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WHITE PAPER

Increasing Supply Chain Responsiveness Among Configured Electronic Systems Manufacturers

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INTRODUCTION

A Light at the End of the Tunnel

The outlook for the high-tech industry is improving, and expectations for the configured electronic systems segment are rising as well. Configured electronic systems include telecommunication or networking equipment, semiconductor capital equipment, data storage systems, scientific test and measurement systems, and server systems. With the leading computer manufacturers reporting growth in earnings, others in the industry are starting to feel more optimistic about the industry's short-term outlook. For the first time in two-and-a-half years, configured electronic systems manufacturer executives are starting to feel that that the worst may be behind the industry.

> "We're now focused on growing our revenues back after three years of pure cost cutting," explains the CIO of a configured electronic systems manufacturer.

However, configured electronic systems manufacturers have not yet declared victory. Demand continues to be a concern and will be until configured electronic systems manufacturers see a steady stream of demand in their pipeline.

> "You plan and you plan; but it is uncertain when the demand will pick up," comments the CTO of a configured electronic systems manufacturer.

During these turbulent times, IT has proven itself to be an ally of the configured electronic systems industry. IT has enabled configured electronic systems manufacturers to create greater efficiencies in their organizations as a result of streamlining and creating a more agile supply chain.

At the heart of supply chain management initiatives are the series of applications that synchronize demand and supply, manage inventory, ensure service-level commitments, and provide greater visibility into the manufacturing operations. This white paper explores the power of supply chain applications in the configured electronic systems industry. It examines the pressing supply chain issues faced by configured electronic systems manufacturers and how they are using IT applications to address these business issues. The paper presents a case study of a cutting-edge configured electronic systems manufacturer that has deployed a suite of supply chain management applications and profiles Oracle, a supplier of IT solutions to the configured electronic systems industry.

Sponsored by Oracle

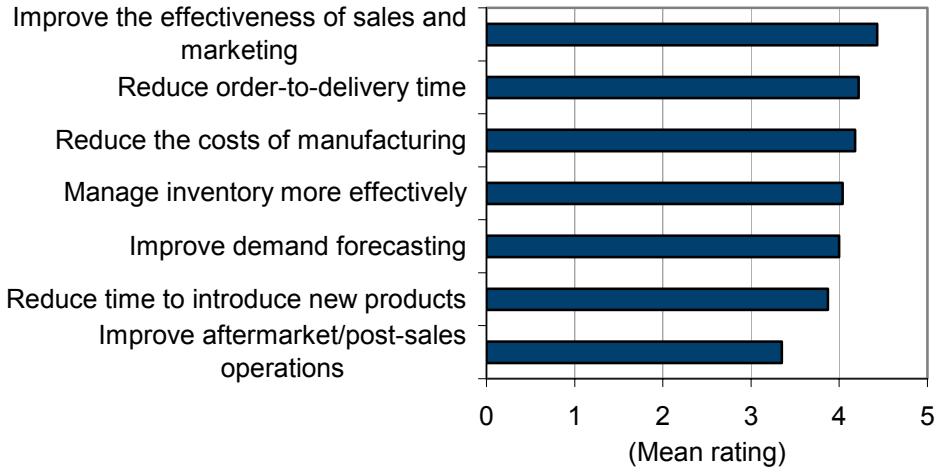
Satisfied Customers Boost Revenues

A recent IDC survey of executives at configured electronic systems manufacturers revealed that these firms are grappling with several similar business challenges. Improving the effectiveness of sales and marketing, reducing order to delivery time, and reducing the costs of manufacturing are the top business objectives for configured electronic systems manufacturers, according to the survey. However, the important roles that managing inventory and improving demand forecasting play should not be overlooked. As Figure 1 shows, these objectives received similar ratings: 4.04 and 4.0, respectively.

FIGURE 1

Configured Electronic Systems Manufacturers' Business Objectives

Q. Please rate how important the business objective will be to your company's strategic priorities:



n = 23

Source: IDC, 2003

Not surprisingly, the economic downturn of the past two-and-a-half years has led configured electronic systems manufacturers to focus on retaining existing customers and revenue. In this business, delivering a quality product on time is an important criterion to customer satisfaction.

> "The OEMs and the people you're dealing with want a lot more from a service level," explains the CIO of a complex manufacturer. The level of quality and delivery are still key areas, but they now want you to provide additional services over and above that."

