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SINTEF REPORT

TITLE

INTRA Project Report

Transformation of EDIFACT message types to XML via UML

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ABSTRACT

INTRA – Intermodal Transport, is a project with objective to improve the information flows in intermodal freight transport. The project focuses on standardisation of data messages, which are exchanged between systems in the transport chain. Improvements of current standards will result in more integrated systems that can exchange data without the needs for manual conversions.

The UN/EDIFACT standard for electronic message exchange format is one area for improvement. XML is a new exchange format, which may replace UN/EDIFACT, but it is not obvious how this can be done. This report proposes a method for transforming of UN/EDIFACT message descriptions to XML/DTD or XML Schema, by using UML message models as an intermediate step.

KEYWORDS	ENGLISH	NORWEGIAN
GROUP 1	Computer Science	Datateknikk
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Preface

The INTRA project consists of four main workpackages:

1. Development of a framework for message exchanges between transport systems
2. Promotion of TRIM – Transport Reference Information Model for standardisation of message contents
3. Development of methods for use of XML as a new standard format for messages
4. Establish seminar meetings about co-ordination of intermodal freight transport projects in Norway.

A description of INTRA and the workpackages can be found at:

http://prosjekt.marintek.sintef.no/intra/

This report is a deliverable from the third workpackage, and describes the results of a co-operation with the Pharos XML/EDI project hosted by the Swedish Transporters EDI Association. One of the objectives for the Pharos XML/EDI project was to investigate how current EDIFACT message definitions could be replaced by XML, and to propose a method for transformation of EDIFACT message standards to XML. The result is a recommendation of a method in three steps, including use of the Unified Modelling language, UML.

List of Abbreviations

The following abbreviations have been used in this report:

BM	Business Model
BSR	Basic Semantic Repository
CEN	Comité Européen de Normalisation
DTD	Document Type Definitions
EWG	European Working Group
ISSS	Information Society Standardisation System
MIG	Message Implementation Guideline
UML	Unified Modelling Language
UN/EDIFACT	United Nations Directories for Electronic Data Interchange for Administration, Commerce and Transport
XML	Extensible Markup Language

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1. Executive Summary

1.1 Background and work performed

In the ongoing development of methodologies for using XML for business to business communication one of the most challenging issues is how to migrate from existing Edifact messages to XML/EDI messages. This paper presents a transformation method developed by the Swedish Transporters EDI Association and SINTEF Telecom and Informatics in the Pharos XML/EDI project

Pharos Transformation Method starts from an existing Edifact implementation guide (MIG) where all information necessary for a certain business transaction is defined. All specific Edifact syntax elements are removed and the basic operational data terms are structured into a so called Business Model, understandable for people, without any syntax knowledge needed.

Next step is to formalise the Business Model into a UML model. UML is a modelling language with widespread use in the XML area, and is also recommended by UN CEFACT as a tool for message development.

One of the great advantages with using UML is that available software makes it possible to automate the third and final step to an XML message. It has been proven feasible during the Pharos project to automatically generate an XML/DTD as well as the corresponding XML Schema.

Pharos Transformation Method has been developed in close connection with other relevant projects, above all CEN/ISSS XML/EDI European Pilot Projects (Healthcare and Transport). High attention has also been given to the global ebXML initiative and other standardisation activities.

This document contains references to transformation approaches tested in other projects, with comments on their advantages and disadvantages.

1.2 Conclusions

- The method has been tested and found very easy and straightforward to handle.
- The transformation method is reusable by means of a set of principles and rules.
- Standardised rules for naming of business elements are highly important.
- Tests have been performed on an EDIFACT message for Transport Booking. There should be no difficulties to use it in any other message area.
- Using UML has proved feasible with a reasonable amount of resources.
- The transformation can be partly automated. The degree of automation increases with number of transformed messages.

1.3 Further Work

- Test the methodology on other UN/EDIFACT message types.
- Adjust the methodology with recommendations from the ebXML project
- Improve the XML generator software with functions for message layout forms
- Develop transport domain model “as global as possible”.

2. Introduction

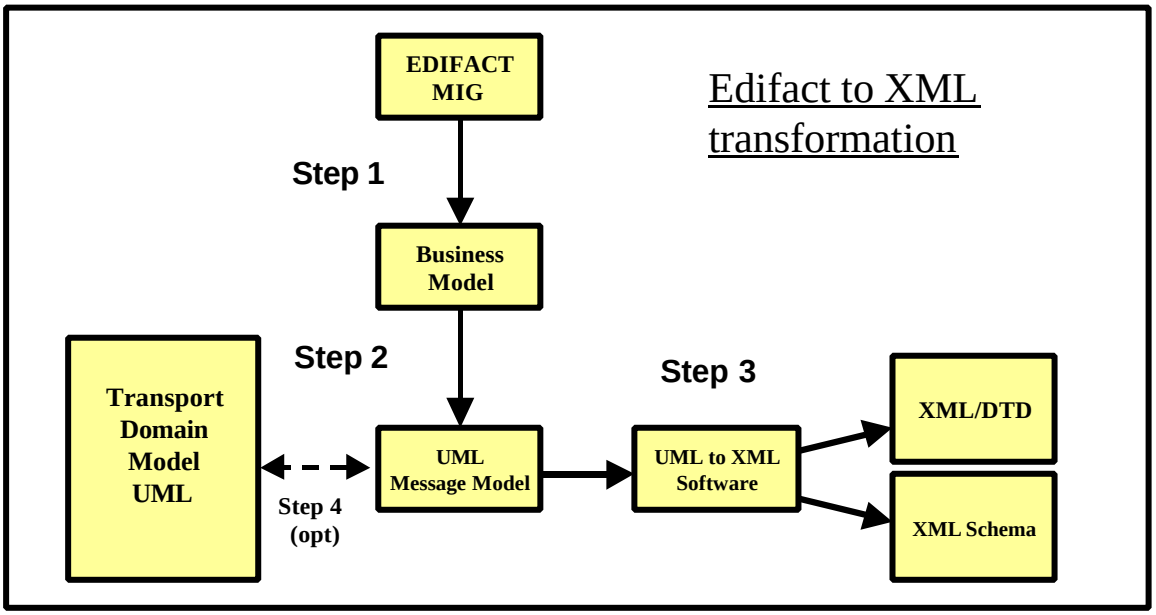
2.1 Background on Pharos project

The Swedish Transporters EDI Association has published Edifact Message Implementation Guides (MIG:s) since 1990 under the name of Pharos[1]. They cover relevant scenarios within Transport and Logistic, like booking, instructions, track and trace, and freight invoice.

During 1999 – 2000 a new project, called Pharos XML/EDI, has been carried out with a major task to find the best way to migrate the Pharos messages from Edifact syntax to XML format. The result is a recommendation of a transformation method in three steps, including use of the Unified Modelling language, UML.

2.2 Overview of Pharos Transformation Method

The starting point for the transformation is a MIG describing a functional subset of an Edifact Message type. The way forward to an XML/DTD or an XML Schema consists of three steps, as illustrated in the picture below.



Step 1.

The first step is a manually performed transformation of the MIG to a so called Business Model [2]. This transformation intends to remove all specific EDIFACT syntax elements and extract a functional specification of the information contents and its structure. A person with knowledge

[1] *Pharos was the name of the antique lighthouse outside Alexandria built to support the international sea transport. It is recognized as one of the seven wonders of the world.*

[2] The term Business Model is used by Pharos to separate it from an Edifact message model or an UML model. While these other two have strong formal restrictions, the word Business Model indicates that focus is concentrated upon the information contents used by business people for operational purpose.

both of EDIFACT and the related business should perform this first step.
See annex A for an example of a Business Model.

Step 2.

The second step transforms a Business Model to a UML Message Model. This step should be performed by a person with UML competence. The transformation is supported by a UML modelling tool, which can produce documentation such as class diagrams, class attribute lists, etc.
See annex B for examples of Message Model documentation.

Step 3.

The third step creates the correspondent XML/DTD or XML Schema. For this step the project group used a software tool called MessageDesigner developed by SINTEF, see reference G. It can be foreseen that this kind of software will be needed to support the automated generation of XML messages from a formalised UML model.
See annex C and D for examples of automated generated DTD and XML Schema.

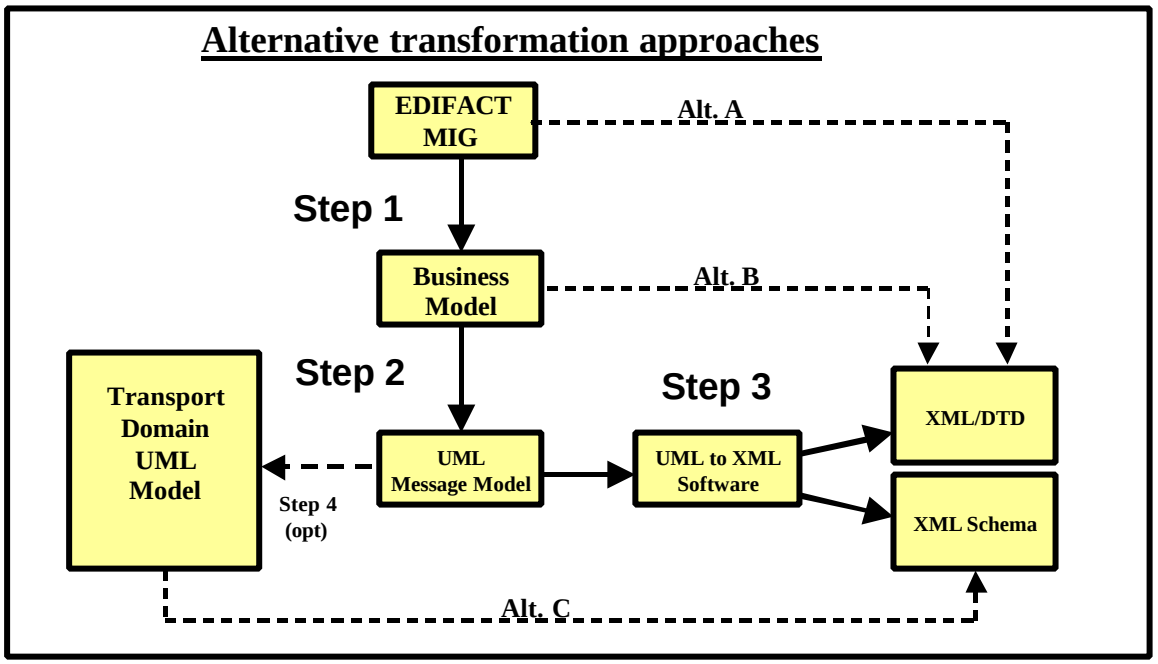
Step 4 (optional).

The proposed transformation method also includes an optional fourth step with the possibility to store the elements of UML Message Models in a Transport Domain Model for later reuse when new message types shall be developed. This is more discussed in chapter 2.5.

2.3 Benefits and reasons for Pharos Transformation method.

- All semantics in the Edifact message reflecting the relevant business transaction is reused.
- Edifact syntax is removed making the message developing process easier to understand and maintain.
- Existing Edifact structure (branch diagram) may be used as a starting point to build a structure according to business needs. No formalities to change the structure when needed for better illustration of the business transaction.
- References to Data Dictionary (mostly UN Codelist, but also other code sets) are kept as necessary pointers to find the precise definition of each data term.
- Use of UML facilitates acceptance by both “XML world” and “traditional EDI world”.
- Automatic generation of DTD and XML Schema.

