

# Orchestrating Man and Machine

Presented by:

Adam Kline

Sr. Director Product Management  
Manhattan Associates



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# Automation

Significant growth trend

- Tight labor markets
- Need more capacity
- Fulfillment as a competitive weapon



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# Automation

Growing in variety and sophistication

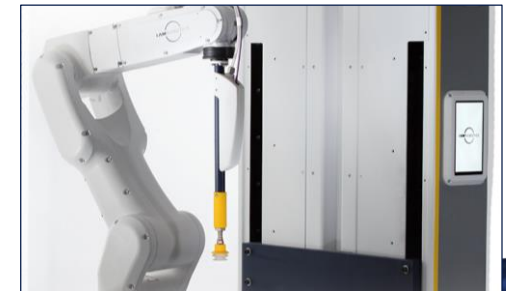
## Traditional MHE



## Sophisticated Storage & Retrieval



## Cutting Edge Robotics

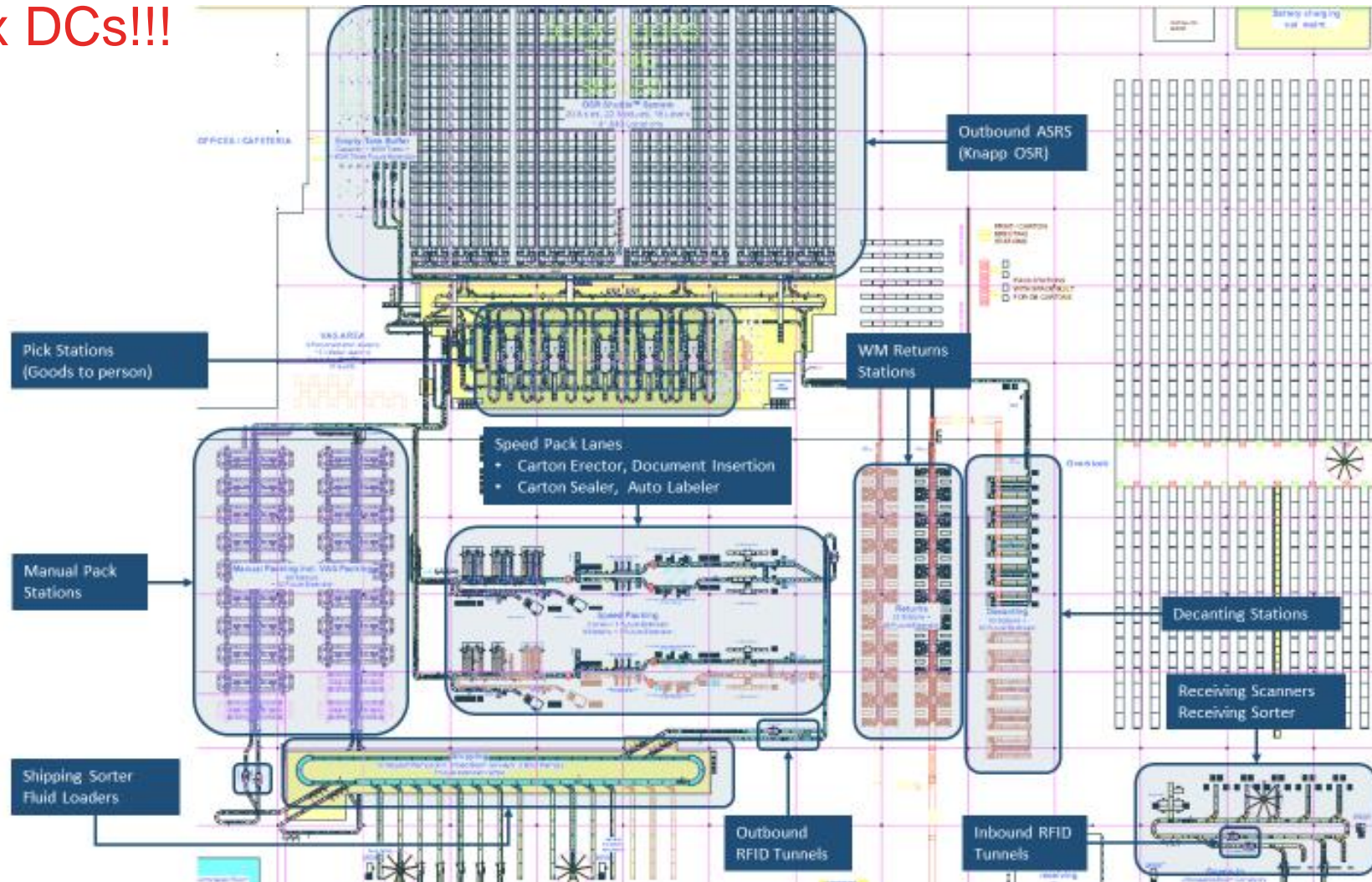


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# Automation

## Complex DCs!!!



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# Automation

Complex Systems?

