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The New Definitions of Innovation, Sustainability and Responsiveness for High Tech and Electronics Manufacturers

Date: **January 2010**

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Compliments of Microsoft Dynamics ERP

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Executive summary

For nearly 50 years, Moore's Law[1] has dictated that high tech and electronics (HT&E) manufacturers have competed on their ability to innovate and respond to exponential changes in technology and market opportunities. Today, the pace of these changes — coupled with tougher regulations, market diversification, and the drive for sustainability — makes competing profitably far more challenging.

Three significant shifts are changing how companies are bringing products to market in an era of greater corporate responsibility and economic uncertainty. These shifts re-define innovation, sustainability, and responsiveness.

1) **Innovation:** More companies are designing components, systems, and application-specific solutions as a response to specific customer needs rather than purely as a result of an exciting technological innovation.

2) **Sustainability:** Leading companies have moved beyond simple compliance to environmental regulations and are striving to implement leading sustainability practices throughout their businesses. Having already learned that green and lean manufacturing practices lead to cost-savings, they are now finding opportunities for new revenue and profit streams by addressing customer demand for sustainable products and suppliers.

3) **Responsiveness:** To increase agility and responsiveness, companies are extending their use of collaborative partnerships and outsourcing. The resulting networks move beyond traditional supply chain network roles to assemble new teams with the necessary skills and resources to win business and share risks – even if they are competitors.

A growing number of high tech and electronics companies across the world are making these shifts in how they define innovation, sustainability, and responsiveness. The economic downturn of 2008–2009 was the catalyst for these changes. However, leading companies recognize that while these new priorities address immediate concerns to reduce costs and retain customers, they also provide the foundation for competitive advantage and market share growth as the recovery takes hold.

Companies of all sizes across the HT&E industry need to adapt to these new definitions of innovation, sustainability, and responsiveness. To succeed as innovators and as partners, companies must provide information access and process transparency across disparate operations. So HT&E companies must facilitate clear communications, real-time visibility, and better decision-making.

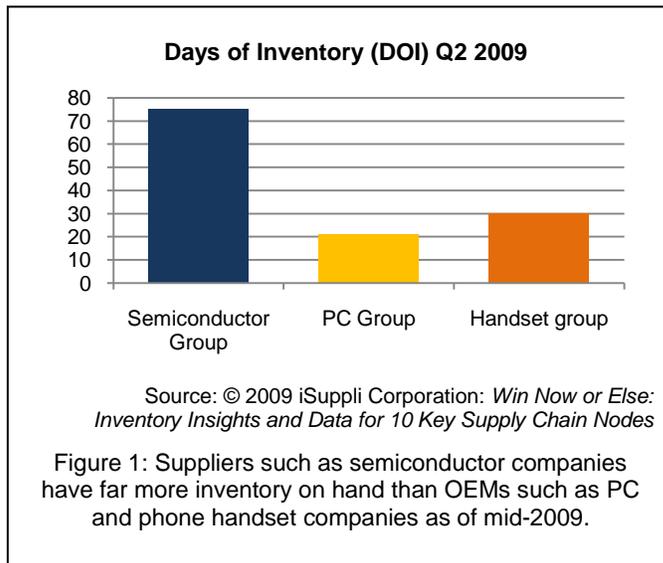[1] In a paper in *Electronics* magazine in April 1965, Gordon E. Moore, then Director of Director of R&D Labs at Fairchild Semiconductor and later co-founder of Intel, put forward the premise that the number of transistors that can be placed inexpensively on an integrated circuit would double approximately every two years. This has set an exponential improvement rate for processing speed, memory capacity, etc. for electronics.

Driving trends in high tech and electronics

In this uncertain and evolving marketplace, HT&E original equipment manufacturers (OEMs), original design manufacturers (ODMs), and electronics manufacturing services (EMS) firms, as well as other industry contractors, distributors, fabless semiconductor, and component suppliers are working to improve and adapt their business practices to stay competitive and profitable. Regardless of where they are located, which markets they serve, or their size, nearly every company is experiencing similar issues and feeling the impact from a series of current market trends.

Economic upheavals: Manufacturers could not anticipate the 2008-2009 economic downturn, but it changed market conditions and customer behavior across the globe. Despite efforts during the past decade to increase HT&E supply chain forecast visibility, semiconductor and electronics supplier groups were the last to be aware of, and be able to respond to, the falling demand for HT&E products. Data from iSuppli Corporation indicates that, compared with others in the HT&E supply chain, semiconductor groups have experienced much higher inventory levels (Figure 1). They have also seen a significant drop in revenue, by 21 percent in Q4 2008 from Q3 2008, and another 19 percent in Q1 of 2009.

