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New Concepts in Multi-Channel Order Fulfillment

Sponsored by:

SSI SCHÄFER

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Concepts for Discussion

- Traditional order fulfillment solutions, including Goods-to-Person, evolved in a "retail centric" environment (full case and split case replenishment to brick and mortar stores)
- As the Direct-to-Consumer (DTC) market grows, so do the limitations of traditional technologies and fulfillment strategies
- Today's solutions must account for the significant differences between Retail Order Fulfillment vs. Direct-to-Consumer (and the combination of both)

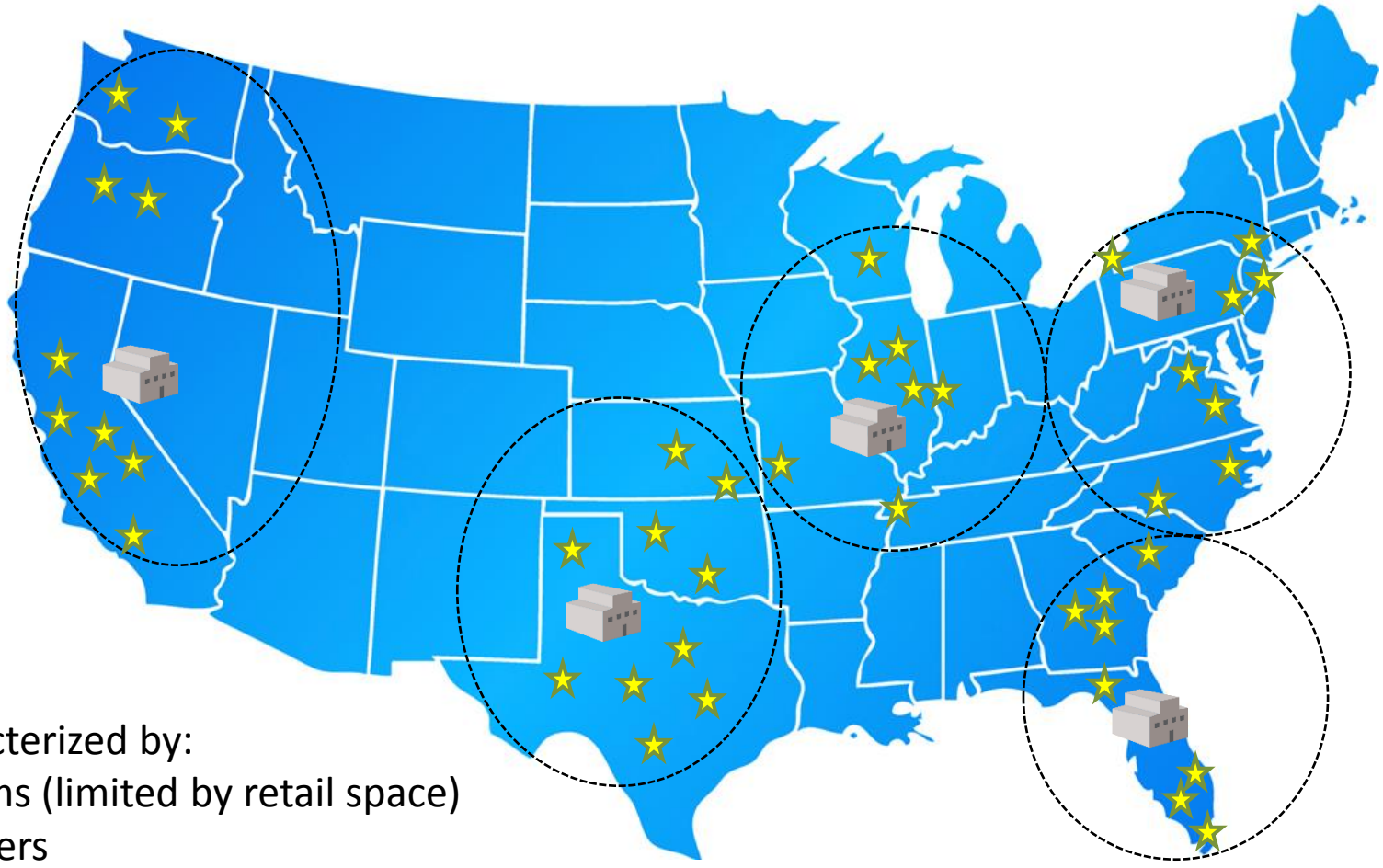
Presentation Content

- Retail Order Fulfillment (ROF)
  - Common order fulfillment strategies including Person-to-Goods and Goods-to-Person technologies
  - Typical constraints inherent in these strategies

- Impact of the Direct-to-Consumer (DTC) market
  - eCom, Multi Channel, and Omni Channel drivers:
  - Magnification of the traditional fulfillment constraints

- Technology and software innovations designed to improve fulfillment strategies

Retail Distribution Model



Retail characterized by:
- Fewer Items (limited by retail space)
- Larger orders

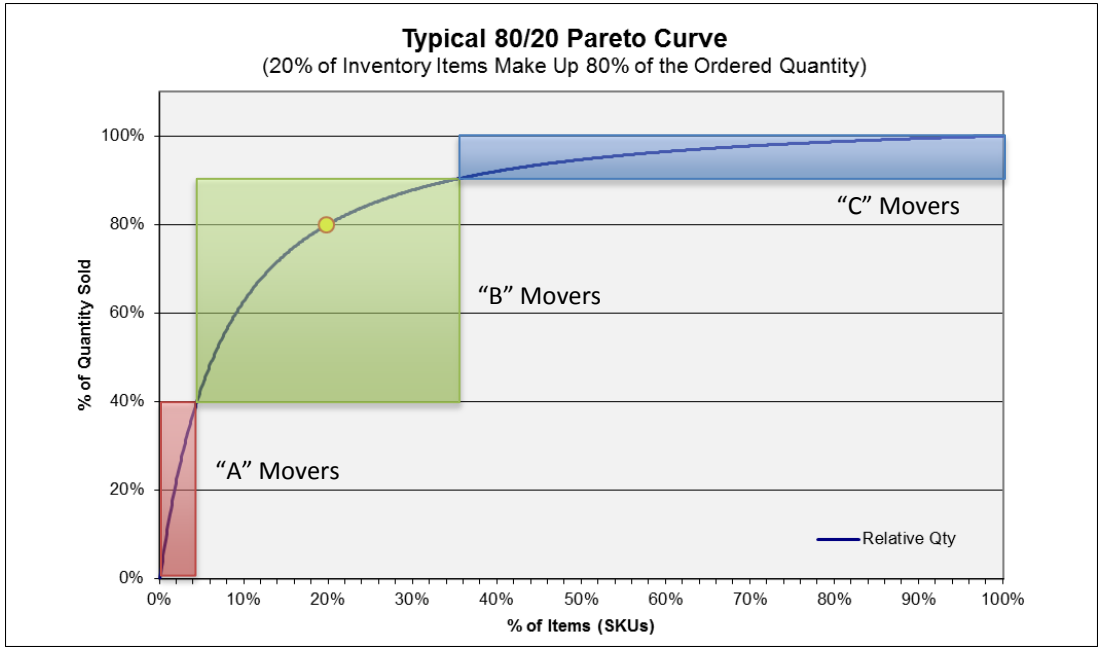
Common Order Fulfillment Strategy

Typical 80/20 Pareto curve, wherein 20% of the inventory items make up 80% of the volume. A common fulfillment strategy is to physically slot inventory to different picking technologies based on velocity, such as:

- A Movers: Fastest 5% of SKUs account for 40% of the volume
- B Movers: Next 30% of SKUs account for 50% of the volume
- C Movers: Bottom 65% of the SKUs account for only 10% of the volume

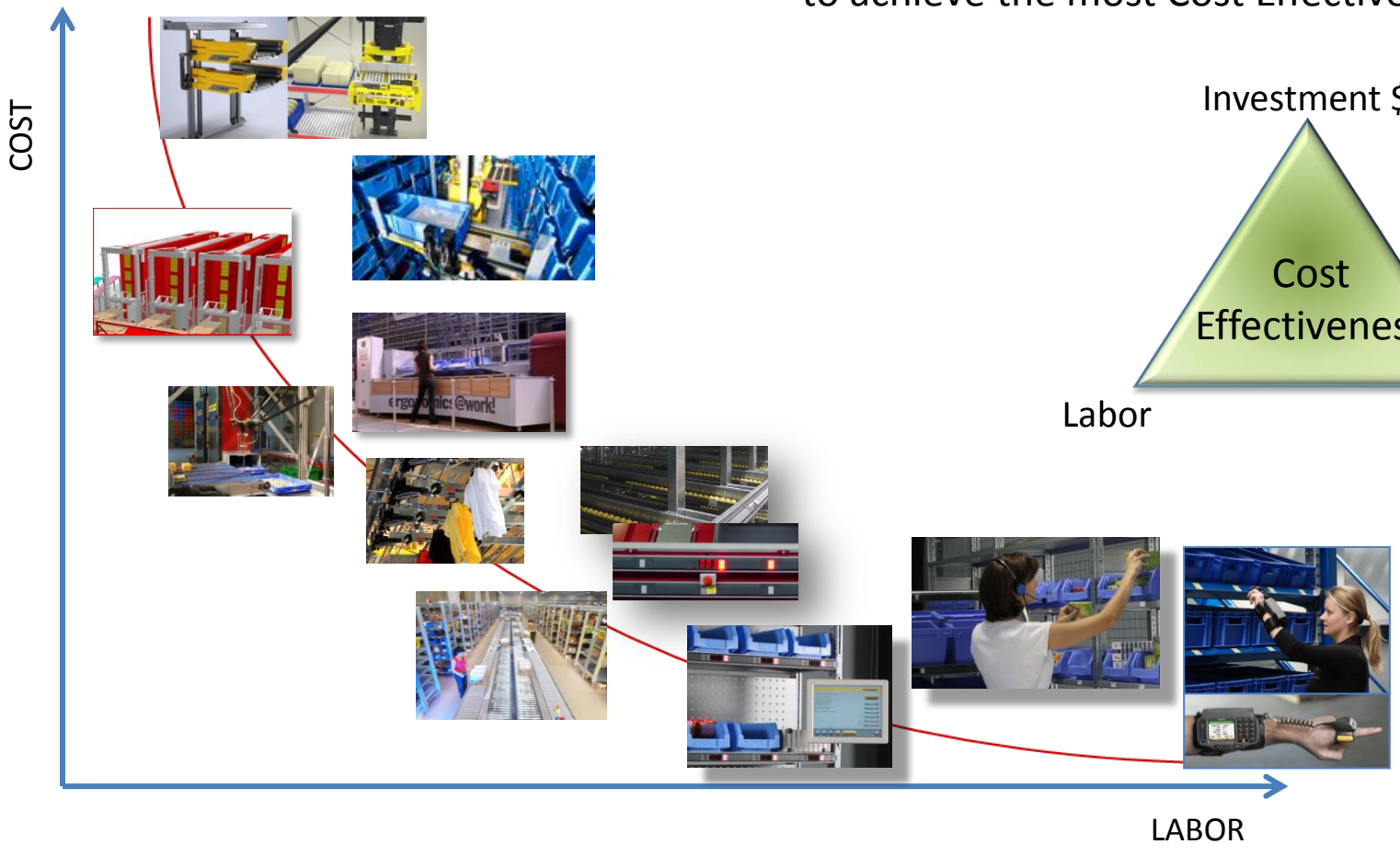
There may also be more than only 3 fulfillment areas, such as “AA” movers for very fast or promotional items.

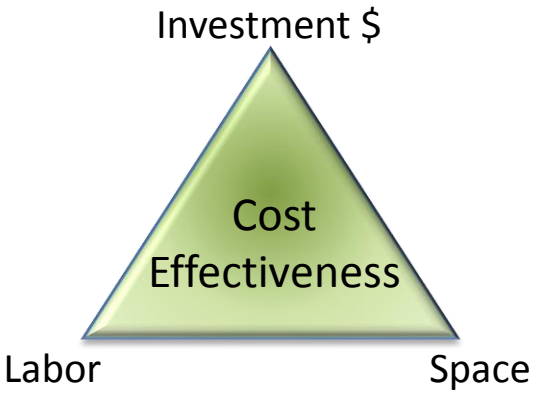
Various picking methods may be used for any subset, such as carton flow, pick module, goods-to-person, etc.



