

A WHITE PAPER ON:

GLOBAL MARKETS FOR AIDC SYSTEMS APPLICATION SOFTWARE

**VOLUME I: BAR CODE LABEL GENERATION/PRINT & DIRECT MARKING
APPLICATION SOFTWARE**

VOLUME II: IN-STORE/POS APPLICATION SOFTWARE

**VOLUME III: WAREHOUSE MANAGEMENT SYSTEMS APPLICATION
SOFTWARE**

VOLUME IV: MANUFACTURING SHOP-FLOOR APPLICATION SOFTWARE

VOLUME V: FIELD FORCE AUTOMATION APPLICATION SOFTWARE

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This white paper presents a few of the top-level findings from VDC's five-volume report, the **Global Markets for AIDC System Application Software**.

2003 AIDC APPLICATION SOFTWARE MARKET OVERVIEW

Exhibit 1 Global Shipments of AIDC Application Software (Millions of Dollars)						
	Base Year	Forecast				CAGR
	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2003-2008</u>
Bar Code Label Generation Software	63.2	69.1	77.2	86.9	98.5	11.7%
Direct Marketing/Coding Software	13.3	15.0	17.3	20.1	23.9	15.9%
POS Application Software	642.7	710.5	791.1	879.7	976.9	11.0%
Warehouse Management Systems (WMS)	268.5	287.9	312.5	343.6	382.7	9.3%
Manufacturing/Shop Floor Control Application Software	95.1	102.9	111.8	122.2	134.6	9.1%
Field Force Automation Application Software	<u>843.3</u>	<u>933.7</u>	<u>1039.5</u>	<u>1165.34</u>	<u>1316.5</u>	11.8%
Total	1926.1	2119.0	2349.4	2617.9	2933.1	11.1%

The global market for AIDC application software reached an estimated \$1.93 billion in 2003, growing 10% by the end of 2004. VDC predicts the market will grow by more than 11% through 2007. Specific market trends for each AIDC application software category are provided in the following sections.

The primary application software product categories covered by VDC in this White Paper and The Global Markets for AIDC Application Software report are:

- Volume I: Bar Code Label Generation and Direct Marking and Coding System Software
- Volume II: In-Store/POS Application Software
- Volume III: Warehouse Management System (WMS) Application Software
- Volume IV: Manufacturing Shop-Floor Application Software
- Volume V: Field Force Automation (FFA) Application Software

Bar Code Label Generation & Direct Marking and Coding System Software

- near-term growth will largely be driven by compliance labeling applications (such as pharmaceutical package coding to meet US FDA regulations and marking applications in electronics manufacturing environments) and greater support for seamless enterprise system integration and operation among ERP, MRP II, WMS, AIDC, and other business process applications;
- off-the-shelf/discrete packaged software accounts for the majority – approximately 53% – of revenues. This is a direct result of the large volume of standard, non-customized bar code label generation software packages being sold/licensed; and
- software development and revenues are being driven by increased end-user demand for more powerful, flexible software to address system errors – for example, end users continue to face significant issues with incorrect product coding, requiring software and database updates across the enterprise.

In-Store/POS Application Software

- while Linux is now a viable alternative to a Windows OS, and IBM has publicly stated its support for the Linux OS, the majority of new installations continue to be Windows-based – particularly Windows XP Embedded. Cited advantages of a Linux-based system include lower cost of ownership, good interoperability, and scalability;
- the POS software market continues to consolidate as a number of acquisitions occurred over the last two years. A few of the key accounts include Radiant acquiring Aloha Technologies, Micros acquiring Datavantage, and Agilisys acquiring Kyrus; and
- retailers are increasingly looking for specialized POS software solutions that meet their specific niche market requirements such as pharmacy, tobacco/liquor store, bike shop, etc. This is largely seen as a trend within specialty stores as businesses and their corresponding sales models widely vary.

