

Reference Model of the International Supply Chain
with special reference to
Trade Facilitation and Trade Security

**Source: UN/CEFACT/TBG-International Trade Procedures and Business Process
Analysis Groups**

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1. Introduction

1.1. *Background to the document*

At its meeting in May 2003, the International Trade Procedures Group of UN/CEFACT together with representatives from WCO, Transport and UN/CEFACT/ BPA, reviewed the Reference Model of the International Supply Chain produced by the Business Process Analysis Group (Ref.1). It was agreed that the model should be further developed to enable it to be used to help identify the needs for future work on trade facilitation and to position the existing facilitation recommendations within the International trade process. In particular it was agreed that that the model should be enhanced to incorporate processes that are currently under development to ensure the security of trade transactions and to identify those areas where security may need to be reviewed. This paper presents the current status of this modeling work that incorporates the processes identified by ACI (Ref.2), IMO and CSI¹ and transport related processes identified in the MIST project report (Ref.3). As the European Commissions proposal for " simple and paperless environment for Customs and Trade" is congruent with the recommendations of the ACI, the EC's proposed measures are implicitly represented as well.

The business process modelling methodology applied to draw up this document is based on the UN/CEFACT Modelling Methodology (UMM). UMM in its turn is based on the Unified Modelling Language (UML) from the Open Management Group (OMG) and is derived from the Rational Unified Process (RUP) developed by Rational Corporation. As such, UMM provides a procedure for specifying/modelling business processes in a protocol-neutral, implementation-independent way. The Model has been developed using the modelling software "Rose" developed by Rational Corporation. Although the methodology supports the full development cycle starting from the high level "Domain View" of the International trade process to a specific e-business solution, this work concentrates on the Domain view leaving the detailed solutions to be developed by the relevant organisations concerned. By presenting this Domain view the various bodies involved in implementing security solutions can see how their activities fit in with others to support the achievement of security for the full international trade process.

¹ The model explicitly shows the impact of the "24Hour rule".

2. The BPAWG Reference Model of International Supply Chain

The Business Process Analysis Group of UN/CEFACT developed a high level model of the International supply chain in order to support consistent standardisation work within the various UN/CEFACT business area teams and to provide a mechanism to link this with trade facilitation work carried out by the International Trade Procedures Group. The approach used represented an early application of the Unified Modelling Methodology (UMM), developed by the Techniques and Methodology Group of UN/CEFACT. The model is also intended as an educational tool to provide a simple introduction to the complex processes that operate in International trade.

Since the model was first developed it has been expanded regularly as more detail of the various aspects of International trade were added. The presentation has also recently been updated to reflect changes to the UMM. The model was last reported in the UN/CEFACT/BPA/BP044, March 2000. The current version of the model was updated in October 2003 and incorporates more information on Transport and Customs related activities.

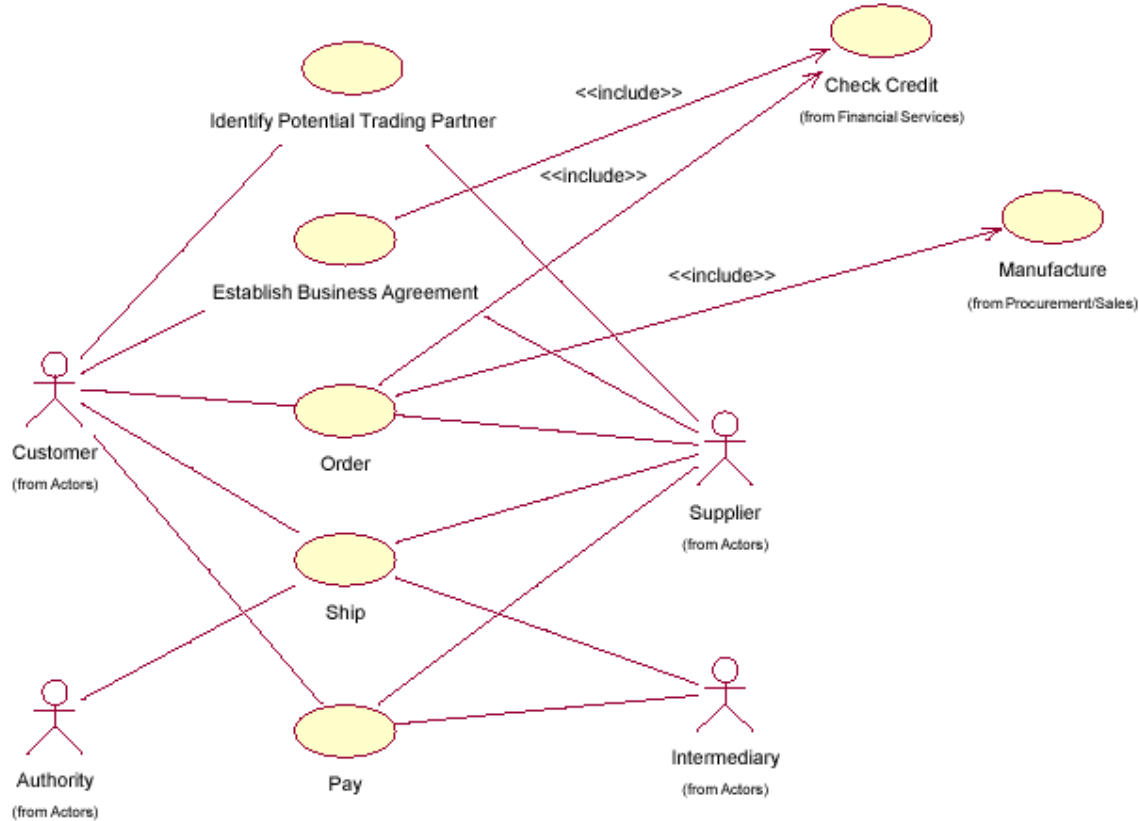
2.1. Purchase and Supply Internationally

The International Supply Chain model provides a high level view of the total ISC process by first dividing the domain into 5 main process areas (identify potential trading partner, Establish business agreement, Order, Ship, Pay) and classes the parties involved in these processes into 4 groups (Customer, Supplier, Authority, Intermediary). This is illustrated in the form of a UML Use Case Diagram in Figure 1,

The activities represented may be summarised as follows:-

The customer recognises the need for a product, gathers market intelligence on suppliers, establishes contracts with selected suppliers, places order, product is shipped according to the agreed terms of delivery, all requirements of authorities are met and customer pays supplier according to agreed terms of trade.

