ARIA – The Next Evolution in Wireless Mobile Computing in Supply Chain Execution

Introduction

Mobile automatic identification and data collection (AIDC) technologies have greatly increased the ability of companies to quickly and accurately gather critical business data from the warehouse. However, business requirements are rapidly changing. Manufacturers are being asked to respond in real-time to changes in demand. Successful off-shoring requires system wide real-time visibility of inventory. Customers are demanding "store-ready" mixed SKU pallets and faster order cycle times. The "Perfect Order" is no longer a goal, but a business requirement. Systems are just not keeping up with the market's demands for flawless execution and shorter lead times.

Although AIDC technology has steadily advanced over the past two decades, warehouse workflow models for use of the technology have not. The computer screen still represents the primary means to issue operator task assignments and the laser scanner/keyboard the primary data collection vehicle. However, new combinations of technologies are emerging that will enable significant increases in warehouse worker productivity and accuracy. And these technologies are needed today to effectively meet the growing demands being placed on warehouse operators today and in the future.

The purpose of this whitepaper is to discuss the next evolution in AIDC technology that's needed for enterprises to better compete in the hyper-competitive and demanding environment that is emerging. We'll first define the concept of ARIA – which represents a framework for this evolution to emerge – then we will discuss ARIA based use cases that bring to light the benefits of ARIA based applications.

ARIA

ARIA (Adaptive Recognition and Information Assurance) is a framework for achieving new levels of efficiency, velocity, visibility and accuracy in Supply Chain Execution. ARIA consists of a suite of mobile computing technologies, next generation software applications and new business processes designed to work together, in harmony, with operators in the execution of supply chain transactions.

From Structured to Adaptive

ARIA based technologies are adaptive by nature, enabling processes that are more fluid, flexible, intuitive and efficient. Adaptation drives long-term productivity gains by adjusting to process, system and operator interface demands in a more natural and self correcting way. Properly combining the strengths of various technologies, like voice recognition, RFID, sensors and wearable computing, results in such adaptive solutions.

From Identification to Recognition

AIDC solutions in the warehouse must move beyond "operator-initiated" identification to support real-time automatic intelligent recognition. ARIA capable technologies are designed to automatically recognize process changes and inventory anomalies such as outages or misplaced inventory. Mid-task adjustments can be initiated automatically by the warehouse management system (WMS) via the ARIA technologies that are virtually transparent to the operator executing the task. These "transparent" adjustments will allow operators to maintain their work flow momentum, thereby increasing overall productivity. We will describe this in more detail in the use cases below.

Real Time Information Assurance

Today's warehouse systems are largely based on a "trust, but validate" philosophy – trust that the warehouse operator actually executes warehouse management system-directed tasks error-free, but validate with typically redundant error checking effort. With ARIA technologies, the accurate collection of critical information can occur automatically in real-time in the normal work flow – not before or after the task is completed.

"Adaptive," "Recognition," "Information Assurance" are all words that have been used to describe where AIDC technologies need to go in order to support the processes that will be needed to be competitive in the very near future.

ARIA Use Cases

Let's talk specifically about how ARIA can change the way tasks are accomplished in the warehouse – starting with a standard case pick application. Here is a typical case pick workflow process.

1. The warehouse operator gets direction from the WMS via the screen on their wireless computer. "Go to aisle 7, bin 234, and pick 3."
2. Upon arriving at aisle 7, bin 234 the warehouse operator pulls out their bar code scanner and scans the location.
3. The WMS "confirms" the correct location.
4. The operator then scans one or all of the 3 cases, puts the bar code scanner down and places the cases on the pallet.
5. The operator may confirm the quantity (3) to the WMS via the keyboard on the wireless computer.
6. The WMS then directs the operator to the next location via the screen.

The above represents the "perfect" execution of the pick. It's a fact of life, however, that warehouse operators will take shortcuts to bypass some of the data entry or verification processes they feel are getting in the way of the most efficient task execution. In voice

picking applications, for example, they will try to memorize the "check digits" rather than spend the time to actually look at the location label, or they might find ways around scanning the bar codes on each case. What if the operator scans 3 boxes then proceeds to place four on the pallet? In the current environment these mistakes might be caught during the QC process. But fixing the mistake at that point requires a significant amount of extra work. What if the QC process doesn't catch the mistake? Your customer surely will.

Now let's walk through that process using an ARIA enabled framework.

1. The warehouse operator gets direction from the WMS via their headset which is attached to a mobile computer worn on their arm, belt or installed on their lift truck. "Go to aisle 7, bin 234, and pick 3.
2. Upon arriving at aisle 7, bin 234, the RFID reader on the operator's arm, belt or lift truck auto-confirms the operator's location by reading an RFID tag embedded in the floor or on the rack.
3. The warehouse operator then places 3 boxes on the pallet.
4. The RFID system confirms that the correct product has been picked in the correct quantity.
5. If the wrong product or quantity is picked, the system immediately communicates appropriate corrective action at the pick location where the problem can be resolved with minimal disruption and expense.

