



**material handling**  **logistics conference**  
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# HKEMS 9.3 WCS Workshop

Track 6 Session 1



# Supply Chain Forward.

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# Abstract

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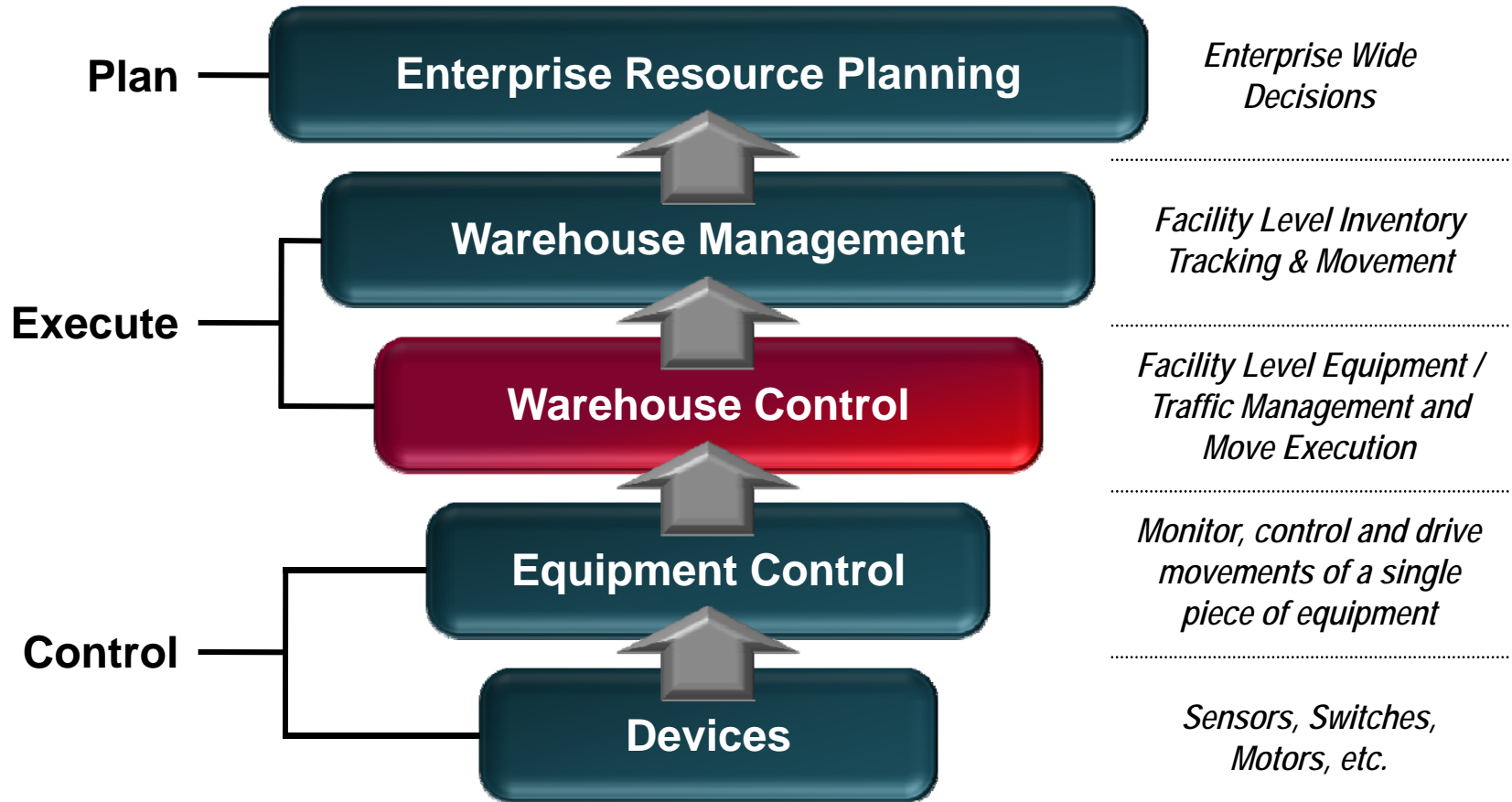
- ▶ **Warehouse Control Systems (WCS) have finally evolved as the backbone of automated facilities. They are expected to be as robust and 'productized' as a WMS. This workshop and demo will unveil the features and roadmap for the HKEMS family and is appropriate for those contemplating new automation or a migration of old control.**

# Agenda

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- ▶ **Warehouse Control Systems (WCS)**
- ▶ **Functional Overview**
- ▶ **Releases and Roadmap**
- ▶ **Demonstration**
- ▶ **Interactive Discussion**
- ▶ **Key Takeaways**
- ▶ **Questions/Feedback**