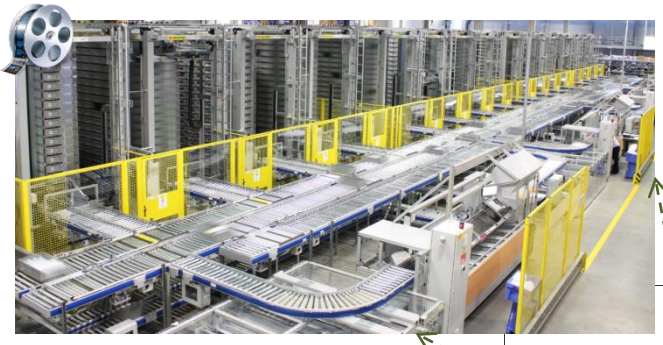
Dozens of Technology Alternatives

The challenge is finding the right combination to achieve the most Cost Effective Solution

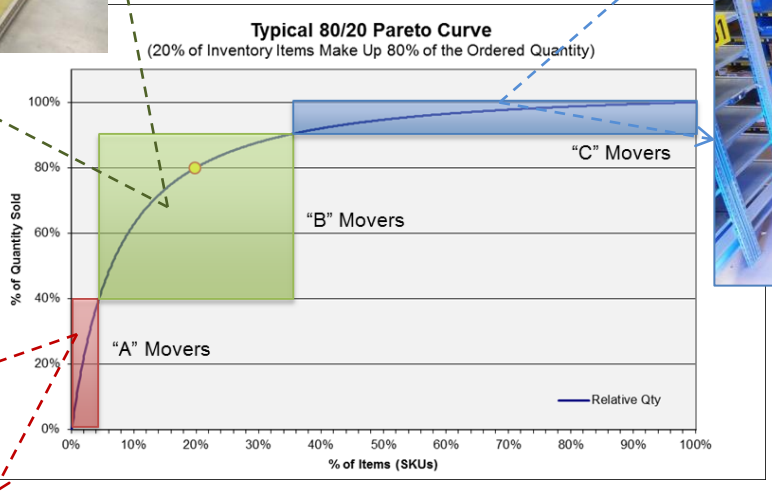




Examples of Picking Methods for Various Inventory Subsets



- The “B” movers are frequently active, but not constant and not all items are active each day. These are great candidates for Goods-to-Person picking. As needed, inventory is brought from storage engine to picker.

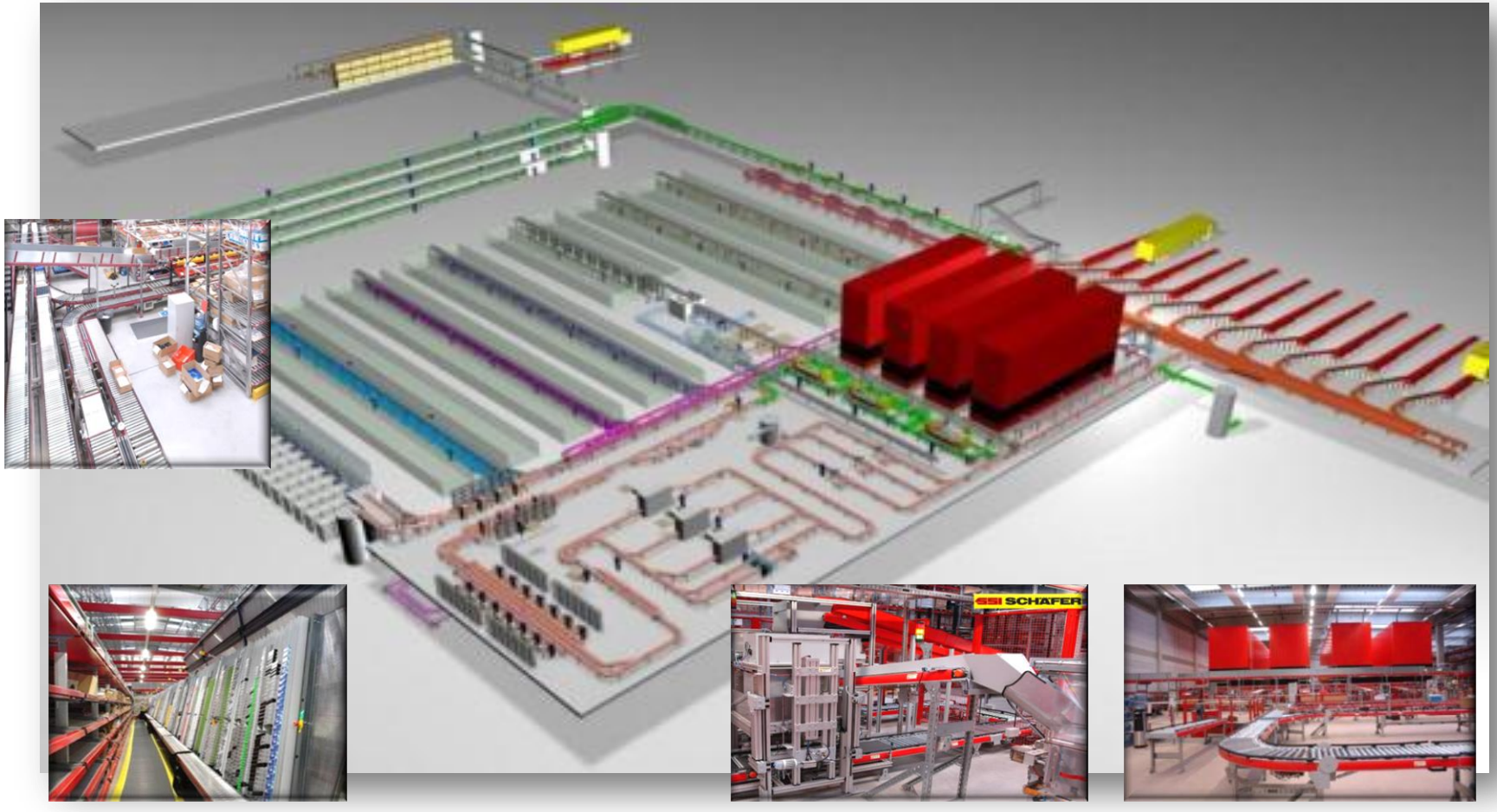


- The “C” movers are touched infrequently and at random. Often there is little stock on hand and reserve inventory is not needed. A very cost effective solution for these items is standard shelving separated into zones for order fulfillment.

- The “A” movers are constantly active and should always be available for selection. Carton flow with pick by light is often a good fit for these items.

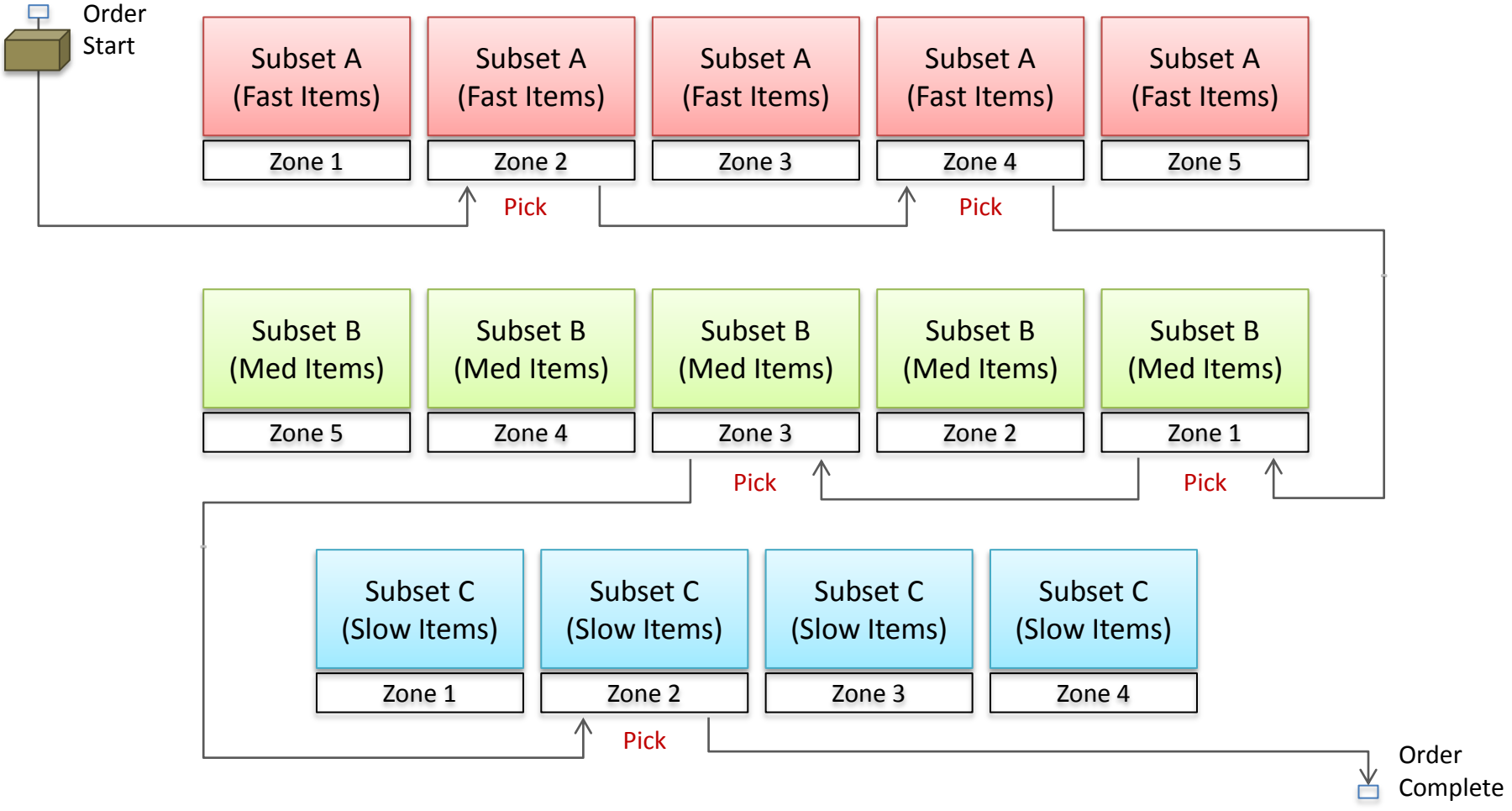
Sample Zone Bypass Layout

- Illustrates various fulfillment areas integrated into common fulfillment strategy.



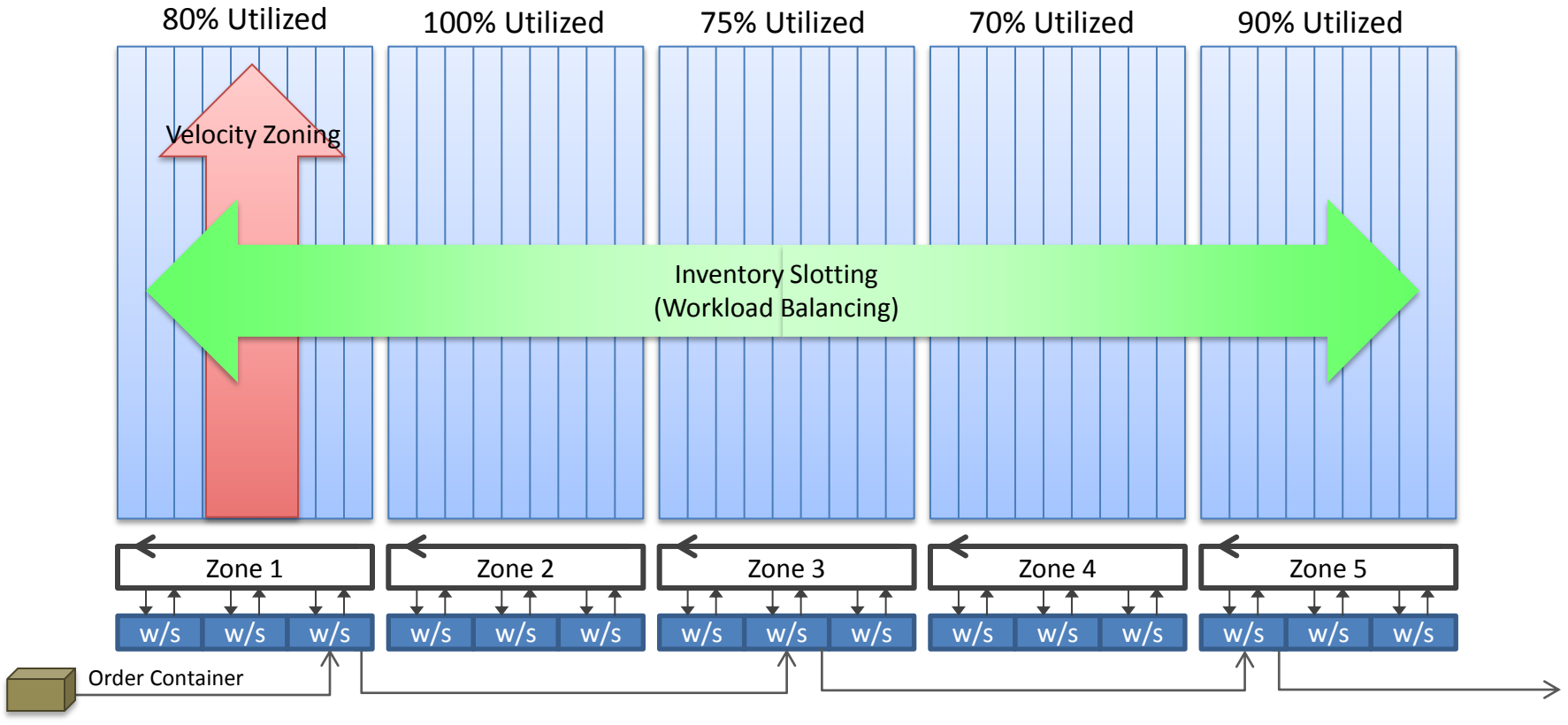
Zone Bypass Order Fulfillment

Order container moves from zone to zone, collecting the inventory it needs.



