On the Road to Smart Manufacturing

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On the Road to Smart Manufacturing



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Key Questions

- goals?
- 3. How will these technologies evolve?
- 4.Is there anything we're missing?

1. What are the key technologies we need to apply to achieve smart manufacturing

2. Does MES still fit in as part of an overall smart manufacturing strategy?



Key Questions

manufacturing goals?

3. How will these technologies evolve? 4.1s there anything we're missing?

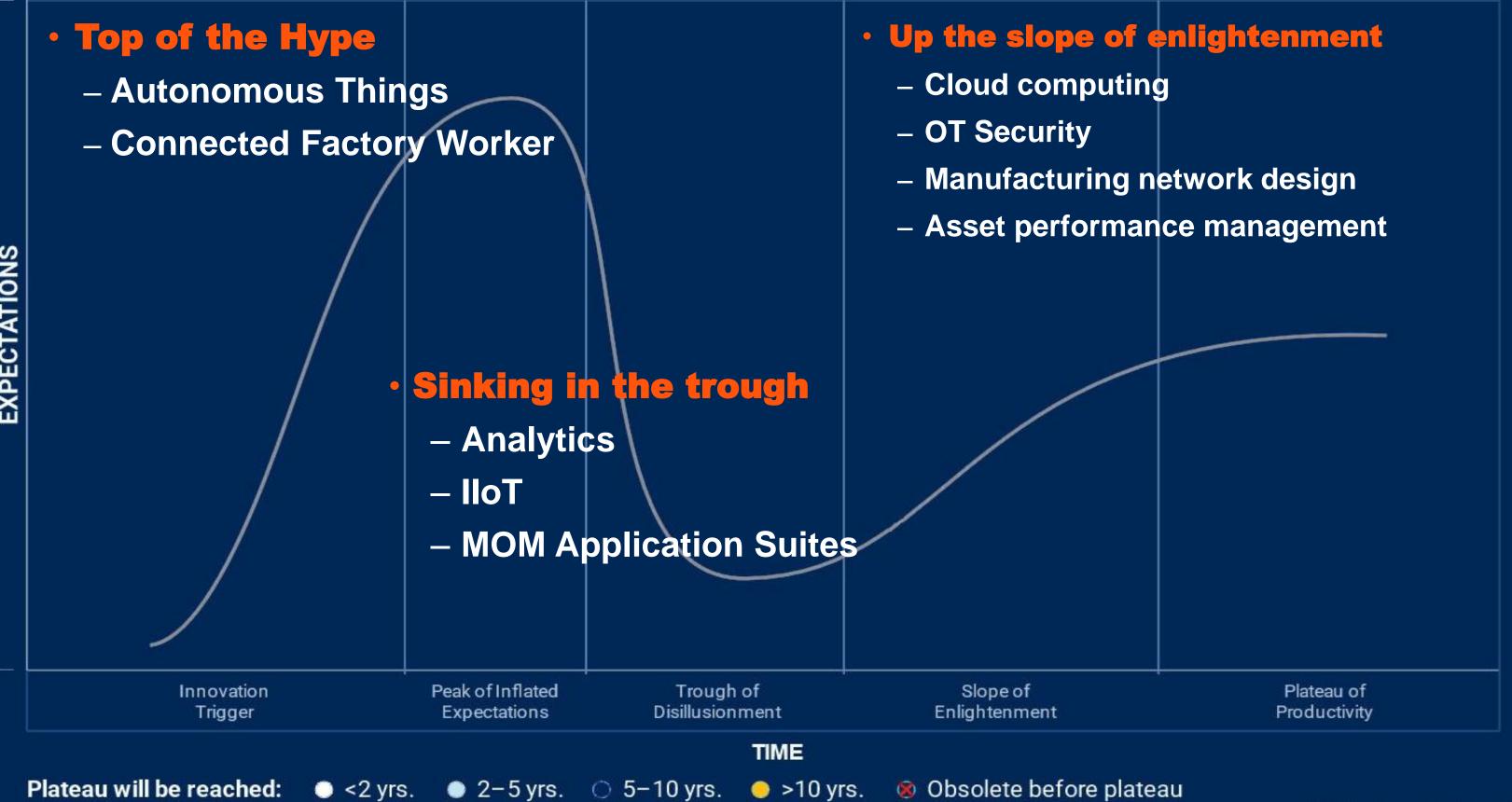
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Hype Cycle for Manufacturing Operations Strategy

