

Electronic Freight Management

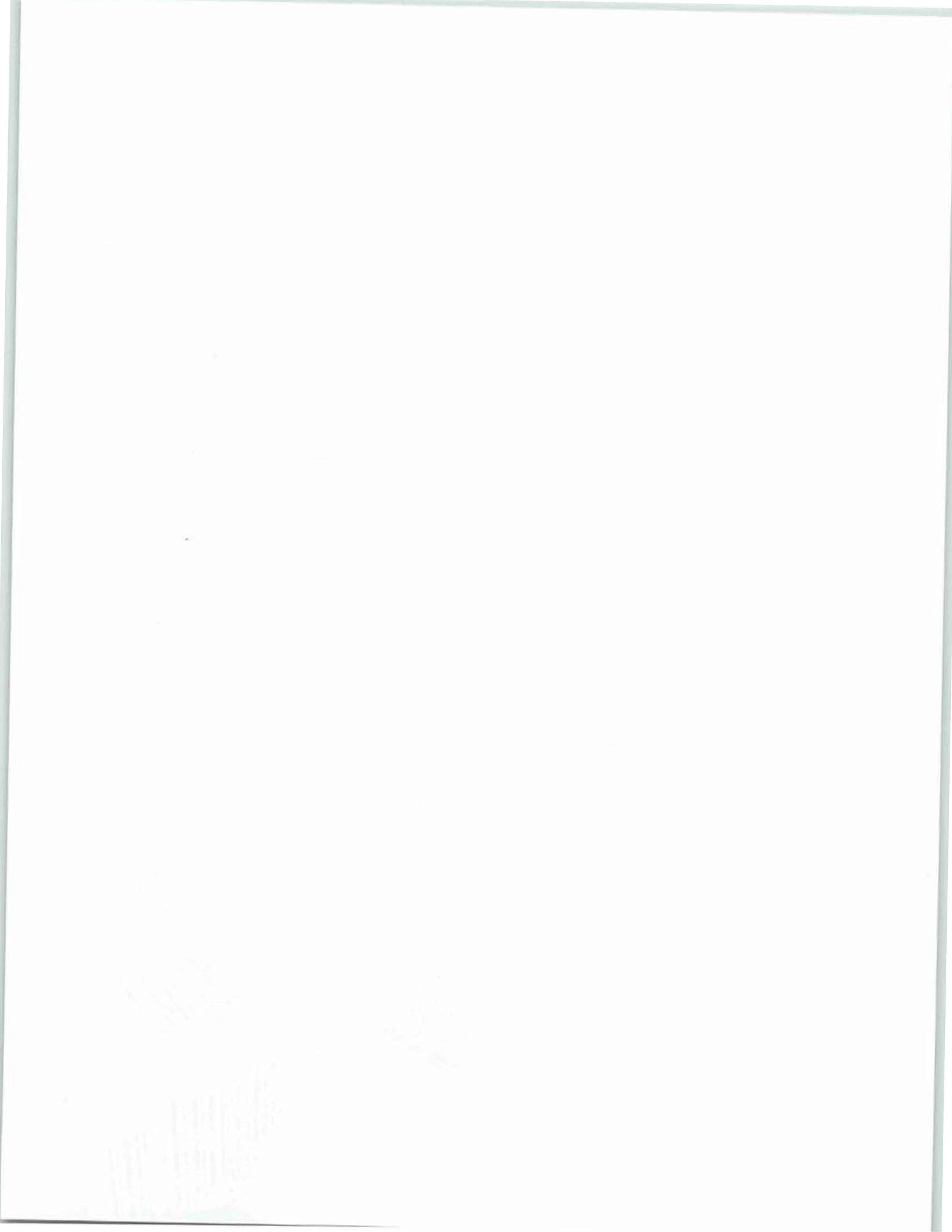
Providing Supply Chain Visibility for All



Accurate, visible information provides supply chain partners with the actionable intelligence they need to improve operational efficiency and increase responsiveness in a fast-paced global business environment. Without this information, supply chain partners can face delayed shipments, disrupted assembly lines, congested cargo transfer points, and stressed inventories.

