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REFERENCE MODEL OF THE INTERNATIONAL SUPPLY CHAIN UN/CEFACT/BPAWG

1 Introduction

1.1 Business Process Analysis, Modeling and Trade Simplification

Business Modelling has been endorsed by UN/CEFACT as the basis for future e-business standardisation activities and to aid in the facilitation and simplification of international trade procedures.

The Business Process Analysis Working Group of UN/CEFACT were charged with analysing business processes and the development of a Business Domain model(s) that can act as the reference for these activities.

Business Modelling provides a formalised way of describing how a business/market operates and thus enables a common understanding of the key features / requirements of that domain. The business requirements can then be refined to enable UN/CEFACT or independent software vendors to provide a range of e-business solutions covering all or part of the domain and based on a variety of technologies. The models also enable identification of opportunities for simplification and harmonisation of business and administrative procedures.

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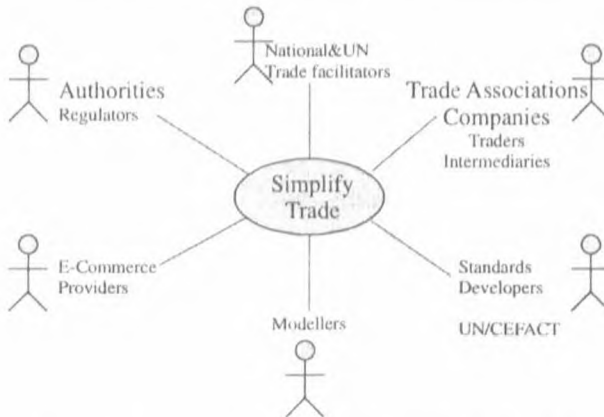


Figure 1 Business Process Analysis, Modelling & Trade Simplification

The Business Process Analysis Working Group of UN/CEFACT has set out to model the International Supply Chain using the UML based methodology proposed by the Techniques and Methodologies Working Group. This paper represents a report of that work to date. It presents a high level description of the International Supply Chain Domain expressed as Business Use Cases and Business Information Objects and provides UN/CEFACT with a reference model that can support more detailed standardisation work and trade facilitation actions within UN/CEFACT working groups.

Further information and an expanded model can be found at www.unece.org/cefact/wg/bpawg

2 Modelling the International Supply Chain Domain

The modeling methodology used is based on the UMM as defined by TMWG in N090R7.

2.1 Business Opportunities/Problem Statement

The procedures for international purchasing and supply are often cumbersome, time consuming and inefficient. This can affect a country's economic viability as well as introduce unnecessary cost to the consumer and poor service to customers.

The international supply chain involves a potentially large number of activities performed by a number of different parties. An activity may be carried out by different parties depending on the terms of business, type of product,

country and market etc. as well as on the methods of operation of the buyer and seller. If a supply chain is to operate effectively and efficiently then the relationships and activities have to be clearly identified and managed. This paper sets out to identify and model the key activities and relationships of the parties involved.

This should enable the operation of a supply chain to be comprehended and the model used to show "best practice" as a way to highlight opportunities for improvements for all countries, businesses, governments or economies. The procedures and activities identified in the modeling process can then be assessed to identify any that do not add significant value or enhance security or safety, and provide opportunities for facilitation actions.

The use of e-business and Simple EDI can bring efficiency gains to organisations for who do not yet benefit from EDI. Simplified procedures can aid countries seeking to expand their international trade. The revised work plan of UN/CEFACT including the formation of T8 and T9 Groups and the growing recognition that object based modeling can support message design, EDI standardisation and facilitate software development, make this a good time to introduce a reference model on which to base developments within UN/CEFACT.

2.2 Boundaries of the Domain

Name of Domain International Supply Chain

Actors

There are potentially some 40 or more actors involved in international trade. These may be categorised as Customer, Supplier, Authority, and Intermediary.

Customer. A party who acquires, by way of trade, goods or services

Supplier A party who provides, by way of trade, goods or services

Authority A statutory body existing within a jurisdiction and a specific area of responsibility that administers legislation to regulate trade and/or monitors compliance with existing legislation.

Intermediary A commercial party who provides services to Customers, Suppliers or Authorities within the international supply chain.

Some of the roles carried out by the Actors in these 4 categories are listed in 1.2.3 below.

Business Information Objects

An initial list of high-level Business Information Objects is given below and expanded in 2.6.

Names of Business Information Objects
Product
Supplier (Potential Supplier or actual Supplier)
Customer (Potential Customer or actual Customer)
RFI Document
RFQ document
Quote
Catalog
Price
Delivery time
Payment terms
Delivery terms
Contract document
Framework Agreement
Order
Order Response including Order Change, Order Confirmation, Order Cancellation.
Credit rating
Transport document
Consignment
Transport
Regulations
Locations
Invoice
Payment documents
Letter of credits
Payment
Call-off order

Constraints

Political - Terrorist Countries

Trade Barriers/Embargoes

Government Regulation

Economic - Ability to Pay

Environmental - Hazardous Goods, Health

Physical - Weight, Physical form

2.3 Stakeholders' Needs

Customer - Knowledge of sources of supply, Best products /services at the best prices, simpler procedures, reduced restrictions, minimum costs of operation.

Supplier - Increased market share, optimum profit, reduced restrictions to market, simpler procedures, reduced documentation, guaranteed payment.

Authority - Ensure regulations are enforceable easily/effectively to protect consumer from risk or protect economy.

Intermediary - Efficient procedures with minimum of imposed restrictions/delays

Sponsor Stakeholder

UN/CEFACT - A model to provide a common reference for standards development and trade simplification actions.

