Building
Tomorrow's Enterprise

White Paper

WMS Consolidation,

Getting the instance strategy right

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Abstract

Companies, worldwide, are realizing the benefits of rolling out standardized Warehouse Management System (WMS) processes across their national or global warehouses. Popularly referred to as WMS consolidation, this initiative is typically triggered from a need to streamline processes by extending best practices from the industry or within the company to all the storage locations. This paper delves into the outline, benefits and implementation perspectives to design the "right" WMS instance strategy for companies having geographically distributed warehouses on the road to a WMS unification exercise.

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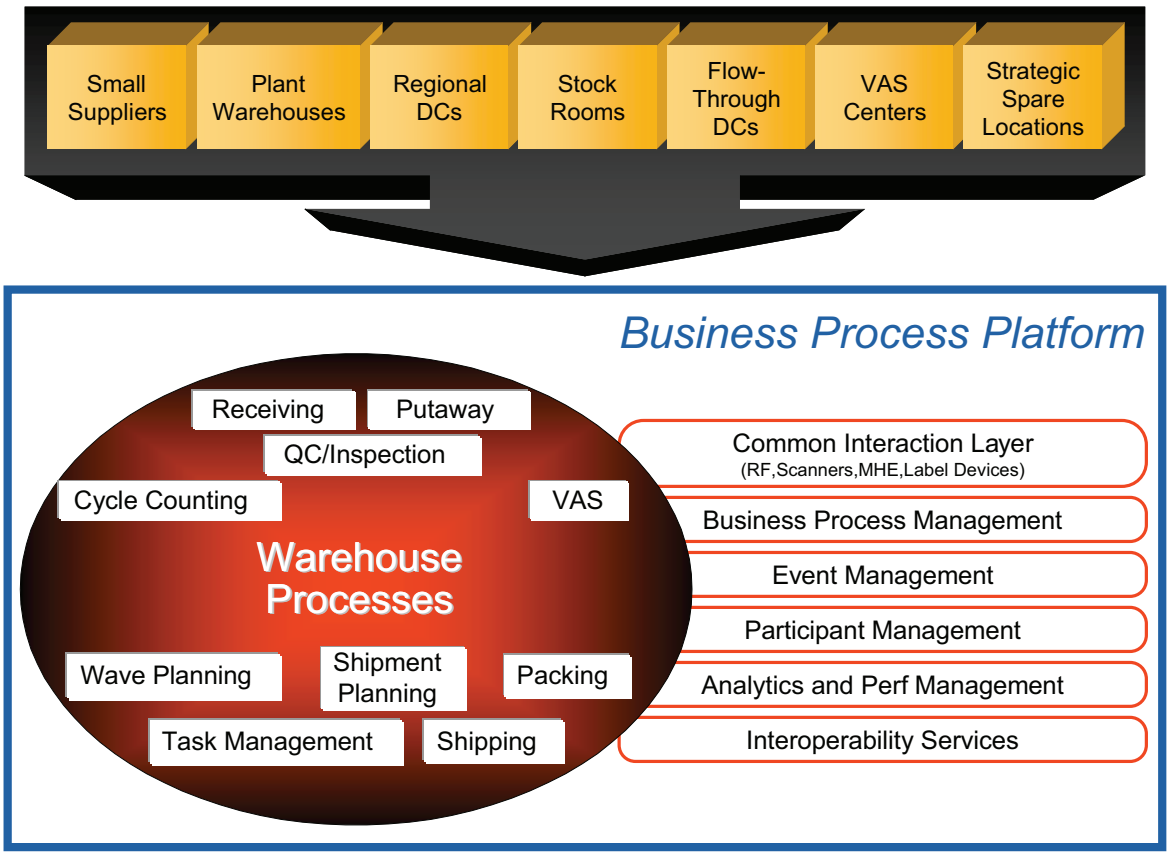
The drive for WMS unification

Complex warehousing environments usually manage inventory in a variety of disparate facilities. Over time, this would typically evolve into a non-federated structure where each facility employs different operational processes and disparate systems throughout the network. The multiple fallouts of this evolution would be an increased complexity in managing operations, a lack of centralized visibility and increased infrastructure and ownership costs due to complex systems integration.