Many large firms use logistics software and electronic data exchange to standardize data flows, but small to medium-sized firms often do not because of the high implementation cost and technical expertise required to use effectively the software and standards. The Electronic Freight Management (EFM) initiative offers in-transit visibility to all supply chain owners, from large to small; it was specifically designed to provide a positive return on investment (ROI) for small and mid-sized supply chain partners. All supply chain partners can use EFM—from shippers to third party logistics providers (3PL) to customs brokers—creating a truly integrated, “shared view” of the status of shipments across the globe and helping to increase the competitiveness and the effectiveness of the supply chain.





What is Electronic Freight Management?

The EFM Initiative improves the efficiency and productivity of freight movements by promoting innovative e-business concepts that support coordination and information sharing among supply chain partners. EFM is an open-architecture, Internet-based solution that allows supply chain partners to efficiently track freight shipments as they move through the supply chain. EFM provides shippers—the supply chain owners—with visibility to meet very tight performance standards and improve operational efficiencies. The EFM initiative provides a cost-efficient and easily adoptable information sharing alternative for small to medium-sized firms that currently use fax, email, or telephone for the majority of their communications with their supply chain partners; it is more affordable and less complex than existing data exchange approaches.

EFM offers uniform access to existing customized database formats, computing platform independence, and adaptable services. EFM allows each supply chain partner to exchange data with other supply chain partners via Web services using eXtensible Markup Language (XML) data standards. The framework employs secure encryption and digital certificates, ensuring that any information exchanged between partners is authorized, that data are not corrupted in-transit, and that the data transmitted are complete. EFM provides a gateway for automated interfaces and software capabilities to support computer interactions over the Internet.

More information on EFM including a free EFM package is available at www.efm.us.com.

EFM Streamlines Communications

	Without EFM	With EFM
Data Entry	Redundant data entry	Enter data once, and processed many times
Reporting	Manually-prepared reports	Process automated data to generate reports
Shipment Documentation	Restricted document distribution—hard copy or Electronic Data Interchange (EDI)	All documents available electronically to all partners
Status Updates	Phone calls and emails of shipment status	Automated status inputs from existing systems of carriers and other partners
Data Formats	EDI via fee-based value added network	XML data in standard form over the Internet
Communications	One-to-one communications with partners	Network collaboration for many-to-many exchanges with partners
Software	Developed or purchased software and central database	Free Web services and related software without central database

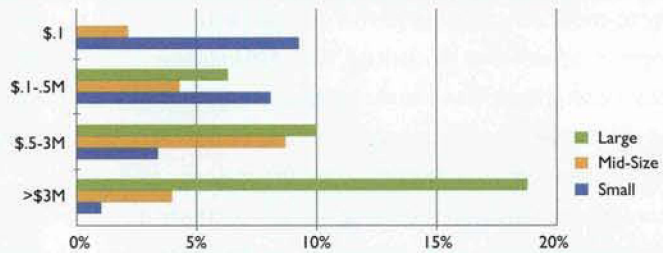


Who Benefits from Using EFM?