# Logistic Solutions



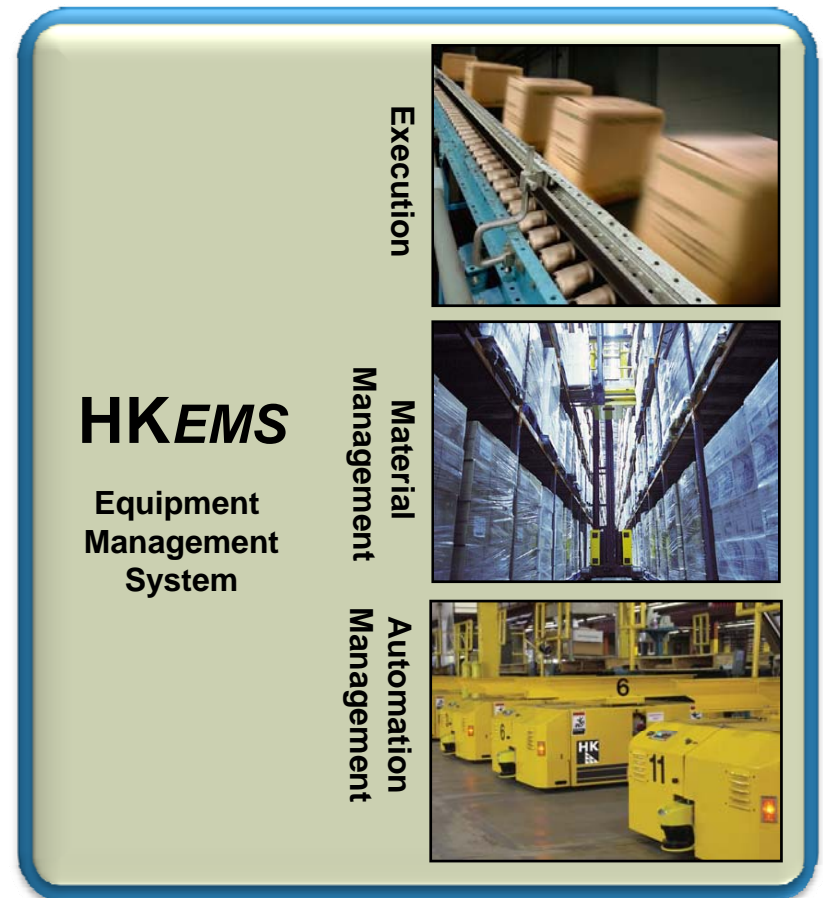
# Warehouse Control Systems

- ▶ **Serve as the backbone of automated facilities**
- ▶ **Manage automated facility aspects**
- ▶ **Synchronize activities of multiple equipment subsystems**

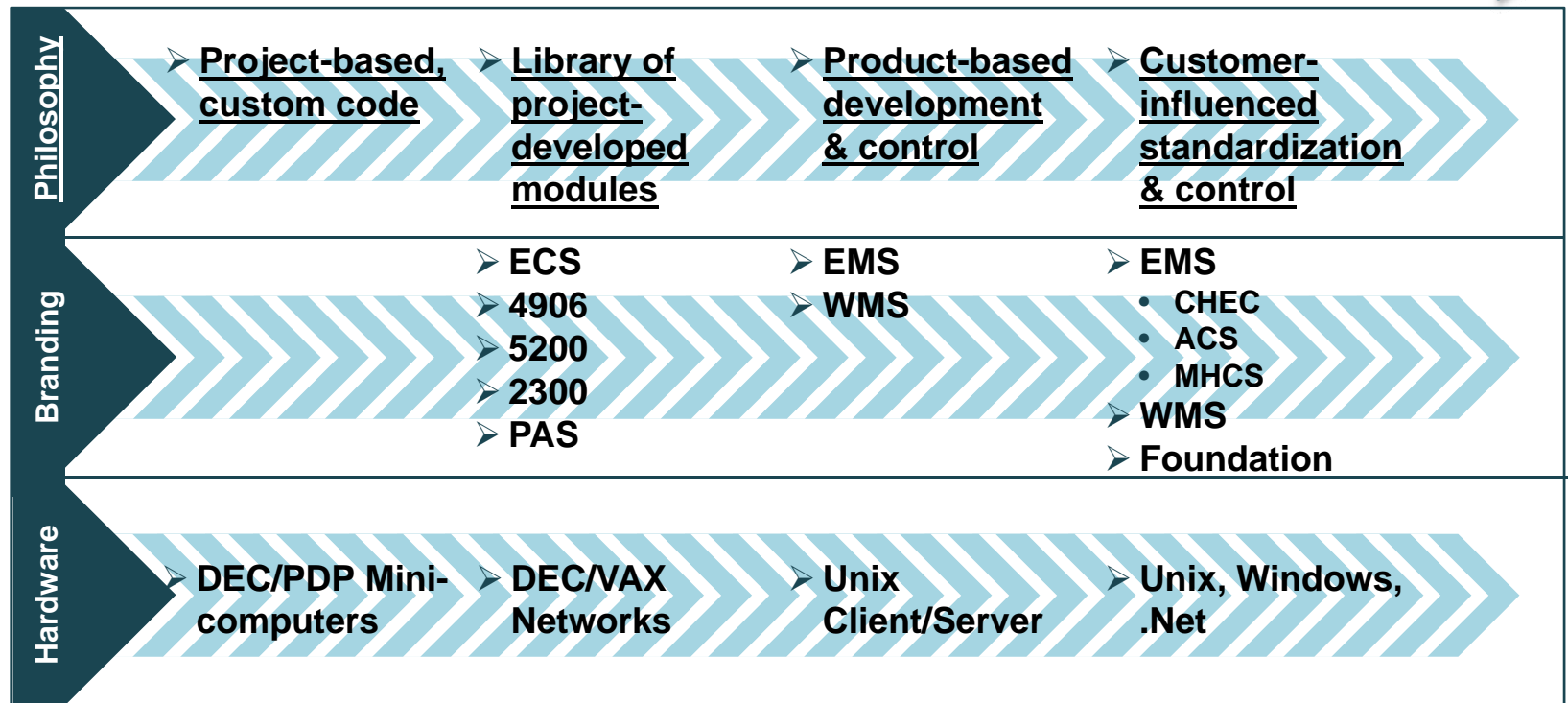
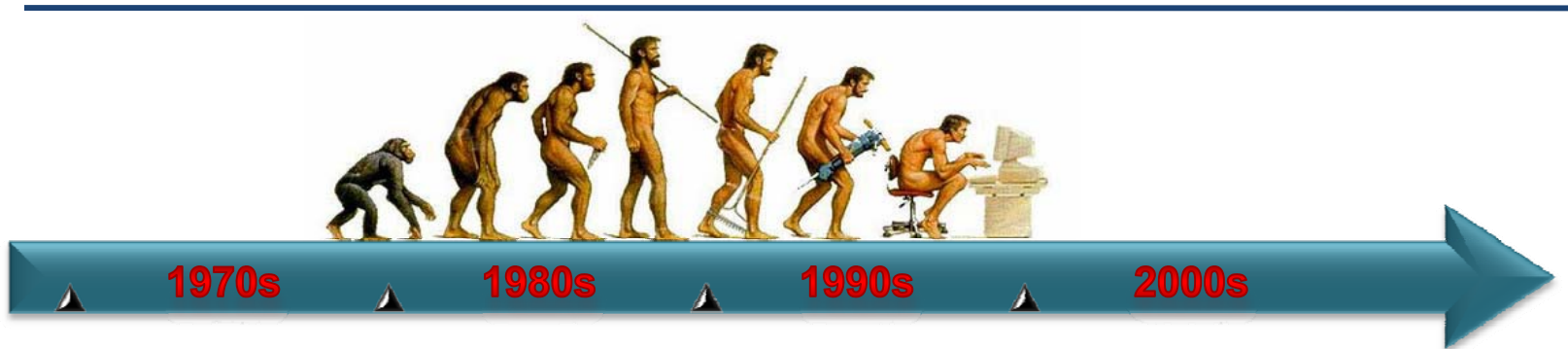


