On the Road to Smart Manufacturing

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@RealTimeRick

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Key Questions

1. What are the key technologies we need to apply to achieve smart manufacturing goals?
2. Does MES still fit in as part of an overall smart manufacturing strategy?
3. How will these technologies evolve?
4. Is there anything we're missing?

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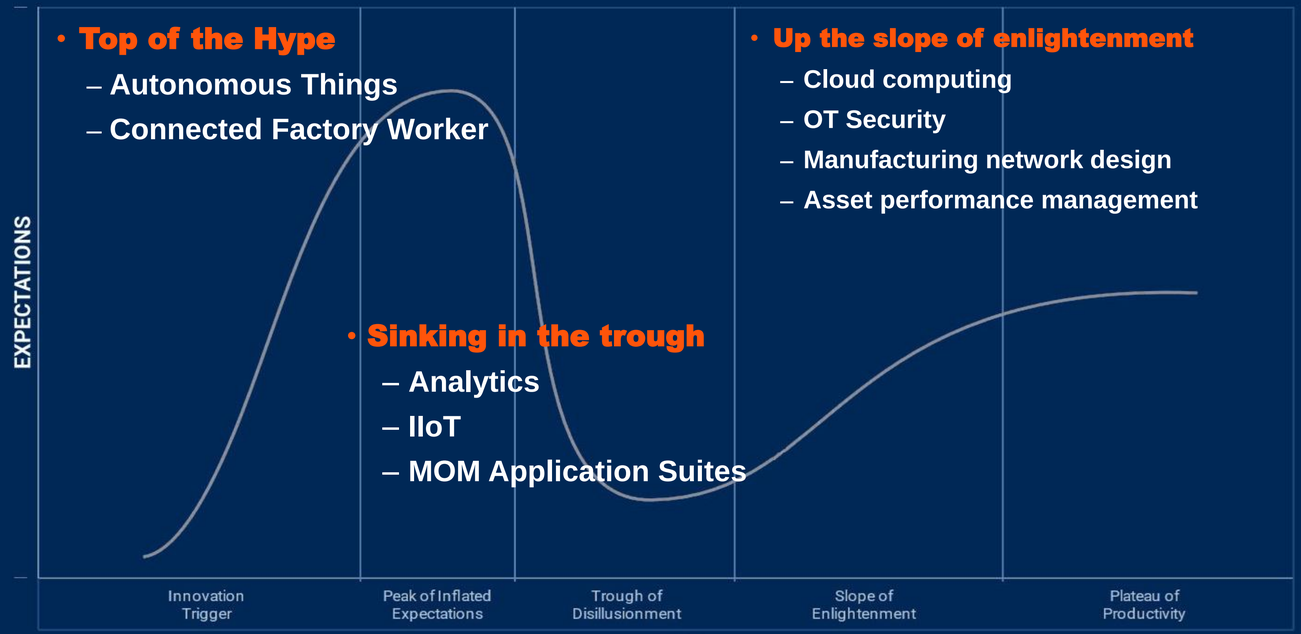
Hype Cycle for Manufacturing Operations Strategy