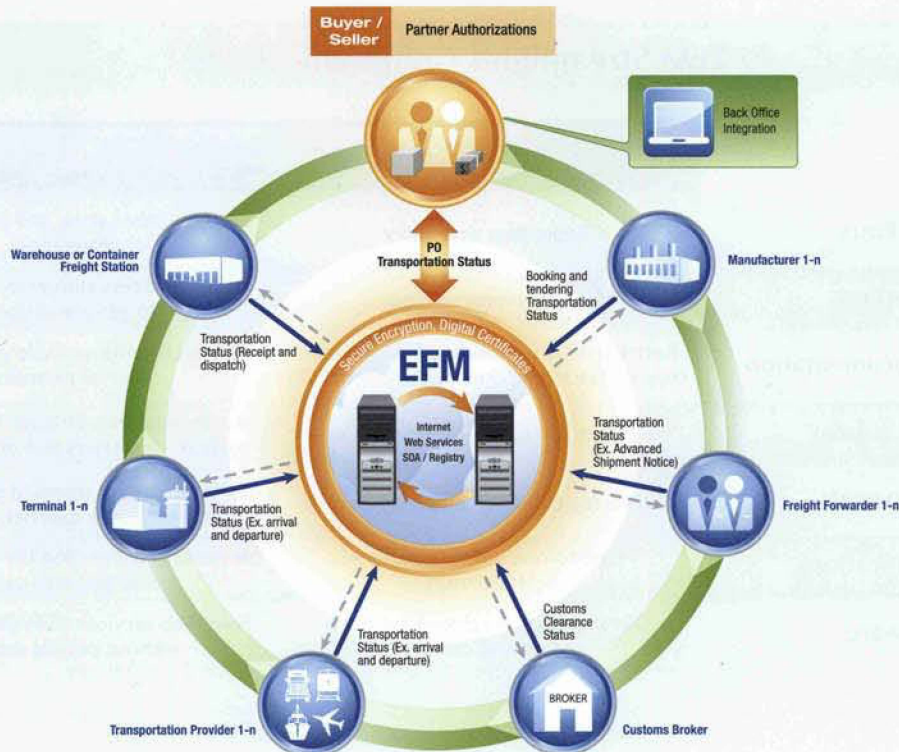
All supply chain partners can benefit from using supply chain visibility tools like EFM. While as few as two partners in the supply chain can benefit from using EFM, the value and operational efficiencies grow as more supply chain partners link into EFM. As more partners adopt EFM, fewer manual transactions are required; a more complete "shared picture" among partners enables better and more responsive decision-making.

Consider a 2008 study by the Aberdeen Research Group, which surveyed 349 U.S. businesses across all industries that use supply chain visibility software. While this survey revealed that large businesses achieve most of the large dollar benefits, there were enough small and mid-sized businesses achieving quantifiable benefits to show that such businesses can and do benefit from technologies like EFM. With well less than half of companies reporting benefits, the data shows that there is a need for an EFM solution and that such a solution is in line with industry trends toward implementing improved visibility solutions.

Quantified Benefits of Surveyed Companies



EFM - Captures Data Once, Uses Many Times



What Kind of Benefits do Users See?

