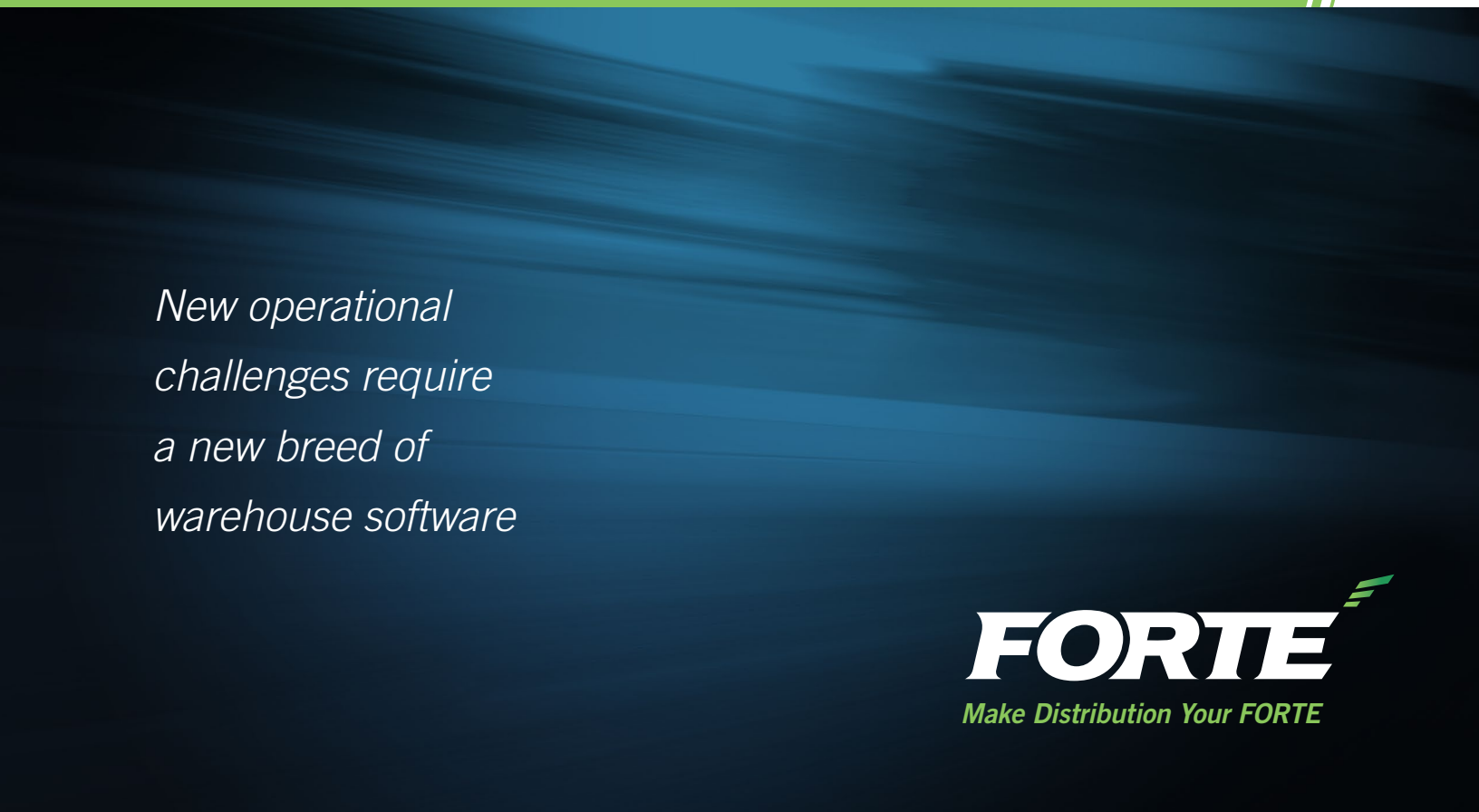
WHITE PAPER

Warehouse Execution Software Breathes New Life into DC Operations:

Enhancing the Intersection of People and Automation



New operational challenges require a new breed of warehouse software

FORTE

Make Distribution Your FORTE

Introduction

DC Velocity editor-at-large James Cooke nailed the current state of affairs in his July 2012 Tech Watch column, "WCS or WMS: Which is right for you?"