Days of Inventory (DOI) Q2 2009

Source: © 2009 iSuppli Corporation: *Win Now or Else: Inventory Insights and Data for 10 Key Supply Chain Nodes*

Figure 1: Suppliers such as semiconductor companies have far more inventory on hand than OEMs such as PC and phone handset companies as of mid-2009.

Market-driven innovation: In the past, market leaders such as Intel, Texas Instruments, and Motorola could afford to offer a broad product line based on design innovations; now, these companies all specialize. Today, market leaders are applying key technologies to solve specific customer issues. For example, Konica Minolta focuses not just on selling printing equipment, but on enhancing print shop uptime. Increasingly, the industry is separated into those manufacturers that provide high volume commodity devices and those that specialize, offering both products and technical services.

Market diversification: With each economic downturn, some market sectors are hit harder than others, and the most recent recession was no exception. Automotive and consumer electronics markets were severely impacted. While not all HT&E suppliers are in a position to diversify their customer base, those that can are diversifying into more markets and strategically focusing on long-term growth opportunities for energy, sustainability, and security related solutions.

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Green Technology Sample Opportunities
• Power efficiency (low-power semiconductors)
• Energy-efficient lighting (semiconductor LEDs)
• Solar cells
• Wind power
• Biofuel equipment
• Energy-reducing smart appliances
• Energy-reducing smart machinery
• Smart Grid for electricity

Figure 2: High tech companies are finding many areas for products that support sustainability.

Sustainability solutions: As sustainability mandates and initiatives sweep the globe, HT&E manufacturers are looking at ways to participate in the green technology (sometimes referred to as "greentech" or "cleantech") revolution, using technology to conserve the natural environment and resources (Figure 2). In a 2008 survey of semiconductor executives by KPMG[2], 84 percent of those surveyed said that in five years, green technology products would account for more than 20 percent of their revenues. Manufacturers selling measurement and automated control technologies have already jumped into the market with smart environmental protection and energy conservation solutions.

Partner collaboration: Companies are collaborating and outsourcing with a broader range of partners to share risks, costs, and competencies. Some are unlikely associates: competitors are forming joint ventures, OEMs are turning to two-tier distributors to reach emerging markets, and manufacturers are outsourcing design to their distributors who are located in high growth markets. Managing these relationships effectively creates internal complexity.

Operational flexibility: To deal with the pace of technology, product line and market demand changes, and to continually improve customer service, companies must be highly flexible. The need for agility extends to all processes: design, sourcing, manufacturing, and distribution. While Lean, Six Sigma, and adaptable information systems are coming into play, companies must do more to ensure wasteful processes are cut and replaced with smarter, longer-term solutions that support this flexibility.

Workforce shortage: There are growing concerns about a shortage of skilled workers, who are crucial for growth, productivity, and determining the allocation of capital spending. In the 2008 KPMG survey of semiconductor executives[3], 76 percent expected to decrease their global workforce in 2009. Workers losing their jobs during economic downturns and then leaving the industry contribute to the problem, as they take their knowledge with them.

Regulatory changes: Since the adoption of the Restriction of Hazardous Substances (RoHS) Directive, the Waste Electrical and Electronic Equipment (WEEE) Directive, and the Registration, Evaluation, Authorization and Restriction of Chemical substances (REACH), environmental regulations during 2006–2007, additional regulations affecting electronics products and producers have been announced. These regulations include Energy Using Products (EUP), Integrated Product Policy (IPP) and Environmental Permitting Program (EPP). In addition, greenhouse cap-and-trade legislation is on the near-term horizon, as well as added regulations from Japan and China.