# Mission

- ▶ Synchronize material flow
- ▶ Optimize asset utilization
- ▶ Sub-Second decision processing
- ▶ Provide repeatable performance
- ▶ Allocate automation logically
- ▶ Intelligent exception handling and recovery



# Product Evolution



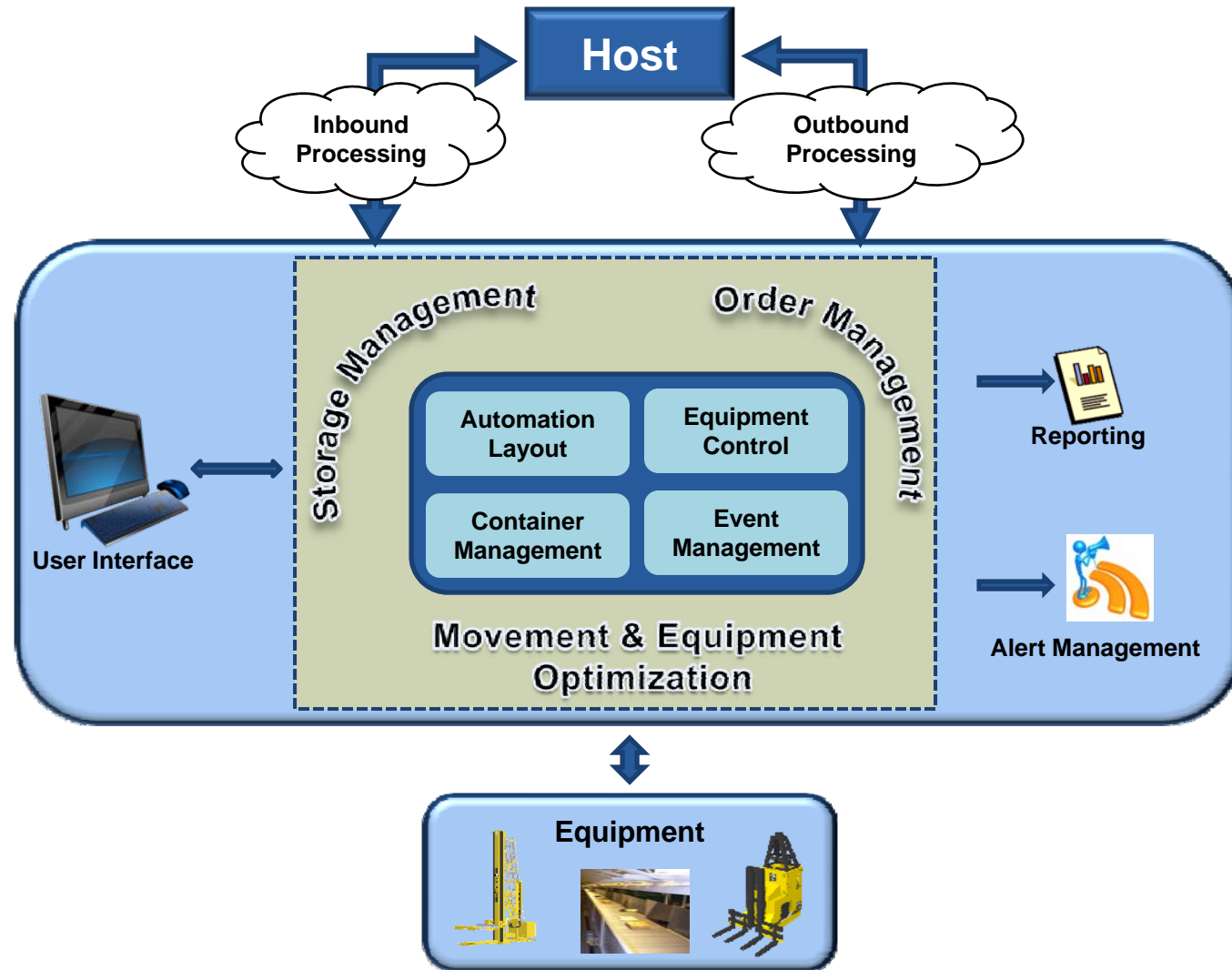
# Productization

Standard	WMS	WCS
Customer & Market Driven	X	X
Planned Product Releases	X	X
Roadmap	X	X
Current Technology Stack	X	X
