Smarter Supply Chain Workflows with Digital Twin and SAP S/4HANA

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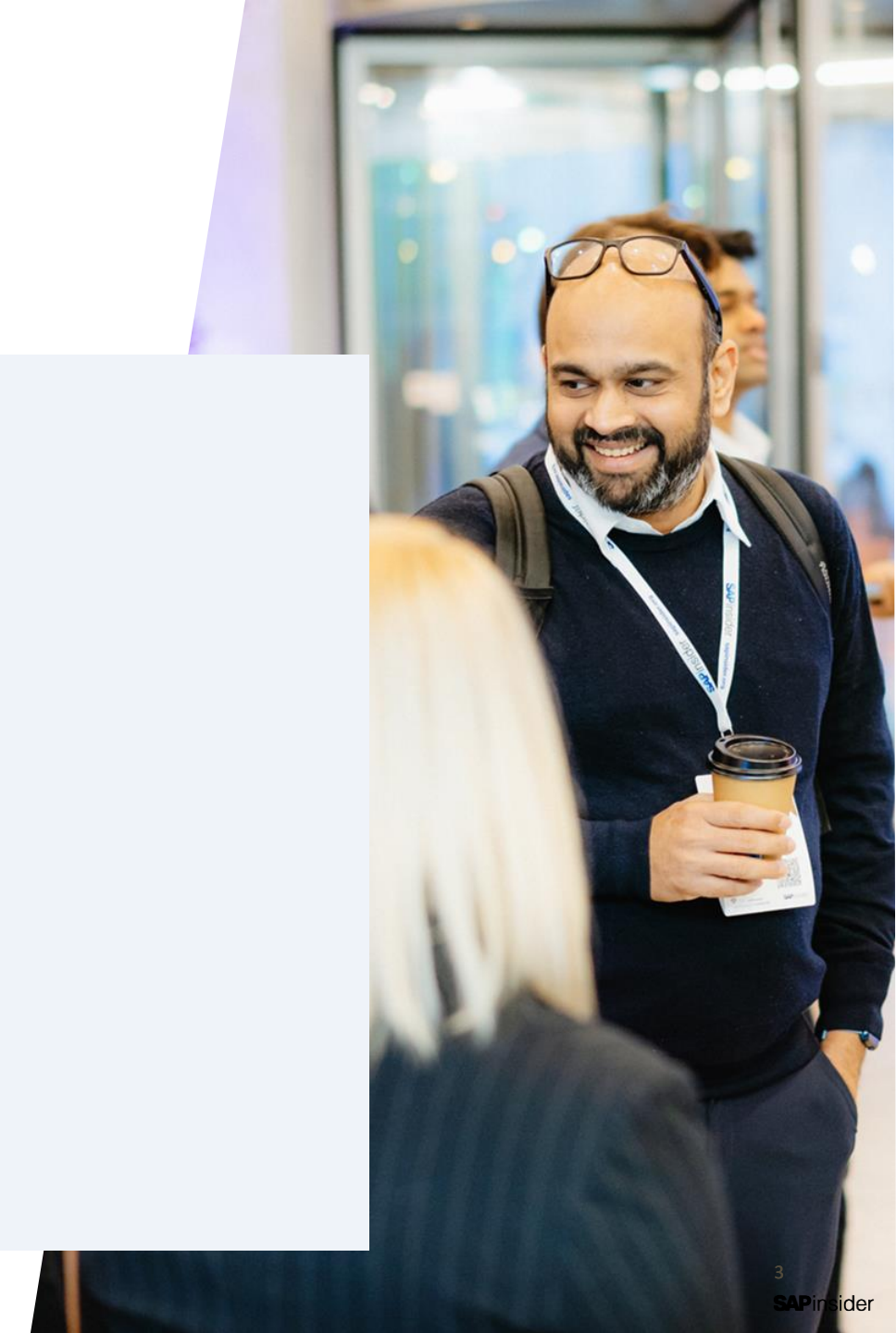
SAPinsider

In This Session

- Discover how Fulfilld builds a dynamic digital twin with machine learning, CAD models, and real-time SAP data.
- Learn more about optimizing workflows with AI simulations.
- Empower your team with mobile on-device route guidance and task prioritization, informed by the real-world environment
- See how Fulfilld seamlessly integrates with SAP S/4HANA, adding an intelligent layer that empowers your existing system.

What We'll Cover

- Define the Digital Twin
- Warehouse Uses Cases for ML
- Practical Implementation
- Integrating with SAP S/4HANA
- Wrap Up



What is a Digital Twin?

Digital Representation of Physical World

- ✓ Spatially correct
- ✓ Easy to understand visualization

Real-time Depiction

- ✓ Conveys status of physical object or space
- ✓ Joins data from multiple sources

