

# *Next Gen Fulfillment Answered The warehouse execution system (WES)*

Presented by:

Jeff Lammert

Art Eldred

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 **FUTUREPROOF.**



## Agenda

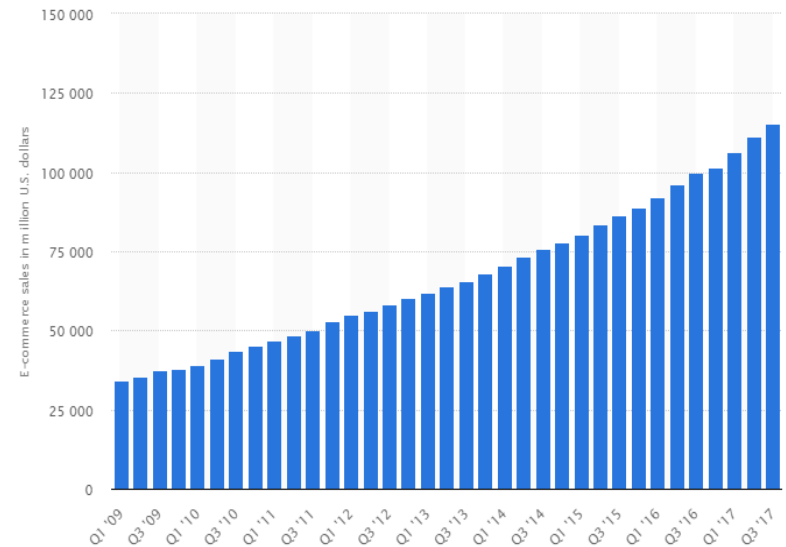
- Fulfillment Trends & Challenges
- What is a Warehouse Execution System
- What can we learn from manufacturing
- Where does WES fit with fulfillment technologies
- How do I solve for expediency and efficiency?

- VARGO® is a material handling solutions company, powered by a team of fulfillment and distribution center specialists with expertise in warehouse execution systems, integration and material handling equipment. For more than four decades, we have been working with retailers, manufacturers, wholesale and e-commerce distributors to improve material handling operations and maximize resource utilization.
- Jeff Lammert - 28 years experience in distribution facility design and implementation across consumer, technology, life-sciences, retail and e-commerce businesses. His expertise is in total facility design, merging the work processes, systemic processes and physical flows to create the optimal solution. In addition to VARGO®, Mr. Lammert's resume includes 17 years with DHL / Exel Supply Chain, The Limited and Tompkins Associates. He has a bachelor of science degree in industrial engineering from North Carolina State University.
- Art Eldred – 26 years experience developing, implementing and supporting supply chain solutions. His expertise is in material handling systems, functions and solutions. In addition to VARGO®, Mr. Eldred has work for Unarco Automation, Intelligrated (FKI Logistex), Dematic, DHL/Exel and Kiva. He has a bachelor of science degree in industrial engineering from Ohio University and actively serves on the engineering college's faculty advisory committee.

## Fulfillment Trends

- Retailer growth continues to be through e-commerce
- 4 – 5 times faster growth than offline sales growth <sup>1</sup>
- 12.7% of retail sales in 2017 growing to 17% in 2022 <sup>2</sup>
- 16% CAGR

- E-commerce sales in US Q12009 – Q32017 <sup>3</sup>



Data visualized by + **tableau**

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## Fulfillment Challenges

eCommerce creates challenges for fulfillment centers designed pre-eCom

- Operational Profile
- Order Cycle Time Expectations
- Dated Technology Stacks
- Significant Peak

## Definitions

- **Machine Control Software:** software to start & stop the machine, monitor sensory inputs to provide instantaneous control direction and safety functions to protect people and machinery during operation
- **Warehouse Control System (WCS):** a software system that integrates the control of multiple machine control systems in real time
- **Warehouse Execution System (WES):** a software system that works in real time to organize, sequence and synchronize all warehouse resources: material handling equipment, devices and employees
- **Warehouse Management System (WMS):** a software application, designed to support and optimize warehouse or distribution center management. They facilitate management in their daily planning, organizing, staffing, directing, and controlling the utilization of available resources, to move and store materials into, within, and out of a warehouse, while supporting staff in the performance of material movement and storage in and around a warehouse. <sup>4</sup>

