

AGV Automation Case Study for Internal Material Flow Optimization

BMW Logistics Department

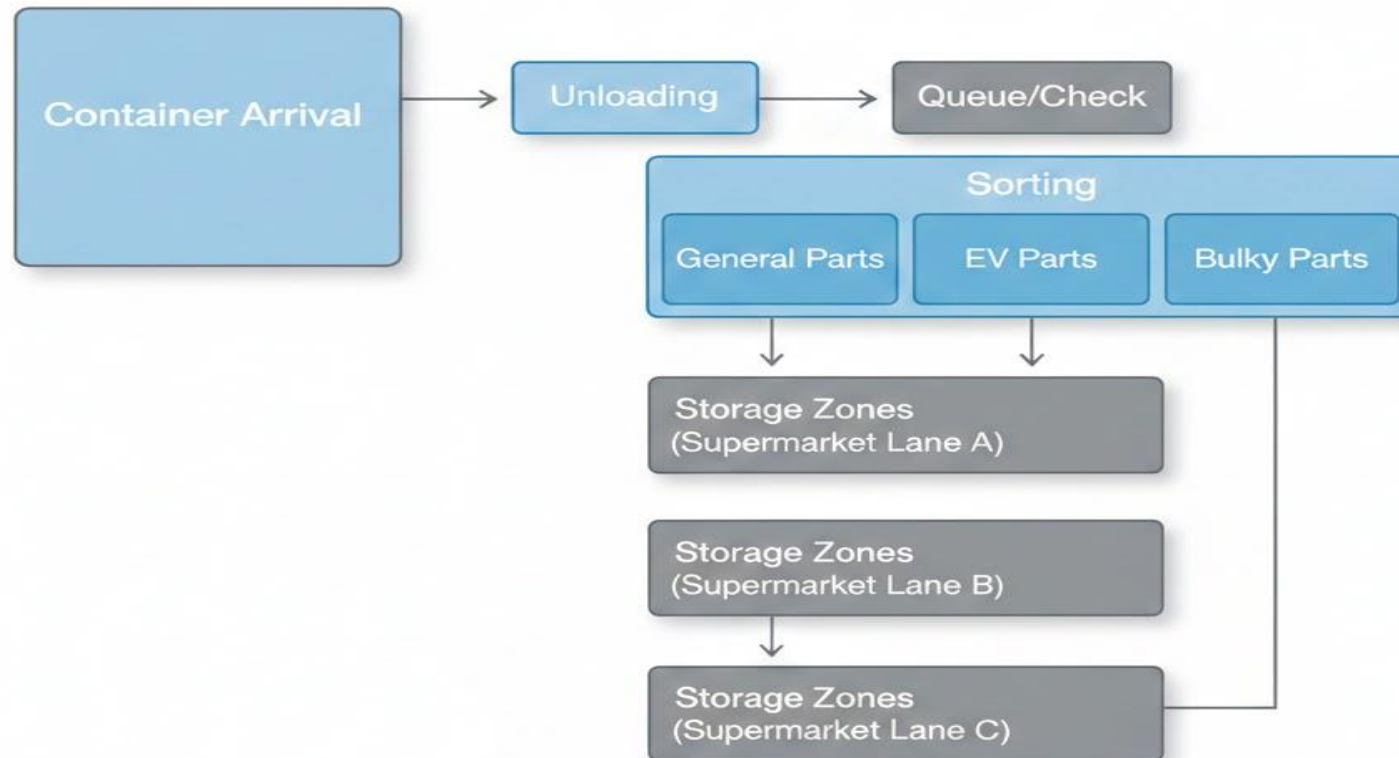
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Objective of the Case Study

- Analyze the current internal logistics flow.
- Identify repetitive and high-frequency material movements.
- Evaluate the feasibility of introducing AGV automation.
- Propose suitable AGV integration points within the plant.
- Recommend a low-risk pilot zone to validate benefits.

