



WHITE PAPER

Which SAP® Warehouse Management Application is Right For You?

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ABOUT THE AUTHOR

Catalyst has long been recognized as an industry leader in warehouse management and SAP® R/3® implementation consulting with noted expertise in SAP's Logistics Execution System (LES), Warehouse Management (WM) and Task and Resource Management (TRM).

Catalyst was a key player in SAP's internal, pre-release testing stage for TRM in Walldorf, Germany and successfully rolled out TRM to an R/3 Enterprise ramp-up customer. Catalyst also played an integral role with pre-release testing of SAP's native radio frequency data collection product, SAP Console and was the first to implement it with a customer using R/3 release 4.6.

Our in-depth expertise of SAP LES products and functionality—along with our close relationship with SAP®—provides us with an intimate knowledge of the development vector SAP is applying to the LES product suite and allows us to advise customers on strategic operational decisions, provide them with detailed information on key integration points and quickly assist them in identifying fit/gaps with current and future release levels.

EXECUTIVE SUMMARY

This white paper is designed to give warehouse operations managers and IT managers a useful framework for understanding SAP's newer Warehouse Management (WM) application functionality. It encompasses a look at both the core ERP Central Component (ECC) functionality in addition to the SCM Extended Warehouse Management product. It will also assist companies in understanding which WM application to select when it comes time to upgrade their SAP environments.

The paper includes the following information:

- **What does the evolution of SAP WM look like?**

A brief recap on past and future functionality for SAP's WM application.

- **What is some of the newer functionality that SAP WM has to offer?**

With the advent of Transportation Resource Management (TRM) and SCM Extended Warehouse Management (EWM), the functionality within the WM application has been vastly improved. Capabilities such as cross docking, dynamic cycle counting, slotting, yard management, labor management, kitting and task interleaving are now standard functionalities within particular releases.

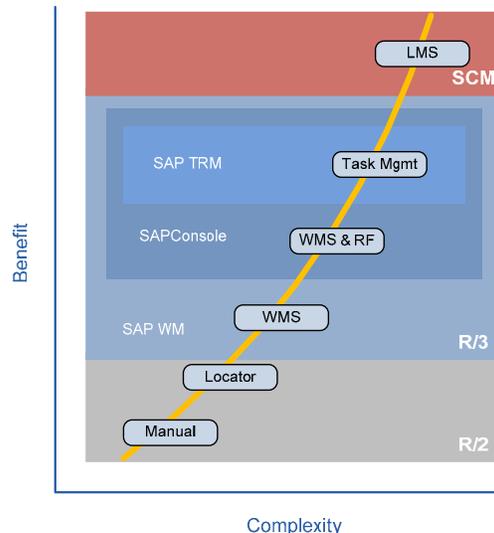
- **What WM solution is right for you when it comes time for an upgrade?**

A comparison chart on some of the newer functionality and release information to help you make a more informed decision when it comes time to upgrade your R/3 system.

Which Application is Right for Me?				
	ERP WM	Standard dWM	TRM	SCM EWM
Distribution Activity	✓	✓	✓✓	✓✓✓
High Volume		✓	✓✓	✓✓✓
Operational Complexity			✓	✓✓✓
Value Added Services			✓	✓✓✓
Tighter Integration to QM				✓✓✓
Tight Integration to EH&S*				✓✓✓
RF Capability (SAPConsole)	✓✓	✓✓	✓✓✓	✓✓✓

WHAT DOES THE EVOLUTION OF SAP WM LOOK LIKE?