Product Evolution and Growth	X	X
Upgradeability	X	X
Product Development Methodology	X	X
Product Support Model	X	X

# Standard Features

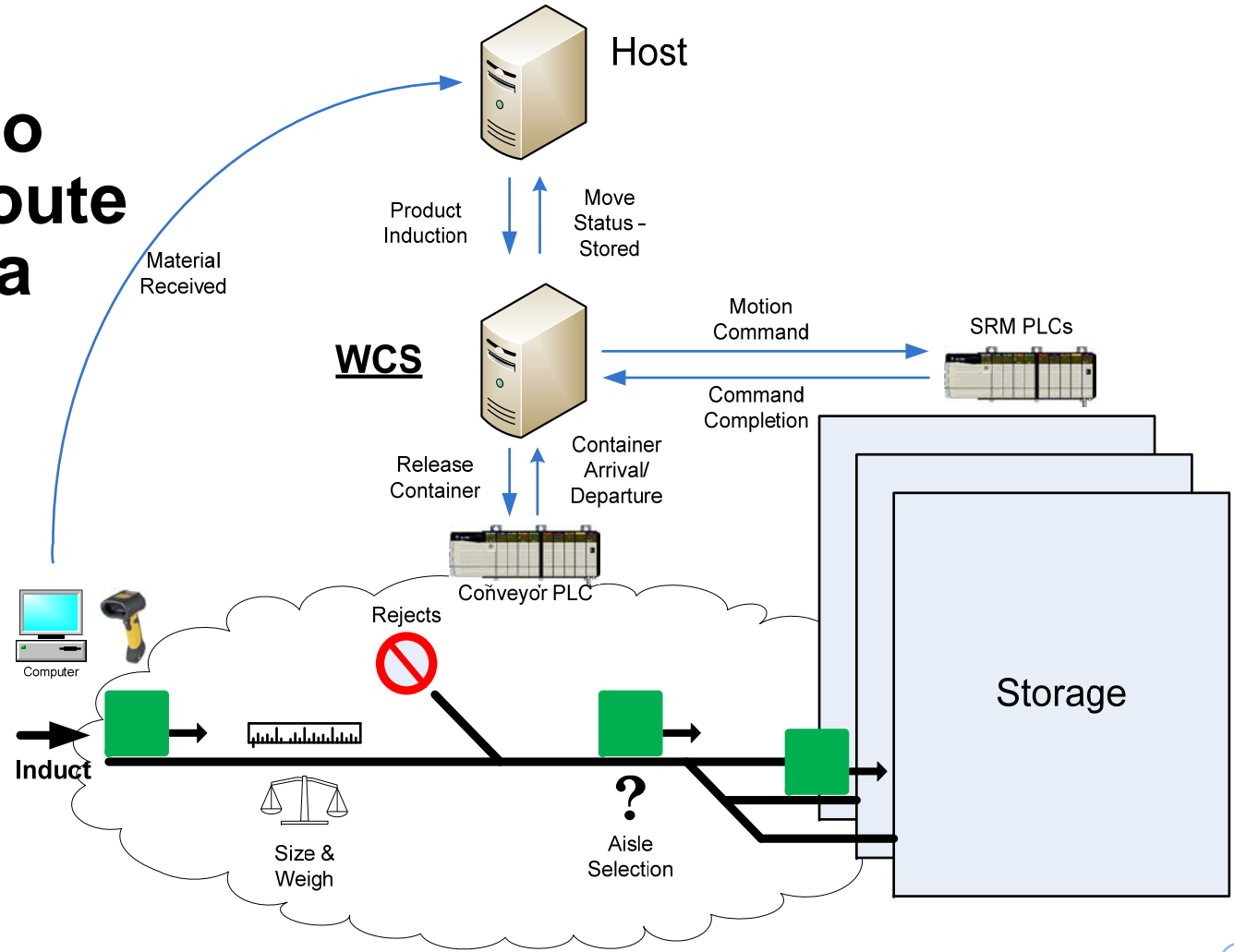
Standard	WMS	WCS
Configurable	X	X
Intuitive Use User Interface	X	X
Optimize Asset Utilization	X	X
Common Core Services	X	X
Standard Host Interfaces	X	X
Standard Equipment Interfaces		X
Development Flex Points	X	X
Documentation	X	X
Deployment Tools	X	X