Current Inbound Logistics Flow

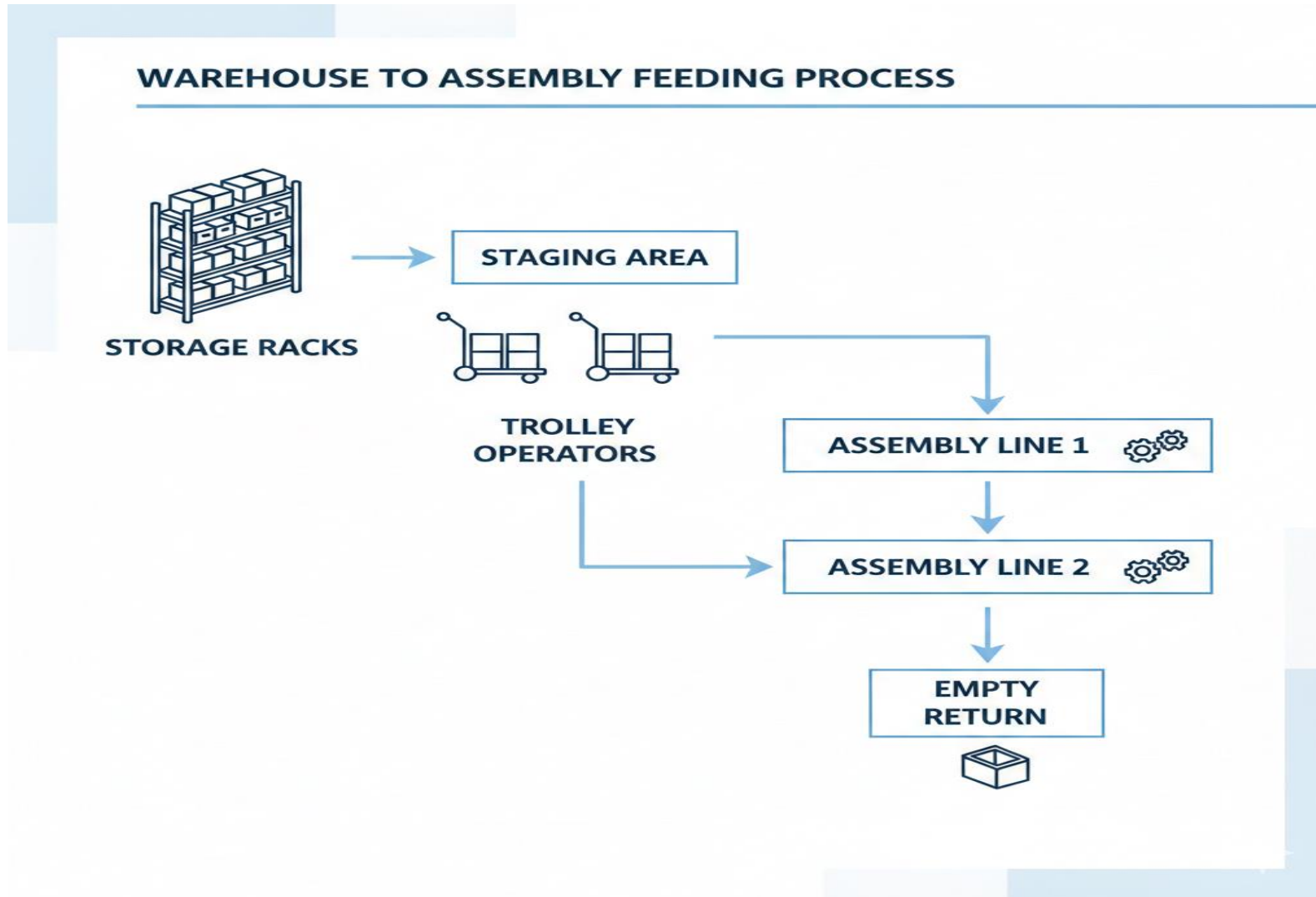
BMW Warehouse Logistics Flow



Storage & Pick Process

- Parts are arranged in racks according to lanes.
- Trolley operators pick items based on pick lists.
- Picked items are transported to the staging area.
- High frequency of manual cycles increases workload.