Warehouse Management Systems Application Software

- several WMS application software vendors noted they were not very optimistic on market growth, citing that Tier-1 and upper Tier-2 best-of-breed markets are highly saturated and likely to decline; however, lower-tier market solutions will grow, but may default to the ERP supplier (i.e., Oracle, SAP, PeopleSoft) if the incumbent solution is viable;
- the mature WMS market features lower-cost standardized software packages and more full-featured, reliable products that better meet the needs of a specific industry – falling prices leads to implementation of WMS across a broader spectrum of warehouses than ever before; and
- falling prices also mean that RF solutions become more practical for a broader range of warehouses to support manufacturing, customer service, merge-in-transit facilities, or mixing center warehouses. And, reduced prices combined with simpler solutions are leading to growth among Tier-3 end users.

Manufacturing Shop-Floor Application Software

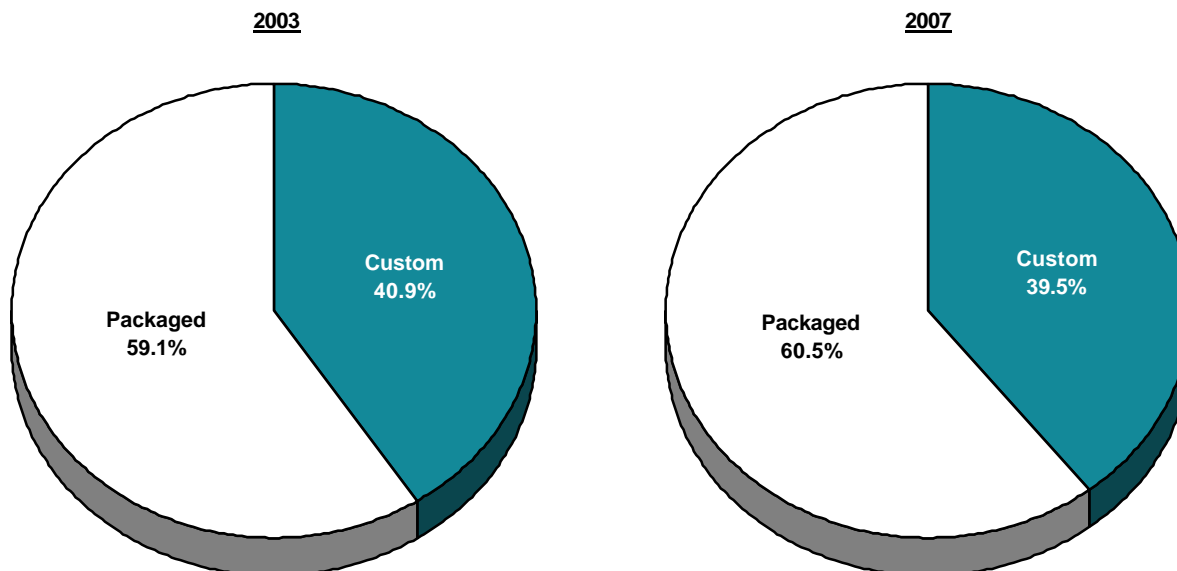
- manufacturing shop-floor software is rarely sold as a bundled solution with the data collection terminals. While the products may be purchased from the same systems integrator in a complete package, the software is not termed “bundled” with the hardware since the end user will often have a selection of software suites to choose from;
- the majority of shop-floor software received some degree of customization before installation. Whether third-party or in-house, the software will often be tailored to meet the individual requirements of end users based on functionality, performance, ERP integration, and hardware integration; and
- new AIDC software opportunities continue to emerge within manufacturing shop-floor environments, including strong growth prospects in pharmaceuticals (potential US FDA track and trace anti-counterfeiting standard), automotive (TREAD Act and other similar regulations), and general manufacturing (i.e., expanding manufacturing operations in Asian markets).

Field Force Automation Application Software

- the market is maturing and migrating toward smaller accounts and Tier-2 and Tier-3 installations – according to one industry source, it is estimated that in the US there are roughly 5 million small and mid-sized businesses (SMBs) with 20 million mobile workers in (roughly half the total of US mobile workers);
- the high cost and complexity of traditional CRM (customer relationship management) packages have hindered the adoption of field service and sales applications in the SMB market – many SMBs lack efficient and effective means to access customer data, records, files, and notes while being mobile;
- falling hardware prices are expected to increase overall demand for FFA solutions. The increased demand is expected to enable suppliers and third-party partners to extract premiums from software in the near-term; and
- the sluggish economy, the uncertainty in Iraq, and demands from investors for a quick ROI is causing end users to view FFA software investments differently – according to one competitor, users desire:
 - FFA vendors who can provide a full suite of products in order to create an integrated, seamless flow of goods in the supply chain;
 - greater assurance that FFA software companies are financially stable; and
 - tighter, more complete FFA solutions.