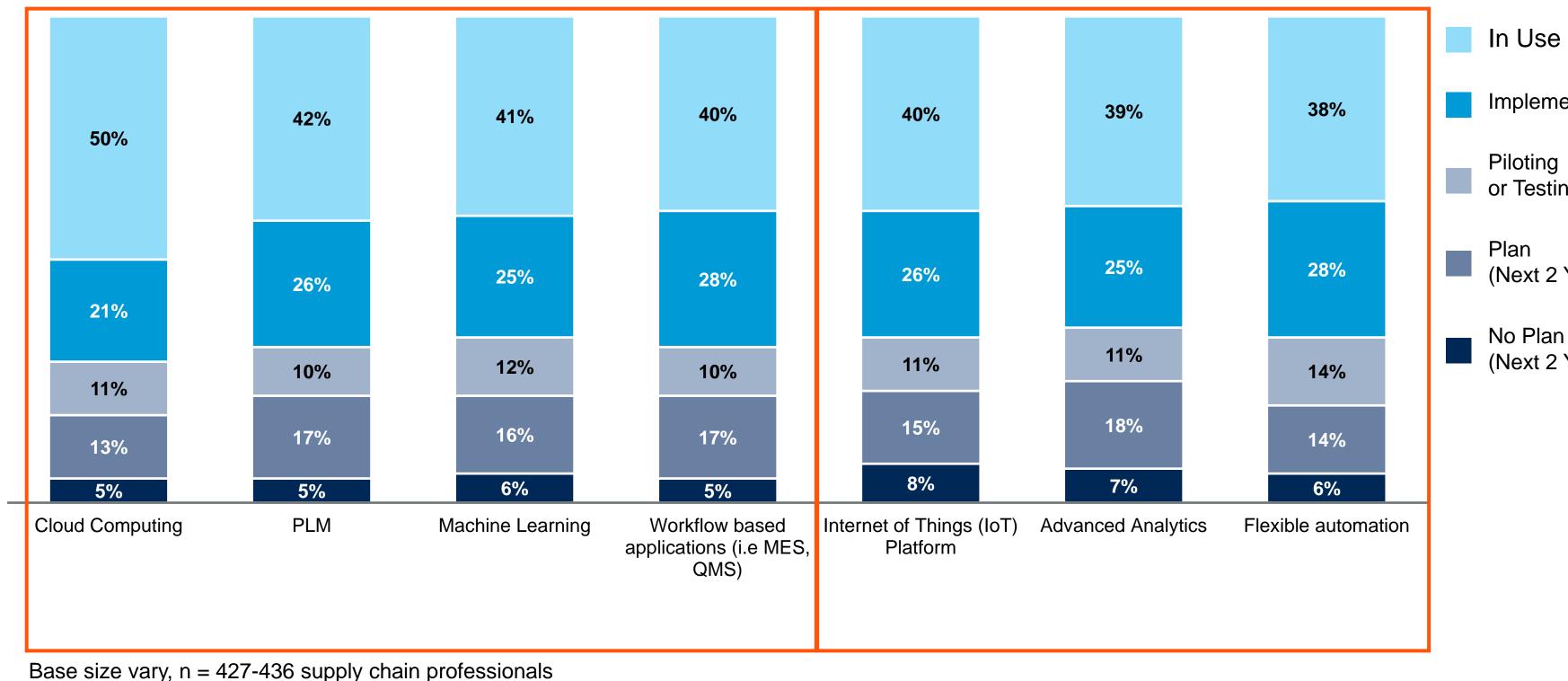


EXPECTATIONS



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Current Adoption ... And New Foundation



Q: For each of the following technology areas, please indicate your organization's adoption status or plans Source: Gartner 2020

Implementing

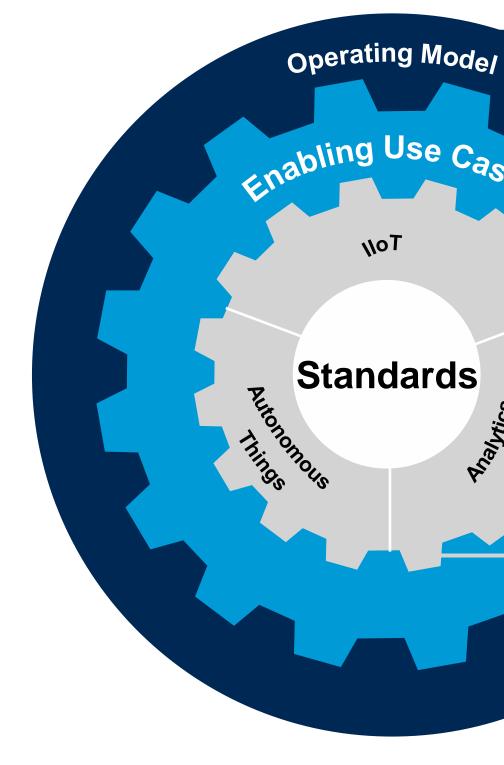
or Testing

(Next 2 Years)