2.4 Summary of other approaches for transformations of EDIFACT to XML



2.4.1 Alt. A - Straight conversion Edifact to XML 1:1

Exact mirror of Edifact structure including name of segments, composites and data elements. See example below:

```
<!-- BGM : Beginning of Message -->

<!ELEMENT MessageId (#PCDATA) >
<!ATTLIST MessageId
            UN-EDIFACT:Segment          CDATA#FIXED         "BGM"
            UN-EDIFACT:Attributes       CDATA#FIXED         "1001 MessageTypeCode
                                                             1060 RevisionNo
                                                             1225 MessageFunction
                                                             4343 ResponseType"
             MessageTypeCode            CDATA#FIXED         "BookingConfirmation"
             RevisionNo                 CDATA#IMPLIED
             MessageFunction            (%Confirmation;)    "Original"
             ResponseType               (%Response;)        "Accepted"
             Constraints                CDATA #FIXED        "an..35" >
```

- The method is easy to understand for Edifact people.
- Difficult to understand for non-Edifact people.
- Needs knowledge both of Edifact and XML.
- Do not utilise any of the new benefits in the XML format.
- Brings on even the bad parts of Edifact.

For these reasons the method is not recommended by the Pharos project. The principle is however tested in CEN/ISSS European Pilot project, where also a DTD for a Transport Booking is created. See Reference List A and B.

2.4.2 Alt. B - Create XML DTD direct from Business model.

This was the first approach in Pharos XML project. It was successful in the sense that it was very easy for an XML programmer to create a DTD based upon the information in the Business Model.

Problems appeared however when the project group tried to standardise principles and rules. It turned out that the interpretation of the Business Model could be very subjective. Naming of elements and choices between element and attribute was very varying depending on the background of the XML programmer.

Conclusion:

A Pharos Business Model is a very good starting point for the creation of an XML DTD from an existing Edifact message (or MIG). But the components are hard to standardise. This led to the idea of using a formal UML Model to make it reusable by different programmers.

The bad expectations with using UML were that it could be very time consuming. However project experiences showed that it took almost the same time to manually create a DTD compared to create a UML Message Model. And after that it was possible to get an automated generated DTD and/or XML Schema.

So the project group abandoned the simple method B, and instead elaborated the Pharos Transformation Method, as is described in this document.

2.4.3 Alt. C - Creating XML DTD from a UML Domain model

In some newer Edifact message development groups, the standardisation efforts have resulted in a UML Domain Model. This is the case in Healthcare, where CEN TC251 has developed a "Method for the development of Healthcare messages". The end result of this process is the production of a syntax independent UML representation of each message, referred to as a General Message Description (GMD).

Such a model is probably one of the best starting points for creating messages of any syntax, Edifact as well as XML. In the CEN/ISSS European Pilot project mentioned above, a method is described how to map from such a domain model to XML DTD:s. The process turned out to be very successful and included automatic creations of DTD:s. It is described in project deliverable, see Reference List C.

The same deliverable contains also a section with naming conventions when going from UML to XML, which has been found very valuable also in the Pharos Transformation Method.

In older Edifact message groups, like Trade, Transport and Customs messages were not created from any formal model. The Edifact structure itself was said to constitute also to the business model. This is the case in the Transport and Logistics area, which is one reason for the Pharos Transformation Method. While building UML models for one message at a time is a practical and feasible way, the ultimate goal should be to develop a general Transport UML Domain Model.

2.5 Development of a Transport Domain Model

Most of the elements in UML Message Models may be used in multiple messages, and it should be unnecessary to perform multiple repetitions of the same transformation steps from EDIFACT MIG:s to UML Message Model. A possibility exists to store the Message Model elements in a separate Domain Model for later reuse. A Domain Model may in this way be stepwise developed based on the existing UN/EDIFACT standard definitions.

Experiences with transformation of UN/EDIFACT messages to UML domain models have shown that message contents correspond strongest on the data element/attribute level. But the structuring of attributes in classes and associations are often different in a domain model compared to UN/EDIFACT segments and segment groups.

This implies that the structure of the domain model should exist on an early stage, in order to be used as a reference structure for the stepwise development of the bottom levels.

No standard domain model exists today for the transport sector. A number of European projects in the 4th framework program have developed data models for various aspects of freight transport, and one of the most comprehensive is TRIM - Transport Reference Information Model, see Reference List D.

Within UN/Edifact the responsibility for transport messages lies upon the EWG/D4 group, and its ITIGG subgroup, (International Transport Implementation Guidelines Group). It should be an urgent task for D4 to elaborate a Transport Domain model.

2.6 The issue of XML tag names

One of the basic principles when implementing the XML language is to use human readable names (also called tags) for XML elements in a message. The obvious advantage is that this makes it easy to understand by programmers, leading to lower cost for software creation and maintenance. The obvious disadvantage is the increase of file size. An XML message is typically 3 – 5 times larger than correspondent Edifact message.

As an alternative principle it is proposed to use short tags, typically coded in the same way as an Edifact segment or element. This will give smaller file size, and it will also be more precise when it comes to an unambiguous identification of a given element.

While Pharos Transformation Method is independent of the choice between the two naming principles, it could not be avoided to discuss the issue in the project. The group came to a consensus that ”human readable tags” are best for programmers and also for traffic supervising. The ”Edifact-coded tags” are best for automatic mapping and also best as key to dictionary definition. This led to a recommendation as follows: (See also Reference List F.)

- **Use human readable tag as element name**
- **Use Edifact-coded tag as a required fixed attribute**
- **Design XML mapping software to mandatory reading of attributes**

3. Step 1 – From EDIFACT MIG to Business Model

3.1 Illustration of a Pharos Business Model

SECTION A - MESSAGE INFORMATION (mandatory, max occur = 1)

SECTION B - TRANSPORT SERVICES (mandatory, max occur = 1)

SECTION C - CONSIGNMENT INFORMATION (mandatory, max occur = 1)

	Functional term name	O/R/D	Comments	Standard ref
C1	**Consignment date and times**			**Pharos C1**
	C1-1 Earliest pickup	R		CL 2005 - 234
	C1-2 Latest pickup	O		CL 2005 - 235
	C1-3 Earliest delivery	O		CL 2005 - 71
	C1-4 Latest delivery	R		CL 2005 - 74
	C1-5 Reimburse valid to	O		CL 2005 - 123
C2	**Consignment weight and volumes**			**Pharos C2**
	C2-1 Gross weight	D	Kilos	CL 6069 - 7
	C2-2 Volume	D	Qubic metres	CL 6069 - 15
	C2-3 Total number of packages	D	Pieces	CL 6069 - 11
	C2-4 Loading metres	D	Meters	CL 6069 - ZLM
C3	**Consignment references**			**Pharos C3**
	C3-1 Transport contract number	O	Format an..35	CL 1153 - CT
	C3-2 Domestic waybill number	O	Format an..35	CL 1153 - AAS

Fig. 3-1. A Business Model consists of sections, subsections and data terms

An EDIFACT MIG can be transformed to more than one Business Model, because an EDIFACT MIG usually covers several message functions. An EDIFACT MIG of a transport booking message may cover functions like: original request, cancellation, replace, etc. Each function may result in a separate Business Model.

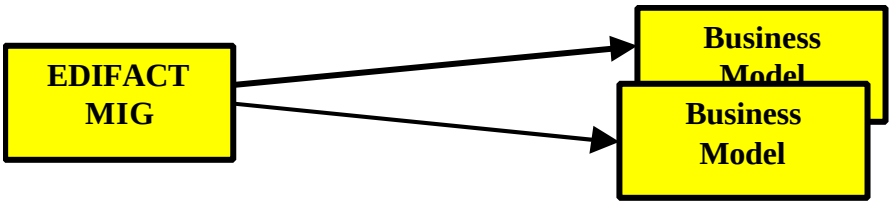


Fig. 3-2. An EDIFACT MIG may be transformed to one or more Business Models.

3.2 Transformation from Edifact to Business Model

Transformation rules may be varying in different message development areas. For Transport messages based upon the IFTMIN structure following rules apply: (BM = Business Model)

- Edifact message structure (as shown in a branch diagram) should be taken as starting point.
- Main segment groups on level 1 should correspond to BM Sections.

- Individual segments on consignment level have no relevant Edifact grouping. BM Sections should be created based upon business needs, from the view of operational understanding.
- BM Subsections should be created based upon business needs, from the view of operational understanding. There is no mandatory demand for preserving structures like composite dataelements or hierarchical segments.
- BM Data Terms may originate from either a Edifact Data Element or a code value for a certain DE. In most cases it is necessary to include the code level to make a operational BM.
- It should be noted that when Edifact people refer to a "code" it includes a Tag, a (sometimes rather long) Name, and a definition of its meaning (Desc). When using a BM Data Term on code level it refers to this whole "code concept".
- A name of a BM Data Term should be specific enough to be understood. It is not enough with generic words as often used in Edifact.
- Names should be as short as possible, considering information given by the context. It is not necessary to use the full term name in the model as long as the model context offers full unambigouty.

3.3 Additional principles and rules for Pharos Business Model (extract)

Full description to be found in Pharos deliverables.

- The BM should start with a one page verbal description of message scope, parties involved, limitations etc.
- Information to be structured in sections and **subsections** giving conditions and relations to other sections including hierarchy.
- Every **data term** used in the model may have following information items. They may be mandatory (M) or optional (O) as marked below.

Functional term name (M)	Term name understandable by operational people involved in the business. "Parent name" may be omitted if clear from the context, e.g. by section headline.
Data type (O)	Representation class (as from BSR guidelines)
Representation (O)	As in Edifact notation, e.g. an..35 or n6
Condition: (M)	O = Optional, R = Required, D = Dependent. When "D" a dependency note must be given
Standard Reference (M)	Standard sources may be: UNTDID, ISO, UN/ECE, Itigg, etc.

- The functional terms in the information model should be specific enough to be understood. It is not enough with generic words as often used in Edifact. Example: Consignment references (section C3) must also have each individual reference instance described as a specific line in the model. (1153-CT, 1153-AAS, 1153-CMR etc)
- While each term in the Business Model must be found in a Data Dictionary, it is not necessary to use the full term name in the model as long as the model context offers full unambigouty. E.g. "earliest pickup" is enough in the model as the section heading says "consignment date and time" and also the data type column indicates Date/time. (In a Data Dictionary the term name would probably be "consignment-earliest-pickup-date/time".)
- Term names used in the Business Model should be used in XML DTD or Schema as unchanged as possible still considering naming conventions like "Camel Case" etc. Example: "C2-1 Total gross weight" should be written "TotalGrossWeight". (In a Term Catalogue the name would probably be "Consignment-Total-GrossWeight-Value")

As a result of the work it was found that in order to achieve a standardised implementation of XML DTD:s or Schemas produced by independent persons it is necessary to document a set of rules covering among others following issues:

- *Choice between XML element and attribute*
- *Naming conventions ("CamelCase" was decided as the first recommendation)*
- *Formatting rules (an..17 n3 etc). Results from XML Datatyping Group are expected.*
- *Formalised way of making reference to a standard definition.*

4. Step 2 – From Business Model to UML Message Model

4.1 UML conceptual terms

An UML Message Model is a conceptual specification of a message type, and consists of:

- Message classes
- Attributes
- Associations

These terms are defined in a formal UML glossary, (see Reference List E), except "message class" which is a subclass of a formal UML class. This term is used to differentiate from ordinary UML classes (e.g. in a domain model), because a message class may contain attributes from one or more UML classes.

Message classes are structured by associations in a hierarchical structure. A root message class must always be defined.

The Message Model is created in a suitable UML modelling tool, the Pharos project group used "Rose 2000" from Rational and "Power Designer 7" from Sybase. With the Business Model as starting point all data terms and sections were transformed and entered into the tool. The resulting output is Class diagrams, Class Attribute lists, etc. Examples see Annex.

