
DE + IA (INFO 243) - 4 February 2008

Bob Glushko

Plan for Today's Lecture

Supply chains, and information supply chains
Beyond CPFR
Paperless Trading
Adoption of UBL in Denmark
What is a Supply Chain?

A SUPPLY CHAIN is the network of relationships, communication patterns, and distribution capabilities that provide raw materials, components, products, or services to a customer.

Any of the participants in a supply chain can be viewed as the "customer" of those that precede it; it is conventional to make the manufacturer or assembler the focus of the supply chain that extends upstream and downstream from it.

The Document Engineering perspective on supply chains emphasizes the information flows that accompany the movement of materials and goods, or that move in the opposite direction (often called the DEMAND CHAIN).

Supply Chain Depicted as Physical Model
Supply Chain Design [1]

Your business model and strategy sets the framework for design of the supply chain.

Supply chain structures (like the number of suppliers and distributors) are shaped by industry characteristics and product architectures.

Supply chains reflect many interconnected decisions about allocation of materials, production, and distribution responsibilities.
Supply Chain Design [2]

Location of manufacturing facilities and how to transport materials and goods to and from them

Location of suppliers and distributors with respect to manufacturing facilities

How many distributors and other intermediaries between the manufacturer and customers (0 or more)?

How much inventory to maintain at each stage

How visible are secondary tiers (suppliers of suppliers (of suppliers...))? 

The Information Supply Chain

The flow of materials and goods in a supply chain is accompanied by information about it

But information about supply chain activities and processes is increasingly separated from the physical flow of materials and goods, and for information-based services there is no physical stuff

Information also flows in the opposite direction from the customer, retailers, and distributors back into the supply chain – this is also called the DEMAND CHAIN

The information supply chain has become especially important because increased global competition and better informed customers are forcing forms to shift from forecast to demand (i.e. customer) driven business models
Design Issues for the Information Supply Chain

What information is exchanged?
Which entities in the supply chain are able to exchange information?
What is the frequency of this information exchange?

"Beyond CPFR" (Collaborative Planning, Forecasting, and Replenishment)

If this article is about "beyond CPFR," what comes before CPFR?
What makes CPFR possible?
What is SBT and how does it go beyond CPFR?
Scan-Based Trading

POS information is shared directly with suppliers, who don't get paid until items sell

This additional information changes the relationship between suppliers and retailers, "making the supplier think like a retailer"

Is SBT primarily a technological innovation, or a business process one?

The Case for Paperless Trading [1]

Tsunami aid stuck in port for months

JAKARTA, Indonesia (AP) - More than 70 shipping containers packed with mosquito nets, school supplies and timber for tsunami survivors have been stuck at an Indonesian port for months because of inadequate documentation, an official said Wednesday.

Borneo Bulletin, 12 January 2006

74 shipping containers with aid for tsunami survivors stuck in port of Belawan in Sumatra (other side of island from Bandar Aceh) because organizations sending the aid didn't complete all the shipping and customs documents
"Paperless Trading"

What problems will paperless trading hope to solve?

Why is international trade so much more complex than domestic trade?

What are the projected savings? Why do they vary so much by product category and type of shipment?

How does paperless trading affect the need for inventory in supply chains?

Why is paperless trading especially attractive to developing countries?

In what ways is it problematic for them?
The Three Information Flows for Import/Export

- Commercial / Financial
- Regulatory
- Logistics

Commercial and Financial Document Flow

The Importer places an order to buy goods from overseas supplier (who then becomes the Exporter).

The Exporter arranges the shipment of the goods with an international carrier (shipping line, freight forwarder or airline). They will be responsible for getting the goods to the destination port (and maybe beyond).

The Bill of Lading (sea) or Air Waybill (air) describes the goods and their transportation details and costs. They are required as proof of shipment by many of the parties involved.

---


Either the Importer or Exporter (or both) will need to insure the goods in transit. Banks have divisions that offer maritime insurance.

To cover the exporter's exposure a guarantee of funds is lodged with the exporter's bank.

At some stage the Exporter invoices the Importer for the goods

If the Importer is satisfied with the goods they instruct their bank to release funds to the Exporter.

The Banks inform their customers of the funds transfer.
The Exporter must apply for relevant certificates based on international trading arrangements with the destination country, export restrictions and the type of goods being shipped.

A Certificate of Origin verifies where the goods were manufactured (or grown). This controls trade being redirected through 3rd party countries to avoid duty or trade restrictions.

- Sanitary Certificates cover meat products for health and hygiene safety
- Phytosanitary Certificates do the same for vegetable matter (including wooden products)

The Exporter needs these certificates when they apply to Customs for permission to export the goods.
Customs will give authorization for the goods to be exported. This can be done weeks before the goods actually ship.

When the goods are actually loaded on a vessel (or aircraft) the terminal operator will notify customs the goods are being shipped.

The Exporter notifies the Importer that the goods are being shipped and sends copies of all certificates.

The Importer uses these when they apply to Customs to import the goods.

Customs will advise of any duties payable on the goods.

The Importer must pay the amount of duty based on the classification of the type of goods.