(Next 2 Years)



Smart Factories Have Three Components



Source: Gartner 2021

How the Business Works

Strategy and culture Operating systems deployment and capability building

Use Cases

Blend of technology, data

management/process ing, and workflow



Foundations

Common processes, controls, measurements





Key Issue Take-Away:

required to keep production running.

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Key Questions

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?

1. What are the key technologies we need to apply to achieve smart manufacturing





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2019 "MES is dead ... lloT has arrived." 2021 "The death of MES: A new vision for the factory software stack"

2020 "Are manufacturing execution systems

(MES) still relevant?"



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Legacy MES Limitations

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MES Functions (and Challengers)



Execution

Connected Factory Worker

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Orchestration

Monitoring

Platform **Solutions**

Analytics



Key Issue Take-Away:

smart manufacturing.

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



Key Questions

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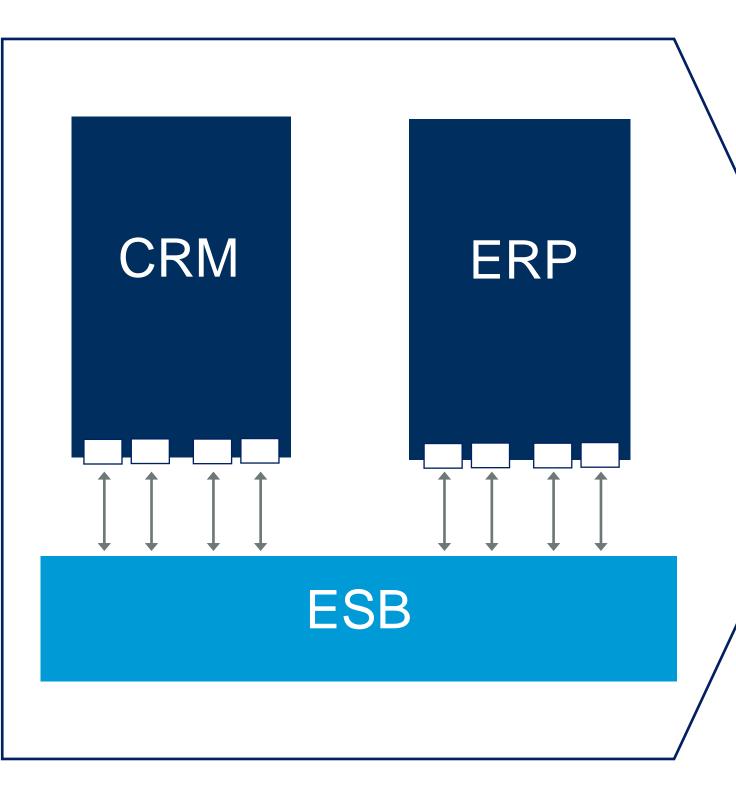
Software Architecture Evolution

Packaged Applications (Project-Style Delivery)