The give and take relationship that currently exists between the WMS and the operator no longer exists. No longer does the operator have to disrupt their momentum in order feed the WMS the necessary data for the WMS to direct the operator. The WMS gets what it needs automatically. The operator is truly "technology enabled" (vs "technology serving") and can focus on moving inventory.

Now let's look at a traditional receive & put-away application. Here is the way that task combination typically works.

1. The warehouse operator gets direction from the WMS via their mobile computer's screen "go to dock door 234."
2. Upon arriving at dock door 234 the operator takes out his scanner and scans the barcode on the dock door to confirm that they are at the proper dock door.
3. The system confirms.
4. The operator unloads the pallets from the trailer and moves them to a receiving station (generally a computer workstation with a tethered scanner).
5. The operator reviews any available paperwork that accompanied the load and the pallets to identify the shipper and/or order number.
6. Once the order is identified, the operator goes through the WMS receiving process, gets LPNs assigned from the WMS and applies LPN labels to the pallets.

7. The WMS assigns an operator to pick up the pallets and take them to a put-away location.
8. The operator scans the pallet to confirm that they've got the correct pallet.
9. The system confirms.
10. The operator picks up the pallet.
11. The WMS then tells the operator via the operator's computer screen to take the pallet to aisle 7, bin 234 and put it away.
12. Upon arriving at aisle 7, bin 234, the operator scans the location.
13. The WMS confirms that they are in the proper location.
14. The operator drops of their load.
15. The WMS completes the transaction and updates the inventory location record.

Now let's look at the same process, but with an ARIA voice and RFID capability:

1. The warehouse operator receives direction from the WMS via their headset which is attached to a mobile computer worn on their arm, belt or installed on their lift truck to "go to dock door 234.
2. As the operator drives through the dock door, the RFID reader on the lift truck automatically reads the RFID tag on the dock door confirming that they are at the correct location.
3. The RFID reader then automatically reads the pallet tag which contains a unique EPC code associated with the pallet and the shipper. The WMS retrieves the electronic ASN referenced by the RFID tag.
4. Based on the ASN data the WMS issues any QC instructions (damage checks, case counts, etc.) to the operator either via the mobile computer screen or via headset.
5. After the operator validates any QC tasks complete, the WMS does an auto-receive of the pallet.
6. The WMS then tells the operator via voice to take the pallet to aisle 7, bin 234 and put it away.
7. Upon arriving at aisle 7, bin 234, the RFID reader on the operator's lift truck auto-confirms the operator's location by reading an RFID tag embedded in the floor or on the rack.
8. When the pallet is deposited in the location, the RFID reader notifies the WMS that the task has been completed correctly.
9. The WMS completes the transaction and updates the inventory location record.

Having freed the operator's eyes and hands from the task of reading the pick or put-away location and verifying items, what should we do with the mobile computer's display?

One option would be to eliminate it, making the device smaller and lighter. Or, we could use it to display a whole new type of useful information. It could, for example, function as a sort of local GPS system to show the optimal route to the next pick location. It could show the location of other lift trucks to help avoid temporary obstructions, congestion or

even collisions. It could display a diagram of the storage location and highlight the specific location of the items to be picked. It could show a photo of the item or its label -- particularly if there are similar ones in the same location. It could display a pallet loading diagram to indicate the optimal loading configuration -- and verify each item as it's placed on the pallet. In other words, it could provide the worker with useful information to improve the operation.

We need you to think beyond current paradigms and processes and begin to consider the full capabilities of a family of mobile computing platforms, enabled with voice, RFID and other AIDC technologies, and the many ways you can leverage their true potential with optimized application software and business processes. That is, don't think just of the technology-enabled operator, but of the technology-enabled process.

As mentioned earlier, many ARIA technologies are available today. What's needed is the marrying of these technologies to newly enabled workflows within the supporting WMS. Additionally, you will need to review current process to identify areas in which ARIA enabled technologies will produce the highest potential return on investment.

Summary

In summary:

- ARIA technologies drive significant productivity gains from minimizing and improving operator interaction with the WMS.
- With ARIA, your "system" serves the operator versus the operator serving the system, resulting in more natural and efficient processes.
- ARIA provides a platform to develop productivity-improving processes previously not possible with traditional stand-alone AIDC technologies.
- ARIA technologies are intuitive, easy-to-use, and easy-to-understand resulting in more rapid operator acceptance.

LXE anticipates that, with ARIA, customers will see turbo-charged operator productivity, unprecedented levels of inventory accuracy, reduced training time, more accurate orders and more satisfied customers.

LXE's role going forward will be to

- Continue the development of ARIA capable technologies
- Work with customers to further define use cases
- Champion ARIA within the VAR/Integrator community to develop the software that will empower ARIA