A full description of the Use Case represented by this figure is given in annex 1.

Fig.1 Use Case Diagram: Purchase and Supply Internationally**Figure1. Purchase and Supply Internationally**

The model expands the detail within each of these areas by defining the more detailed processes/activities that occur in each of the 5 main processes. In the full model this process is continued until all processes that involve 2 parties are identified and described. The model uses the UML artefacts to describe these processes in the form of Use Case diagrams and descriptions, Activity diagrams and Sequence diagrams, and the information that is exchanged between parties expressed as Class diagrams. For this report only a limited number of these artefacts are presented, highlighting those aspects of the international supply chain most relevant to the movement of goods and trade security. This is primarily covered by the "Ship" Use Case and this is presented in section 3.

2.2. Positioning Trade Facilitation within the Model

The International trade procedures Group of UN/CEFACT have published some 30 recommendations relating to the conduct of International trade and it was of interest to see what aspects of the ISC process as described by the model were impacted by these recommendations. It is also intended to see if the model can help highlight the areas where new recommendations are needed.

Figure 2 shows where the recommendations relate to the 5 main processes (Use Cases) shown in Figure 1. Some of the Recommendations are more general ones and do not directly effect the processes or data within the model. These are identified in the General category. The results shown in Figure 2 provide a high level view of the areas impacted by the recommendations. The more detailed expansion of the model enables these to be more specifically positioned against the Information and processes but these are not shown here.

Fig.2	UN/CEFACT Facilitation Recommendations	International Supply Chain Reference Model					
		Identify Trading Partner	Establish Business Agreement	Order	Ship	Pay	General Recommendations
UN/CEFACT Recommendations							
1	UN Layout Key						
2	Location Codes						
3	ISO Country Codes						
4	National Trade Facilitation Bodies						
5	INCOTERMS						
6	Aligned Invoice						
7	Representation of Dates/Times						
8	Unique Identification Code (UNIC)						
9	Currency Codes						
10	Codes for Identification of Shipping						
11	Documentary aspects of Transport of Dangerous Goods						
12	Maritime Transport Facilitation Measures						
13	Facilitation of Legal Problems in Import Clearance						
14	Authentication of Trade Documents						
15	Simpler Shipping Marks						
16	UN/LOCODES						
17	PAYTERMS						
18	Facilitation Measures for Trade Procedures						
19	Codes for Modes and Means of Transport						
20	Codes for Units of Measure						
21	Codes for Passengers, Types of Cargo Packages and Packing material						
22	Layout Key for Standard Consignment Instructions						
23	Freight Cost Codes (FCC) Harmonisation						
24	Trade and Transport Status Codes						
25	Use of UN/EDIFACT						
26	Commercial Use of Interchange Agreements						
27	Preshipment Inspection						
28	Codes for Types and Means of Transport						
29	Codes for Types of Cargo						
31	Electronic Commerce Agreement						

3. ISC-Transport and Security

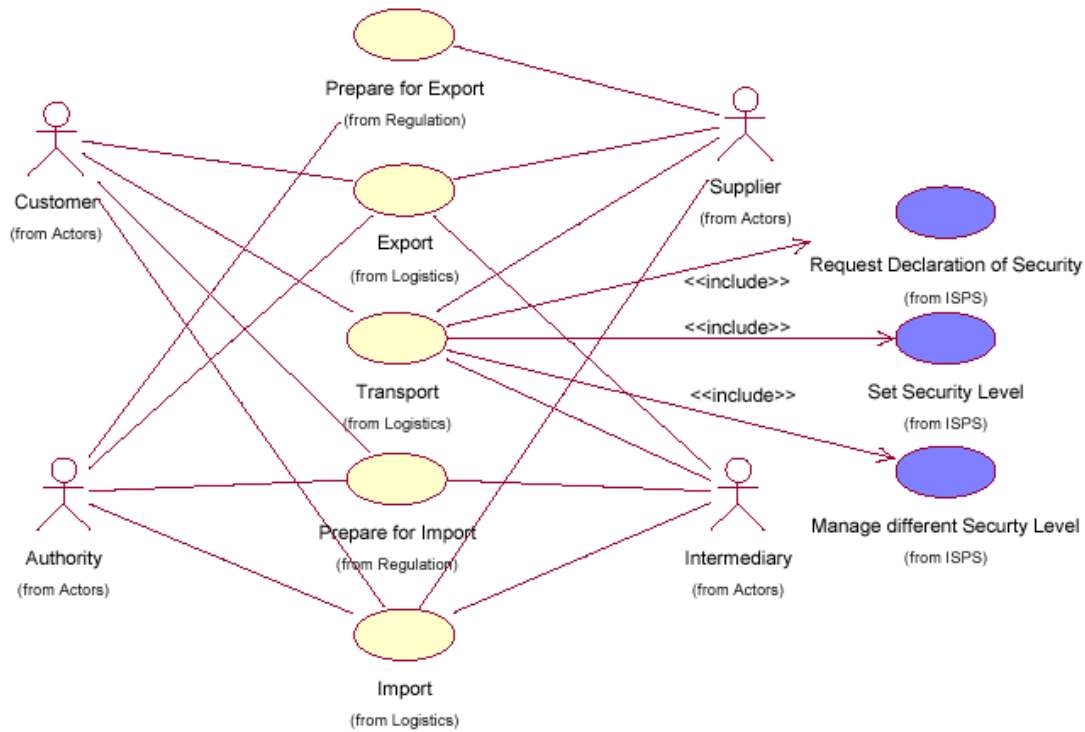
Security within International trade depends on a range of actions being taken by all parties involved in the physical handling and movement of Goods, and in the provision and transfer of trade related information. Areas in which security standards may be needed were highlighted in the Proposal for Standards Development (Ref.4). This paper referred to the ISC model, the earlier versions of which presented only a simple view of the Transport related activities involved in International Trade. The recent emphasis on security aspects of International trade required an expansion of the model to encompass the relevant processes that fall within the Logistics and Authority areas of responsibility. (Transport and Customs related processes). This has specifically required the expansion of the "Ship" Use Case identified in figure 1. The publication of the ACI guidelines (Ref.2), the MIST report (Ref.3), and the IMO/ISPS have provided some of the information required to support the current enhancement of the model. The additional requirements of ISPS involve the reporting of security levels and managing cases of different levels upon the arrival of a vessel at a port. These requirements have been modelled using three different Use Cases, which are included as expansion of the Transport processes within the "Ship" Use Case. See Figure 3.