Cooke correctly observed, "Not so long ago, software used in distribution centers fit into neat categories. There was the warehouse management system (WMS), the market's dominant application, which essentially ran the DC operation, overseeing activities like receiving, putaway and picking. Then there was the warehouse control system (WCS). Designed for distribution centers that utilized automated material handling equipment, the WCS primarily served as an interface between the WMS and the automated devices. Today, however, the boundaries between WCS and WMS applications have blurred."

As the lines between WMS and WCS blur and they encroach upon each other's previously defined roles in the warehouse, a new class of software is emerging out of necessity. Each of these common systems has come at the needs of the warehouse from different directions. WMS has and continues to focus on people-driven processes, such as the tasks a person on a fork truck needs to follow and complete to put away or pick a pallet. WCS grew up supporting automation-driven processes, for actions such as sorter control or conveyor operation, providing the real-time integration to the machine layer. Historically these specific areas of focus had a clear divide in roles: WMS — people; WCS — automation. Increasingly, the real-time needs of automated facilities have demanded more business process logic in the WCS layer, and thus emerges a new breed of offering — WES.

From Optimized Hardware to Smart Software

Standing at the forefront of this evolution and building on an unmatched knowledge of warehouse operations, FORTE has developed the Smart Warehouse Suite™ of warehouse execution software (WES). This next-generation modular software platform cost-effectively maximizes the extensibility of existing WMS or enterprise resource planning (ERP) systems in today's increasingly automated warehouse environments by enabling delivery of functions typically found only in today's feature-rich WMS packages. In many cases, the Smart Warehouse Suite WES can supplement existing legacy WMS or ERP warehouse modules so successfully as to eliminate the need to invest in a new WMS package.

Furthermore, unlike modern WMS software — where almost every possible warehouse function is bundled into a complicated feature set geared primarily to people-driven activities — the Smart Warehouse Suite is modular, application-specific software and designed to bridge the gap between people and automation. This flexibility enables FORTE clients to implement the specific functionality required for their unique operational needs, using only the modules they require.

In essence, FORTE has translated its extensive experience in warehouse automation hardware systems into a modular software suite that can handle any of the complex dynamic needs of today's fast-paced, multichannel distribution operations. Just like its automated warehouse designs, the Smart Warehouse Suite WES is an efficient approach that lets companies "right size" their implementation precisely to their needs, avoiding costly and often wasteful WMS enhancements that complicate future upgrades. Whether it's an over-investment in a new WMS that provides an excess of functionality or the complication of making modifications to a legacy system's code base, it's completely avoided by the implementation of the proper Smart Warehouse Suite modules.

The FORTE WES seamlessly interfaces with each existing system in a given warehouse operation.

How Does FORTE WES Bridge the Gaps?

The flexibility of the FORTE Smart Warehouse Suite™ can be seen in the wide variety of situations in which FORTE clients have been able to deploy WES modules to seamlessly provide precisely the needed functionality in a variety of automated operations. The most common scenarios are noted below:

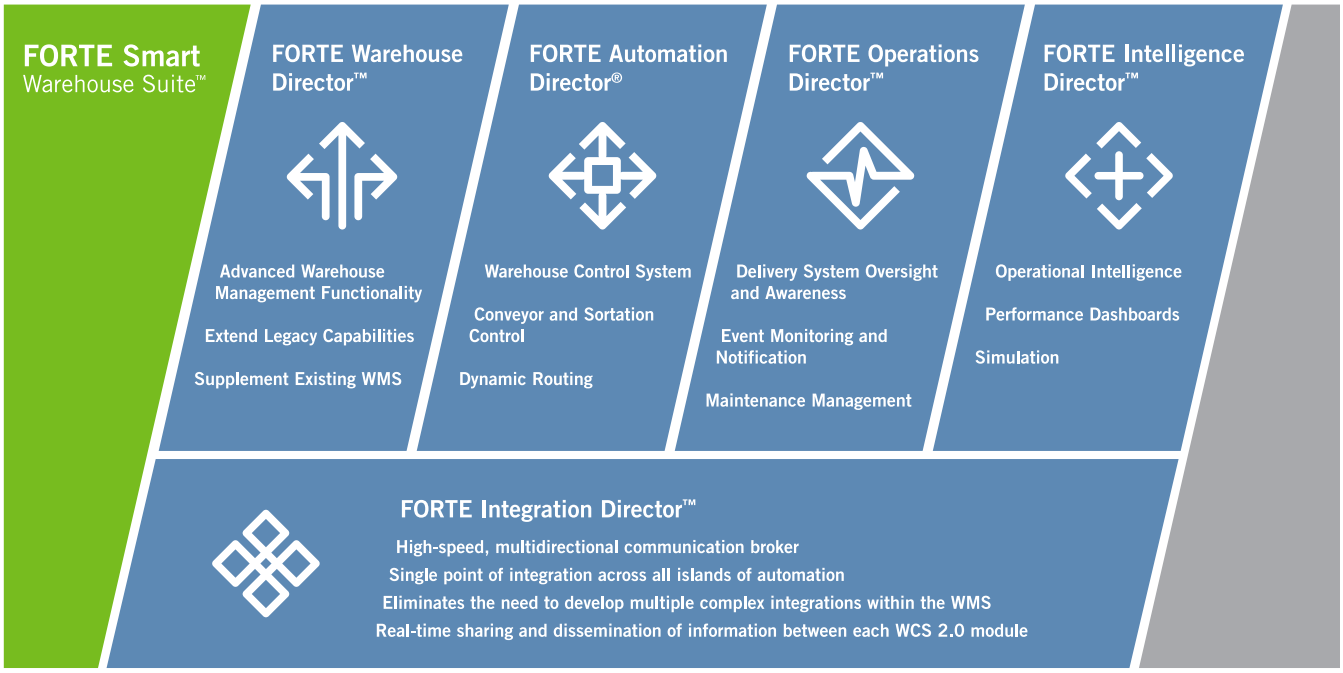
1. **No existing WMS (or ERP system only) – With its many application modules, the FORTE WES can provide WMS-like capabilities in lieu of a full-fledged WMS.**

2. **A legacy WMS with limited functionality – When customers are constrained by their system's finite functionality set, WES extends the WMS capabilities as operations dictate.**

3. **A best-of-breed WMS with reluctance to complicate the upgrade path – When complicated (and costly) code changes are required in the WMS, increasing the cost and risk associated with future WMS upgrades, WES offers the desired functionality with reduced risk and significantly improved time to deployment.**

How does the FORTE Smart Warehouse Suite™ accomplish this?

The FORTE WES seamlessly interfaces with each existing system in a given warehouse operation. Whether it's a rudimentary, ERP-based system that lacks essential warehouse functionality or a WMS that's issuing transactional instructions, the Smart Warehouse Suite communicates with an existing system and gives warehouse operators the flexibility to quickly make changes and improvements in processes. Furthermore, the Smart Warehouse Suite provides operators real-time event monitoring, incident management and visibility to the effectiveness of the delivery systems with detection and correction of system inefficiencies. Importantly and critical to the needs of a typical customer, all of these functions can be obtained without requiring major system customization.



AGENT FRAMEWORK:
The FORTE Flexible Software Development Platform

Agent Framework is the innovative and dynamic development environment that gives the FORTE WES platform the power and flexibility to provide high-value, targeted warehouse functionality while seamlessly integrating upstream with any WMS or ERP system and downstream with automation. Unlike other WMS swoftware packages that require laborious uninstall/reinstall sequences, cumbersome add-in packages or complex code changes to activate new functionality, Agent Framework uses fully autonomous agents, which function independently of existing systems and other agents. Agents handle discrete functionality requirements and are deployed as needed to implement a specific interaction, task or function. It's this flexible use of agents that provides the seamless integration with other systems and the various functions that comprise the Smart Warehouse Suite modules. By utilizing the proper agents to correspond with the existing systems and the needed functionality, the FORTE WES modules can be quickly and cost-effectively configured and deployed to match the specific needs of a customer's warehouse — without ever touching the code in the existing system.