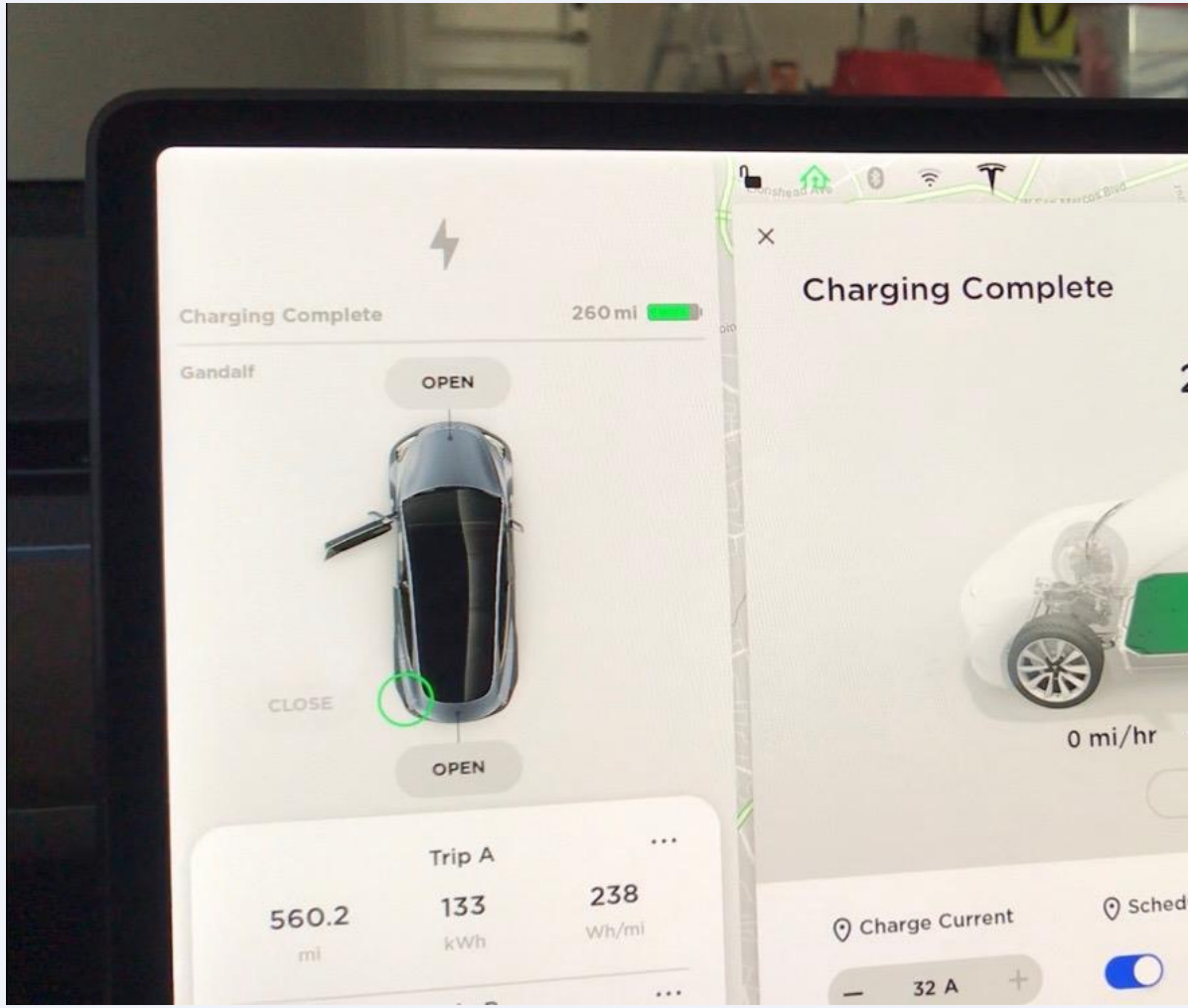
Digital Actions Translate to Real World Actions

- ✓ Software interacting with physical world
- ✓ More than analytics or data illustration

Digital Twin Example

Tesla Model Y Touchscreen

- Quick view of the vehicle status
- Software Button Action drives mechanical interaction
- Alerts presented with recommended actions

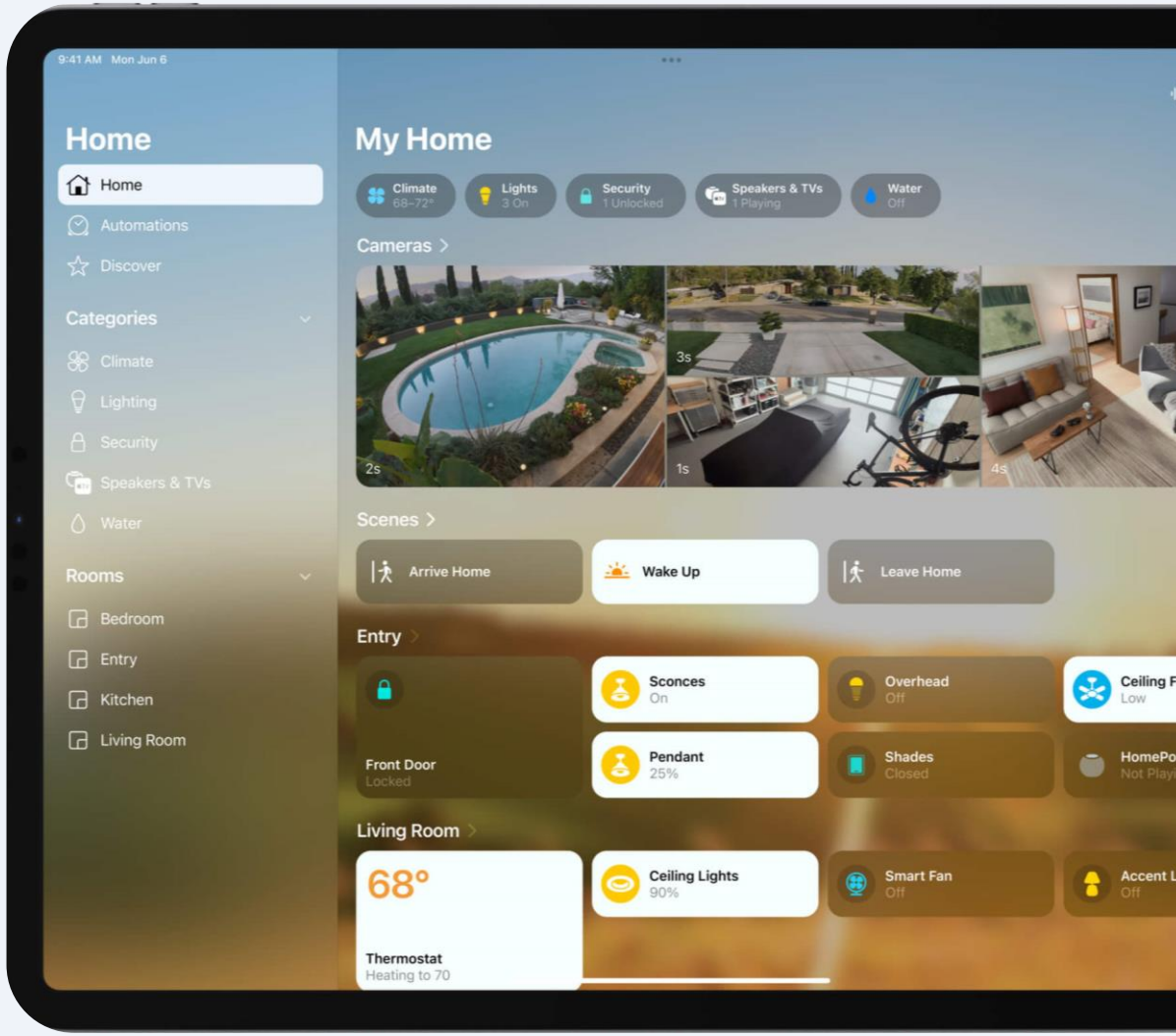


Source: Michael Pytel

Digital Twin Example

Apple HomeKit

- Camera provide me an update on the status of my home
- View history and add automation
- Collaborate with others



Source: Apple HomeKit

Warehouse Digital Twin Use Cases

Find & Prevent Issues

- Identify potential areas of congestion within the physical space
- What is our theoretical maximum throughput?
- What is the best warehouse design?
- Do we have product in locations optimized for our warehouse and resources?