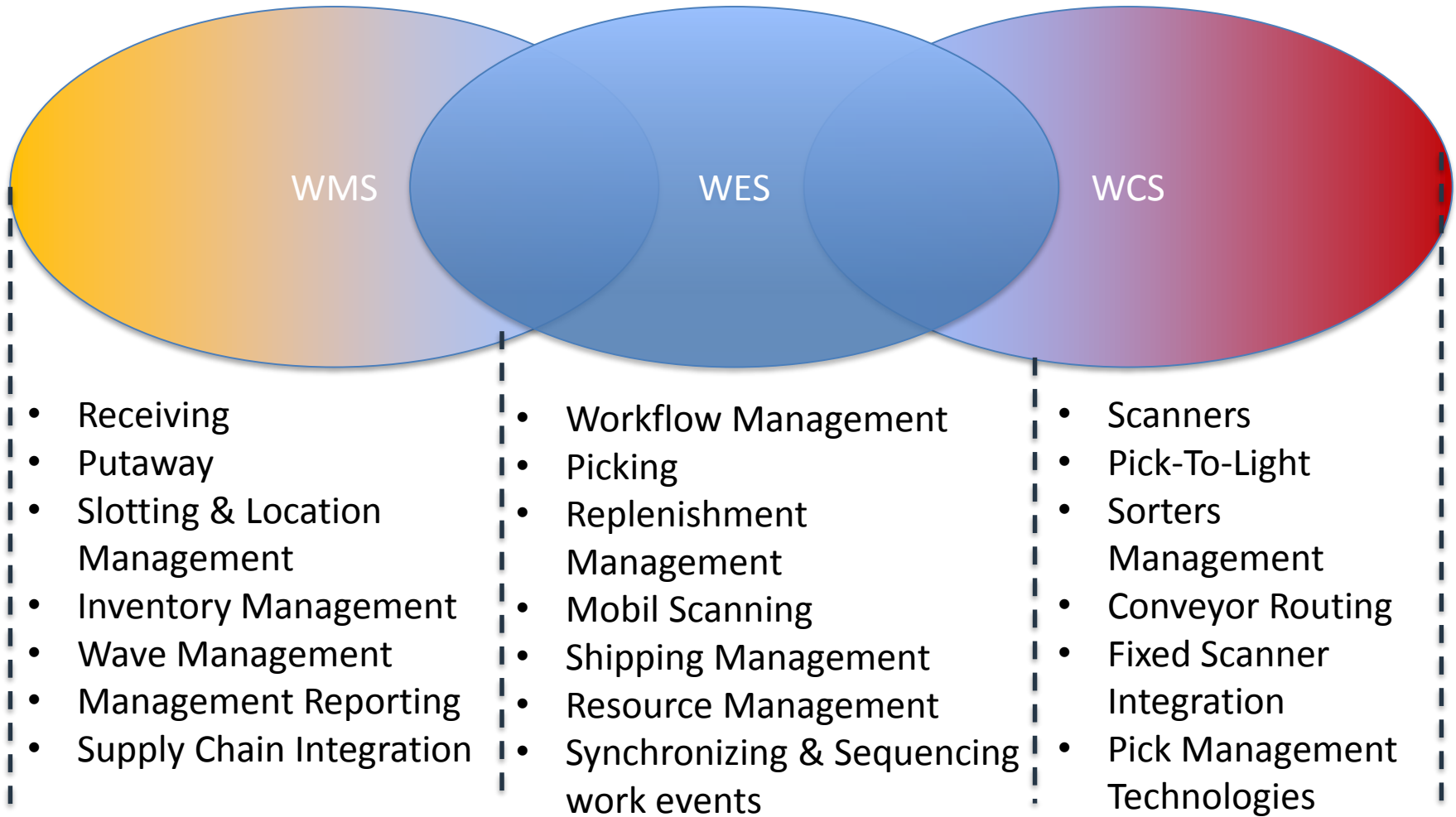
## WMS is only part of the Fulfillment Center “Brain”