With the elegant simplicity and robust capabilities that the Agent Framework supplies at its core, the Smart Warehouse Suite WES delivers targeted, value-driven warehouse execution at a fraction of the time it would take larger software packages to achieve. Communication protocols are quickly configured to interface with a variety of development architectures and other FORTE WES modules to orchestrate specific distribution center workflows. Additionally, since the Agent Framework is an instruction-driven platform, it does not consume unnecessary resources when functions are not in use. In short, Agent Framework is lean, nimble, resource-light and system-unobtrusive.

What this means is that FORTE is able to provide its clients with limitless expandability, low-risk upgrades, low-cost implementations and greatly accelerated access to the functionality they need. The Agent Framework also protects a customer's investment as the system can adapt more readily to business change when, not if, it occurs.

Why FORTE Smart Warehouse Suite™ WES? The Right Size at the Right Cost

By supplementing existing software systems, the Smart Warehouse Suite can perform virtually any required function on the warehouse floor to meet the demands of growth — and in any scenario, from receiving through shipping. Simply put, the FORTE WES seamlessly interfaces with existing software and systems to cost-effectively enable WMS-like functions. What's more, WES accomplishes this objective without touching the code in the existing software systems.

Benefits

In automated warehouse environments, the Smart Warehouse Suite has proven itself a cost-effective means to extend the functionality of legacy systems or augment WMS functionality.

The benefits of the FORTE WES are many:

Significantly lower cost than upgrading or customizing WMS

Seamless integration with existing software and systems

No noteworthy interference in the upgrade path for existing software/systems

More agile means to obtain the functionality while offering simple expandability

Lower risk, since the core monolithic systems are not modified

Dramatically reduced implementation time

Available Functionality

The Smart Warehouse Suite WES modules continue to grow to adapt to the needs of warehouse operators who seek to enable functionality that their current WMS or ERP system cannot easily provide. The list of needs addressed by a FORTE WES implementation for customers is immense, but these are the most common:

- ***WCS software***
- ***Advanced ship notification (ASN) receiving***
- ***Vendor compliance tracking/QC auditor***
- ***RF or RF with voice receiving***
- ***Pallet LPN (license plate number)***
- ***Hot item receipt for inventory outages or back-ordered items***
- ***Directed putaway***
- ***Cross-dock***
- ***Inventory/location management***
- ***Replenishment module***
- ***Wave management***
- ***Slotting***
- ***Kitting***
- ***Interface with rate shopping (labor and transportation)***
- ***Voice for other non-pick functions***
- ***Returns***
- ***Unit/conversion of measure***
- ***Task interleaving***

As the demand for warehouse automation increases to address the complex challenges of today's multichannel fulfillment operations, operators are less inclined to invest large amounts of time and money in new WMS or enhance existing WMS packages. Expensive upgrade paths, long development and implementation cycles, and the high cost of new, best-of-breed WMS software all present hurdles to operators who would be better served by agile, lower-cost alternatives. With its flexible, adaptive and modular architecture that offers complete WMS and ERP system neutrality, the Smart Warehouse Suite WES gives operators a superior option that can be quickly deployed with the specific functions required to overcome any constraints imposed by their current systems.

Why FORTE

Single-Source Accountability

Whether we're helping you develop a strategic plan, design and build a distribution facility, or optimize a distribution operation through performance metrics and analytics, FORTE provides a true single point of contact responsible for the complete performance of your distribution network. No finger pointing. No fragmentation of responsibility. No multiple suppliers for technical support. You have performance goals, and it's our job to make sure they're met on an ongoing basis.

Total Objectivity

We don't manufacture equipment. We don't develop WMS software. We don't have commercial arrangements with any suppliers for expected volumes of business. We're simply interested in delivering the most efficient distribution solutions at the lowest total cost. Our client-side service approach means our only allegiance is to our customers. So with every engagement, you know we'll choose the most appropriate level and blend of technologies integrated into an effective operational system.

Expertise

Our team is deeply rooted in the hands-on implementation of distribution center design and warehouse automation. FORTE's engineers and technicians integrate today's best practices in supply chain management and distribution center operations while developing next-generation technologies. As a result, our solutions employ the best combination of practical advice, data-driven analysis and technology-enabled systems. With FORTE, you get:

- More accountability than a consultant
- More experience than a systems integrator
- More objectivity than a manufacturer

That's why the world's fastest growing companies are making distribution their FORTE.