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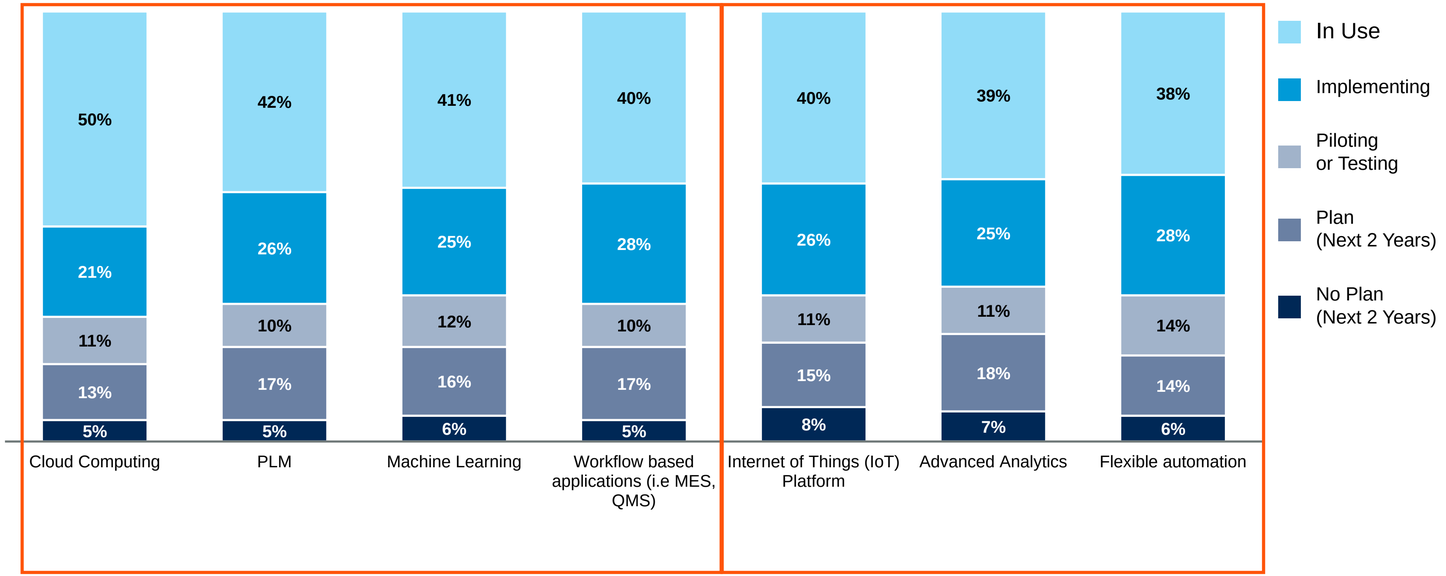
Current Adoption … And New Foundation



Base size vary, n = 427-436 supply chain professionals

Q: For each of the following technology areas, please indicate your organization's adoption status or plans

Source: Gartner 2020

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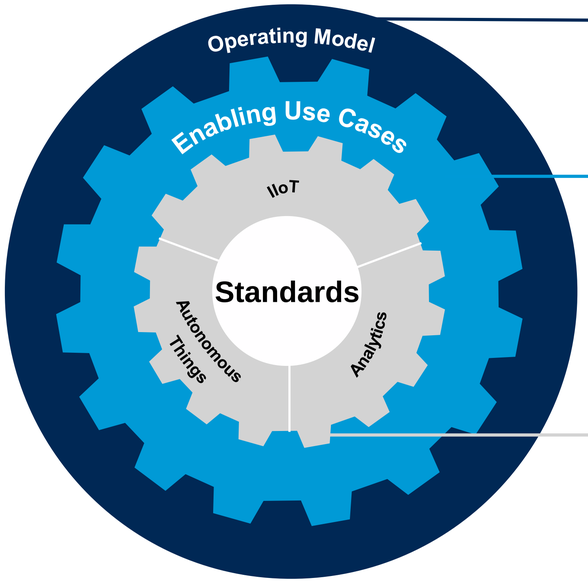
Smart Factories Have Three Components



How the Business Works
Strategy and culture
Operating systems deployment and capability building

Use Cases
Blend of technology, data management/processing, and workflow

Foundations
Common processes, controls, measurements

Source: Gartner 2021

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Key Issue Take-Away:

While smart manufacturing is creating new value streams, transactional software systems are still required to keep production running.