Employee & Equipment Routing

- Optimize task assignment by resource type
- Reduce wasted travel (and time)
- What is the optimal number of resources per shift?
- If we add robots, could warehouse flow improve?

Quick Fact Check

≳ 25% of Labor within the warehouse is Temporary or Contract labor

US Bureau of Labor & Statistics

Employee turnover in the warehouse industry stands at 46.1% -

US Bureau of Labor & Statistics

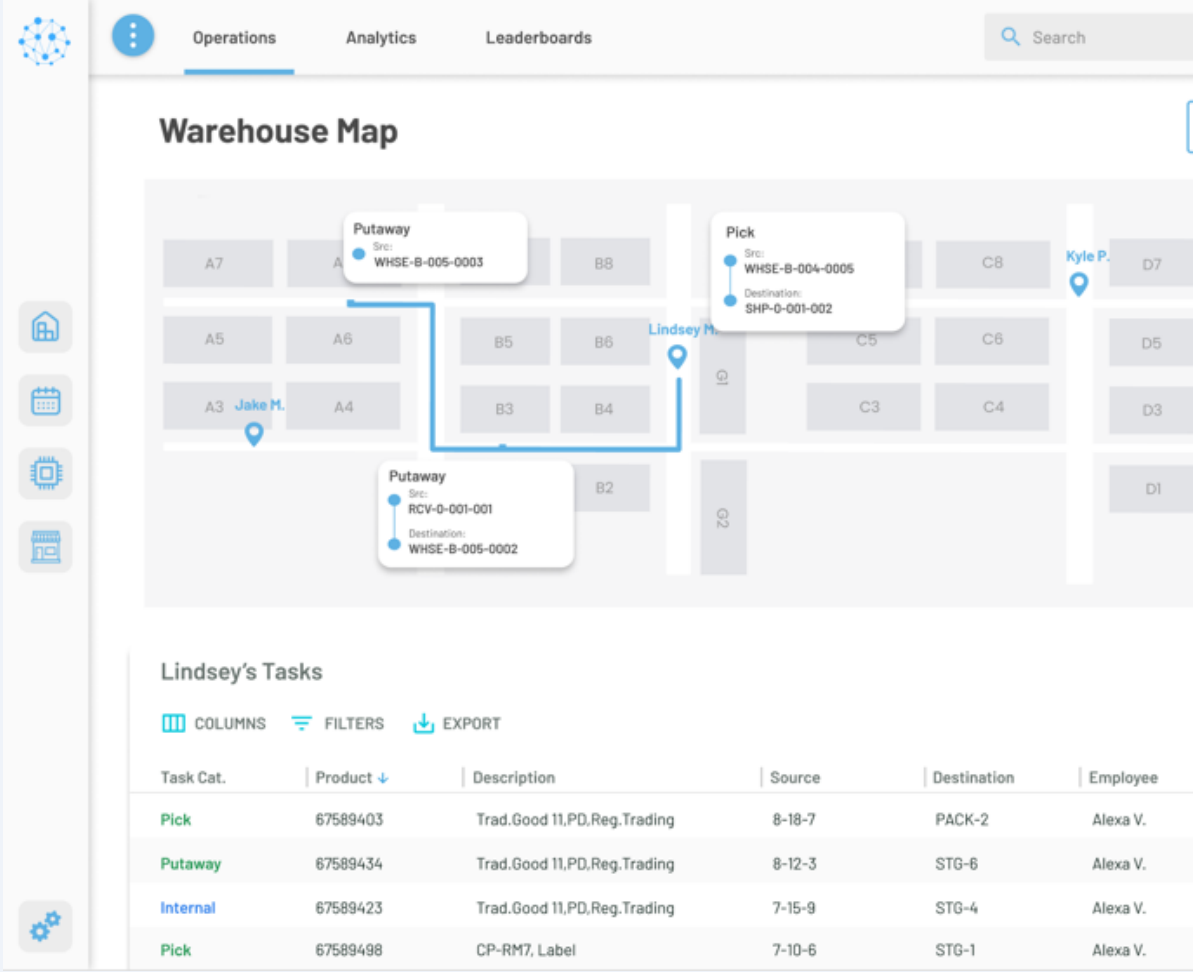
≳ 40% of Labor travel time within the warehouse is considered not value added

UC Berkeley Center for Labor Research and Education

Advanced Warehouse Execution

Warehouse Digital Twin

- Moving beyond tables and grids
- Visualize products and resources
- Leverage shortest-path algorithms with business rules baked in
- Alerts presented with recommended actions