SAP has come a long way in the warehouse management application since its release of the R/2 product. A brief evolution is below:



SAP Releases by Date

R/2

1990's.....WM was a sub-module within the R/2 system

R/3

Version 3.1..... 1998
Version 4.0B.....1998
Version 4.5B..... 1999
Version 4.6B..... 2000
Version 4.6C..... 2000
Version 4.7 xt. 1.1.....2002
Version 4.7 xt. 2.0.....2003
mySAP ERP 2004 (ECC 5.0)..... 2005
mySAP ERP 2005 (ECC 6.0)..... 2006
mySAP SCM EWM 5.0.....2005
mySAP SCM EWM 5.1.....2007
mySAP SCM EWM 7.0.....2008

Functionality built within SAP WM 3.X included the following:

- Storage and Facility Management – manage different batches, stock types (vendor consignment stock, own), and stock status (quality, unrestricted)
- Warehouse Structure – basic building blocks of the warehouse (storage type, storage sections and bins)
- Stock Management – mixed and homogeneous storage possible
- Material Master Data – addition of WM fields in MM views
- Units of Measure – WM unit possible at WM level
- SLED
- Posting Changes – material to material, stock status to stock status
- Transfer Requirements/Transfer Orders – See Appendix A
- Ability to Post Stock Differences – upon putaway only
- Fixed Bin Replenishment
- Putaway Strategies
- Picking Strategies
- Storage Unit Management
- HAZMAT
- Inbound Material Processing

- Internal Movements
- Outbound Material Processing
- Physical Inventory
 - > Annual
 - > Continuous
 - > Cycle Count
 - > Zero Stock Check
- Basic Reporting
- Authorizations
- Archiving
- Interfaces Available to External Systems (i.e. RF devices)
- User Exits Available

Functionality built within SAP WM 4.0 included the following:

- Lean WM
- New Org. Structures such as gates, picked items zone, and pick area
- Capacity to search up to 30 Storage Types (previously 10)
- Number of Storage Unit Types increased to 30 (previously 10)
- Number of Storage Sections searched increased to 30 (previously 10)
- Up to 99 items can be managed in a bin with Putaway strategy P (previously 14)

- More than 1 storage location can be warehouse managed under the same warehouse number (previously only 1 warehouse per storage location and plant was manageable).
- Pick strategy performance enhanced (active capacity check)
- WM unit of measure possible at material level
- Enhanced stock search (i.e can search own stock before vendor consignment stock)
- Enhanced storage section search capability
- Create Transfer Order (TO) for GR from Return Stock functionality
- Customer Exit available for Replenishments
- Planned TO times – used for the basis of workload calculation and incentive wage
- TO Splitting – balance workload between users
- Ability to change a TR
- Ability to process posting changes completely in WM
- Enhanced putaway strategy K and Bulk putaway (ability to block from further stock placements to ensure FIFO)
- Ability to process QM samples in the background
- 2 Step Picking
- Enhanced strategy M through rounding quantities on the material master
- +++ calls a customer exit for Stringent FIFO
- Pre-picked shipping units
- Free Packing
- Planning and Monitoring Tools
- Picking Waves
- Rough Workload Estimator

- WAM (warehouse activity monitor)
- Physical Inventory Changes – monetary limits can be set for recounts
- Quantity reduction
- Display material texts with Release Order Parts Staging

Functionality built within SAP WM

4.5A included the following:

- New component added (LES) vs. WM
- dWM (Decentralized Warehouse Management) available
- KANBAN capabilities
- Destination bin changeable upon putaway TO confirmation
- Ability to close out TR's (i.e. set delivery complete)
- TO processing comment added
- Basic pre-allocated stock cross docking (hot list)
- Inbound delivery becomes available
- Ability to putaway stock that was incorrectly picked on a delivery
- Enhanced picking reports
- Enhanced HAZMAT processing
- Physical inventory enhanced – inspection lot processing

Functionality built within SAP WM

4.6A/B included the following:

- Ability to suppress differences in confirming TO's
- Two-step TO confirmation possible
- Native RF capabilities
- RF Monitor available
- Enhanced dWM capabilities
- Use of Enjoy transactions (LS01 to LS01N) make transactions easier to use
- Reports converted to ABAP List Viewer (ALV) – gives the user the ability to sort, sum, etc.

