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Third Generation E-Business and the Supply Lattice

Online commerce is drawing a greater share of customers and markets. Although automated back-end systems and user-friendly Web interfaces are improving customer relationships, this is only the earliest step in an online revolution. The next step is to solve the main problem of the supply chain, which is the efficient incorporation, integration, and utilization of information provided by multiple suppliers. Supply Chain Management should give people a greater governing role in defining business rules. E-business applications will automatically integrate the information, sort it, apply the rules, and make decisions, thus automating your ability to react.

Every day companies like Amazon.com, Dell Computer, and Federal Express are winning customers and earning market share by shifting commerce online. Automated back-end systems, combined with user-friendly Web-based order interfaces, are streamlining operations and creating innovative customer relationships. But this is just the beginning of the Web revolution.

In the next generation of Internet business, companies will solve a major supply-chain problem – how to efficiently incorporate, integrate, and utilize the rich inflows of information provided by multiple suppliers. Purchase agents must still manually enter and track every product order they make. What's more, they must check with numerous supplier representatives and Web sites in order to ensure that they have the latest information about pricing and availability. Services such as e-mail notification do little to streamline operations, since these data do not integrate into customer systems.

Let me give you an example. Believe it or not, Intel now has 650,000 known suppliers of everything from chip wafers to hotel rooms. With so many, you'd think our goal would be to greatly reduce the number for easier administration and lower overhead. In fact, we're looking to e-business to expand that number by automating our supply chain. To find the best suppliers, we want our computer applications to do the tedious work of running through all the possible combinations of all those suppliers.

A staff member might consider a few scenarios that combine two or three suppliers to fill a need, but the computer can come up with a combination of say, 57, that, over the next five days and 3,000 separate purchase orders, fills our need for the best price and availability.

In most of today's e-business supply chains, the human is a processor in the system. In Supply Chain Management, he or she has to look at a series of Web screens, integrate the information, perhaps by cutting and pasting between different applications, and get back on the Web to implement the decision. Our vision for Supply Chain Management is to give people a greater governing role of defining business rules. E-business applications will automatically integrate the information, sort it, apply the rules and make the decision, thus automating your ability to react.

The Generations of E-Business

The evolution of e-business has already passed through two important generations. In the first generation, companies established a static presence on the Web, publishing HTML-based Web sites that serve as online catalogs. In the past two years, innovative companies have launched second-generation e-business programs, linking their Web front-ends with back-end order management and inventory control systems. Such deployments let the customer place and track orders directly from a company's Web site, reduc-

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ing transaction costs and giving customers more control over the order process.

This second generation of Internet business is largely vendor-centric, in that it centers on the ability of vendors to automate internal processes and link them to customers via the Web. By linking Web sites to back-end systems, vendors can display up-to-the-minute information about inventories, pricing, and order and shipping status. A growing universe of tools and utilities has allowed businesses to Web-enable their back-end systems, linking even complex ERP applications such as SAP and Baan to easy-to-use Web-based interfaces.

In the final phase of the e-business evolution – the third generation – vendors extend the benefits of automation to their customers. Vendors not only deliver information directly into customer systems, they facilitate transactions triggered by events communicated between computers. Companies engaged in third-generation Internet business conduct business programmatically, applying sophisticated business rules to control activities like pricing and purchasing. The result? Vendors adopt a customer-centric approach that employs automation to deliver maximum competitive value to external customers.

The Vision of the Third Generation

The benefits of third generation e-business become apparent when you look at the multi-faceted nature of business relationships. An individual may buy his or her

books from a single vendor, but a manufacturer typically sources individual parts from multiple vendors in order to ensure timely delivery and competitive pricing. What's more, the manufacturer purchases thousands of different products for its various manufacturing and business operations. If every vendor presents a distinct order interface, it becomes very expensive for the customer to adapt its personnel and business systems to each case.

Third generation e-business automates that complex mesh of business relationship that can best be described as a supply lattice. Rather than manually scanning vendor Web sites for updated pricing information, for example, customers automatically receive pricing updates in formats tailored to their internal systems, and send similar data out to their customers, creating a lattice of connections rather than a linear supply "chain." Applications then act across the lattice on updated data and take actions based on business rules. Humans set the parameters of decision-making through business rules, but machines are taking the actions.

Consider a business that uses an application to monitor in-house inventory. When inventory levels for a product become low, the application sorts through possible actions to determine the most profitable course. The program draws on a continuous feed of product pricing from numerous vendors to determine the best mix of price and availability among its suppliers. The system might even split the order, taking a rush shipment of product at a higher price to fill the immediate inventory shortfall. The remainder of the order is then placed at a lower price with a vendor who can deliver product later in the week.