4.2 Naming Rules

The names in the Message Model should be in accordance with XML syntax. In practice, the most important rules to remember are:

- Remove spaces in names. Example: "Goods Item" may be changed to: "GoodsItem"
- Duplicate names are not allowed.

As mentioned above in a deliverable from the CEN/ISSS European Pilot project, a method is described how to map from a UML to XML DTD:s. The same document contains a set of naming conventions, which have been found very valuable also in the Pharos project.
See Reference List C.

4.3 The Message Root Class

Pharos Rule 1:
Create the message root class with name equal to the message name in the Business Model.

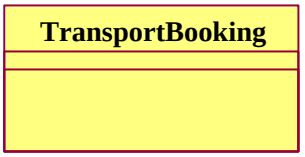


Fig. 4-1. Example of a message root class

The message function as defined in the Business Model e.g. scope, definition, restrictions, etc. may be attached to the message root class.

4.4 Transformation of Sections and Subsections

A sections or subsection in the Business Model may be categorised in:

1. Ordinary (sub) section
   A section or subsection that is not of category role list or value list.
2. Role list
   A (sub) section containing data terms that are role names. See example below.
3. Value list
   A (sub) section containing data terms that specifies code values.
   See example in chapt. 4.6. (subsection B1 "Basic service).

Role list example.

SECTION D - PARTIES (mandatory, max occur = 4)

	Functional term name	O/R/D	Comments	Standard ref
D1	**Party functions**			**DE 3035**
	D1-1 Consignor	R		CL 3035 - CZ
	D1-2 Despatch party	O	if other than consignor	CL 3035 - PW
	D1-3 Consignee	R		CL 3035 - CN
	D1-4 Delivery party	O	if other than consignee	CL 3035 - DP
D2	**Party address details**			**Pharos D2**
	D2-1 Party identification	O	an..17	DE 3039
	D2-2 Party name	R	an..35 (x5)	DE 3036

A role name defines a task or duty of a class in an association with another class. The BM subsection "D1 Party functions" contains only data terms that are role names: Consignor, Despatch party, etc. for the section D "Party".
D2 is an ordinary BM subsection as defined above.

Pharos Rule 2:
Create a message class for each ordinary (sub) section.

The message class name is equal to the (sub) section name.

(Sub) sections of the role list category will not result in message classes, but the role names will later be used to create associations.

(Sub) sections of value list category should not result in message classes, but will later be used to create attributes. However, the UML modeller has a choice to still create a message class containing one attribute.

There can be many sections and subsections in a Business Model, which may result in a lot of message classes. The modeller has the possibility to decide if some (sub) sections should be merged to common message classes.

Pharos Rule 3 (Optional):
(Sub) sections may be merged.
It is possible to merge (sub) sections which:

- Have a maximum occurrence = 1 (are non-repeating), and
- Have only one parent association. (are not multiple referenced)

The merging can be done between (sub)sections on the same hierarchical level, or child (sub) sections are merged with theirs parent (sub) sections.

4.5 Associations

Pharos Rule 4:
Create single associations

Single associations are created from a parent message class to a child message class where the child message class is not multiple referenced.

Fig. 4-2. Example of a single association.

The associations in a message have only one direction, from parent to child. This association direction must have a **multiplicity.**

The multiplicity symbol contains a specification of minimum and maximum occurrences of the child message class, and is written as:

Minimum..Maximum

The multiplicity symbol is located at the child end of the association. The multiplicity values are taken from the (sub)section descriptions in the Business Model.

The diamond symbol at the parent end is an aggregation indicator, and specifies that the parent message class is an aggregate. The diamond symbol is optional and not needed for XML/DTD or XML Schema generation.

The example association in the figure above can be read as:

A TransportBooking has minimum 0 and maximum 9 Equipment.

Pharos Rule 5: Create multiple associations

Multiple associations are created for message classes that include subsections of the role list category.

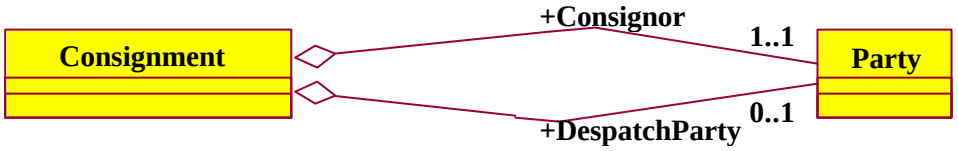


Fig. 4-3A. Example of multiple associations.

Each of the multiple associations is given a multiplicity and a role name. The role names are found as data terms names in subsections of the role list category, see 2.2.3.

Each of the role names will replace the child message class name in the generated XML/DTD or XML Schema. The UML notation uses a "+" before the role name to indicate that the role name is "public", but this symbol will be stripped of in the generated XML/DTD or XML Schema. The example multiple association in the figure can be read as:

A Consignment has minimum 1 and maximum 1 Consignor
A Consignment has minimum 0 and maximum 1 DespatchParty

An alternative modelling technique is to use subclasses instead of multiple associations:

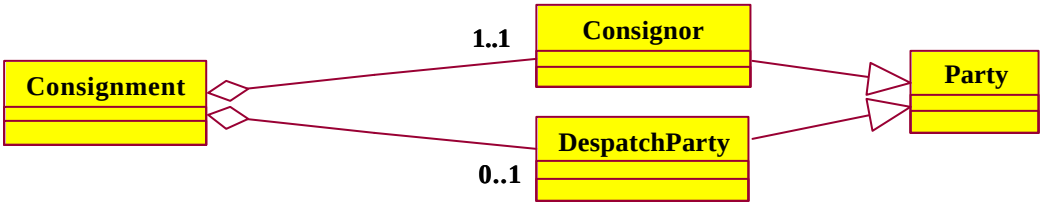


Fig. 4-3B. Alternative example with subclasses.

This technique has not been used in the message model because inheritance increases the complexity level of the XML generation procedure. However, this technique may be used in the domain model for modelling roles.

4.6 Attributes

The data terms in (sub) sections can be categorised in:
1. Ordinary data terms
2. Role names
3. Code values

Examples of **ordinary data terms** are PartyName, PlaceOfDeparture, EarliestPickupTime, etc.

Data terms of category **role names** have been treated above, and will not result in corresponding attributes.

Code values are data terms that represent a value in a value list. Examples of code values are presented below for the subsection Basic service.

Functional term name	O/R/D	Comments	Standard ref
B1 Basic service			DE 4065
B1-1 Groupage	D	an..3	CL 7273 - 3
B1-2 Full load	D	an..3	CL 7273 - 2
B1-3 Parcel transport	D	an..3	CL 4065 – 7

Example of Code Values.

The code value “Groupage” has the value “3”, “Full load” has the value “2”, and “Parcel transport” has the value “7”.

Pharos Rule 6:
Create attributes from ordinary data terms and code values.

An attribute is created for each ordinary data terms, and located in the message class corresponding to the attributes (sub) section.

A subsection that contains code values should be transformed to one attribute, which has allowed values according to the code list.

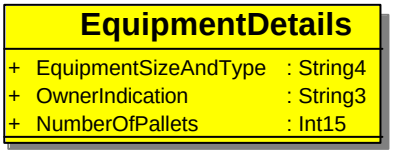


Fig. 4-4. Example of a message class with attributes.

4.7 Attribute Properties

When an attribute is created, a number of properties may be specified based on information from the Business Model:

- Data Type
- Multiplicity
- Allowed values
- Business rules
- Comment
- Standard reference

The way of specification of these attribute properties may vary between the UML tools. Some tools can support all of these properties, while others have a limited support.

The **data type** is used in XML Schema generation, and must have an allowed value according to the XML Schema definition. Examples of the most common data types:

- String35 – Alphanumeric character string of length 35
- Int5 – Numeric character string of length 5
- Date – Date and time

Multiplicity is used both for XML/DTD and XML Schema generation. Two values are allowed:
0..1 - Means an optional attribute
1..1 - Means a mandatory attribute

Allowed values are used to specify one or more allowed code values for the attribute. Examples:
OwnerIndication "1" means Shipper, "2" means Carrier
EquipmentType "CN" means Container, "RR" means Rail Car, etc.

Allowed values are used for both XML/DTD and XML Schema generation.

Business rules may be specified for some of the more complicated dependency notes in the Business Model. However, business rules are not used for XML/DTD or XML Schema generation. They may be specified for documentation purposes, and are needed in programs that logically controls XML message instances before storing in a database.

C**omments** about data terms in the Business Model may be copied as attribute comments. They are only used for documentation purposes.

Standard reference is a unique identifier that points to a standard attribute definition, e.g. an UN/EDIFACT data element tag number. The standard reference may be used for documentation purposes, and may also be used in the generated XML/DTD and XML Schema as an alternative to the attribute name.

5. Step 3 - From UML Message Model to XML/DTD or XML Schema

5.1 Automatic generation

The transformation process from UML to XML follows a formal algorithm, and can be performed mainly by a tool. Examples of XML/DTD and XML Schema generated by the MessageDesigner tool are found in Annex.

5.2 Transformation rules

The transformation of a UML Message Model to XML/DTD or XML Schema is performed according to the following rules:

Message Model	XML/DTD	XML Schema
Root message class name	Root element name	Root element type name
Rolename	Element name	Element type name
Association multiplicity	?, * , +, (empty)	Min and max occurrence
Attribute name	Element name	Element type name
Attribute data type	Not used	Date type and max length
Attribute multiplicity	?, (empty)	Min and max occurrence
Attribute values	Allowed value list	Allowed value list

Mapping between UML Message Model and XML/DTD and XML Schema.

5.3 Sequence

The Business Model specifies a sequence of sections, subsections and data terms that should be kept in the Message Model. The associations and attributes should be modelled in the same sequence. This is possible for attributes, but not for associations. UML has no means to specify sequence of associations. In order to generate a XML/DTD or XML Schema with correct sequence of attribute names and role names, the generating tool should have a function for manually adjusting the sequence of role names for parent message classes.

6. Reference List

A. CEN/ISSS XML/EDI European Pilot deliverables
D1: XML Document Type Definitions for selected messages
http://www.tieke.fi/isis-xmledi/D1/D1.htm

B. Rules for mapping existing Edifact MIG:s to XML DTD:s
Draft working material from ISIS project group, available at
Pharos website: www.Pharos.NU
http://www.edifact-transport.se/library/engbib.html

C. Mapping from UML Message Model to XML DTD
(Part of CEN/ISSS European Pilot deliverable D9, available at Pharos website)
http://www.edifact-transport.se/library/engbib.html

D. TRIM- Transport Reference Information Model
http://noemie.informatics.sintef.no/trim

E. UML Notation Guide, version 1.1
http://www.rational.com

F. The issue of XML Tag names.Report from Pharos project.
http://www.edifact-transport.se/library/engbib.html

G. MessageDesigner – Generator of XML from UML
http://www.informatics.sintef.no/MD/

7.Annex A – Example of a Business Model

PHAROS – TRANSPORT BOOKING
BUSINESS MODEL based upon Functional Terms
Message scope and definition:

From whom to whom
A Transport Booking is a message from a Transport Service Buyer to a Transport Service Provider (TSP) requesting space on a means of transport for a given consignment and requesting related transport services.

Contents
The Booking message contains estimated information of one consignment and its details including means of transport and/or type of equipment needed. The message may additionally contain conditions and other details under which the sender of the message requests the services to take place.

A consignment is defined as a separately identifiable collection of goods items (available to be) transported from one consignor to one consignee via one or more modes of transport.

Transactions scenario
The Booking message is expected to be answered from the TSP with a Booking confirmation. This may then be followed from the Buyer by a Transport Instruction message which finally evidences the contract for the ordered services, and shall include all necessary information.