Reduction of manufacturing costs has also resulted in a tightening of operations, particularly those activities associated with the supply chain and manufacturing processes. Many configured electronic systems executives would agree that their business is now leaner and more efficient as a result of the past 30 months.

> "Everyone has gotten smarter on how the whole supply chain is being managed. I don't think you're ever going to go back away from that," comments one high-tech executive.

However, as we all know, tackling the supply chain is no simple task. Optimizing the supply chain comes with its own set of business challenges, including:

- Using strategic inventory risk pooling to minimize inventory and maximizing service for continuous configuration
- Building complex configured products efficiently
- Managing outsourcing without losing global visibility
- Retaining configuration life cycle from as-designed to as-built to as-serviced
- Managing demand variability and attaining accurate forecasts
- Achieving accurate supply and demand picture

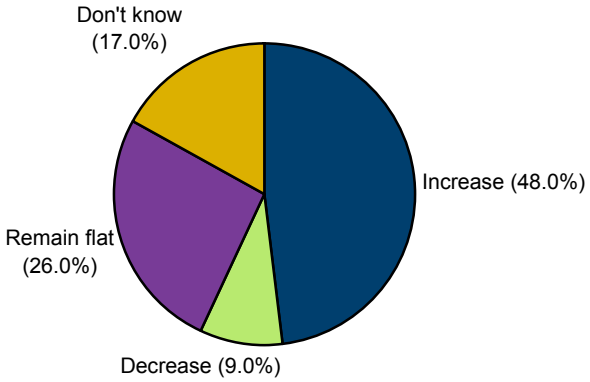
IT Proves Itself to Be an Important Tool

Configured electronic systems manufacturers that have focused on streamlining their supply chain have found IT to be an important tool in their efforts of the past two-and-a-half years. IDC doesn't expect this situation to change. As the high-tech sector picks up, IDC expects configured electronic systems manufacturers will continue to invest in IT, particularly as it relates to the supply chain. Of the configured electronic systems manufacturers surveyed by IDC, 48% expect their IT spending to increase in 2004 (see Figure 2).

FIGURE 2

Changes to Configured Electronic Systems Manufacturers' IT Budget in 2004

Q. Do you expect your IT budget to increase, decrease, or stay the same from calendar year 2003 to 2004?



n = 23

Source: IDC, 2003

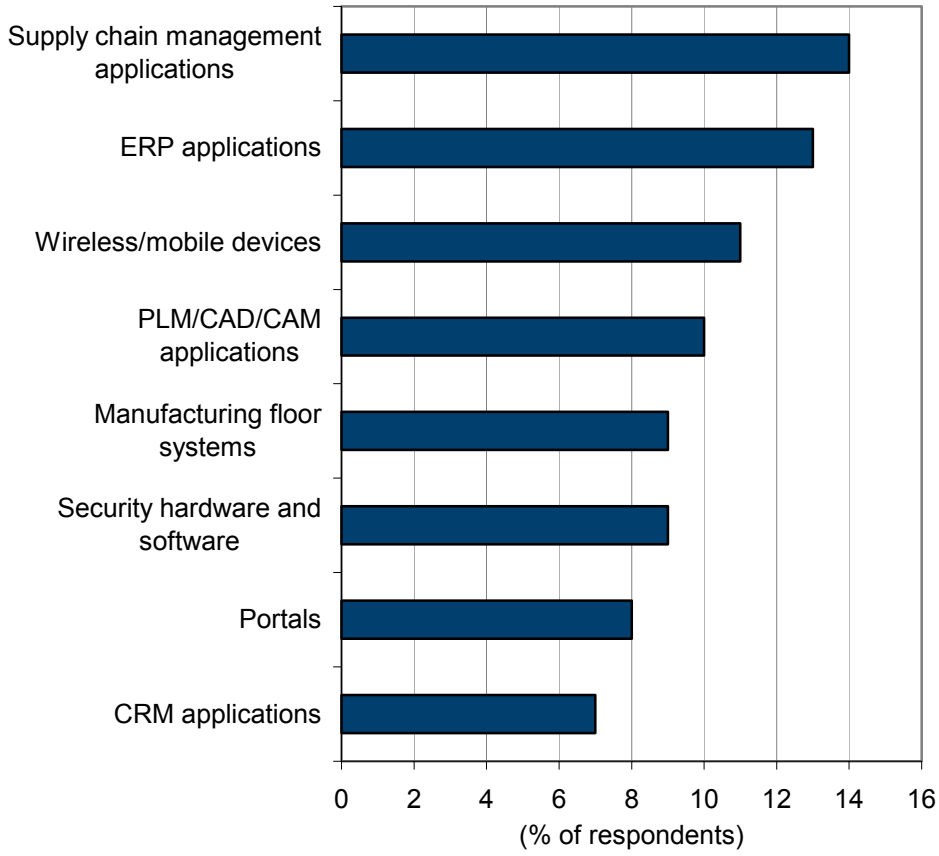
During the 2002–2007 period, IDC expects high-tech manufacturers to increase their IT spending at a compound annual growth rate (CAGR) of 7.1%.