Functionality built within SAP WM

4.6C included the following:

- Added additional SAP console (RF) transactions and fixed many bugs
- Ability to create a replenishment TO automatically
- Handling Unit Functionality
- Physical Inventory Changes – counting at quant level possible
- Basic interleaving possible
- Enhancements to dWM – posting changes initiated from dWM, delivery split
- Proof of Delivery functionality
- Packing Station

Functionality built within SAP WM

4.7 EE1 included the following:

- 1 TO possible for multiple deliveries
- Partial GR for an IBDN possible
- TRM (Task and Resource Management) introduced
- Data changes to dWM can be timed
- Several ERP systems can be tied to a single dWM instance

Functionality built within SAP WM

4.7 EE2 included the following:

- Support for DSD (Direct Store Delivery)
- Planned and Opportunistic Cross Docking functionality
- Value Added Services
- Yard Management
- Dynamic Cycle Counting
- TRM enhancements (Log monitor, capacity checks at the node level)
- RF serial number capture possible on the Delivery

Functionality built within mySAP ERP

2004 (ECC 5.0) or mySAP ERP 2005

(ECC 6.0) includes the following:

- Advanced Transportation Planning (ATP) and Vehicle Scheduling using APO
- Direct Store Delivery enhancements
- Archiving enhancements
- Progress Confirmation of jobs (background status update every 30 min, foreground every 10 seconds)
- WCU (Warehouse Control Unit) – controls automation of warehouse devices; optimized when used in conjunction with TRM

Functionality built within SAP EWM 5.0

includes but is not limited to the following:

- Slotting
- Rearrangement
- Warehouse Orders
- Warehouse Monitor
- Internal Routing
- Value Added Services
- Quality Inspection Engine
- Yard Management
- Transportation Cross-Docking
- Tight EH&S Integration
- Kit to Order - Requires CRM
- Resource Management

Functionality built within SCM EWM 5.1

includes, but is not limited to :

- Labor Management
- RFID Enablement - Integration with All
- Warehouse Cockpit
- Batch
- Management Enhancements with EHP3
- Serial Number Enhancement – can track SN to a bin without needing an HU
- Production Receiving with EHP3
- Catch Weight
- Material Flow Systems

Functionality built within SCM EWM 5.1

includes the following :

- Merchandise Distribution Cross-Docking
- Opportunistic Cross-Docking
- Production Supply with EHP4
- Graphical Warehouse Layout
- Task Interleaving

TRM offers unique features for optimized materials movement, a transparent view of warehouse processes and value added services support.

With TRM's support for value added services, you can easily label goods or accommodate customers' special packaging requests.

TRM Features

- Task Execution
- Prioritization
- Interleaving
- Value Added Services
- Tracking and Monitoring

Bottom line, TRM will optimize your supply chain management, improve your customer and partner relations and provide cost savings.

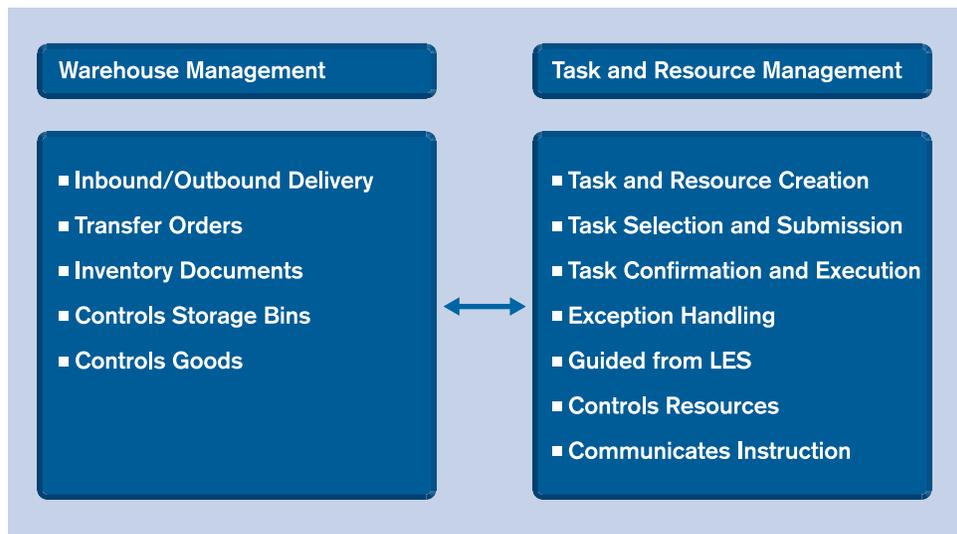
WHAT IS SOME OF THE NEWER SAP WM FUNCTIONALITY?