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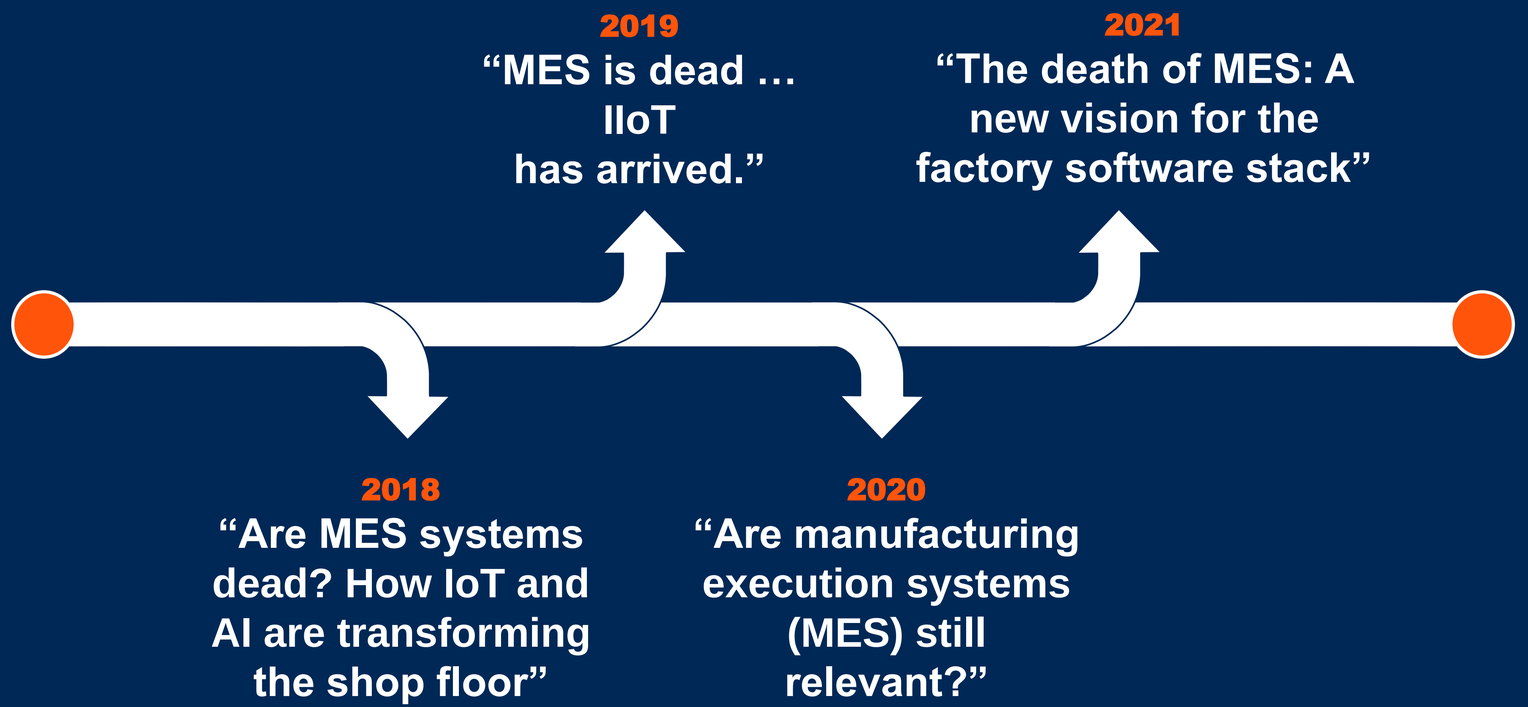

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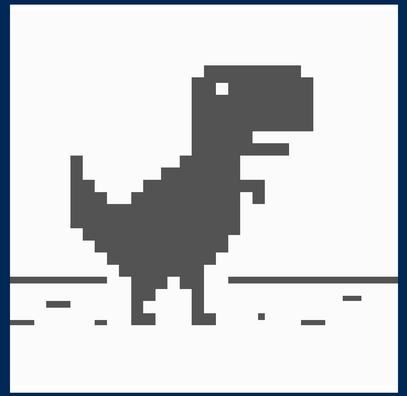
Legacy MES Limitations



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MES Functions (and Challengers)

Execution

Connected Factory Worker

Orchestration

Platform Solutions

Monitoring

IIoT/ Analytics

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Key Issue Take-Away:

Regardless of the three-letter acronym, the *functions* performed by MES are essential and foundational to smart manufacturing.

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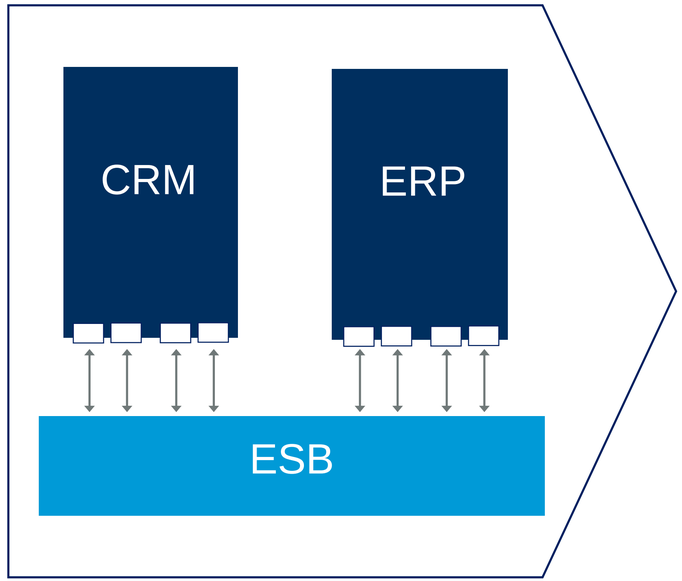
Software Architecture Evolution