**WMS**

**WES**

**WCS**

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# Automation

Visibility from key systems

Orders	<b>WMS</b>
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People	<b>WMS</b>
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Work	<b>WMS</b>
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Equipment	<b>WCS</b>
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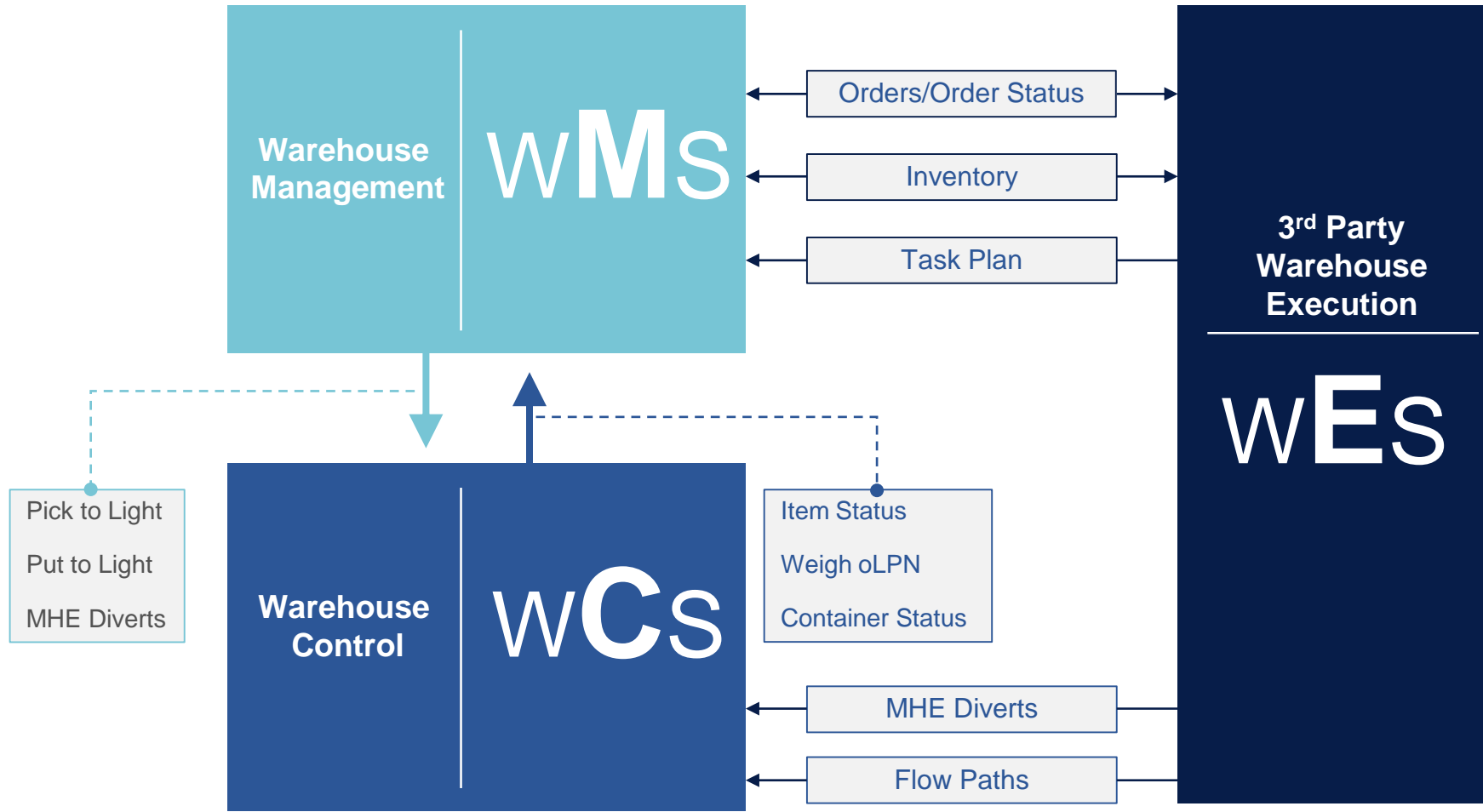
Inventory	<b>WMS</b>
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# Automation