Once duty is paid Customs issue a commercial clearance of the goods.

The destination terminal operator notifies Customs when the shipment has arrived. This may trigger an inspection.

Once Customs are satisfied the shipment is legitimate they allow the terminal operator to release it to the Importer.
Once they have a Forwarding Instruction from the Exporter (see Commercial Flow) the main (international) carrier will arrange for transportation of the goods to the port of origin.

The local carrier (e.g. trucking company) will notify the Exporter of their intention to pick up the goods.

The Exporter supplies them with the information (such as customs clearance authorization and onward transportation details) necessary to allow the terminal to load the shipment.

The truck driver uses this export advice document as authorization for the terminal to accept the shipment and load it onto the vessel.

The Terminal operators notify each international carrier about their (and only their) shipments loaded onto the vessel.

The terminal operators also update the ship's bayplan and pass this onto to the next port of call. It will eventually get to the destination terminal operator.

The International Carrier will also create a manifest (a list of all their shipments on the vessel) and lodge this with the terminal operators concerned. Copies also travel with the vessel.

Prior to the ship's scheduled arrival the International Carrier will notify the Importer of its intended arrival date.


The Importer (or the carrier) will then arrange domestic transportation from the port to the Importer.

The Import Delivery Order contains reference information used to match against customs import clearances.

When the importing Terminal receives the delivery order it checks against its Customs clearances and then releases to shipment for delivery to the Importer.
The Need for a "Universal Business Language"

Too many redundant and incompatible document models of common business documents like catalogs, orders and invoices

Too many redundant adapters and gateways to enable trading relationships across domain boundaries

UBL

31 document types needed for supply chains (European) and International Trade (Asia and US)

These document types use a library of XML schemas for reusable aggregate data components such as "Address," "Item," and "Payment"

The library is a standard implementation of the ebXML "core components" types ("Amount," "Code," DateTime," etc.

An OASIS standard
"Adoption of UBL in Denmark"

What is the overall goal that motivates this project?
What are the key technical pre-requisites for this project?
How much does it cost to process an invoice?
What will happen next with this project?
Would this kind of project be possible in the US?

---

Manual Invoice Process

[Diagram of the manual invoice process]
3 Ways to Send an Electronic Invoice

Send directly (e.g., from ERP system) to the government (using EDI value-added network as transport)

Enter invoice information into Web form

Send paper invoice to scanning agency that will create the UBL invoice and forward it
UBL's Ancestry

Electronic Data Interchange (EDI)

Before the Internet the most important technology for inter-enterprise document exchange and automation was *Electronic Data Interchange* or EDI.

EDI's roots in the 1960s with freight industry standard electronic formats for bills and other documents.

By 1970s banking and grocery / retail industries had standard messages and private networks for exchanging them.

In 1979 ANSI initiates US national EDI standards (*ASC X12*).

1987 - **EDIFACT**

-- UN standards body created to consolidate national standards.

late 1990s EDIFACT collaborates with XML community to develop syntax-neutral libraries: **ebXML**.
**EDI's Successes**

EDI is widely used to automate routine transactions between established trading partners.

Reduce costs of interconnecting business systems because connection is via document exchange instead of via direct integration.

EDI reference models for business processes and standard documents provide starting points for relationships between trading partners.

---

**X12 EDI Message Fragment**

```plaintext
ISA*00* *00* *08*JCPenny111 *ZZ*test22222 *971107*1220*U*00302*112240001*1*P*@
GS*PO*test111111*test22222*19971107*1220*123456789*X*003042
ST*850*4567
BEG*00}*10117564*19990105
REF*ZI*11
REF*1V*97-0049393
PER*OD*Chris Smith*EM*csmith@supplyworks.com
PER*RE*Tom Gerry*TE*617-861-7900x1567
DTM*074*19990120*1806
N1*BB*SupplyWorks*91*FFF
N1*BY*SupplyWorks*91*ABC1235
N1*BY*Chris Smith*92*csmith1
N2*Room 208C*SupplyWorks Corporate
N3*57 Bedford Street*Building 2
N4*Lexington*MA*02173
N1*ST*SupplyWorks*ZZ*SW1
N1*SB*EC Office Supplies*1*98629321
N2*Purchase Department
N3*123 Main Street
N4*NY*NY*03417
POI*1*24*EA*1.86**UI*999999922234
TXI*TX*9.41
POI*2*12*CA*25.67**UI*999999955567
TXI*TX*4.51
CTT*2*42
SE*24*4567
GE*1*123456789
IEA*1*112240001
```
General Discussion about the Case Studies

How are the business cases in all of these case studies similar? How are they different?

Are legacy technologies and information dealt with in the same way?

How does a firm's size affect its adoption of new technology and processes?

What is the role of standards?
Readings for 6 February

"HIT and MIS: Implications of Health Information Technology and Medical Information Systems" (2005)

"Electronic Health Records: Just around the Corner? Or over the Cliff?" R. Baron, E. Fabens, M. Schiffman and E. Wolf (August 2005)

"Cracks in the Pharmaceutical Supply Chain" Susannah Patton (January 15, 2006)