Restrictions
Partner agreements may include situations where all consignment details are given already at the booking moment. In such situations the information transfer should be made by using the Transport Instruction message. The Booking message described in this document does not give the possibility to cover all possible consignment information. Examples: actual number of packages, actual weight, full dangerous goods details, goods handling instructions, etc.

This Booking message is described mainly considering road transport operations. There may be additional information needs for other modes of transport.

This model does not cover a situation where a consignment consists of several shipments, each of which with its own goods item details.

Reading instructions for pages 2 - 4

- Column O/R/D: O = Optional, R = Required, D = Dependent,
- Column "Standard Ref" refers to Pharos "Namespace" (= Dictionary for functional terms)
  Alternatives: DE = UN Edifact Data Element. Example: DE 1225
  CL = Definitions from UN Code List. Example CL 1225 – 9.
  Pharos means definition created in Pharos project. Example: "Pharos A1".
- Term names used in the information model should be used in XML DTD or Schema as unchanged as possible still considering naming conventions like "Camel Case" etc.
  Example: "C2-1 Total gross weight" should be written "TotalGrossWeight".

Information Model for Transport Booking

Section A - Message Information (MANDATORY, MAX OCCUR = 1)

*** This section covers information relevant for an application which is part of a message exchange. Routing details related to the physical communication (e.g. IP-addresses, communication sender and receiver) are assumed to be handled in a special "routing envelope section".

	Functional term name	O/R/D	Comments	Standard ref
A1	Document identification			Pharos A1
	A1-1 Document type coded	R	"335" = Booking request	CL 1001 - 335
	A1-2 Document issue date	R		CL 2005 - 137
	A1-3 Carrier booking number	D	Primary key, if not CU	CL 1153 - BN
	A1-4 Consignor reference number	D	Primary key, If not BN	CL 1153 - CU
	A1-5 Reference to previous message	D		CL 1153 – ACW
	A1-6 Message sender	O	For return purposes	CL 3035 – MS
	A1-7 Message receiver	O	For on-distribution	CL 3035 - MR

Dependency Note: A1-5 is required, when replace or cancellation, see A2 below.

A2	Message function			DE 1225
	A2-1 Original	D		CL 1225 – 9
	A2-2 Replace	D		CL 1225 – 5
	A2-3 Cancellation	D		CL 1225 – 1

Dependency Note: One value is required.

A3	Edifact identification			**Pharos A3**
	A3-1 Message type	O	Fixed "IFTMBF"	DE 0065
	A3-2 Message type version	O	Fixed " S"	DE 0052
	A3-3 Message type release	O	Fixed "93A"	DE 0054
	A3-4 Controlling agency	O	Fixed "UN"	DE 0051
	A3-5 MIG identity	O	Fixed "SE0023"	DE 0057
	A3-6 Message reference number	O		DE 0062

Section B - TRANSPORT SERVICE AND TERMS OF DELIVERY (MAND, MAX OCCUR = 1)

	Functional term name	O/R/D	Comments	Standard ref
B1	Basic service			DE 4065
	B1-1 Groupage	D		CL 7273 - 3
	B1-2 Full load	D		CL 7273 - 2
	B1-3 Parcel transport	D		CL 4065 – 7

Dependency Note: One value is required.

B2	Additional services			Pharos B2
	B2-1 Cash on delivery	O		CL 7273 – COD
	B2-2 Delivery advice	O		CL 7273 - DAV
	B2-3 Special handling	O		CL 7273 - SPH
	B2-4 Carrier loads	O		CL 7273 – 1

Comments: More than one may occur at the same time.

B3	Requested priority			DE 4219
	B3-1 Normal	D		CL 4219 – 3
	B3-2 Express	D		CL 4219 - 1
	B3-3 Special	D		CL 4219 – Z01

Dependency Note: One value is required.

B4	Type of goods indicator			DE 7085
	B4-1 Normal	D		CL 7085 - ZNO
	B4-2 Cold	D		CL 7085 - ZCO
	B4-3 Hot	D		CL 7085 - ZHO
	B4-4 Frozen	D		CL 7085 - ZFR
	B4-5 Dangerous	D		CL 7085 – ZDG

Dependency Note: One value is required.

B5	Terms of delivery			Pharos B5
	B5-1 Incoterms code	D	an 3	CL IncoTerms
	B5-2 Combiterms code	D	an 3	CL Combiterms
	B5-3 Terms of delivery, free form	D	Format an..70	DE 4052
	B5-4 Location for TOD, coded	O	Format an..6	CL UN Locode
	B5-5 Location for TOD, free form	O	Format an..35	DE 3225

”

Dependency Note: One of the three first lines is required.

Comments: IncoTerms and Combiterms have each about 10 – 15 alternative code values.

Comments: UN Locode has about 1000 alternative location codes

Section C - CONSIGNMENT INFORMATION (MANDATORY, MAX OCCUR = 1)

	Functional term name	O/R/D	Comments	Standard ref
C1	Consignment date and times			Pharos C1
	C1-1 Earliest pickup	R		CL 2005 - 234
	C1-2 Latest pickup	O		CL 2005 - 235
	C1-3 Earliest delivery	O		CL 2005 - 71
	C1-4 Latest delivery	R		CL 2005 - 74
	C1-5 Reimburse valid to	O		CL 2005 - 123
	C1-6 Equipment availability date/time	O		CL 2005 – 396
C2	Consignment weight and volumes			Pharos C2
	C2-1 Gross weight	D	Kilos	CL 6069 - 7
	C2-2 Volume	D	Qubic metres	CL 6069 - 15
	C2-3 Total number of packages	D	Pieces	CL 6069 - 11
	C2-4 Loading metres	D	Meters	CL 6069 - ZLM
	C2-5 Number of pallet space	D	Pieces	CL 6069 – Z12
	C2-6 Number of half pallet space	D	Pieces	CL 6069 – Z14

Dependency Note: One value is required. More then one may occur.

C3	Consignment references			Pharos C3
	C3-1 Transport contract number	O	Format an..35	CL 1153 - CT
	C3-2 Domestic waybill number	O	Format an..35	CL 1153 - AAS
	C3-3 CMR-number	O	Format an..35	CL 1153 - CMR
	C3-4 AWB-number	O	Format an..35	CL 1153 - AWB
	C3-5 Sea Waybill number	O	Format an..35	CL 1153 – AEX
	C3-6 Country of exportation	O	Codes from ISO 3166	CL 3227 - 35
	C3-7 Country of destination	O	Codes from ISO 3166	CL 3227 - 28

Comments: Zero, one or several references may occur.

C4	Consignment text information			Pharos C4
	C4-1 General transport information	O	Format an..70	CL 4451 - TRA
	C4-2 Requested route	O	Format an..70	CL 4451 - RQR
	C4-3 Requested routes and tariff	O	Format an..70	CL 4451 – RQT

Comments: Zero, one or several texts may occur.

Section D - Parties (mandatory, max occur = 4)

*** In EDIFACT parties are described in NAD-segment with a qualifier value which specifies the function of the party. For each qualified party a set of information pieces may be given. They are listed below in section D2 and D3. Note that the rules for each set may be different depending on party.

	Functional term name	O/R/D	Comments	Standard ref
D1	Party functions			DE 3035
	D1-1 Consignor	R		CL 3035 - CZ
	D1-2 Despatch party	O	if other than consignor	CL 3035 - PW
	D1-3 Consignee	R		CL 3035 - CN
	D1-4 Delivery party	O	if other than consignee	CL 3035 - DP
D2	Party address details			Pharos D2
	D2-1 Party identification	O	an..17	DE 3039
	D2-2 Party name	R	an..35 (x5)	DE 3036
	D2-3 Party street	O	an..35 (x3)	DE 3042
	D2-4 Party city	O	an..35	DE 3164
	D2-5 Party country sub-area	O	an..9	DE 3229
	D2-6 Party postcode	O	an..9	DE 3251
D3	Party other details			Pharos D3
	D3-1 Party contact	O	an..35	DE 3412
	D3-1 Party telephone	O	an..512	CL 3148 - TE
	D3-1 Party telefax	O	an..512	CL 3148 - FX
	D3-1 Party email	O	an..512	CL 3148 - EM
	D3-1 Party VAT number	O		CL 1153 – VA

Section E – means of transport information (MANDATORY, MAX OCCUR = 3)

*** In the EDIFACT structure the Transport Details Group (known as TDT) is used to describe means of transport, mode of transport, carrier data etc, and related locations and date/times. The information may be different for consecutive transport stages and must therefore be repeated per transport stage. In many cases a simple booking is described as one transport stage, using the qualifier for main carriage.

	Functional term name	O/R/D	Comments	Standard ref
E1	Transport stages			DE 8051
	E1-1 Pre carriage	O		CL 8051 - 10
	E1-2 Main carriage	R		CL 8051 - 20
	E1-3 On carriage	O		CL 8051 – 30
E2	Transport stage general information			Pharos E2
	E2-1 Mode of transport	R	Sea, rail, road etc.	CL 8067
	E2-2 Carrier name	O	an..35	DE 3128

	E2-3 Means of transport identity	O	an..17	DE 8212
	E2-4 Means of transport nationality	O	Codes from ISO 3166	DE 8453
E3	Transport stage locations			Pharos E3
	E3-1 Place of departure, coded	R		CL 3227 - 5
	E3-2 Place of destination, coded	R		CL 3227 - 8

Comments: Codes for departure and destination may be taken from one of following codesets: UN/Locode, Postcode directory, Railways locations, Airports.

SECTION F - GOODS ITEM INFORMATION (mandatory, max occur = 99)

*** In the EDIFACT structure the Goods Item Details Group (known as GID) is used to give information on packages within a consignment. Packages may be grouped into “clusters” or “GID Groups” for various reasons e.g. same package type, or belonging to the same purchase order, or having the same delivery address. In modern logistics there is often a demand to trace individual packages with their barcode numbers, meaning that each package is described as its own “GID-Group”.

There are large variations on on the amount of information items for a “GID-Group”. The following may serve as typical examples for an ordinary booking.

	Functional term name	O/R/D	Comments	Standard ref
F1	Goods item details			Pharos F1
	F1-1 GID Group sequential number	R	n..5	DE 1496
	F1-2 Number of packages	R	n..8	DE 7224
	F1-3 Type of packages, coded	D	UN/ECE Rec 21	DE 7065
	F1-4 Type of packages, clear text	D	an..35	DE 7064
	F1-5 Package dimensions (If special)	O	Length in M	DE 6168
	F1-6 Package dimensions (If special)	O	Width in M	DE 6140
	F1-7 Package dimensions (If special)	O	Height in M	DE 6008
	F1-8 Number of packages with special dim,	O	n..15	DE 6350
	F1-9 General text information	O	an..70 (x 3)	CL 4451 - TDT

Dependency Note: One of F3 or F4 is required.

Comments: The GID group need to be redesigned. E.g. insert special group for Package details.