Inherent Limitations of Zone Bypass

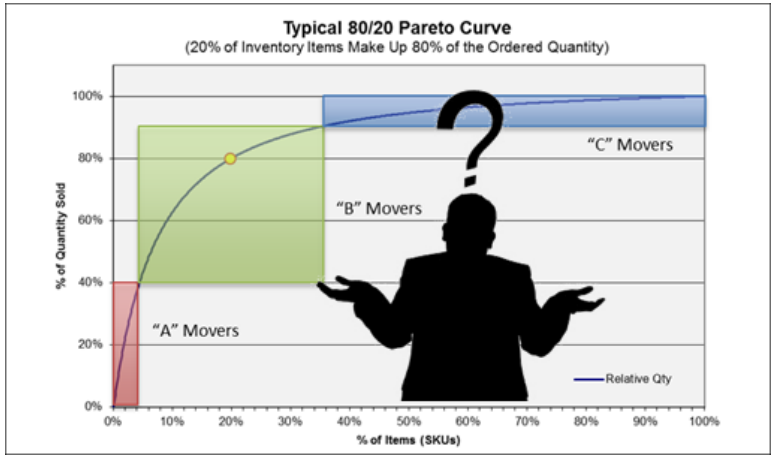
Proactive inventory management is required to maximize efficiency of people or machines (velocity zoning) and to balance work across clustered zones (inventory slotting). Even with good management there will be imbalance. **This applies to Goods-to-Person or Person-to-Goods.*



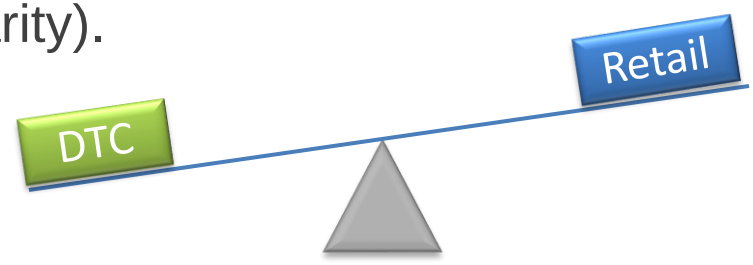
Impact of the DTC Market

Inventory slotting, zone bypass fulfillment and similar strategies are good for Retail Order Fulfillment (ROF). However the Direct-to-Consumer Market (DTC) has created conditions that are challenging to these types of designs. The constraining conditions include:

- Higher number of SKUs
- Smaller order sizes
- Faster & more frequent order cutoff times
- Larger variety of outbound containers (to reduce shipping costs)



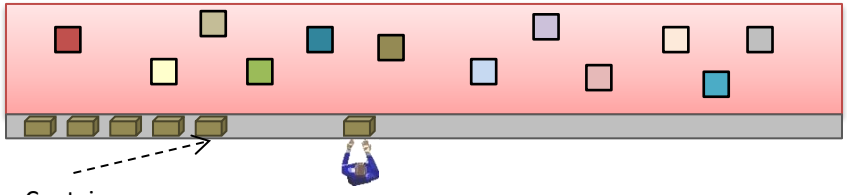
This applies to pure eCom (DTC) as well as central fulfillment of Retail + DTC (growing in popularity).



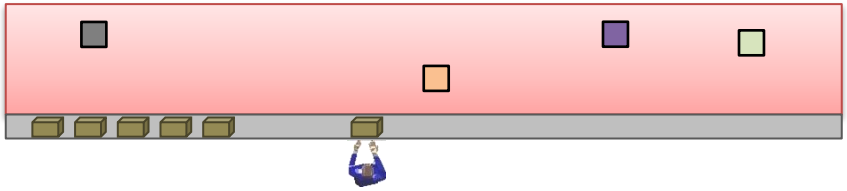
Impact of More SKUs and Smaller Orders

The following illustrations show the impact of more SKUs and smaller orders. Whether goods-to-person or person-to-goods, the impact is directly related to active SKUs per zone

Traditional ROF – Many Active SKUs per Zone

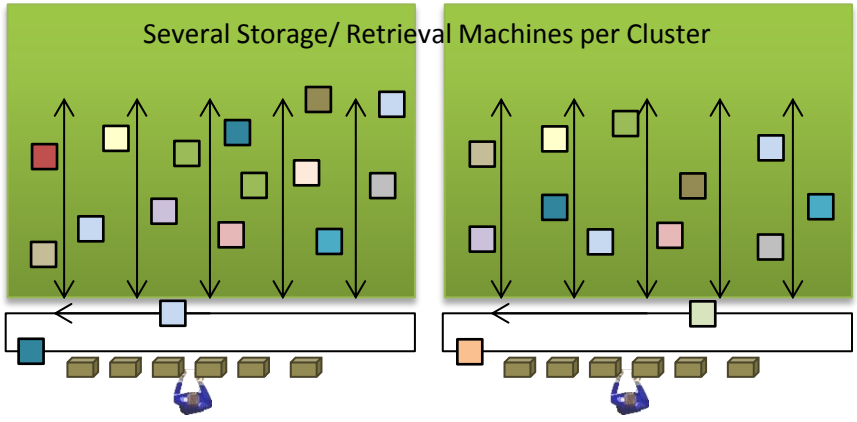


More SKUs + Smaller Order = Few Active SKUs

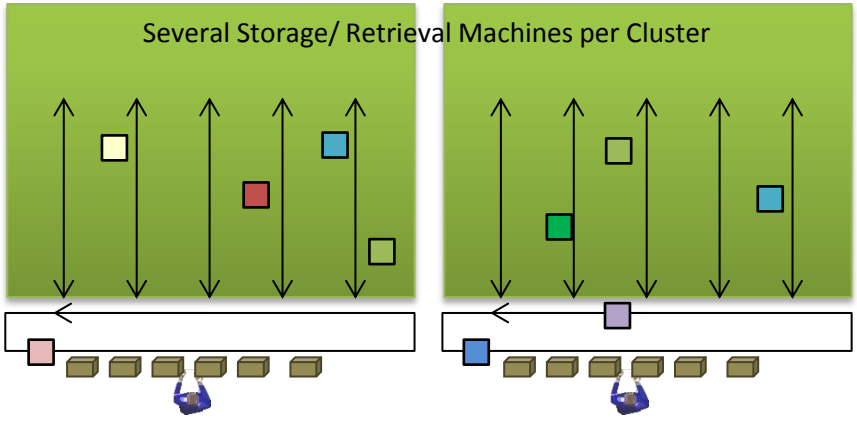


Example of impact in carton flow pick

Traditional ROF – Many Active SKUs per Cluster



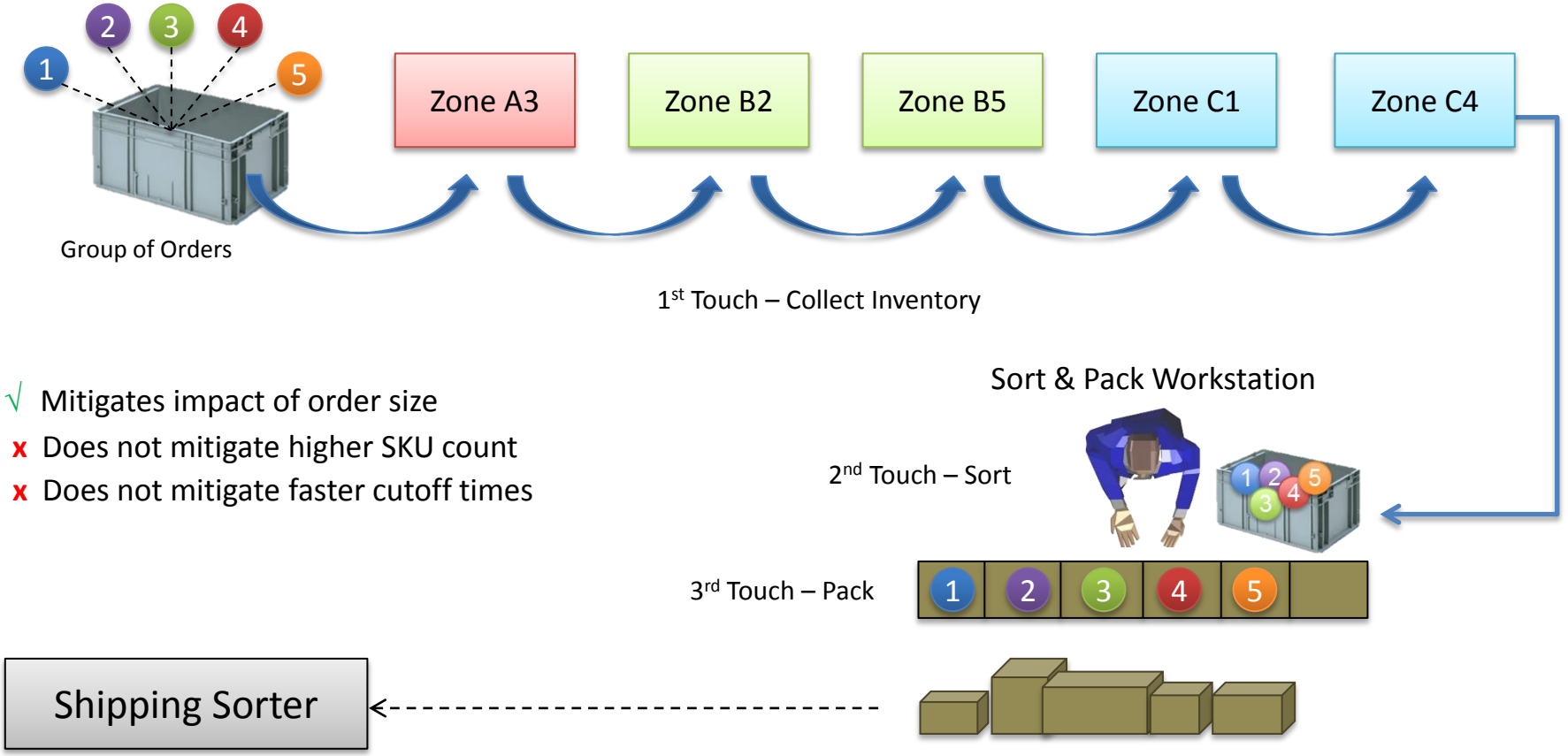
More SKUs + Smaller Order = Few Active SKUs



Example of impact in a Goods-to-Person system

Batch Picking Strategy for DTC

Batch picking may be used to minimize the effects of higher SKU count and smaller order sizes. Multiple orders assigned to a tote and the tote moves from station to station collecting the inventory needed across all orders.