SOFTWARE PACKAGING AND CUSTOMIZATION OVERVIEW

Exhibit 2
Global Shipments of AIDC Application Software Segmented by Package Type
(Percent of Revenues)



Bar Code Label Generation Software

Off-the-shelf commercial software packages are generic applications that produce labels on demand. There are many DOS- and Windows-based applications that allow custom labels to be generated on demand using WYSIWYG interfaces. These labels are generally produced offline and do not need to be created from the host program.

Standardized solutions with no custom code offer flexibility in the choice of printer manufacturer, full use of printer features without sacrifices, and running a UNIX or AS/400-based solution without implementing Windows NT to drive the printing of bar code labels.

Custom software is required if it is necessary to integrate bar code printers with current applications. Program callable printing generates labels through custom programming, usually requiring simple modifications to existing software. Printing directly to a printer requires a basic knowledge of the syntax of the printer commands used to format the label. Usually each manufacturer has a different command set – among them some instruction sets are much easier to use and more robust.

The most common method for addressing integration problems is to write custom code – for example, to tightly integrate bar code printing and coding into the ERP application. Customization also has its pitfalls:

- the programming code of bar code label generation software is printer and application specific – it takes time and is difficult to update label formats quickly or to implement new printer hardware;

- programmers often have a limited understanding of printer technology, therefore they often overlook printer features available for optimizing label output; and
- custom coding often restricts end users to specific makes and models of printers – too many variables and no standard programming language exists between printers, making it difficult to replace or upgrade printers.

Off-the-shelf packaged software (sold separately or bundled with hardware) accounts for more than 78% of revenues in 2003 – by 2007, this percentage will decrease to nearly 70% as end-user demand for customization increases – to enable the seamless integration with complex enterprise systems and applications.

Direct Marking and Coding System Software

Standard direct marking and coding system software is traditionally bundled with hardware as part of a complete solution or customized to some degree to meet specific end-user application requirements. Most marking and package coding software is customized, performed by software vendors, integrators, or end users themselves.

Commercial, non-proprietary marking and package coding system software packages are virtually mythical. The software that is proprietary comes with hardware that is proprietary – interoperability with other vendors' hardware is not a feature. However, end users are not (in general) interested in mixing and matching hardware – they are looking for remote monitoring and management capabilities in software – whether the software is a customized vendor solution or an off-the-shelf offering from a third party is of little consequence (as long as the requirements are met).

Standard software bundled with hardware accounts for more than 21% of revenues in 2003 – by 2007, this percentage will decrease to less than 17% as end-user demand for customization increases – to enable the seamless integration with complex enterprise systems and enhance the functions/capabilities of direct marking/package coding applications.

In-Store/POS Application Software

The majority of end users do not expect the amount of software customization to increase over the next two years. In fact, the amount of customized software is expected to decrease or remain flat as standards and open platforms continue to reduce the customization necessary for system implementation.

Data synchronization is becoming an increasing priority among retailers – particularly within grocery stores/supermarkets and department stores/mass merchandisers. As channel masters such as Wal-Mart, Lowe's, Kroger, and The Home Depot require suppliers to join the UCCnet's GLOBALregistry, other retailers seek individual membership such as Food Lion and Target. While this is not a specific POS application, future POS software will need to provide the functionality and integration necessary for data synchronization and the UCCnet's standards.

Warehouse Management Systems Application Software

Roughly 62% of WMS application software revenues are from the sale of software that receives some degree of, or complete, customization. By 2007, customized software will continue to account for 61% of the market as many applications (especially those emerging in new AIDC environments) are expected to require some degree of customization to seamlessly integrate software offerings with legacy systems, emerging RFID systems, different databases, and various enterprise systems.