2.4 Actors and Use Cases

Main Actors	Possible Roles
Customer	Buyer
	Consignee
	Payor
	Importer
Supplier	Consignor
	Payee
	Seller
	Manufacturer
	Exporter
Authority	Chamber of Commerce
	Consular
	Customs
	Health
	Intervention Board (EU)
	Licensing
	Receiving Authority (Port Authority)
	Standards Institute
Intermediary	Bank / Financial Institution
	Broker
	Carrier
	Credit Checking Company
	Credit insurer
	Commission Agent
	Export Agent
	Freight forwarder
	Import Agent
	Insurer
	Inspection company
	Receiving authority

Identify Business Use Cases

Name of Use Case - Purchase and Supply Internationally (P&SI)

Actors - Customer, Supplier, Intermediaries, Authorities

The Use Case for Purchase and Supply Internationally can be expressed as 5 main Use Cases reflecting the major stages in the process. These Use Cases are

in turn dissected to reveal more detailed Use Case descriptions and the activities they represent.

The five main Use Cases are:

Identify Potential Trading Partner (Market intelligence gathering, RFI)

Establish Business Agreement (RFQ, Selection/negotiation, Establish framework or contract with selected supplier including agreement on payment terms and delivery terms (Data Alignment))

Order (Including order change, confirmation etc)

Ship (Including transport and all appropriate administrative and regulatory actions)

Pay (Including Invoicing or other means of instigating a payment, disbursements, taxes, and the payment itself)

Two other Use Cases may be "included" as part of these Use Cases. They are:

Check Credit (supplier checks with credit checking agency on credit worthiness / solvency of potential customer)

Manufacture (includes supplier ordering product, production and packing of goods)

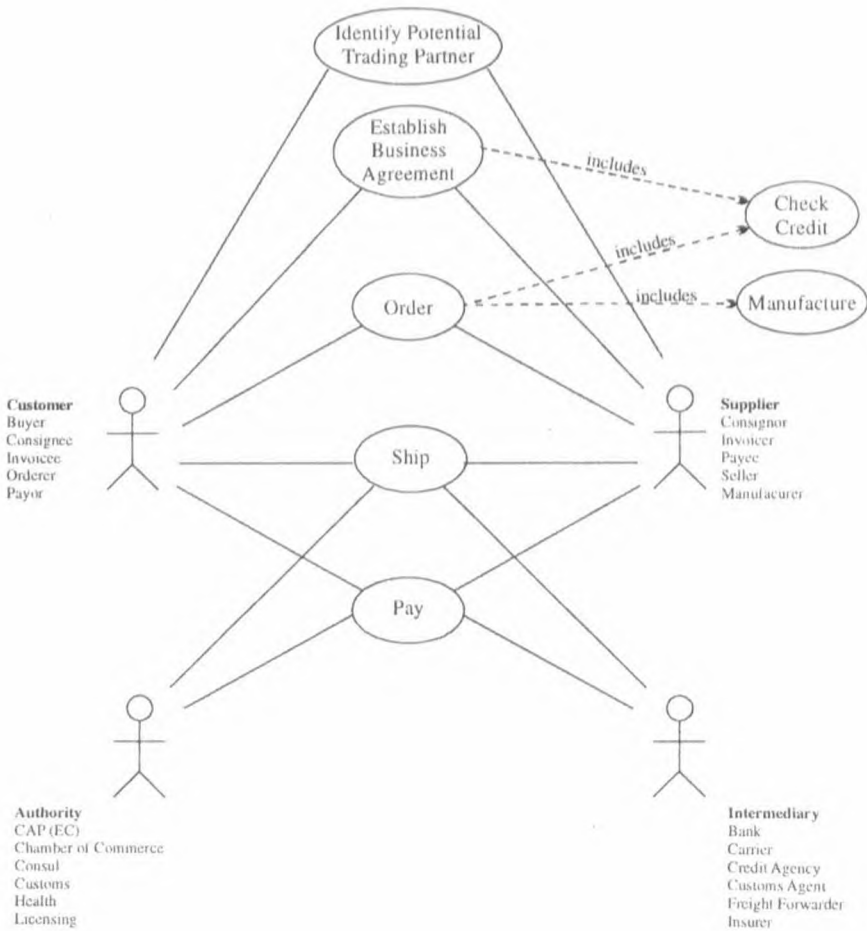


Figure 2 Use Case Diagram – Purchase & Supply Internationally (D-P&SI-1. D-P&SI-1-1)

Use Case Description

Name	Purchase and Supply Internationally (P&SI)
Traceability Identifier	D-P&SI-1.U-P&SI-1-1
Actors	Customer Supplier (manufacturer) Intermediary (PSI company, insurer, credit checking agency, credit provider, carrier, bank) Authority (chamber of commerce, CAP authority, license authority, health authority, customs, consul)
Description*	The Customer recognises a need for a product, gathers market intelligence on suppliers, establishes contract arrangement with selected supplier, places order, product is shipped and customer pays supplier according to agreed terms of trade.
Pre-condition	Customer recognises need for product. Potential supplier exists.
Post-conditions	Customer has product and supplier received agreed payment
Main Scenario	<p>Starts when Customer decides to look for potential supplier or supplier decides to look for a potential customer.</p> <p>Potential trading partners identified.</p> <p>Customer issues a Request for Information and interested suppliers respond or a supplier sends information to potential customers with whom they would like to do business</p> <p>Customer issues a Request to Quote to Suppliers. Suppliers respond with Quote.</p> <p>Customer negotiates with the selected suppliers to agree the terms of a Contract.</p> <p>Supplier initiates query on the Credit worthiness of his customer. Intermediary responds with credit status.</p> <p>Customer and supplier agree Contract. (Contract may be a Framework Agreement or a "one off" Contract.)</p> <p>The customer recognises a need for a product and places an Order under an established contact. The supplier receives Order and responds.</p> <p>Supplier meets order from stock or places order for manufacture of product on manufacturing facility (manufacturer) to meet customer's order. Manufacturer produces Product for shipping.</p> <p>The supplier dispatches the products according to the terms of delivery specified, and the customer receives the product. All transport arrangements are made and executed and the requirements laid down by the relevant authorities are met.</p> <p>A demand for payment is raised. The Customer (payor) makes the payment and the Supplier (payee) receives the payment according to the terms of payment agreed.</p> <p>Ends when Supplier receives payment and Customer receives products ordered and the contract terms have been met.</p>
Alternative Scenarios	To be developed further at a later stage in the modelling process. (See also Main Scenario-Annex 5 and VMI- Annex 6)