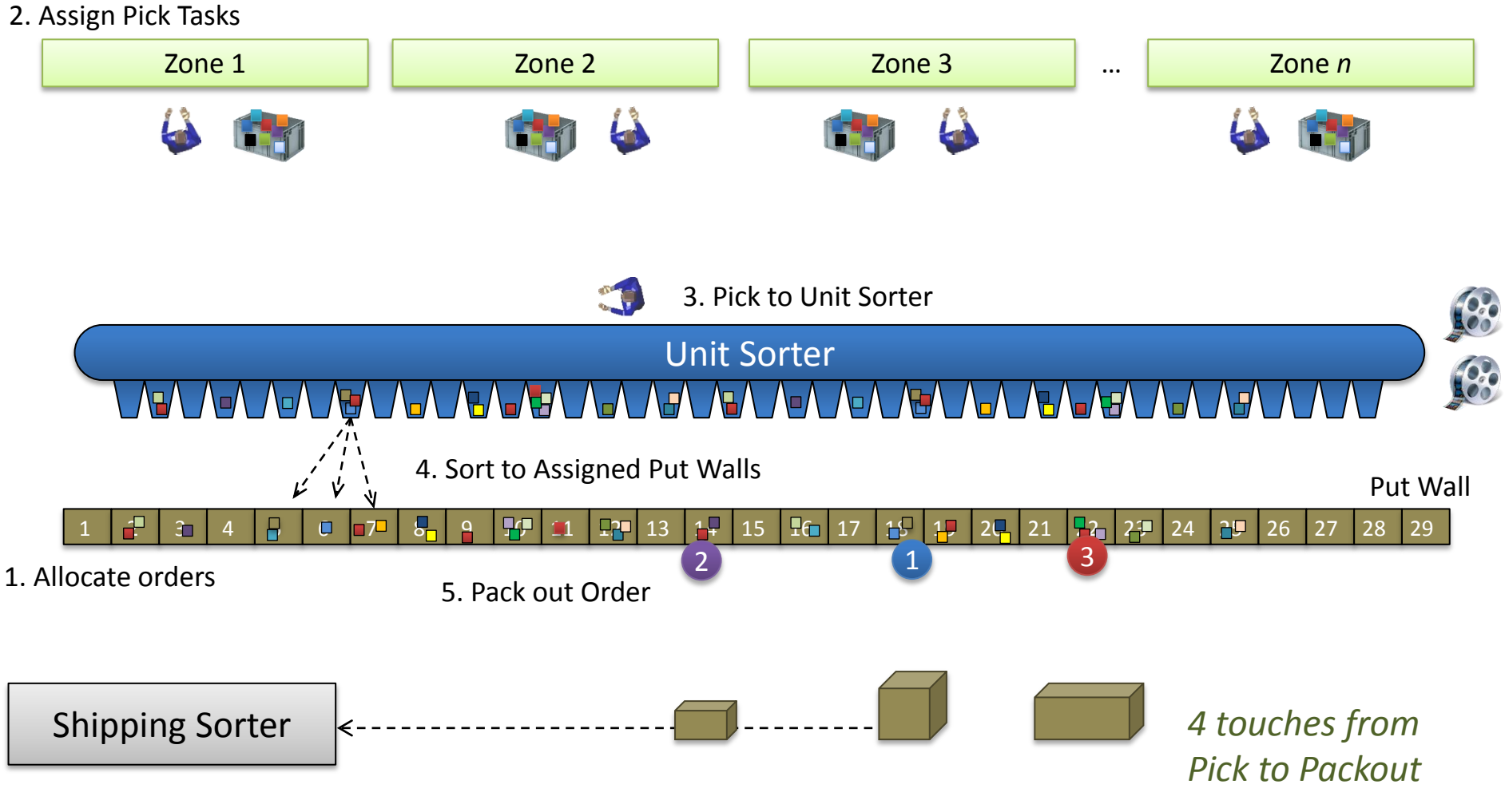


√ Mitigates impact of order size

x Does not mitigate higher SKU count

x Does not mitigate faster cutoff times

Wave Picking Strategy for DTC



Limitations of Wave Picking

- Asynchronous picking created dead time between waves (final destinations are occupied for long periods of time)

Dead Time (unproductive)

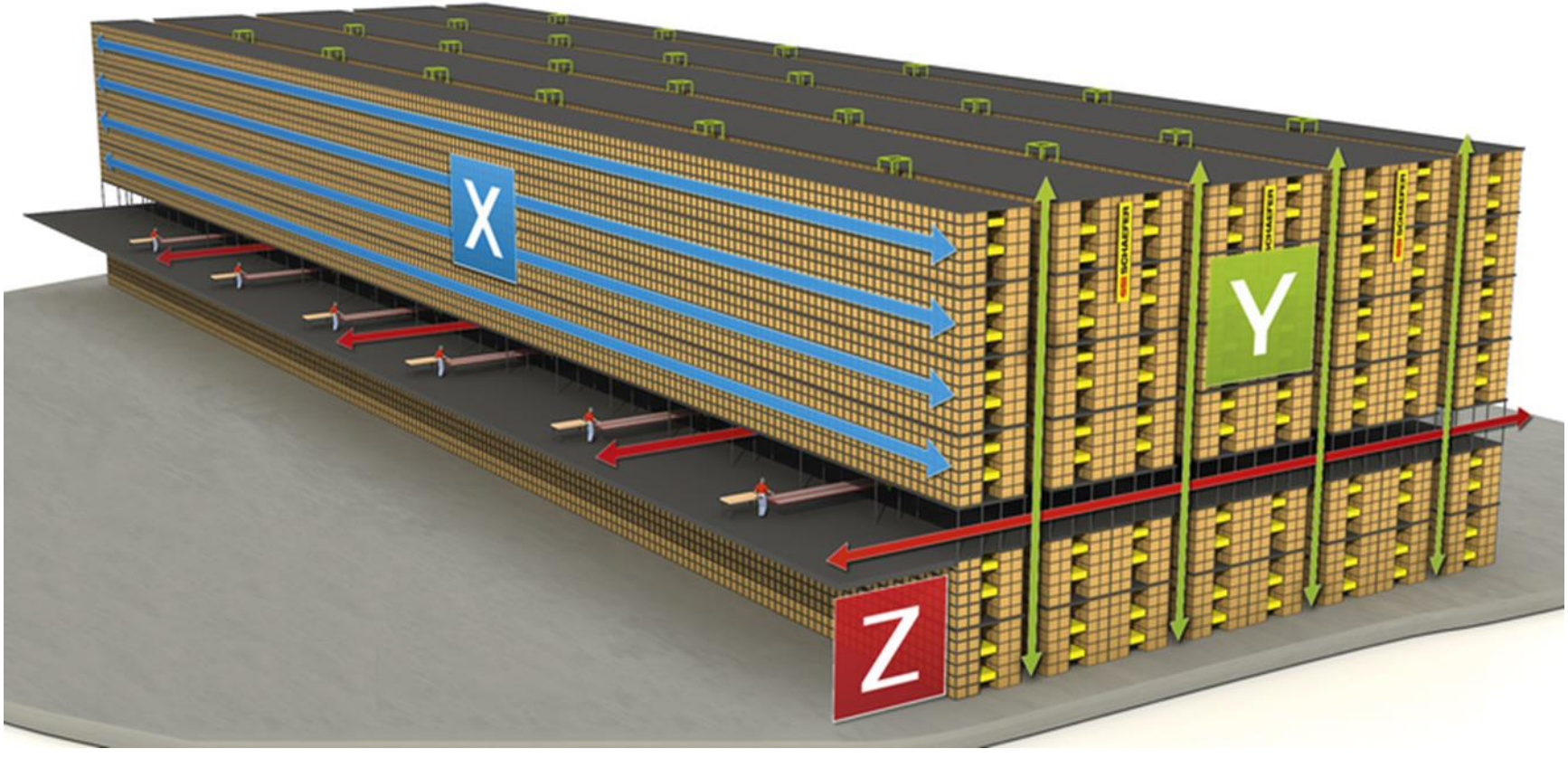
- Overlapping waves may be used to reduce downtime between waves.

When wave 1 is in a trough, other waves rounding their peak.

Tradeoff is reduced picking efficiency.

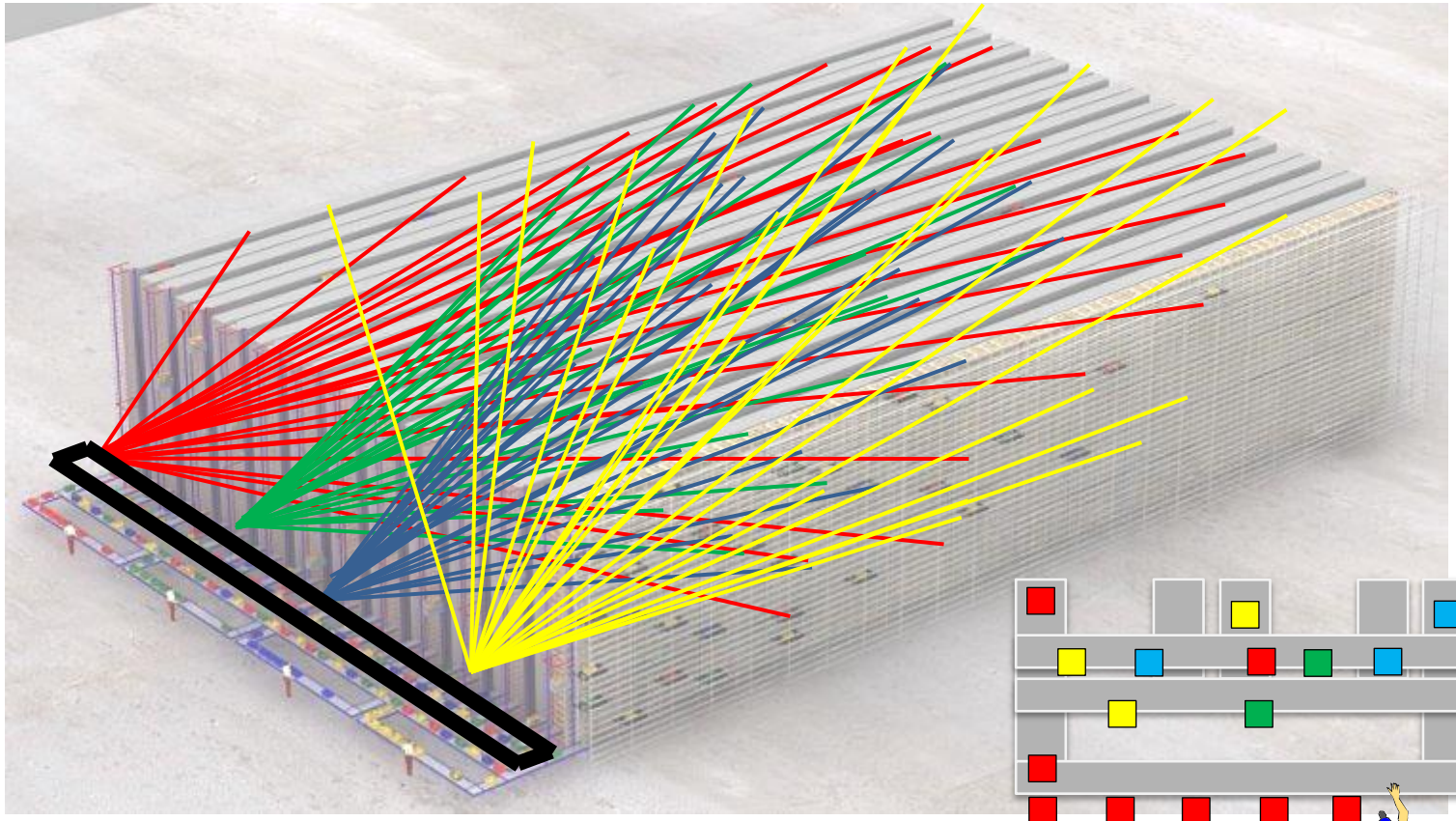
3D-Matrix: An alternative to Zone Batch Pick and Wave Picking

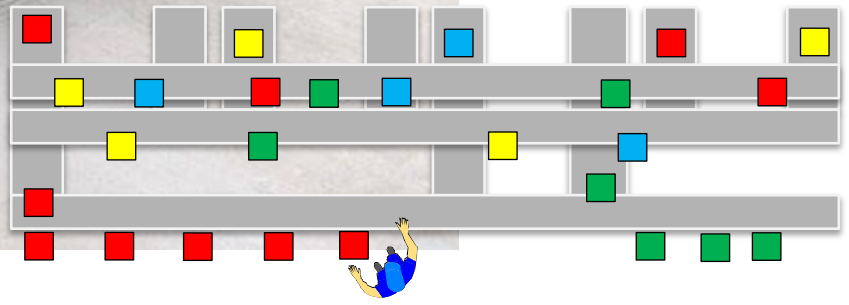
The 3D matrix is a Storage/ Retrieval system capable of moving inventory from any storage location to any point of use.



Traditional Storage/ Retrieval Systems

Traditional Storage/Retrieval systems are limited by front-end throughput constraints. Front end lifts and conveyors have limited capacity. Multiple levels of conveyor may limit this constraint but result in other difficulties (reduced transfer locations).