F2	Product details			Pharos F2
	F2-1 Goods description	R	an..70 (x 2)	CL 4451 - AAA
F3	Dangerous goods details			Pharos F3
	F3-1 Dangerous goods information	D	an.. 70 (x 5)	CL 4451 – AAC

Dependency Note: F3-1 is required when dangerous goods

Section G - Equipment information (OPTIONAL, MAX OCCUR = 9)

	Functional term name	O/R/D	Comments	Standard ref
G1	Equipment type			DE 8053
	G1-1 Container	D		CL 8053 - CN
	G1-2 Rail Car	D		CL 8053 - RR
	G1-3 Swap Body	D		CL 8053 - SW
	G1-4 Trailer	D		CL 8053 – TE
	G1-5 Pallets	O		CL 8053 - EFP

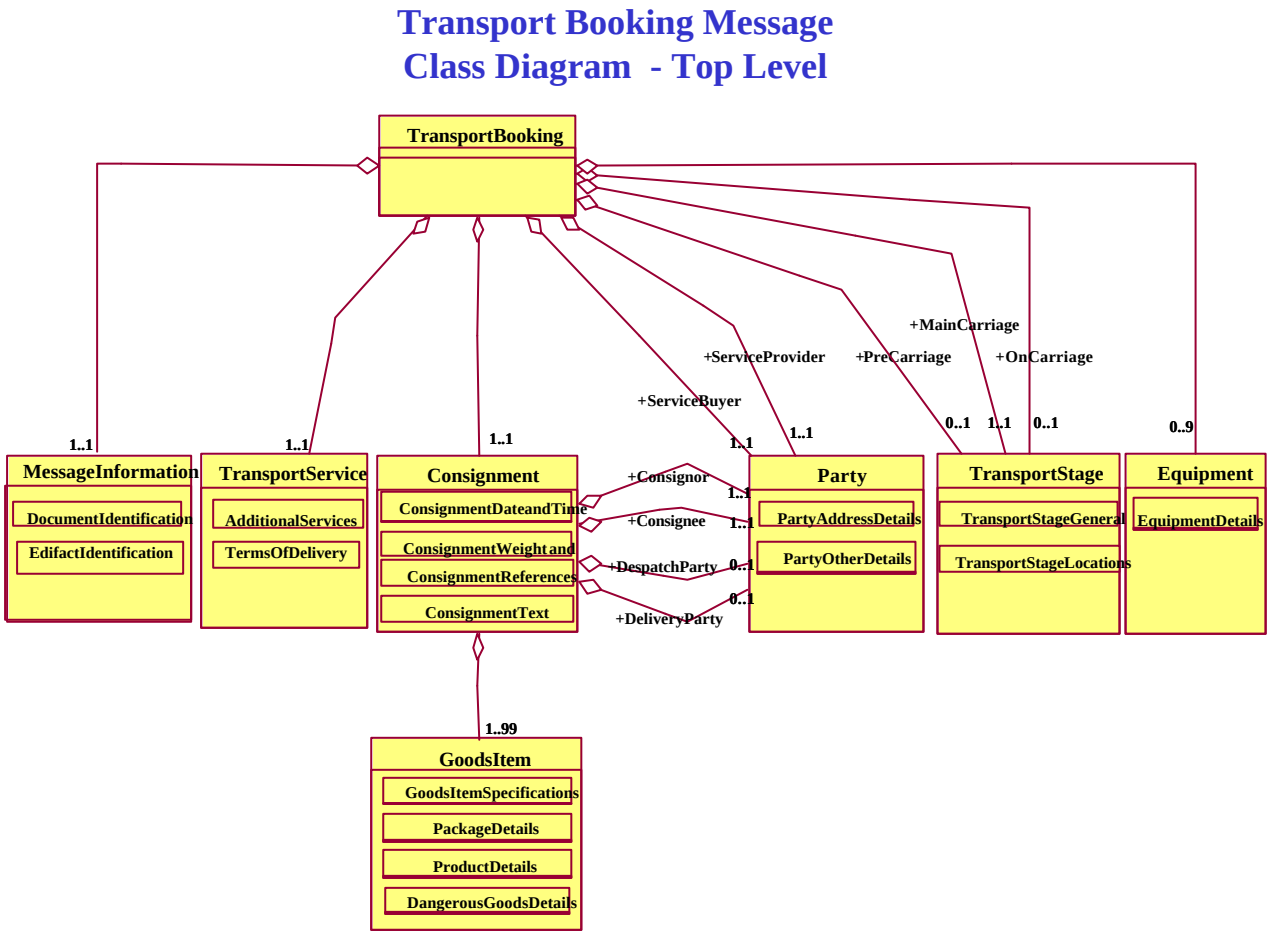
Dependency Note: One value from G1 is required

G2	Equipment details			Pharos G2
	G2-1 Equipment size and type, coded	D	Codes from ISO or Carrier	DE 8155
	G2-2 Owner indication, coded	O	1= shipper, 2 = carrier	CL 8077
	G2-3 Number of pallets	O		DE 6350

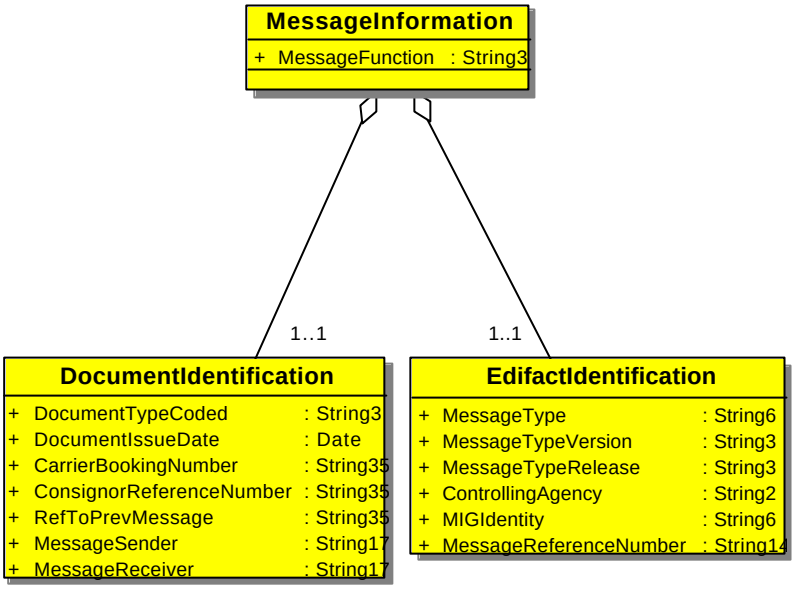
Dependency Note: G2-1 is required when container

Dependency Note: G2-3 is required when exchangeble pallets

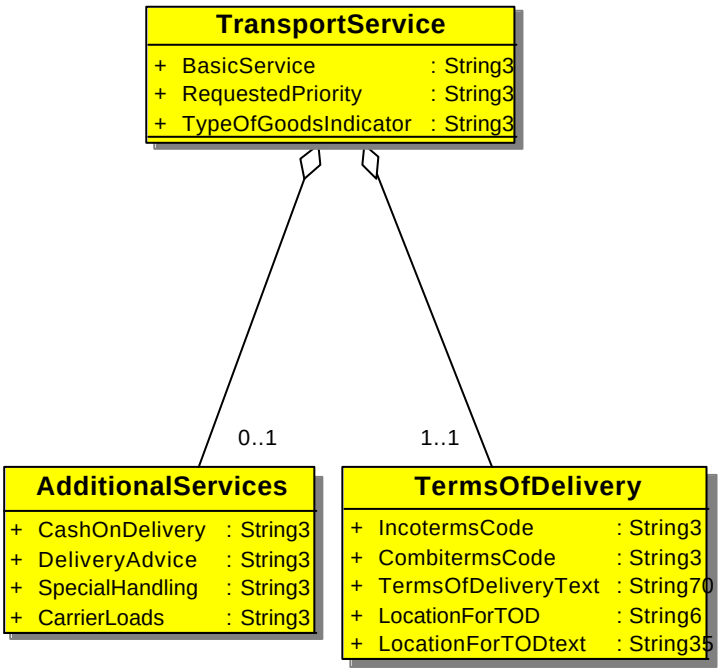
8.Annex B1 – Example of UML Message Model Class Diagrams



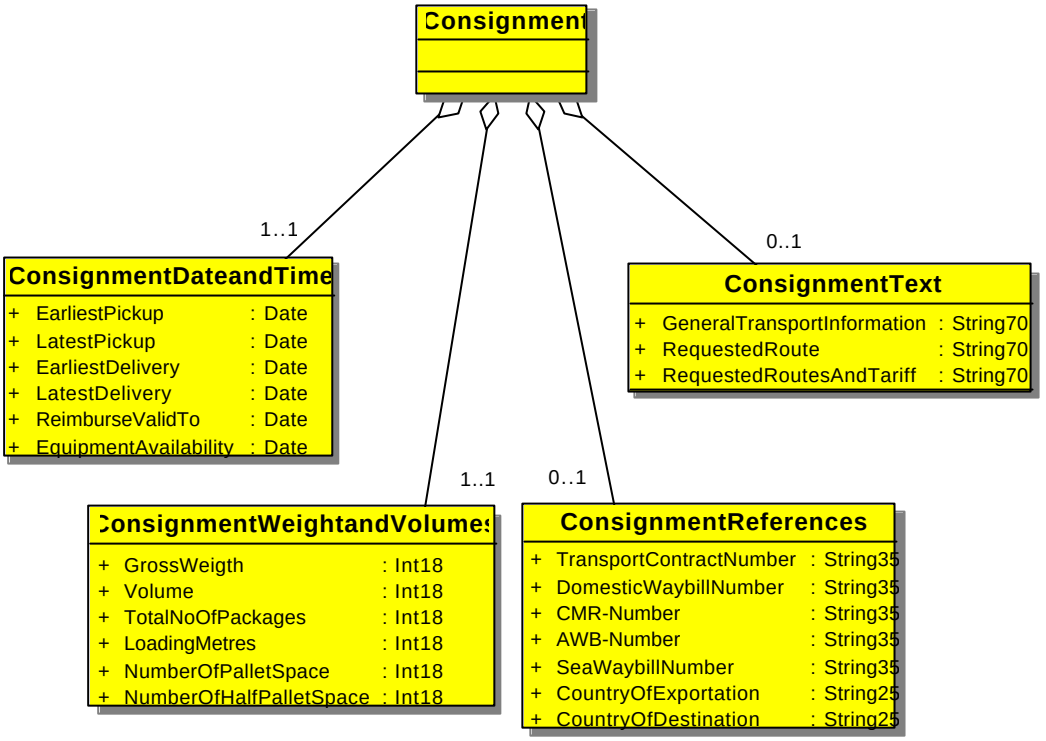
Transport Booking Message
Class Diagram - Level 2



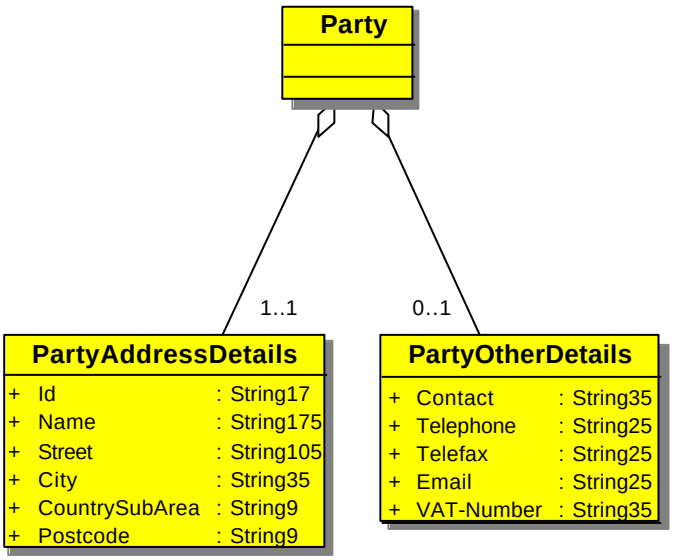
Transport Booking Message
Class Diagram - Level 2