Task and Resource Management

As of SAP release 4.7, TRM strengthens and completes the LES/WM solution by optimizing material flows via task execution and resource deployment. TRM breaks down material movements to a task and resource level and optimizes the sequence in which they are executed, ensuring that the right task is completed by the best resource at the most optimal time.

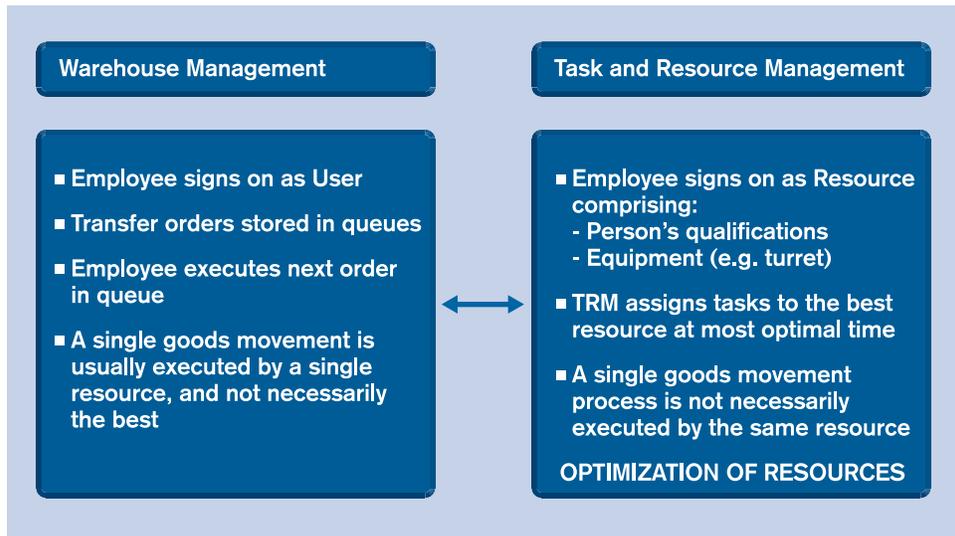
TRM helps you to manage your warehouse processes more efficiently because it achieves an unparalleled degree of process visibility within the system by tracking any activity performed on the warehouse floor. TRM uses a systemic model of the warehouse's physical layout to deploy resources according to the actual workload, the resource's qualifications and the current geographic positions of the resources. The efficient deployment of resources contributes to a considerable reduction of costs in material flow processing.

SAP Logistics Execution System



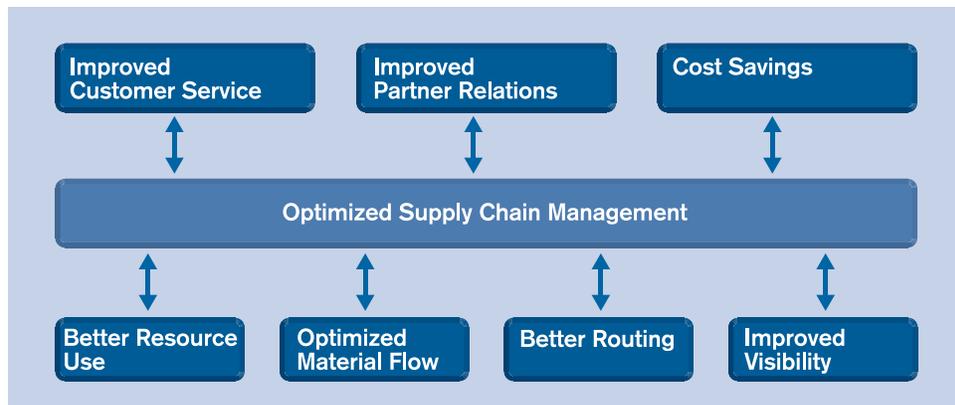
SAP WM and TRM are closely integrated and work hand-in-hand to manage and maintain the workload in warehouses. WM provides the movement, operation demands, high-level scheduling and planning. TRM distributes the work among the various resources.