• 2000s

– Business Applications

- 2010s
- Manufacturing Applications





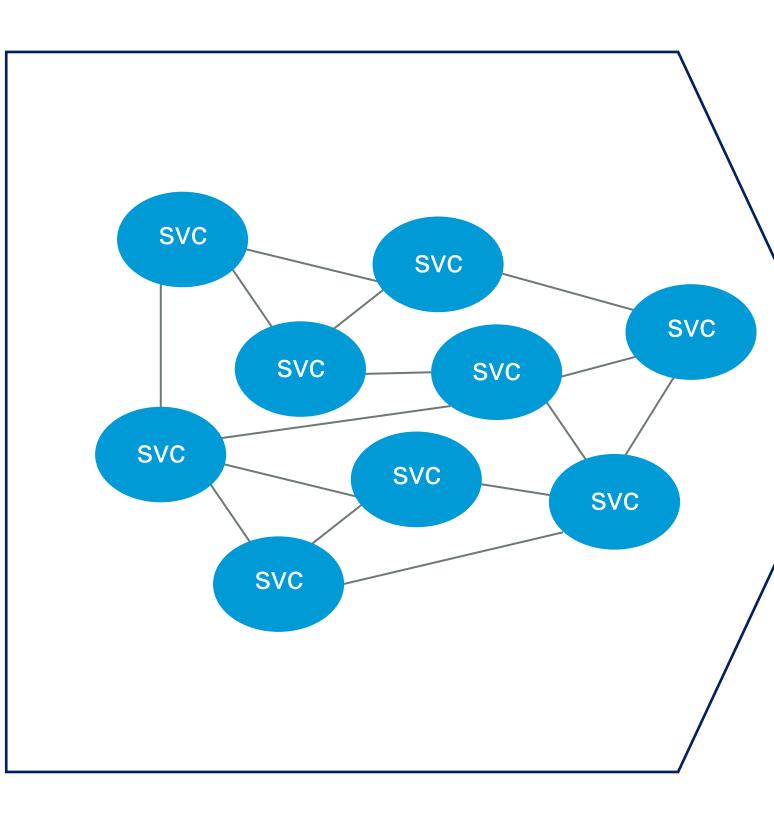
Software Architecture Evolution

Microservices (Product-Style Delivery)

• 2010s

Business Applications

- 2020s
 - Manufacturing Applications

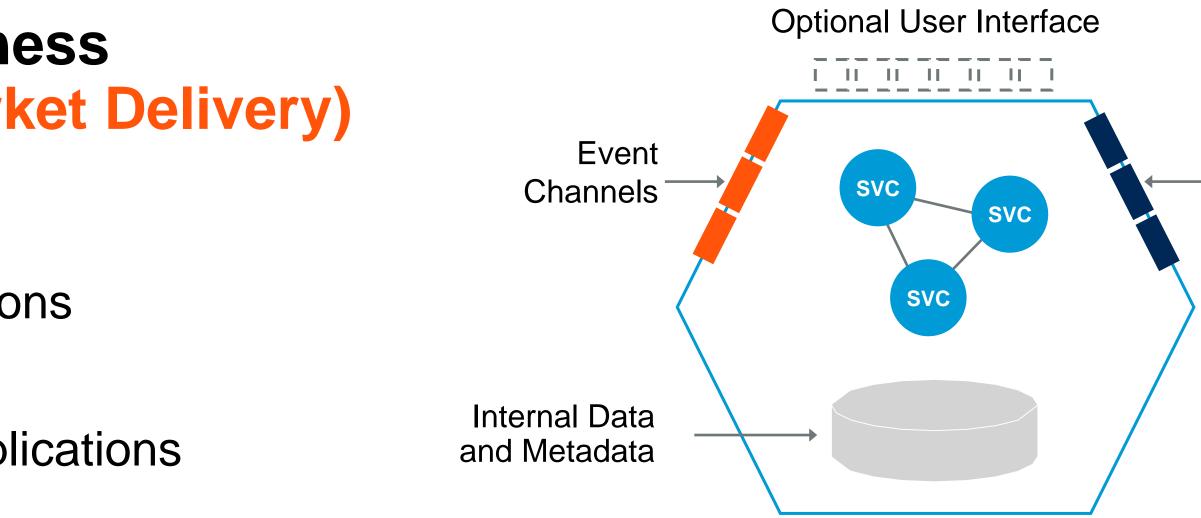




Software Architecture Evolution

Packaged Business Capabilities (Market Delivery)

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



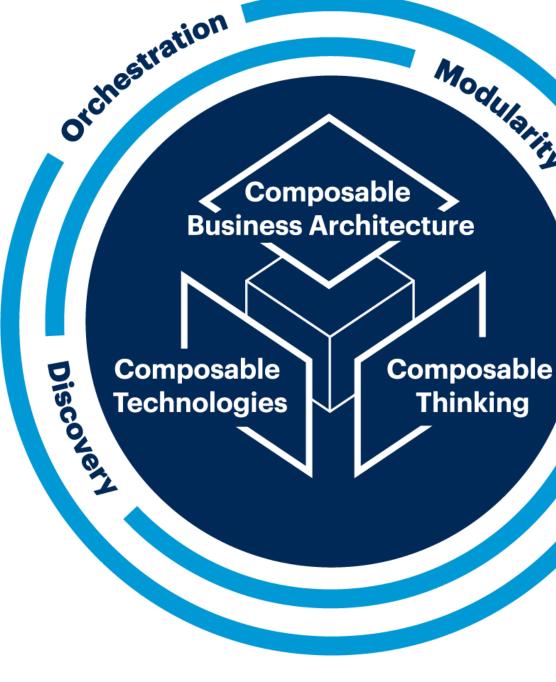
- APIs



Composability Helps You Thrive Amid Disruption

Modularity

Thinking



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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.