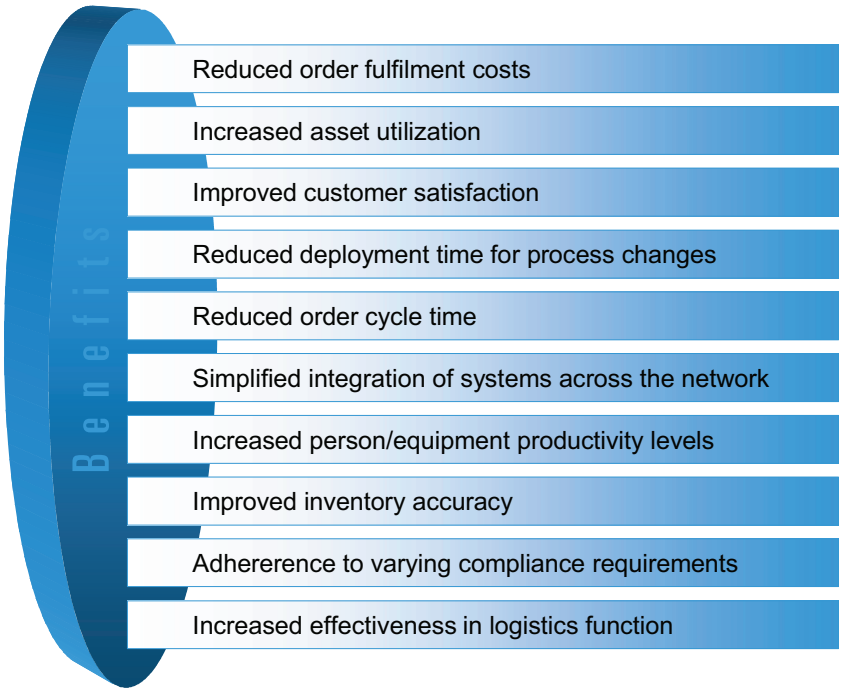
Companies worldwide are realizing the benefits of rolling out standardized Warehouse Management System (WMS) processes across their national or global warehouses. Popularly referred to as WMS consolidation, this initiative is typically triggered from a need to streamline processes by extending best practices from the industry or within the company to all the storage locations. Crucial to this rollout strategy is the role played by WMS packages, acting as unifiers and enablers.

However, warehouses typically serve a local audience. Hence, customization of processes are a must have considering the obvious local influence on solution governing factors like business practices, Stock Keeping Unit (SKU) distribution, volumes handled, item velocity, holidays, labour policies, Material Handling Equipment (MHE), and so on. Constructing the localization story in a WMS consolidation endeavour requires certain capabilities within the package to derive localized WMS functionality from one global collection of standardized & optimised process template(s).



The WMS solution space today has evolved from basic singleton execution strategy to solutions offering an unbundling capability of process models. This enables multiple disparate processes to be modelled within a single architectural landscape, allowing the creation of localized process versions from the global collection of optimised processes. This is essentially a business process platform (as shown below) that enables the creation and management of end-to-end business processes, which extend beyond traditional boundaries of underlying business applications. The term "WMS Fusion Architecture" is increasingly gaining currency to describe this phenomenon.

