



The Resurgence of Manufacturing **Harnessing Technology for the Future**

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forv/s
mazars

Today's Presenters



Kathryn Schneider

Forvis Mazars
Director, Consulting

People



David Mayo

Forvis Mazars
Director, Consulting

Process



Christian Segurado

Forvis Mazars
Sr. Manager, Consulting

Technology



Mike Moody

Pella Corporation
Process Engineer

Intelligent Operations



Haley Berland

Pella Corporation
Process Engineer

Intelligent Operations

“If you always do what you always did, you’ll always get what you’ve always got.”

– Henry Ford, American industrialist & pioneer of modern manufacturing

Agenda

1. Why Culture Matters
2. Embracing Technology for Process Improvements
3. Innovation in Action
4. Closing Remarks



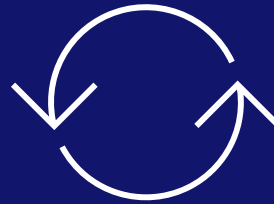
Empowering Innovation through People, Process and Tech

People



Drive ingenuity and
spark improvements

Process



Streamline workflows
and create efficiencies

Technology



Leverage AI,
automation and data

01

Why Culture Matters



Companies with a Continuous Improvement Culture Perform Better



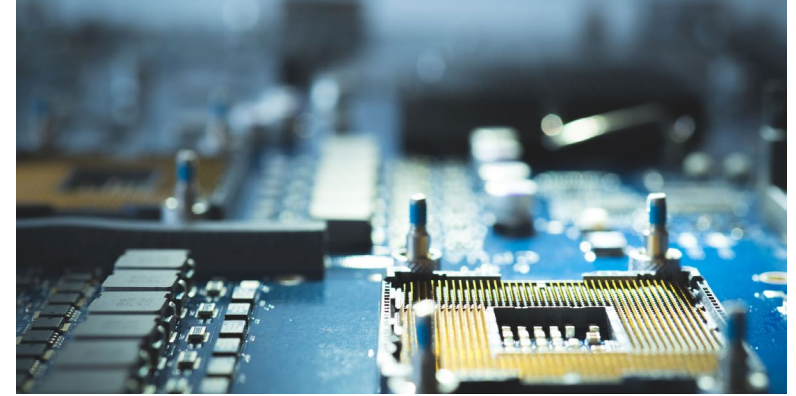
Technological Adoption

Companies that quickly embrace & integrate new technologies see increased efficiency & productivity



Data-Driven Decisions

Leveraging data analytics & AI enables informed decision making



Streamlined Operations

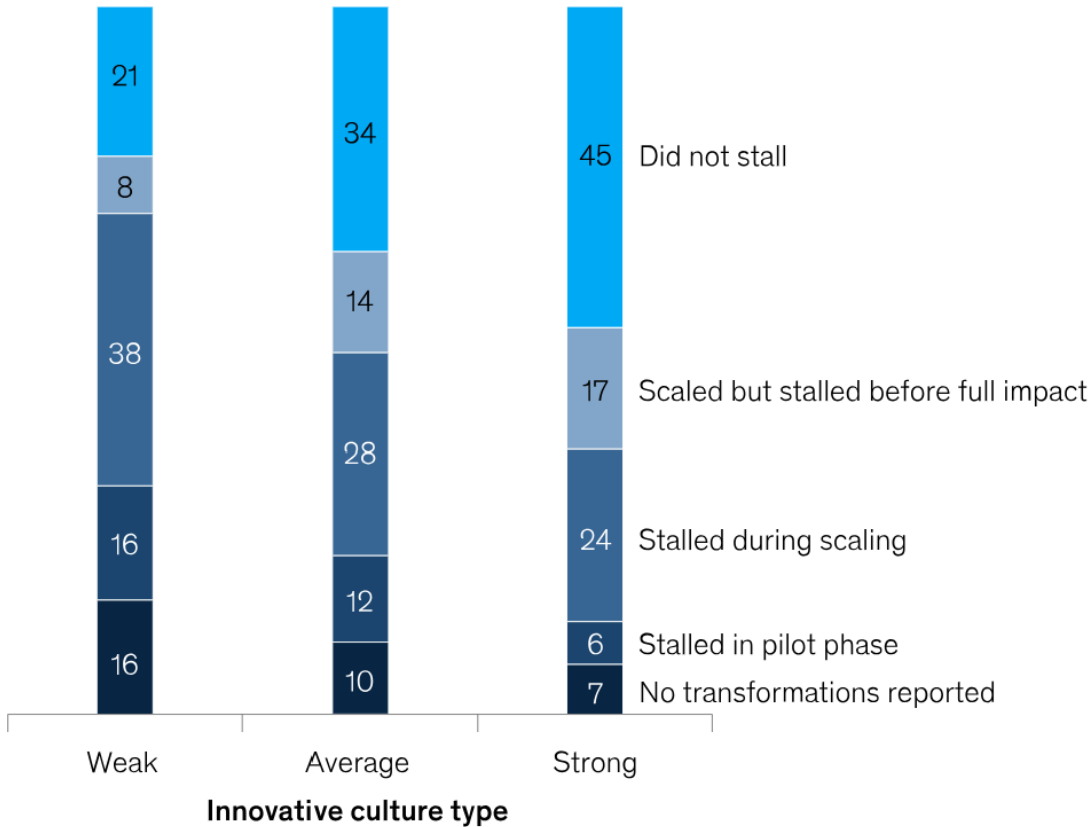
Automating repetitive tasks & workflows reduces costs & improves scalability

In today's fast-paced digital landscape, forward thinking manufacturers are poised to gain a competitive edge with enhanced performance, agility, & market responsiveness.

Culture Matters

Innovative Companies Outperform

Outcome of transformations by innovation culture type, % of respondents selecting each outcome



Note: Figures may not sum to 100%, because of rounding.
Source: McKinsey Global Survey on digital strategy, 2023, n = 1,086

Cultural challenges are the **biggest barrier to getting results from digital investments**. Risk aversion, siloed mindsets, & a general aversion to technology slow down the adoption of new tools & processes.