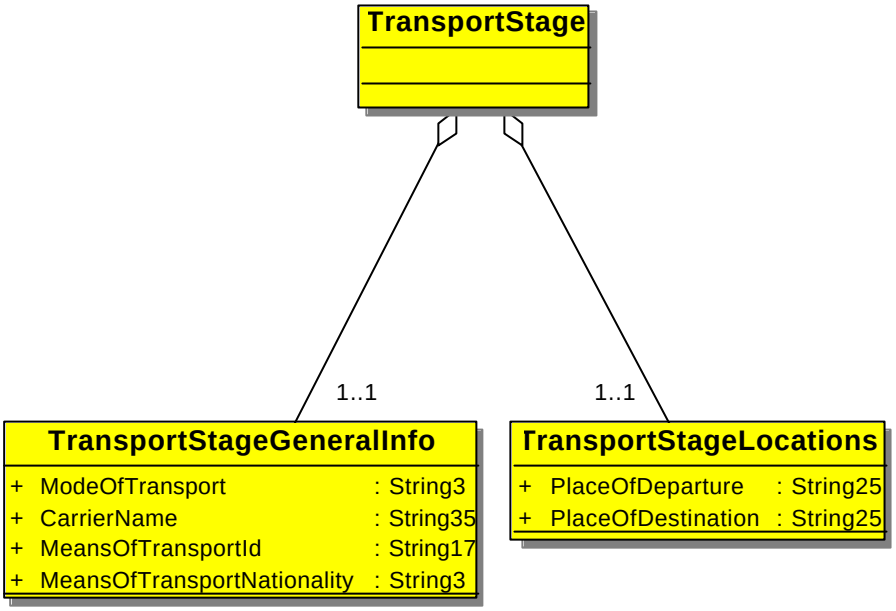
Transport Booking Message
Class Diagram - Level 2



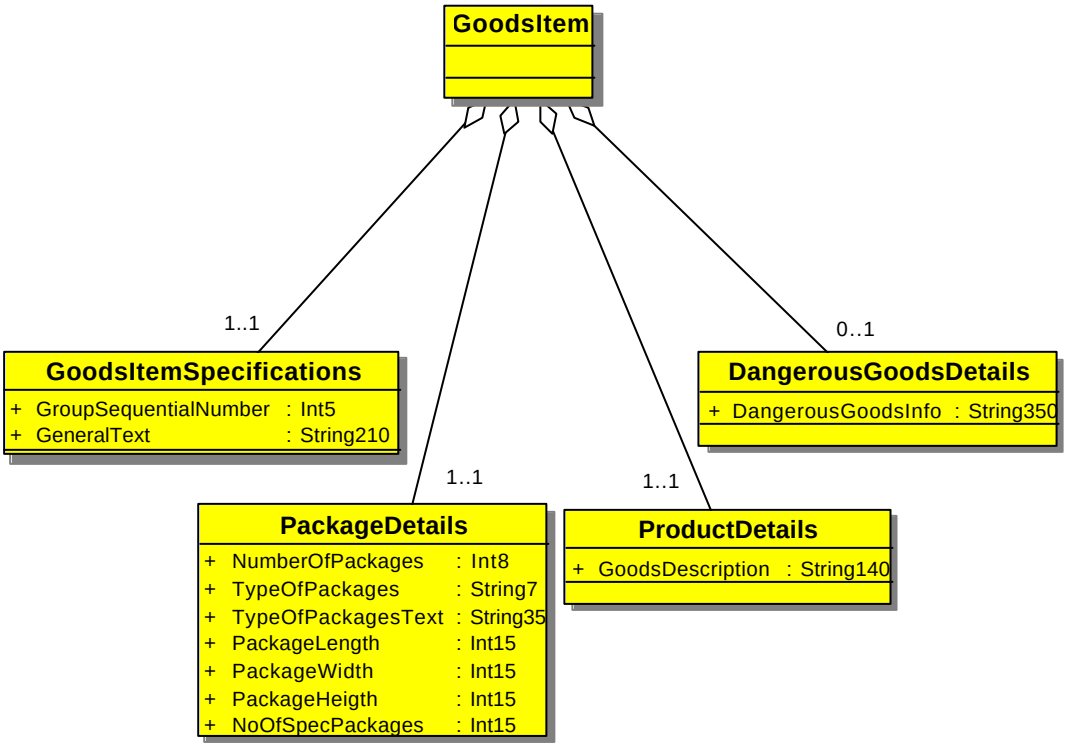
Transport Booking Message
Class Diagram - Level 2



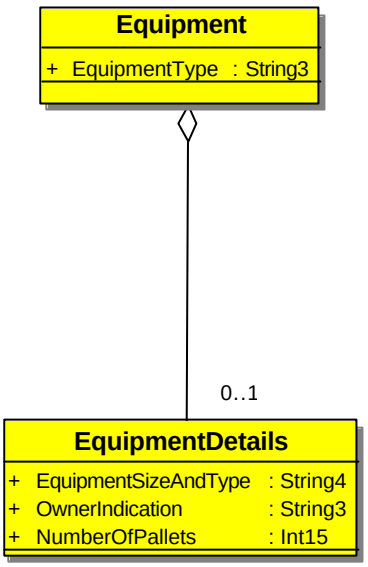
Transport Booking Message
Class Diagram - Level 2



Transport Booking Message
Class Diagram - Level 3



Transport Booking Message
Class Diagram - Level 2



9.Annex B2 – Example of UML Message Model Report

Transport Booking Message Model
Class Attribute List

Pharos XML/EDI Subgroup
Date: 2000-03-20
Version 1.0

Class AdditionalServices

Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
CashOnDelivery		String3	CL7273-COD.	
DeliveryAdvice		String3	CL7273-DAV.	
SpecialHandling		String3	CL7273-SPH.	
CarrierLoads		String3	CL7273-1.	

Class Consignment

Class ConsignmentDateandTime

Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
EarliestPickup	1..1	Date	CL2005-234.	
LatestPickup		Date	CL2005-235.	
EarliestDelivery		Date	CL2005-71.	
LatestDelivery	1..1	Date	CL2005-74	
ReimburseValidTo		Date	CL2005-123	
EquipmentAvailability		Date	CL2005-396	

Class ConsignmentReferences

Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
TransportContractNumber		String35	CL1153-CT	
DomesticWaybillNumber		String35	CL1153-AAS	
CMR-Number		String35	CL1153-CMR	
AWB-Number		String35	CL1153-AWB	
SeaWaybillNumber		String35	CL1153-AEX	
CountryOfExportation		String25	CL3227-35, Codes from ISO 3166.	
CountryOfDestination		String25	CL3227-28, Codes from ISO 3166.	

Class ConsignmentText

Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
GeneralTransportInformation		String70	CL4451-TRA	
RequestedRoute		String70	CL4451-RQR	
RequestedRoutesAndTariff		String70	CL4451-RQT	

Class ConsignmentWeightandVolumes

Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
GrossWeigth		Int18	CL6069-7. In kilos.	
Volume		Int18	CL6069-15. In qubic metres.	
TotalNoOfPackages		Int18	CL6069-11. In pieces.	
LoadingMetres		Int18	CL6069-ZLM. In meters.	
NumberOfPalletSpace		Int18	CL6069-Z12. In pieces.	
NumberOfHalfPalletSpace		Int18	CL6069-Z14. In pieces.	

Class DangerousGoodsDetails

Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
DangerousGoodsInfo		String350	CL4451-AAC	

Class DocumentIdentification

Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
DocumentTypeCoded	1..1	String3	CL1001-335. "335"= Booking Request.	335
DocumentIssueDate	1..1	Date	CL2005-137	

Name	Mult	Data Type	Standard Ref and Comments	Value List
CarrierBookingNumber		String35	CL1153-BN. Primary key, if not CU.	
ConsignorReferenceNumber		String35	CL1153-CU. Primary key, if not BN.	
RefToPrevMessage		String35	CL1153-ACW	
MessageSender		String17	CL3035-MS. For return purposes.	
MessageReceiver		String17	CL3035-MR. For on-distribution.	

Class EdifactIdentification
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
MessageType		String6	DE0065	IFTMBF
MessageTypeVersion		String3	DE0052	S
MessageTypeRelease		String3	DE0094	93A
ControllingAgency		String2	DE0051	UN
MIGIdentity		String6	DE0057	SE0023
MessageReferenceNumber		String14	DE0062	

Class Equipment
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
EquipmentType	1..1	String3	CL8053. "CN"=Container, "RR"=Rail car, "SW"=Swap body, "TE"=Trailer, "EFP"=Pallets.	CN RR SW TE EFP

Class EquipmentDetails
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
EquipmentSizeAndType		String4	DE8155. Codes from ISO or Carrier.	
OwnerIndication		String3	CL8077. "1"=Shipper, "2"=Carrier..	1 2
NumberOfPallets		Int15	DE6350	

Class GoodsItem
Class GoodsItemSpecifications
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
GroupSequentialNumber	1..1	Int5	DE1496	
GeneralText		String210	CL4451-TDT	

Class MessageInformation
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
MessageFunction	1..1	String3	CL1225. "9"=Original, "5"=Replace, "1"=Cancellation..	5 9

Class PackageDetails
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
NumberOfPackages	1..1	Int8	DE7224	
TypeOfPackages		String7	DE7065. UN/ECE Rec 21.	
TypeOfPackagesText		String35	DE7064	
PackageLength		Int15	DE6168. In meters.	
PackageWidth		Int15	DE6140. In meters.	
PackageHeigth		Int15	DE6008. In meters.	
NoOfSpecPackages		Int15	DE6350. Number of packages with special dimensions.	

Class Party
Class PartyAddressDetails
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
Id		String17	DE3039	
Name	1..1	String175	DE3036	
Street		String105	DE3042	
City		String35	DE3164	
CountrySubArea		String9	DE3229	
Postcode		String9	DE3251	

Class PartyOtherDetails
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
Contact		String35	DE3412	
Telephone		String25	CL3148-TE	
Telefax		String25	CL3148-FX	
Email		String25	CL3148-EM	
VAT-Number		String35	CL1153-VA	

Class ProductDetails
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
GoodsDescription	1..1	String140	CL4451-AAA	

Class TermsOfDelivery
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
IncotermsCode		String3	CL Incoterms	
CombitermsCode		String3	CL Combiterms	
TermsOfDeliveryText		String70	DE4052. Free form	
LocationForTOD		String6	CL UN Locode	
LocationForTODtext		String35	DE3225. Free form.	

Class TransportBooking
Class TransportService
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
BasicService	1..1	String3	CL7273. "3" =Groupage, "2"=Full load, CL4065. "7"=Parcel transport.	2 3 7
RequestedPriority	1..1	String3	CL4219. "3"=Normal, "1"=Express, "Z01"=Special.	1 3 Z01
TypeOfGoodsIndicator	1..1	String3	CL7085. "ZNO"=Normal, "ZCO"=Cold, "ZHO"=Hot, "ZFR"=Frozen, "ZDG"=Dangerous..	ZNO ZCO ZHO ZFR ZDG

Class TransportStage
Class TransportStageGeneralInfo
Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
ModeOfTransport	1..1	String3	CL8067. Sea, rail, road etc.	
CarrierName		String35	DE3128	
MeansOfTransportId		String17	DE8212	
MeansOfTransportNationality		String3	DE8453. Codes from ISO 3166.	

Class TransportStageLocations

Attribute List

Name	Mult	Data Type	Standard Ref and Comments	Value List
PlaceOfDeparture	1..1	String25	CL3227-5. Coded.	
PlaceOfDestination	1..1	String25	CL3227-8. Coded.	

