I4.0: FINDING OPPORTUNITY FOR A COMPETITIVE EDGE

Paul E Juras, PhD, CMA, CPA
Babson College
May 16, 2019

Changing competitive landscape

It is all about the data

Merck – smart factories
Pfizer – connected manufacturing
Sanofi – digital twins and AR
Johnson & Johnson – Apple partner
Data costs are dropping

2004 average cost: $1.30

2020 average cost forecast: $0.38

Source: Bank of America; Merrill Lynch

The race has begun
New technologies are attractive

A Promise or Hype?

• Higher quality products
• Improved responsiveness to market demands
• Cycle time reduction
• Shorter lead times
• Maintaining margins while facing pricing pressures
• Optimization of asset performance
• Improve quality control
• Continuous replenishment for customers while minimizing your own inventories
• Increased energy efficiency
Navigating a path to value creation

- Understand customers and build relationships
- Efficient operations and optimized supply chains
- Innovative products and services
Six general areas of focus in manufacturing: Large Pharma Company

- Asset Performance Optimization (APO)
- Digital Performance Management (DPM)
- Integrated Quality & Real Time Release
- Smart Factory
- 3D Printing
- Materials Science

Use domain-specific data to solve industrial challenges

Reactive maintenance
Condition-based monitoring + advanced analytics and AI: OXYS Corporation

Did what happened here lead to this?

Chance for predictive maintenance?

Example of Historical Data Analysis: OXYS
A more focused data science approach: OXYS

Critical Feature

Humans in the loop:
Human expert was critical in selection of this single feature which very accurately separates known-good from known-bad manufacturing runs

From batch manufacturing to Real Time Release - Janssen Supply Chain headlines

April 2016 - FDA Approves Tablet Production on Janssen Continuous Manufacturing Line

June 2017 - EMA Approves Janssen Drug Made Via Continuous Manufacturing

January 2019 – Janssen achieves a Pharmaceutical First in Continuous Manufacturing
Current versus expected state: Janssen

- Space: 7 Rooms vs. 2 Rooms
- Quality assurance: Make then Test vs. Continuous Quality monitoring
- Production time: 2 Weeks vs. 1 Day

Source: Janssen infographic

Projected long term benefits: Janssen

- 80% reduction in manufacturing and testing cycle time
- 33% yield increase through waste reduction

Source: Janssen infographic
The 4.0 Implementation Continuum

Information flow
– a strategic requirement

Suppliers
Organization
Customers

Supply chain impact

Develop Plan Source Make Deliver Support

3-D Printing - Aprecia

Self-printed
Cyber-physical systems

Data drives action

Digital Core

Develop

Plan

Source

Make

Deliver

Support

Maximize information flow – collaboration and cooperation are the result, along with faster delivery of business value
The 4.0 race to capture value has begun - What kind of race will you run?

THANK YOU

PAUL JURAS
PJURAS@BABSON.EDU