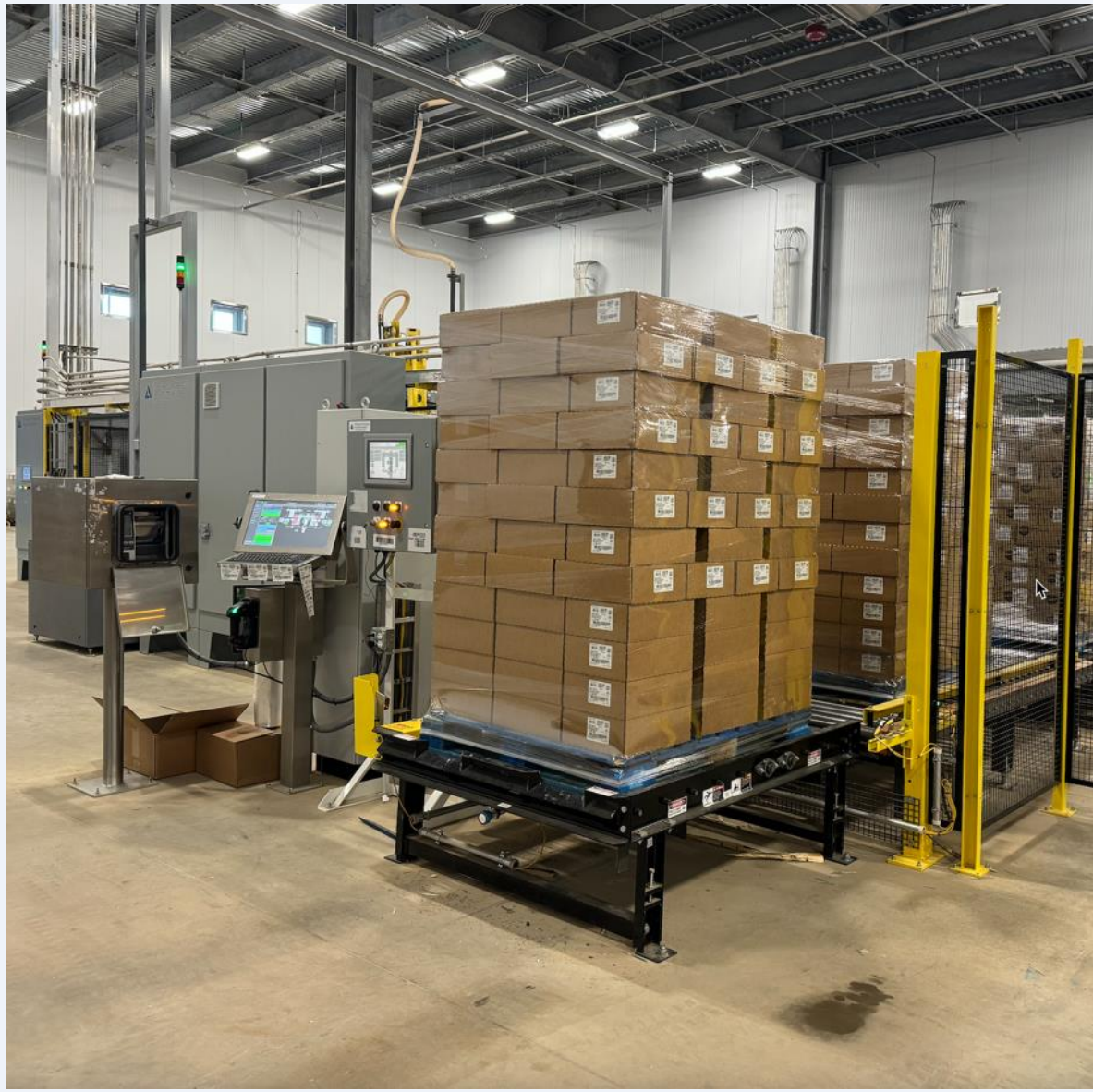
Source: Fulfilld

Real World Example

Palletizer

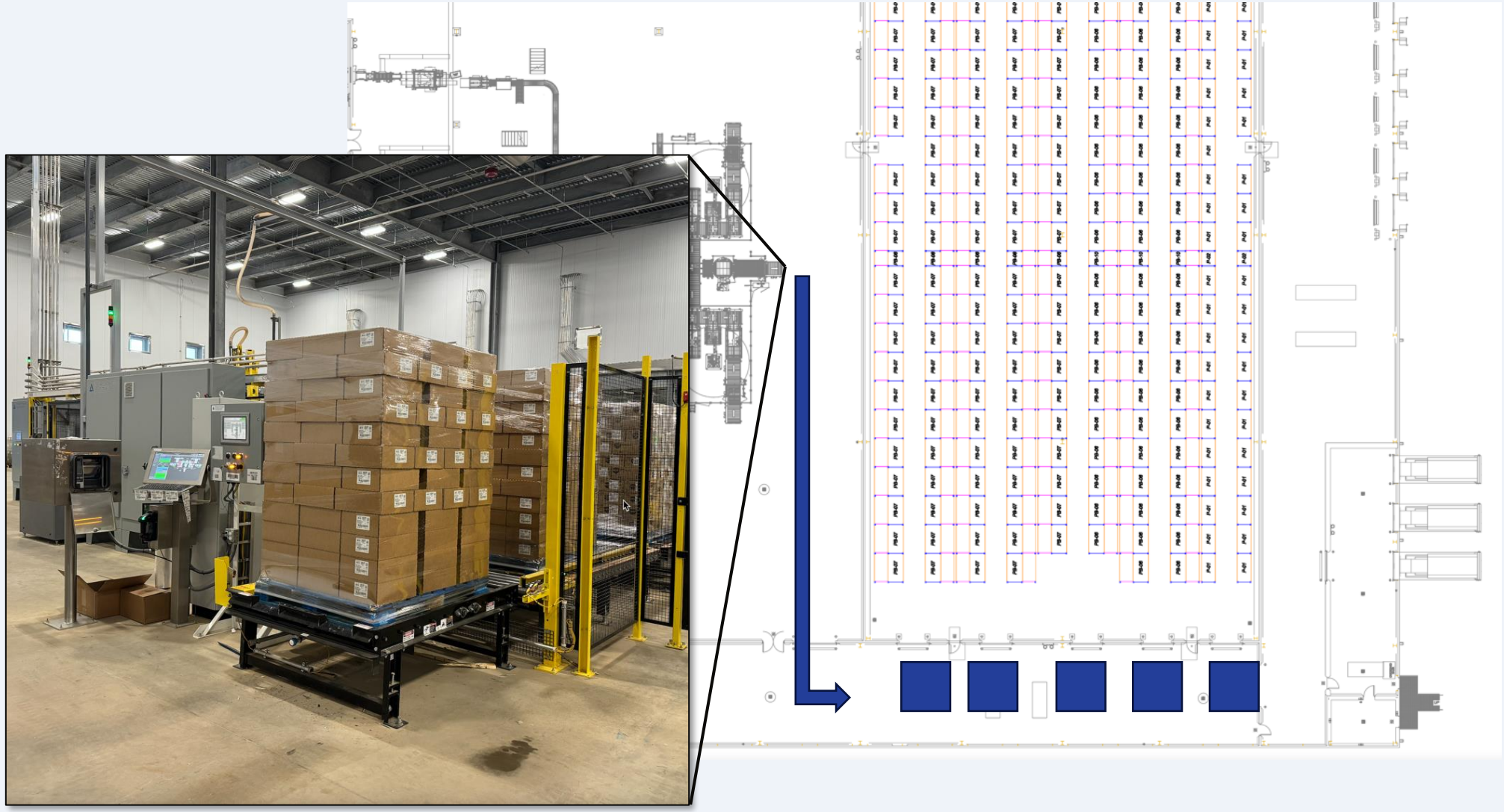
AGV

Human