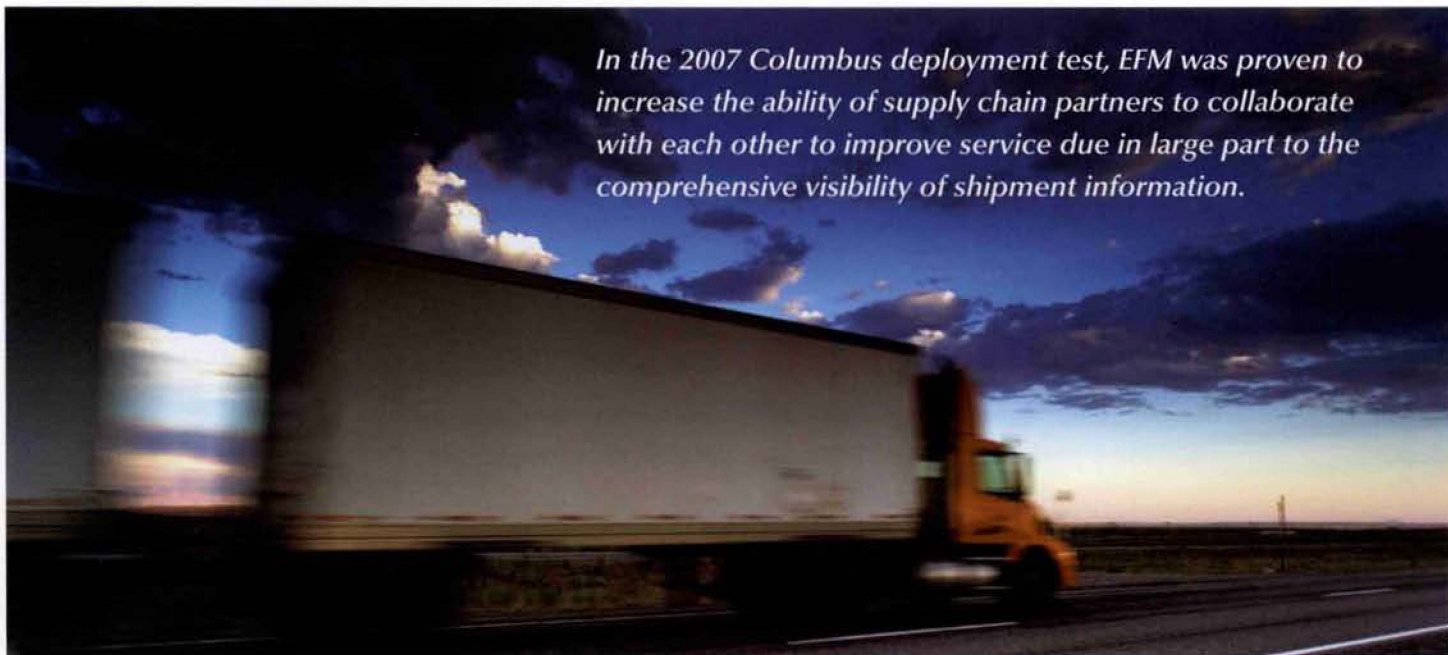
The Limited Brands' 2007 Columbus test deployment of EFM (CEFM) showed significant benefits to the company's international air freight supply chain partners in the areas of productivity, service quality, and data quality and availability. More information on this test is available from the references listed on the back cover:

Productivity

- Asian manufacturers in CEFM reduced time spent booking and tendering purchase orders (PO) by 75 percent (5 minutes per PO).
- CEFM freight forwarders achieved a 65 percent reduction in labor on pre-alerts (76 minutes per day). Forwarders also received booking data 1 day earlier, improving shipment planning. Reductions in forwarder report preparation and distribution center priority shipment processing saved \$173/day. Reductions in airline research saved 28 minutes and reductions in daily status report preparations saved 178 minutes.
- The container freight station (CFS) in Columbus experienced 6 percent fewer errors at \$4/error correction, or \$24/day. Further, CEFM saved \$3/error, or \$16/day, in reduced EDI corrections.
- Throughout the supply chain, CEFM's automated status message feature reduced information exchanges from 22 to 16, and reduced manually-initiated exchanges from 15 to 2.

Other likely productivity benefits of EFM implementation are:

- Container freight stations can dynamically allocate inbound inventory, resulting in more efficient warehouse capacity planning.
- Distribution centers with more precise and up-to-date knowledge of when shipments will arrive and when they need to be shipped out to customers can increase cross docking. This increased knowledge leads to reduced temporary shipment storage and re-handling.



In the 2007 Columbus deployment test, EFM was proven to increase the ability of supply chain partners to collaborate with each other to improve service due in large part to the comprehensive visibility of shipment information.



- Productivity is improved across the board when automation is used to eliminate process steps, reduce the time it takes to perform tasks, and make it possible for lower skilled workers to perform higher level tasks.

Service Quality

Because of automated shipment status data received from CEFM, brokers processed 18 percent more shipments each week.

- Supply chain owners saved \$11 per day by reducing time in researching priority shipments by 27 minutes per day. Visibility technologies like EFM promote high quality customer service, which is vital to retention and growth in the customer base.
- EFM can help reduce out-of-stock conditions for shippers, which keeps service quality high while reducing a firm's cost and effort to manage the supply chain. Such improvements reflect an agile supply chain that is capable of adapting quickly and easily to customer needs and supply chain disruptions while facilitating corrective actions.
- Because EFM allows supply chain partners to gather event data from internal sources and trading partners, key users are quickly alerted when anomalies occur in the supply chain.
- Knowing when there will be a delay in shipments allows shippers and other partners to implement postponement strategies so that later production

steps are better scheduled to match demand; this would not be possible without up-to-date visibility of location and anticipated arrival of shipments.