WM Versus TRM: The Difference



TRM'S BOTTOM LINE VALUE

TRM's ability to optimize resource deployment, material flow, routing and process visibility enables an accelerated supply chain, which in turn leads to improved customer service, better partner relations and overall cost savings.



Extended Warehouse Management

Extended Warehouse Management (EWM) was released with SAP's Supply Chain Management module (SCM). The terminology can be confusing, but there are really two different forms of EWM, depending on how they are being used. When SAP Warehouse Management is being used with SAP release ECC 5.0 or higher, in the centralized mode, it is referred to as ERP EWM. When SAP WM is being used in the decentralized form in conjunction with the SCM module, it is referred to as SCM EWM. In its decentralized form, the capabilities of EWM are expanded.

Basically, ERP EWM is little changed from the functionality that exists in SAP 4.7. With SCM EWM, the functionality includes what 4.7 EE2 can do as well as improved workflow, process integration and the various other features mentioned above (under evolution).

SCM EWM offers increased flexibility and capabilities beyond ERP EWM. Typically, SCM is tailored to organizations who have high SKU and line item volumes, very fast moving product, complex cross docking requirements, detailed packaging and shipping processes, and third party logistics services (3PL) on either the Inbound or Outbound side, or both.

The following table represents the various types of SAP Warehouse Management that are available for each release. You can see that there is a migration towards SCM EWM.

SCM EWM CAPABILITIES

	ERP 3.1-4.0	ERP 4.5-4.6C	ERP 4.7 ext set 1.1	ERP 4.7 ext set 2.0	ERP ECC 5.0 & 6.0	SCM 5.0
ERP WM (Traditional WM)	X	X	X	X	X	
ERP Decentralized WM (dWM)		X	X	X	X	
ERP Extended WM (eWM)				X	X	
SCM Extended WM (eWM)						X

Inherently, SCM EWM should operate on a decentralized server. This is designed in this matter for maximum performance and flexibility. Periodically, you will see references to the Service Parts industry, as this industry made the first use out of this solution; however, SCM is designed to work across multiple industries. It all depends on the functionality and business requirements that your organization needs to meet. This is discussed in more detail in the next section.

Minimum Architecture

The following minimal architecture is required to run SAP SCM EWM:

- SAP SCM 5.0
- Plug in basis 2005.1
- ECC 6.0 (mySAP ERP 2005) – see note below
- SAP Netweaver 2004s

NOTE: For SAP SCM EWM - Service Pack 6 supports connections (through IDOCs and Bapis vs. qRFC) to releases from 4.6c to mySAP ERP 2004 (ECC 5.0), but full functionality does not exist

Functionality

Many of the underpinnings of TRM have been incorporated into the SCM EWM product (such as Tasks, Resources, 3-dimensional warehouse, etc). Like TRM, SCM EWM should use Handling Units to move and track stock in the facility. SAP has enhanced the use of Handling Units within the warehouse to make them easier and more flexible to use compared to previous releases. Other functionality features of SCM EWM include:

Deconsolidation – Upon receipt, the products can be directed to a deconsolidation work area where like products can be separated off of the mixed pallet and put away as homogenous units.

Handling Unit Management – Handling Unit Management is defined at the storage type level versus the Storage Location level as in ECC.

Rules and Prioritization – Increased flexibility in work assignment and prioritization of tasks. Task interleaving can be found as an offering in EWM 7.0. BAdI's for interleaving are available in all releases.

Explicit and Implicit Counting – Used as part of the Quality Assurance process for counting goods upon arrival into the warehouse.

Wave Creation and Assignment – Improved tools in order to group and efficiently pick Outbound Orders.