What key IT investments are high-tech manufacturers making? Most of the investment dollars center around supply chain management and enterprise resource planning (ERP) applications, which top the list of technologies in which high-tech manufacturers are planning to further invest during the next 12 months (see Figure 3).

FIGURE 3

Future Plans to Use Technology at High-Tech Manufacturers

Q. Please tell me if your organization has plans to use the following technologies in the next 12 months:



n = 100

Source: IDC, 2003

PROFILE OF A SUPPLY CHAIN SOLUTION VENDOR SERVING THE CONFIGURED ELECTRONIC SYSTEMS INDUSTRY: ORACLE

A multitude of vendors provide supply chain management applications to the high-tech industry. Oracle is no exception. The vendor has placed a significant focus on the high-tech manufacturing industry. IDC estimates that Oracle generated approximately $326.6 million in revenue (or 7.2% of its revenue) from the U.S. high-tech industry in 2002. As a result, Oracle is one of the 10 largest IT vendors in the U.S. high-tech industry.

The company's mission in the high-tech industry is "to continue to define and develop business solutions and processes which unlock true value for its customers in the EMS, semiconductor, configured electronic systems, and consumer electronics segments of the high-tech industry." To achieve this mission, Oracle pursues customers that are innovative, leading high-tech manufacturers. This work exposes Oracle to cutting-edge requirements, which it uses to build functionality back into its products.

In addition to working with leading high-tech manufacturers, Oracle stays attuned to changing industry requirements through a series of mechanisms, including:

- **High-Tech Customer/Partner Advisory Board (CAB).** Through its annual customer and field advisory board, Oracle uses information gleaned from customers and partners to define functional inputs for future releases.
- **Critical Account Program.** Oracle provides development-assisted implementation to select accounts.
- **Center of Excellence Program.** Development works closely with the business and IT executives of industry-leading companies to build solutions for leading-edge business practices.

