Electronic Freight Management (EFM) & Cross-Town Improvement Project (C-TIP)

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Office of Freight Management
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The Challenge

Freight volumes will continue to grow

Capacity expansion has not kept pace

Maximize efficient use of existing capacity
**FHWA Mission**

*To improve mobility on our Nation's highways through national leadership, innovation, and program delivery.*

System Performance – The Nation's highway system provides safe, reliable, effective, and sustainable mobility for all users.

- Objective 2 — Performance Improvements: Make significant improvements to critical aspects of highway system performance (safety, congestion, reliability, infrastructure condition, air quality, user satisfaction, and emergency response).
  - 2.2 Evaluate causes of congestion and develop deployable tools, options, and solutions that reduce congestion.
  - 2.4 Improve highway system reliability through operations, intermodal integration, and increased multijurisdictional institutional capacity and cooperation.
What is EFM?

**EFM Goal:** Improve the efficiency and productivity of freight movement through better sharing of information and collaboration of supply chain partners.

**US DOT Role:** Provide a neutral platform for advanced research that is beyond the scope of any one member of the supply chain.
What are we trying to accomplish?

Opportunity for Improvement

Manufacturer's Factory

Distribution Center

Time in Hours = 160

Shipment is in movement

Shipment awaiting physical state change, such as shipment consolidation

Shipment awaiting information exchanges to take place

Target Of Opportunity Using Freight Technologies

Percent of 160 Hour Duration

0 %

20 %

40 %

60 %

80 %

100 %

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How Will We Achieve the EFM Goals

• Provide:
  – Comprehensive shipment information visibility
  – Electronic communication platform
  – Secure and near real-time electronic data management
  – Data standards

• Increase collaboration among supply chain partners

• Enable universal and distributed applications deployment among supply chain partners

• Improve ability to plan for shipment receipt
Integrated solutions are only available in closed systems

Manual Inputs are required to support sharing of data

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Shippers Want Automated Coordination

- Real-time status of orders from the time a Purchase Order is issued until product is delivered – this doesn’t exist in an open environment.
- Visibility, accountability, flexibility, efficiency, performance monitoring
- Secure exchange of data to facilitate decision making
EFM Concept

An Open Information Sharing System with a secure exchange of data to support decision making

EFM Request: What is the status of my order?

Web Service EFM Request

Web Service EFM Reply: Cargo Information

Web Service EFM Request

Web Service EFM Reply: Received Cargo

Web Service EFM Request

Web Service EFM Reply: Arrived Location

EFM Concept
Establish Agreements with Partners
- What data is needed/shared?
- Format for sharing
- Agreed-to security for data/systems

Establish Rules for Governance
- Enforcement of agreements (data quality, content, freshness, access)
- Gatekeeper for new partners
- System enhancements

Need to Connect to All Partners
- Use existing systems
- Each partner responsible for data they create
- No centralized database. View data needed . . . when it is needed

HOW?
EFM Deployment Test: End-to-End Supply Chain

1) Manufactured in Southern China
   - PO’s FOB to FF
   - Mfg arranges Export Customs
2) Trucked to Hong Kong & delivered to Freight Forwarder
3) Air Freight from Hong Kong (HCK) to Columbus OH, Rickenbacker Airport (LCK)
4) Import Customs cleared in Columbus
5) Trucked from LCK to LB’s distribution center
EFM Deployment Test: End-to-End Supply Chain

The Limited Brands
Fortune 250 Specialty Retailer:
Headquartered in Columbus, OH
3,500 Stores Nationwide
$9.7 Billion Revenue

Ops Test
5/31/07 – 11/13/07

Inland China -> Hong Kong -> Columbus

Buyer/Vendor -> Manufacturer -> Outbound Truck -> Freight Forwarder -> Air

Export Customs -> Import Customs

Broker

Limited DC

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Unique Aspects of CEFM Deployment

• Truck-Air-Truck, End-to-End Supply Chain
• Improve shipment visibility and information sharing
  – Service Oriented Architecture (SOA)
  – Web Services
• Implementation of data standards in a logistics supply chain
  – UBL Version 2.0
  – Unique Consignment Reference (UCR) consistent with WCO approach
Web Services in a SOA
W3C Approach
Service-Oriented Architecture
Web Services

• Architecture will lead to more efficient sharing of information among SC partners
  – Enter data once, use many times
  – Improve data quality

• Minimize need for large shipment-related databases
  – SC partners maintain only the data they are responsible for

• Increased shipment visibility
  – Reduce delays associated with waiting on paper
  – Better planning and utilization of capital and labor resources

• Adoption open to ALL users
  – Implementation based on data standards
  – Focus on open system available for all to adopt
21 Web Services Developed

- Purchase Order (publish & receive)
- Generate UCR
- Consignment Booking
- Identify SC Partners (request & reply)
- Status (publish, receive, request, & reply)
- Federated Status (request & reply)
- Open Consignment Status (request & reply)
- Advanced Shipment Notice (publish & receive)
- Receipt Advice (publish & receive)
- Dispatch Advice (publish & receive)
Standardized Messages