Packaged Business Capabilities in the Real World

Vendor Application PBCs

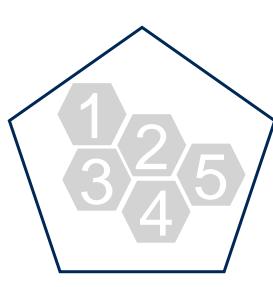
• Audience — 100s

Business Unit PBCs (IT)

• Audience — 10s

Self-Service PBCs

Audience — 1





MOM Application Suite

- Select vendor applications with IT-generated PBC extensions
- Vendor and business unit PBCs with personalized extensions



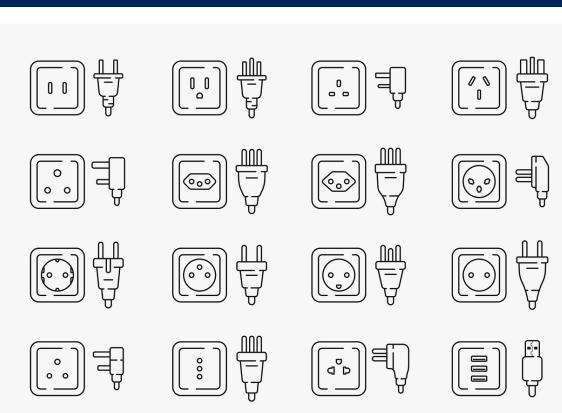


But Reuse is Hard and Expensive!

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

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APIs aren't reusable by default



Most companies reuse <10% of their APIs



Development Teams Don't Build for Reuse



You Aren't Gonna Need It

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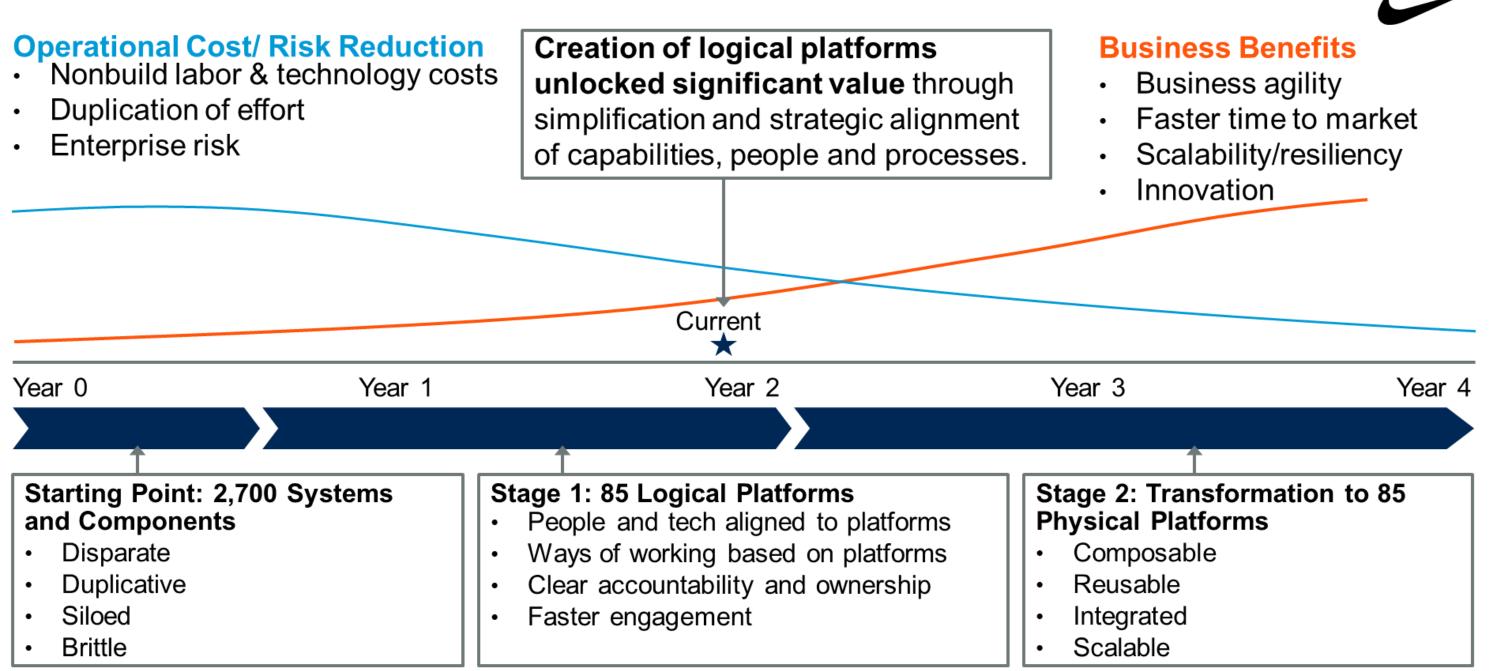
"Always implement things when you actually need them, never when you just foresee that you need them."