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[2] © 2009 KPMG, *Managing challenges in the global semiconductor industry: a survey of industry executives — first quarter 2009*

[3] © 2009 KPMG, *Managing challenges in the global semiconductor industry: ibid*

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Regional considerations: For products sold globally, manufacturers must ensure that product variants exist to satisfy the needs of each destination market. Businesses operating in different parts of the world must also conform to local regulations, government interests, business practices and market conditions. For example:
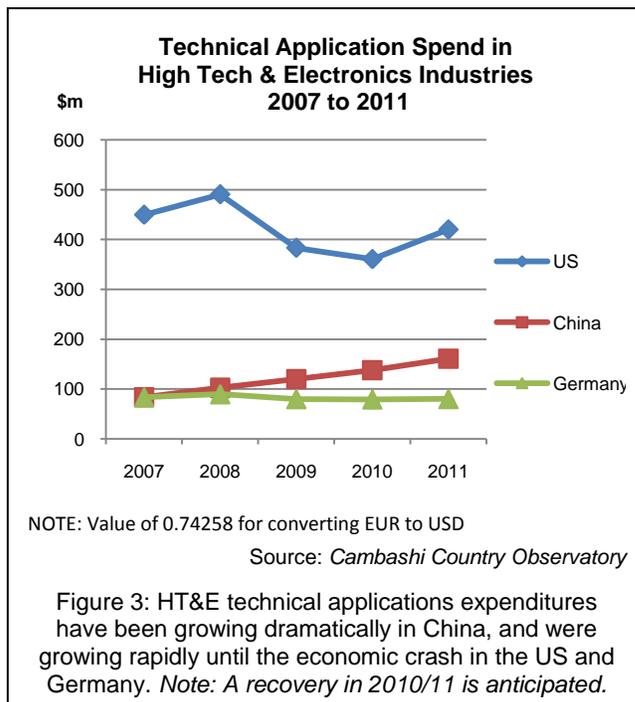
- The European Commission has identified nanotechnology, electronics, and photonics as being of strategic interest to the European Union (EU).

- The US government stimulus bill is funding portions of Smart Grid, the future intelligence-based energy management of the national electric utility power grid.

- In Asia, there is intensifying competition to increase integrated circuit (IC) packaging performance.

Major challenges for high tech and electronics companies

The trends impacting the industry offer both challenges and openings for competitive advantage in today's economy.

Some of these challenges that can become opportunities are:

1) Innovating to address specific market opportunities with greater success and efficiency.
2) Moving beyond regulatory compliance for sustainability into cost savings and marketable advantage.
3) Facilitating greater collaboration with supply chain partners to improve market responsiveness, lower risks and further reduce costs.

Technical Application Spend in High Tech & Electronics Industries 2007 to 2011

NOTE: Value of 0.74258 for converting EUR to USD

Source: *Cambashi Country Observatory*

Figure 3: HT&E technical applications expenditures have been growing dramatically in China, and were growing rapidly until the economic crash in the US and Germany. *Note: A recovery in 2010/11 is anticipated.*

For many companies, these trends push the envelope on their current operating environments and present the need for improvements in business process alignment and information management. Companies that bring a strategic enterprise-level perspective to these challenges, rather than a functional approach, will have greater success.

Product innovation with higher success rates and efficiencies

The high failure rate of new product introductions and the unrelenting pace required to beat competitors to market is a given in the HT&E sector. Add the convergence of electronics with nanotechnology, biotechnology, energy,

photonics, and electrical devices, and you've got significant product and process complexity. To remain competitive, HT&E companies have been investing in technical applications, such as computer-aided design (CAD) and computer-aided engineering (CAE). Cambashi expects that trend will continue[4] (Figure 3).

Beyond products, complexity is further heightened by companies' vast product line breadth, customers in various industries that have their own regulatory requirements, and an increasing number of partnerships in and outside traditional supply chain networks. Companies also need to design for end-of-life recycling or reusable parts to support environmental sustainability. All of that complexity leads to inefficiencies in development, sourcing, engineering, production, and logistics.

To increase success rates and profit margins, companies are moving from designing products to applying their technology and their expertise to new markets, applications, and services. Many HT&E companies today are developing designs, software devices, developer kits and technical services specific to a customer's applications or a market's needs. By working more closely with partners to solve problems, companies have a greater chance of securing long-term contracts and having better market success. One example is Open Silicon, which actually grew during the downturn by building strategic partnerships with manufacturing, test, and packaging companies to support their fabless semiconductor business model.

However, this new approach to doing business has its own share of challenges. Closer customer relationships rely on collaborative information exchange. Only by sharing across multiple organizations and regions can companies facilitate greater understanding, better designs, and faster prototypes. Being in tune with the market requires collecting and analyzing market intelligence from customers and distributors, sales and R&D teams, and independent Web sites or blogs.

Competing on sustainability

Regulatory mandates for environmental emissions, safe disposal, hazardous materials, and worker safety are both costly and challenging. While the HT&E industry has adapted to the wave of new regulations in 2006-2007 fairly well, manufacturers need to be prepared for a plethora of new compliance mandates every year as a normal part of doing business.