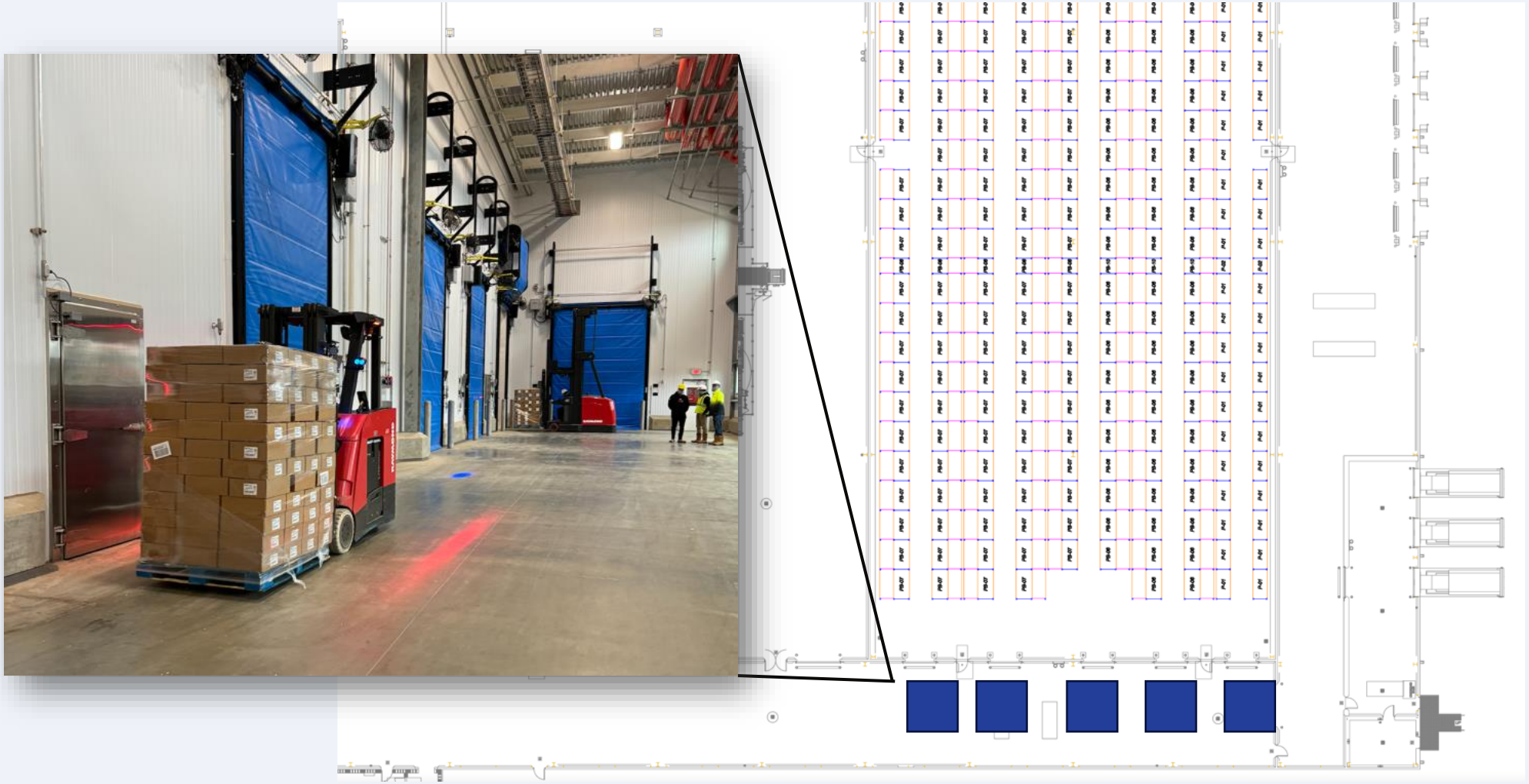
Determine Best Product Position

Staging Area



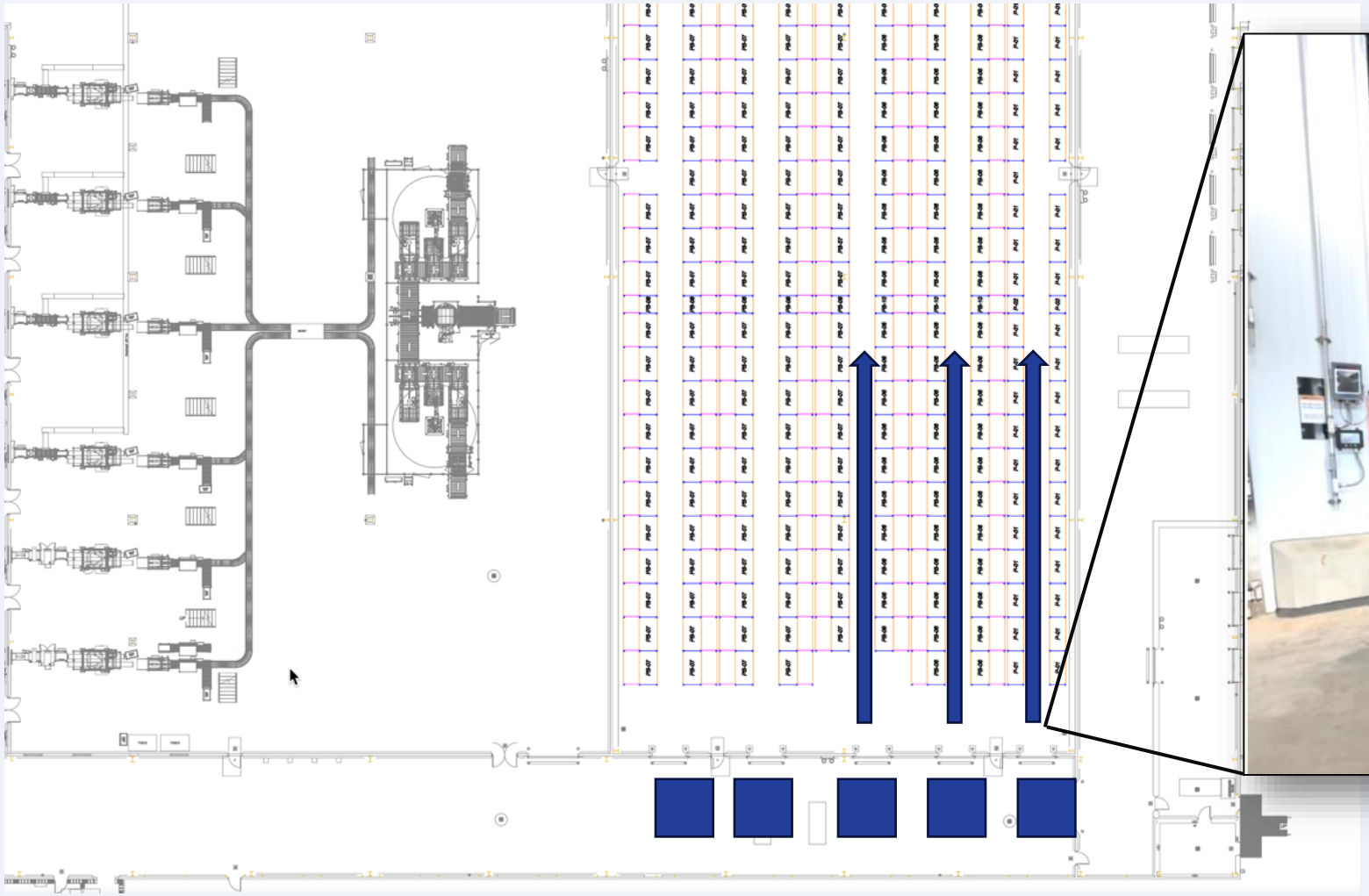
Automated Guided Vehicles (AGVs)

