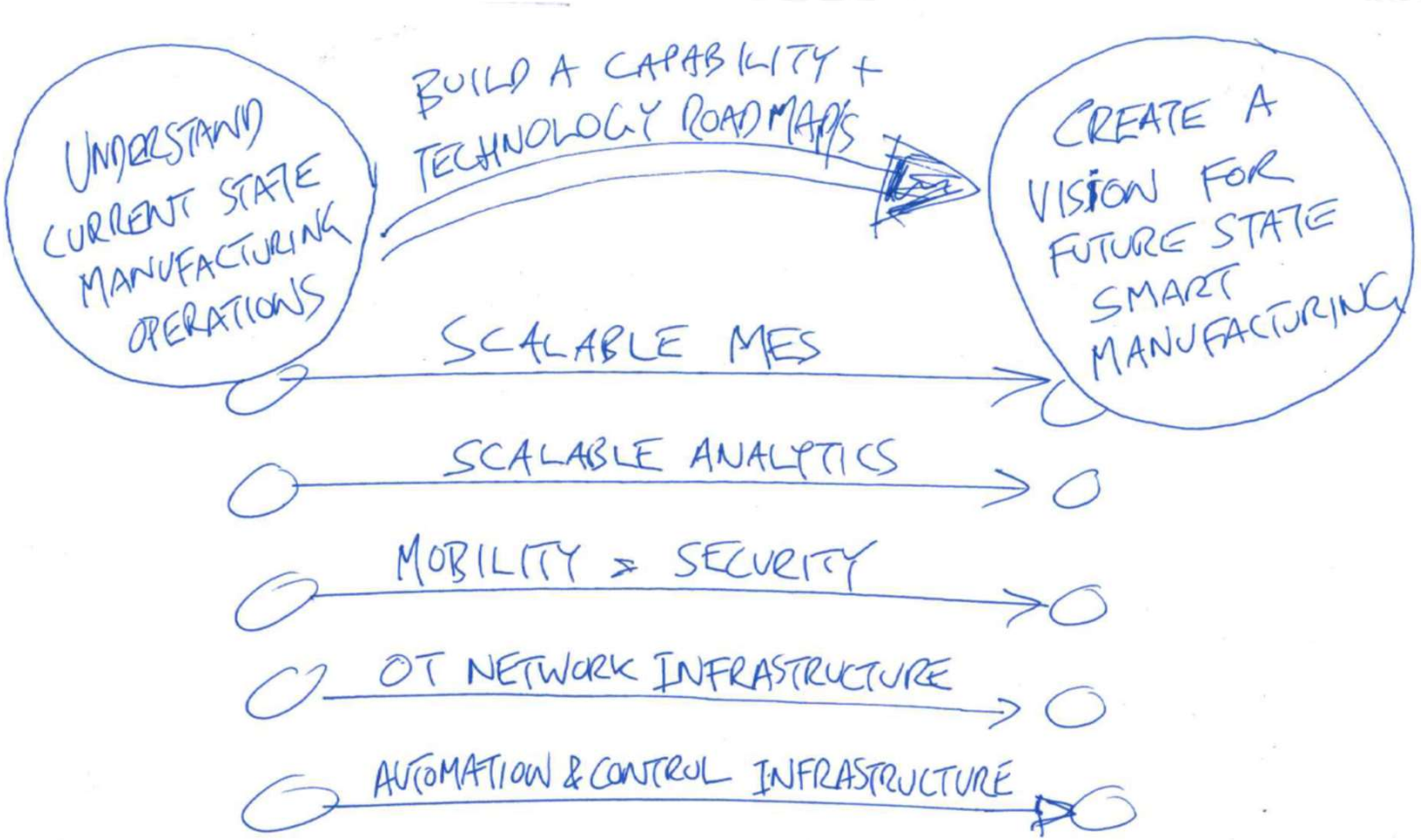
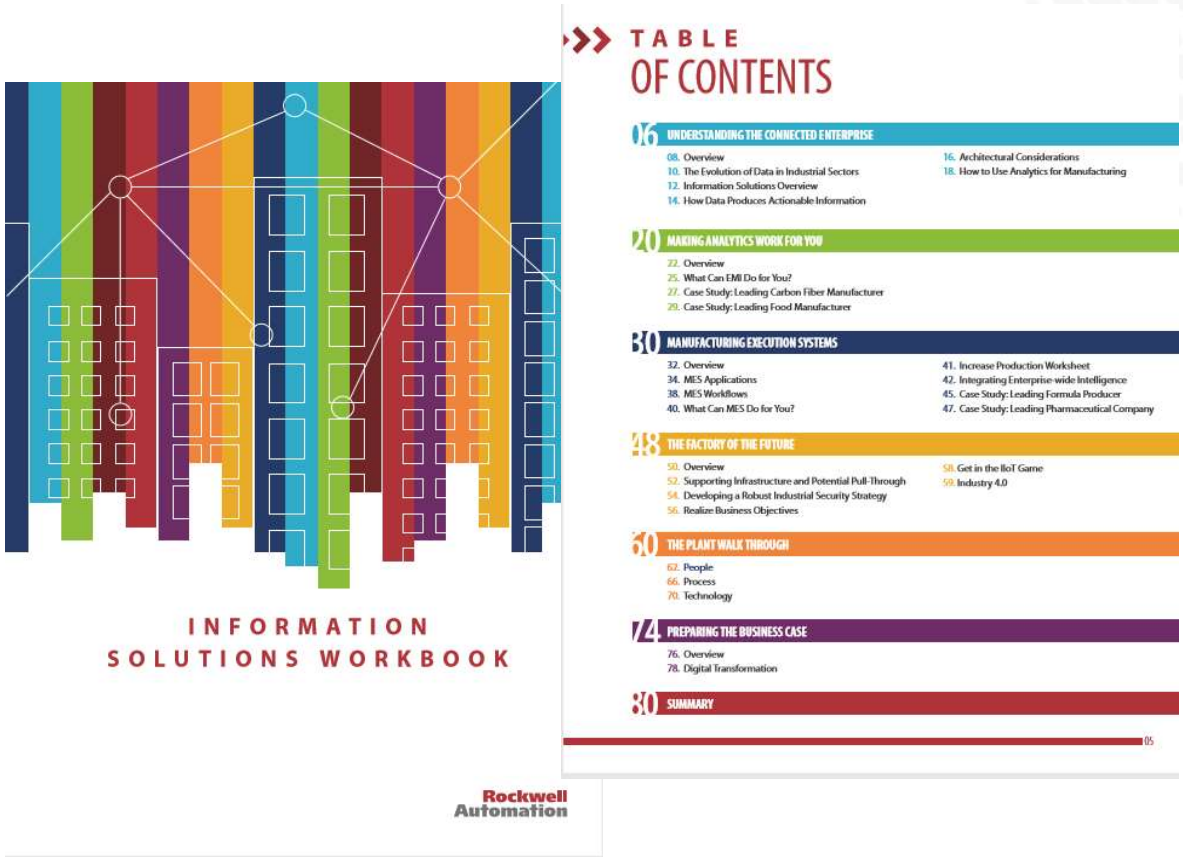
Digital Transformation Discovery Process