Line Feeding Process (Line 1 & Line 2)



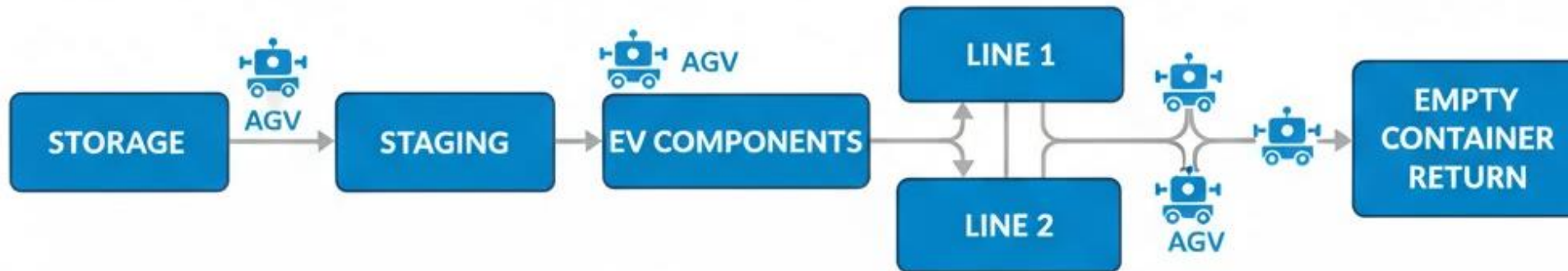
Identified Pain Points

- Repetitive manual transport across short distances.
- High traffic density inside supermarket lanes.
- Fatigue-based slowdowns and takt-time variations.
- EV components require controlled, error-free handling.
- No automated tracking of internal material movement.

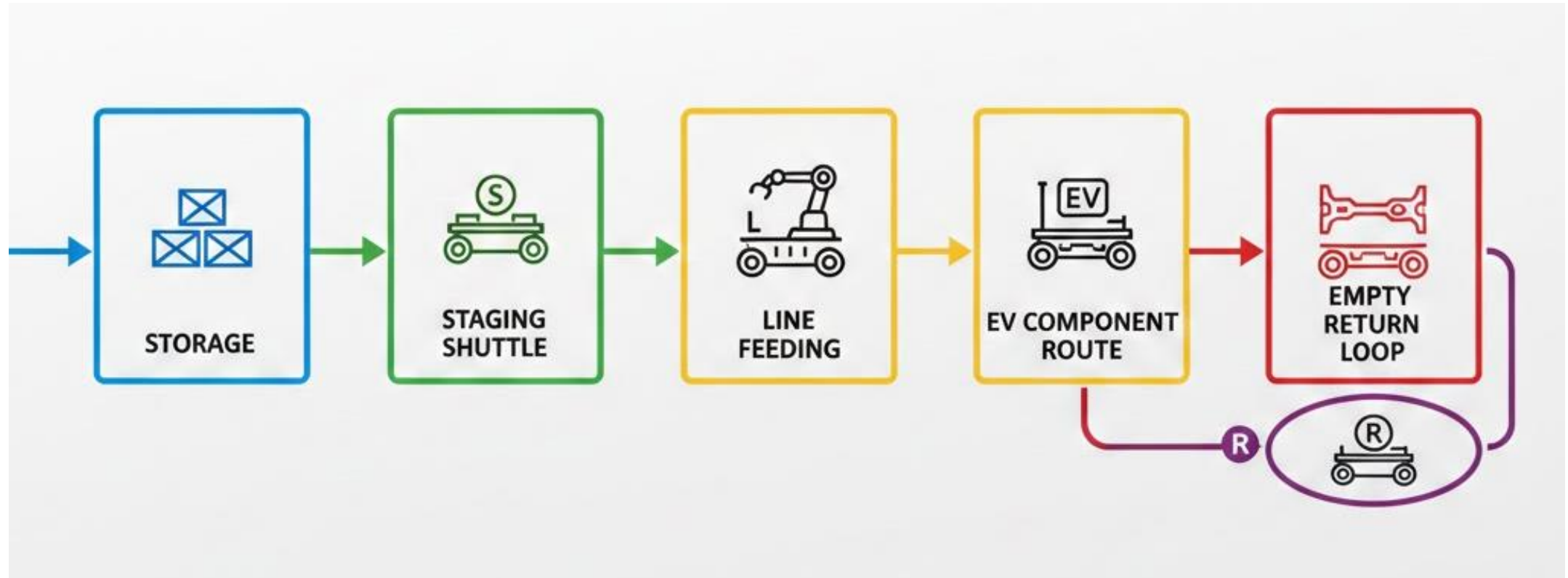
Why AGVs Are Suitable

- Fixed and predictable movement routes inside Lanes A/B/C.
- Stable storage → staging → line feeding sequences.
- Low navigation complexity for AGVs.
- Controlled AGV routing benefits EV component handling.
- Supports BMW's long-term automation and Industry 4.0 goals.