53%

of manufacturers identify creating a continuous improvement culture as a top priority*

*APQC's 2025 Process and Performance Management Priorities and Challenges: Manufacturing Sector Report; N= 212

Culture Matters

Understanding Technology Adoption



Silent Generation

Slow adoption of new tech, often uncomfortable with digital tools



Millennials

Tech-savvy but can become frustrated with slower adoption by older colleagues



Baby Boomers

Often hesitant with new tech; will adopt with a Pilot or POC



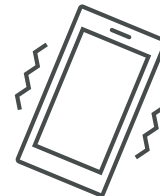
GenZ

Grew up in the digital world, expect technology to be intuitive & seamless



GenX

Adaptable but can struggle with the pace of change



Alpha

Reliance on technology potential challenges with attention span & information overload due constant digital simulation

Culture Matters

Impact on the Bottom Line

An innovative culture is essential because it energizes employee engagement and fosters seamless collaboration, making it easier for teams to adopt new tools and processes quickly. It also creates an environment where curiosity thrives and achievements are celebrated, leading to more fulfilling and satisfying work experiences. Ultimately, this kind of culture accelerates progress and keeps organizations adaptable, more profitable and future-ready.

The Profitability of Innovation

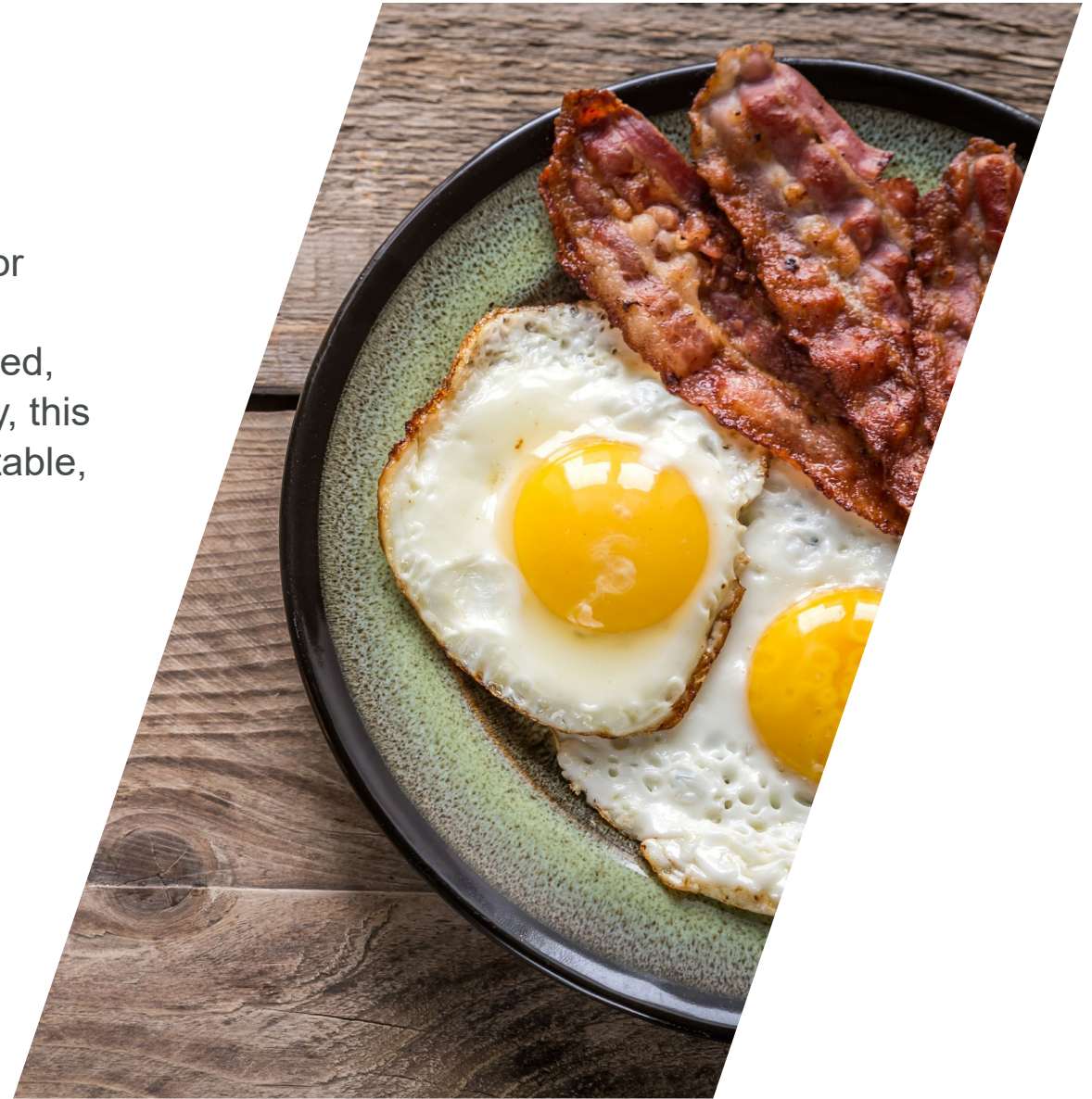
54%

More innovators achieved net profit margins of 10% or greater than the rest of the market*

38%

More Innovators achieved growth rates of 10% greater than the rest of the market*