10.Annex C – Example of a XML/DTD

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- This file was generated by SINTEF MessageDesigner (2000-03-20). -->
<!ELEMENT TransportBooking (MessageInformation,
                            TransportService,
                            ServiceProvider,
                            ServiceBuyer,
                            Consignment,
                            PreCarriage?,
                            MainCarriage,
                            OnCarriage?,
                            Equipment*)>
    <!ELEMENT MessageInformation (DocumentIdentification,
                                  MessageFunction,
                                  EdifactIdentification)>
        <!ELEMENT DocumentIdentification (DocumentTypeCoded,
                                          DocumentIssueDate,
                                          CarrierBookingNumber?,
                                          ConsignorReferenceNumber?,
                                          RefToPrevMessage?,
                                          MessageSender?,
                                          MessageReceiver?)>
            <!ELEMENT DocumentTypeCoded (#PCDATA)>
            <!ELEMENT DocumentIssueDate (#PCDATA)>
            <!ELEMENT CarrierBookingNumber (#PCDATA)>
            <!ELEMENT ConsignorReferenceNumber (#PCDATA)>
            <!ELEMENT RefToPrevMessage (#PCDATA)>
            <!ELEMENT MessageSender (#PCDATA)>
            <!ELEMENT MessageReceiver (#PCDATA)>
        <!ELEMENT MessageFunction (#PCDATA)>
        <!ELEMENT EdifactIdentification (MessageType?,
                                         MessageTypeVersion?,
                                         MessageTypeRelease?,
                                         ControllingAgency?,
                                         MIGIdentity?,
                                         MessageReferenceNumber?)>
            <!ELEMENT MessageType (#PCDATA)>
            <!ELEMENT MessageTypeVersion (#PCDATA)>
            <!ELEMENT MessageTypeRelease (#PCDATA)>
            <!ELEMENT ControllingAgency (#PCDATA)>
            <!ELEMENT MIGIdentity (#PCDATA)>
            <!ELEMENT MessageReferenceNumber (#PCDATA)>
    <!ELEMENT TransportService (BasicService,
                                AdditionalServices?,
                                RequestedPriority,
                                TypeOfGoodsIndicator,
                                TermsOfDelivery)>
        <!ELEMENT BasicService (#PCDATA)>
        <!ELEMENT AdditionalServices (CashOnDelivery?,
                                      DeliveryAdvice?,
                                      SpecialHandling?,
                                      CarrierLoads?)>
            <!ELEMENT CashOnDelivery (#PCDATA)>
            <!ELEMENT DeliveryAdvice (#PCDATA)>
            <!ELEMENT SpecialHandling (#PCDATA)>
            <!ELEMENT CarrierLoads (#PCDATA)>
        <!ELEMENT RequestedPriority (#PCDATA)>
        <!ELEMENT TypeOfGoodsIndicator (#PCDATA)>
        <!ELEMENT TermsOfDelivery (IncotermsCode?,
```

```
                                CombitermsCode?,
                                TermsOfDeliveryText?,
                                LocationForTOD?,
                                LocationForTODtext?)>
        <!ELEMENT IncotermsCode (#PCDATA)>
        <!ELEMENT CombitermsCode (#PCDATA)>
        <!ELEMENT TermsOfDeliveryText (#PCDATA)>
        <!ELEMENT LocationForTOD (#PCDATA)>
        <!ELEMENT LocationForTODtext (#PCDATA)>
<!ELEMENT ServiceProvider (PartyAddressDetails,
                           PartyOtherDetails?)>
    <!ELEMENT PartyAddressDetails (Id?,
                                   Name,
                                   Street?,
                                   City?,
                                   CountrySubArea?,
                                   Postcode?)>
        <!ELEMENT Id (#PCDATA)>
        <!ELEMENT Name (#PCDATA)>
        <!ELEMENT Street (#PCDATA)>
        <!ELEMENT City (#PCDATA)>
        <!ELEMENT CountrySubArea (#PCDATA)>
        <!ELEMENT Postcode (#PCDATA)>
    <!ELEMENT PartyOtherDetails (Contact?,
                                 Telephone?,
                                 Telefax?,
                                 Email?,
                                 VAT-Number?)>
        <!ELEMENT Contact (#PCDATA)>
        <!ELEMENT Telephone (#PCDATA)>
        <!ELEMENT Telefax (#PCDATA)>
        <!ELEMENT Email (#PCDATA)>
        <!ELEMENT VAT-Number (#PCDATA)>
<!ELEMENT ServiceBuyer (PartyAddressDetails,
                        PartyOtherDetails?)>
    <!-- PartyAddressDetails is described above.-->
    <!-- PartyOtherDetails is described above.-->
<!ELEMENT Consignment (Consignor,
                       Consignee,
                       DespatchParty?,
                       DeliveryParty?,
                       ConsignmentDateAndTime,
                       ConsignmentWeigthAndVolumes,
                       ConsignmentReferences?,
                       ConsignmentText?,
                       GoodsItem+)>
    <!ELEMENT Consignor (PartyAddressDetails,
                         PartyOtherDetails?)>
        <!-- PartyAddressDetails is described above.-->
        <!-- PartyOtherDetails is described above.-->
    <!ELEMENT Consignee (PartyAddressDetails,
                         PartyOtherDetails?)>
        <!-- PartyAddressDetails is described above.-->
        <!-- PartyOtherDetails is described above.-->
    <!ELEMENT DespatchParty (PartyAddressDetails,
                             PartyOtherDetails?)>
        <!-- PartyAddressDetails is described above.-->
        <!-- PartyOtherDetails is described above.-->
    <!ELEMENT DeliveryParty (PartyAddressDetails,
                             PartyOtherDetails?)>
        <!-- PartyAddressDetails is described above.-->
        <!-- PartyOtherDetails is described above.-->
    <!ELEMENT ConsignmentDateAndTime (EarliestPickup,
```

```
                                    LatestPickup?,
                                    EarliestDelivery?,
                                    LatestDelivery,
                                    ReimburseValidTo?,
                                    EquipmentAvailability?)>
    <!ELEMENT EarliestPickup (#PCDATA)>
    <!ELEMENT LatestPickup (#PCDATA)>
    <!ELEMENT EarliestDelivery (#PCDATA)>
    <!ELEMENT LatestDelivery (#PCDATA)>
    <!ELEMENT ReimburseValidTo (#PCDATA)>
    <!ELEMENT EquipmentAvailability (#PCDATA)>
<!ELEMENT ConsignmentWeigthAndVolumes (GrossWeigth?,
                                       Volume?,
                                       TotalNoOfPackages?,
                                       LoadingMetres?,
                                       NumberOfPalletSpace?,
                                       NumberOfHalfPalletSpace?)>
    <!ELEMENT GrossWeigth (#PCDATA)>
    <!ELEMENT Volume (#PCDATA)>
    <!ELEMENT TotalNoOfPackages (#PCDATA)>
    <!ELEMENT LoadingMetres (#PCDATA)>
    <!ELEMENT NumberOfPalletSpace (#PCDATA)>
    <!ELEMENT NumberOfHalfPalletSpace (#PCDATA)>
<!ELEMENT ConsignmentReferences (TransportContractNumber?,
                                 DomesticWaybillNumber?,
                                 CMR-Number?,
                                 AWB-Number?,
                                 SeaWaybillNumber?,
                                 CountryOfExportation?,
                                 CountryOfDestination?)>
    <!ELEMENT TransportContractNumber (#PCDATA)>
    <!ELEMENT DomesticWaybillNumber (#PCDATA)>
    <!ELEMENT CMR-Number (#PCDATA)>
    <!ELEMENT AWB-Number (#PCDATA)>
    <!ELEMENT SeaWaybillNumber (#PCDATA)>
    <!ELEMENT CountryOfExportation (#PCDATA)>
    <!ELEMENT CountryOfDestination (#PCDATA)>
<!ELEMENT ConsignmentText (GeneralTransportInformation?,
                           RequestedRoute?,
                           RequestedRoutesAndTariff?)>
    <!ELEMENT GeneralTransportInformation (#PCDATA)>
    <!ELEMENT RequestedRoute (#PCDATA)>
    <!ELEMENT RequestedRoutesAndTariff (#PCDATA)>
<!ELEMENT GoodsItem (GoodsItemSpecifications,
                     PackageDetails,
                     ProductDetails,
                     DangerousGoodsDetails?)>
    <!ELEMENT GoodsItemSpecifications (GroupSequentialNumber,
                                       GeneralText?)>
        <!ELEMENT GroupSequentialNumber (#PCDATA)>
        <!ELEMENT GeneralText (#PCDATA)>
    <!ELEMENT PackageDetails (NumberOfPackages,
                              TypeOfPackages?,
                              TypeOfPackagesText?,
                              PackageLength?,
                              PackageWidth?,
                              PackageHeigth?,
                              NoOfSpecPackages?)>
        <!ELEMENT NumberOfPackages (#PCDATA)>
        <!ELEMENT TypeOfPackages (#PCDATA)>
        <!ELEMENT TypeOfPackagesText (#PCDATA)>
        <!ELEMENT PackageLength (#PCDATA)>
        <!ELEMENT PackageWidth (#PCDATA)>
```