Some of the benefits that companies would reap from extended WMS entities architecturally fused in this fashion would be:



The "Fusion" effect

Fusion principles for distribution networks would mean that all stakeholders/participants, locations, processes and activities are co-located in the same data model or within a single solution. This would provide the following capabilities for modelling a culturally and organizationally diverse, multi-echelon distribution network:

1. Facility of process orchestration at the location/ship node level for each facility/ warehouse with embedded alert and event management functionality
2. Ability to model facilities and locations, catering to the need of disparate warehouses that honour organizational diversities and boundaries
3. Configurability/ visual modelling of process semantics and workflow
4. Integrated visibility across business process tiers through a linked set of entities (for example, orders to shipments, shipments to task level shipment processing sub-activities like Pick and Pack)
5. Inventory visibility at multiple levels of aggregation (case/ pallets) for SKUs
6. Availability of an open modular package architecture
7. Consistent interaction experience across multiple mobile device channels (Personal Digital Assistants (PDA), Radio Frequency (RF) Terminals, Windows CE operating system-based terminals, etc.)
8. Ability to interoperate with Service Oriented Architecture (SOA) enabler back-bones, such as the Enterprise Service Bus (ESB) infrastructure(s) to connect to unified applications like order capture, order processing and master data management.

The business imperative to unify WMS applications has driven companies to aggressively explore opportunities. For instance, the opportunity to consolidate this "fusion" genre of products with a view to rationalize the cost of hardware investments. While there are benefits for a global single instance WMS platform, due to issues in performance and ownership, single instance hosting may not be a viable solution for all locations and stages.

The NWMS concept

Packages that provide warehouse management process execution and tracking capabilities are creating a unique differentiation in the market. With the adoption of fusion vision, the result is the emergence of "Networked WMS", or "N-tier WMS", or simply "NWMS" solution.

NWMS is designed for managing fulfilment and distribution across a network of facilities. The network includes central distribution centres, regional distribution centres, local fulfilment centres, stock rooms, plant warehouses, returned material centres, and any physical/ virtual entity configured as a fulfilment node. It helps businesses manage inventory and processes throughout their network, through a synchronized warehouse management system.

NWMS is process centric, notifying other systems or locations of critical events that occur within the network. This nature allows fulfilment decisions to be made based on real-time information received from customers, partners and suppliers. It is built on a service oriented, component-based architecture. It enables responsive customer order fulfilment, improved operational efficiency, greater flexibility for growth and a lower total cost of ownership in large scale, complex fulfilment environments.

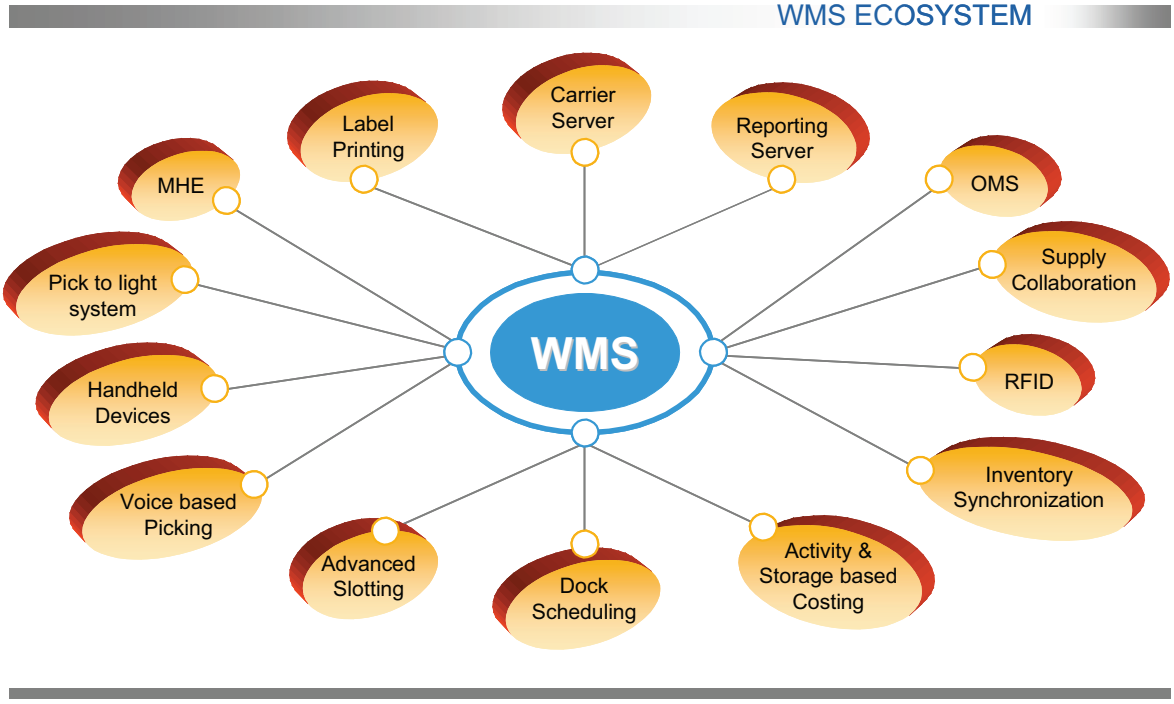
NWMS can be leveraged across all types of inventory stocking situations, from the largest facilities down to the smallest stocking locations. Its functional capabilities allow one instance of the software to be simultaneously deployed in multiple facilities and operate locally and/ or at the network level. The subsequent sections of the paper have been detailed in reference to Sterling Commerce Order Fulfilment (WMS) package application, in pursuit of the right instance strategy. The choice is driven by two considerations:

- Sterling is seen as one of the visionaries in the unified NWMS space since its product architecture has the capabilities to scale up a single solution definition through intrinsic use of distributed architecture principles.
- Sterling's WMS process orchestration features (like the service centric process design) underlying open technology architecture capabilities along with SOA interoperability makes it an ideal candidate to explore alternate solution approaches in line of geographically distributed collection of solution participants.

Instance strategy Options

The fusion architecture centric design of the solution framework tends to suggest a centralized hosting strategy for the WMS solution with web-based access to the WMS console functionalities from the warehouses located at different geographies. However, it is also possible to deploy a de-centralized or a hybrid instance strategy if the product supports a modular architecture.

The key variations of architecture styles for a WMS solution can be envisioned by constructing a comprehensive WMS solution eco-system. This eco-system would not only contain components resident within the WMS application footprint, but also encompass considerations for the various human, robotic and interfacing systems that complete the WMS operational landscape as shown below:



Factoring this extended landscape into the solution means additional design parameters, one such being “Interleaving”. In a WMS-Robotic System (MHE) integration scenario, there are often situations where the process activity sequence involves multiple request-response interactions between WMS & MHE system. This concept is referred to as Interleaving. Interleaving leads to the MHE system waiting for WMS to respond in time during intermediate processing steps and puts unique response time demand on WMS solution to keep pace with Robotic actions. It is important to keep the Robotic idling minimal as it results in a substantial loss of operational productivity. Addressing high levels of interleaving imposes network performance restrictions and thus affects the WMS instance decision.