*NTT DATA's 2023 Innovation Index



Pella Corporation – Intelligent Operations

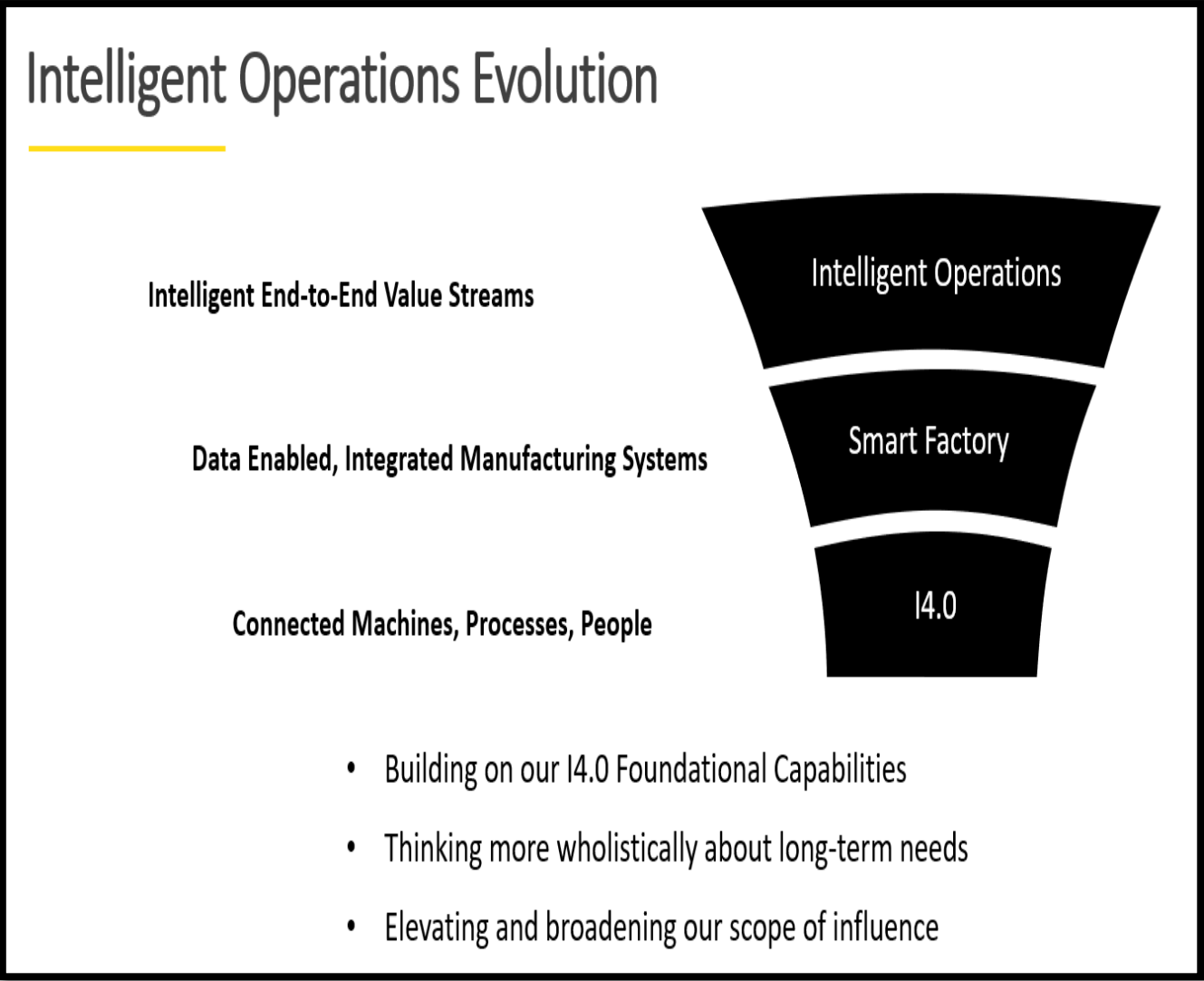
Continuous Improvement Journey

- 30+ years of Continuous Improvement culture
- Digital culture change with the formation of Pella's I4.0
- I4.0 team dedicated to solve manufacturing problems with digital solutions
- Expanded to a Smart Factory team in 2021
 - Project Teams
- Expanded to an Intelligent Operations in 2023
 - Product Teams



Pella Corportation – Digital Evolution

Problem Solving

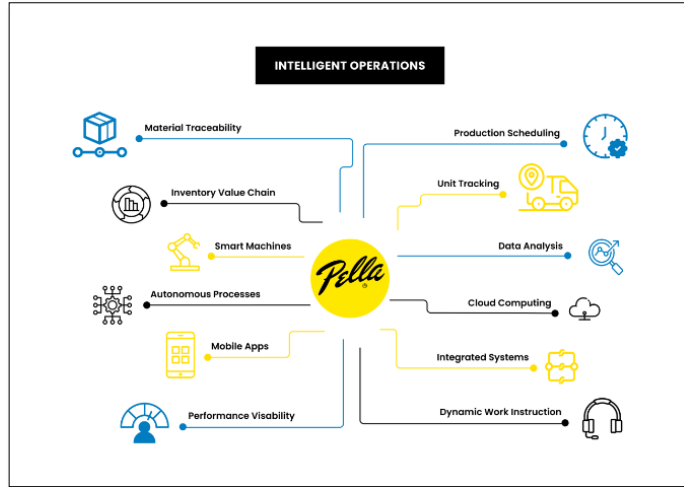


Digital Evolution	Problem Solving Evolution	Product Development
Intelligent Operations	Enterprise Solutions – Scaling enabled	Enterprise thinking – Supply Chain through Logistics
Smart Factory	Production Solutions	Manufacturing Improvements
I4.0	Point Solutions	Cell Improvements

Pella Corporation – Intelligent Operations Structure

End to End digital solutions

Digital Transformation – Director



Cross Functional Teams

Team Structure

- Engineering
- Information Technology
- Operations Technology
- Data Engineering
- Data Scientist

Transform the Business

Product Development Teams

- Supply & Parts Making
- Assembly & Logistics
- Data Architecture

Run the Business

Deployment/Maintaining Teams

- Scaling Proven Solutions
- Data Analytics and Insights (x 2)
- Mfg IT team
- Service Desk

Culture Matters

Building an Innovation Team

Key Considerations

Dedicated Resources: Allocate budget, personnel, & time for innovation

Cross-Functional Collaboration: Include representatives from various departments

Focus on Practical Solutions: Prioritize innovations that deliver tangible value

Continuous Learning: Encourage ongoing learning & upskilling



02

Embracing Technology Transformation for Continuous Improvement



Embracing Technology Transformation

Trends in Modern Manufacturing



AI & Machine Learning in Modern Manufacturing

AI and Machine Learning are now central to manufacturing operations. They are used to:

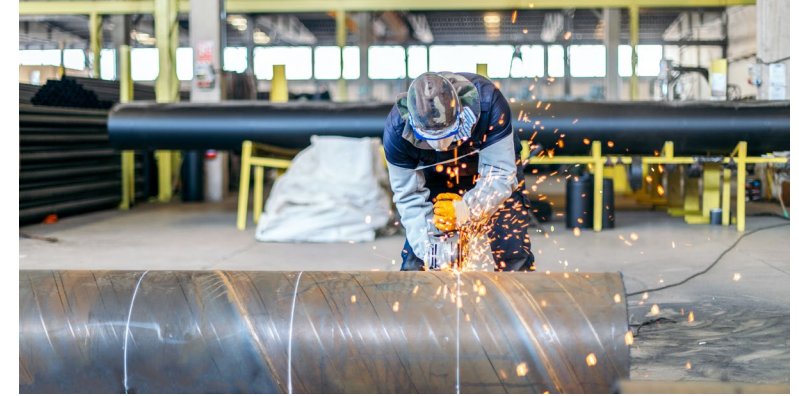
- Predict equipment failures.
- Optimize production schedules.
- Improve product quality through real-time defect detection.



Real-Time Monitoring & Analytics

Manufacturers are increasingly relying on real-time data streams to:

- Monitor production process continuously.
- Detect anomalies instantly.
- Implement predictive maintenance strategies.