- Improved visibility results in less opportunity for shipments to be delayed en route, reducing potential exposure to theft and other security threats.
- If a shipment is lost or stolen, improved visibility enables a supply chain manager to learn about the problem and quickly develop a proactive solution.

Data Quality and Availability

- All partners received Advanced Shipment Notices (ASN) (versus only a few with EDI), and the ASN was generally available 6-8 hours earlier than through EDI. In addition, EFM messages were 90 percent accurate or better, whereas EDI accuracy was only 65 percent.
- Customs brokers received shipment information 4-6 hours earlier with EFM, allowing clearance processing earlier.
- The CFS reduced the number of trips from the warehouse floor to the office to investigate missing or incorrect data. Improvement in data availability on warehouse floor allowed better staff planning and forecasting of workload.
- Freight forwarders received direct, near real-time airline status information that had not been available before.

“EFM offers supply chain partners increased shipment visibility by producing real time status information by as much as 48 hours over current systems in place. The system setup cost is between a third and one-half the cost of traditional EDI systems and is easy to setup and connect.”

Rick DeShone, President, Codeworks, LLC



Using the estimated hardware, software, and implementation levels-of-effort associated with deploying EFM in different types of companies as well as estimated annual software maintenance costs and the per-shipment savings identified during the actual 2007 use of EFM in Columbus, the ROI for EFM has been estimated for three sizes of companies and shown in the table below. These ROIs indicate the value of implementing the three models of EFM.

Having access to up-to-date information about orders and shipment status at each step in the supply chain

is an ideal means of improving productivity. Visibility technologies that leverage the EFM initiative turn this ideal into a reality that partners throughout the supply chain can leverage to improve their efficiency. Enhanced information availability is useful in arranging transportation with carriers and managing shipments as they move from origin to destination, resulting in reductions in shipment transportation and administrative costs, transit time, and improvements in inventory and shipping.

Estimated Return on Investment for Companies Using EFM

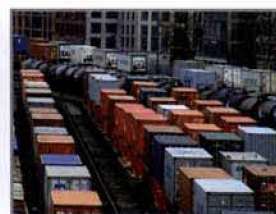
	Small Company (Portal model)	Mid-Sized Company (Hybrid model)	Large Company (Integrated Model)
Annual Cost Savings at \$5.94/shipment	\$6,000	\$178,000	\$594,000
Required Investment in IT (initial)	\$7,000	\$121,000	\$162,000
Total 5-year benefits	\$25,000	\$730,000	\$2,400,000
Total 5-year costs	\$9,500	\$450,000	\$835,000
5-year ROI	257%	162%	292%
Average Annual ROI	51%	32%	58%

The following points should be considered when reviewing the data in the above table:

NOTE 1: Estimated by the CEFM Evaluation and Deployment teams in March 2007; updated in March 2008.

NOTE 2: Per-shipment cost savings assume a truck-load or container level shipment size.

NOTE 3: The per-shipment savings may vary among small, medium and large companies.



EFM Brings Efficiencies to All Supply Chain Partners

During the CEFM deployment, independent evaluators found that shippers, freight forwarders, container freight stations, and customs brokers, among others, experienced a wide variety of specific productivity, service quality, and data quality and availability improvements. Data was extracted from each partner's existing system if available, and there was no data entry after the shipment origination by the manufacturer. These improvements both benefitted the individual partners and improved the overall efficiency and productivity of the supply chain as a whole, since data was entered once and used many times.

Shippers

Based on the CEFM deployment, evaluation results indicate that the EFM initiative is ideal for small- to medium-sized shippers that use fax, email, or telephone for the majority of their communications with their supply chain partners. Such companies, which typically rely on largely manual processes, could enjoy a significant improvement in data accuracy and a decrease in the amount of labor necessary to manage their supply chains.