2.5 Use Case Elaboration (Level 2)

Use Case identified above for Identify Potential Trading Partners, Establish Business Agreement, Order, Ship and Pay Use Cases are further elaborated in sections 2.5.1 to 2.5.6

2.5.1 Use Case Elaboration- Identify Potential Trading Partners

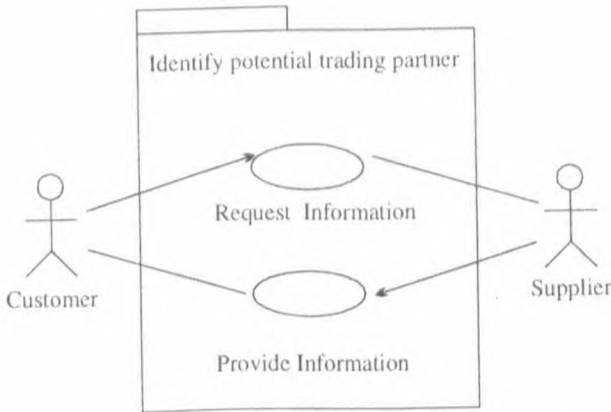


Figure 3 Use Case Elaboration- Identify Potential Trading Partners

Name	Identify potential partners
Traceability Ind.	D-P&SI-1.U-Identify Potential Partners I-2-1
Actors	Customer Supplier
Description	The customer looks for potential suppliers and the supplier looks for potential customers.
Pre-condition	Customer has need for product and to identify a potential Supplier.
Post-conditions	Customer has received information from potential Supplier. Supplier has provided information to potential Customer.
Scenario	<ul style="list-style-type: none"> - Customer issues a request for information to potential Suppliers - Interested Suppliers provides information to potential Customer <p>Or</p> <p>Supplier send unsolicited details of products and supply terms to potential Customer</p>

2.5.2 Use Case Elaboration - Establish Business Agreement

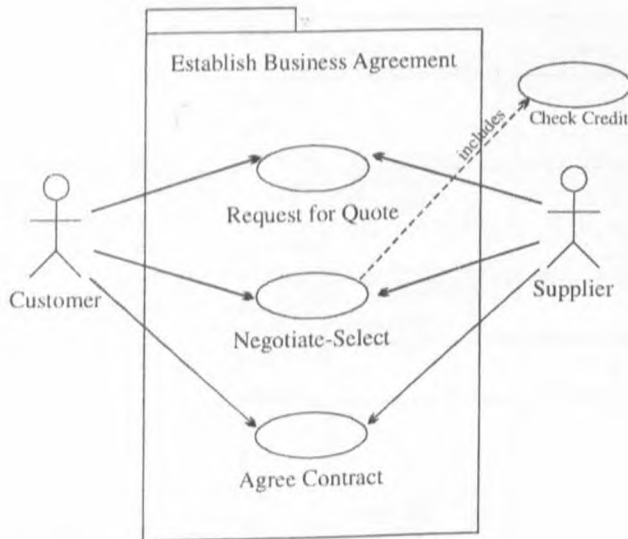


Figure 4 Use Case Diagram - Establish Business Agreement
(D-P&SI-1.U-Establish Business Agreement-2-2)

Use Case Description

Name	Establish Business Agreement
Traceability Ind.	D-P&SI-1.U- Establish Business Agreement-2-2
Actors	Customer Supplier Intermediary (credit checking agency)
Description	The Customer and Supplier establish contract for potential supply of product as a "One- Off" contract or a framework agreement (blanket order) for potential call-off supply.
Pre-condition	Customer has need for product and to identify a potential Supplier.
Post-conditions	Customer and Supplier have established a contract
Scenario	<ul style="list-style-type: none"> - Customer issues a request for quote to Supplier - Supplier provides quote to Customer Or - Supplier send unsolicited details of products and supply terms to Customer - Customer and Supplier negotiate terms of business (This may include terms of delivery, terms of payment, delivery location, products, prices, duration of contract etc) after checking on credit status of customer if appropriate. - Supplier and Customer establish a contract for supply, or a framework agreement that will support potential call off orders, and encompasses the agreed terms of business