Proposed To-Be Process Using AGVs



AGV Integration Zones



AGV Technical Architecture

- **Navigation System:**

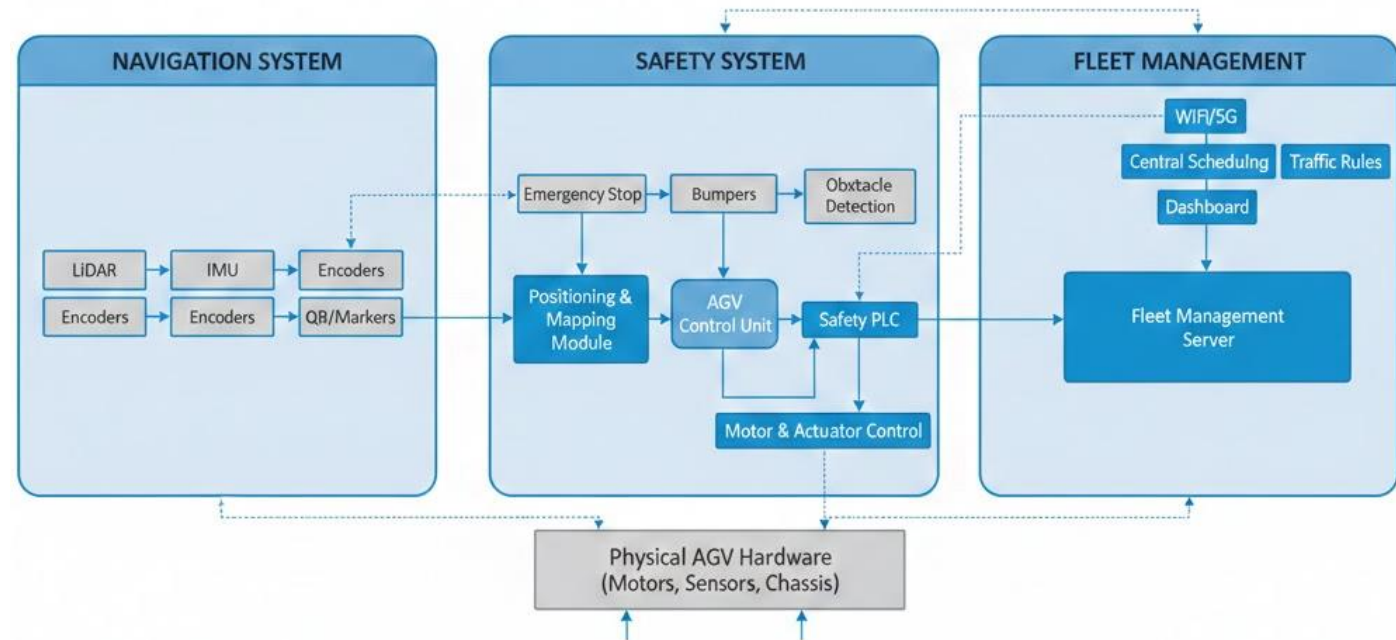
- LiDAR for mapping
- Ultrasonic sensors for proximity detection
- IMU + wheel encoders for odometry
- QR/magnetic markers for guidance