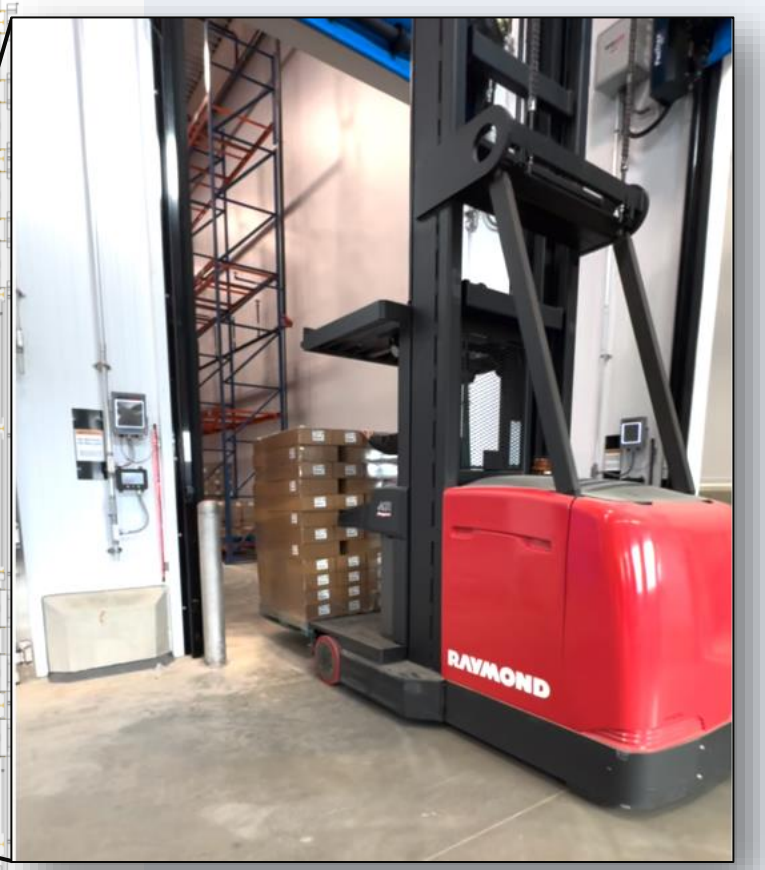
Staging Area



Coordinating Robotics & Humans

Staging Area





Traditional Process

- Employee Directed Putaway
- OR WMS assigned Bin
- Round-robin distribution on inbound

Challenges

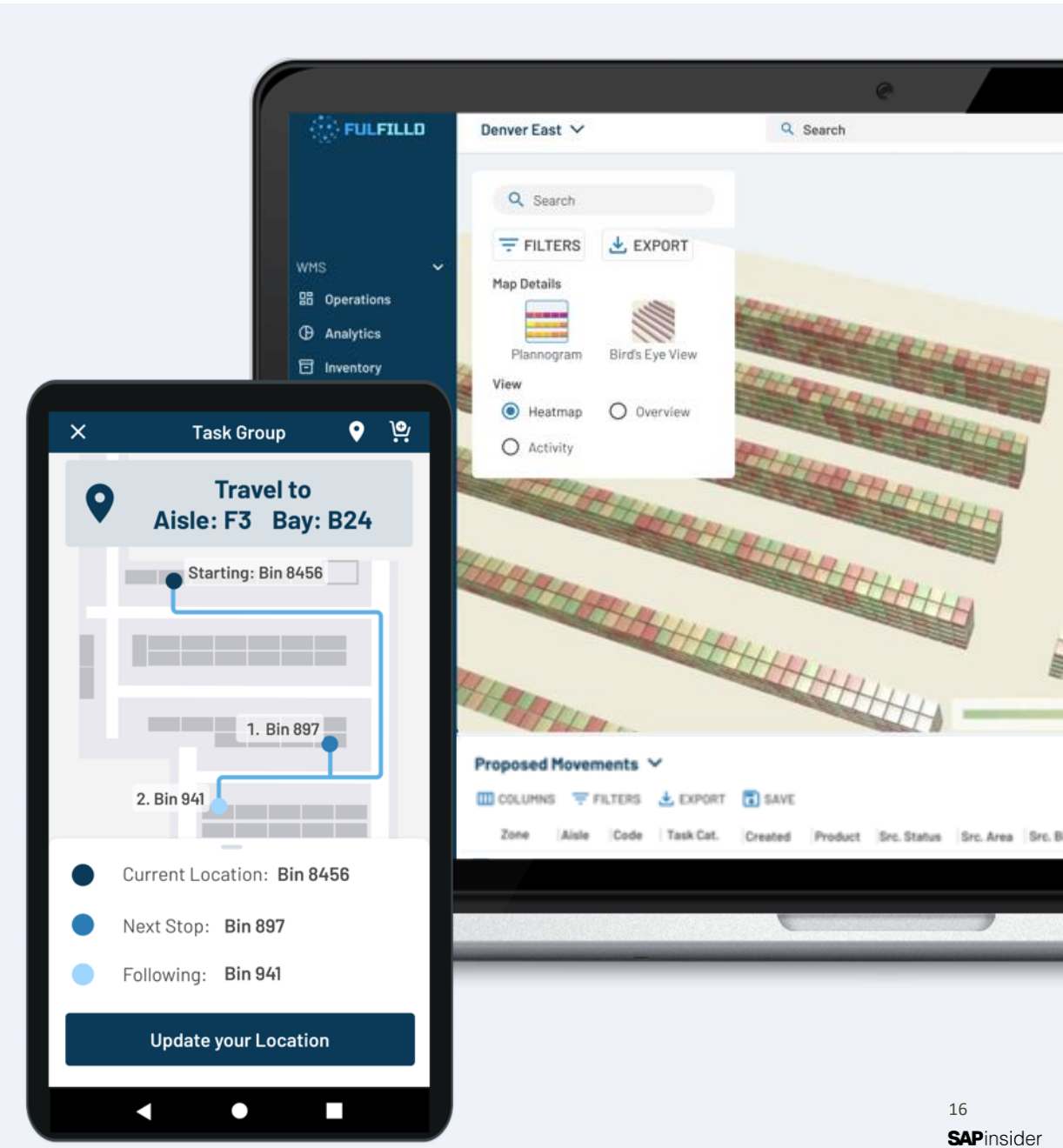
- Mixed Lots in Bins
- Placement based on site-level knowledge
- Longer picking and loading durations (potentially)