Kitting – Kit to Order, Kit-to-Stock and Reverse Kitting. The functionality for Kit-to-Stock exists within EWM 5.1. Need SAP CRM and APO in order to perform pieces of kitting. Supports complex kitting.

Slotting – SCM EWM has slotting tools available to determine the best location of product storage within the warehouse. It is broken into 2 pieces:

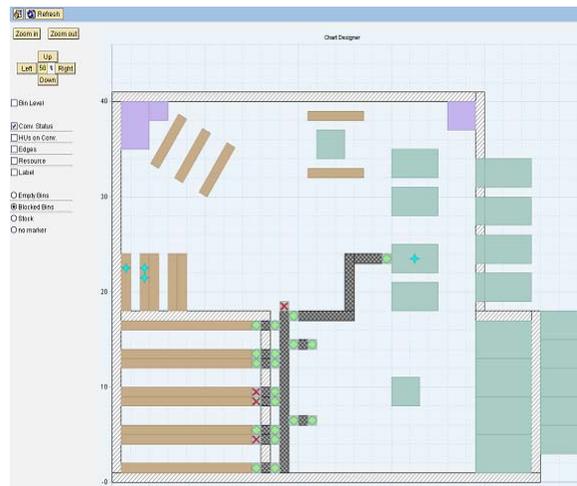
1. Slotting – more of a planning tool
2. Rearrangement – the execution of the planning run

Yard Management – Similar to 4.7, however the logical HU is now replaced with a TU (transportation unit)

Post Processing Framework (PPF) – Used to be known as Output Determination. This provides additional functionality after a transaction has occurred (i.e. trigger messaging, execute follow-on transaction, etc).

Returns Processing – Supports a robust returns function. Must use CRM in order to support this process.

Material Flow System – Provides integration points to directly communicate with IP connected Programmable Logic Controllers for automated material handling systems, including a graphical status display to monitor material movement and system status.



Labor Management – Provides the capture of direct and indirect labor tasks and allows for integration with Engineered Labor Standards for warehouse tasks. Increase visibility into workload both planned and actual and integrates with SAP Business Intelligence (BI) for reporting.

Graphical Warehouse Layout – Provides a 2-D representation of the warehouse and the yard of the warehouse for both definition and re-warehousing efforts.

Production Receiving and Supply – Provides the functionality to do Goods Receipt for Production Order in the EWM warehouse, then staging of parts for Goods Issue in a Production Supply Area. Production Supply is included in EWM 7.0.

Cross Docking – EWM provides multiple cross docking scenarios, including pass through transportation hubs, STO generation and transfers based on APO drivers or updating open picking tasks to consider material on the receiving dock before putaway, if quantity and FIFO/FEFO requirements are met. Merchandise Distribution and Opportunistic Cross-Docking exist with EWM 7.0.

New Terminology

- Activity Area – logical grouping of bins that are used to facilitate activities such as picking, putaway and physical inventory. These assist in Queue assignment and Warehouse Order creation.
- Warehouse Task – equivalent of a Transfer Order (TOs no longer exist)
- Warehouse Order – Groups together Warehouse Tasks. The warehouse order is the document the end users execute upon.
- Stock Identification – Unique number for a segment of stock. It includes attributes such as material, quantity, batch and stock type. It technically replaces an SU (storage unit), but the advantage of a stock ID is that it can exist in an interim location.

WHICH WM APPLICATION IS RIGHT FOR YOUR WAREHOUSE?

SCM EWM and 4.7 TRM are tailored to be of most benefit to the warehouse with high activity levels, high volume and complex operations. These and other factors should be considered when determining which application is a fit for your facility. Warehouse operations with a high level of distribution activity, volume, operational complexity and value added services are the best fit for SCM EWM and TRM.