- **Safety System:**

- Emergency stop layers
- Safety bumpers
- Obstacle detection sensors

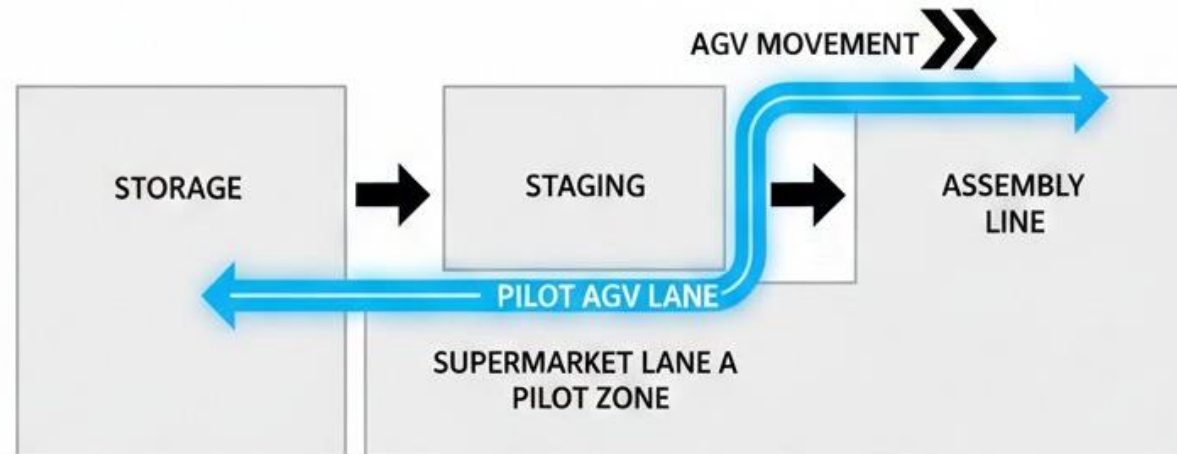
- **Fleet Management:**

- WiFi /5G communication
- Central scheduling
- Traffic rule enforcement
- Real-time tracking dashboard



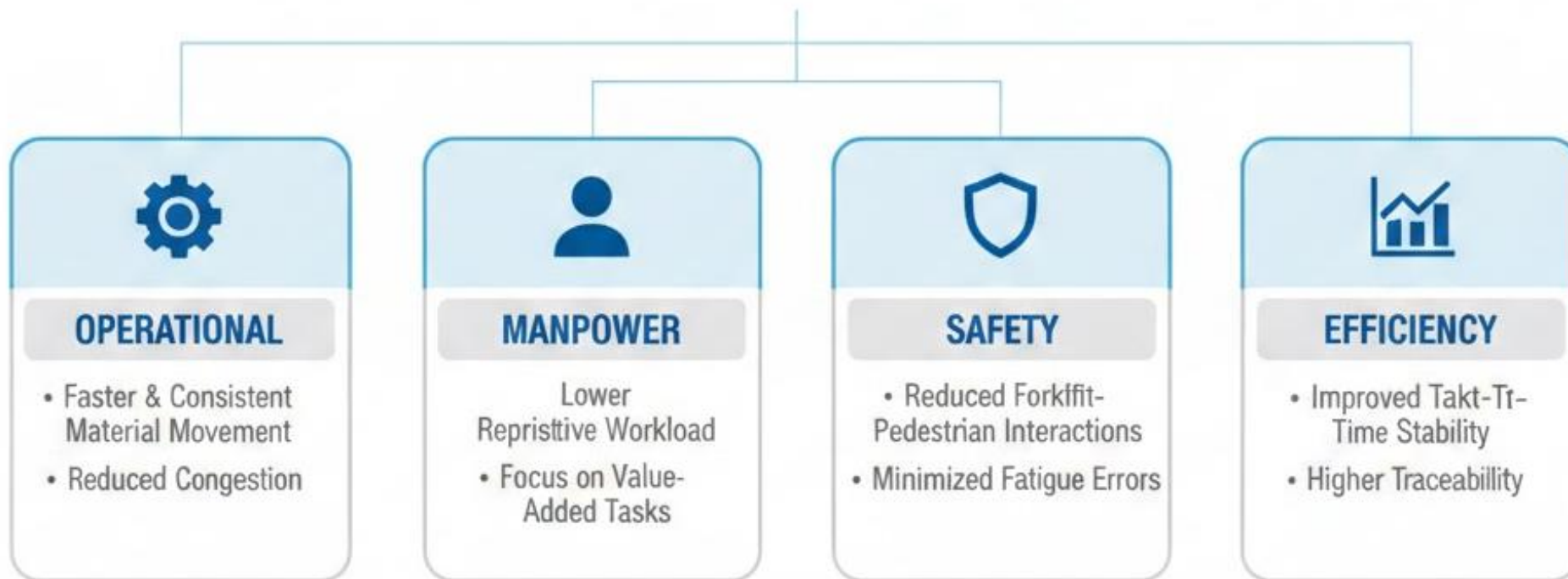
Pilot Implementation Proposal

- **Recommended Pilot Zone:** Supermarket Lane A
- **Reasons:**
 - Repetitive and structured material routes.
 - Low cross-traffic compared to other lanes.
 - Easy to map and monitor for AGV testing.
 - Ideal for validating cycle time, safety, and reliability.



