Online logistics: The challenge of moving atoms

Globalization and the move to e-commerce have challenged logistics with demand for smaller loads, more shipments and faster delivery. At the same time, technologies such as business analytics, global positioning systems (GPS), decision support, biometrics and online collaboration have opened up new opportunities to increase shipping efficiency and reliability, while maintaining requirements for controlling and safeguarding shipments. The key to success for retailers, manufacturers and others that depend on shipping will be integration of systems along the supply chain continuum and the ability to both collaborate and outsource.

The artist B’Cose Davidson sold every one of his sculptures during his lifetime. As museum curator, your goal is to bring them together for the first time in an international exhibit. The challenge is formidable. Only 10 survive, kept by collectors at locations scattered across six different countries. Each piece is worth several hundred thousand dollars. They are fragile, and -- carved from the best chocolate in the world -- delicious. You'd eat them yourself, given the chance. They need to be packed, cooled, tracked and protected without breaking the museum’s budget. With some trepidation, you post your requirements on the online logistics site.

Many vendors are attracted to the opportunity. After your insurance company narrows the list, you look more closely at the bids. In every case, multiple firms are involved, including trucking, air freight, packing and security companies. With the memory of the vibration damage done to the Book of Kells (a manuscript written in the eighth century) fresh in your mind, you look over the offers in detail. No trucks that carry salami will be allowed. Sensors must be attached to each package to constantly monitor the location and temperature of the parcels. Biometrics must be used to verify the identities of all personnel. It all comes together, and you strike a deal.

How this happens

Music, programs, money and text happily travel through cyberspace, but humans don’t live by data alone. Ultimately, food, electronic devices, spare parts, passengers and even papers need to move from here to there, which means trucks, ships, trains and airplanes will not become obsolete in the near future. In fact, in the U.S. alone, the logistics market is over $900 billion annually and growing. With new buying patterns -- especially e-commerce -- the demands on the shipping industry for smaller, quicker, individual household deliveries have
created new strains, pushing unused capacity across the U.S. to nearly 20 percent, for a loss of about $165 billion. Losses extend beyond moving merchandise. Even companies with excellent logistics capabilities often use less than half of their warehouse capacity.

One attempt to solve these emerging problems is the creation of online logistics exchange markets. The online logistics market is already at $150 million today and is estimated to grow to $3 billion by 2004. How does e-business lower the costs and improve the quality of the process of moving material things?

There are at least four key areas of logistics that are relevant to information technology: efficiency, integrity, reliability and commitments.

**Efficiency**
No one wants to pay for shipping, so costs need to be contained by timing, consolidation of shipments and sharing assets (space on a vehicle or in a warehouse) with other firms and allocation. Sites such as Freightquote.com and Transpeed Group help bring clients together so less capacity goes to waste. One key to the success of such aggregators is Extensible Markup Language (XML), which makes sharing data between diverse organizations more transparent. As things become more complex, efficiency can also be gained by using business analytics. Taking advantage of massive computing power and advanced algorithms, American Airlines and other carriers have used this technology to schedule equipment and personnel. As shipping becomes more complex, business analytics holds the potential for optimizing those shipments.

**Integrity**
The first step in protecting shipments from pilfering and damage is ensuring proper labeling and chain of custody controls so that shipments are transferred, packed and maintained properly. Signatures have long been a standard for control in logistics, and, by capturing images of signatures electronically with handheld computers and making these signatures viewable to clients online, United Parcel Service has reduced customer service calls by 25 percent. In the future, biometrics will allow such sign-offs to be qualified as well as captured. In addition, using sensors and GPS can help to assure proper treatment of packages (e.g., appropriate temperature controls, careful handing of fragile shipments) and to locate those that go astray.

**Reliability**
A reputation for timely deliveries is a key differentiator for vendors (especially e-commerce) and is a prerequisite for just-in-time approaches to manufacturing and service. The necessary logistics include tracking (accessible online), scheduling, coordinating and monitoring. Online shipment tracking is no longer an option for carriers. UPS saw a jump to 3.2 million tracking requests per day in 2000 (an increase of 182 percent from 1999), and, through its OnLine Tools, has moved this capability closer to customers by embedding package tracking into client Web
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sites. In the future, wireless technology will play a role on both ends of this process as packages signal their locations with GPS and customers receive updates via cell phones and personal digital assistants (PDAs). Business analytics can constantly update and coordinate shipments, rerouting around snowstorms and traffic snarls so that packages arrive on time, and advanced workflow tools can help ensure that steps in the process aren't missed.