Shippers may also derive indirect benefits from the savings other partners experience from using EFM. Being able to determine where a shipment carton is while en route can result in operations decisions that improve efficiency, leading to decreased costs.

Freight Forwarders

In CEFM there was a potential for a variety of labor savings and other benefits related to improved visibility for freight forwarders, including:

- Access at least 1 day earlier to manufacturer booking and tendering data for the Hong Kong-based forwarders, allowing the forwarder to plan for shipment receipt and to forecast workload and function more efficiently.
- Access at least 3 days earlier to manufacturer booking and tendering data for the Columbus-based forwarders.

In addition, the supply chain process before CEFM relied on a series of manually prepared status spreadsheets that were updated each day by the Columbus forwarder using data from their Hong Kong counterparts. With data provided by CEFM, the Columbus office could prepare reports about shipments 4-6 hours earlier than without CEFM. Also, arrival data is available to partners as soon as it is posted to the logistics provider's system, allowing the logistics provider and or/shipper to make improved decisions about truck load planning.

Container Freight Station

In the CEFM deployment, the container freight station integrated the EFM framework with its existing logistics system. The results of this decision were striking. Improved data accuracy at the container freight station meant a reduced occurrence of missing data on the warehouse floor, and therefore a reduced number of trips to the office to verify data. Data availability improved in the warehouse from 80-85 percent for non-CEFM freight to 90-95 percent for CEFM shipments. Knowledge of airline departure information for a shipment also allowed managers to more effectively plan their staffing resources in advance.



Customs Broker

Prior to the CEFM deployment, nearly half the shipments arriving at the container freight station were discovered not to have received customs clearance. Lack of timely notification of overseas airline departure resulted in an inefficient use of weekend staff at the customs broker; a Monday morning shipment backlog, and increased delay in submitting release documentation to U.S. Customs and Border Protection.

CEFMs automated airline departure and arrival information on both the automated and on-demand status reports virtually eliminated the delay at the

customs broker related to late flight notifications. With EFM, brokers can obtain electronic verification of "Wheels Up" in near real time, thus improving customs documentation processing. Shipment status reports available to customs brokers within CEFM were available at least 4-6 hours sooner than previous reports, providing brokers with additional time to plan for and arrange customs clearance documentation. Brokers also can save 15-30 minutes of the 1-3 hours it takes to prepare a customs filing, which may yield a potential savings of 8-25 percent.

Building upon the success of the Columbus EFM deployment test, US DOT and the EFM integration team began working with Demdaco in Kansas City in 2008 to implement their deployment of EFM, the goal of which is to improve the visibility of inbound ocean container shipments. Demdaco's objective for the deployment is to integrate EFM with its own systems and have complete status information in one place and to be able to display most data on a web portal so that small- and medium-sized partners will need little technology to participate. The test deployment will occur over several months in 2009, and will demonstrate several EFM improvement initiatives. The results of both the Columbus EFM deployment and the Kansas City EFM deployment can be found at www.efm.us.com.



Implementation Options

EFM offers several deployment options and can accommodate most existing technology infrastructure. Because EFM can work with the full range of legacy systems employed by most supply chain partners, it can provide in-transit visibility to each, regardless of which integration option they choose.

Most organizations will choose one of the following three high-level implementation options:

Fully Integrated Model

Because EFM is based on a service-oriented architecture (SOA) and web services, organizations that are already using SOA and Web services can choose a fully integrated implementation of EFM into their existing information system architecture and should achieve the full benefits of automation described earlier. A fully integrated implementation includes seamless electronic transfer of key data into a company's own legacy system, eliminating the need to access the data through a separate web-based user interface and to re-key or manually transfer data to the legacy system. The data within a company's internal logistics system can be automatically populated and updated using EFM's Web services, so there is no need for a Web-based user interface and the user can take advantage of existing familiar screens or output reports. In CEFM, however, the fully integrated user found that having access to an EFM user interface made it possible to view transportation status messages and update screens as all the other partners saw them.