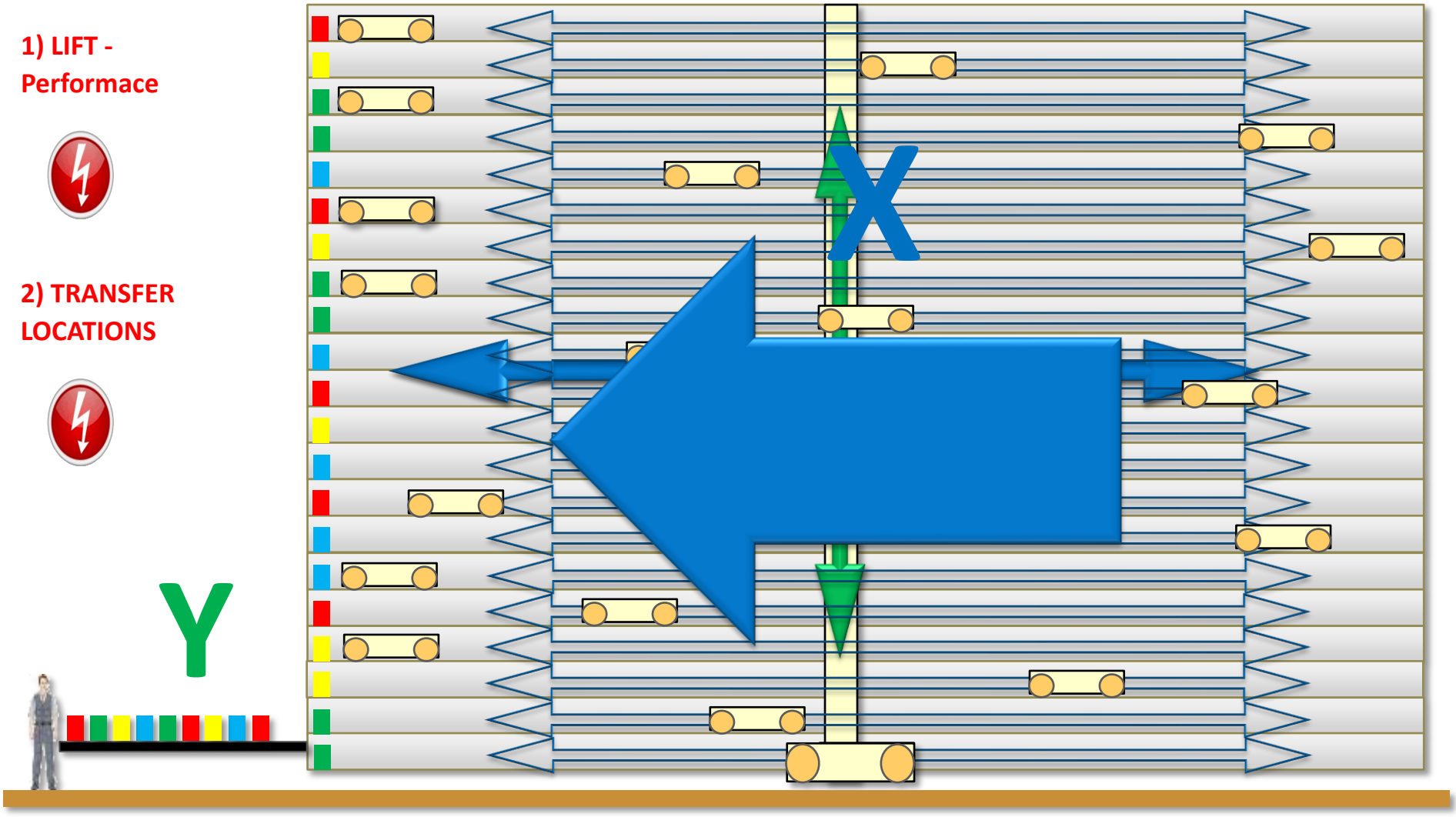




From Traditional AS/RS to Shuttle

1) LIFT - Performace

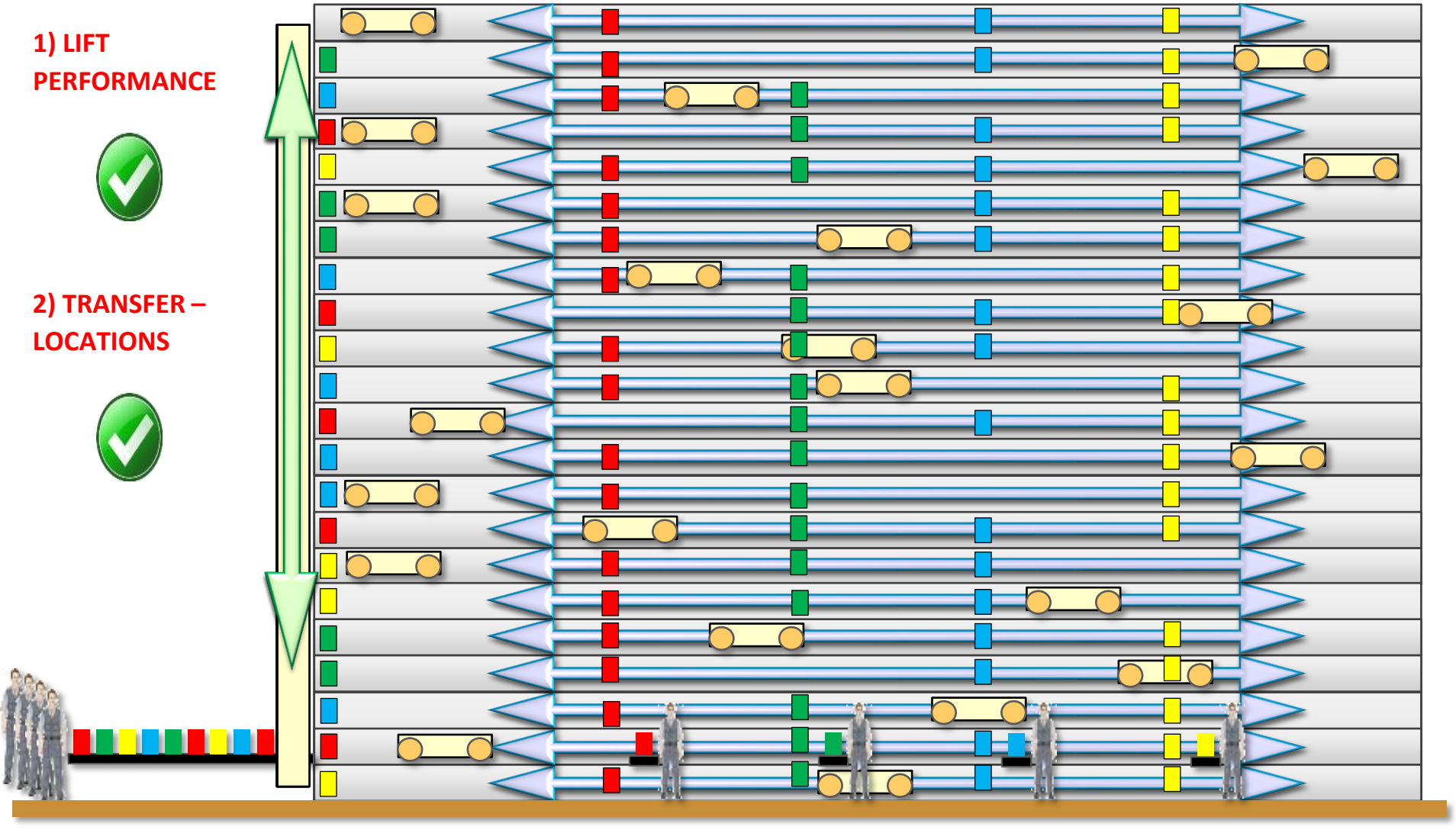
2) TRANSFER LOCATIONS



From Traditional Shuttle to 3D-Matrix

1) LIFT PERFORMANCE

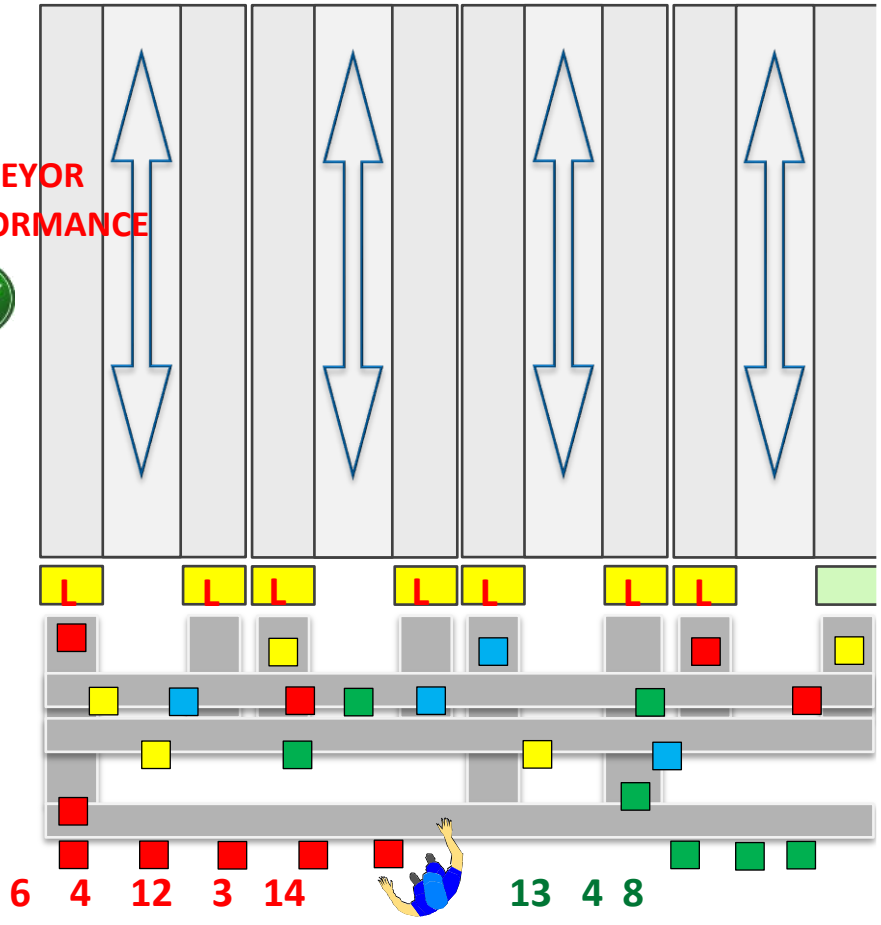
2) TRANSFER – LOCATIONS



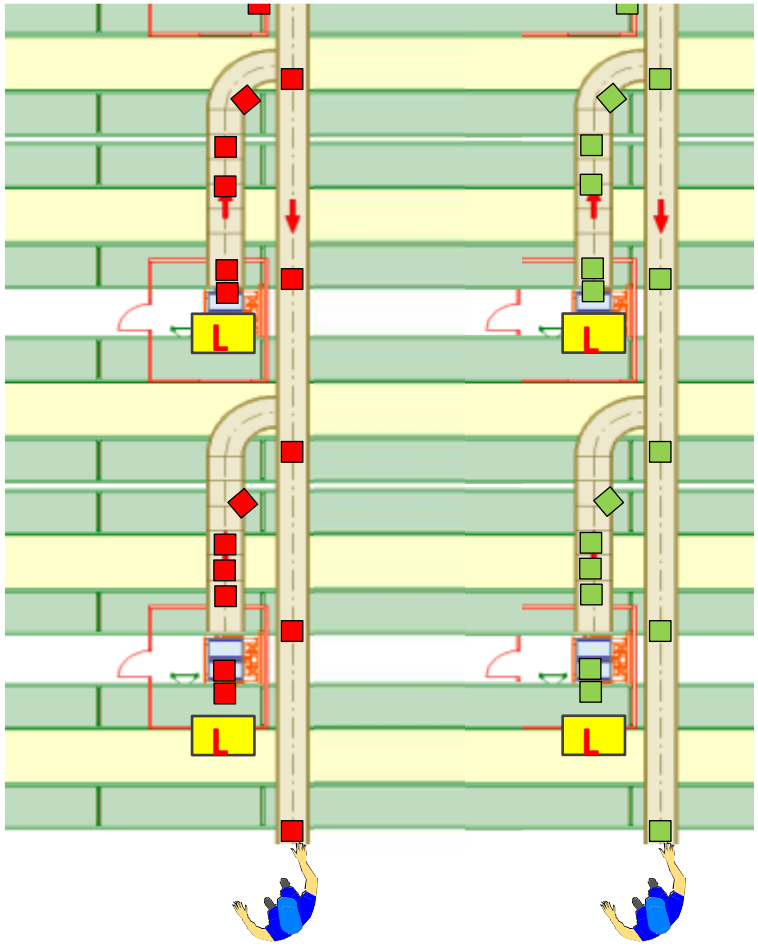
Lower Equipment Rates Required

Typical System

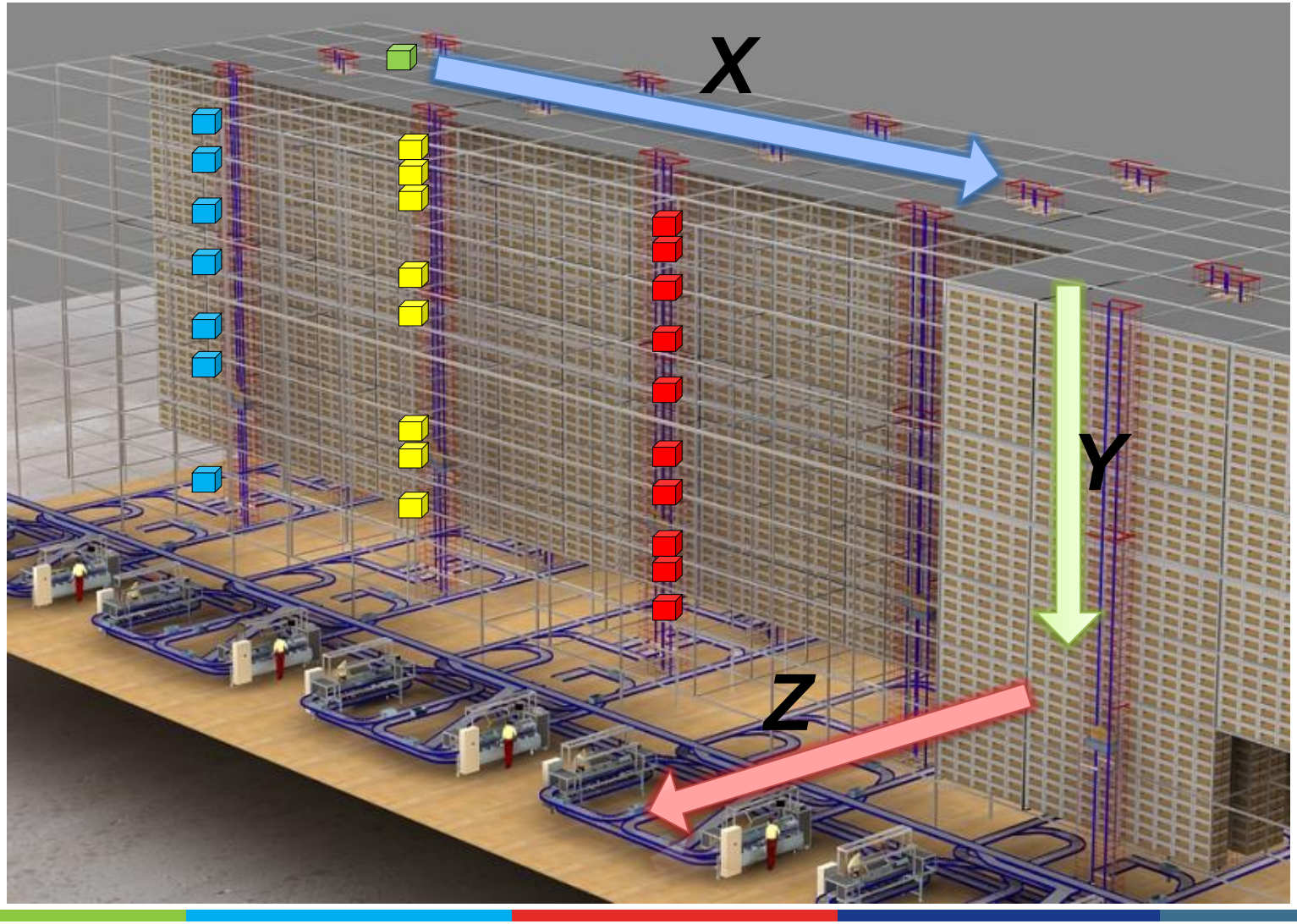
CONVEYOR PERFORMANCE



3D - Matrix



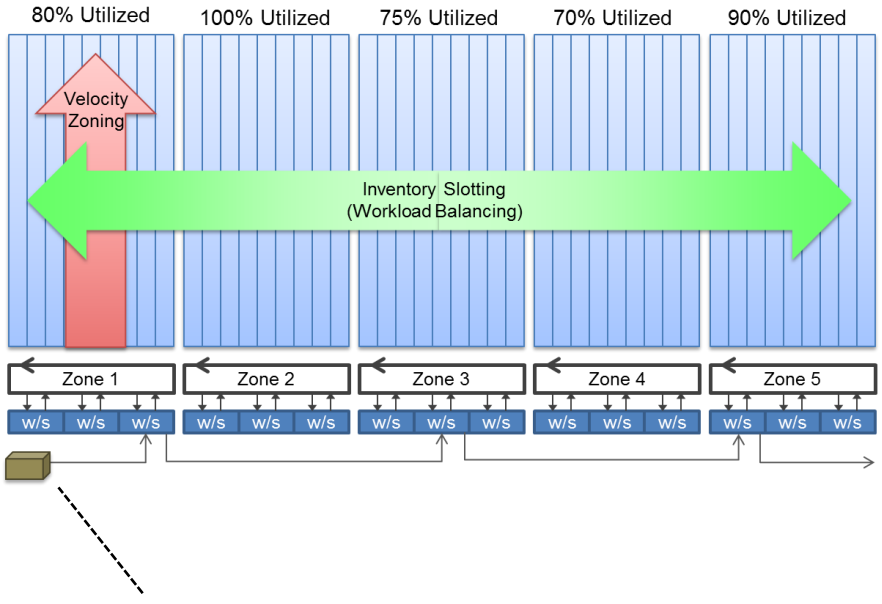
3D-Matrix: Any Product to any Location



Front End Zone Pick vs. 3D-Matrix

Following is a high-level comparison of Goods-to-Person order fulfillment with front end zone-bypass pick vs. 3D Matrix approach