Integration of IoT Sensors

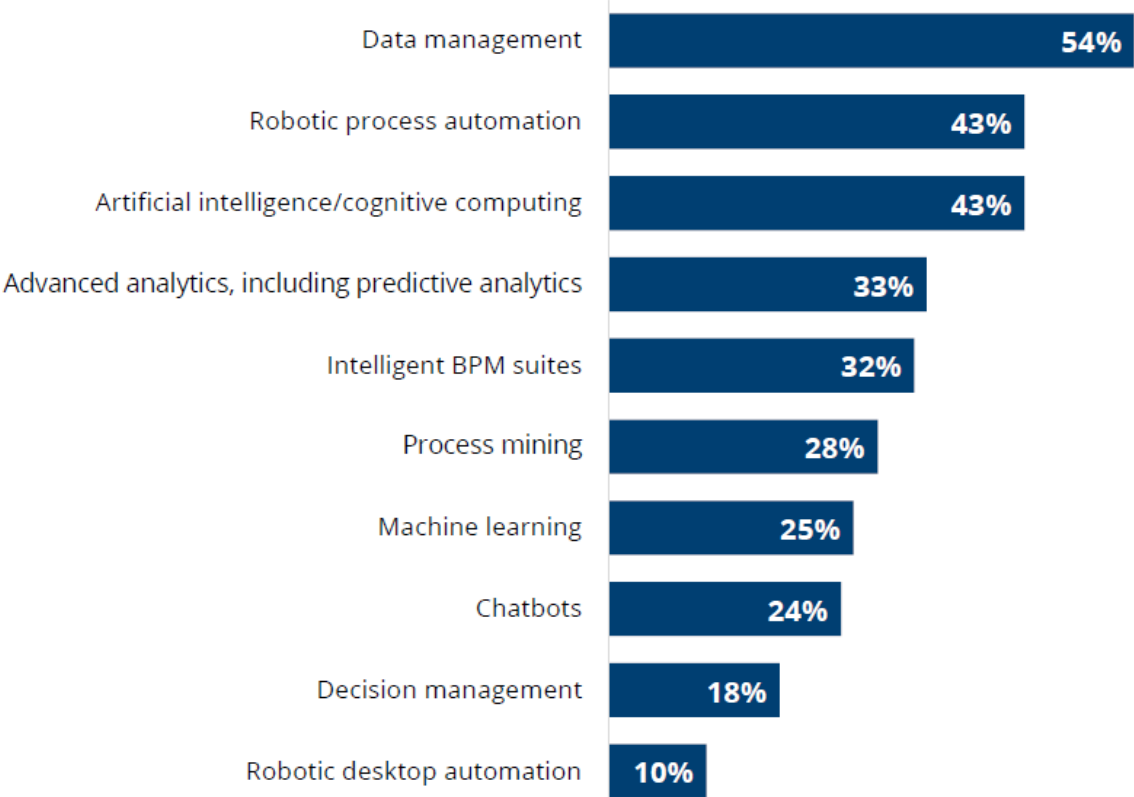
Internet of Things (IOT) is transforming manufacturing operations by:

- Providing deep insights into machine performance.
- Enabling scenario simulations without physical trials.
- Accelerating innovation and reducing costs.

Embracing Technology Transformation

Areas of Investment for Digital Solutions

Manufacturing Sector Report 2025 – Top Tech Investment Areas



**APQC’s 2025 Process and Performance Management Priorities and Challenges: Manufacturing Sector Report; N= 212*

Embracing Technology Transformation

Maturity of AI Agents

Agentic Transformation Maturity Levels (Human in the Loop)

1. Human First



Employees are augmented by AI that understands their work & has access to their data

2. Human + Agents



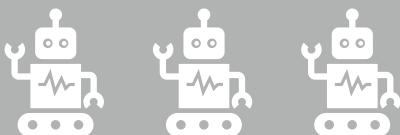
Teams are augmented by AI agent(s) that support specific tasks or processes

3. Human Lead, Agent Operated



Entire “teams” are comprised of AI agents overseen by a human “manager”

4. Agents Only



Business functions operate autonomously without regular supervision

Digital Coexistence

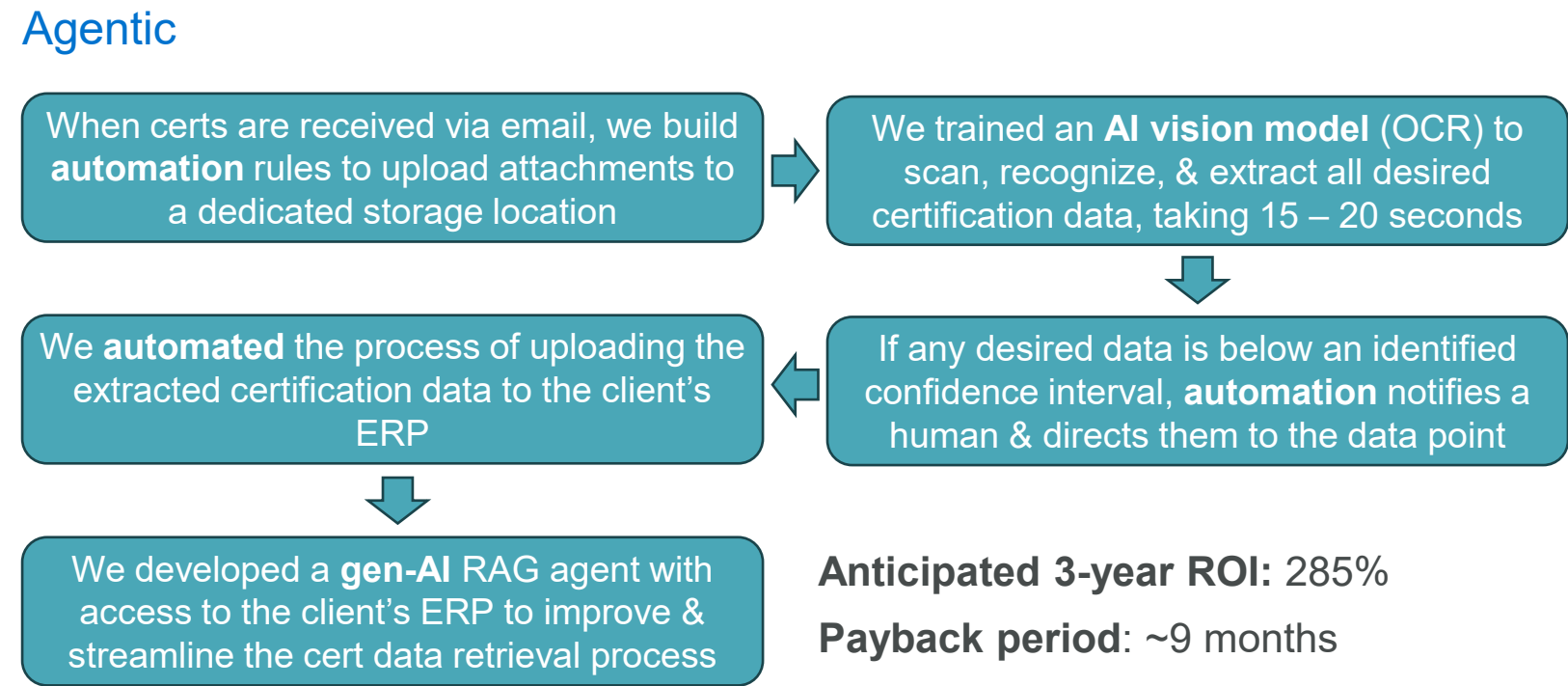
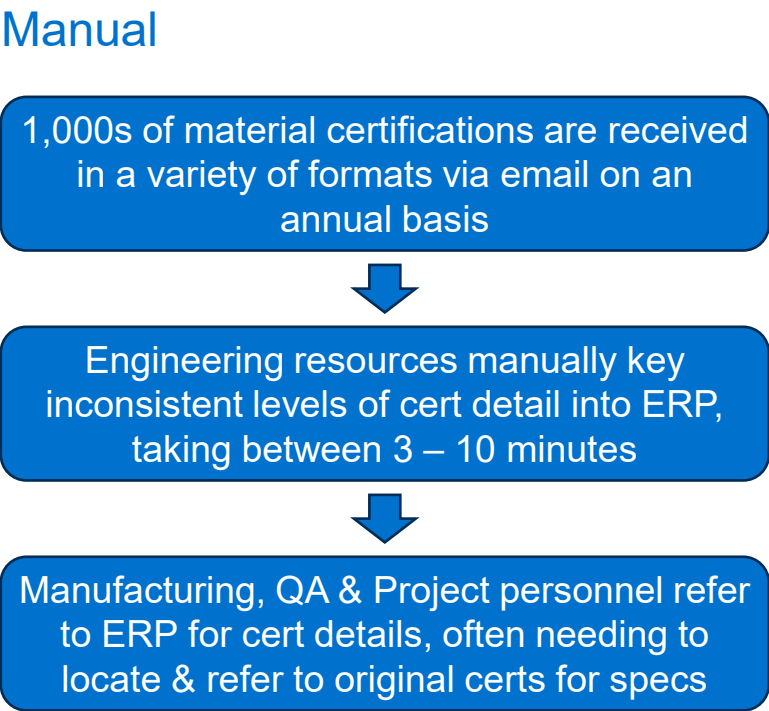
Autonomous AI