Along came the WES

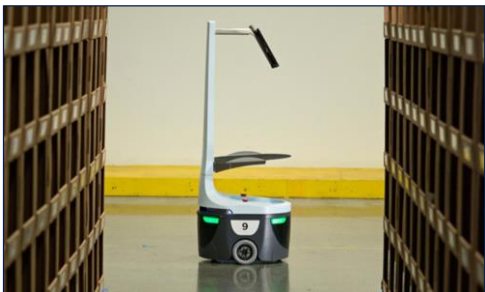
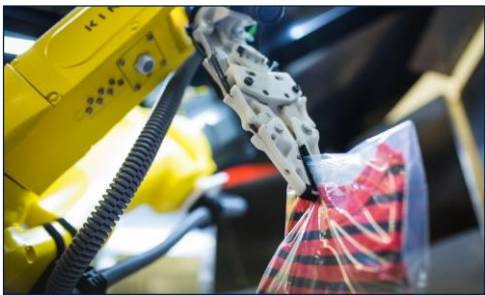


**Cumbersome  
Redundant  
Expensive!!!**

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# Automation

Is there a better way?





# Automation

Only part of the story



- Nothing can replace human decision making
- Some tasks cannot be automated (yet)
- Man + Machine can yield great efficiency

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# Orchestrating Man And Machine

So many questions!!!

- Where is the item?
- Which order takes precedence?
- What type of automation can move the inventory?
- What resource is available right now?
- What carrier/service is required?
- What delivery requirements exist?
- What is the most efficient travel path?
- How long will the work take?

# Orchestrating Man And Machine

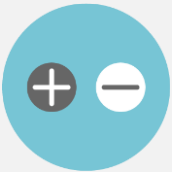
Wave vs. waveless?

W4.....> W3.....> W2.....> W1.....>

Traditional Order Fulfillment  
via Wave-Driven Batches



Waves require user attention to release batches of orders which create tasks (work).



Throughput and utilization rise and fall naturally throughout the batch release & execution processes.



Manual intervention may be needed to expedite High Priority Orders after a batch (wave) is set in motion.

Peaks and valleys in labor





# Orchestrating Man And Machine

Wave vs waveless?



Streaming eliminates peaks and valleys leading to consistent asset utilization.



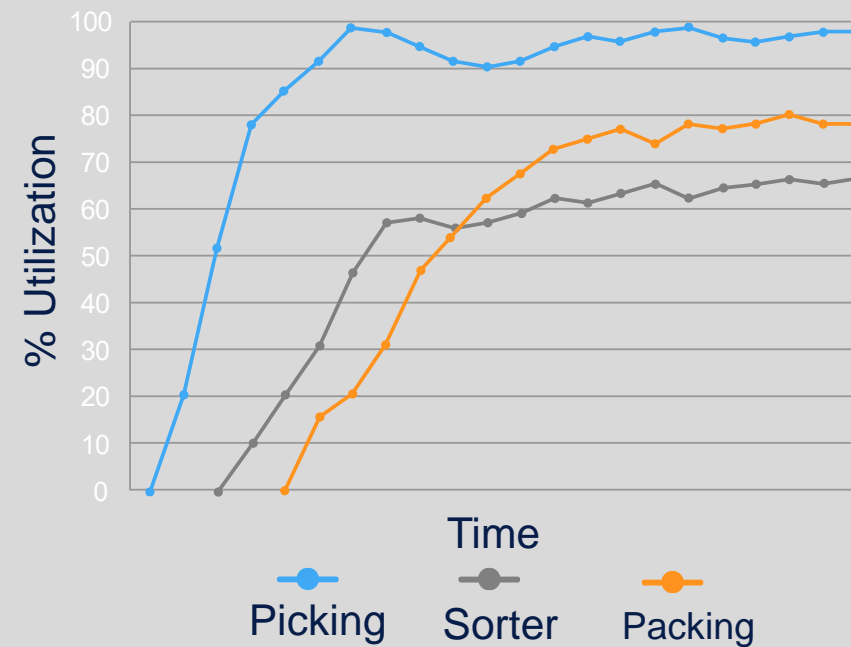
Just-in-time release allows for late-stage reprioritization and better accommodation of higher priority orders.



Throughput and utilization metrics are improved.