High Level of Distribution Activity & Materials Movement

SCM EWM and TRM were designed to benefit warehouse operations that are more distribution oriented as opposed to material storage oriented (e.g., a production supply facility). If efficient management, movement and distribution of materials are core competencies and critical success factors for your organization, EWM is a good fit and will significantly enhance your labor efficiencies and minimize your labor costs. The monitoring capabilities provide increased visibility into movement and material throughout the warehouse, as well as those inbound and outbound. Catalyst provides specific enhancements that can even integrate Small Package Shipping services with FedEx, UPS and other carriers, including LTL.

High Level of Volume

TRM and SCM EWM offer the most value to those facilities with a high level of material flow velocity (typically characterized by the number of transfer orders or line items), high transaction volume, a high number of warehouse associates per shift and multiple types of material handling equipment. The higher the number, the better the fit. For example, if you have 50 trailer loads a day, you will reap a much higher benefit from the system than if you only have five.

Operational Complexity

SCM EWM and TRM offers strong functionality for complex material flows, such as the use of special equipment that cannot physically make certain material moves efficiently, but instead uses pick and drop locations. The system's decomposition of TOs into tasks offers an advantage for these complex scenarios. Other operational complexities such as pallet decomposition and other warehouse work center operations are handled much better in SCM EWM and TRM.

Level of Value Added Services

TRM and SCM EWM also offer strong functionality for value added services such as special labeling, pricing, packaging, and hazardous materials notes on shipping documents. The higher the level of services you offer, the better the fit with these solutions. Many pharmaceutical organizations require additional quality checks on random, product or origin parameters and this functionality can be leveraged effectively for this purpose,

Current User of SAP WM and Decentralization

Current users of SAP WM will find an independent systems configuration audit and warehouse operational review beneficial prior to undertaking the implementation of TRM or SCM EWM. It is highly recommended that users considering these solutions as part of the initial WM rollout seek experienced consulting support because of the complexity and abstraction of these solutions. Other factors that should be weighed when considering the implementation of TRM or SCM EWM is the organization's ability to decentralize the WM/TRM/SCM EWM system as well as the use of Storage Units (SUs) or Handling Units (HUs).

The decentralized WM architecture is strongly recommended for TRM and is assumed for those who want SCM EWM because of the heavy processor load that TRM and SCM EWM can pose for your core system. HUs or SUs work very smoothly with TRM and make task processing more efficient. HUs are necessary when considering SCM EWM. Implementing decentralized WM and choosing whether or not to use HUs or SUs should be considered a prerequisite to implementing TRM. Companies with more than one Distribution Center, geographically separated, can also benefit from a decentralized architecture. If the connection from the central SAP ERP instance broken, SCM EWM can continue to operate as normally, working on the Inbound and Outbound Deliveries already sent down to EWM. Once the connection is restored, the interface will synchronize the two systems. This also allows for maintenance on the ERP system without impacting all Distribution Centers.

Which Application is Right for Me?

	ERP WM	Standard dWM	TRM	SCM eWM
Distribution Activity	X	X	XX	XXX
High Volume		X	XX	XXX
Operational Complexity			X	XXX
Value Added Services			X	XXX
Slotting				XXX
Tighter Integration to QM				XXX
Tighter Integration to EH&S*				XXX
RF Capablity (SAP Console)	XX	XX	XXX	XXX

X Good Fit
 XX Better Fit
 XXX Best Fit

*Environmental Health and Safety

CONCLUSION

SAP's SCM EWM and TRM both deliver value by optimizing labor utilization and providing warehouse process monitoring and controlling functionality. Bottom line, TRM and SCM EWM enable warehouse activities to be executed better, faster and cheaper than possible without a warehouse optimization engine. Moreover, SCM EWM has been identified as the future for all WM development. While ECC WM will continue to be supported, new functionality will go into the EWM platform.

When determining which solution is the right fit for your operations, it is important to consider that TRM and SCM EWM best benefit warehouse operations with high levels of distribution activity, volume and operational complexity. Companies who decide to implement TRM or SCM EWM will gain the benefit of an accelerated supply chain, improved customer service, better partner relations and overall cost savings.

For more information on how TRM, SCM EWM or any SAP WM solution can optimize your warehouse operations, contact Catalyst at 484-636-3000 or www.catalystsap.com.