Embracing Technology Transformation

Client Story: Construction Materials Manufacturer

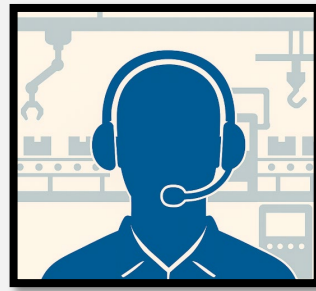
From Manual to Agentic

We helped our client, a construction materials manufacturer, transform their material certification data management process, leveraging AI vision, automation, and gen-AI to drive process efficiencies, reduce cost, and reduce risk.



Opportunities to Harness Technology

Pella – Dynamic Work Instructions via Product Attribute Driven Voice Directed Work



How it Works

Customer Selects Product Attributes

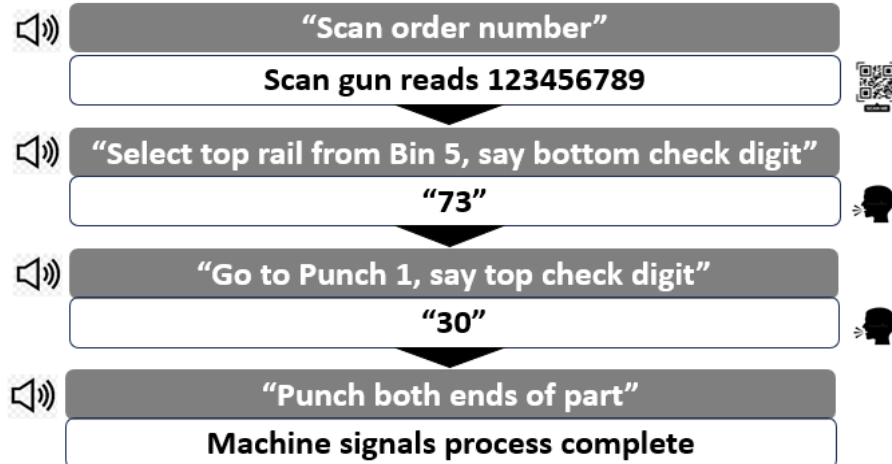
Type, Size, Color, Features, etc.

ERP Configures Order for Mfg

BOM, Mfg Attributes, Process Flow, Material Purchases, Etc.

Dynamic Voice Instruction Created

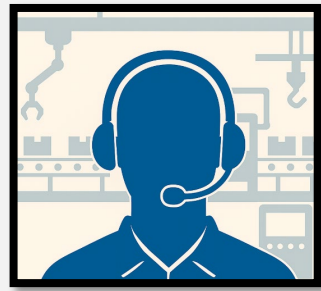
Configuration Specific Workflows, Voice Translation



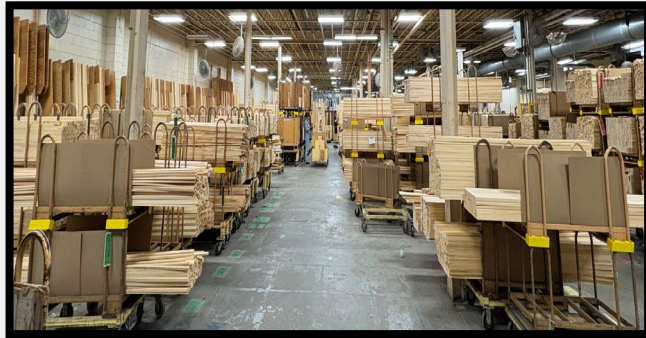
- Customer Focused
- Made to Order Business
- MTO Drives Complexity

Opportunities to Harness Technology

Pella – Dynamic Work Instructions via Product Attribute Driven Voice Directed Work



Stockroom Applications



Area Complexity:

- **600+** stocked part SKU's in standard lengths
- **18** different internal customers
- **10,000** parts per day picked and staged