Packaged Applications
(Project-Style Delivery)

- **2000s**
  - Business Applications
- **2010s**
  - Manufacturing Applications



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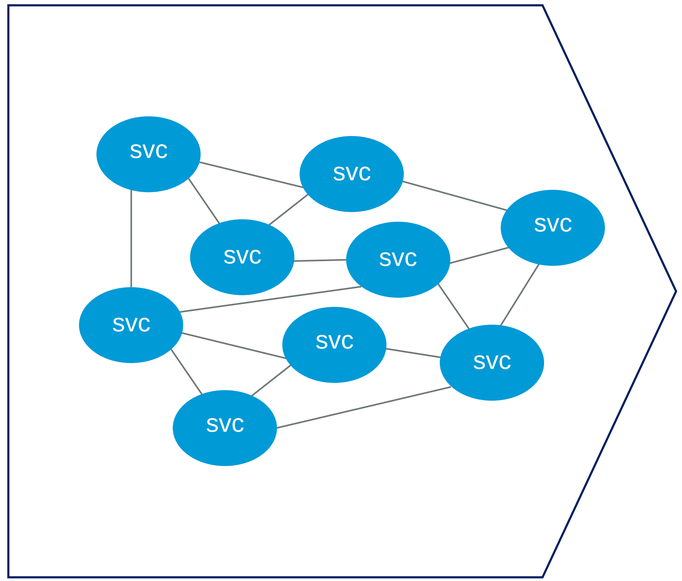
Software Architecture Evolution

Microservices
(Product-Style Delivery)

- **2010s**
  - Business Applications
- **2020s**
  - Manufacturing Applications



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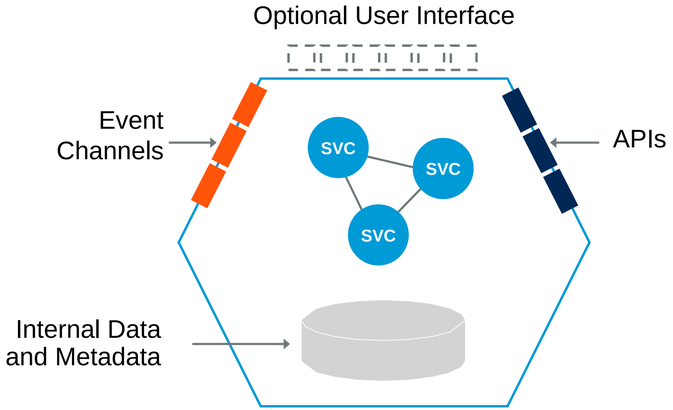
Software Architecture Evolution

Packaged Business Capabilities (Market Delivery)

- **2020s (now)**
  - Business Applications
- **2020s (when?)**
  - Manufacturing Applications



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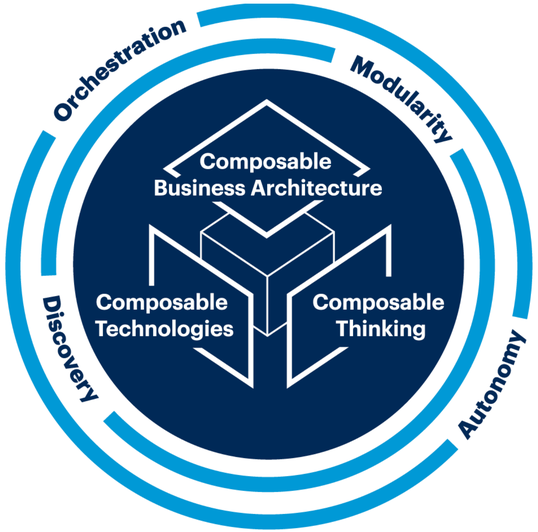
Composability Helps You Thrive Amid Disruption



Thinking	Everything is composable. Culture emphasizes exploration.
Business Architecture	Strategy for proactive adaptability and resilience in the face of uncertainty.
Technologies	Digital assets designed as composable building blocks and technologies that enable composition.