# Warehouse Control System



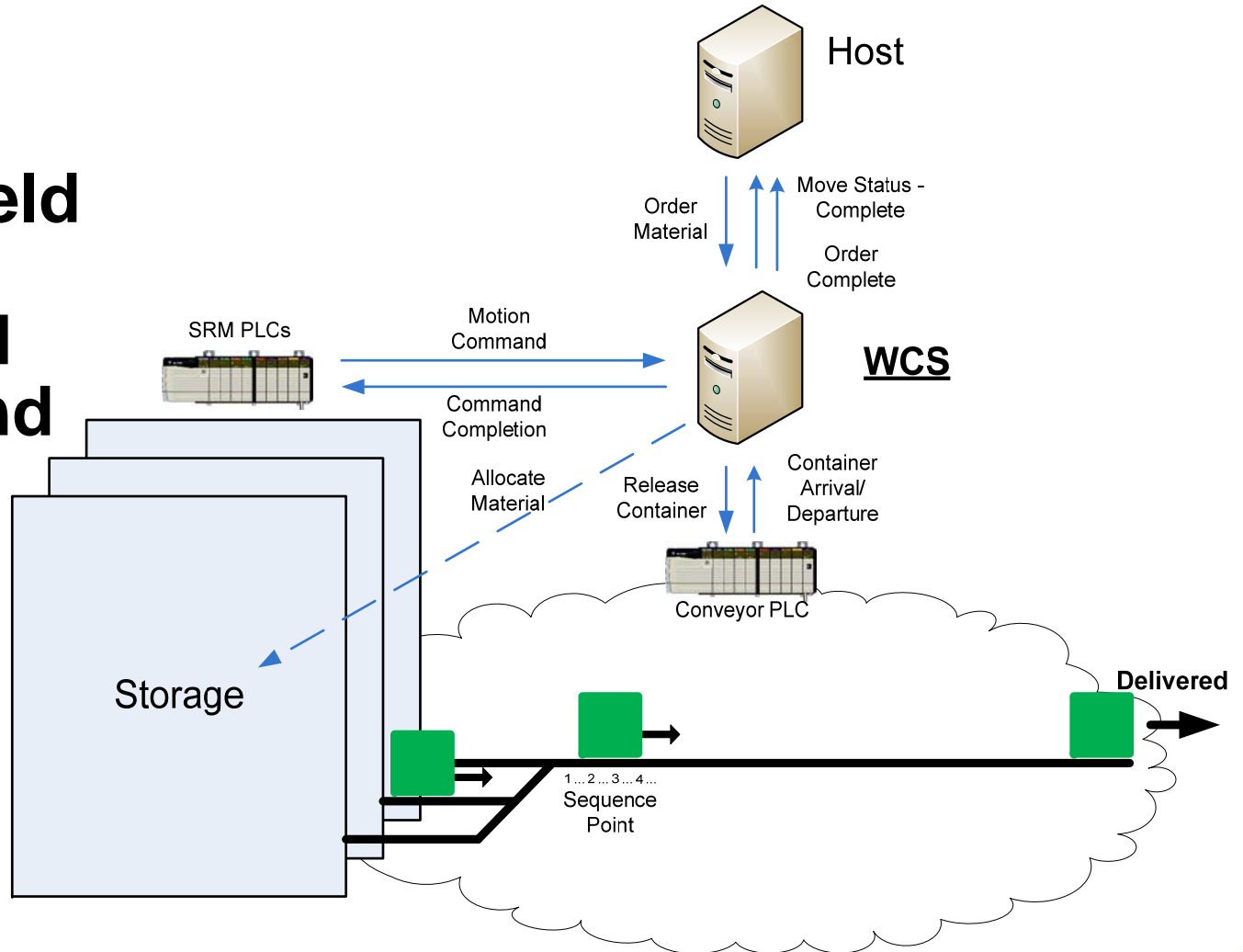
# Inbound

- ▶ **Receive material into WCS and route product to a destination (typically storage)**



# Outbound

- ▶ **Release orders for product held within automated storage and allocate inventory to orders**



# HKEMS - Integrated WCS



## ACS

**AGV Control System**

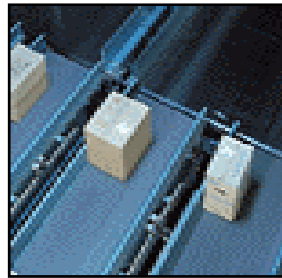
- Vehicle Scheduling
- Scheduling / Routing
- Traffic Management
- AGV Equipment Control