Information Solutions Workbook

Great Reference for Manufacturing Digital Transformation

http://rockwell.lookbookhq.com/scio/manuf-analytics-workbook

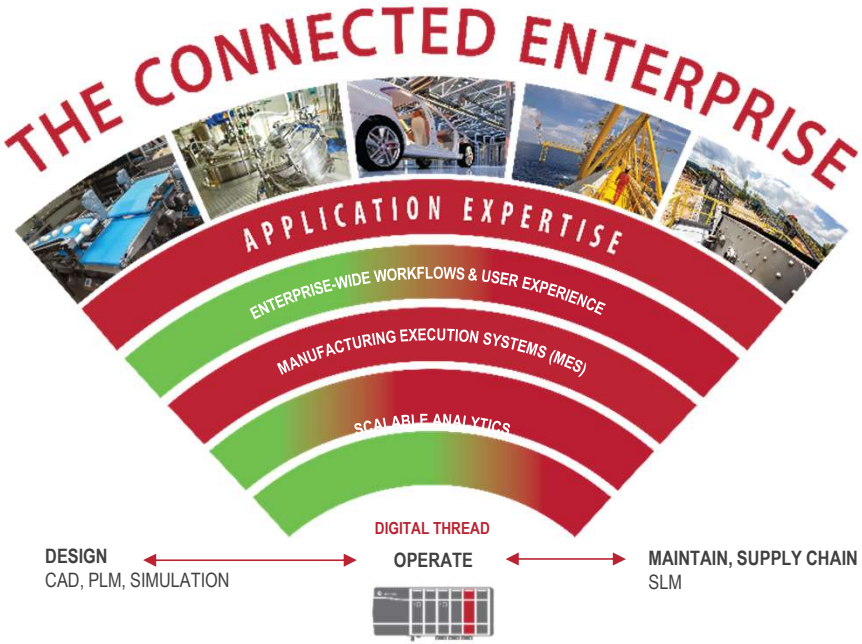


- Smart Manufacturing/The Connected Enterprise/Industry 4.0/IIoT etc
- Difference between MES and Analytics
- Value of MES and Analytics
- Factory of the Future and What future state could look like
- What we would typically do on “The Plant Walk Through”
- Preparing the Business Case