The challenge is keeping up-to-date on all relevant pending regulatory changes and determining how to update processes and systems (internally and with partners) to meet the required activity and documentation changes. Adding to the complexity is that each country, and in some cases each state or region within a country, has its own laws and reporting requirements, and very often the regulations differ in substance and timing.

In the past few years, leading HT&E manufacturers have recognized that environmental compliance and proactive sustainability can be cost-saving opportunities. Most efforts have focused on using plant automation and software to cut emissions and reduce use of energy and water while improving monitoring and reporting. Lean manufacturing practices have cut
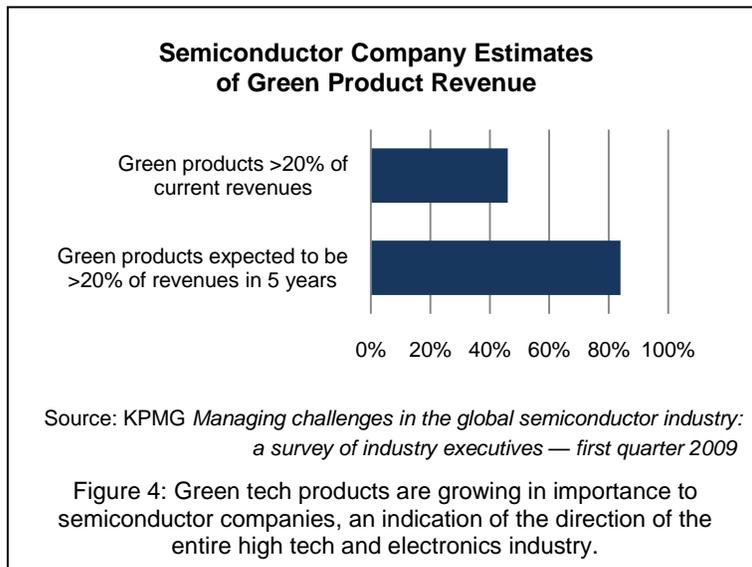
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[4] © 2009 Cambashi, *Cambashi 2009 Country Observatory*

waste further, plus reduced the production and inventory storage footprint for even greater conservation of energy and resources.

Yet today, that is not enough. Customers are increasingly asking companies to report on their environmental practices and results, making sustainability a competitive requirement. Companies must now consider sustainability issues across their organizations and supply chains from a strategic and enterprise perspective. For example, Shinko Electric has an environmental policy that starts with a philosophy and guiding principles; plus specific targets for reducing emissions, energy consumption, volatile organic compounds (VOCs), and waste; and achieving at least two-star Green Factory ratings[5].

HT&E manufacturers must identify which sustainability programs will provide the greatest strategic business opportunities to decrease costs or increase competitive differentiation in specific vertical markets. First, companies need to determine how they monitor and report energy and water conservation and carbon emissions. They must incorporate greentech criteria into their innovation efforts as an additional target. Then they need to tie this data into financial accounting to measure costs and demonstrate sustainability performance of their companies and products. The complexity of the global electronics supply chain makes some of the data for these calculations difficult to capture, analyze, and report. In addition, each manufacturing facility tends to be unique in the mix of products, specific suppliers, and local environmental exposures. For example, development facilities tend to have low volume, high mix, and experimental processes, making analysis very difficult.

Another interesting opportunity is to introduce products that support customers' green efforts. A KPMG study in the semiconductor industry[6] showed that 77 percent of respondents see their companies increasing their R&D investment in green technology over the next two- to-three years. That portion includes 49 percent of the total who see that investment increasing by more than 10 percent. With customer interest in saving energy and purchasing an eco-friendly brand running high, many more companies expect green products to account for at least one-fifth of revenue by 2014 (Figure 4).

Semiconductor Company Estimates of Green Product Revenue

Source: KPMG *Managing challenges in the global semiconductor industry: a survey of industry executives — first quarter 2009*

Figure 4: Green tech products are growing in importance to semiconductor companies, an indication of the direction of the entire high tech and electronics industry.