## Difference between WMS & WES?

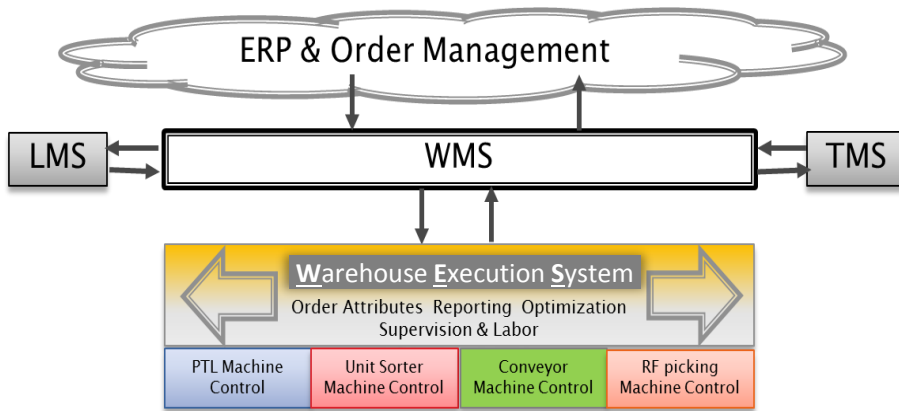
- **Time**
- WMS - Time to create a work plan is not critical to the operation. Work can be planned hours ahead. Computing architecture not based on making real time decisions
- WES – Time is very critical to provide direction to MHE. Knowing the status of all resources in real time enables an operation to react to increasing order cycle time expectations



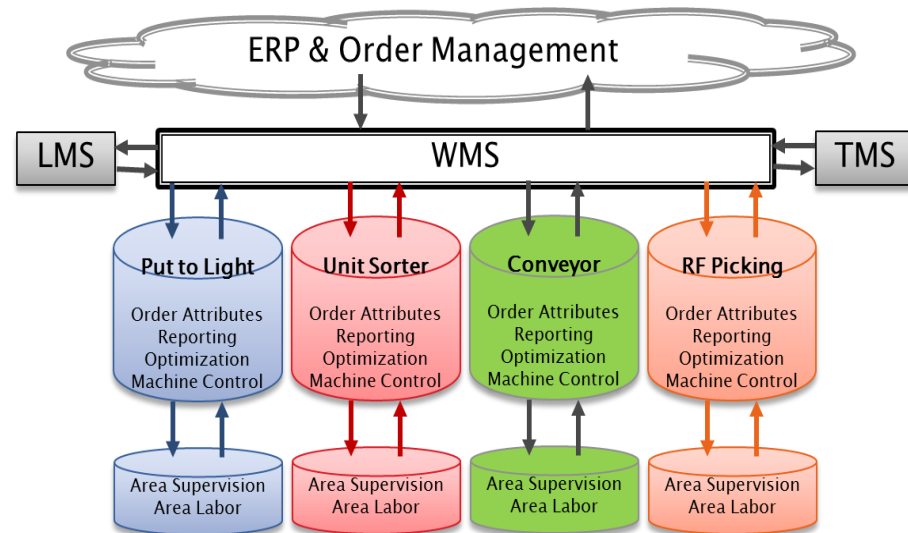


# WES in the technology stack

## WMS & WES



## WMS & WCS's

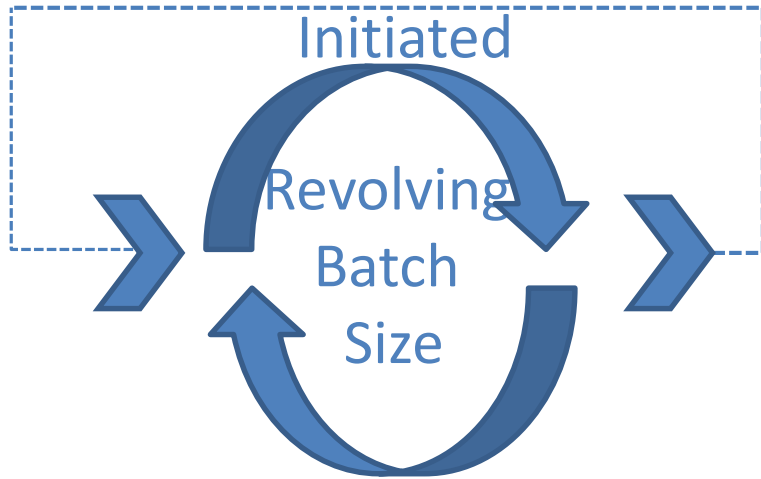


## What can we learn from Manufacturing?

- LEAN
- PUSH verse PULL
- 1 piece flow
- How can that be incorporated into fulfillment center operations?