> • Ron Jeffries, Founder Extreme Programming Methodology



Benefits Across Nike's Platform Transformation

- Enterprise risk



Source: Adapted From Nike





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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Key Questions

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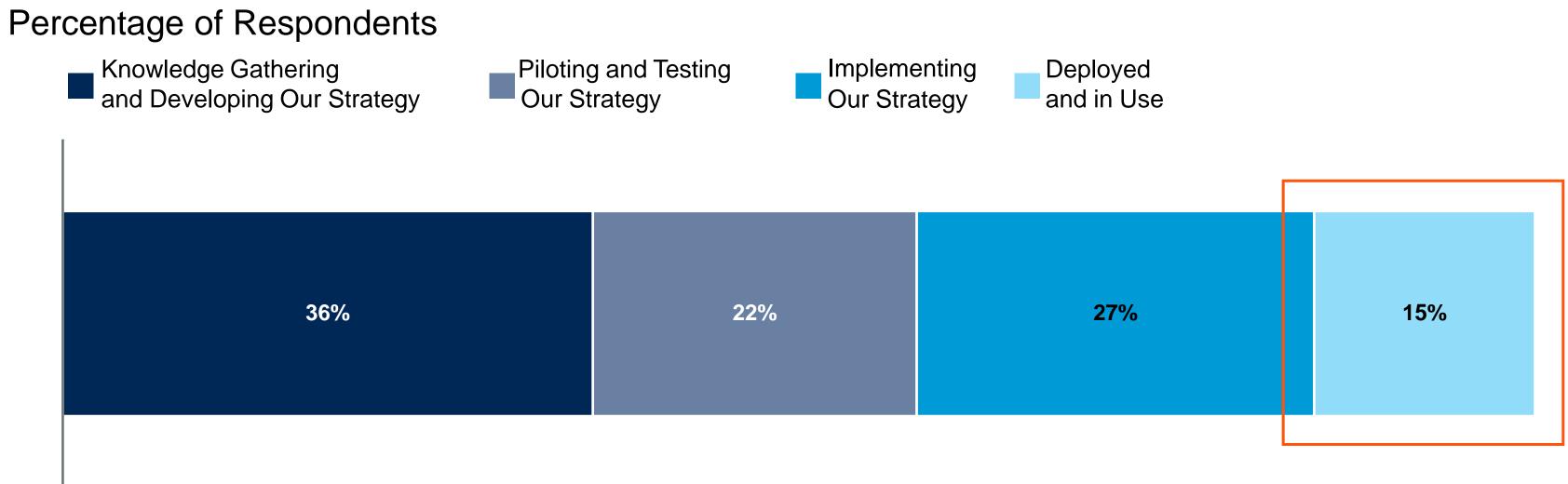
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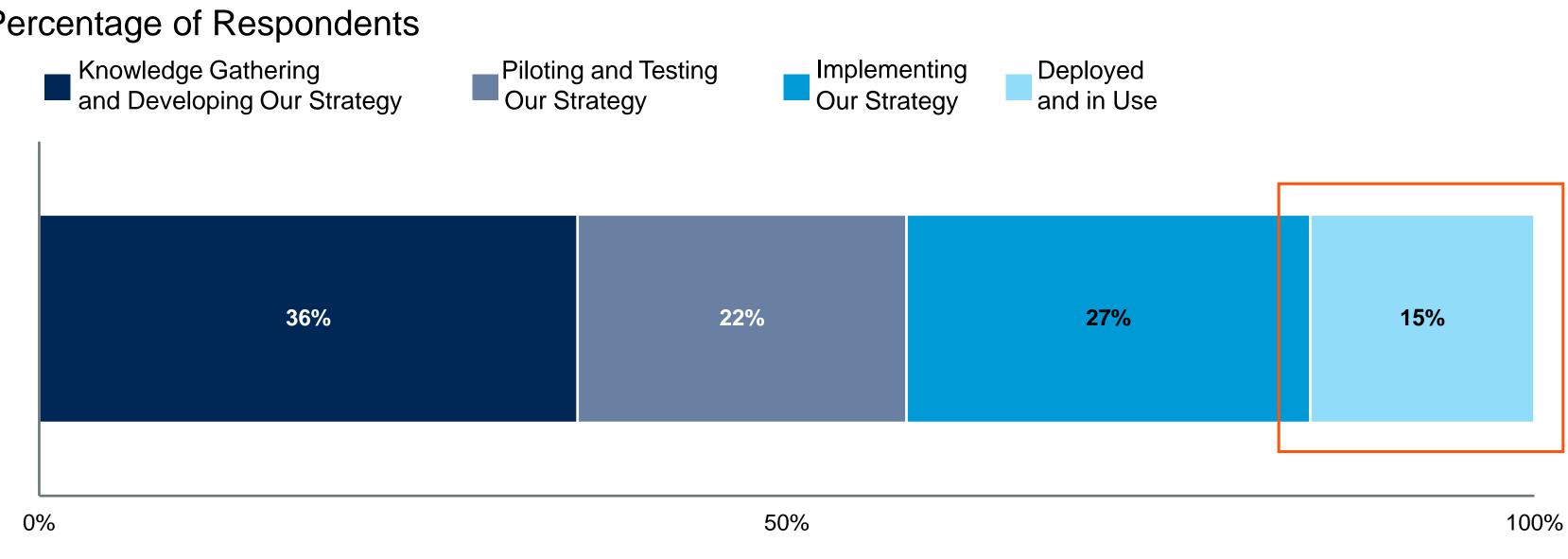
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Current State of Smart Manufacturing Strategy