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[5] Shinko Electric website, http://www.shinko.co.jp/english/environment/policy.html

[6] [6] © 2009 KPMG, *Managing challenges in the global semiconductor industry: a survey of industry executives — first quarter 2009*

Collaborating for synchronized market responsiveness

The recent downturn made it clear that supply chain response to changes in demand has improved, but still involves risk. The HT&E industry responded much faster during the recent downturn than during the prior recession in 2001 by quickly reversing their excess inventory positions, halting production, and closing semiconductor fabrication plants (fabs). Yet these quick responses also caused concern about capacity shortages, longer lead times, and higher chip prices. These concerns got to a point that semiconductor companies acted to rebuild inventory levels prior to actual market demand, leaving them vulnerable to write-offs.

The challenge continues to be that high tech and electronics supply chains are long and complex. Thus, the industry requires advance build up of semiconductor components and materials, driven by forecast-based demand signals and not actual demand. The result is what is referred to as the "bullwhip effect," where overstock cycles at component suppliers – and the high risk of obsolete inventory liabilities – alternates with substantial inventory shortages and the inability to capture fleeting market demand.

In addition, more companies have expanded their networks into new markets, each of which require different features, configurations, and support, not to mention software and documentation. For example, Brainboxes makes data communication systems, which are now used in leisure, retail, banking, industrial process control, government research agencies, and the military and universities; beyond Recommended Standard F(RS) 232, the company offers eight other categories plus custom products.

Companies are expanding their eco-systems while dealing with ever greater numbers of products and variants in the portfolio, shorter product lifecycles, and a large number of supply chain participants that may shift in and out over the lifecycle of a product. All of these factors complicate further responding rapidly and accurately to changing market conditions.

More companies see greater collaboration as a way of dealing with many of these challenges as a cohesive industry, not just isolated companies. Semiconductor competitors are creating joint ventures to share in the risk and cost of developing larger fabrication plants, and all types of HT&E manufacturers are working to provide better demand visibility across their networks and communicate faster as demand patterns change.

How leaders are addressing the challenges

Given that the trends and challenges facing the industry are substantial, the most successful HT&E manufacturers are taking decisive action. They are moving beyond the original outsourcing models to create strong yet flexible and changeable value networks including partners of all sizes.

To enable this new way of working, leaders are investing in a new round of information technology applications. These systems not only ensure visibility to accurate company-

wide information, but foster effective communication, collaboration, innovation, and decision making by appropriate employees and partners at a given moment.

A new business model and way of working

High tech and electronics companies were the first to leverage technology to create value networks of outsourced partners spanning multiple countries. This is no longer a new business model. What is new is how HT&E companies are joining forces and making decisions as teams to more effectively and efficiently respond to opportunities and problems impacting all aspects of going to market and serving customers, from design and engineering to production and logistics, and post sales support and end-of-life.

Companies that work together also look at ways to improve operational efficiencies to keep costs low, create higher margins, and further broaden eco-sustainability initiatives. Sustaining margins is quite a challenge, considering the ever greater complexities the high tech and electronics industry faces. These complexities make it even more important for companies and their partners to have information systems that are designed to address these challenges.

Yet these networks continue to be hampered by their weakest links – companies that are not fully automated, integrated, or connected. Being the weak link is no longer acceptable, as enterprise information systems with high tech-specific functionality have become more accessible for even the smallest companies in the industry. Information visibility is crucial as collaboration becomes the means by which value networks as a whole and companies individually strive to keep up with changing market and regulatory requirements.

Information technology and applications support

Too many HT&E manufacturers still have outdated, ineffective or incompatible systems throughout their organizations. For example, less than a third of medical device manufacturers under $100M in revenues use enterprise resource planning (ERP) systems widely today[7]. Running a growing, competitive and often virtual business on an outdated accounting system or through manual processes and separate departmental information applications is inefficient to say the least. Using old or disjointed systems makes it nearly impossible to be responsive to demand changes and market opportunities or to collaborate fully between departments or with supply chain partners, or create effective end-to-end business processes. The problem is even more challenging when companies have acquired multiple facilities, entered into joint ventures, or created independent entities that share customers, suppliers, sales, or develop resources.

To continually grow and expand products, customers and markets, an HT&E manufacturer needs a sophisticated, integrated, and highly adaptable information system that's tailored to its unique business processes. The "one size fits all" type of thinking for a business system also requires more thought. The type of system necessary to achieve profitable product

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[7] © 2009 Cambashi Inc and Axendia: *Total Product Lifecycle Management: Lowering Costs while Increasing Quality*

innovations, sustainability initiatives, and responsive collaboration fulfills the following requirements.