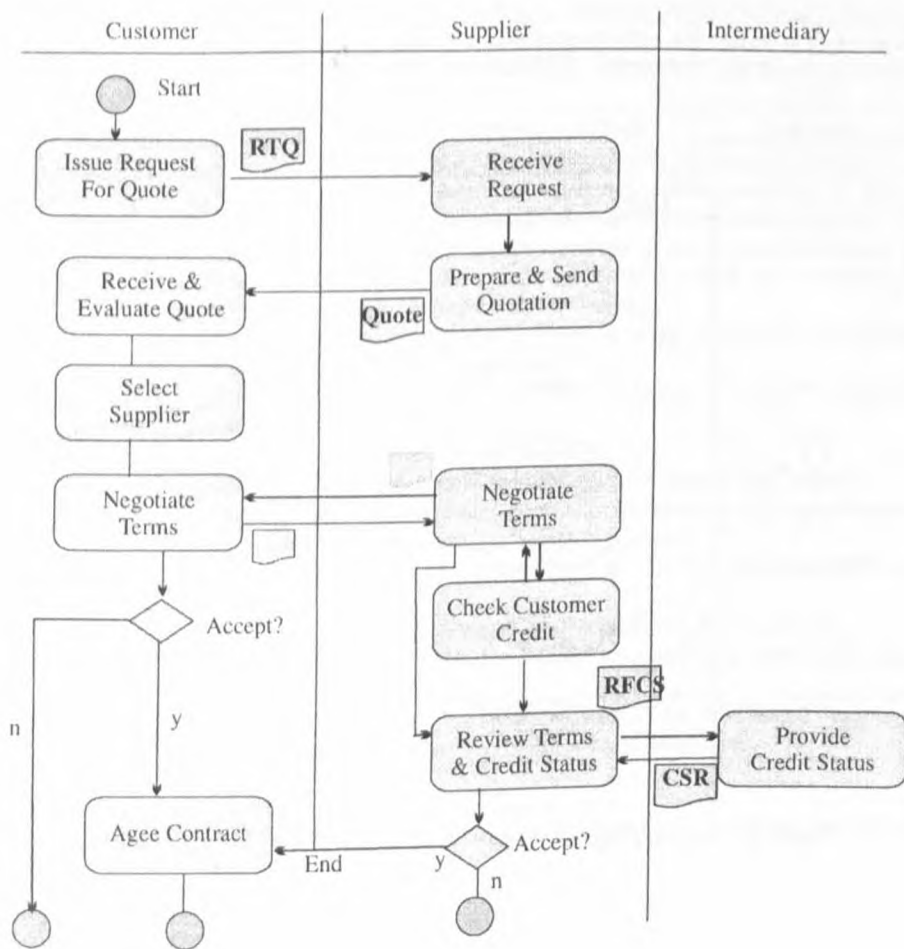


Figure 5 Activity Diagram Establish Business Agreement

2.5.3 Use Case Elaboration- Order Use Case (D-P&SI-1.U-Order-2-4)

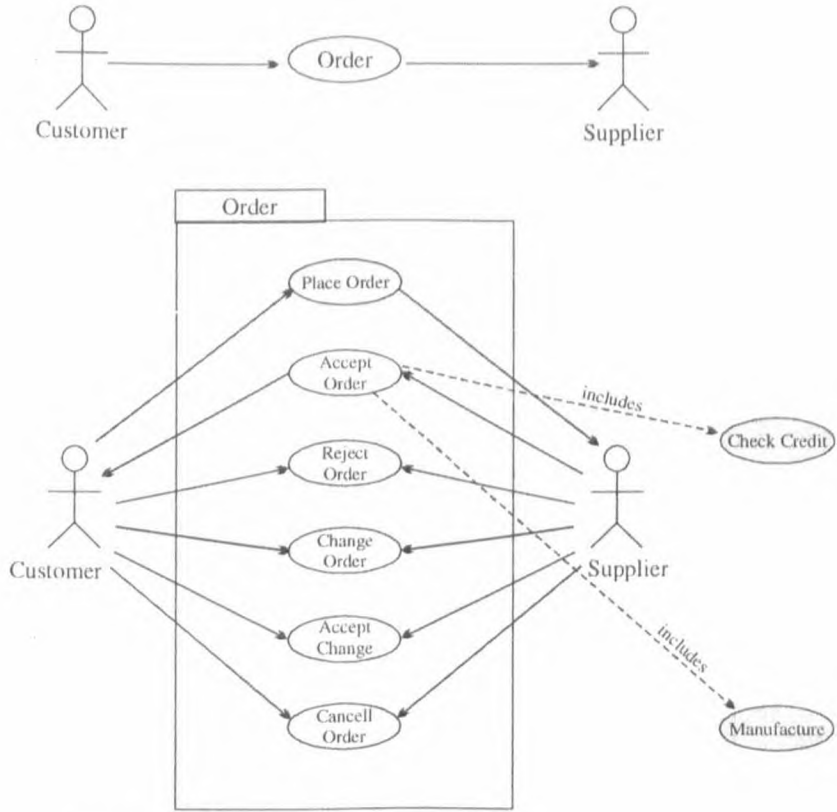


Figure 6 Use Case Diagram – Order

Name	Order
Traceability Ind.	D-P&SI-1.U-Order-2-4
Actors	Customer, Supplier (manufacturer), Authority (credit checking company)
Description	The Customer recognises a need for a product and places an Order under an established contact or a framework agreement. The Supplier receives order and responds.
Pre-condition	Framework Agreement or Contract is in place.
Post-conditions	Customer received request for payment or order has been cancelled
Scenario	<p>Starts when customer recognises need for specific quantities of one or more products and decides to place an order with a particular Supplier</p> <p>Customer raises and sends an order containing one or more order lines, to Supplier. Order may be a call off order covered by a framework agreement or a specific order under a contact</p> <p>Supplier receives order and may check on credit worthiness of customer with Credit Checking Company</p> <p>Supplier confirms acceptance or order or proposes change to order or rejects order</p> <p>Customer accepts change or cancels order</p> <p>Customer changes order and supplier accepts or rejects order change</p> <p>Supplier provides goods from stock or orders product from manufacturer for delivery at the lead time</p> <p>When goods are available to despatch, Supplier issues despatch advise to Customer</p> <p>Supplier Invoices Customer when order conditions have been met</p> <p>Ends when Customer receives order acceptance or order has been cancelled/rejected.</p>
Alternative Scenario	- Supplier is operating a stock replenishment (Vendor Managed Inventory) system on behalf of customer. (Scenario to be developed)