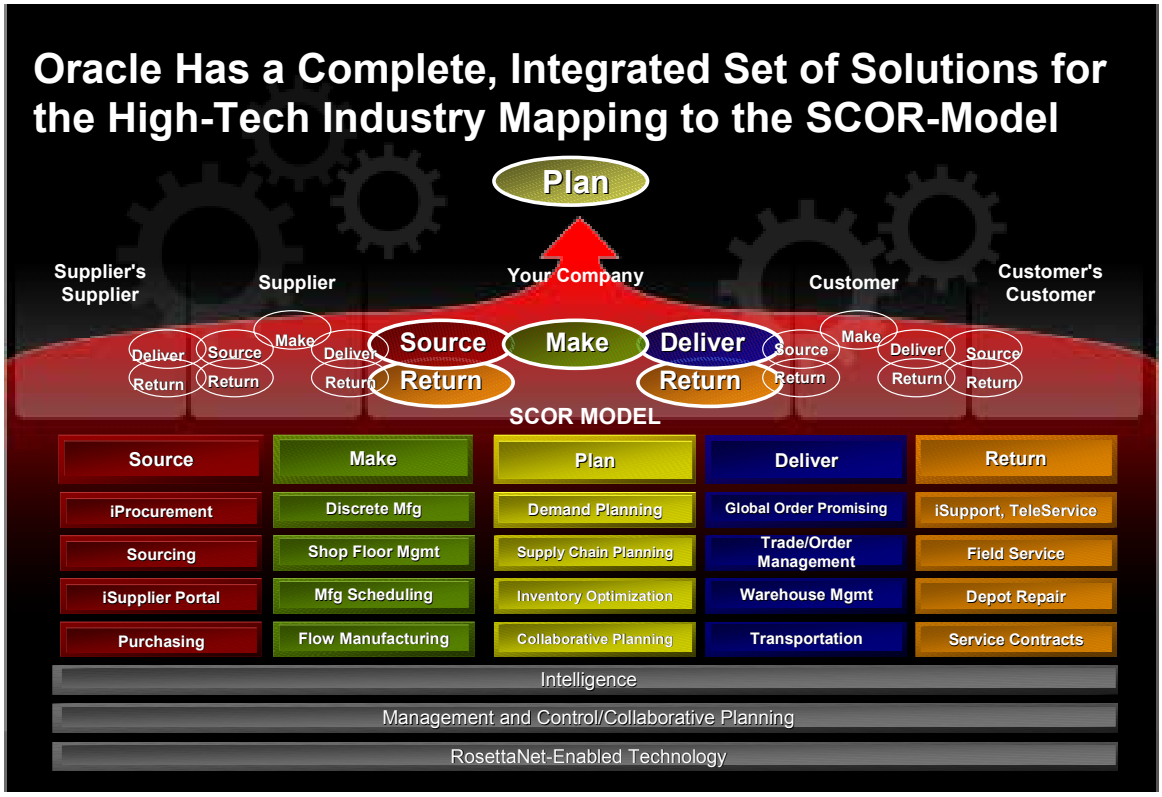
Solutions for the High-Tech Industry

With its E-Business 11i.9 suite of applications, Oracle is able to bring an end-to-end offering of applications to configured electronic systems manufacturing organizations. The application suite includes financials, human resources, manufacturing, sales and marketing, order management, procurement, product life-cycle management, service, and supply chain planning and execution. The latest version of the supply chain modules includes 772 new features, of which 70% are expected to benefit high-tech customers. Some of the key features include outsourcing and multi-tier CTO (configure to order), serial tracking and genealogy, resource-centric detailed scheduling along with key enhancements in demand planning, collaborative planning, and field service. With RosettaNet support built into the middleware and its applications, Oracle's manufacturing applications can integrate the business processes of customers' suppliers and partners.

Oracle provides a broad set of integrated applications specifically for the high-tech industry that map to the Supply-Chain Operations Reference-model (SCOR) (see Figure 4). This paper does not go into detail about every module; rather, it highlights some of the key components of Oracle's supply chain management solution.

FIGURE 4

Oracle's Supply Chain Solutions for the High-Tech Industry Map to the SCOR-Model



Source: Oracle, 2003

Supply Chain Management Solution

Most relevant to configured electronic systems manufacturers is Oracle's supply chain management solution. The supply chain planning solution can support all types of high-tech manufacturing business models — from completely manufactured in-house operations to completely outsourced manufacturing operations. The solution provides manufacturers with real-time access to information and supports transition to the virtual manufacturing environment. Key components of Oracle's supply chain management solution for the configured electronic systems industry include Oracle Advanced Planning, Oracle Configure to Order, and Oracle Order Management solutions.

Oracle Advanced Planning

This set of modules is designed to address end-to-end planning across procurement, manufacturing, fulfillment, service, marketing, and logistics enterprise processes. It enables strategic risk pooling for critical components or inventory postponement that allows configured electronic systems manufacturers to drive inventory out of their

supply chain, reduce costs, and quickly respond to changes in custom configuration. Key components of the Advanced Planning solution include:

- **Demand Planning.** Helps to achieve an accurate consensus forecast by bringing together marketing, sales, manufacturing, customer, and supplier information and supports an enterprisewide sales and operation planning process with multidimensional OLAP analysis (e.g., product, channel, geography, and time).

- **Inventory Optimization.** Determines the most effective inventory postponement strategy while taking into account demand, supply and lead-time uncertainty, and customer service levels.

- **Supply Chain and Manufacturing Planning.** Reduces supply chain planning cycle time through holistic database-centric planning. Collaborative capabilities help to provide a clearer picture of the impact of customer and supplier forecasts, schedules, and constraints.

- **Global Order Promising.** Helps manufacturers to promise orders more accurately by taking into account material availability, manufacturing capacity, supplier capacity, and transportation capacity.

- **Manufacturing Scheduling.** Helps to drive plant and shop floor efficiencies by improving asset utilization through support for complex scheduling methods such as sequence dependent setups, batch resourcing, network routings with a highly interactive scheduling user interface.