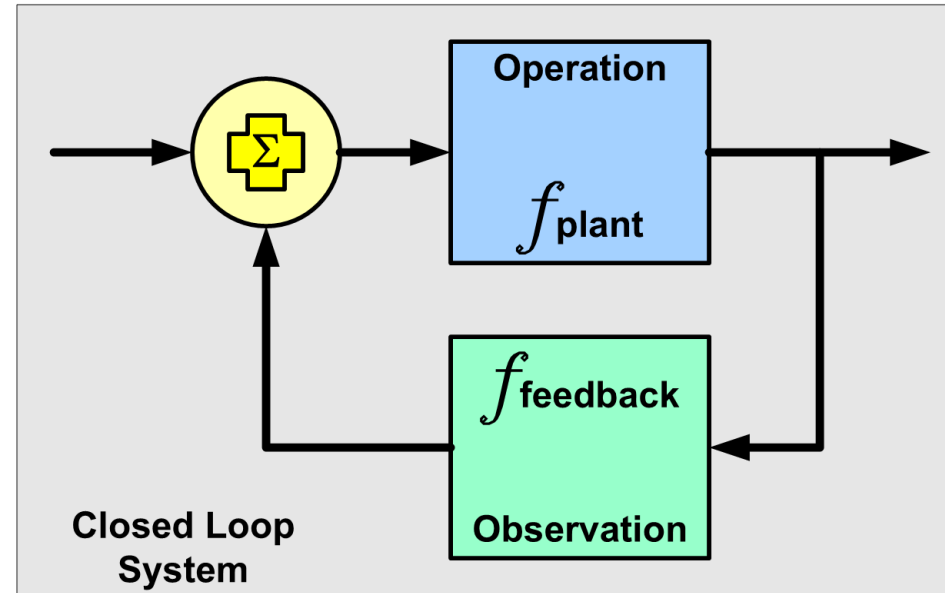
## Fulfillment Process

For Every Order Completed 1 is



Efficiency of Batch Picking with  
Waveless Processing

## Manufacturing Process

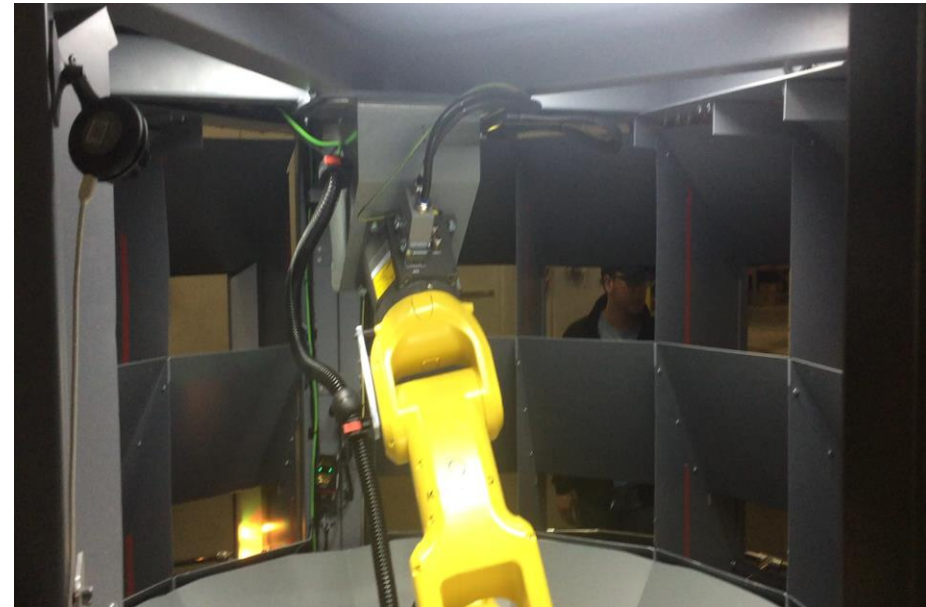


## Waveless ≠ Batchless

- Waveless does not mean batch-less
- Larger batch size = Greater pick efficiency