See separate Use Cases for Credit Check and Manufacture - to be produced

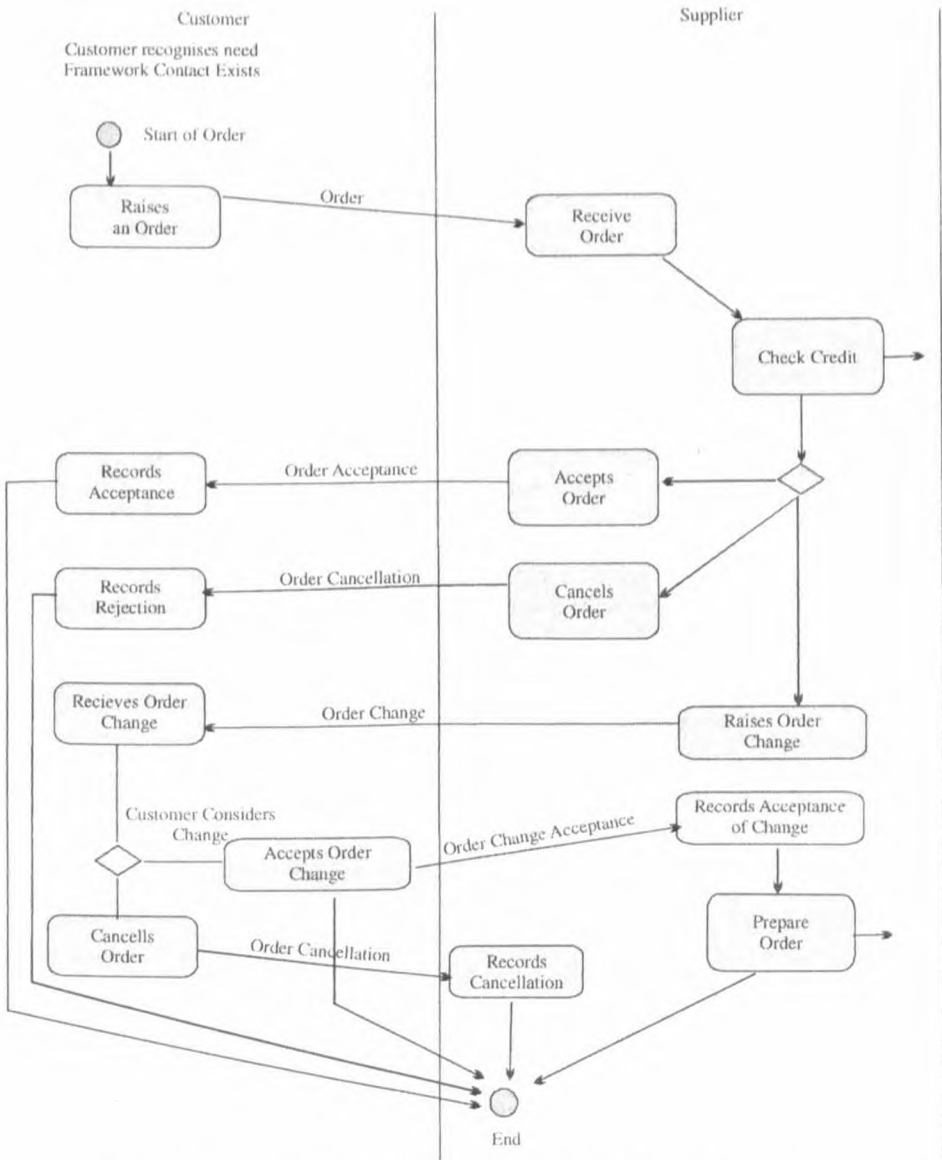


Figure 7 Activity Diagram Order Use Case (D-P&SI-1.U-Order-2.4.A-1)

2.5.4 Use Case Elaboration- Ship Use Case

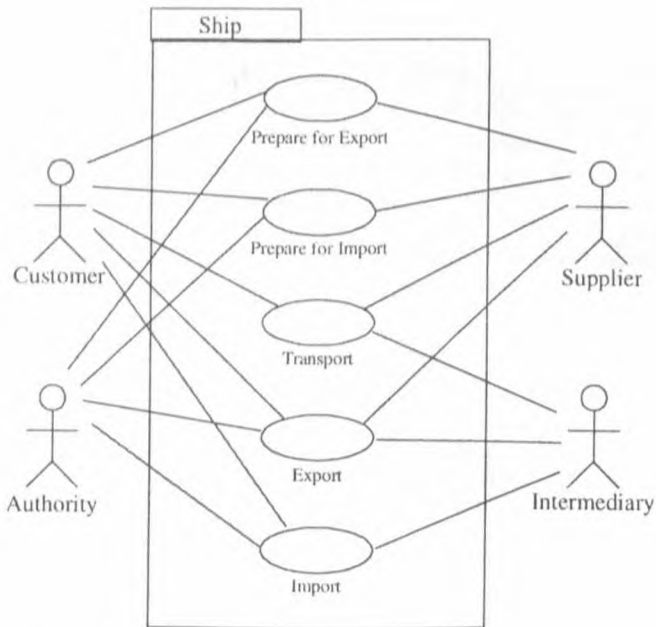


Figure 8 Use Case Diagram - Ship (D-P&SI-1.U-Ship-2-4)