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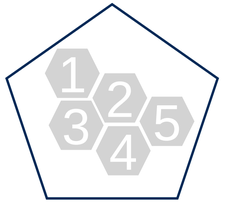
Packaged Business Capabilities in the Real World

Vendor Application PBCs
- Audience — 100s



- MOM Application Suite

Business Unit PBCs (IT)
- Audience — 10s

- Select vendor applications with IT-generated PBC extensions

Self-Service PBCs
- Audience — 1

- Vendor and business unit PBCs with personalized extensions

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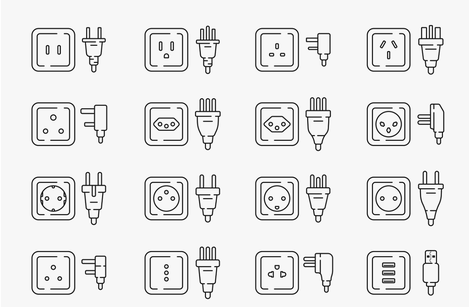
But Reuse is Hard and Expensive!

APIs aren’t reusable by default

- APIs don’t always fit
  - Incorrect workflow
  - Incomplete data
  - Semantically incompatible
  - Version discrepancies



Most companies reuse <10% of their APIs

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Development Teams Don’t Build for Reuse

YAGNI

You Aren’t
Gonna Need It

"Always implement things when you actually need them, never when you just foresee that you need them."

- Ron Jeffries, Founder
  Extreme Programming Methodology

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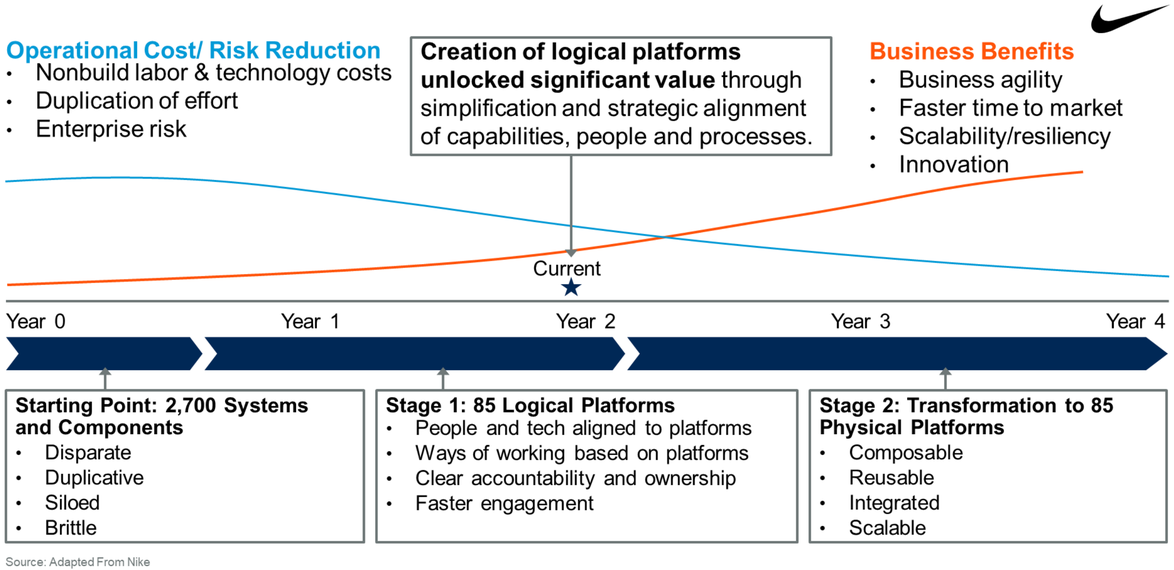
Benefits Across Nike's Platform Transformation



Source: Adapted From Nike

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Key Issue Take-Away:

The answer to the question “Are composable manufacturing systems in your future?” is “Yes”, but the hard part is business transformation, not technology.