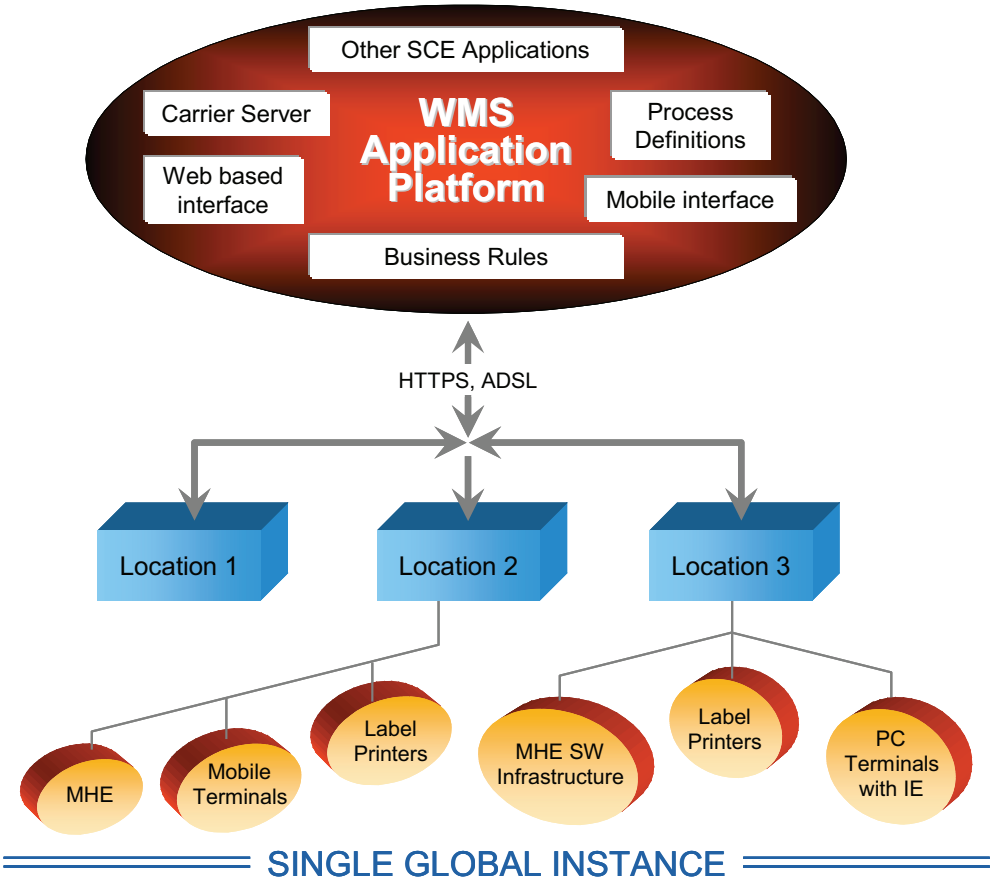
Based on the above considerations, we suggest three instance strategy options – Single Global Instance, Distributed Instances and Hybrid approach. Let us look at these in detail in the subsequent sections.

WMS Instance Strategy platter

Single Global Instance:

A single instance strategy (illustrated below) is always the first consideration whenever

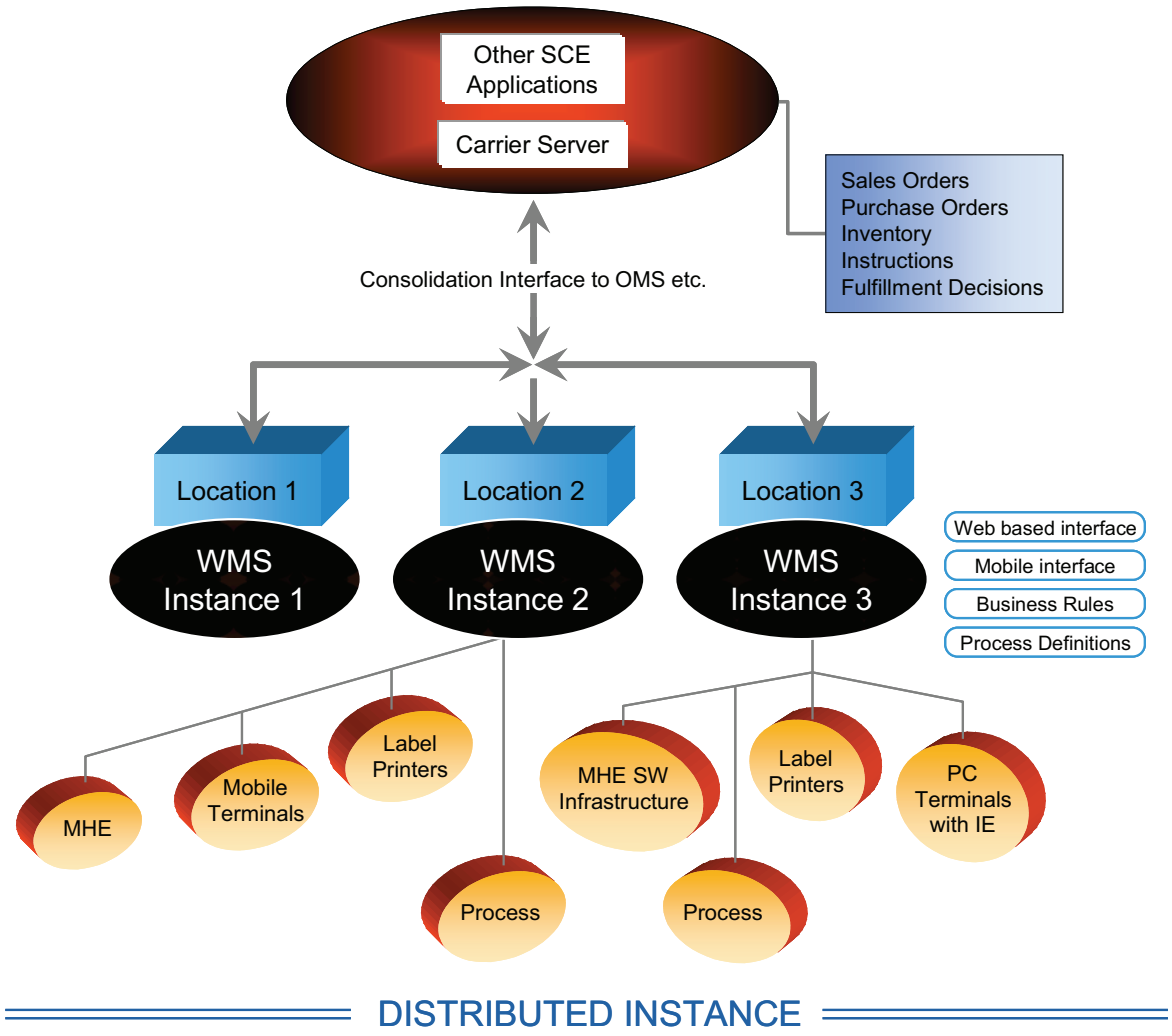
- visibility, tracking and event information across the distribution network is vital
- there is standardized set of definitions across different locations
- there is standardization of automation equipment landscape across the locations (allowing for the same technology interface to be re-used)