Expected Benefits

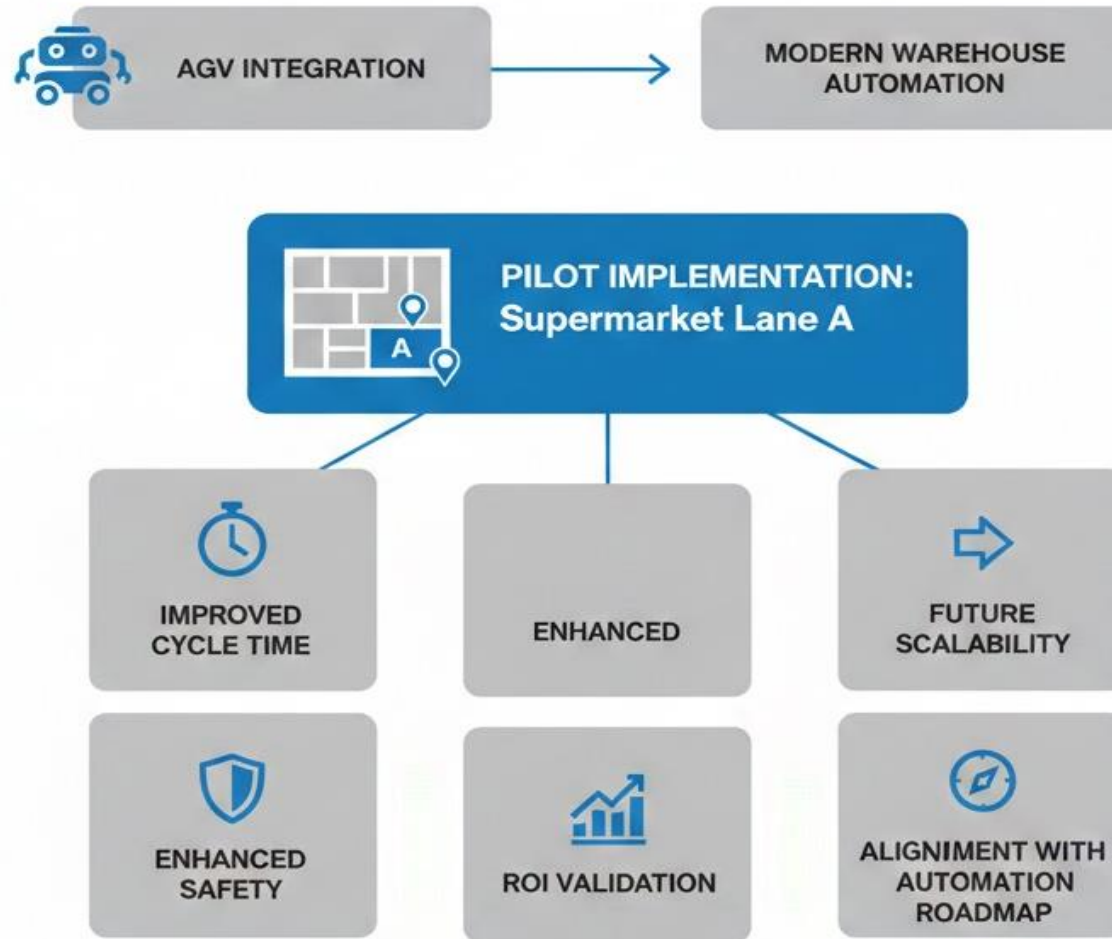
BENEFITS OF AGV IMPLEMENTATION



Feasibility & Constraints

- Some lanes may require minor layout adjustments.
- Initial investment in AGVs and charging docks.
- Battery docking/charging area must be allocated.
- Requires strict routing rules to avoid congestion.
- Very heavy or oversized parts may still need manual handling.

Conclusion



Thank You