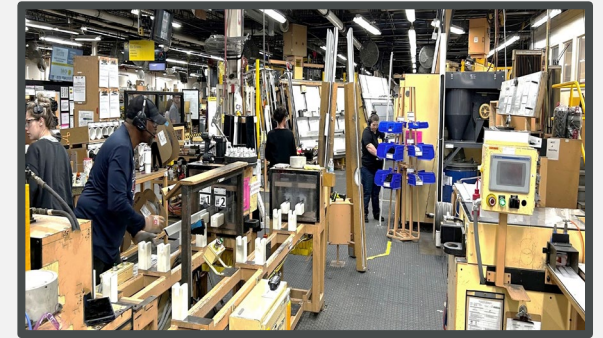
Machine Integration



ERP Connectivity:

- Custom Order Info Flow
- Two-Way Machine Connection & Poka-Yoke
- Embedded with Physical Processes
- Automated Order-Specific Visual Aides

Assembly Applications



Line Complexity:

- 8 different products built
- > **20** fabrication options
- 61** hardware options
- 5-10** person variable staffing

03

Innovation in Action

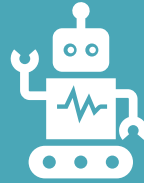


Innovation in Action

Bringing together People, Process and Technology



AI & Agents



Robotics & Automation



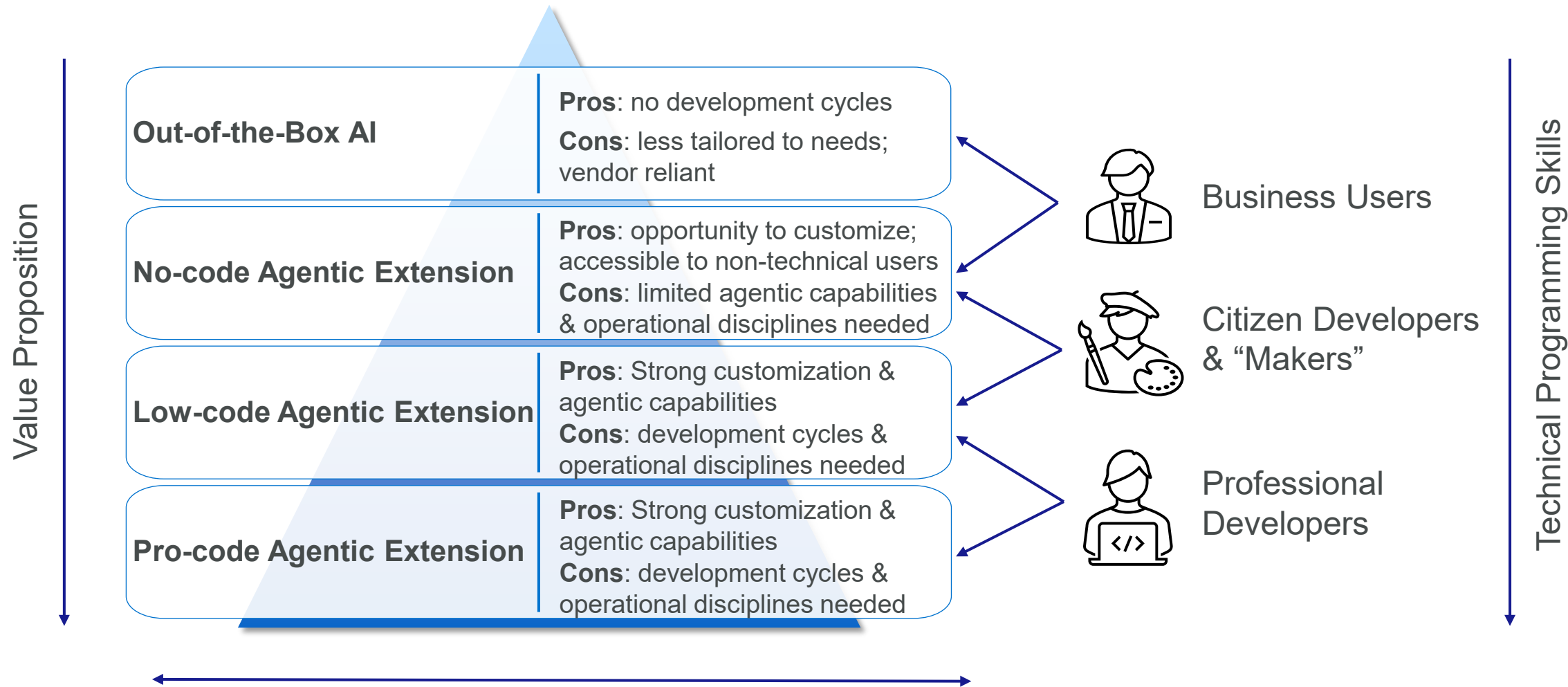
Digital Twin



AI & Agents

Embracing Technology Transformation

Adoption Strategy: Crawl, Walk, Run



Breadth of Capabilities

Looking Into the Future

Agent Capabilities in ERP

Sales Order Agent

Responds to customer inquiries about products & catalogs, generates sales quotations, & intakes sales orders.

Supplier Comms. Agent

Processes purchase order confirmations, follows up with suppliers on pending purchases, & helps navigate through the impact of changes to inbound supply.

Account Reconciliation Agent

Autonomously reconciles ledger & subledger accounts, flags discrepancies, & carries out corrections based on business logic.

Financial Reconciliation Agent

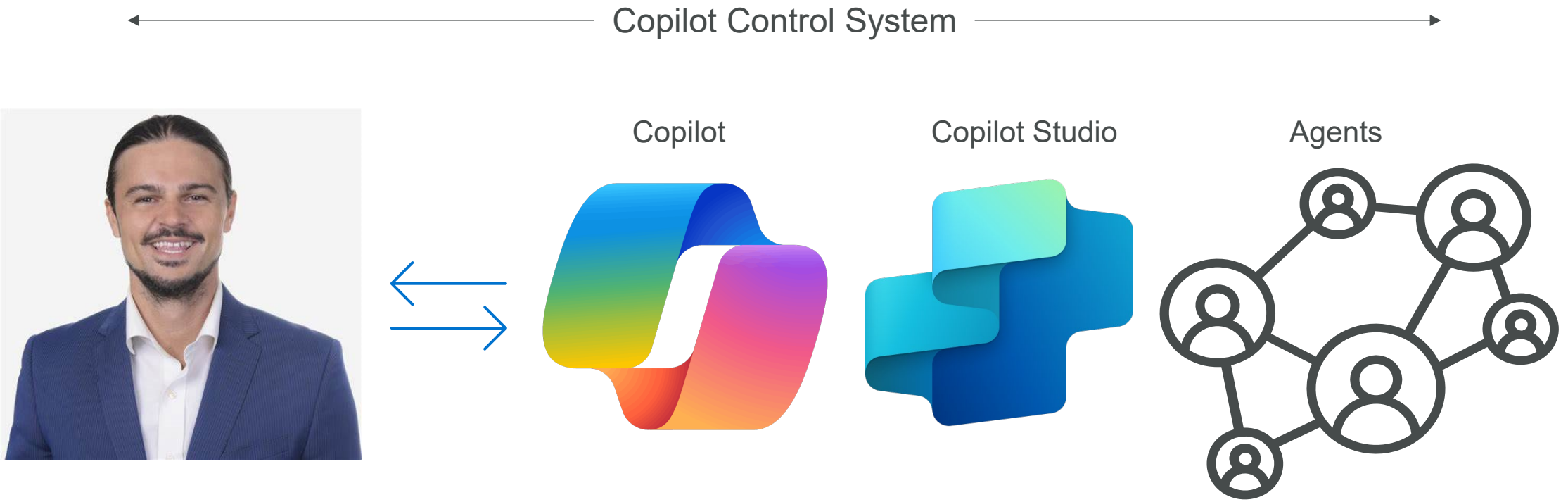
Cleanses financial data from multiple sources & reconciles the data, flagging discrepancies for further review & suggesting mitigations.