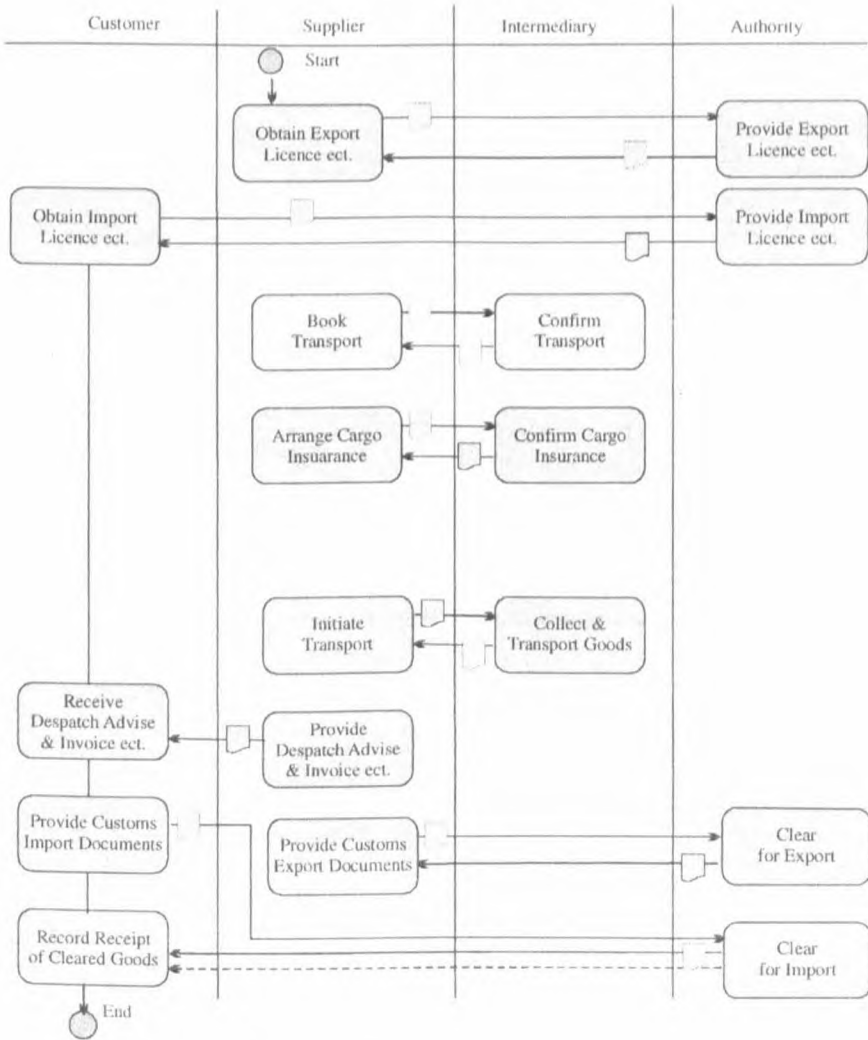


Figure 9 Activity Diagram Ship

Use Case Description

Name	Ship
Traceability Ind.	D-P&SI-1.U-Ship-2-4
Actors	Customer, Supplier, Intermediary, Authority
Description	The necessary preparations are made to enable goods to be delivered to the customer. Goods are cleared by authorities and delivered to the agreed customer location.
Pre-condition	Order has been confirmed.
Post-conditions	Cleared goods have been delivered to customer.
Scenario 1.	<p>Starts when Supplier has accepted the order from the Customer</p> <p>Supplier requests Export license from Authority</p> <p>Authority responds</p> <p>Health certificates requested from Health Authority</p> <p>Authority provides certificates (required by Import Country Health Authority)</p> <p>Radiation, isotopic and salubrity certificate</p> <p>Conformity certificate for Import Health Authority</p> <p>Bacteriological certificate</p> <p>Physical Chemical certificate</p> <p>Veterinary and sanitary certificate</p> <p>Analysis certificate</p> <p>Dangerous Goods Note prepared and provided to Carrier</p> <p>Supplier requests and obtains certificate of Origin from Chamber of Commerce</p> <p>Supplier produces and supplies relevant export documentation including:</p> <p>For Customer</p> <p>Packing Weight List/Delivery Note/Invoice</p> <p>For Export Customs</p> <p>Relevant Customs Documents (e.g Customs Product List T1, C88A-LEC,T5 documents, EUR1,Customs Invoice)</p> <p>For Import Customs</p> <p>Relevant Customs Documents.(e.g Certificate of Origin</p> <p>Age certificates and batch codes, Customs Invoice)</p> <p>Intermediary(insurer) provides Supplier with Insurance Certificate (for Customer)</p> <p>Transport booked with Intermediary (carrier or freight forwarder) by Customer and/or Supplier according to agreed delivery terms.</p> <p>Supplier provides Standard Shipping Note and Bill of Lading Instructions to Intermediary (carrier/shipper)</p> <p>Intermediary (carrier or freight forwarder) agrees contract for transport of goods and collects and delivers goods to Customer's agreed location.</p> <p>Supplier (Ship from) issues Despatch Advise to Customer(Ship to)</p> <p>Intermediary (carrier/shipping line) provides supplier with Certificate of</p>

	Shipment and Bill of Lading (for Customer, shipper/carrier) Pre shipment inspection arranged, order details provide by Supplier and inspection carried out by Intermediary(inspection company) Goods cleared for export by Authority(customs) after checking documentation and goods Goods cleared for import by Authority(customs) after checking documentation and goods Ends when Customer records receipt of cleared goods at agreed location.
Alternative Scenarios	Goods in Free Circulation, National Trade. To be defined