Further to adding required detail to the "Ship" Use Case, the considerations of the ISPS made it necessary to add a series of additional Use Cases. Four of them describe processes to conceive and certify respective security plans for ships and port facilities. These 7 Use Cases are shown in Figure 4. Albeit these activities will imply added costs to international trade, they are not expected to impact the flow of goods themselves.

These aspects have been incorporated into the current version of the reference model and the following sections present some of the results of these developments. Results in the form of Activity diagrams are presented in section 3.3 and these show the activities carried out by the parties (Actors) involved in the Use Cases and the flows of the information between them.

Fig.3 The Ship Use Case

The activities represented in this Use Case may be summarized as follows:-



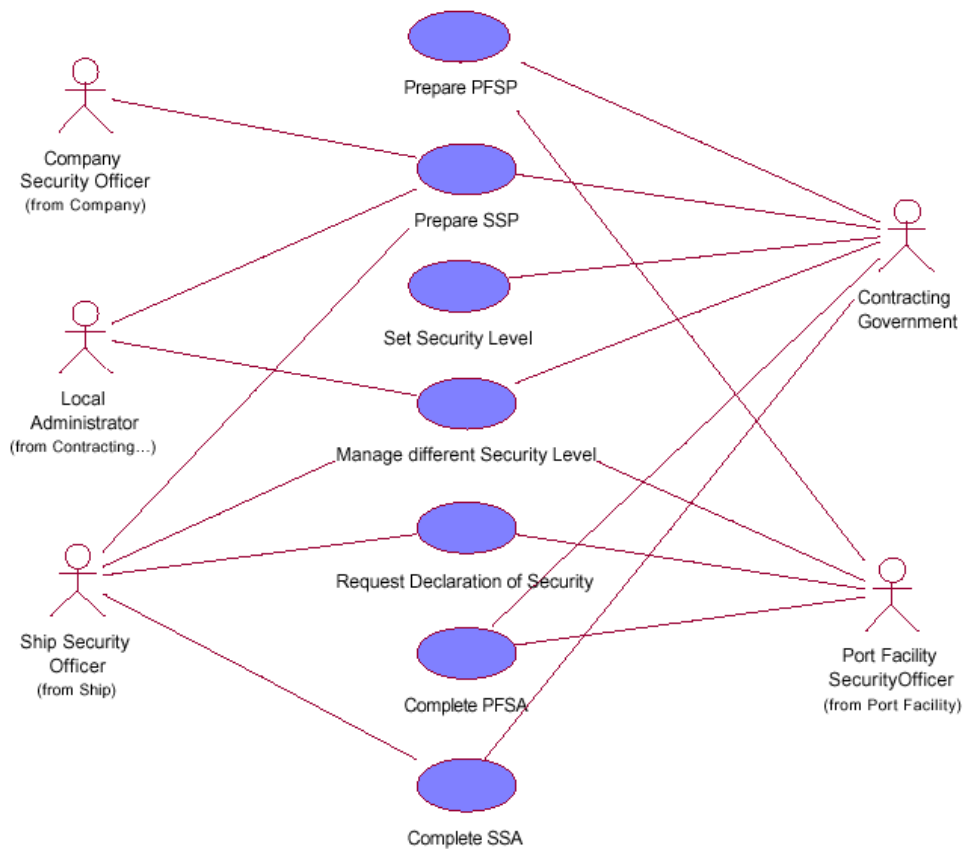
The supplier despatches the products according to the agreed terms of delivery and the customer receives the product. All transport arrangements are made and executed, and the requirements laid down by the relevant authorities are met. Security aspects represented by ISPS are included in the Transport processes.

A fuller description of this Use Case is given in Annex2

3.1. Positioning ISPS within the Model

As mentioned above, the ISPS resulted in 7 Use Cases being added to the model involving a number of new roles and actors: (Fig.4). The three that relate to the "Ship" Use Case were shown in Fig.3. Further details concerning the "Request Declaration of Security" and "Manage different Security Levels" use cases are further detailed in Annexe 3. The five others "Prepare PFSP", "Prepare SSP", "Set Security Levels", "Complete PFSA" and "Complete SSA" represent new additions to the model structure and are not presented in this report.

Fig.4 ISPS Use Cases



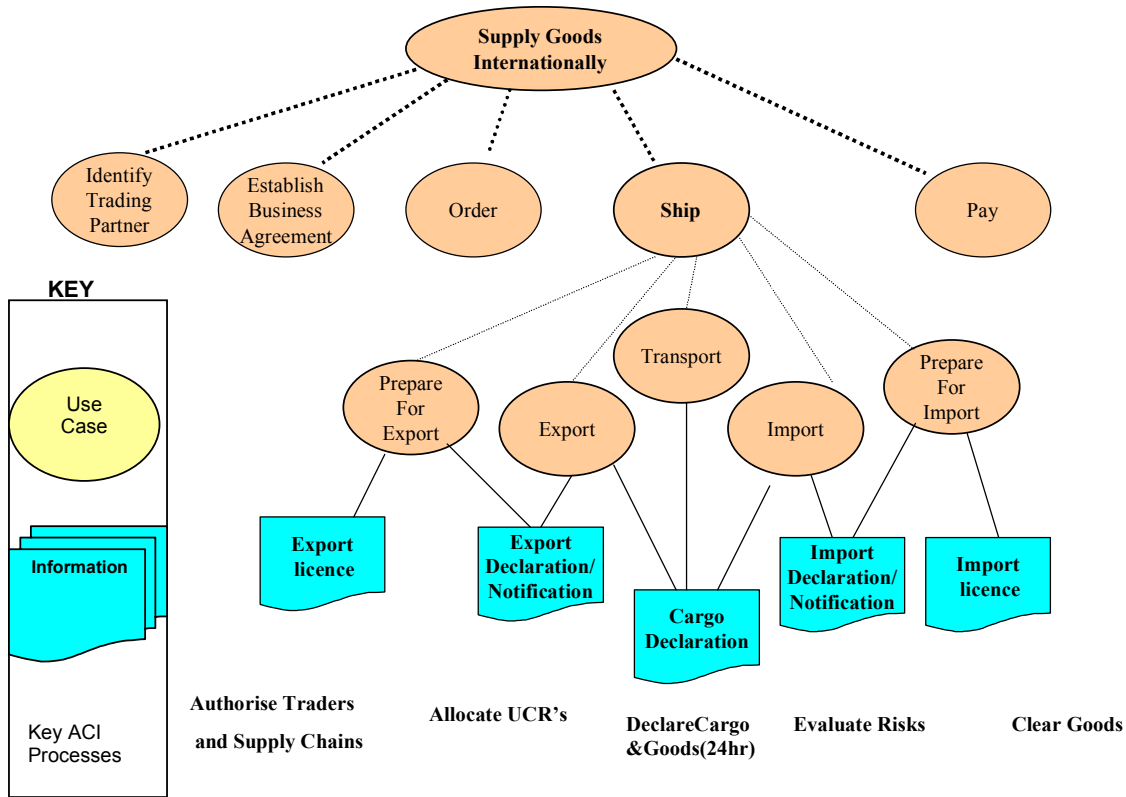
Further detail of these use cases are given in Annex 3.