Time & Expense Agent

Drafts time entries based on project's forecast & calendars, creates expense reports based on email receipts, & reviews submitted time & expense reports for compliance with policies.

Looking Into the Future

Business Applications of the Future



From (Past):

- App as UI
- Workflows
- Data

To (Now):

- Copilot as UI
- Agents (Nested Agents)
- Knowledge



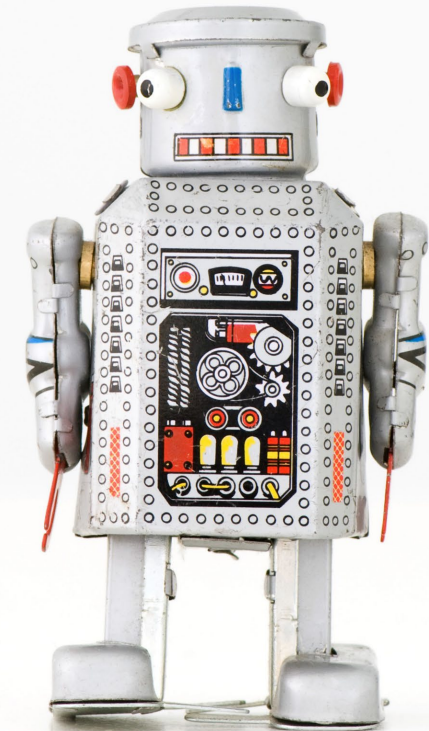
Robotics & Automation

Robots Are Not Just For The Big Companies

Over the last 10 years, warehouse automation has gone through dramatic changes based on the availability, breath and cost of robotic systems for warehouses.

According to data from Gartner*:

- 96% of respondents surveyed were already investing or planned to invest in robotic systems
- 7% had completed implementations
- 29% were in the process of implementing some robots
- By 2028, 50% of large corporations will have deployed robotics within their warehouses



**Gartner Research: Hype Cycle for Hybrid Work 2023*

Warehouse Automation



Mobile Robots in Warehousing

High Speed, high density mobile robots are seen efficiently transporting blue bins, showcasing cutting-edge automation in modern warehouses



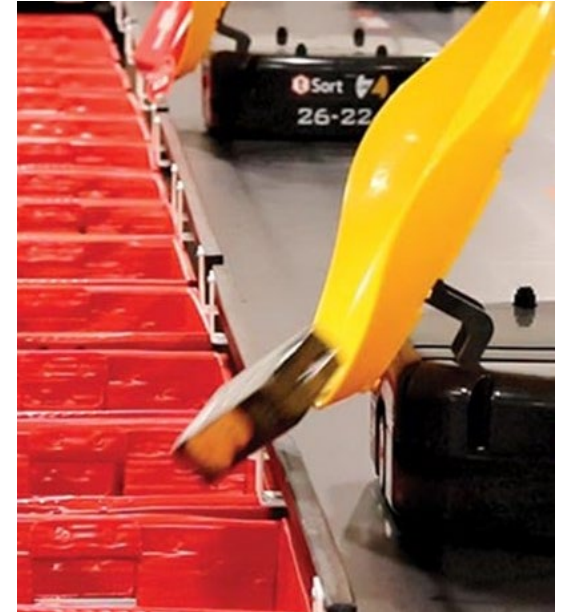
Automated Storage and Retrieval Systems

An advanced AS/RS system is featured, highlighting efficient and intelligent inventory management..



Robotic Shelf Management

Robotic units streamline organization, managing shelves with precision for optimal warehouse operations.



Automated Sorting Systems

Robotic arms sorting red bins illustrate the speed and accuracy of automated systems in smart warehousing.



Digital Twin

Digital Twin + Simulation – How They Work Together

Optimize Manufacturing and Warehouse Automation and Operations

Inbound

- Receiving
- Put-away
- Replenishment

Outbound

- Picking
- Packing
- Loading

Connected management systems

- Warehouse
- Labor
- Transportation
- Yard
- ERP

Historical and Current Behaviors

- Daily/Hourly Order Volume
- Staffing
- Seasonal Impacts



Manufacturing/Warehouse Digital Twin

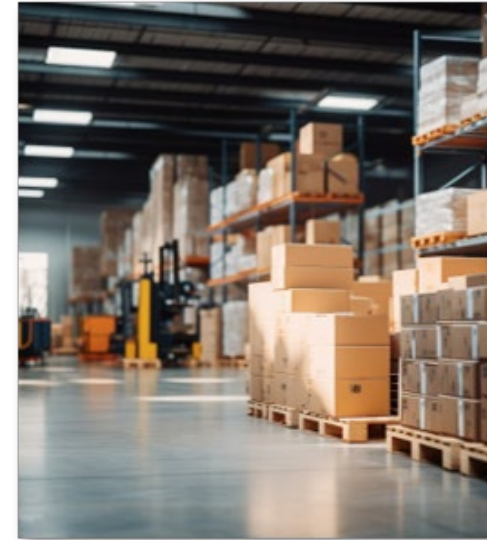


Designed to Model Your Operations

Dynamic representation of manufacturing / warehouse operations that will act and react as conditions change