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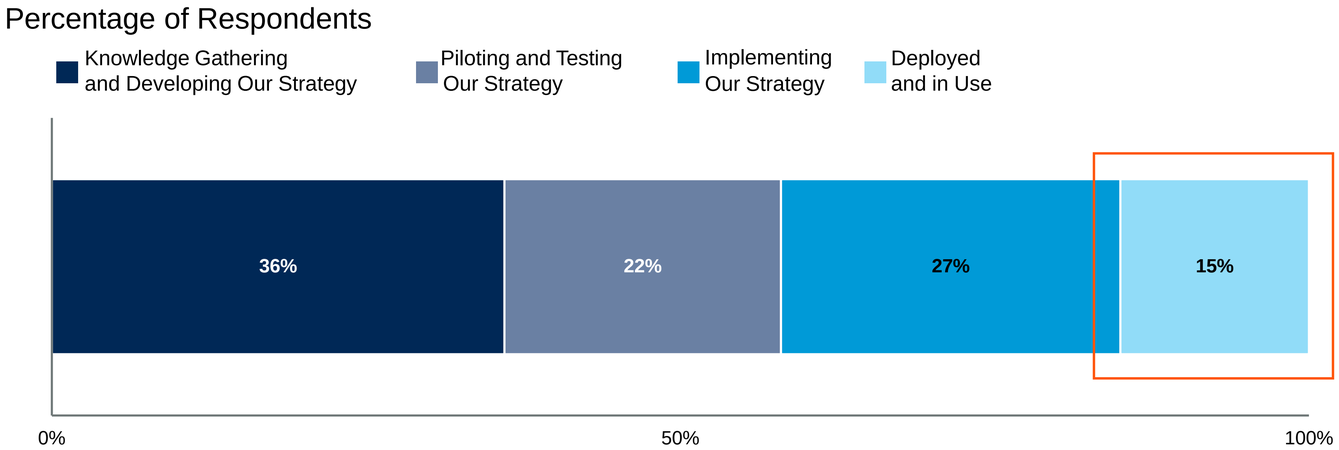
Current State of Smart Manufacturing Strategy



Bottom line: It's not too late to start.

n = 439 total respondents

Q: What is the current state of your company's smart manufacturing strategy?

Source: Gartner 2020

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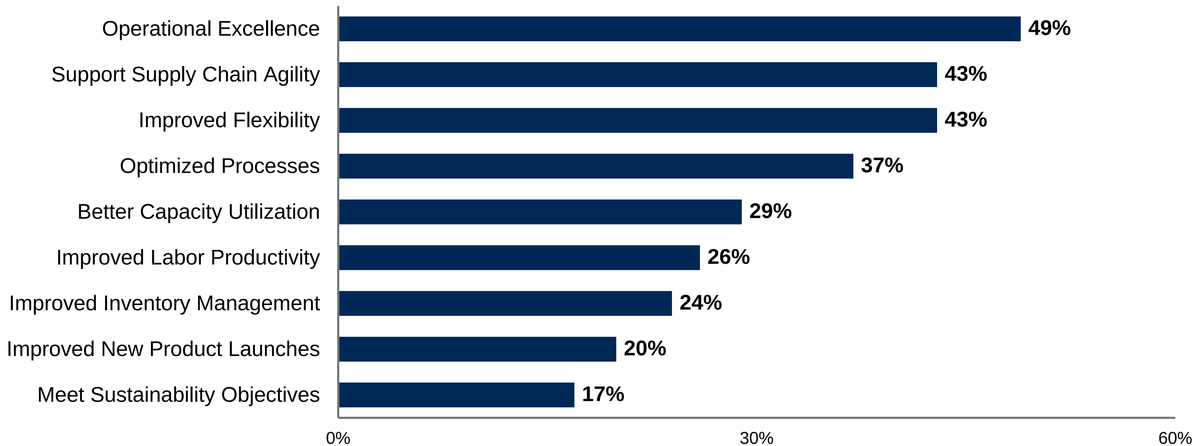
Optimize … Then Transform …

Smart Manufacturing Benefits Organizations by Delivering Reliable Supply From Efficient Operations

Percentage of Respondents - Sum of top three



n = 439

Q: What are the top three benefits your organization expects to get/is currently experiencing from smart manufacturing?
Source: Gartner 2020