3.2. Positioning ACI, 24Hour Rule and the EC's recommendation within the Model

The Advance Cargo Information guidelines produced by WCO show the activities designed to improve trade security and build on principles in the revised Kyoto Convention. The main activities that contribute to the security may be illustrated in relation to the high level processes in the model of the ISC shown in the expansion of the "Ship" Use Case. (Figure 5).

A more detailed activity model involving the ACI activities is shown in Figures 6,7.

Fig. 5 ACI and the ISC Reference Model



3.3. Activities involved in the "Ship" Use Case

The ISC Model describes the activities involving the various Actors that are involved in the processes that make up the "Ship" Use Case. These are shown below.

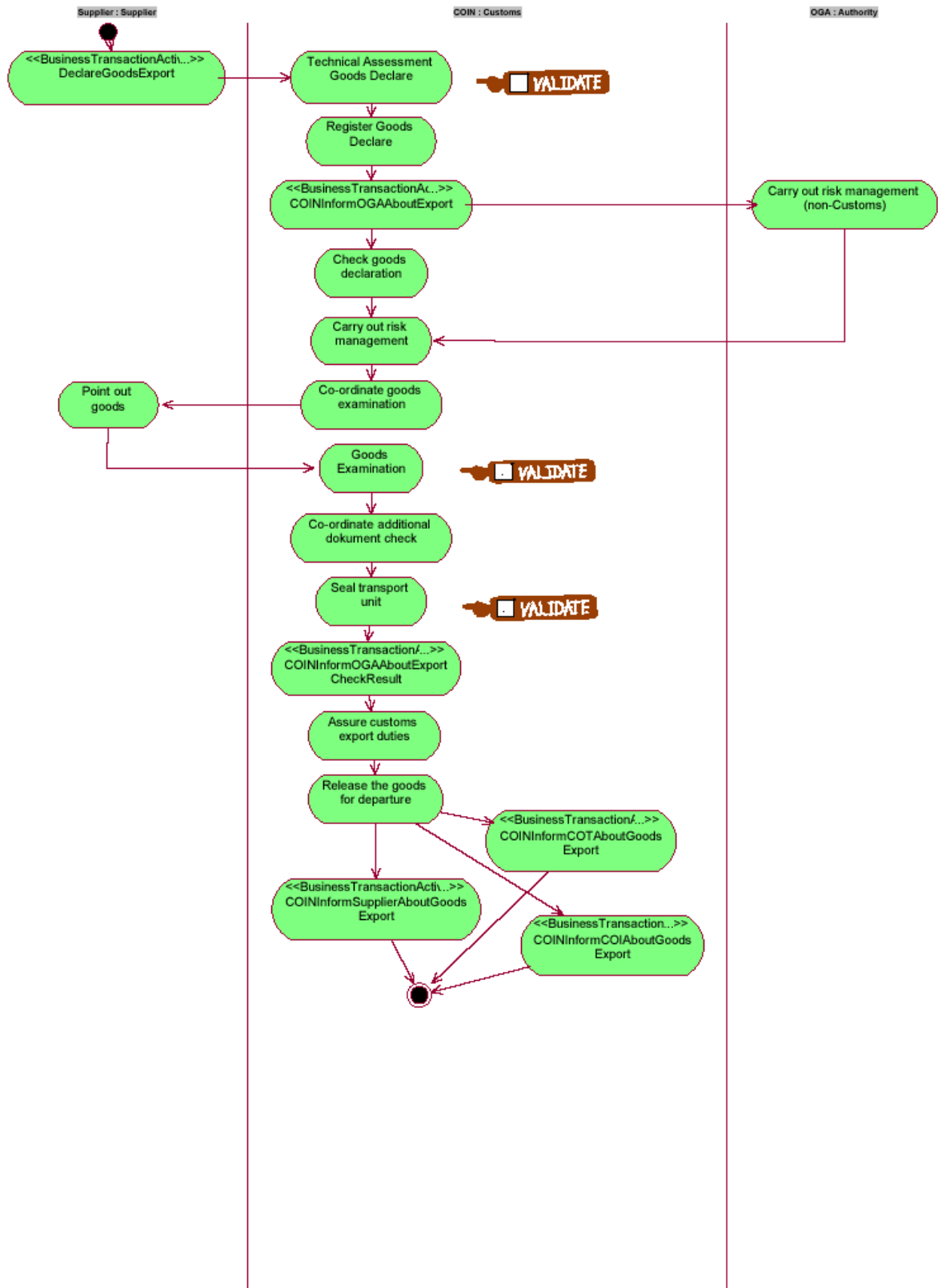
3.3.1. Prepare for Export

Activity Diagram: Prepare for Export

The activities involved in the Use Case Prepare for Export include the lodging of the Customs declaration and the carrying out of the relevant customs checks, risk assessment and duty collection prior to release or otherwise of the goods. This is the main point where the security procedures operated by custom, based on the information flow and also on the goods flow, can be exercised. .