- **Collaborative Planning.** Provides demand and supply collaboration with customers, contract manufacturers, and suppliers, and therefore complete supply chain visibility, by simultaneously sharing of forecasts and order commit information across multiple enterprises. Includes support for key processes such as waterfall analysis, vendor managed inventory (VMI), and liability analysis.

- **Supply Chain Intelligence.** Decision-making tool to help drive continuous improvement in supply chain. Can define a series of parameters upon which to be notified. For example, can track key performance indicators compared to plan, set up business performance targets, and notify decision makers of exceptions.

Oracle Configure to Order

Oracle's Configure to Order (CTO) solution represents a leap forward in addressing mass customization by offering an integrated solution that combines state-of-the-art configuration technology, demand management, advanced planning, and agile manufacturing. Oracle's CTO solution leverages Oracle Configurator, Oracle Order Management, Oracle Advanced Planning, Oracle Manufacturing, and Oracle Service to provide a complete and integrated order-to-ship-to-service flow for configured electronic systems manufacturers. Key features include the ability to:

- Use a single data source to coordinate customer orders with manufacturing

- Plan and manage complex configurations across the supply chain

- Configure to unique customer requirements
- Build or procure unique configurations

Oracle Order Management

Oracle's Order Management solution supports the end-to-end fulfillment process for configured electronic systems manufacturers with configuration, pricing, order management, release management, transportation, and warehouse management modules. Key benefits include:

- Improve visibility to customer demand across all channels
- Provide accurate order promise dates
- Respond quickly to changing customer needs
- Execute customer shipments accurately and on time

Some key components of Oracle's Order Management solution include:

- **Configurator.** Helps complex manufacturers work through the myriad of choices to configure a product to specification for their clients and guides customers to the best solution and gives them a complete order-to-ship flow.
- **Advanced Pricing.** Helps to integrate pricing across the enterprise, target pricing strategies, and provide complete deal and promotion support.

Table 1 shows how Oracle's supply chain management solution helps configured electronic systems manufacturers address many of their key business and technology challenges.

TABLE 1

How Oracle's Supply Chain Management Solution Addresses Challenges of Configured Electronic Systems Manufacturers

Challenge	Oracle's Solution
Using strategic inventory risk pooling to minimize inventory and maximizing service for continuous configuration	Solution that uses "risk pooling" methodology to determine optimal inventory levels of parts and sub-assemblies while at the same time pushing inventory further up the supply chain — Inventory Optimization, Collaborative Planning, Supply Chain and Manufacturing Planning
Building complex configured products efficiently	Solutions that help manage configuration complexities and accelerate order-to-delivery cycle times — Configure to Order, Advanced Planning (Suite)
Managing outsourcing without losing global visibility	Solutions that support all types of high-tech manufacturing business models — from completely manufactured in-house operations to completely outsourced manufacturing operations; that supports transition to the virtual manufacturing environment and supports supplier drop-ship across multiple legal entities — Discrete Manufacturing, Configure to Order, Collaborative Planning, Purchasing
Retaining configuration lifecycle from As-Designed to As-Built to As-Serviced	Solutions that offer a single enterprise data source to enable tight front- to back-end integration letting companies automatically generate manufacturing BOM from customer orders. A copy of the as-built BOM is passed to service and is kept updated as the as-serviced BOM as and when service is performed — Discrete Manufacturing, Configure to Order, Depot Repair, Field Service
Managing demand variability and attaining accurate forecasts	Solutions that enable demand collaboration and improve forecast accuracy by enabling ubiquitous information sharing among ASIC suppliers, OEMs, contract manufacturers and allowing independent forecasting and consumption of optional components — Demand Planning, Collaborative Planning
Achieving accurate demand and supply picture	Solutions that generate a single holistic supply chain plan that provides long-range aggregate planning across ASIC suppliers, contract manufacturers, and OEMs as well as short-term detailed scheduling — Advanced Planning (Suite)

Source: IDC, 2003

IDC OPINION

Oracle has put quite a bit of emphasis on the configured electronic systems industry because it sees high-tech as the source of much innovation. By staying in touch with the leading-edge developments in the high-tech industry, Oracle is well positioned to drive innovation through the rest of the high-tech industry and even the manufacturing sector. Furthermore, the company's belief that it needs to maintain leadership across the high-tech sector in order to stay in touch with innovative manufacturing developments for the rest of its business helps ensure Oracle's commitment to this industry.