Commitments
Documentation can be one of the biggest logistical challenges because of legal requirements (import/export regulations, taxes, restrictions on dangerous and controlled materials) and the need to verify payments and fulfillment of contractual obligations. Shipments intended for export may require dozens of additional documents. Decision support can be used to help ensure compliance with the numerous commitments. Expert finder systems can help connect with the right person to resolve exceptions. Contract management software is a key differentiator for Nistevo Corporation, helping companies to quickly arrive at "rules of engagement" (e.g., who is responsible for paying for additional miles for specific cargo). Of course, to get full value from IT investments in handling logistical commitments, government needs to participate as fully as industry does. U.S. Customs is currently updating these systems so that they can handle e-commerce/globalization volumes and the new requirements of e-business.

Major improvements to the logistics process will come by going beyond end-to-end, reaching out in all directions to share data and capacity. According to Dr. C. John Langley Jr., Dove Distinguished Professor of Logistics and Transportation at the University of Tennessee, collaborative logistics depends upon "Seven Immutable Laws."

Collaboration must:

- Result in real and perceived benefits to all members
- Allow members to dynamically create, measure and evolve collaborative partnerships
- Support co-buyer and co-seller relationships
- Provide flexibility and security
- Maintain collaboration across all stages of business process integration
- Support open integration with other services
- Uphold collaboration around all five of the essential logistics flows (information, products, documents, assets and capital)
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The benefits of supporting such collaboration include reduced administration costs and increased capacity utilization because of the many synergies among the players. As this collaboration expands across geographies and industries, Metcalfe’s Law takes effect, increasing value in proportion to the square of the number of users.

What this means to you
Many businesses are feeling pressure to invest in or outsource logistics, because the costs of traditional approaches are growing and the potential for saving money through efficiency is rising. General Mills estimates it can save $800,000 annually just by sharing truck space. Overall, the back haul opportunity for trucking is estimated at five to 18 percent of the costs; numbers that are appealing especially in a slow economy. However, many of the major financial benefits and potential improvements to quality are not yet within reach. In particular, the promise of optimizing logistics across a large and complex system complete with realtime data is not likely to be realized in the short term. But with alliances already forming and a business justification in place, the limits are primarily technical. Once the appropriate infrastructure and models are in place, adoption should be rapid.

Two industries: Retail and transportation
Logistics has always been a key competitive factor for the retail industry. Leaders have based their success on superior, IT-driven logistics. Merchants that exist primarily on the Web are particularly vulnerable to logistical failures, and many dot-coms have gone bankrupt or been bought out by a bricks-and-mortar competitor because they couldn’t solve this problem. Collaborative logistics will provide unheard of efficiencies for retailers and allow them to react more rapidly to market changes. For small startups, well-developed outsourcing opportunities will ease entry into the market.

For the transportation industry, online logistics could become the key to survival. In the short term, those that solve the growing back haul problem will have a large advantage over competitors. Longer term, customer expectations for reliability, on-time delivery, import/export capability, reasonable costs and ability to share data in near realtime are likely to separate winners from losers.

Tek to watch

- Decision support
- Wireless
- GPS
- Workflow
- XML
- Encryption
- Pervasive computing
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Other sites of interest

freightquote.com

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Nistevo Corporation

Precision Software

SAP

Transpeed Group

UPS Logistics Group
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About this publication

*Executive Tek Report* is a monthly publication intended as a heads-up on emerging technologies and business ideas. All the technological initiatives covered in *Executive Tek Report* have been extensively analyzed using a proprietary IBM methodology. This process involves not only rating the technologies based on their functions and maturity, but also doing quantitative analysis of the social, user and business factors that are just as important to its ultimate adoption. From these data, the timing and importance of emerging technologies are determined. Barriers to adoption and hidden value are often revealed, and what is learned is viewed within the context of five technical themes that are driving change:

**Knowledge management**

Capturing a company's collective expertise wherever it resides -- databases, on paper, in people's heads -- and distributing it to where it can produce the big payoffs.

**Pervasive computing**

Combining communications technologies and an array of computing devices (including PDAs, laptops, pagers and servers) to allow users continual access to data, communications and information services.

**Realtime**

"A sense of ultra-compressed time and foreshortened horizons, [a result of technology] compressing to zero the time it takes to get and use information, to learn, to make decisions, to initiate action, to deploy resources, to innovate." (Regis McKenna, *Real Time*, Harvard Business School Publishing, 1997.)

**Ease-of-use**

Using user-centric design to make the IT experience intuitive, less painful and possibly fun.

**Deep computing**

Using unprecedented processing power, advanced software and sophisticated algorithms to solve complex problems and derive knowledge from vast amounts of data.

This analysis is used to form the explanations, projections and discussions in each *Executive Tek Report* issue so that you not only find out what technologies are emerging, but *how* and *why* they'll make a difference to your business.

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