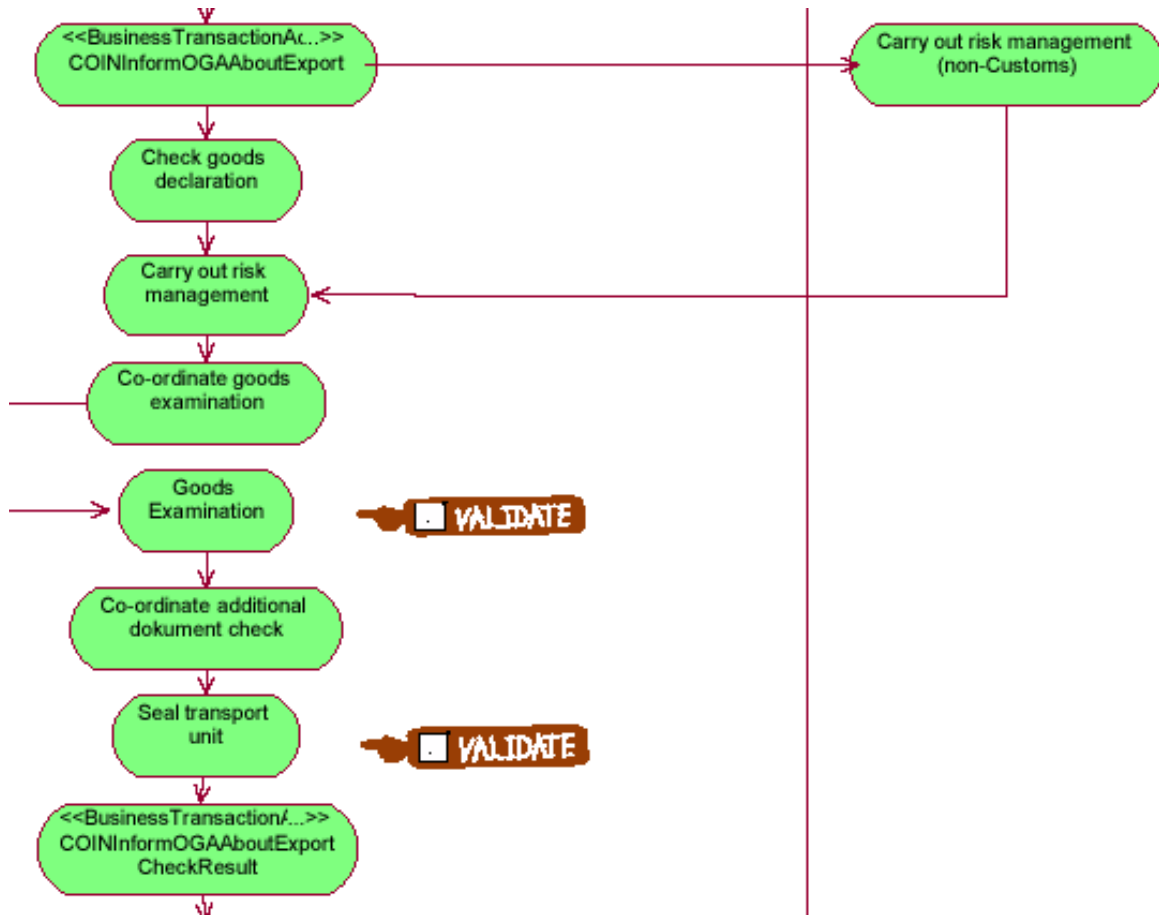
Main actors involved in this sub process include the Supplier, Customs Office Inland (COIN) and, depending on the kind of goods being exported, the relevant (Other) Government Agencies (OGA). The role of the Transport Service Buyer at this stage is a minor one that is only affected insofar as activities can only commence once the goods have been cleared for export.

Fig.6 Prepare for Export

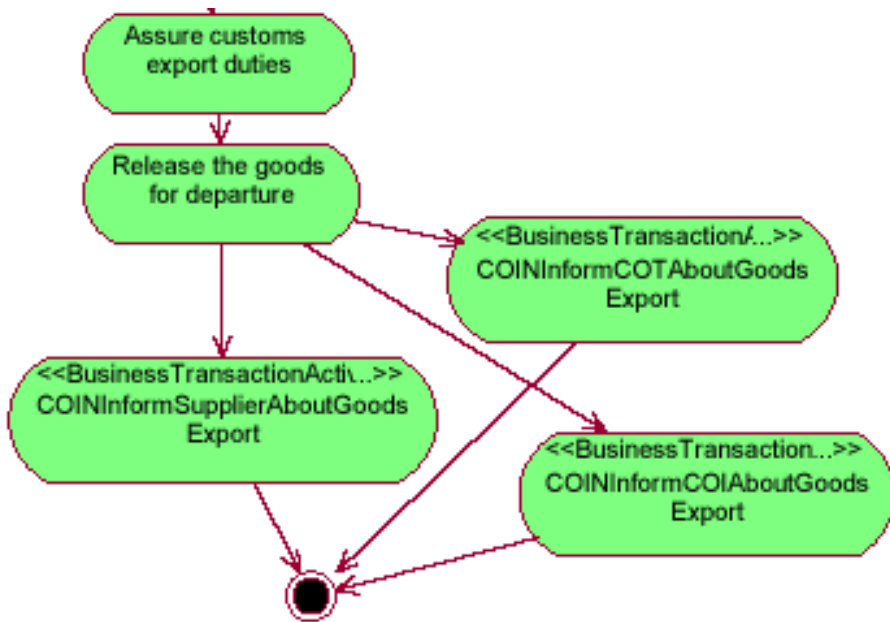


Activities performed by Customs Office Inland (COIN) and their interactions with Other Government Agencies are more clearly visible in the higher resolution charts below. Specifically highlighted are those checkpoints where either declarations or the physical goods themselves are validated by Customs or the relevant government agency.