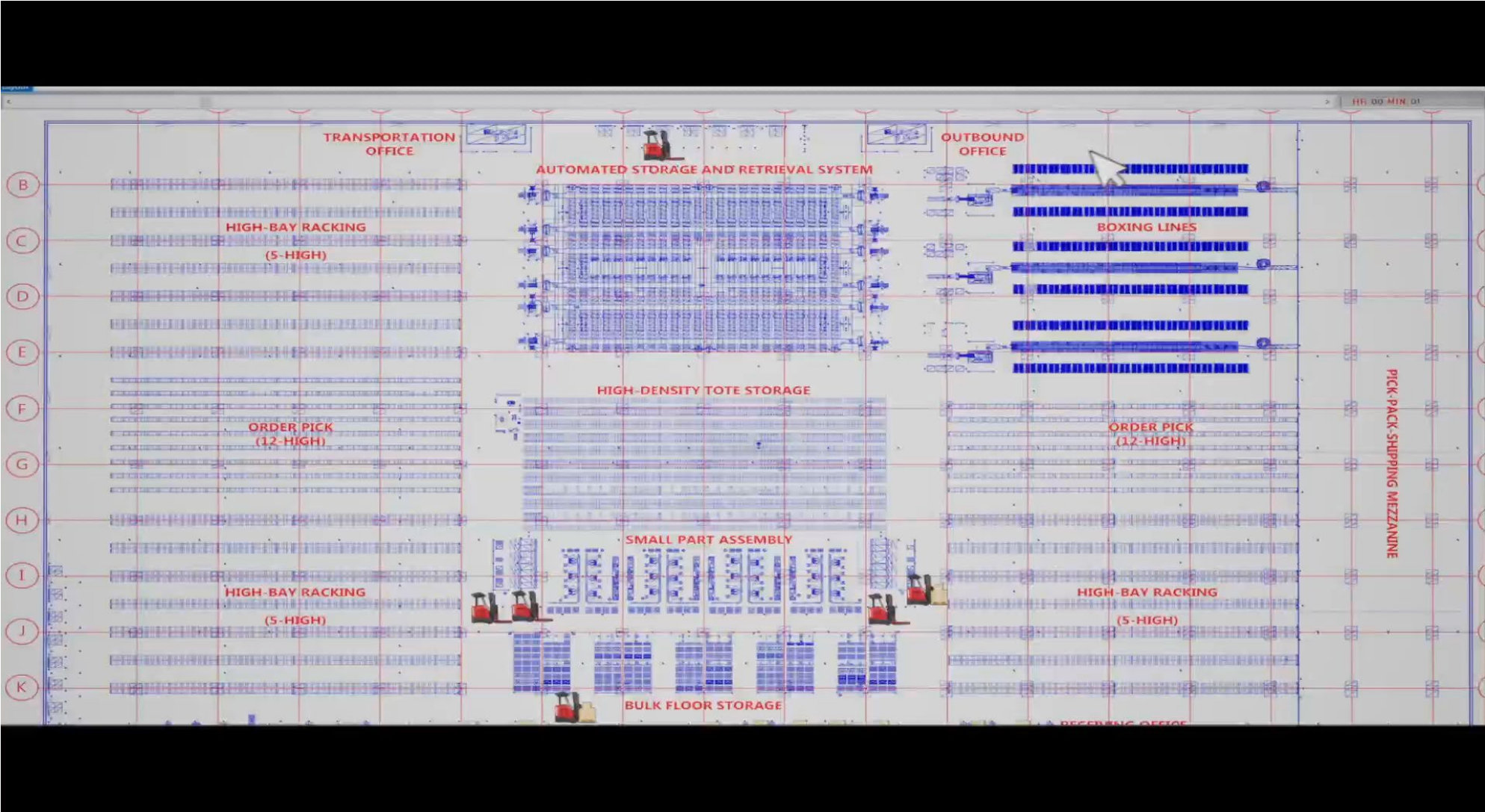
Simulation + AI/ML



Powered with Discrete Event Simulation + AI / ML

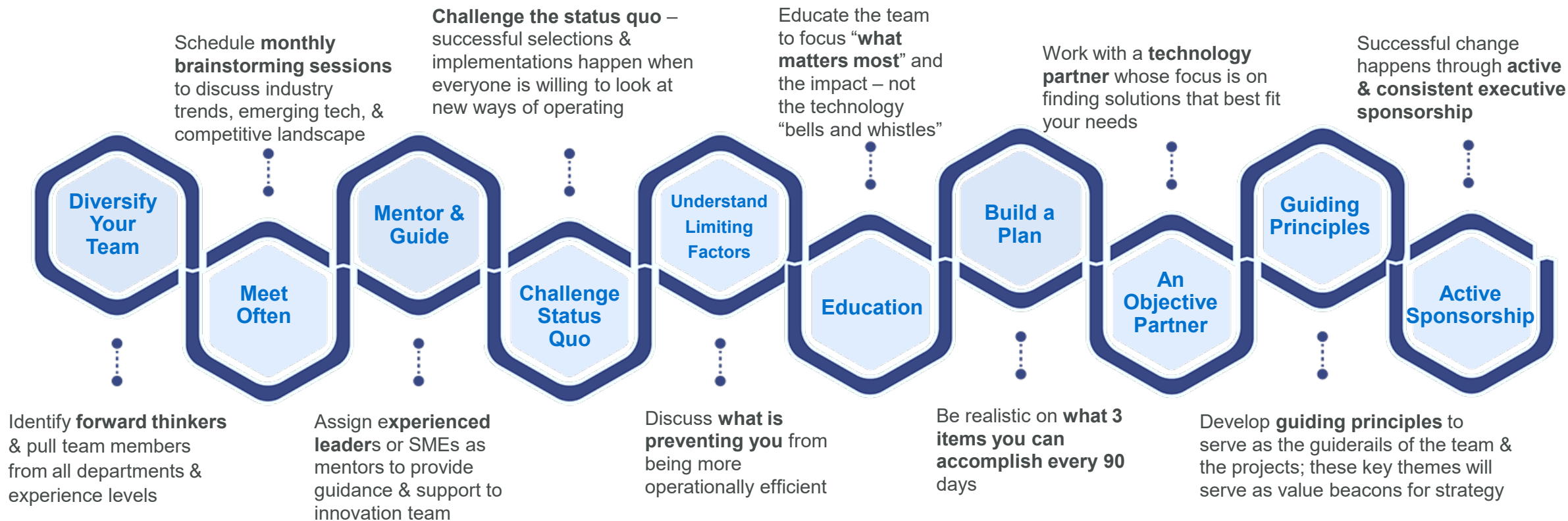
Simulate real-life behavior and predictive models that consider all complexities and interdependencies

Digital Twin Simulation



Key Takeaways

Innovation Team Best Practices



Questions?



Contact

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