- Purchase Order (UBL “consistent”)
- Advance Ship Notice
- Receipt Advice
- Dispatch Advice
- Transportation Status Message
  - Open Consignment Report
  - Messages consistent with UBL v2.0
Service-Oriented Architecture
Web Services

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Consignment Status

Purchase Order: V5554537687
HAWB: ST8023948
MAWB: 3694036663
Consignment: 2007CN680407785022472468000347

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Status

- Manufacturer: Booked
- Manufacturer: Tendered
- Freight Forwarder: Received
- Freight Forwarder: Docs Rcvd
- Air Terminal: Rcvd
- Air Carrier: Departed
- Broker: Docs Received
- Air Carrier: Arrived
- Air Carrier: Departed
- Broker: Customs Filed
- Air Carrier: Arrived
- Air Terminal: Rcvd
- Truck: Rcvd
- CFS: Rcvd
- Broker: Customs Released
- CFS: Docs Rcvd
  - CFS: Dispatched
  - CFS: Delivered
EFM Success....

Transit Time from Hong Kong to Container Freight Station

Base Line = 96 Hours

12% Improvement

Total Savings of $5.94/shipment
Next Step EFM Adoption
Use of Case Studies to Validate Concept

• An EFM adoption strategy has been developed.
• Complete adoption plan that includes:
  – Expansion to all modes of transportation
  – Expansion of architecture and standards based upon business requirements.
  – Cost Benefit analysis to support adoption.
• A detailed adoption package that supports a “Connect and Configure” concept for potential adopters is being developed.
• EFM Package
  – Source Code
  – Implementation Guidelines
Steps to EFM Adoption Case Studies

- Document Existing Environment
- Implementation Strategy
- Access Potential Impact
- EFM Governance

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• Assessment of current IT Environment to attain business problem to be solved
• Description of current business environment
• Description of technical environment
• Interface with supply chain partners as necessary or desired to qualify opportunity
Implementation Strategy

- Decision process
- Business rationale of potential adopters
- Development of performance measures
- Challenges to implementation identifying known issues and risks
- Assess the reuse of components from previous implementations of similar projects
- Project Plan and Schedule for Implementation
IMPACT OF ADOPTION

- Documentation of all costs including:
  - Startup Costs
  - Operational Costs
  - Maintenance Costs
- Perform cost-benefit analysis as per the organization’s methodology
- Comparisons of EFM technology with existing EDI, XML, etc.
EFM Governance

- A standardized reference model for all implementations.
- Identifies the relationships between all parties to the governance package
- A requirement to adopt open UBL standards
- A model that can also be used to pre-qualify incoming participants
- Serves as an international trade facilitation framework standard. (Similar to initiatives such as 'APEC Single Window').
- Includes UBL set of messages that meet the requirements of all the EFM Case Studies.
EFM Case Studies
Total of Nine

• VALUE ADDED SERVICE PROVIDER → 4
  – Demonstrate the ease in which EFM can be deployed with a new supply chain partner.

• LOGISTICS ECONOMIC DEVELOPMENT GROUPS → 3
  – Growing economic development through improving the efficiencies of freight movement through the region.

• CONSORTIUM OF PUBLIC-PRIVATE MARKET LEADERS DEMONSTRATE → 2
  – Demonstrate interoperability of transportation data standards between public and private entities to get goods to their destination in highly reliable manner.
  – Includes customs security and normal filings
EFM Governance

Key Components for Transition To Private Sector

- A standardized reference model for all implementations.
- Identifies the relationships between all parties to the governance package
- A requirement to adopt open UBL standards
- A model that can also be used to pre-qualify incoming participants
- Serves as an international trade facilitation framework standard. (Similar to initiatives such as 'APEC Single Window').
- Includes UBL set of messages that meet the requirements of all the EFM Case Studies.
## EFM Case Study
### Project Costs - DEMDAKO

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EFM Case Study

Project Benefits - DEMDAKO

- Back Order Reduction Benefit
- Container Utilization Increase Benefit
- 10 + 2 Filing Cost Reduction Benefit
- Total Annual Benefit

- $236,514
- $67,739
- $12,375
- $316,628
Summary Benefits

EFM Case Study – DEMDAKO

- Initial Investment: $292,457.00
- Net Annual Cash Flow: $223,208.27
- NPV: $510,445.56
- IRR: 70.94%
- Payback: 1.31 years
- Discounted Payback: 1.51 years
- Benefit/Cost: 2.75
Discussion with European Union and Canada

• Europeans have developed an initiative similar to EFM called Freightwise
• Working on a joint research Memorandum of Agreement
• Demonstrate the interoperability of both with European and US industry
• Hopefully file Customs declarations with data collected for each
• Discussions under way with Canada on a China-Canadian-US supply chain EFM Case Study
EFM Architecture used in C-TIP

• SOW for C-TIP calls for the use of the Electronic Freight Management initiative architecture and its established guidelines and standards to include:
  – Design of communications and information exchange interfaces to enable data transfer between freight stakeholder systems using a Service-Oriented Architecture (SOA) approach and Web Services.
  – Use of UBL, the XML message schema standard governed by the Organization for the Advancement of Structured Information Standards (OASIS) group.