Fig.7 Prepare for Export (Details)



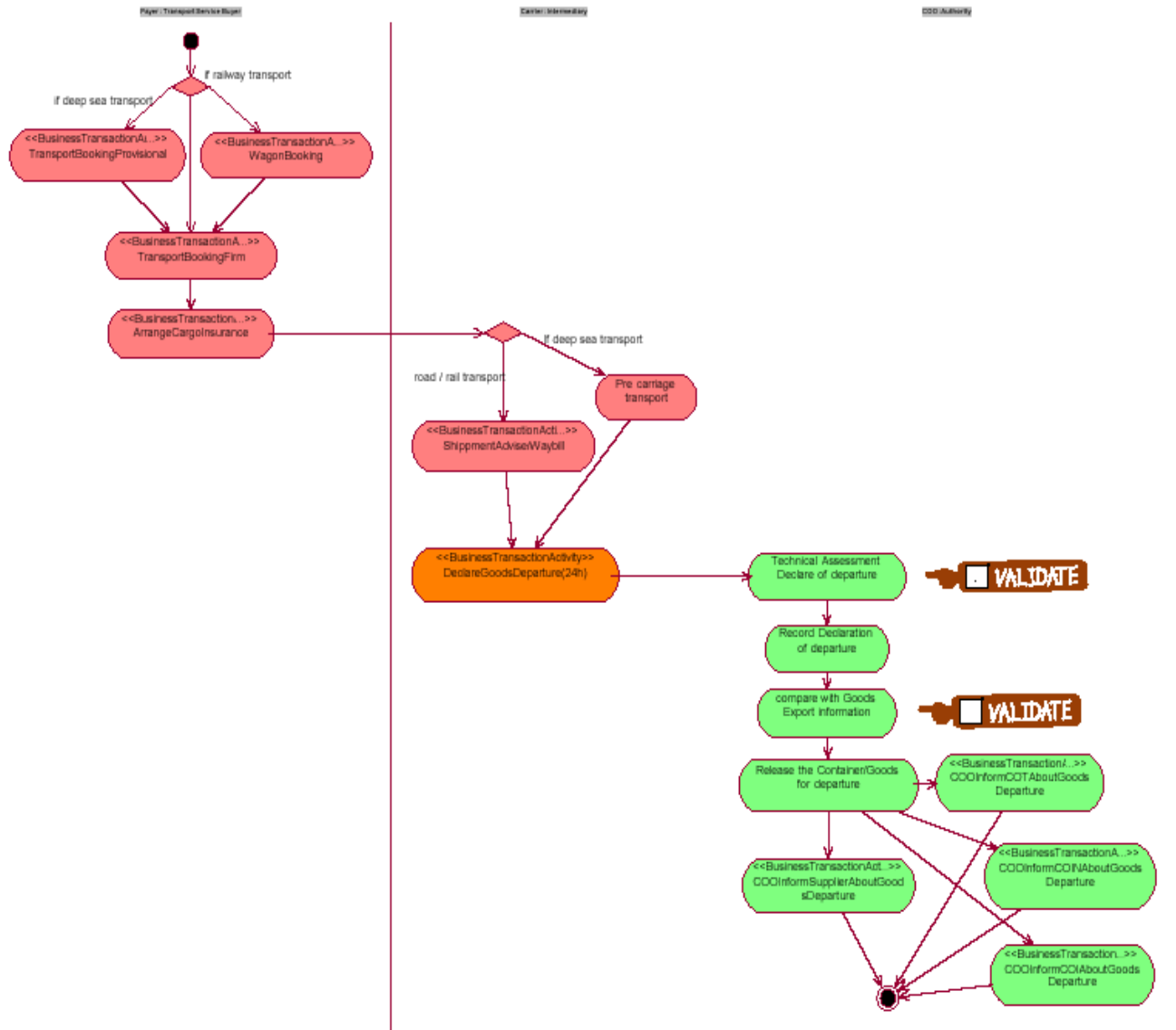
One of the implications of ACI guidelines is illustrated in the above section of the diagram, where Customs (COIN – Customs Office Inland) forwards the relevant information to their counterpart agencies[Customs Office Outward (COO) Customs Office Inward (COI), Customs Office of Transit, ...].



3.3.2. Export

The activities represented in the Export Use Case follow from the release of goods and include the issue of the Shipment Advise/Waybill by the Carrier, the declaration of goods departure (24hr rule) and the information of goods release provided by the export Customs authority to the importing Customs Authority and Exporter.