Hybrid Model

In a hybrid approach, the implementing company's existing logistics system remains intact and isolated from the EFM. The Web services and SOA are implemented on separate systems and simply link to the organization's existing system. In a hybrid implementation, the existing logistics system acts as the data source while EFM acts as a value-added network that routes consignment

information in a secure environment with XML messaging and Web services transmitting messages.

The hybrid approach is often appealing to supply chain partners who are not ready for full integration with a legacy system, or who prefer a staged transition to EFM. The hybrid approach is not considered to be ideal for the long-term as only full integration provides automated access to all EFM data. Without full integration, data received from EFM partners must be rekeyed into existing systems. The implementation costs of the hybrid model generally fall in between full-implementation and the Web Portal implementation costs.

EFM Web Portal

With the EFM Web portal implementation model, users access the database and Web services via the Web and do not require additional software on the user's system. The Web portal implementation option can provide shipment visibility to users who have no other shipment management or visibility system. In this model, EFM acts as a third party host for the participating partners' functions and data. Use of the Web portal means that partners' data and EFM transportation status messages can be used without further data entry, although providing data or responding to other partners would require manual inputs. Web portal users with legacy logistics systems would have to rekey data to take full advantage of EFM's automated supply chain data. This is the least expensive implementation model, but cannot achieve all of the benefits because of rekeying.



High-level Technical Description

The open architecture and Web services (applications) employed by EFM allow supply chain partners to automate daily business interactions such as status reporting and streamline business processes related to shipment documentation by facilitating cross-agency messaging and by containing a Yellow Pages-like function that standardizes the directories of information on Web services (listing their capabilities, location, input requirements, and expected output or service performed). Because direct partner connections via Web services use the Internet, there is no transaction or network fee as there is when EDI is provided through a value added network.

EFM's SOA is what holds the pieces together and delivers a consolidated view of the supply chain, enabling a big-picture view by making it easier for partners to provide data and then making that data more accessible to users. SOA-enabled systems allow end users to pick the parts—or services—they need from among all installed

systems and to assemble them into a business process that meets specific requirements.

In the CEFM deployment, 21 Java-based Web services were used to obtain, store, and automatically send and receive shipment status information among supply chain partners; store the data separately; and then exchange the data with other trading partners, resulting in a simplified means of communicating and sharing shipment information.

EFM operates on a dedicated server, either a 10 GB virtual machine on an existing server or a separate server; and uses the CentOS5.2 operating system and other free open-source software components. US DOT provides these and other components free of charge in an EFM Package that can be downloaded from the EFM website. The Package and components are described in more detail in documents available at www.efm.us.com.