n = 439 total respondents

Q: What is the current state of your company's smart manufacturing strategy? Source: Gartner 2020

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





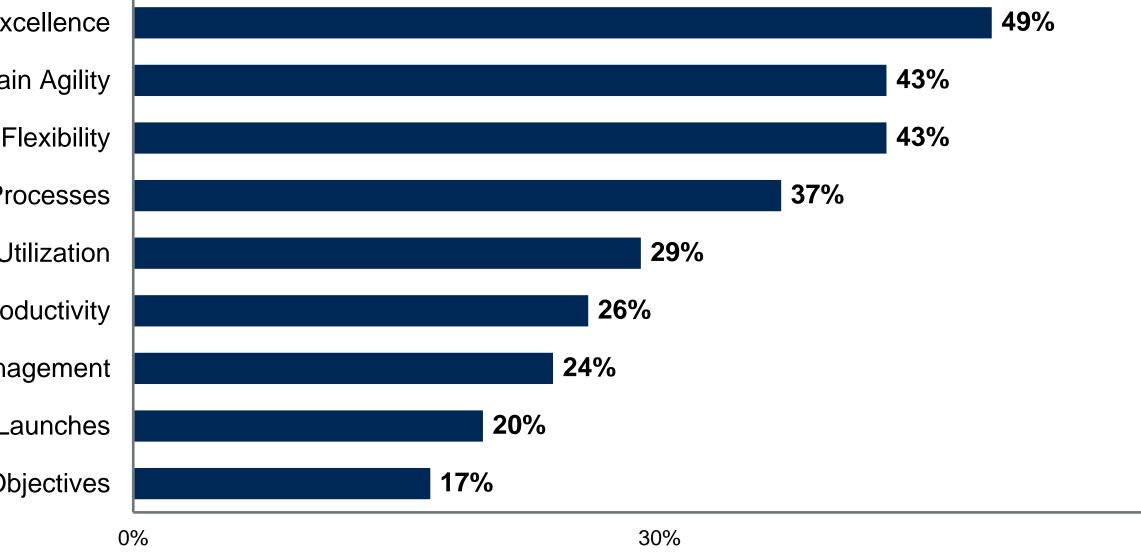
Optimize ... Then Transform ...