Back-up Slides

ptc

- Built for Industrial Innovation
- Quickly Deploy Industrial Apps
- Augmented Reality Experience
- Agile and Flexible
- Wrap and Extend Existing Technology
- Expansive Ecosystem



Rockwell Automation

- IIoT Installed Base
- Industry Application Expertise
- Customer Innovation Process
- Scalable from Cloud – Edge – Device
- Understanding of Real Time Data

Our combined capabilities create the most comprehensive, flexible industrial information platform in the market

CAD	PLM	Augmented Reality	IoT	Connectivity
creo	windchill	vuforia, thingworx, kepware	FactoryTalk	Allen-Bradley

FT InnovationSuite powered by PTC

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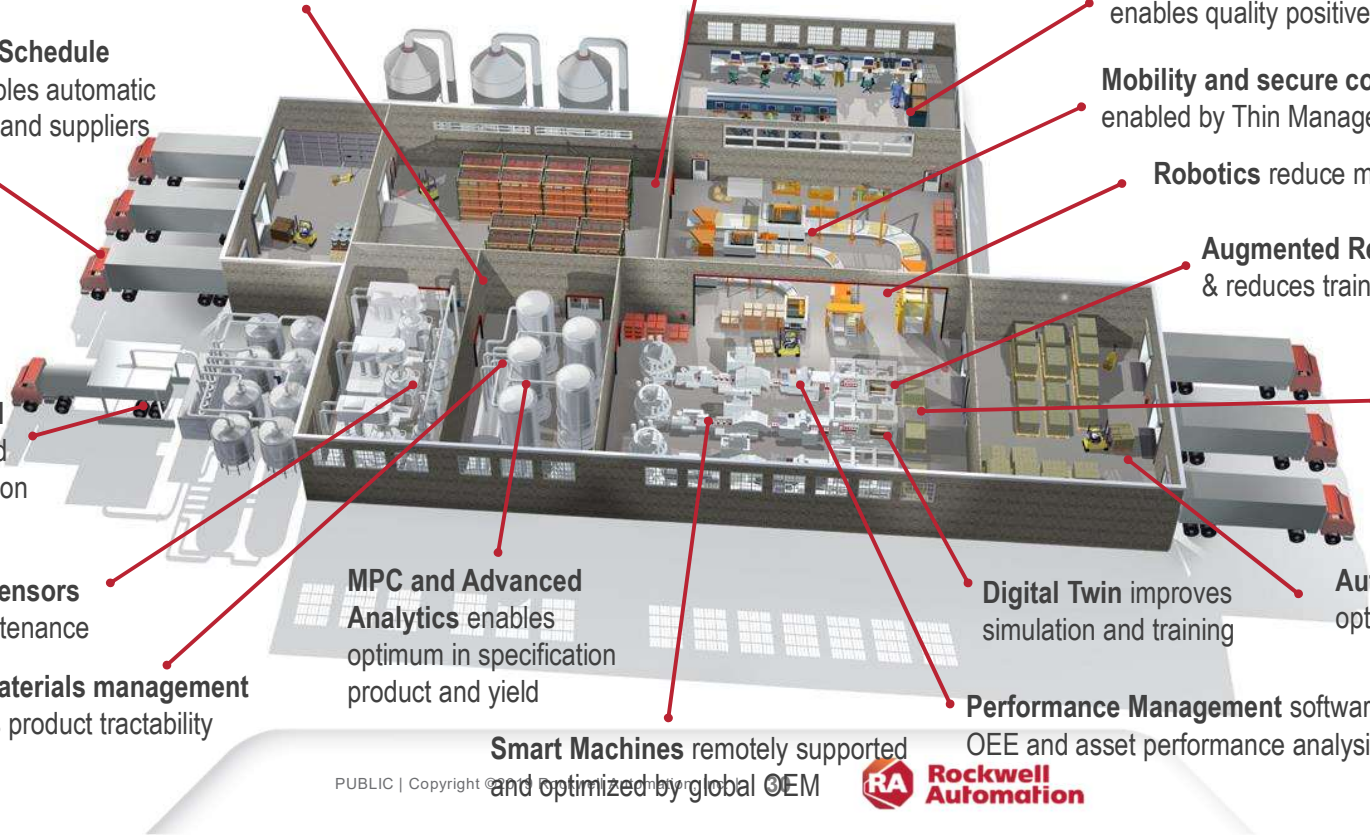
Digitisation in Food & Beverage and How it Changes Operations



Warehouse Management inside plant gives business visibility and traceability of dry goods, staging areas, ingredients etc

In-Process quality control reduces cost of quality

Paperless Quality Management enables quality positive release

Visibility into Production Schedule and Inventory Levels enables automatic restocking of raw materials and suppliers to deliver just in time

Mobility and secure content delivery enabled by Thin Manager

Robotics reduce manual work needed

Augmented Reality enable remote support & reduces training costs

Material Receipt into MOM enable increases quality and traceability through verification of quality and Lot ID