Oracle's supply chain management solution is rich with features. Key to continued success is educating the customers about the benefits of these features and how they can be used. Oracle continues to drive improvements and support for innovative business practices by working closely with its customers. Now that Oracle has a strong supply chain footprint in the high-tech industry, its next challenge is to develop a comprehensive partner strategy and work on educating and converting systems integrator partners.

Oracle's depth in the high-tech industry helps to address industry-specific business processes, but as the company extends its presence in the automotive, aerospace and defense, and medical device industries, these cross-industry leanings are likely to benefit all industries.

CASE STUDY

Agilent Test & Measurement Lowers IT Costs with Oracle 11i

One major configured electronic systems manufacturer that is investing in supply chain and ERP applications is Agilent. This case study illustrates the benefits that can be attained by implementing a global supply chain and ERP system.

Agilent Technologies delivers technologies, solutions, and services to customers in the areas of communications, electronics, life sciences, and chemical analysis. The company has two main lines of business: Test & Measurement and Semiconductors. More than half of Agilent's revenue is generated from outside the United States. With customers in more than 110 countries and facilities in 30 countries, Agilent develops products at manufacturing sites in the United States, China, Germany, Japan, Malaysia, Singapore, Australia, and the United Kingdom.

Bogged Down by Legacy

In 1999, Agilent spun off from HP. Although the companies split, Agilent's worldwide headquarters remained on the site of HP's first owned and operated R&D and manufacturing facility in Palo Alto, California. At the time, Agilent's remaining 25,000 employees accounted for only about one-quarter of HP's total employees.

Spinning off from such a large, multifaceted business left Agilent with an IT environment that was built for a larger company with more lines of business and a larger staff. The existing infrastructure, which included thousands of homegrown applications and a 15-year-old order management system, prevented Agilent from running an agile business, particularly around the company's supply chain.

> "Because Agilent Test & Measurement produces a highly configured product, flexibility throughout the entire supply chain is essential," explains Jeff Gould, Senior Manager, Test & Measurement Global Solution Development, Agilent Technologies. "Our previous ERP systems prohibited us from gaining the visibility and data we needed for a flexible process."

The existing IT environment was also very costly to operate and support. Agilent's IT expenses were very high because the company was spending too much on enhancements for custom legacy applications across multiple countries. In fact, every enhancement or change to an application involved updating anywhere from 20 to 50 systems that did the same function. Ultimately, Agilent could not afford to make enhancements and add new functionality.

Agilent was a new company in the high-growth dot-com era, and its complex legacy infrastructure prevented it from making changes and moving quickly in order to keep up with market dynamics.

Creating a More Agile Supply Chain

In 1999, the company made a strategic business decision to overhaul its IT infrastructure. Agilent began exploring new solutions that could better support its business worldwide and that would cut down on IT expenses. Some of Agilent's specific objectives for its new IT environment included:

- Facilitating communications across the company
- Enabling more collaborative product design
- Developing a single, worldwide solution rather than multiple, disparate regional solutions
- Focusing IT resources on value-add IT initiatives, such as supply chain and customer order management, rather than supporting legacy systems

In Search of a Single, Global Solution

When Agilent began evaluating systems in 1999, the company was looking for a single, off-the shelf solution that could accommodate its worldwide manufacturing operations. Specifically, Agilent sought to implement a new application environment that would enable the company to:

- Improve responsiveness to customers, suppliers, and distributors
- Provide more accurate quote through delivery information to customers, ensuring more accurate delivery commitment

- Create greater flexibility in the supply chain for its highly configured products
- Carry less inventory, thus improving inventory turns and reducing the costs to manage inventory

In June 2000, after evaluating two major ERP vendors, Agilent decided to go with an Oracle solution. Agilent needed a global vendor that could handle the scope of supporting operations in 30 countries. The company also appreciated Oracle's willingness to work as a strategic partner — allowing Agilent to provide input into the development and functionality of product updates and future releases.

An "Out-of-the-Box" Implementation

In what is said to be the largest functional deployment of Oracle, Agilent elected to implement almost the full Oracle 11i suite within its Test & Measurement business unit, including the following modules:

- Advanced Planning
- Order Management
- Manufacturing
- Warehouse Management
- Procurement
- Financials

Across all of its sites, Agilent is running on one instance of 11i (hosted in Colorado) for all of its supply chain functions for its Test & Measurement and Semiconductor businesses. The application itself is very close to the "out-of-the-box" release, ensuring that Agilent would require minimal customization and allowing for easier implementation and updating.