## CHEC

**Case Handling Equipment Control**

- Labeling
- Sortation
- Wave Management
- Conveyor Control



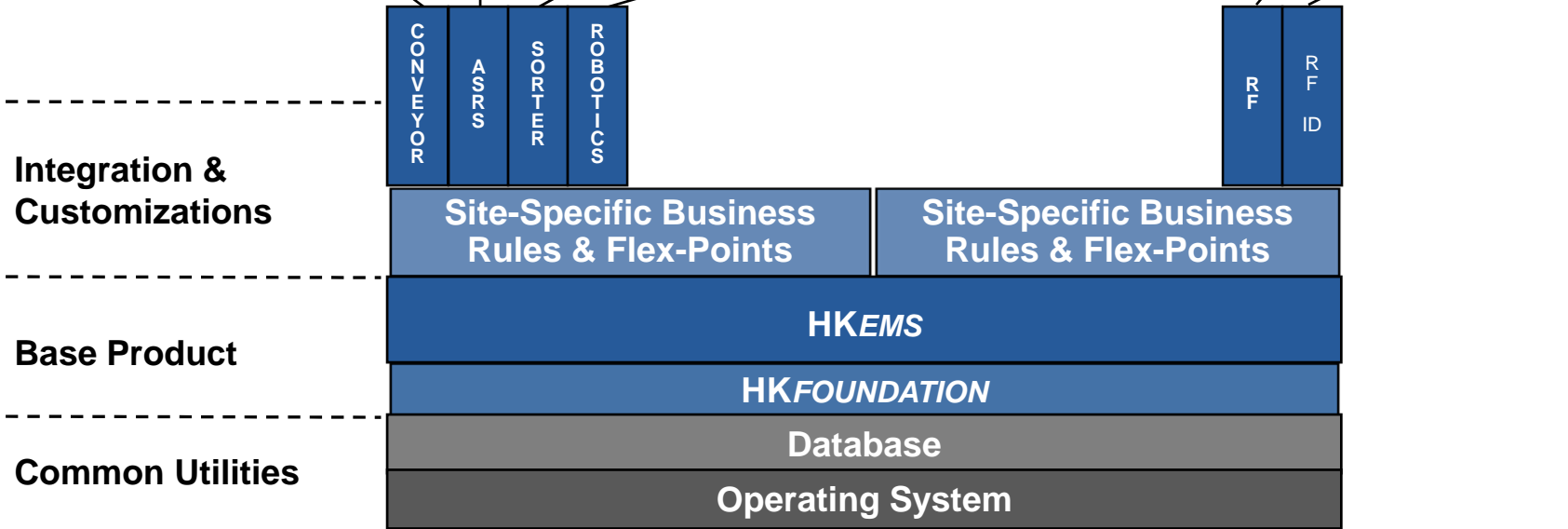
## MHCS

**Material Handling Control System**

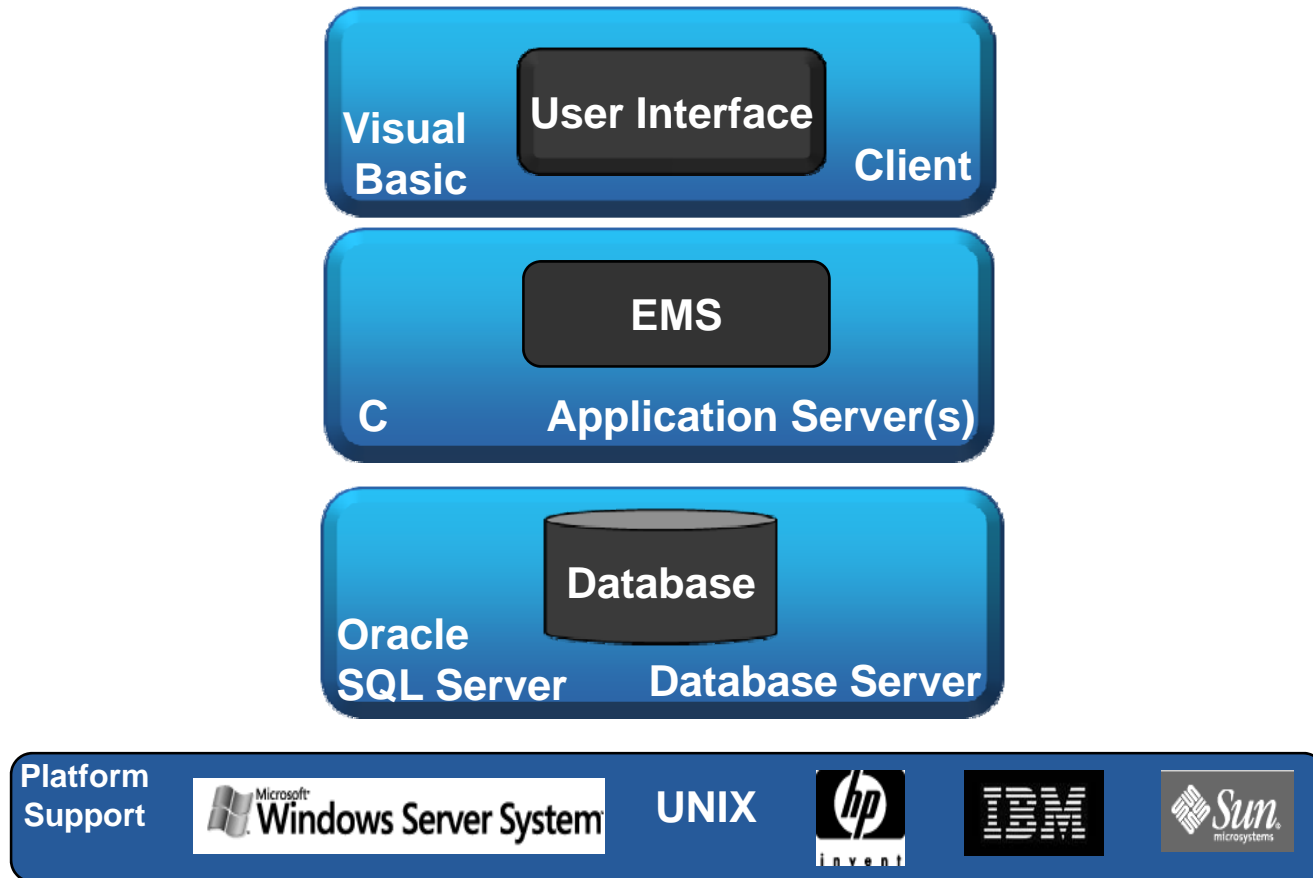
- Inventory Control
- Storage Management
- Equipment Scheduling
- SRM Equipment Control