Distributed Instances:

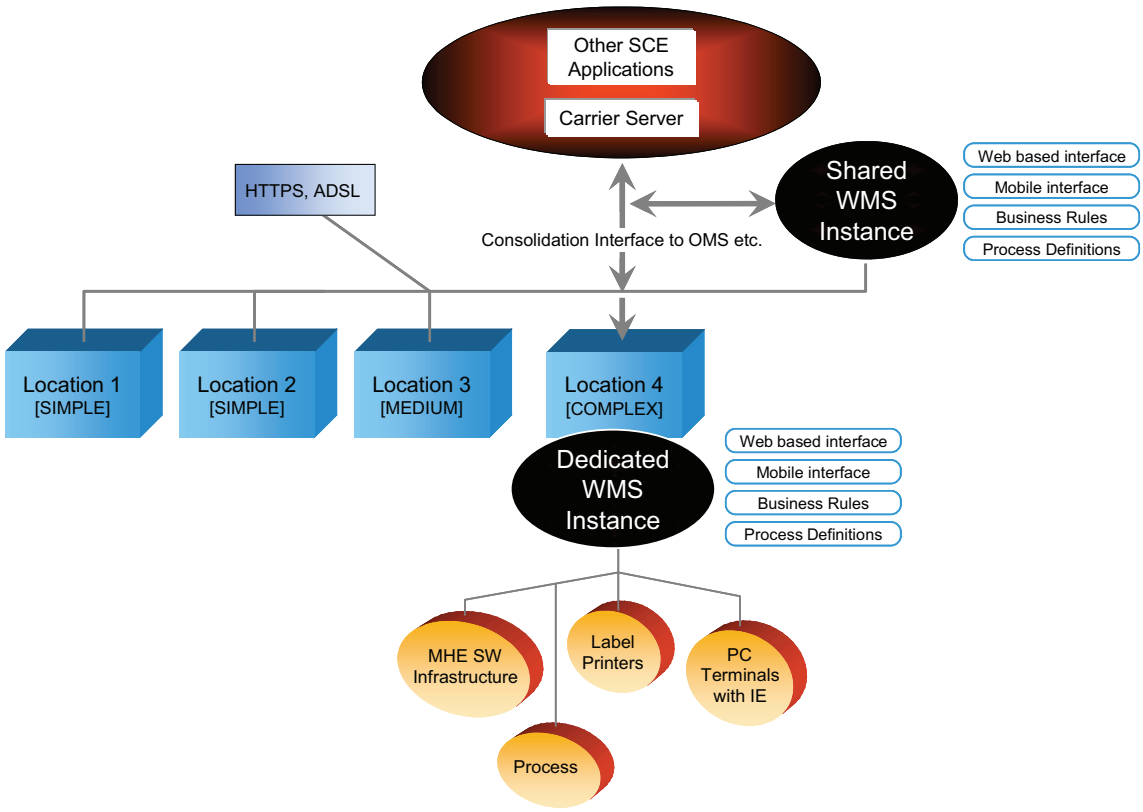
A distributed instance strategy (illustrated below) has been found to benefit where