Full capability enterprise software: The backbone is a tightly integrated ERP system that supports independently run operations. Functional areas include:

- Basic functions for financials, cost management, order management, sales force automation, and supplier, channel, and customer relationship management

- Supply chain management, from demand, distribution, and vendor managed inventory (VMI) replenishment planning to repetitive, continuous, and high mix finite scheduling in the plants, as well as lean production capabilities and transportation management

- HT&E specific requirements, including product lifecycle and engineering change management; project management; product mix management; batch, lot and serial number tracking; quality, binning and attribute management; bar code and radio frequency identification (RFID) tracking; outsourced manufacturing management; fabless semiconductor manufacturing functionality; RosettaNet; field service and warranty management

- Lean manufacturing capabilities such as sales-driven takt time (time per unit) scheduling, demand-pull production, Kanban management, and process flow tools

- A single view of compliance-related information supported by document management, environmental procedures, and control points, as well as full lot traceability and supplier certification tracking

- The ability to act as either a single corporate "hub" system or work in multiple locations as "spokes" that connect to headquarters while still serving local needs and requirements to accommodate the multi-location, multi-currency, multi-language needs of most HT&E manufacturers, plus the ever-changing landscape of mergers and acquisitions

Business intelligence and decision support: To make informed decisions, the system must be able to capture and analyze operational performance, market trends, and opportunities. So the system needs an integrated data repository that captures current data from multiple sources, performs analytics, and provides ad-hoc reports. To set and monitor business performance objectives, companies need financial planning, budgeting, and reporting tools, and key performance indicator (KPI) tracking and reporting. Ideally the system will also be able to use real-time information, consolidate information from multiple partners or sources, provide detailed information, and focus on a specific issue for rapid insight and resolution.

To support strategic sustainability initiatives, more HT&E companies are turning to business intelligence analytical tools to calculate their sustainability performance in terms of metrics and financial performance, which identifies opportunities and demonstrates achievements.

Internal and external collaboration: To collaborate in real-time with internal colleagues, remote sites, and external partners, the information system must easily and seamlessly

share the right data with the right people at the right time in the right format. For example, as sales teams sense a shift in demand, the procurement department needs to share forecasts with each supplier for that supplier's products only, and provide component requirements by number and date needed, not monetary value. Collaboration entails a secure information infrastructure that interoperates with other systems across the organization and shares real-time data through Internet-connected networks.

EDI, XML, and RosettaNet communication protocols are critical for exchanging electronic orders, invoices, forecasts, schedules, and changes. Ideally, the information system also integrates bar code, RFID, and other real-time data to deliver visibility of processes and data. Together, these data capture and transfer technologies from a foundation to collaborate everywhere from R&D to throughout the supply chain.
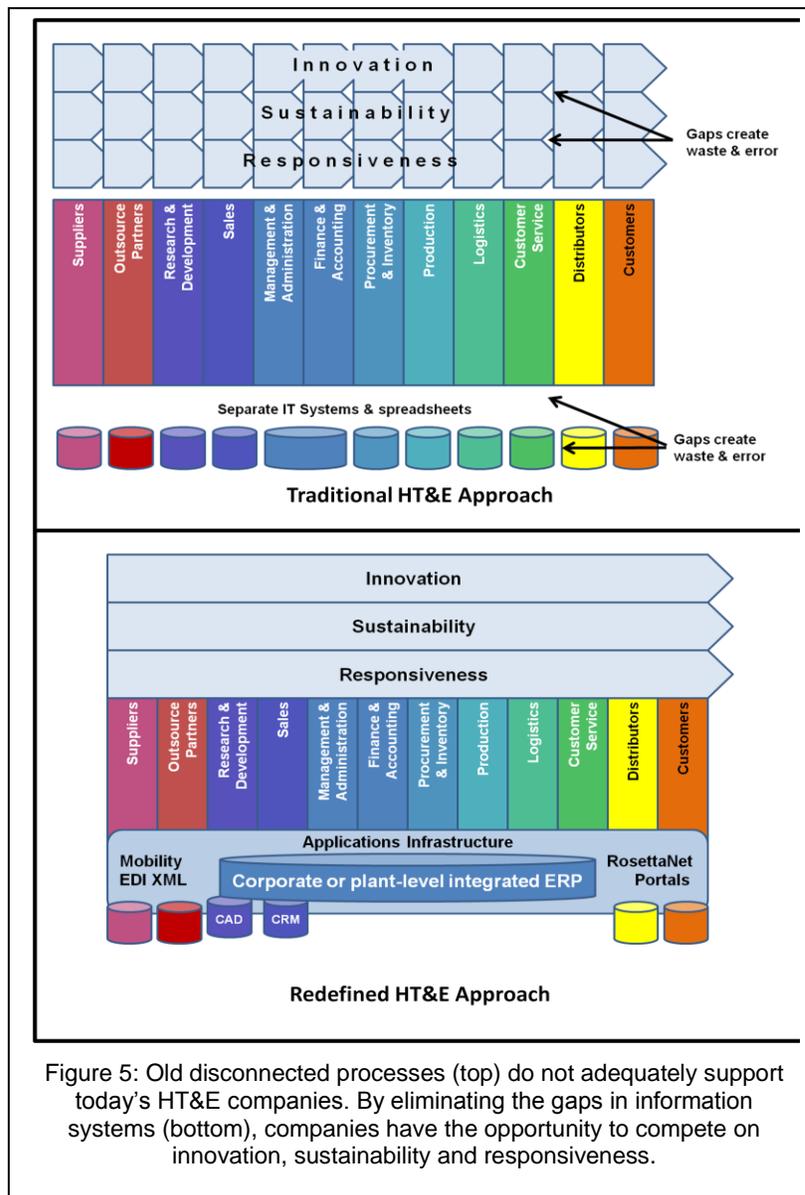