2.5.5 Use Case Elaboration- Pay (D-P&SI-1.U-Pay-2-5)

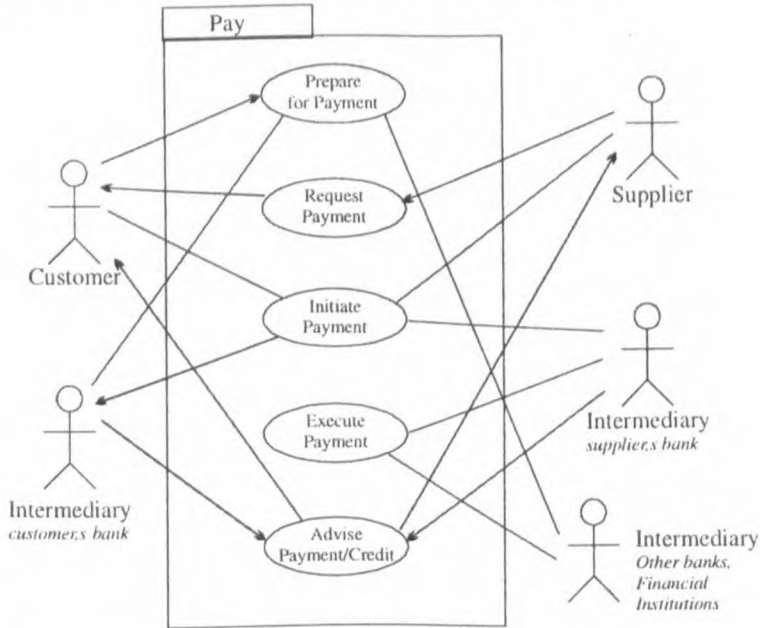


Figure 10 Use Case Diagram. Pay

Use Case Description

Name	Pay
Traceability Ind.	D-P&SI-1.U-Pay-2-5
Actors	Customer, Supplier, Intermediary (banks)
Description	Customer makes arrangement for payment as agreed in the contract and initiates payment when supplier has met contract terms.
Pre-condition	Contract exists and Order has been confirmed.
Post-conditions	Supplier has payment and customer has goods
Scenario	<p>Starts when Supplier has accepted the order from the Customer</p> <p>Customer makes arrangements so that he can pay Supplier on completion of order/contract terms.</p> <p>Supplier issues request for payment when he has met contract/order conditions.</p> <p>Payment to Supplier is initiated by the Customer.</p> <p>Payment is executed through the banking system.</p> <p>Supplier is notified of payment into his account by Intermediary (Supplier's bank).</p> <p>Customer is notified by Intermediary (Customer's bank) that payment has been made.</p> <p>Ends when Supplier receives payment notification from Intermediary (bank).</p>
Alternative scenario	There are many different payment means and modes that require detailed specification as alternative scenarios. To be developed

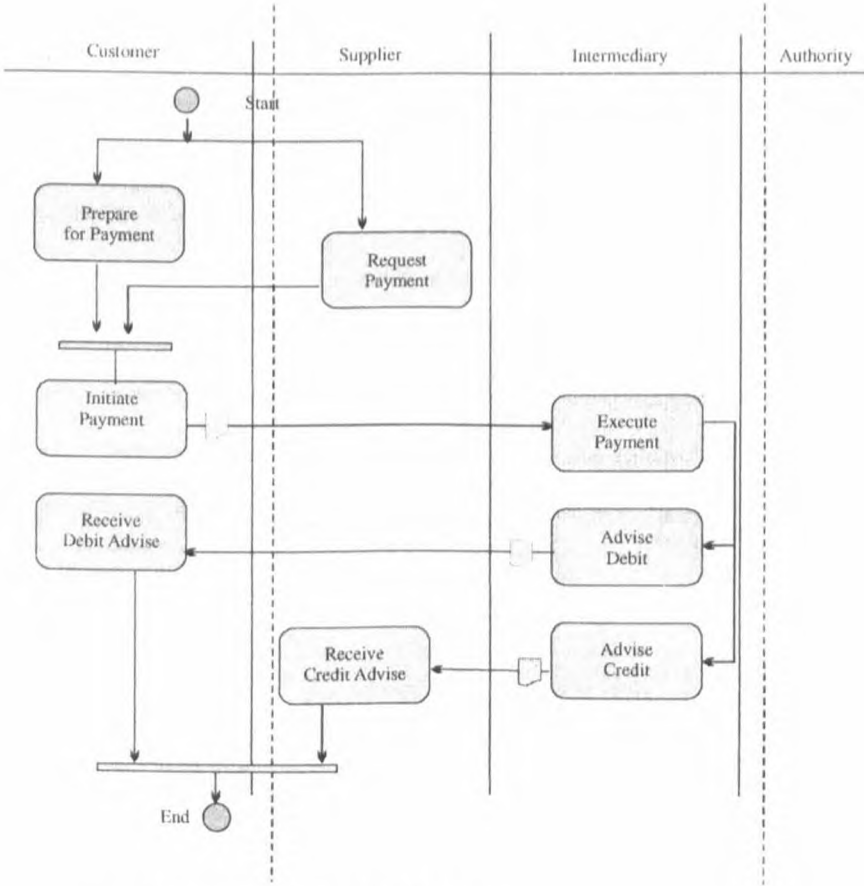


Figure 11 Activity diagram- Pay Use Case

2.6 Business Information Objects

The Objects identified in the Use Cases are tabled. These lists will be expanded as the Use Cases are further detailed.

Objects participating in Use Case	Use Case Involved	
Customer	Identify Potential Trading Partner	
Supplier		
Request for information (RFI)		
Information		
Customer	Establish Business Agreement	
Supplier		
Intermediary (Credit Checking Company)		
Request for Quote		
Quote		
Credit Status		
Product		
Contract/Framework-Agreement		
Terms of Delivery		
Terms of Payment		
Delivery Location		
Product Prices		
Customer		Order Use Case
Supplier		
Intermediary (Manufacturer, Credit Checking Company)		
Order, Call Off Order		
Order Acceptance		
Order Change		
Order Cancellation		
Line Item		
Delivery Lead Time		
Despatch Advice		
Product		
Product Quantity		
Customer	Ship Use Case	
Supplier		
Intermediary		
Authority		

Export License	
Health Certificate	
Conformity Certificate, Certificate of Origin, Dangerous goods note etc	
Customs Declaration etc	
Insurance Certificate	
Packing List	
Transport Booking	
Bill of Lading	
Shipping Note	
Goods	
Terms of Delivery	
Delivery Location	
Customer	Pay
Supplier	
Bank/Financial Institution	
Request for Payment (Invoice)	
Payment (Contract)Terms	
Account	
Payment Order	
Payment	
Payment Notification	

2.6.1 Common Business Objects

The Customer and Supplier objects, and indeed the other objects that describe the Actors in this domain, may be generalised into a Party Object. This Party object will contain the attributes common to all Actors. In this case just their Name and I.d. This may be illustrated in a class diagram as shown below. Thus Party might be a candidate for a common business object and expressed in ebXML as a Core Component.