Digital Twin Enable Process

- At Palletizer, run Putaway Algorithm
  - Is this needed today? → Outbound Stage
  - Is this needed soon? And what is it commonly ordered with?
  - What is current AGV capacity? Inbound Stage Capacity?
- Create AGV Task → Turret Task
  - Track AGVs in flight
  - Alert employees when Task ready

Digital Twin Benefits

- Estimated Time to Complete (ETC) available for all Tasks
  - Distance x Travel Speed = Time
  - Are we meeting defined standards?
- More accurately orchestrate activities for multiple modalities
  - Do we need more employees? Or more AGVs?
  - Traceability of product in different zones



Integration with SAP S/4HANA

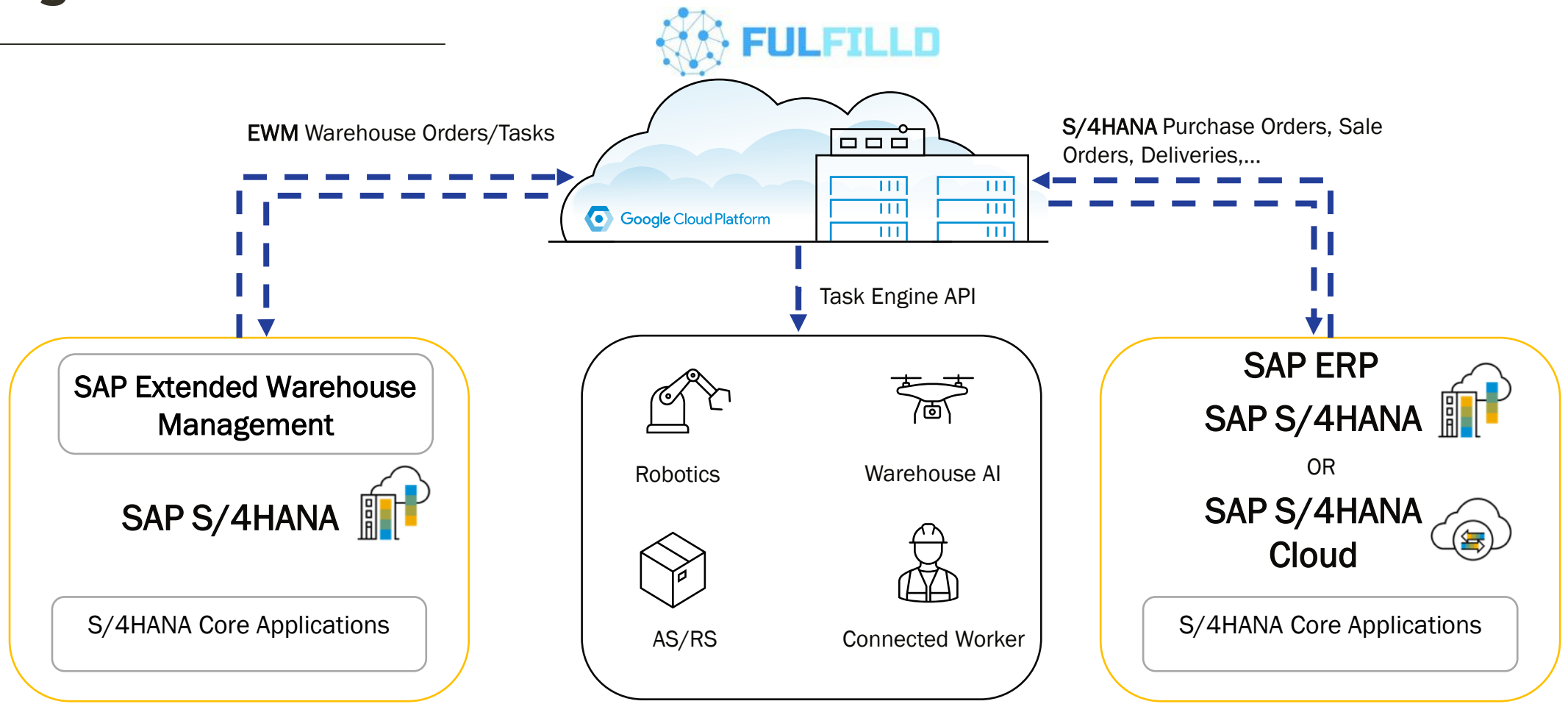
SAP S/4HANA

- Manufacturing
- Accounting
- Sales
- Quality Assurance
- Analytics

FULFILLD WMS (Or 3rd Party)