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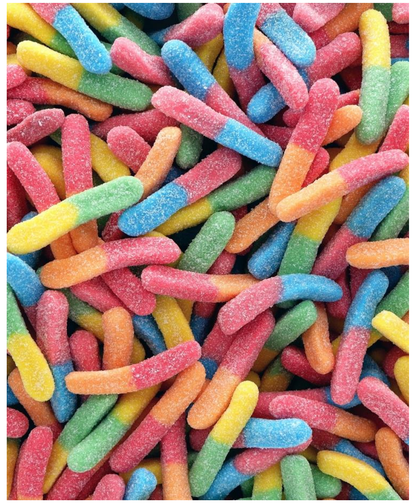
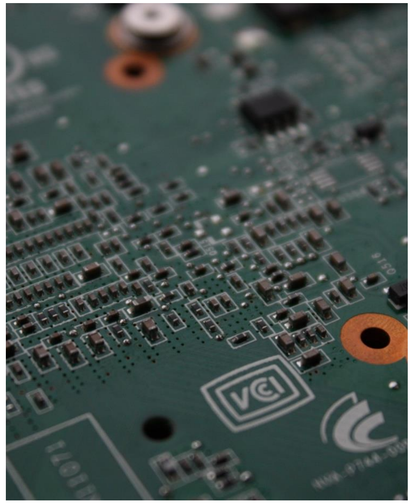
Continuous Improvement Examples



Improve product consistency



Improve fill rates and quality

Limit scrap and improve yield

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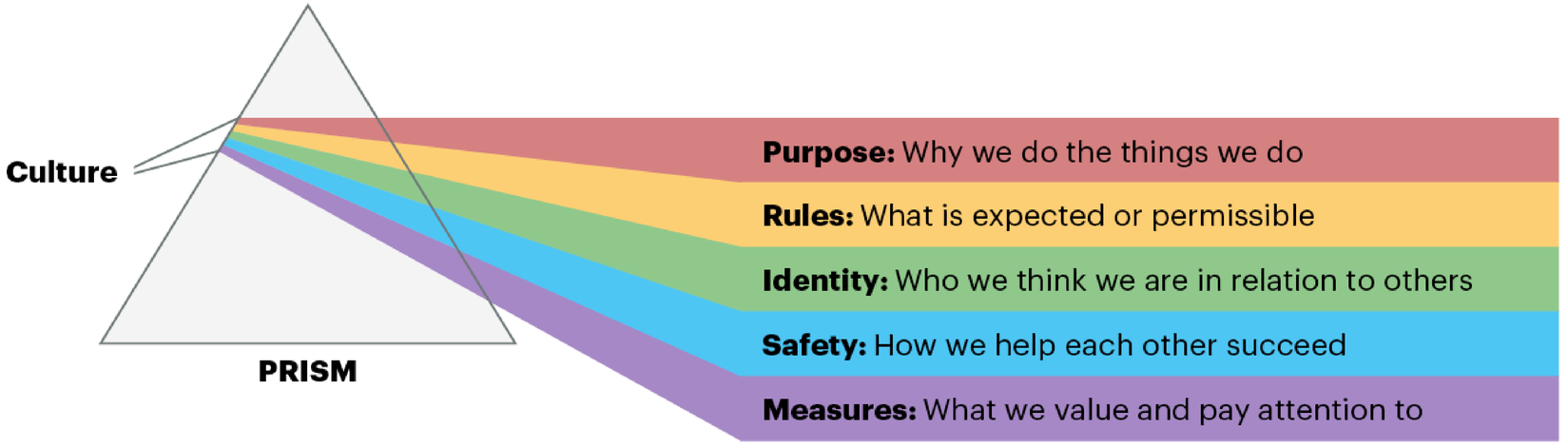
Culture



Source: Gartner

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Culture Enablers …

Execution

Orchestration

Monitoring

Rules

Identity

Purpose

Safety

Measures

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The Basic Building Blocks

Transactional Applications/Workflow

Data Visibility/Analytics

Data Connectivity/Integration Platform

Infrastructure

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Key Issue Take-Away:

Technologies come and go, but the in the end, smart manufacturing is built on strategy process, culture… supported by execution, orchestration and monitoring.

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Recommendations

- Investigate new technology to enable smart manufacturing pilots, vetting the required building blocks and technology roadmaps of candidate suppliers.
- The platform, infrastructure, roadmap, culture and domain expertise matter. Three letter acronyms do not matter.
- Focus pilots on incremental improvement when starting smart manufacturing. Look for the “adjacent possible” to gain continual momentum and continued success.
- Repeat. This is an iterative process in a changing world.

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