# Architecture



# Technology Stack



# User Interface

- ▶ Allow the user to monitor and modify the system behaviors and provides the following:

- ◆ Intuitive user interface
- ◆ User customizable screen organization
- ◆ Quick access to data via hyperlinks
- ◆ Audio and popup alerts
- ◆ Create and view Standard Operating Procedures
- ◆ Predefined and User Modifiable Filters
- ◆ User configurable system overview
- ◆ Secure access to information and functions
- ◆ Access to Online Help

The screenshot displays the EAS Control Center software interface. At the top, there are navigation tabs for equipment management, load management, location management, order management, transactions, reporting, configuration, and system. Below these are icons for equipment, chapter, conveyor, devices, graphical overview, and sim1. The main area is divided into several sections:

- Load Movement:** A table with columns for MBC Order Number, Drop-off Location, Status, Completed Picks, Order Actions, Order Priority, and Qty/Pallets. It lists several orders with their respective statuses and actions.
- SRM Table:** A table with columns for S/RM, Current Status, Pending Status, Current Fault, Aisle, and Sub System. It shows SRM01 through SRM04 with their current and pending statuses.
- Picks for Order 'U7X7D1':** A table with columns for Pick ID, MBC Order Number, Sku ID, Pick Quantity, Pallet Height, State, Load Sequence, and Max Age. It shows two pick records.
- SRM Command Information:** A table with columns for Sub System, Aisle, Command Type, Operation Status, Operation Type, Move Queue ID, Source Location ID, and Source Location Type. It shows various command and operation details.
- System Status Bar:** A section at the bottom left showing 'STATUS OK' and 'System MHCS is running' with a green checkmark. It also indicates 'Material movement is active' and provides a link to access Startup/Shutdown.
- Recent Alarms:** A table at the bottom right showing a list of alarms with columns for Time, Alarm Id, Severity, and Alarm Text. It lists several informational alarms from 5/2/2008.

# Core Services

- ▶ **Manage the efficient flow of material throughout the entire facility and provide the following:**
  - ◆ **Optimal equipment and route selection**
  - ◆ **Load movement scheduling and traffic control**
  - ◆ **Coordination and synchronization between various types of automated equipment**
  - ◆ **System status monitoring and alerts**
  - ◆ **Equipment utilization and diagnostics**

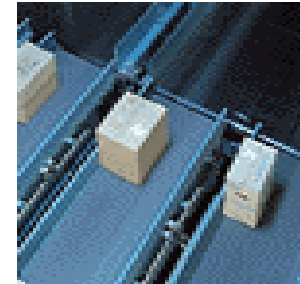


# Equipment Services

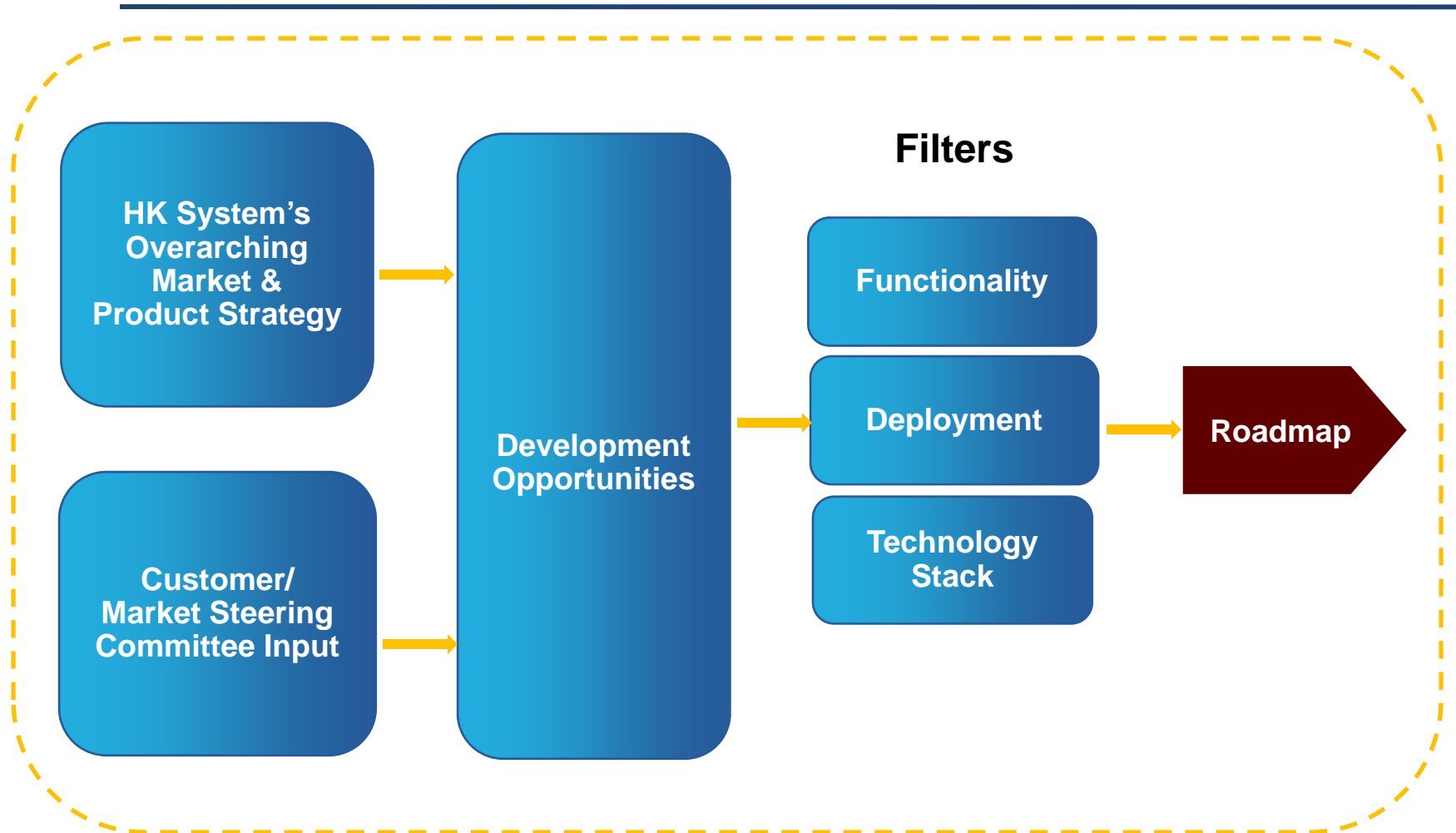
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► **Manage the efficient utilization of automated equipment and provide the following:**