Additional considerations include the following:

- WMS application software vendors actively develop technology agnostic solutions so that their software packages can be bundled with AIDC hardware as part of a complete solution sale;
- software that is customized internally by a software vendor often yields significant revenues as programming/custom coding rates and other fees are added to the total cost of the off-the-shelf/packaged software;
- customization is primarily done by independent software vendors (ISVs), systems integrators (SIs)/channel partners, or the users themselves. However, most of the customization is performed on off-the-shelf, discrete packaged software. Several vendors noted that, on average, only one-quarter of global WMS application software is fully (100%) customized; and
- WMS application software (particularly legacy systems) tends to be among the more customized of enterprise application software solutions, which often makes it more affordable for companies to forego the upgrade process and just install new more out-of-the-box functional WMS applications.

Manufacturing Shop-Floor Application Software

Customized software (through a third party or in-house) accounts for more than 63% of revenues in 2003. By 2007, this percentage will increase to more than 66% as end-user demand for customization accelerates. An increasing number of end users are incorporating multiple input technologies (bar code scanners, RFID readers, vision-based machines, etc.) and numerous software levels (ERP, MRP, MES, SCADA, etc.) making it extremely difficult to offer an off-the-shelf solution.

Manufacturing shop-floor software is rarely sold as a bundled solution with the data collection terminals. While the products may be purchased from the same systems integrator in a complete package, the software is not termed "bundled" with the hardware since the end user will often have a selection of software suites to choose from and will often require customization.

Field Force Automation Application Software

Roughly 63% of FFA application software revenues are from the sale of software that receives some degree of, or complete, customization. By 2007, customized software will continue to account for 66% of the market as many applications (especially those emerging in new AIDC environments such as health care) are expected to require some degree of customization to seamlessly integrate software offerings with legacy systems, emerging RFID systems, different databases, and various enterprise systems.

Custom corporate databases and FFA applications typically become important in organizations with more than 50 employees – customized applications and legacy systems are the domain of larger, Tier-1 end users. However, this dynamic is rapidly changing as mobile hardware devices are decreasing in cost and FFA applications are being scaled back so that they become standardized and easier to manage, implement, and deploy.

Additional considerations include the following:

- as the FFA market matures and increasingly adopts standards to reduce costs and enhance connectivity, growth in revenues for standard software packages is expected to exceed that of custom application software;
- while larger organizations in particular are likely to continue to prefer to develop their own custom programs, the market as a whole is expected to migrate gradually toward standard applications to save implementation time and costs;
- discrete application software revenues are expected to grow at a higher rate than custom software revenues as the industry matures and more feature-rich, standardized off-the-shelf FFA applications become available;
- increased adoption by Tier-2 and Tier-3 companies should accelerate growth of standard software packages, as smaller companies tend to be more price sensitive. This is in contrast to larger Tier-1 organizations that have the internal resources to develop custom software applications;
- customization is primarily done by independent software vendors (ISVs), systems integrators (SIs)/channel partners, or the users themselves. However, most of the customization is performed on off-the-shelf, discrete packaged software;
- software that is customized internally by a software vendor often yields significant revenues as programming/custom coding rates and other fees are added to the total cost of the off-the-shelf/package software;
- many vendors and integrators agree that some degree of customization will continue to be required for most standard software applications, such as customizing data fields and report generators; and
- despite the growth in standard software, VDC believes the largest share of the market will continue to demand custom or modified custom software packages that are designed to meet the specific needs of the customer's application requirements.

IMPACT ON THE RFID INDUSTRY

The hype and activity surrounding radio frequency identification (RFID) technology continues to build. The level of interest in and awareness of RFID technology is at its highest level. Regardless of the stories published by the mass media, it is clear that RFID transponders will not cost five cents and will not replace bar codes – the two technologies are more complementary than competitive.