Smart Manufacturing Benefits Organizations by Delivering Reliable Supply From Efficient Operations Percentage of Respondents - Sum of top three

- **Operational Excellence**
- Support Supply Chain Agility
 - Improved Flexibility
 - **Optimized Processes**
 - **Better Capacity Utilization**
- Improved Labor Productivity
- Improved Inventory Management
- Improved New Product Launches
 - Meet Sustainability Objectives

n = 439

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





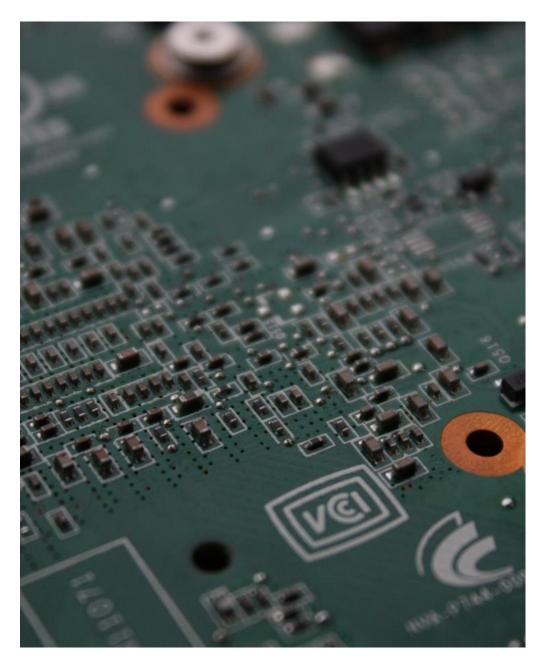
60%

Continuous Improvement Examples



Improve product consistency

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Improve fill rates and quality

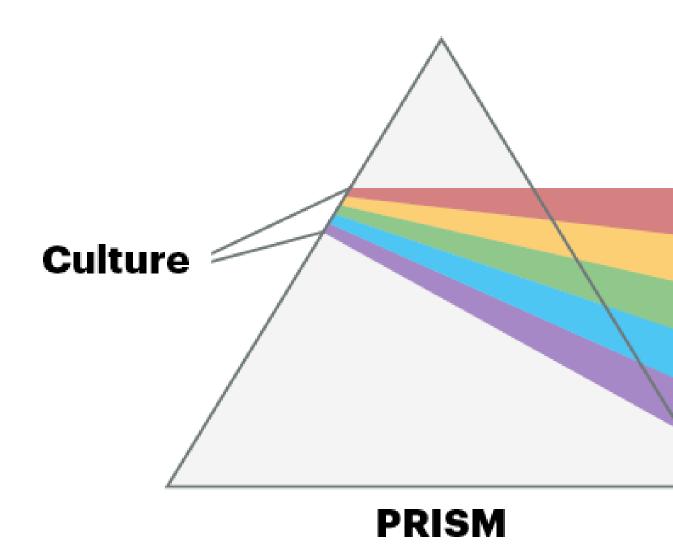


Limit scrap and improve yield









Source: Gartner

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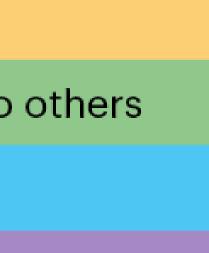
Purpose: Why we do the things we do

Rules: What is expected or permissible

Identity: Who we think we are in relation to others

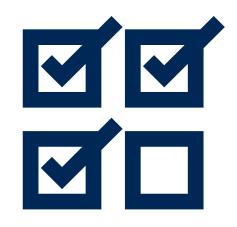
Safety: How we help each other succeed

Measures: What we value and pay attention to



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Culture Enablers ...

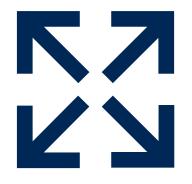


Execution

Rules



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Orchestration

Monitoring

Safety

Measures

Purpose



The Basic Building Blocks





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Infrastructure









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

technology roadmaps of candidate suppliers. gain continual momentum and continued success. \odot Repeat. This is an iterative process in a changing world.

- \checkmark Investigate new technology to enable smart manufacturing pilots, vetting the required building blocks and
- ✓ The platform, infrastructure, roadmap, culture and domain expertise matter. Three letter acronyms do not matter.
- Socus pilots on incremental improvement when starting smart manufacturing. Look for the "adjacent possible" to



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