Fig. 8 Activity Diagram: Export

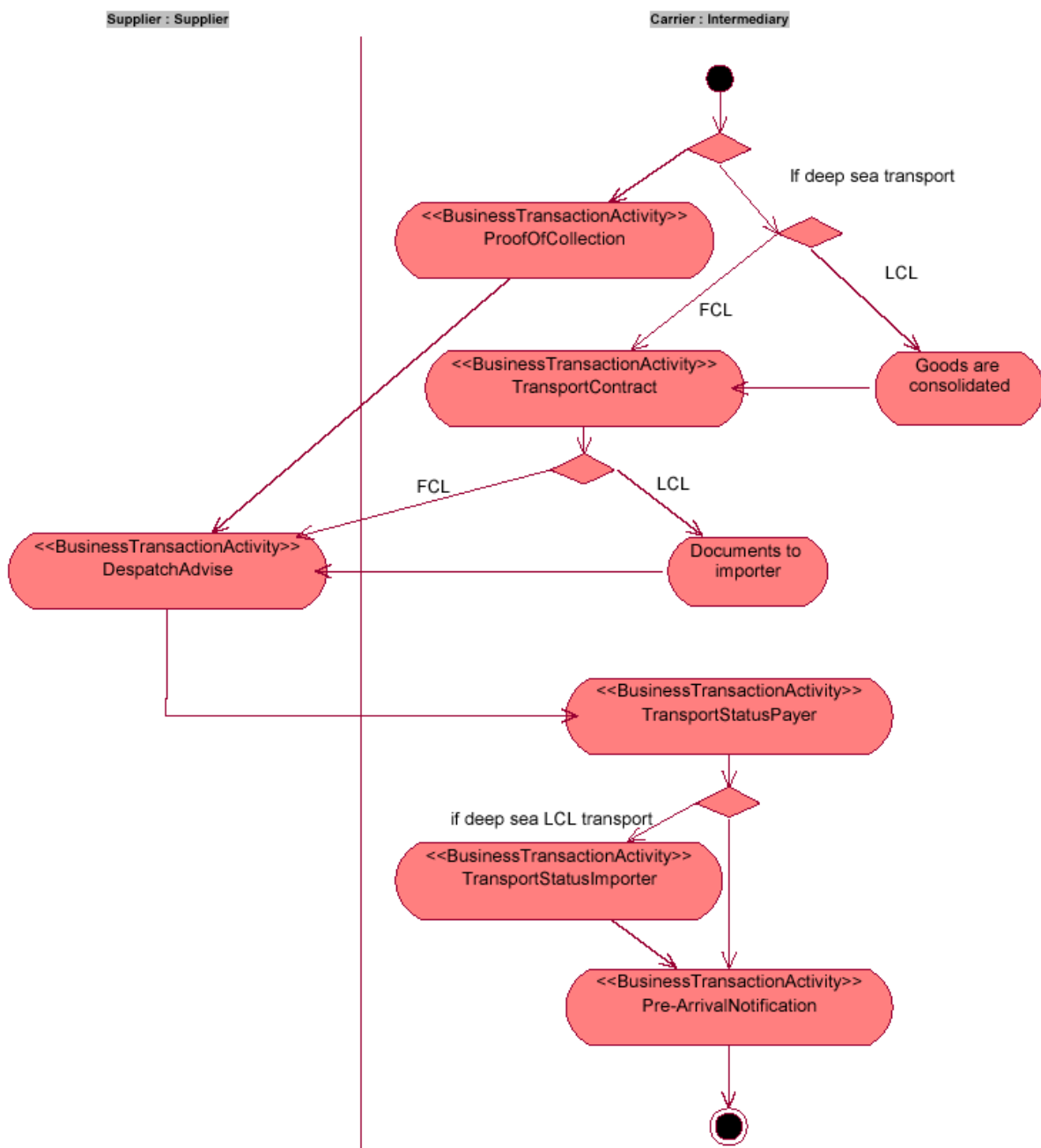


The Customs Office involved at this stage is Customs Outward (at the border) who check the Declaration/Notification Of Departure and may check the physical goods. Information on the “release for departure” is transmitted to other Customs Offices.

3.3.3. Transport

The activities involved in the Transport Use Case cover the issue of proof of collection of goods, issue of despatch advise as well as any consolidation activities and goods movements. (The activities relating to ISPS have not yet been included in the model)

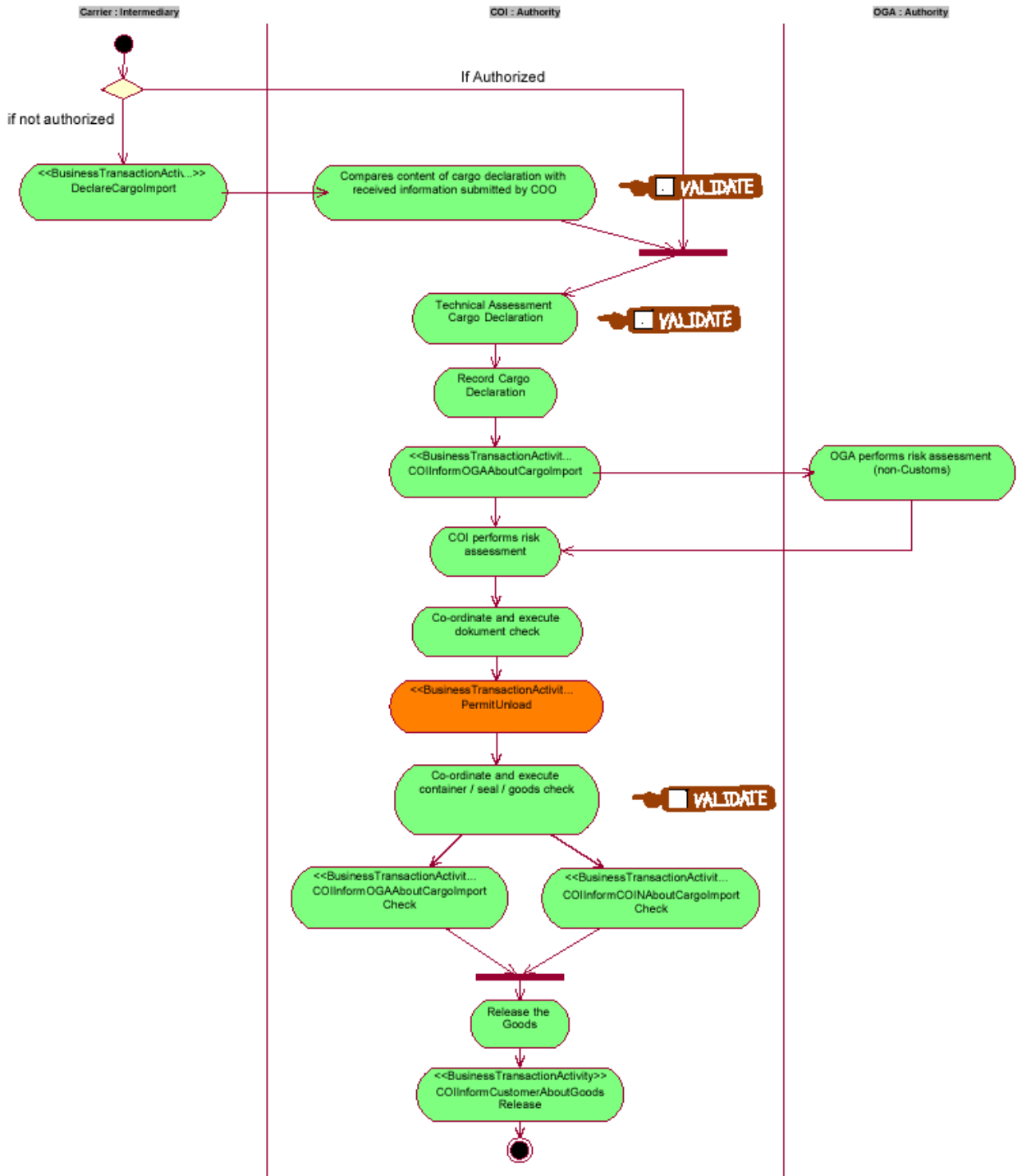
Fig.9 Activity Diagram: Transport



3.3.4. Prepare for Import

The activities involved in the Prepare for Import Use Case include the receipt of the pre-arrival information and all the activities involved with declaration of goods Import to Customs Authority, Risk assessment, and Release of goods.