- localization of warehouse level activities is high
- there are significant differences in manual and automated activities across the facilities
- there are widely varying automation technologies found across the facilities. For example, in a distributed environment, one facility uses robots for palletization during receiving, while the other does not, but does make extensive use of conveyor systems
- there is strong interleaving between WMS & robotic systems (A strong interleaving demands an instant response from WMS about next task advices. If the advice is not returned by the WMS in time, the MHE would idle out resulting in productivity losses)



Hybrid Approach:

A hybrid approach (illustrated below) combines the benefits of both worlds above and would be typical for complex scenarios that need visibility across distribution networks, yet should live up to the needs of large scale localization and process complexity at the warehouse level. This approach would provide flexibility to handle complex activity-level interleaving between WMS and Robotic systems by local hosting and also manage to address the needs of smaller facilities with rudimentary IT infrastructure (a computer with a dial-up connection).



HYBRID APPROACH

Another situation could be where business rules are localized at warehouse level. At the company level, these rules may be applicable for all its locations and warehouses. At the warehouse level however, certain business rules could be specific to that warehouse and may override rules defined at the company level. For example, all physical warehouses, in each of the logical locations, need to follow certain standard picking rules, set at the company level. But for a specific warehouse or even a zone within a warehouse, this rule can be customised and deployed as a local business rule (Dedicated WMS Instance).

Hybrid strategies are best handled by forming logical candidate clusters arrived at grouping facilities/ locations following similar processes and with the goal of attaining a certain level of uniformity of infrastructural needs. These warehouse clusters can then be hosted on shared hardware platforms/ hardware consolidation solutions. The hybrid hosting model itself can be of different topologies and the approach to hybridization should be strongly connected with enterprise wide supply chain consolidation vision and needs better IT-Business strategic monitoring to succeed.

Towards the Right Instance Strategy

Given the fact that global WMS consolidation initiatives are progressive in nature, any instance strategy decision would have to be evolutionary with flexibility to churn out blueprints appropriate for the situation on ground.

Over its life cycle, warehouses can go through various levels of operational maturity. Initiating at a basic level (without leveraging cutting edge technologies or state-of-the-art processes) and gradually moving on in terms of automation, leveraging latest technology (eg. introduction of robotic conveyors or RF) to the final stage of attaining process maturity/ coverage (eg. addition of cross-docking). These changes would, in turn, drive a realignment of instance strategy wherein the warehouse might choose to align with a different instance strategy, hosting a configuration more aligned to its newly streamlined processes.

A winning instance strategy:

- would be the one that is "Just about right" in terms of provisioning for cost at a given point in time
- would provide "just what is needed" in terms of horsepower and availability to address new peaks in transaction volumes to make the better optimised new business processes run quicker
- would provide "opportunities for expansion/evolution" using the budgetary allocations derived from a sub-section of earned profit as the roll-out program crosses from one milestone to the next

Moreover, managing inventory across a network is fraught with challenges. Enterprise software systems should facilitate company-wide inventory visibility and control, even when inventory is managed in a network of diverse and heterogeneous operating facilities. All too often, when selecting inventory management systems, business decision makers tend to compromise on a solution that can never achieve company-wide inventory visibility and control.