- ◆ **Vehicle scheduling**
- ◆ **Guide-path traffic control**
- ◆ **Wave management and lane assignments**
- ◆ **Conveyor divert and routing**
- ◆ **Space management by rack depth, size, temperature, velocity, etc.**
- ◆ **Inventory control**
- ◆ **Equipment interfaces**
- ◆ **Equipment specific reports and diagnostics**



# Product Roadmap Process



# Release Summary

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## ▶ 9.0 New User Interface

- ◆ May, 2007
- ◆ 1 – Click Deploy, Custom Filters, Hyperlinks
- ◆ Customizable Graphic Display
- ◆ Active Directory Server Support
- ◆ Alert Dispatch (e-mail)

## ▶ 9.1 Enhance AGV Features

- ◆ January, 2008
- ◆ AGV Dynamic Rescheduling and Reallocation
- ◆ Battery Management
- ◆ Enhance Eagle and Odyssey (AGV Control) Support

# Release Summary

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## ▶ 9.2 Enhance Deployment Capabilities

- ◆ January, 2009
- ◆ Increase Flexpoint Support
- ◆ Enhance Standard Host Interfaces

## ▶ 9.3 Tech Stack & Usability

- ◆ September, 2009
- ◆ MS Windows Server 2008 64bit, MS Windows Vista
- ◆ Oracle 11g, MS SQL Server 2008
- ◆ Visual Studio 2008
- ◆ Enhance UI Capabilities

# Roadmap

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## ▶ 9.x

- ◆ 2010
- ◆ Enhance Foundation Dashboard
- ◆ Extend Support for Case Handling Equipment
- ◆ Upgrade AGV Vehicle Communication
- ◆ Enhance AGV Reporting
- ◆ Technology Stack Upgrade
- ◆ Enhance Usability

# Demonstration

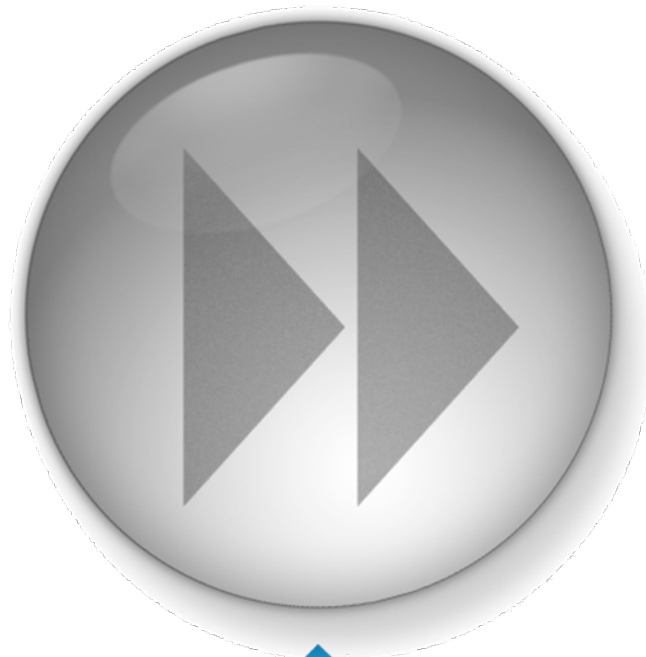
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# Key Takeaways

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- ▶ **WCS has evolved to be as ‘productized’ as WMS**
- ▶ **WCS functionality has stretched via adapters and plug-ins to provide comprehensive OEM-independent control**
- ▶ **The roadmap for meaningful future releases is User driven, not author driven...that’s YOU**
- ▶ **Cost of ownership (upgrades, service, migrations) has decreased due to modularity and consistency**



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Questions?