## More Consistency via Waveless Fulfillment

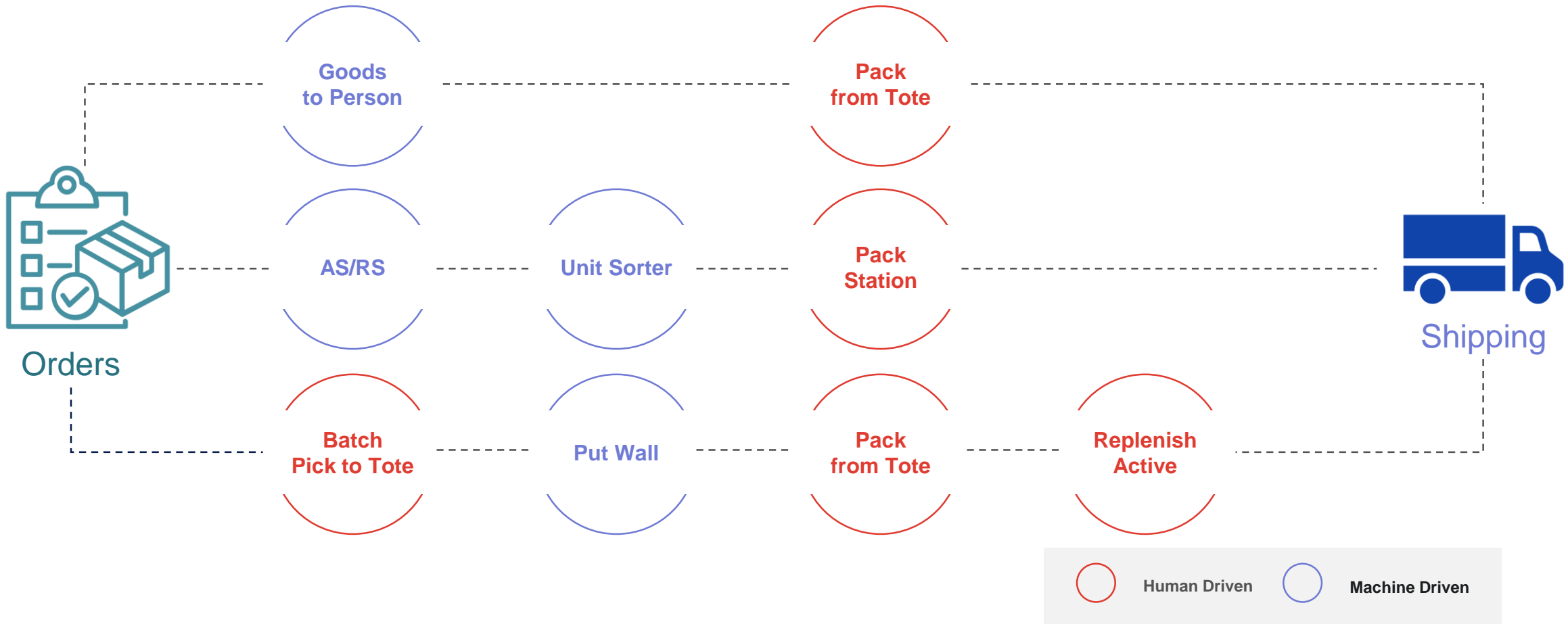
Peaks and valleys in labor



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# Orchestrating Man And Machine

Putting it all together



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# Orchestrating Man And Machine

Putting it all together

## Order Streaming + WES – Saves Time

The system continuously evaluates the order pool to prioritize orders and advance orders through the process without human intervention.

High priority orders are completed in less time.

## Order Streaming + WES – Improves Asset Utilization

Work release delayed...until Human or Equipment capacity is available.

Pull-based processing based on real-time human and automation status honors capacities and constraints in real-time.

Reduced  
Order  
Cycle Time

Improved  
Facility  
Throughput  
%

Improved  
Asset  
Utilization



# Orchestrating Man And Machine

## Final thoughts

- Which system is right for me?
  - Don't use a hammer when a screwdriver is required
  - **WMS** – intelligence, optimization, inventory, prioritization, etc.
  - **WCS** – all move logic
  - **WES** – communication between WMS and WCS
- The most sophisticated, complex, and cognitive machine in the warehouse is the **human brain**
- Automation most often **augments**, not replaces, the workforce
- Applying right mix of optimization and automation can
  - Reduce cycle time
  - Improve asset utilization
  - Increase throughput
  - Eliminate upgraded shipments

*For more information:*

Speaker email: [akline@manh.com](mailto:akline@manh.com)

Website: [www.manh.com](http://www.manh.com)

Or visit MODEX Booth 7485



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