Figure 5: Old disconnected processes (top) do not adequately support today's HT&E companies. By eliminating the gaps in information systems (bottom), companies have the opportunity to compete on innovation, sustainability and responsiveness.

Remote access mobility: To support a mobile workforce, companies need remote data access through mobility devices that connect to the enterprise system in real-time and exchange data specific to the current tasks. These devices need to provide a seamless work environment by connecting remote personnel into their workspace, portal or task list. The devices also need to support specific applications, such as VMI, field sales, wireless inventory tracking, asset management or quality inspections.

Ease of use for a transient workforce: Productivity and efficiency are directly related to how rapidly people can learn a new system, access information, collaborate with others, do their job, or make decisions. Ease of learning a system is particularly important when companies contract and rebuild their workforce during economic swings. For employees to

actually use systems, they need a user interface that is intuitive, familiar, and simple to use. Employees need easy navigation and work processes that are based on pulling all the right information into one view in a clear and concise format for making decisions.

An information technology (IT) system with all of these capabilities (Figure 5) enables a new way of working. It creates an environment for real-time unified communication, business insight, collaborative visibility, streamlined processes, and cost-saving efficiencies. An example of how a high tech and electronics manufacturer can leverage a strong IT platform and integrated business system to help reach these goals of productivity and efficiency follows.

Case Study: Network Equipment Technologies (www.net.com)

Since 1983, Network Equipment Technologies (NET) has been a leader in innovating next generation network and Voice over Internet Protocol (VoIP) unified communication solutions for enterprise and government customers around the world. The company, whose stock is traded on the Nasdaq stock exchange, has 235 employees, with headquarters in California. The company completed a merger with Quintum Technologies of New Jersey in late 2007, just months before the worldwide economic downturn.

The merger and the economic downturn were disruptive events in their own right, but could have caused large operational difficulties were it not for the earlier decision to implement a highly flexible and integrated enterprise-wide ERP system in 2007. With the new ERP, they easily and seamlessly incorporated Quintum into their business operations. In addition, as a result of switching to the new ERP, NET was better prepared for the economic downturn as a result of the lower cost structure and the ability to implement a single integrated operating environment, which streamlined operations and improved management of sales and R&D. "Innovation is one of the key differentiators for us right now," said Carmel Wynkoop, IT Director at NET. "When you look at a challenging market like the current one, it is a time to innovate and reinvent yourself. The flexibility of our new ERP system helps us to reach that innovation."

The new ERP system, combined with a web-based collaboration portal, enables real-time communications between groups, provides workflow approval processes across sites, and performs automatic revision of price change updates to the item master. "It allows us to make these changes about 25 percent faster than we could with our prior system," notes Wynkoop.

One critical factor in the selection and switch to the new ERP was regulatory compliance. Wynkoop says, "We are RoHS compliant – which requires tagging specific components and generating materials reports. When we looked at trying to do this with our old system, it was going to be a big effort to modify the system to perform the needed tagging and reporting. With our new ERP system, we can add fields for compliance checking and the system implementation reflects how we need to report on compliance. This flexibility in the system makes it much easier for us to comply with new regulations or proactively monitor and report on issues."