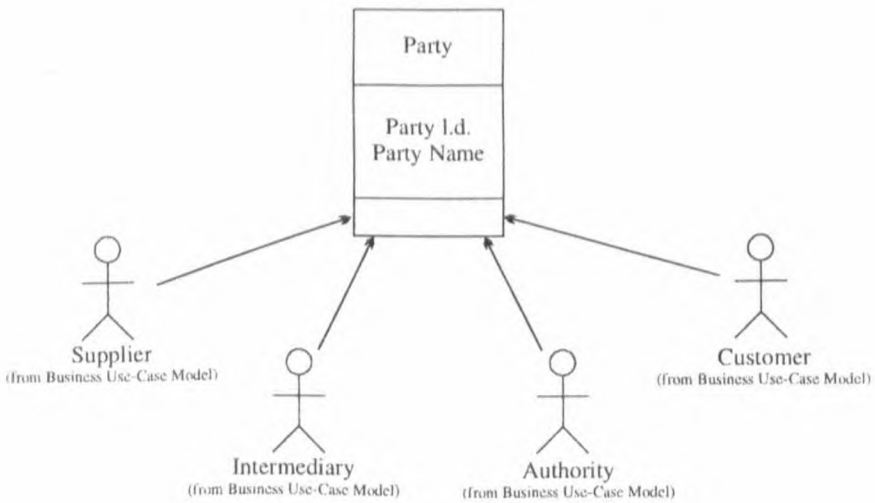


Figure 12 Party Class Diagram

2.6.2 Class Diagram Example

The Business Information Objects that have been identified in the Framework Agreement and the relationships between them are shown in Figure 13 below

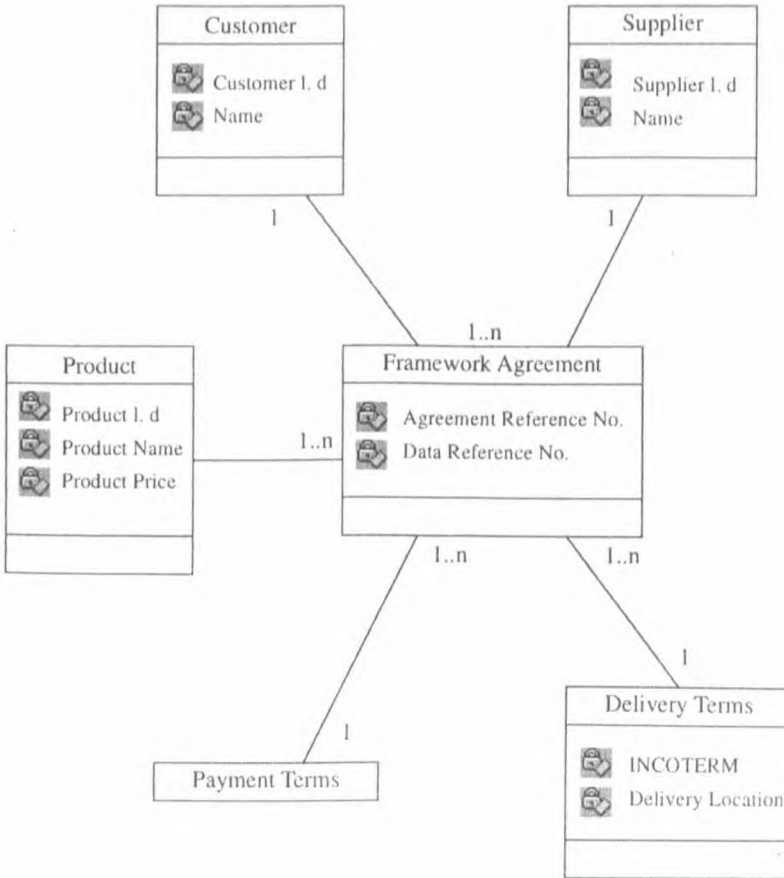


Figure 13 Class Diagram – Framework Agreement

The Business Entities and their relationships identified in the Order Use Case where an order is raised under the terms of a Framework Agreement, are shown in the class diagram (figure 14) below.

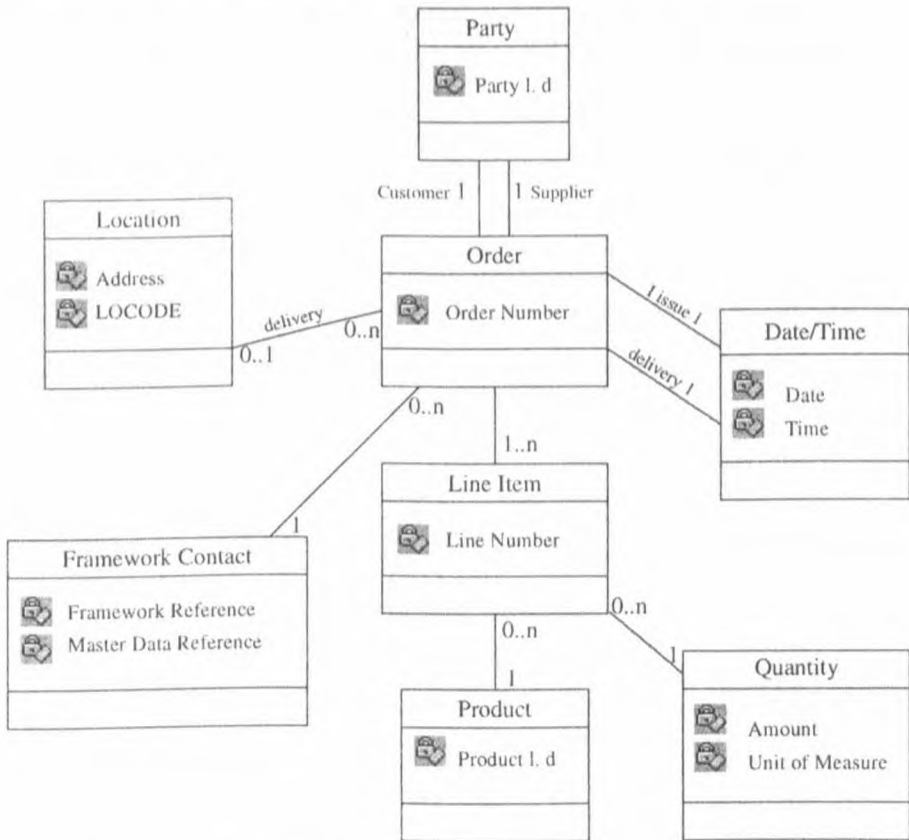


Figure 14 Class Diagram. Order-CallOff

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