The implementation team at Agilent, which consisted of Agilent employees and Oracle consultants, deployed Oracle 11i in a four-phase process. In June 2002, Agilent went live with Oracle 11i in its two largest and most complex factory sites (one in Asia, one in the United States) as well as with its sales and finance modules. Due to the massive functionality and global footprint, the implementation was not simple. The team worked for six months on standardizing the processes and the related solutions, ensuring data transformation, and working out bugs in the process. Agilent learned that the data constructs and transformation were particularly complicated due to the highly configured products.

Once the initial deployment was complete and stable, subsequent phases went smoothly as more functionality was rolled out in a contained fashion. Agilent completed phase 2 of the deployment in June 2003, phase 3 in September 2003, and phase 4 in December 2003. Agilent expects to complete full deployment of Oracle 11i to the entire Test & Measurement business unit by February 2004.

A More Efficient Operation

Because Agilent has been deploying Oracle 11i for more than two years, the implementation has had an impact on its business — both positive and negative. The company lost some of its business momentum during the initial stages of the implementation.

> "We took a step backwards to get to where we are today; but we are now at the point where Agilent is able to achieve greater flexibility in our supply chain," states Gould.

And while the full implementation is not yet complete, the company has already witnessed numerous improvements in its business.

> "We have greatly improved order accuracy as a result of our streamlined product configuration process," explains Gould.

Other benefits include:

- Improved the closing process and reduced the time finance takes to close the financial and operational books at the enterprise level
- Eliminated thousands of legacy systems by implementing a standardized and simplified application architecture worldwide
- Reduced the number of application instances that the company was running in each region
- Streamlined the product configuration data and process in order to improve the efficiency business centers
- Enabled real-time flow of information from business centers to the manufacturing factories due to the implementation of integrated environment
- Improved the reporting efficiencies by implementing a comprehensive enterprisewide data warehousing and reporting solution
- Achieved complete and accurate supply and demand picture by enabling worldwide enterprisewide supply chain planning
- Reduced the operational and maintenance costs of the ERP environment by implementing only a single instance of Oracle 11i
- Improved the efficiencies of the new product introduction sites by enabling an integrated product life-cycle management solution
- Implemented real-time order promising, resulting in greater customer satisfaction
- Enabled a self-service model and reduced the cost of operations for indirect procurement

In addition, and most important, by eliminating thousands of legacy systems and implementing a standardized and simplified application architecture, Agilent has met its primary goal of reducing IT spending by cutting support and enhancement costs.

CONCLUSION AND RECOMMENDATIONS

As the market matures and competition increases, configured electronic systems manufacturers will continue to use information technology to gain efficiencies and establish a competitive differentiator. Customers of configured electronic systems manufacturers will no longer pay for a company's inefficiencies. They will demand top-notch customer service at a lower cost. If they can not attain these attributes, they will move to the competition. As you plan your supply chain strategy, keep in mind the following:

- **Build in agility.** High-tech manufacturers live and breathe in a changing environment. They must adapt to survive. "We're constantly reinventing processes and reinventing ourselves to adapt," explains one high-tech executive. IT systems that are built to be adaptive will succeed in high-tech manufacturing environments — whether it is an agile supply chain, a shared services model, or an IT architecture that supports future expansion. As one high-tech manufacturing executive explains, "We want to gain the purchasing power and economies of scale of being a billion-dollar company while maintaining the agility and closeness to the market that you get by being 15–20 strategically distinct businesses."

- **Create a strong partnership between IT and line of business.** Our interviews with executives who have led successful supply chain projects revealed that such projects always had a tight partnership between the supply chain and IT executives. Remember, these are not IT projects. At the heart of the supply chain solution may be a set of applications, but these projects need to start with the business processes and then use IT as an enabler to streamline the flow of information.

- **Work with your IT vendor to build a partnership.** Work with your IT vendor to jointly lay out a road map of your business today and in several years. If your IT vendor understands your business plans, then it is in a better position to build these features in future releases.

- **Perform due diligence.** Financial stability, technical expertise, and the ability to integrate with legacy systems are top criteria for configured electronic systems manufacturers when selecting an IT vendor, according to an IDC survey. As you evaluate potential IT vendors with which to work, be sure to look into these factors as well as the vendors' commitment to your industry.