Serialisation ensures product authentication

Smart Devices and Sensors enable predictive maintenance

MPC and Advanced Analytics enables optimum in specification product and yield

Digital Twin improves simulation and training

Autonomous vehicles optimize logistics

MOM materials management provides product tractability

Performance Management software provides OEE and asset performance analysis

Smart Machines remotely supported and optimized by global OEM

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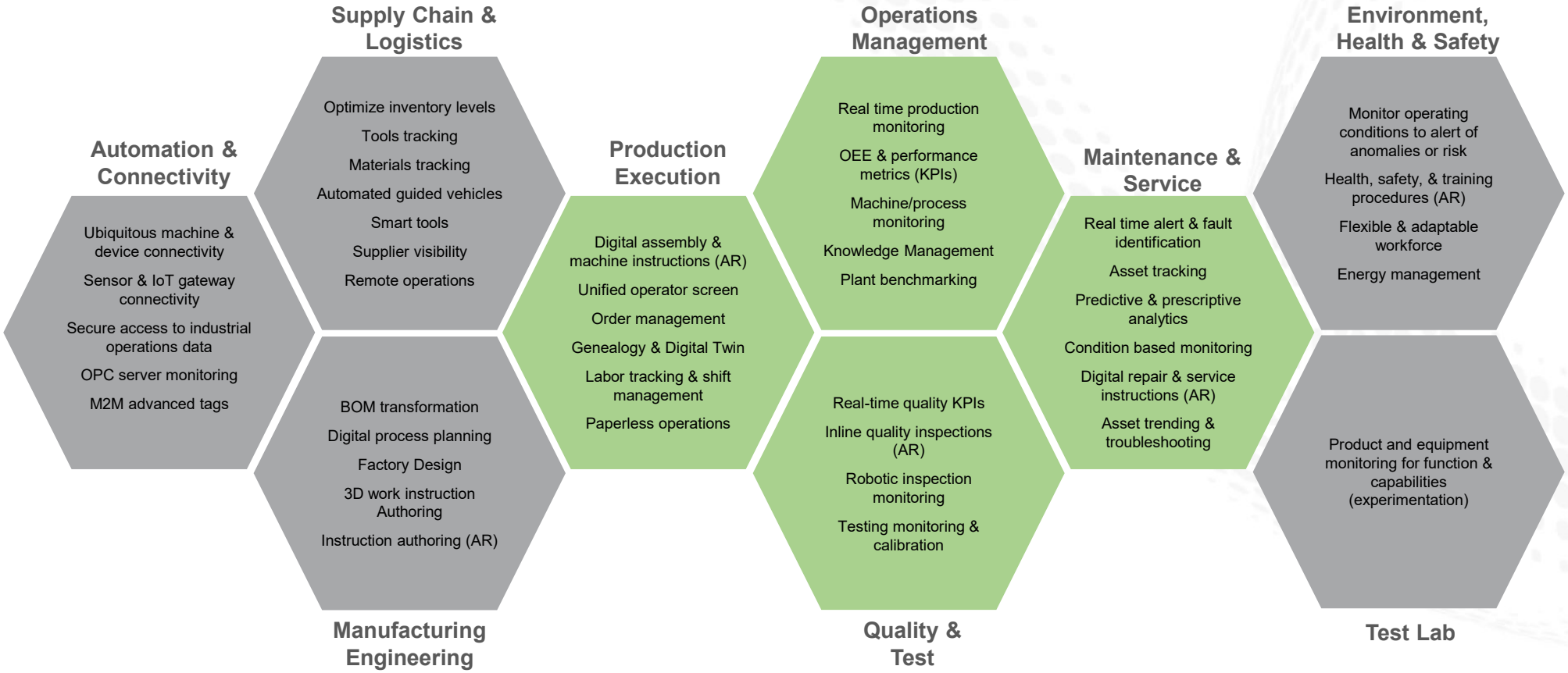
Select IIoT and Smart Manufacturing USE CASEs



WEA 2019

Presentation Synopsys

Leveraging your automation systems moving into the fourth industrial revolution

The question being asked by many food & beverage manufacturing operations is how you take the existing automation systems in your facilities processing and packaging operations and start on journey towards an Industry 4.0 and “Big Data Ready” operations.

There are many emerging and disruptive technologies enabling the fourth industrial revolution. This session will focus in on a couple of theses enabling technologies that are closest to the automation systems and look at how they can be applied to drive productivity on the plant floor.

We will also discuss some guiding principles to lay a foundation to accelerate the time to value from these digital technologies. Also we will touch on the concept of Data Enablement to prepare your organisation automation infrastructure to be “future ready” as we rapidly move into the age of the Industrial Internet of Things, Big Data and digital transformation on the plant floor.