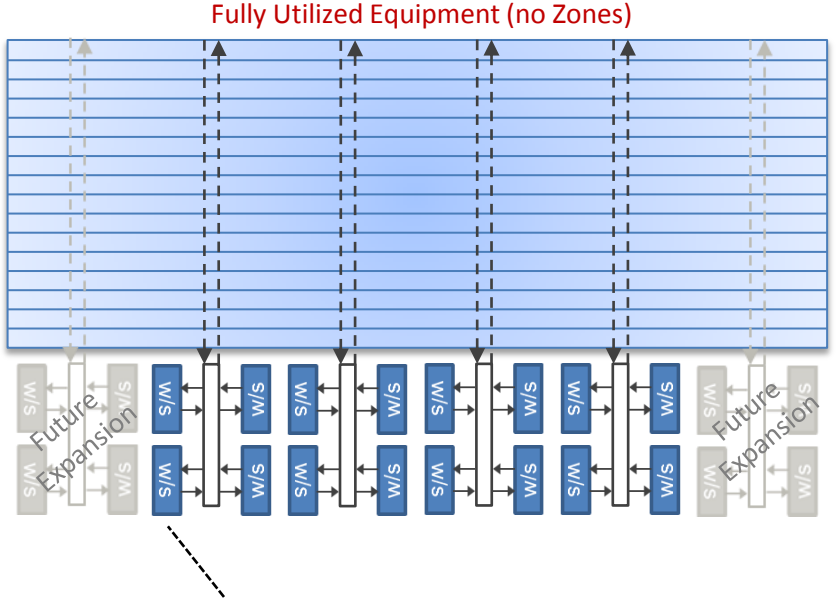
Traditional Front End Workstation Pick



- Order container visits multiple zones to collect inventory needed.
- At least one workstation in each zone is staffed.

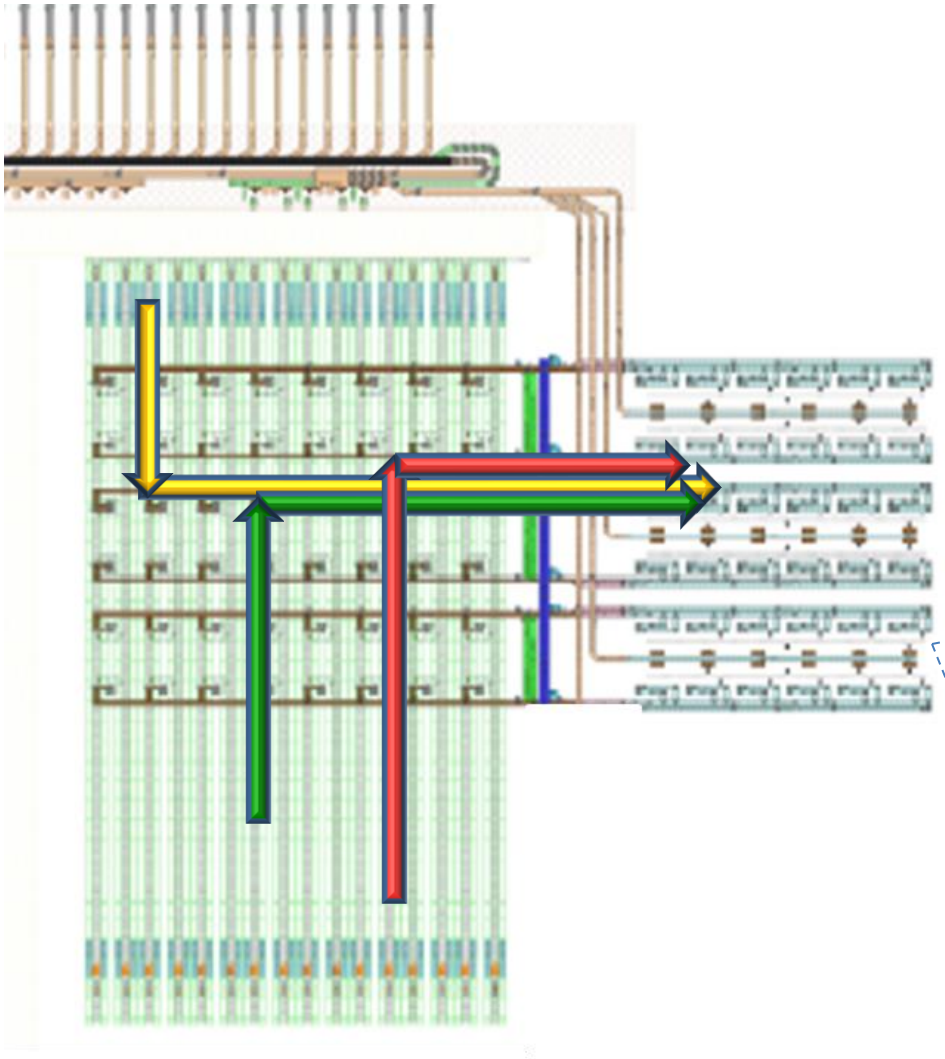
vs.

3D-Matrix Workstation Pick

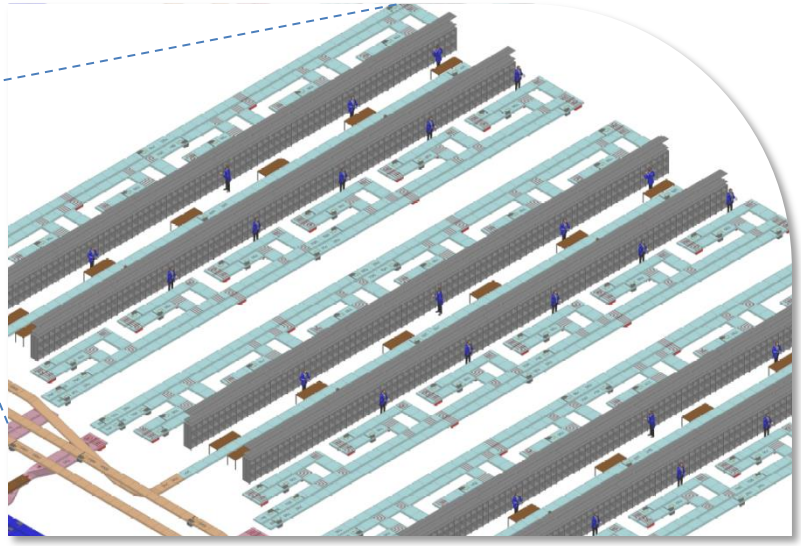


- Order completely filled at one workstation (order can be started at the workstation).
- 1 to n workstations staffed as needed.

Sample 3D-Matrix Layout



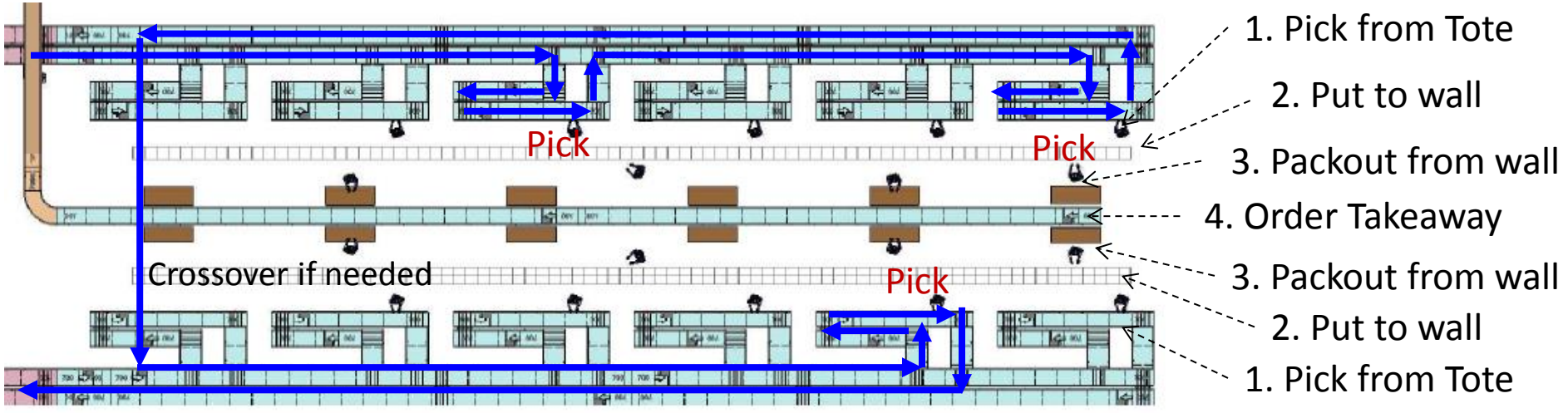
With a 3D-Matrix solution, there are multiple paths to get any product to any workstation. This provides redundancy and balance to the overall operation.