Figure 10. Activity Diagram: Prepare for Import



4. Conclusions

The International Supply Chain Reference Model of UN/CEFACT/TBG-BPA provides a useful basis for the development of an ISC Trade Facilitation and Security Model to illustrate how both trade facilitation and security aspects impact on the supply chain.

Although, in the first stage of the development of the new model, only the WCO ACI Guidelines, MIST Project Report, ISPS and US CSI 24 hour Rule have been taken into consideration, it is proposed that in the next stage of the project the various other requirements and initiatives will be incorporated to cover the whole supply chain. Furthermore, it will serve as a living model that may be regularly updated to reflect latest developments.

It's envisaged that the new model will serve as a tool to :-

- (a) assist the parties in the supply chain to identify and comply with the requirements and achieve trade facilitation benefits
- (b) facilitate the identification of any segments of the supply chain where additional trade facilitation or security measures would be appropriate
- (c) provide a basis for further modelling work by interested parties.

5. References

Ref.1 The BPAWG Reference Model of the International Supply Chain. UN/CEFACT/BPA/BP044, March 2003

Ref.2 WCO Guidelines on Advance Cargo Information (ACI Guidelines). World Customs Organisation. V0.6, May 2003

Ref.3 Report of the Multi Industry Scenarios for Transport (MIST) Version 2001, DRAFT 22 June 2001

Ref.4 Proposal for Standards Development in support of Trade Facilitation and Security-A collaborative approach, UNECE/TRADE/2003/22, April 2003

Ref.5 COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT AND THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE, a simple and paperless environment for Customs and Trade, Brussels, 24.07.2003 COM(2003) 452 final

Annexe 1. Use Case Description-Purchase and Supply Internationally

Name	Purchase and Supply Internationally (P&SI)
Traceability Identifier	D-P&SI-1.U-P&SI-1-1
Actors	<p>Customer</p> <p>Supplier (manufacturer)</p> <p>Intermediary (PSI company, insurer, credit checking agency, credit provider, carrier, bank)</p> <p>Authority (chamber of commerce, CAP authority, license authority, health authority, customs, consul)</p>
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. 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)

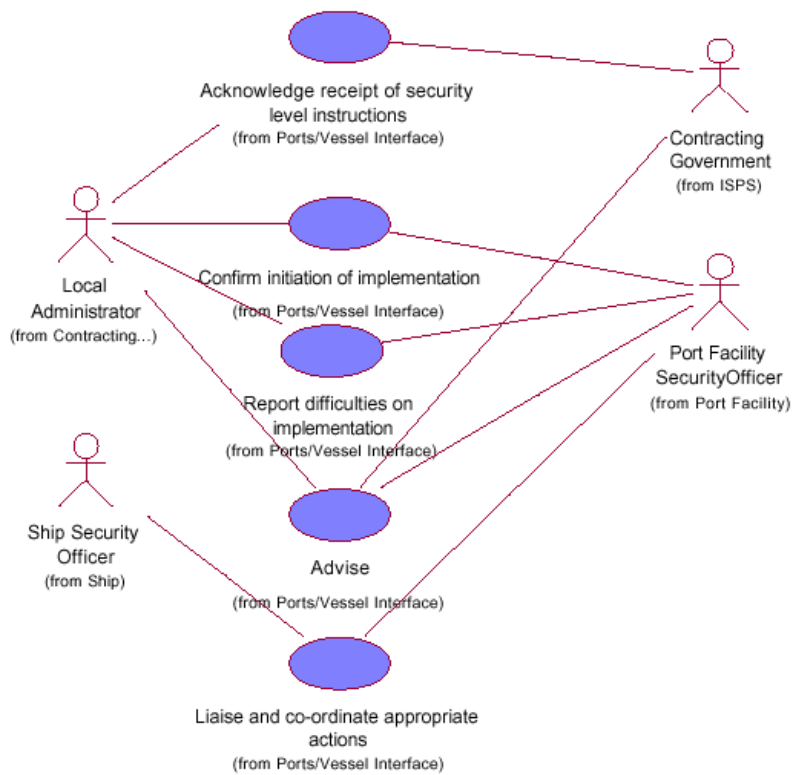
Annexe 2. Use Case Description-Ship

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> <ul style="list-style-type: none"> - Supplier requests Export license from Authority - Authority responds - Health certificates requested from Health Authority - Authority provides certificates (required by Import Country Health Authority) <ul style="list-style-type: none"> Radiation, isotopic and salubrity certificate Conformity certificate for Import Health Authority Bacteriological certificate Physical Chemical certificate Veterinary and sanitary certificate Analysis certificate Dangerous Goods Note prepared and provided to Carrier Supplier requests and obtains certificate of Origin from Chamber of Commerce - Supplier produces and supplies relevant export documentation including:- <ul style="list-style-type: none"> <i>For Customer</i> <ul style="list-style-type: none"> Packing Weight List/Delivery Note/Invoice <i>For Export Customs</i> <ul style="list-style-type: none"> . Relevant Customs Documents (e.g Customs Product List T1, C88A-LEC,T5 documents, EUR1,Customs Invoice) <i>For Import Customs</i> <ul style="list-style-type: none"> Relevant Customs Documents.(e.g Certificate of Origin Age certificates and batch codes, Invoice - Intermediary(insurer) provides Supplier with Insurance Certificate (for Customer) - Transport booked with Intermediary (carrier or freight forwarder) by Customer and/or Supplier according to agreed delivery terms. - Supplier provides Standard Shipping Note and Bill of Lading Instructions to Intermediary (carrier/shipper) - Intermediary (carrier or freight forwarder) agrees contract for transport of goods and collects and delivers goods to Customer's agreed location. - Supplier (Ship from) issues Despatch Advise to Customer(Ship to) - Intermediary (carrier/shipping line) provides supplier with Certificate of 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/or goods - Goods cleared for import by Authority(customs) after checking documentation and/or goods <p>Ends when Customer records receipt of cleared goods at agreed location.</p>
Alternative Scenarios	Goods in Free Circulation, National Trade. To be defined

Annexe 3. The ISPS Use Cases

The following illustration shows more details of the “Request Declaration of Security” Use Case:

Figure 1: Request Declaration of Security



In the case the security levels of port facilities differ from those of the incoming vessel, these differences have to be managed, as illustrated in the figure below:

Figure 2: Manage different security levels