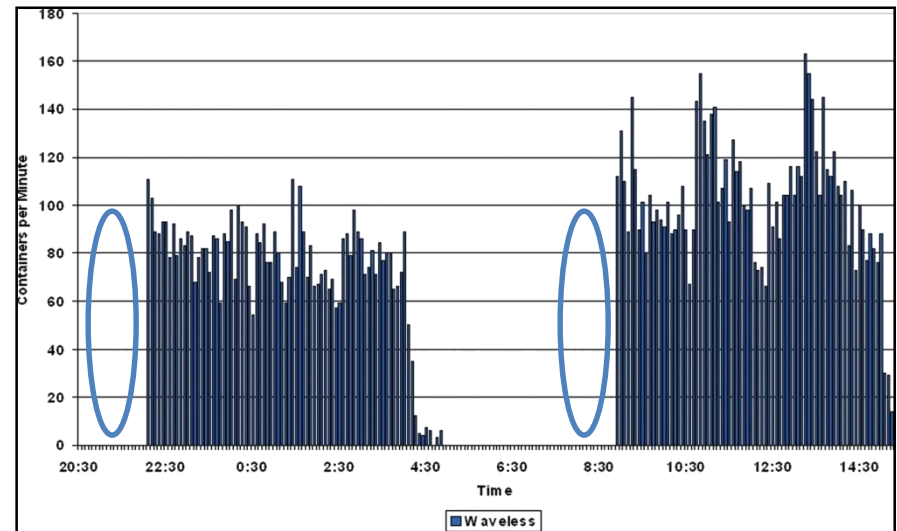
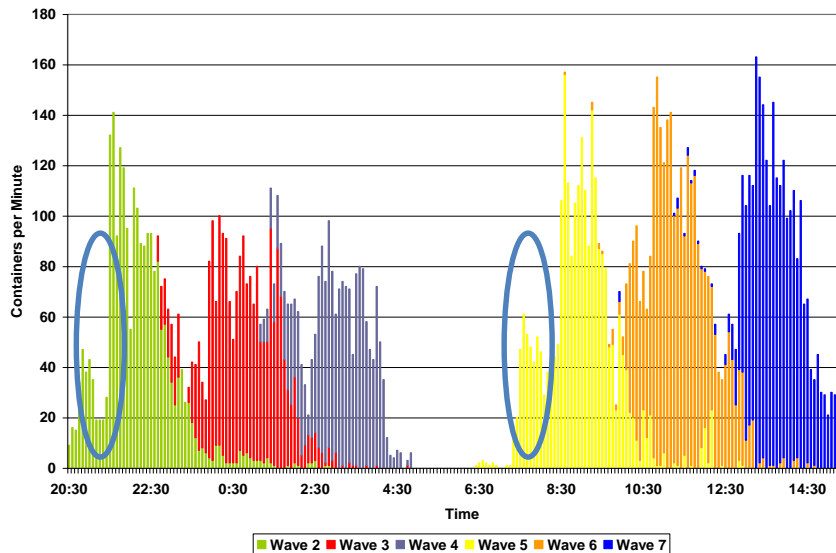
	Waveless	Waves
Batch size	Constant, revolving	Diminishing as wave completes
Order prioritization	Continuous	At time of waving
Order introduction	Continuous	Only at beginning of wave
Order completion	Continuous	Skewed to end of wave
Impact on downstream processes	Level, continuous flow of work to packing & shipping	Uneven flow skewed to end of the wave

# Where does technology fit into WES?



# Expediency vs Efficiency

- Its all about Utilization
- Labor Productivity = Performance x **Utilization**
- Machine Output = Capacity x **Utilization**



## ***For More Information:***

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## ***For More Information:***

1. <http://www.businessinsider.com/the-future-of-retail-report-2018-2017-12>
2. <http://www.businessinsider.com/e-commerce-retail-sales-2022-amazon-2017-8>
3. <https://www.statista.com/statistics/187443/quarterly-e-commerce-sales-in-the-the-us/>
4. [https://en.wikipedia.org/wiki/Warehouse\\_management\\_system](https://en.wikipedia.org/wiki/Warehouse_management_system)