• C-TIP will leverage as much as possible any existing source code produced in previous EFM efforts, such as the CEFM deployment, KC SmartPort, and current C-TIP efforts underway.
Cross Town Improvement Project
Contents

- Background
- Problem Statement
- Potential Cross Town Improvement Project (C-TIP)
- Interchanges
- Goal
- C-TIP Partners
- Components
- Budget
- Operating Scenario
- Next Steps
Where did the C-TIP concept originate?

Intermodal Freight Technology Working Group (IFTWG)
- Transportation User Group focused on improving productivity and public benefits through Technology
- Meets semiannually with the Intermodal Association of North America
- Introduces new projects
- Reviews ongoing projects providing user inputs
What is the Cross Town Improvement Project?

- Truck-borne “rubber tire” interchanges are used:
  - When steel wheel rail-to-rail interchanges are not possible
  - To save time (steel wheel rail-to-rail interchanges often take 2-3 days)
  - When service criteria for cutoff connection not met
  - When railroads have car shortages or don’t want to relinquish scarce assets
- Interchange of this traffic must occur, often in metropolitan areas
  - Truck to rail (near ports)
  - Rail to truck to rail (rail interchanges)
The inefficiency of cross-town rubber tire interchanges creates conditions that adversely impact:

- Congestion
- Efficiency of the transportation network
- Safety of the motoring public
- Environment of neighboring communities
- Energy consumption
Potential Cross Town Improvement Project (C-TIP) Interchanges

Scalable and Transferable

- Rail-to-rail: cross-continental moves
- Port-to-rail: where on-dock rail facilities do not exist
- Port-to-truck: port to distribution centers
- Airport-to-truck: airport to distribution centers
C-TIP Goal

To develop and deploy an information sharing / transfer capability that enables the coordination of moves between parties to **Maximize** loaded moves and **Minimize** unproductive moves.
C-TIP Components

- Intermodal Exchange (IMEX)
- Wireless Drayage Updating (WDU)
- Chassis Utilization Tracking (CUT)
- Real Time Traffic Monitoring (RTTM)
Intermodal Exchange (IMEX)

Basic Concept – Open architecture allowing for collaborative dispatch management model among rail lines, truckers and facility operators

Component Description: An on-line “exchange” allowing the railroads, facility operators, and truckers to share information about available loads, delivery information, traffic and scheduling.
Wireless Drayage Updating (WDU)

Basic Concept: Develop a set of platform-independent messages and best practices for drivers and dispatchers to communicate regarding routing and scheduling.

Component Description: Wireless communications system allowing carriers and their drivers the quick exchange of time-sensitive shipment information.
Basic Concept: Develop a process and system to commonly manage a shared intermodal chassis fleet.

Component Description: Providing a transparent view of the chassis inventory available for use, including asset locations, and provides mechanisms for accurately allocating costs among users.
Real Time Traffic Monitoring (RTTM)

- Basic Concept: Make real-time traffic information available to carriers to facilitate travel routing and scheduling decisions.

- Component Description:
  - Provide Alternate Dynamic Routing
  - Complete Definition of O/D Pairs
  - Acquisition of fleet data from on board probes mounted in trucks
  - Information from on board fleet data probes integrated with live traffic data
  - Integration of live travel time and speed data
  - Integration of road maintenance and construction activities
  - Integration of live road weather data
  - Development of a Travel Time Formulation Algorithm utilizing all available data to predict travel time
Public Private Partnerships

Kansas City Pilot Key Players

...All modes are involved and engaged

- USDOT – FHWA: Facilitator, Convener, and Funding
- Railroads – UP, BNSF, NS, & KCS
- Trucking Companies – Mid Cities, Greer, ITS & IXT
- State Governments – MoDOT & KDOT
- Metropolitan Planning Organizations – Mid America Regional Council
- Economic Development Groups – Kansas City SmartPort
- Traffic Management Organizations – KC Scout
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Operating Scenario

The Scenario:

- Cross Town and Industry Containers identified and shared with IMEX
- IMEX produces work orders for truck carriers to move containers
- Truck Carriers query and receive information either through dispatcher or Wireless Drayage component
- Real Time Traffic information made available through WDU to drayage operators
- Drayage Operator begins trip utilizing real time traffic information and **Dynamic Routing**
- Drayage Operator picks up container at RR1 to move to RR2
- Drayage Operator begins trip to RR2 to deliver container
- Drayage Operator picks up container at RR2 to deliver to RR1
- Drayage Operator picks up container to be delivered to industry at RR1
Where We Go from Here

- Conduct Kansas City Pilot Deployment
  - Deploy system
  - Conduct operational test & evaluation
- Conduct User Conferences
  - Intermodal Freight Technology Working Group
  - ATA/ITLC
  - 2009 Ohio Freight Conference
- Explore applying the C-TIP concept in other environments
  - Ports, Inland Ports, Airports
  - Adapt concept of operations to local conditions
  - Conduct additional pilot deployments
Questions

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