Numerous Configurations and Opportunities with 3D-Matrix Technology

- Integrated software strategies enable inventory to be paired with other orders opportunistically, improving machine efficiency.

From Storage

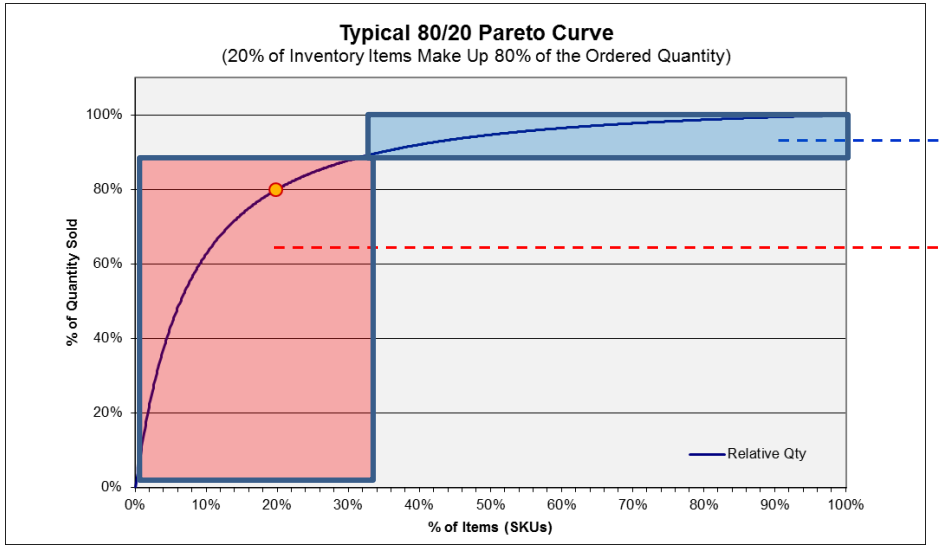


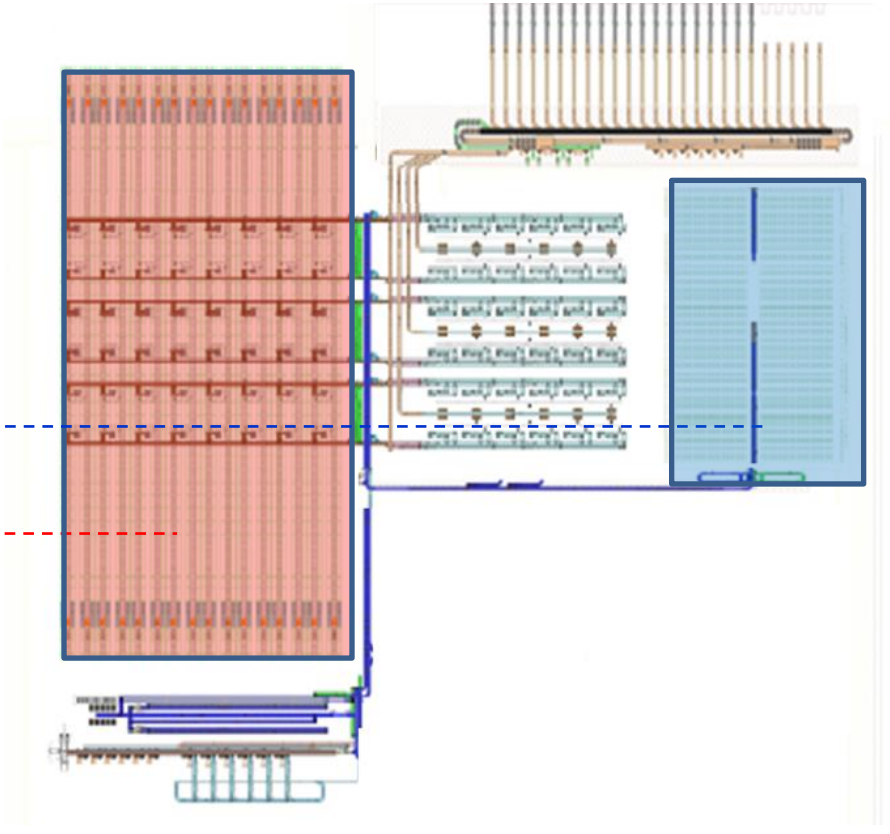
Return To Storage

Pair of Trunklines liked together so that a tote may visit multiple workstations if the opportunity is available.

Integrating Other Technologies

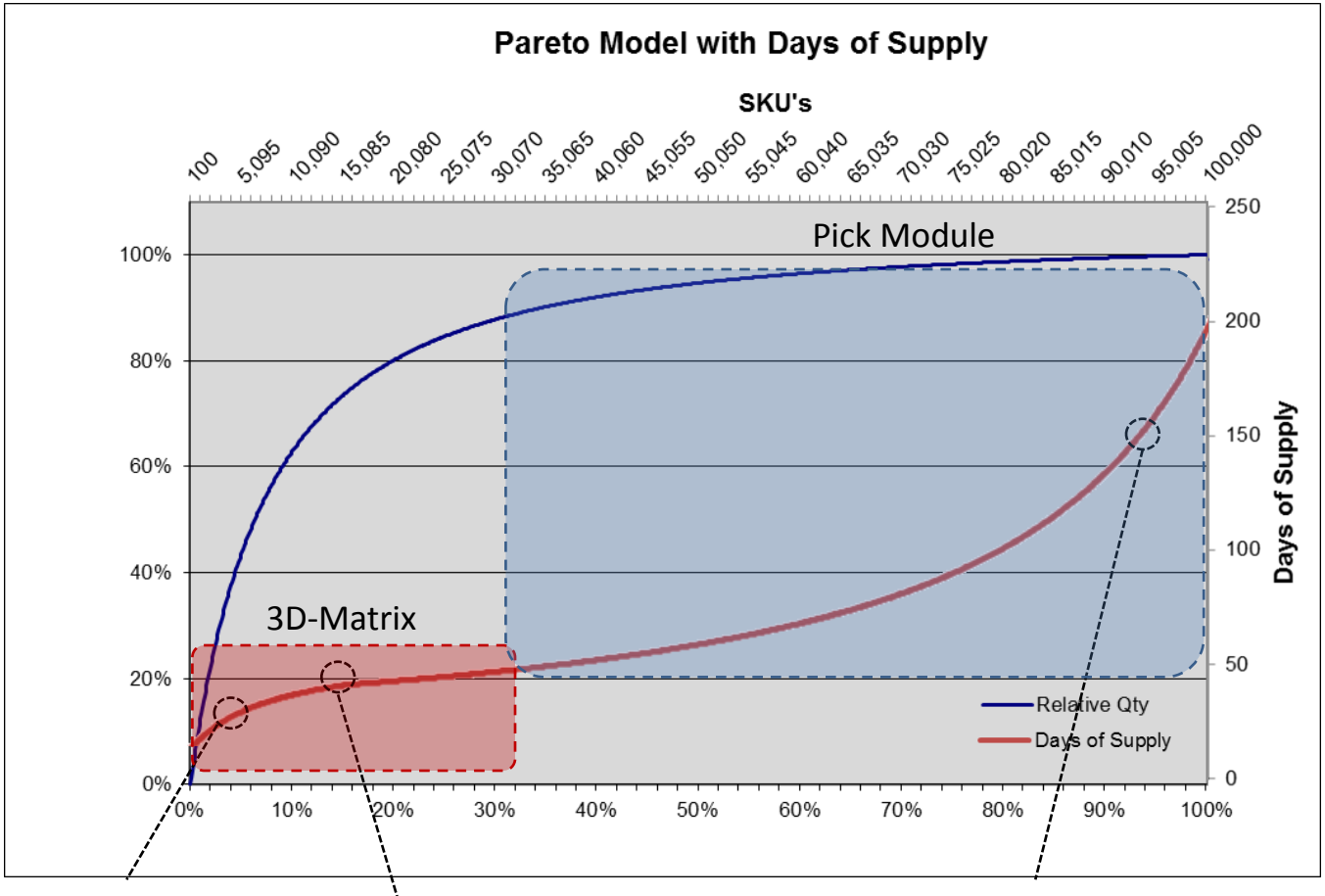
- Other technologies can be easily integrated with a 3D-Matrix solution to cost effectively increase SKU count. An integrated Pick Module, with lower cost of storage and flexible configuration (static and/or dynamic storage) is an ideal compliment to the Matrix
  - Matrix: 1/3 of SKUs, 90% of quantity
  - Pick Module: 2/3 of SKUs, 10% of quantity





Storage Sizing of Multiple Technologies

- Sample: 100,000 SKUs, 9 turns/yr, Avg 40 Days of Supply



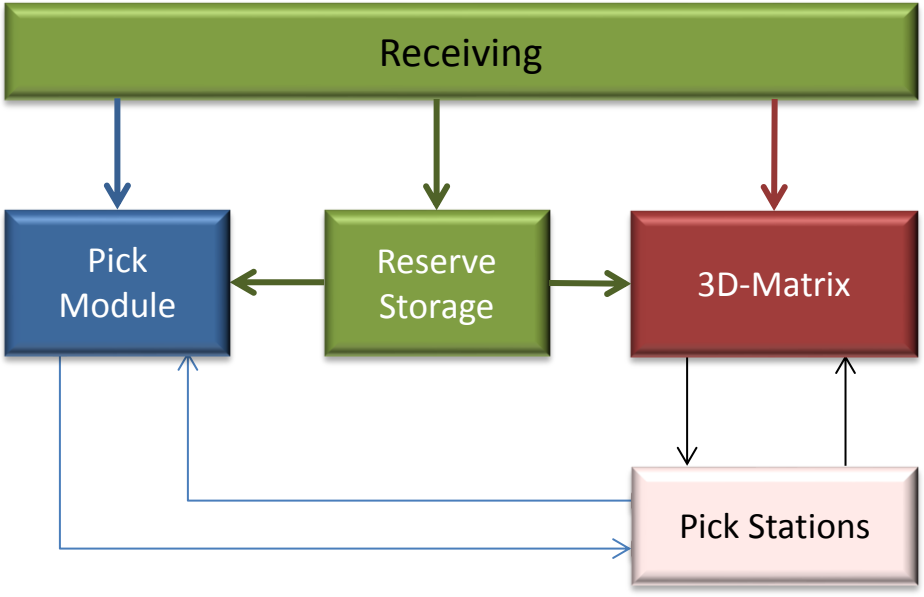
Fast Movers: 10 Days

Average: 40 Days

Slow Movers: 100+ Days

Flowing Through Reserve Storage

- How many days of supply in different fulfillment areas? Considerations include:
  - Cost of storage
  - Cost of additional touches

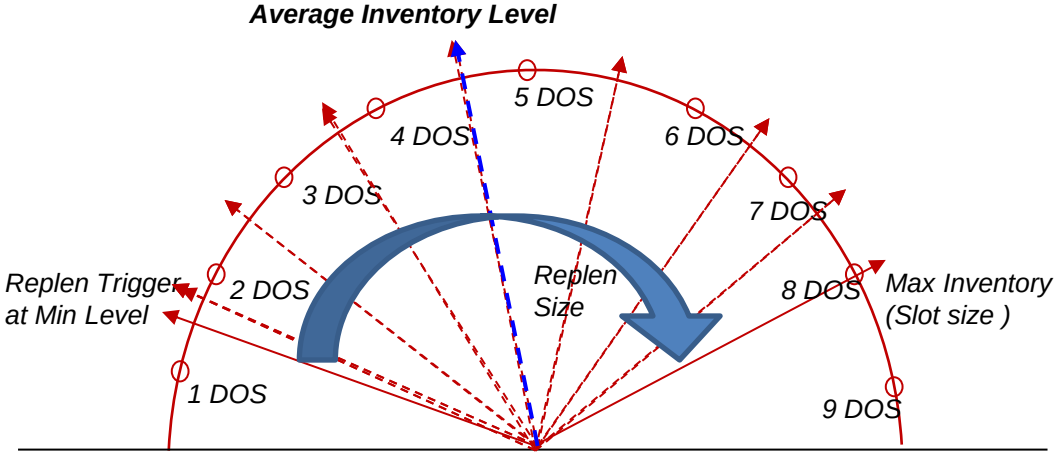


Which inventory subset (fast, medium or slow movers) are better suited to flow directly into the Forward Pick Area vs. flowing through reserve storage?