Responsiveness also plays a critical role in the company's competitiveness. With the new ERP system, NET was able to easily and cleanly interface directly to their contract manufacturer's older ERP system. NET is in the process of implementing web services with their contract manufacturing partner to streamline and automate processes that are currently done manually. The seamless integration between partners and global operations will allow people to access the same information instantly and work together as a team to resolve issues more rapidly and effectively than in the past.

The decision to implement a new more flexible ERP system has significantly improved NET's ability to retain its market position as an innovative, responsive, and sustainable partner in the industry. Even better, says Wynkoop, "We are saving an estimated $1.9 million annually in IT costs because we made this change."

Achieving the new definitions for success

Regardless of economic conditions, HT&E manufacturers will continue to face market, regulatory, and environmental challenges. Companies need the ability to achieve a new level of collaboration, innovation, and sustainability to survive. Doing so intelligently and cost effectively will differentiate profitable leaders in the industry from others.

Manufacturers' business processes, mindsets, and information systems must all be ready to act quickly enough to bring innovations to market while the opportunity for a high margin is still available. HT&E manufacturers must fully meet new regulations while finding the sustainability benefits of cost savings or meeting the demand for green-tech products. They must respond to market shifts and partner requests for information rapidly, and ideally provide visibility even before a partner's query arrives. In short, each company must be an effective operator in their industry value networks.

The global economic recession of 2008-2009 is a reminder that the world can change rapidly. To be in a position to effectively and efficiently respond requires an information technology advantage. Today any size high technology company has access to best-in-class enterprise applications that enable those ways of working. The goal must be to minimize the information gaps between departments and trading partners to fully support the company and its trading network as it changes.

A strong integrated ERP system supported by business intelligence, remote mobility devices, real-time collaborative processes, and a familiar user interface are critical to success (Figure 6). With those applications supporting effective new business

Figure 6: With a full complement of enterprise capabilities as well as business intelligence, collaboration, mobility and ease of use, high tech & electronics companies of all sizes can leverage information to compete.
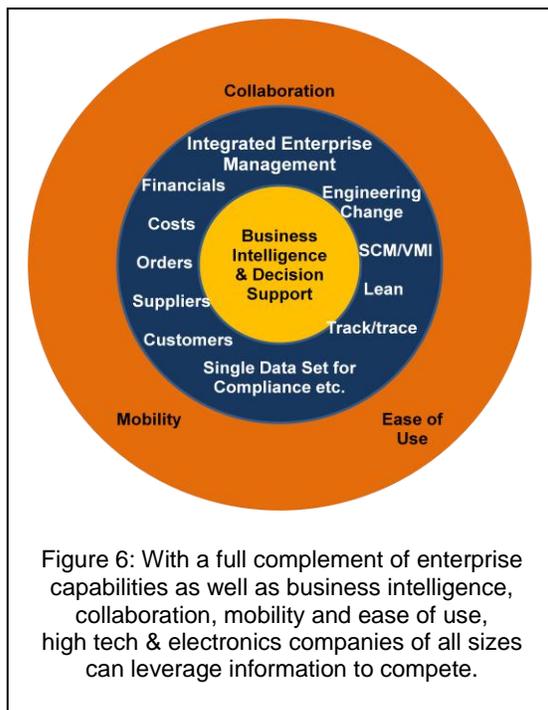
processes, even companies that were the weakest links in the HT&E supply chain can now successfully partner with others to bring new innovation to market faster, demonstrate their sustainable performance, and partner collaboratively for mutual benefit.

There was a time when only the largest of HT&E manufacturers could afford to implement the best and broadest enterprise systems. This is no longer the case. Having a business strategy in place that includes how to use IT and business systems to full advantage needs to be included in every high tech and electronics manufacturer's playbook for success.

About Cambashi

Cambashi, based in Cambridge UK and Cummaquid MA, provides independent research and analysis of the business reasons to use of IT in industry world-wide. Its specialist fields include Engineering, Enterprise, Plant, and Supply Chain applications and the infrastructure to enable industrial firms to use IT effectively. Cambashi publishes market size estimates in the Engineering Applications Market Observatory and multi-client studies in Cambashi's Industry Directions. Its clients vary in size from small to large and include most of the leading software vendors and many pioneering IT users. Cambashi is a member of CATN, an international association of consultants. www.cambashi.com

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