Undeniably, the supply chain has been tapped as the “killer app” for RFID technology, offering high-volume potential and significant growth opportunities. Recent steps toward RFID achieving success in the supply chain include:

1. Wal-Mart recently announced that its Top 100 supply chain partners must integrate RFID systems for pallet tracking applications – mandates have also been handed down by Target, the US Department of Defense, Metro AG, Albertson's, and Tesco.
2. Major IT players, WMS, ERP, and other systems integrators and software developers such as Manhattan Associates, Oracle, Sun, Provia, RedPrairie, Xterprise, IBM, and SAP have all recently announced RFID partnerships and strategies.
3. RFID trials and pilots will continue laboriously in the supply chain over the 6 to 12 months – with the vast majority of the market (end users and vendors) taking a “wait-and-see” approach.
4. RFID is a hot topic (and a technology with benefits) that is being discussed among executives at many Fortune 500 (even Fortune 1000) companies.
5. Several standards and specifications (such as ISO-18000 and EPC Class 1 Generation 2) are nearing ratification and others are being developed – standards are considered critical for wider end-user adoption.

Supply chain management applications using RFID technology will continue to develop and expand, offering significant growth opportunities to an expansive field of software vendors, hardware manufacturers, and third-party integrators.

The estimated market for RFID systems (hardware, software, and service) in 2003 is slightly more than \$1.1 billion. VDC predicts the global market for RFID systems will grow at more than 37% annually, reaching \$2.1 billion by 2005. The strongest growth will be realized within the software and services markets.

In contrast to bar codes, RFID technology enables near-real or real-time data transmission and allows for greater amounts of information to be stored on the transponder. AIDC application software vendors are steadily addressing the “bar code-to-RFID” and “bar code-and-RFID” transitions by supporting RFID-enabled solutions.

Vendors noted it takes a lot to support RFID technology – also stating that RFID functionality will likely be an upgrade for existing customers and will be designed so that users can transition from bar codes to RFID or operate in a mixed environment. RFID-enabled FFA solutions must be able to manage data in mixed environments, optimize core AIDC applications, and provide RFID roadmaps to customers.

RFID poses a significant data challenge to existing software packages whereas RFID middleware will be required due to the large amount of (near) real-time data collected at once. Unlike bar code systems where objects are scanned individually, RFID systems collect the information in one scan where the relationship among the separate objects is not an issue. Therefore, it is critical to look at how RFID data comes into databases, especially as issues around multiple scans exist – if the object is scanned more than once, will the data be sent more than once?

Major AIDC application software players are playing in RFID support to varying degrees. For example, major ERP players such as SAP are targeting RFID with a services and WMS approach. SAP is touting functionality in its WMS software that can help manage the influx of data from RFID tags and is involved in pallet-level tracking tests with P&G and Wal-Mart.

This year will be a challenging year for end users (and software companies) trying to make sense of how RFID technology will affect their operations and impact business processes. Applications have to manage the data from RFID, not just record it.

Although RFID (as a data input technology) is a natural extension of enterprise mobility and is emerging across end-user environments, AIDC application software vendors are not completely at the point where they can communicate how to reduce the amount of human intervention in the field and take full advantage of RFID's functionality and benefits.

ABOUT THE STUDY

Venture Development Corporation's *Global Markets for AIDC System Application Software* is an expansion of VDC's *Global AIDC Industry Business Planning Service* bar code hardware market research that was initiated in 1985 with the publication of VDC's first AIDC market analysis: *The Market for Bar Code Products – A Strategic Analysis*.

The Global Markets for AIDC System Application Software includes analysis of both commercial/off-the-shelf application software packages and the market for custom-developed (in-house and third-party) application software. The goal of the report is to provide AIDC hardware and software vendors, pure independent software vendors (ISVs), as well as systems integrators with granular market estimates, conservative forecasts, and accurate trend information.

Application Software Analyzed

- Bar Code Label Generation Software & Direct Marking/Package Coding Software
- Retail POS Application Software: Stationary POS, Mobile POS, On-Premises Inventory Control/Management, Price Change, Payment Processing
- Warehouse Management System Application Software
- Manufacturing Shop-Floor Application Software: WIP Tracking, Quality Assurance/Control, Inspection
- Field Force Automation Application Software: Field Sales, Field Service, Maintenance/Warranty Management

ABOUT VENTURE DEVELOPMENT CORPORATION

Venture Development Corporation, a technology market research and strategy firm, was founded in 1971, by graduates of the Harvard Business School and M.I.T. VDC offers in-depth market research and custom strategic planning and consulting services in the areas of computers, AIDC, power conversion and control, electronic components, factory automation, communications, instrumentation, office equipment and consumer electronics.

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