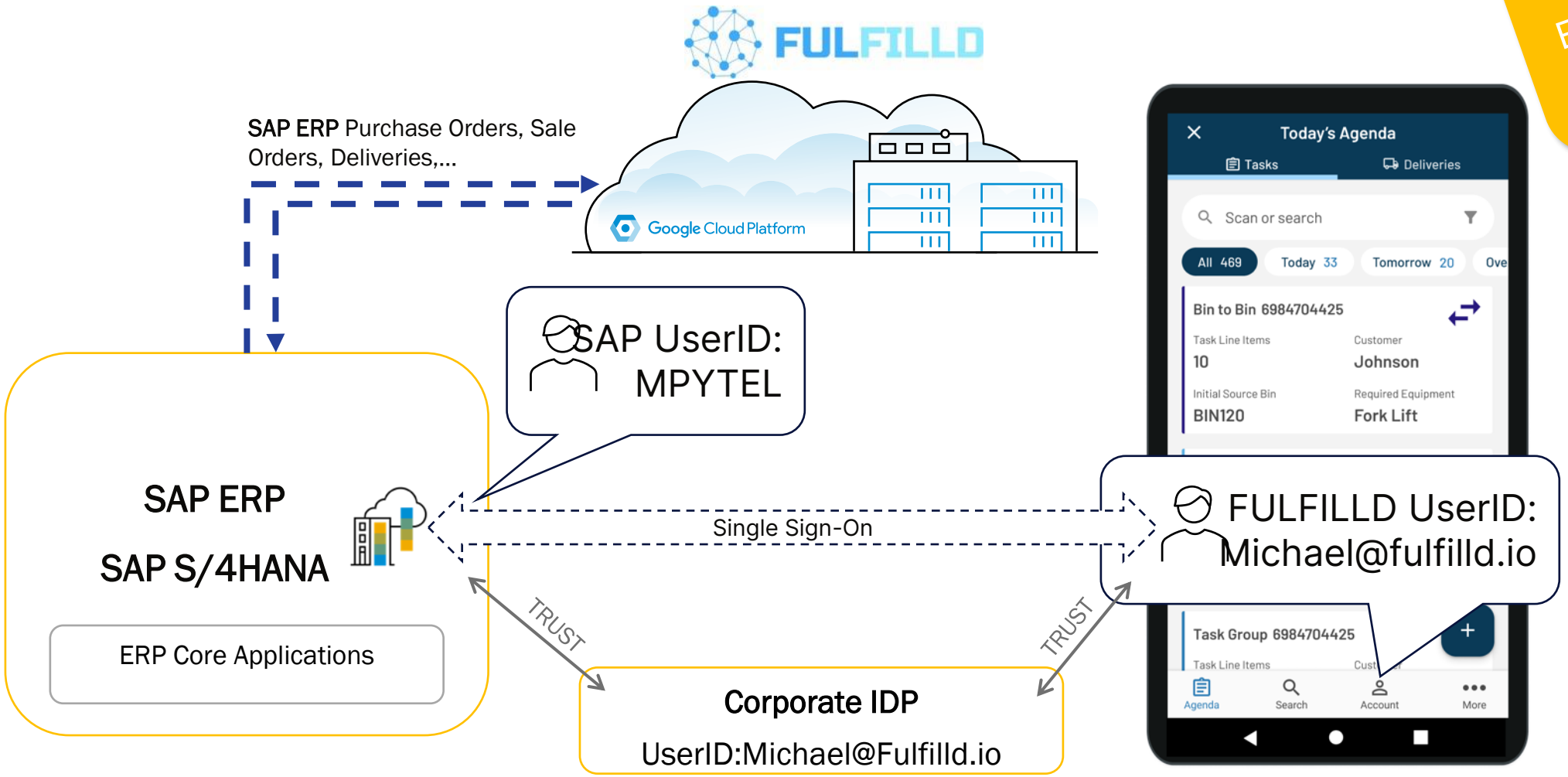
- Inventory Management
- Warehouse Management
- Warehouse Execution
- Door Scheduling
- Analytics

Warehouse Integration



Transaction Traceability

IDOC FREE ENVIRONMENT



Integration Best Practices

- Leverage REST APIs delivered with SAP S/4HANA 2020
  - Production/Process Order Confirmation
  - GR/GI with SAP Deliveries
  - Picking, Delivery Complete, etc
- ”Push” from SAP to Third Party available with addition licenses
  - SAP BTP
  - Third Party Apps
- Standard integration (aka Free) requires “polling” for changes in SAP
- Utilize OAUTH for SAP Single Sign-on to avoid digital access licenses

Quick FAQ

Can I build mobile apps that integrate with SAP S/4HANA Directly?

- Yes! Google Flutter or Apple Xcode can allow developers to build apps that integrate directly with SAP S/4HANA using real-time APIs.

Can I use single sign-on (SSO) from my app to SAP S/4HANA without additional licenses?

- Yes! All modern apps support SSO with OAUTH2.

Can I build my own digital twin?

- Yes! Multiple platforms like Fulfilld exist, but this can be done on your own.

Wrap Up

- A Digital Twin is interactive; it allows the user to engage with the real-world environment using a digital representation.
- Warehouses will continue to be a blend of human and robotics. With AI supporting, not replacing, human decision making. Technology can reduce the risk of resource turnover and help us make better decisions.
- SAP has provided customers with an amazing platform to integrate side-car apps and new spot solutions when using the SAP Gateway.

Where to Find More Information

- SAP API Hub > https://api.sap.com and Filter by SAP S/4HANA On-premise
- Getting started with Flutter for SAP > https://community.sap.com/t5/technology-blogs-by-sap/flutter-with-sap-cloud-platform-sdk/ba-p/13403657
- Google OR Tools > https://developers.google.com/optimization/examples
- Apple XCode for SAP > https://developer.apple.com/sap/

Key Points to Take Home

- A Digital Twin is more than a read-only view of something in the physical world.
- SAP REST APIs are available out of the box; and we can build custom APIs in SAP S/4HANA as needed.
- We can train ML models on physical spaces to permit the simulation of multiple potential changes to the environment.
- Robotics and warehouse employees will coexist for the foreseeable future
- A Digital Twin can more accurately orchestrate activities on the shopfloor or a warehouse
- The adoption curve for Digital Twin technologies has shifted from early adopters to mainstream implementation.

Thank you! Any Questions?

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