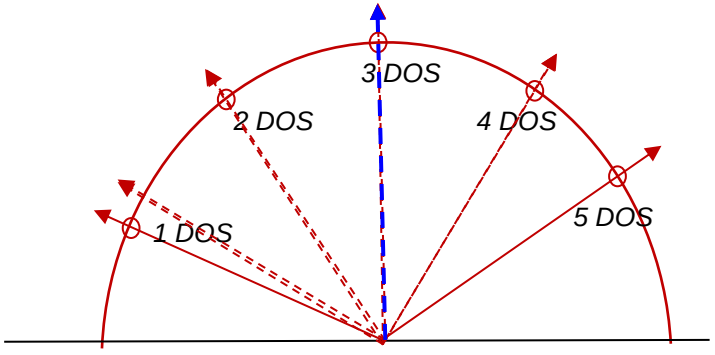
Replenishment Planning

- There is an important relationship between active stock and replenishment responsiveness & efficiency. Some systems run too lean, adding operational risk and unproductiveness.

Relationship Between Days of Supply (DOS) and Replenishment



Avoid being too lean – Frequent Replenishments of Small Quantity with limited lead time



Integrated Returns Handling

- Returns inventory, sorter to mixed inventory totes, is easily integrated into 3D storage for subsequent delivery to any workstation.

Returns Processing

Unique LPN assigned to each item

Sortation

Return to Vendor Disposition

Sort to vendor Gaylord

RTS Disposition

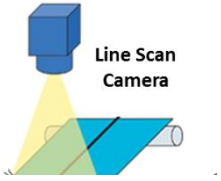
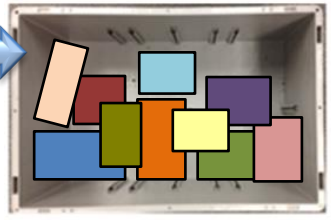
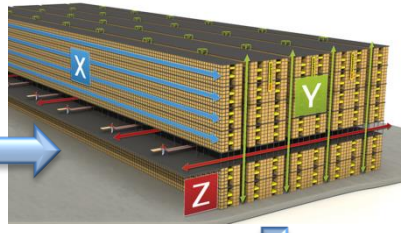


Image capture of each item to facilitate downstream picking and delivered to a mixed inventory tote.



Tote Storage

Totes stored in an automated storage system until needed for order or liquidation.



Product Pick

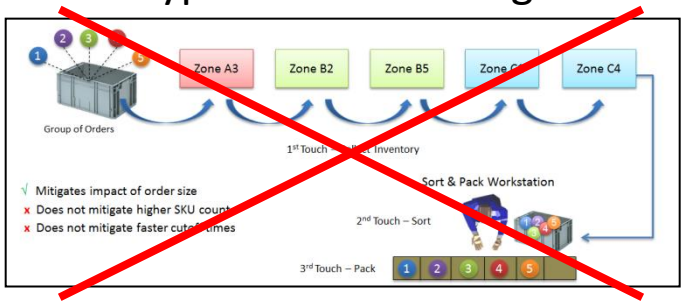
Picture Display of Item

Tote delivered to ergonomic station and operator picks by picture and confirms by scanning unique LPN.

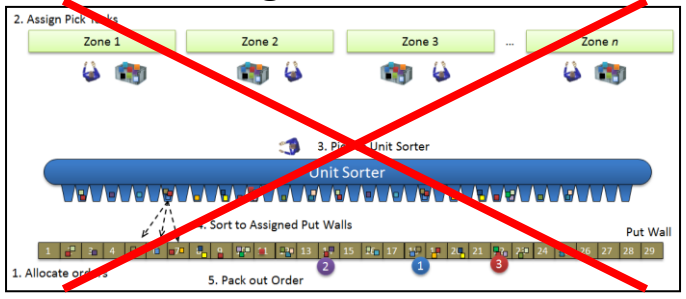
Software – The Critical Backbone

- With the growing complexities of order structures, inventory management, and other distribution requirements…. SOFTWARE is the most important component of the total solution.
- The full potential of 3D solutions are limited by traditional batch pick, wave, or rolling wave order processing strategies.
- **Wave-less order allocation** is therefore a critical element of 3D solutions

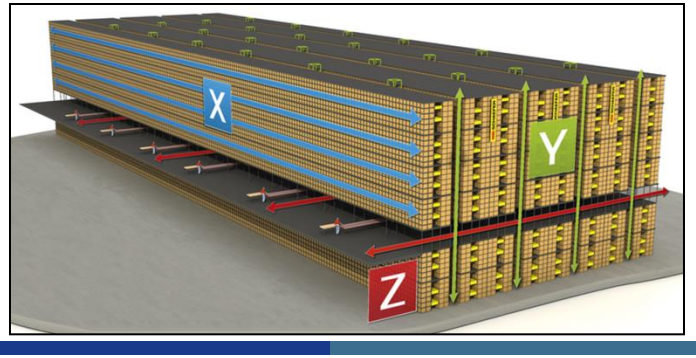
Zone Bypass Batch Picking



Wave Picking



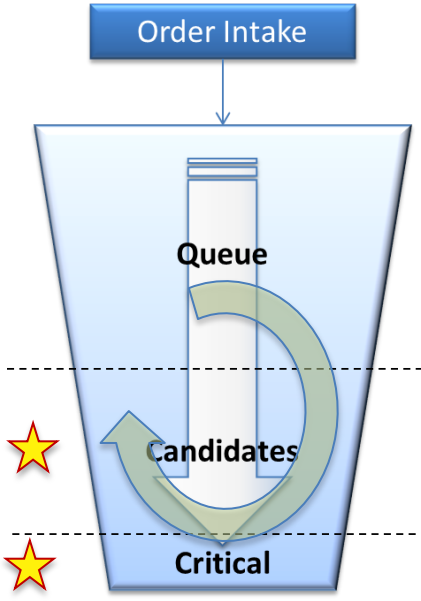
3D-Matrix



Wave-less, Real Time Order Allocation

When a cubby becomes available, the WCS will evaluate the next best order to assign to that cubby based on:

1. Critical orders that must be serviced to meet cutoff times
2. Any candidate order that shares inventory attributes with active inventory in route for Picking
3. Any candidate order that shares inventory attributes with allocated inventory (queued but not yet in route)
4. Highest priority order in the candidate pool based on service commitment

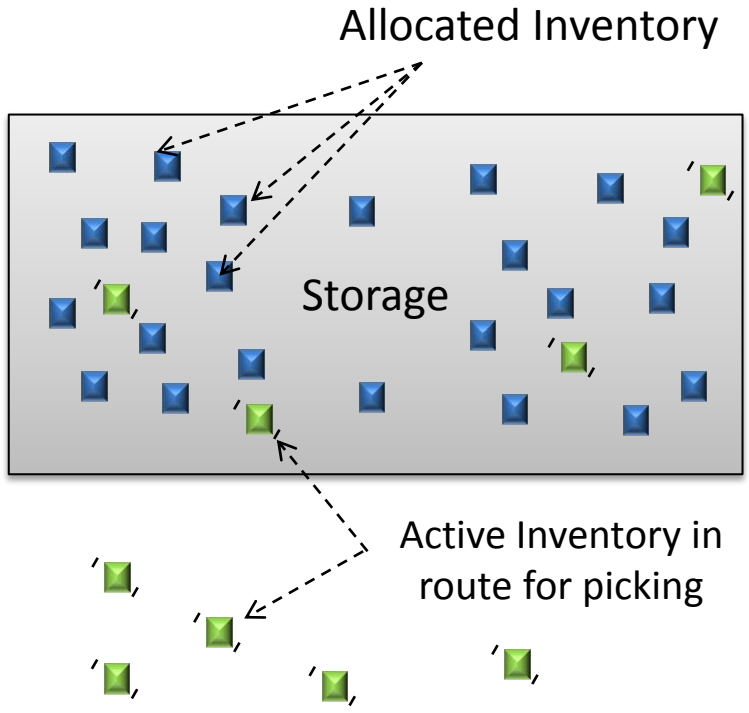


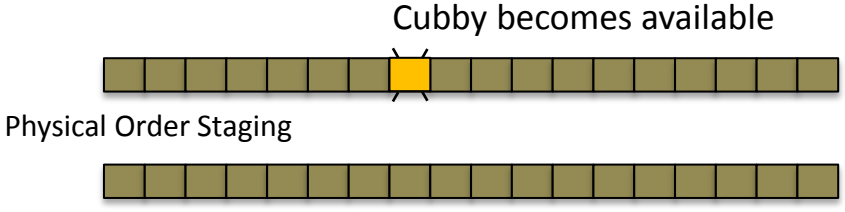
Constant prioritization of orders based on new order intake and service threshold

Backlog of Orders (during peak)

xxxxx Orders

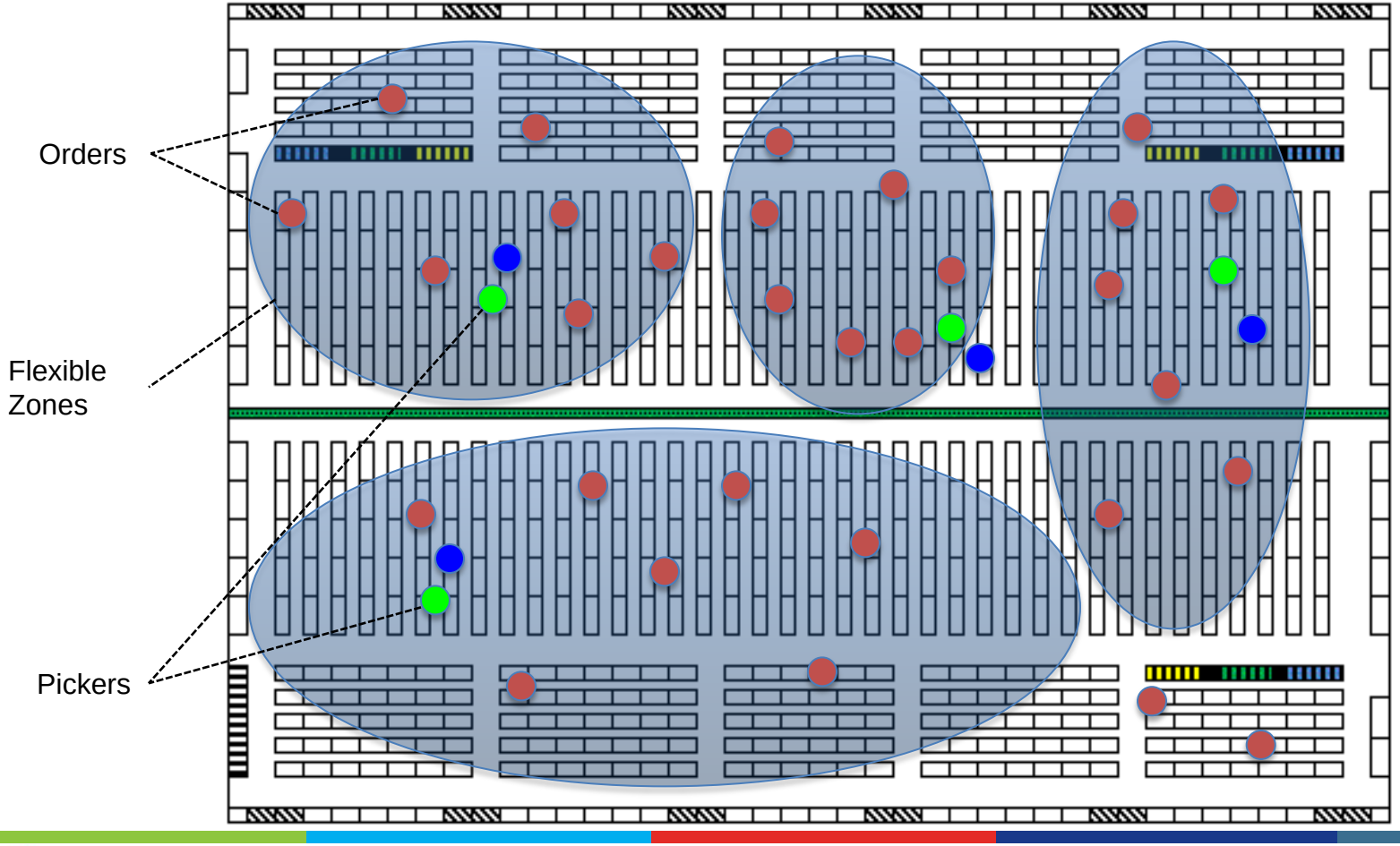
xxx orders (immediate service)





Applying Similar Wave-less picking Strategies to Conventional Picking

- Similar wave-less picking strategies should also be applied to the conventional areas of a warehouse that compliment automation.



Key Takeaways

- The Direct-to-Consumer Market (DTC), including Multichannel fulfillment, create unique challenges to traditional order fulfillment solutions.
- Batch picking and wave picking strategies are good for certain applications but can be limited when dealing with:
  - Oscillating demands of Multichannel Retail vs. DTC
  - Large SKU counts
  - Smaller order sizes
  - Faster & more frequent order cutoff times
- The 3D-Matrix, with the ability to get any product to any workstation, is an innovative solution to these challenges
- Software, including wave-less, real-time order allocation is critical backbone of a successful 3D storage solution

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