The key tenets in designing, and subsequently evolving a successful instance strategy roadmap for a large scale, diverse distribution network would be:

Overall Solution Vision

- Alignment with business case objectives and macro-level solution vision

Operational Factors

- Complexity of warehouse setup
- Volume and performance demand on the system from individual facilities, users and integration with other applications
- Level of Interleaving between WMS and multiple MHE/ Warehouse Conveyor Systems (WCS)
- Programmed speed of operation of MHE Equipment
- Ability of MHE and WCS Systems to send task completion/ exception updates
- Extent of localization in warehouse processes at a local/ region level
- Business demand on upload interfaces (real-time receipts, ship confirmation updates) with an order management solution stack

Enterprise Architecture & Automation Landscape

- Integration capability of MHE software interface in terms of support for standards-based frameworks (JMS, J2EE/EJB, HTTPS, Web services),
- Technology interoperability factors (Unix-based WMS – Windows-based MHE software interface)
- Opportunity for standardization of technical interfaces
- Capability of physical network infrastructure to guarantee quality of service on bandwidth and latency across the distribution network
- Existence of IT Infrastructure at the ship node level (network, connectivity, hardware for local instances, RF network, software interface for automation solutions of key activity milestones)
- Cost of IT infrastructure, monitoring and remote management tool (licensing and support) at distributed facilities, compared to combined cost of maintaining a service level guaranteed, resilient network backbone and centrally hosted redundant hardware solution, providing desired level of availability
- Cost of procurement and operational readiness to implement a high availability solution for centrally hosted deployments
- software/ hardware IT budget provisions and readiness to support large number of roll-outs at the same tim

Implementation Strategy

- Rollout planning
- Pilot implementations with parallel runs
- Periodic effective assessment of the roll outs
- Program execution progress monitoring across all tracks
- User/ stakeholder training and enablement

How crucial these individual parameters are, would be driven by the organization's long term instance strategy, enterprise architecture standards (for example, in between an implementation program, the enterprise standard may adopt virtualisation or grid computing) and the diversity of locations under consideration.

A Last Word

While it is difficult to predict future states of organization especially in terms of choice of stocking locations, definition of ownership boundary and technology infusion, we strongly recommend developing a high level road map for global/ regional/local roll-out programs delineating how the deployments should evolve.Keeping the instance strategy in the program roadmap would go a long way in rationalizing costs and providing a step-wise way forward. This we believe would help organizations with complex warehousing landscape to gain better returns from implementation of WMS packages, optimizing hardware investments and operational maturity. These combined benefits would sustain the flexibility to deal with constantly changing market imperatives to unlock the true "Agile"potential of the enterprise.

About the Authors

Gopikrishnan G R is a Portfolio Head in the SCM Practice at Infosys anchoring worldwide project delivery on diverse SCM functions including Supply Chain Execution, Sourcing & Procurement and Enterprise Asset Management. He has several years of experience in delivering practice leadership, program management and consulting in various supply chain domains in supply chain execution and supply chain planning for global corporations in the US, Japan, Malaysia & Philippines.

Satadal has worked with some of the world's most complex global WMS implementations defining instance solution, architecture and technology around sterling nWMS platform in logistics, spare parts and retail industry. In this role as Head of Architecture and Technology solutions, Satadal looks at enabling better success rate of SCM package adoption across the fortune 500 customers of Infosys SCM clients.

Girish is one of the senior consultants at SCM practice. His diverse supply chain roles include consulting, presales and project management. His core area of specialization is in the Supply Chain Execution domain predominantly in the Retail industry for retail majors in both US & UK. Currently, he's playing a leadership role in one of Infosys's consulting engagements for a leading catalog retailer in the UK.