Another example of a third-generation supply lattice: Say a customer cancels an order for 500 widgets. With a glut of inventory, the widget manufacturer sends an event notification across the Web, computer to computer, to all its widget customers: "If you place an order with me in the next 15 minutes, I'll give you the widgets for half price." One customer receives that event and immediately issues another event to its customers: "If you will buy 500

widgets, you can have them at 25% off." One of those customers receives the event and replies, "I will buy those," and the company that got the acknowledgement sends its order to the manufacturer, buying the widgets. The whole process could take 15 minutes and occur at 3 a.m. in the morning.

With customer-side integration, then, as soon as you receive the event you can make a decision, because your automated response generates another event. Such e-business links can be the source of significant competitive advantage. Even if your widgets are more expensive, the net cost of buying from you can be cheaper if the right connections are in place. And if you and your competitors all sell widgets that contain a key ingredient from the same supplier, and the supplier changes its price, you gain an edge by being the first to inform your customers about the price change in a way they can react to.

Making Supply Lattice Connections

Of course, this kind of hands-off interaction takes loosely-coupled, flexible applications with embedded service interfaces, replacing rigid standards such as electronic data interchange (EDI). The result? Business systems interoperate, while protecting core systems from the vagaries of both customers' systems and Internet connections.

By enabling intelligent interaction and failable links among customers and vendors, third-generation applications can construct the supply lattice mentioned earlier. This complex mesh of business linkages enables a change at any one company to be communicated and reflected at all the connected companies. So a price shift at a vendor will not only be reflected among a community of customers, it will kick off a change in the way those customers interact with other vendors as they seek the best terms for their purchases.

With this supply lattice in place, the stage is set for new species of transactions. Low transaction costs can increase the granularity of transactions, enabling micro-transactions that today are too triv-

ial to conduct. A company might employ micro-transactions to fine-tune inventory levels to squeeze efficiencies out of a just-in-time (JIT) purchasing system. On the other side of the coin, long transactions will enable customers to place a tentative hold on products and services months in advance, enabling them to arbitrage among numerous sources to gain the most advantageous terms.

We can create such applications today using existing software technologies to perform broad-based data exchange. For example, component model technologies such as Microsoft's Component Object Model (COM) and Sun's Enterprise JavaBeans enable developers and corporations to craft modular solutions that link together applications and services. In the years to come, independent software vendors (ISVs) will react to the emerging market opportunity and provide a rich selection of component solutions. The result: Companies will soon be able to buy, license, or craft sophisticated component-model solutions to enable third-generation e-business deployments.

Additionally, XML technology enables broad, machine-based interaction. XML is being used by organizations such as the RosettaNet Consortium to craft an agreed-upon way to exchange information within the technology products industry. The arrival of new software integration tools from ISVs will soon make this task easier.

The result will be a new species of compound applications that embed elements of other applications. That way, customers can accept software components from vendors and integrate event-driven communications directly into their business applications. Purchase agents no longer need scan vendor Web sites to track price changes – rather, the change is pushed directly to their application via an embedded component.

Balanced Computing

Compound applications, event-driven communications, and loosely coupled business solutions put a premium on processing power. From the server to the client, every link in the supply lattice must rapidly acquire, process, and act on constant streams of data. In fact, the ability of an enterprise to compete will depend largely on the computing infrastructure and how quickly it reacts to market conditions.

Which vendor can most rapidly produce price updates based on changes to physical inventory and world markets? Which customers can best link to a wide array of suppliers and effectively arbitrage orders in order to garner best pricing and delivery? First-mover advantage will depend on a balanced distribution of computing power in the enterprise.

Intel calls this the balanced computing model. It is a new way of combining traditional compute models to meet emerging information delivery needs. Balanced computing combines existing server-centric, network-centric, and connected PC compute models to enable businesses to distribute applications and information to many diverse constituents.

The dynamic interaction enabled by these emerging solutions will have a seismic impact on business practices and expectations. Ultimately, customers will look beyond product quality, competitive pricing, and service when selecting vendors. They will seek out suppliers who make their enterprise more competitive. That means suppliers must work to integrate their internal business systems with customers in order to speed the pace of business and wring new efficiencies out of the supply lattice. An emerging class of solutions is even now arming companies with the tools they need to join the third generation of Internet business.