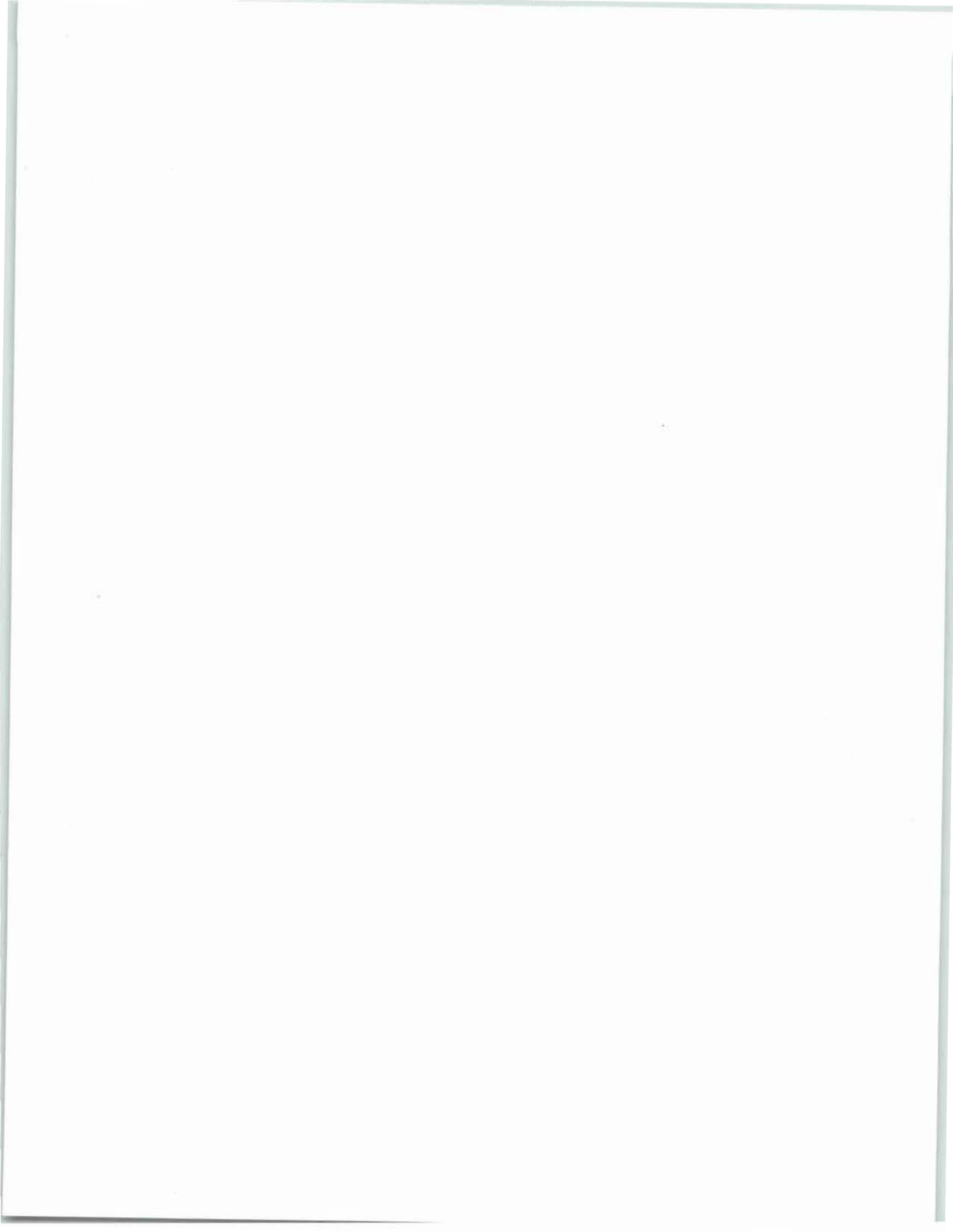
An Equation for Success



“EFM...was the most compelling illustration of the concept of service-oriented architectures in practical use that I've ever seen. It's the most useful combination of SOA and electronic documents (UBL) that I can imagine...”

Jon Bosak, Distinguished Engineer at Sun Microsystems and founding member of OASIS, which organized and led the working group that created XML







If you would like to learn more...

- The EFM Website includes explanatory documents and a free software implementation package that can be downloaded: www.efm.us.com.
- The Final CEFM Independent Evaluation Report, prepared by SAIC and North River Consulting, was published in June 2008 and is available through the FHWA electronic document library: http://www.itsdocs.fhwa.dot.gov/JPODOCS//REPTS_TE/14442.htm
- The USDOT publication Public Roads published an informative article on EFM in January 2009: <http://www.tfhrc.gov/pubrds/09janfeb/06.htm>

For more information, visit:

- USDOT Research and Innovative Technologies Administration (RITA) web site: <http://www.its.dot.gov/efm/index.htm>
- RITA Benefits Data base information: <http://www.itsbenefits.its.dot.gov/its/benecost.nsf/SummID/B2009-00590>
- USDOT EFM Points of Contact: <http://www.resourceguide.its.dot.gov/default.asp?SID=3&SSID=2>