```
            <!ELEMENT PackageHeigth (#PCDATA)>
            <!ELEMENT NoOfSpecPackages (#PCDATA)>
        <!ELEMENT ProductDetails (GoodsDescription)>
            <!ELEMENT GoodsDescription (#PCDATA)>
        <!ELEMENT DangerousGoodsDetails (DangerousGoodsInfo?)>
            <!ELEMENT DangerousGoodsInfo (#PCDATA)>
<!ELEMENT PreCarriage (TransportStageGeneralInfo,
                       TransportStageLocations)>
    <!ELEMENT TransportStageGeneralInfo (ModeOfTransport,
                                         CarrierName?,
                                         MeansOfTransportId?,
                                         MeansOfTransportNationality?)>
        <!ELEMENT ModeOfTransport (#PCDATA)>
        <!ELEMENT CarrierName (#PCDATA)>
        <!ELEMENT MeansOfTransportId (#PCDATA)>
        <!ELEMENT MeansOfTransportNationality (#PCDATA)>
    <!ELEMENT TransportStageLocations (PlaceOfDeparture,
                                       PlaceOfDestination)>
        <!ELEMENT PlaceOfDeparture (#PCDATA)>
        <!ELEMENT PlaceOfDestination (#PCDATA)>
<!ELEMENT MainCarriage (TransportStageGeneralInfo,
                        TransportStageLocations)>
    <!-- TransportStageGeneralInfo is described above.-->
    <!-- TransportStageLocations is described above.-->
<!ELEMENT OnCarriage (TransportStageGeneralInfo,
                      TransportStageLocations)>
    <!-- TransportStageGeneralInfo is described above.-->
    <!-- TransportStageLocations is described above.-->
<!ELEMENT Equipment (EquipmentType,
                     EquipmentDetails?)>
    <!ELEMENT EquipmentType (#PCDATA)>
    <!ELEMENT EquipmentDetails (EquipmentSizeAndType?,
                                OwnerIndication?,
                                NumberOfPallets?)>
        <!ELEMENT EquipmentSizeAndType (#PCDATA)>
        <!ELEMENT OwnerIndication (#PCDATA)>
        <!ELEMENT NumberOfPallets (#PCDATA)>
```

11.Annex D – Example of a XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<Schema xmlns="urn:schemas-microsoft-com:xml-data" xmlns:dt="urn:schemas-
microsoft-com:datatypes">
   <!--This file was generated by SINTEF MessageDesigner (2000-03-23).-->
   <ElementType name="TransportBooking" content="eltOnly">
      <element type="MessageInformation" minOccurs="1" maxOccurs="1"/>
      <element type="TransportService" minOccurs="1" maxOccurs="1"/>
      <element type="ServiceProvider" minOccurs="1" maxOccurs="1"/>
      <element type="ServiceBuyer" minOccurs="1" maxOccurs="1"/>
      <element type="Consignment" minOccurs="1" maxOccurs="1"/>
      <element type="PreCarriage" minOccurs="0" maxOccurs="1"/>
      <element type="MainCarriage" minOccurs="1" maxOccurs="1"/>
      <element type="OnCarriage" minOccurs="0" maxOccurs="1"/>
      <element type="Equipment" minOccurs="0" maxOccurs="*"/>
   </ElementType>
   <ElementType name="MessageInformation" content="eltOnly">
      <element type="DocumentIdentification" minOccurs="1" maxOccurs="1"/>
      <element type="MessageFunction" minOccurs="1" maxOccurs="1"/>
      <element type="EdifactIdentification" minOccurs="1" maxOccurs="1"/>
   </ElementType>
   <ElementType name="DocumentTypeCoded" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="DocumentIssueDate" content="textOnly"
dt:type="dateTime"/>
   <ElementType name="CarrierBookingNumber" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="ConsignorReferenceNumber" content="textOnly"
dt:type="string" dt:maxLength="35"/>
   <ElementType name="RefToPrevMessage" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="MessageSender" content="textOnly" dt:type="string"
dt:maxLength="17"/>
   <ElementType name="MessageReceiver" content="textOnly" dt:type="string"
dt:maxLength="17"/>
   <ElementType name="DocumentIdentification" content="eltOnly">
      <element type="DocumentTypeCoded" minOccurs="1" maxOccurs="1"/>
      <element type="DocumentIssueDate" minOccurs="1" maxOccurs="1"/>
      <element type="CarrierBookingNumber" minOccurs="0" maxOccurs="1"/>
      <element type="ConsignorReferenceNumber" minOccurs="0" maxOccurs="1"/>
      <element type="RefToPrevMessage" minOccurs="0" maxOccurs="1"/>
      <element type="MessageSender" minOccurs="0" maxOccurs="1"/>
      <element type="MessageReceiver" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="MessageFunction" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="MessageType" content="textOnly" dt:type="string"
dt:maxLength="6"/>
   <ElementType name="MessageTypeVersion" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="MessageTypeRelease" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="ControllingAgency" content="textOnly" dt:type="string"
dt:maxLength="2"/>
   <ElementType name="MIGIdentity" content="textOnly" dt:type="string"
dt:maxLength="6"/>
   <ElementType name="MessageReferenceNumber" content="textOnly"
dt:type="string" dt:maxLength="14"/>
   <ElementType name="EdifactIdentification" content="eltOnly">
      <element type="MessageType" minOccurs="0" maxOccurs="1"/>
```

```
      <element type="MessageTypeVersion" minOccurs="0" maxOccurs="1"/>
      <element type="MessageTypeRelease" minOccurs="0" maxOccurs="1"/>
      <element type="ControllingAgency" minOccurs="0" maxOccurs="1"/>
      <element type="MIGIdentity" minOccurs="0" maxOccurs="1"/>
      <element type="MessageReferenceNumber" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="TransportService" content="eltOnly">
      <element type="BasicService" minOccurs="1" maxOccurs="1"/>
      <element type="AdditionalServices" minOccurs="0" maxOccurs="1"/>
      <element type="RequestedPriority" minOccurs="1" maxOccurs="1"/>
      <element type="TypeOfGoodsIndicator" minOccurs="1" maxOccurs="1"/>
      <element type="TermsOfDelivery" minOccurs="1" maxOccurs="1"/>
   </ElementType>
   <ElementType name="BasicService" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="CashOnDelivery" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="DeliveryAdvice" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="SpecialHandling" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="CarrierLoads" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="AdditionalServices" content="eltOnly">
      <element type="CashOnDelivery" minOccurs="0" maxOccurs="1"/>
      <element type="DeliveryAdvice" minOccurs="0" maxOccurs="1"/>
      <element type="SpecialHandling" minOccurs="0" maxOccurs="1"/>
      <element type="CarrierLoads" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="RequestedPriority" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="TypeOfGoodsIndicator" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="IncotermsCode" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="CombitermsCode" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="TermsOfDeliveryText" content="textOnly" dt:type="string"
dt:maxLength="70"/>
   <ElementType name="LocationForTOD" content="textOnly" dt:type="string"
dt:maxLength="6"/>
   <ElementType name="LocationForTODtext" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="TermsOfDelivery" content="eltOnly">
      <element type="IncotermsCode" minOccurs="0" maxOccurs="1"/>
      <element type="CombitermsCode" minOccurs="0" maxOccurs="1"/>
      <element type="TermsOfDeliveryText" minOccurs="0" maxOccurs="1"/>
      <element type="LocationForTOD" minOccurs="0" maxOccurs="1"/>
      <element type="LocationForTODtext" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="ServiceProvider" content="eltOnly">
      <element type="PartyAddressDetails" minOccurs="1" maxOccurs="1"/>
      <element type="PartyOtherDetails" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="Id" content="textOnly" dt:type="string"
dt:maxLength="17"/>
   <ElementType name="Name" content="textOnly" dt:type="string"
dt:maxLength="175"/>
   <ElementType name="Street" content="textOnly" dt:type="string"
dt:maxLength="105"/>
   <ElementType name="City" content="textOnly" dt:type="string"
dt:maxLength="35"/>
```

```
   <ElementType name="CountrySubArea" content="textOnly" dt:type="string"
dt:maxLength="9"/>
   <ElementType name="Postcode" content="textOnly" dt:type="string"
dt:maxLength="9"/>
   <ElementType name="PartyAddressDetails" content="eltOnly">
      <element type="Id" minOccurs="0" maxOccurs="1"/>
      <element type="Name" minOccurs="1" maxOccurs="1"/>
      <element type="Street" minOccurs="0" maxOccurs="1"/>
      <element type="City" minOccurs="0" maxOccurs="1"/>
      <element type="CountrySubArea" minOccurs="0" maxOccurs="1"/>
      <element type="Postcode" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="Contact" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="Telephone" content="textOnly" dt:type="string"
dt:maxLength="25"/>
   <ElementType name="Telefax" content="textOnly" dt:type="string"
dt:maxLength="25"/>
   <ElementType name="Email" content="textOnly" dt:type="string"
dt:maxLength="25"/>
   <ElementType name="VAT-Number" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="PartyOtherDetails" content="eltOnly">
      <element type="Contact" minOccurs="0" maxOccurs="1"/>
      <element type="Telephone" minOccurs="0" maxOccurs="1"/>
      <element type="Telefax" minOccurs="0" maxOccurs="1"/>
      <element type="Email" minOccurs="0" maxOccurs="1"/>
      <element type="VAT-Number" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="ServiceBuyer" content="eltOnly">
      <element type="PartyAddressDetails" minOccurs="1" maxOccurs="1"/>
      <element type="PartyOtherDetails" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <!-- PartyAddressDetails and PartyOtherDetails are described above.-->
   <ElementType name="Consignment" content="eltOnly">
      <element type="Consignor" minOccurs="1" maxOccurs="1"/>
      <element type="Consignee" minOccurs="1" maxOccurs="1"/>
      <element type="DespatchParty" minOccurs="0" maxOccurs="1"/>
      <element type="DeliveryParty" minOccurs="0" maxOccurs="1"/>
      <element type="ConsignmentDateAndTime" minOccurs="1" maxOccurs="1"/>
      <element type="ConsignmentWeigthAndVolumes" minOccurs="1" maxOccurs="1"/>
      <element type="ConsignmentReferences" minOccurs="0" maxOccurs="1"/>
      <element type="ConsignmentText" minOccurs="0" maxOccurs="1"/>
      <element type="GoodsItem" minOccurs="1" maxOccurs="*"/>
   </ElementType>
   <ElementType name="Consignor" content="eltOnly">
      <element type="PartyAddressDetails" minOccurs="1" maxOccurs="1"/>
      <element type="PartyOtherDetails" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <!-- PartyAddressDetails and PartyOtherDetails are described above.-->
   <ElementType name="Consignee" content="eltOnly">
      <element type="PartyAddressDetails" minOccurs="1" maxOccurs="1"/>
      <element type="PartyOtherDetails" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <!-- PartyAddressDetails and PartyOtherDetails are described above.-->
   <ElementType name="DespatchParty" content="eltOnly">
      <element type="PartyAddressDetails" minOccurs="1" maxOccurs="1"/>
      <element type="PartyOtherDetails" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <!-- PartyAddressDetails and PartyOtherDetails are described above.-->
   <ElementType name="DeliveryParty" content="eltOnly">
      <element type="PartyAddressDetails" minOccurs="1" maxOccurs="1"/>
      <element type="PartyOtherDetails" minOccurs="0" maxOccurs="1"/>
```

```
   </ElementType>
   <!-- PartyAddressDetails and PartyOtherDetails are described above.-->
   <ElementType name="EarliestPickup" content="textOnly" dt:type="dateTime"/>
   <ElementType name="LatestPickup" content="textOnly" dt:type="dateTime"/>
   <ElementType name="EarliestDelivery" content="textOnly" dt:type="dateTime"/>
   <ElementType name="LatestDelivery" content="textOnly" dt:type="dateTime"/>
   <ElementType name="ReimburseValidTo" content="textOnly" dt:type="dateTime"/>
   <ElementType name="EquipmentAvailability" content="textOnly"
dt:type="dateTime"/>
   <ElementType name="ConsignmentDateAndTime" content="eltOnly">
      <element type="EarliestPickup" minOccurs="1" maxOccurs="1"/>
      <element type="LatestPickup" minOccurs="0" maxOccurs="1"/>
      <element type="EarliestDelivery" minOccurs="0" maxOccurs="1"/>
      <element type="LatestDelivery" minOccurs="1" maxOccurs="1"/>
      <element type="ReimburseValidTo" minOccurs="0" maxOccurs="1"/>
      <element type="EquipmentAvailability" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="GrossWeigth" content="textOnly" dt:type="int"
dt:maxLength="18"/>
   <ElementType name="Volume" content="textOnly" dt:type="int"
dt:maxLength="18"/>
   <ElementType name="TotalNoOfPackages" content="textOnly" dt:type="int"
dt:maxLength="18"/>
   <ElementType name="LoadingMetres" content="textOnly" dt:type="int"
dt:maxLength="18"/>
   <ElementType name="NumberOfPalletSpace" content="textOnly" dt:type="int"
dt:maxLength="18"/>
   <ElementType name="NumberOfHalfPalletSpace" content="textOnly" dt:type="int"
dt:maxLength="18"/>
   <ElementType name="ConsignmentWeigthAndVolumes" content="eltOnly">
      <element type="GrossWeigth" minOccurs="0" maxOccurs="1"/>
      <element type="Volume" minOccurs="0" maxOccurs="1"/>
      <element type="TotalNoOfPackages" minOccurs="0" maxOccurs="1"/>
      <element type="LoadingMetres" minOccurs="0" maxOccurs="1"/>
      <element type="NumberOfPalletSpace" minOccurs="0" maxOccurs="1"/>
      <element type="NumberOfHalfPalletSpace" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="TransportContractNumber" content="textOnly"
dt:type="string" dt:maxLength="35"/>
   <ElementType name="DomesticWaybillNumber" content="textOnly"
dt:type="string" dt:maxLength="35"/>
   <ElementType name="CMR-Number" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="AWB-Number" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="SeaWaybillNumber" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="CountryOfExportation" content="textOnly" dt:type="string"
dt:maxLength="25"/>
   <ElementType name="CountryOfDestination" content="textOnly" dt:type="string"
dt:maxLength="25"/>
   <ElementType name="ConsignmentReferences" content="eltOnly">
      <element type="TransportContractNumber" minOccurs="0" maxOccurs="1"/>
      <element type="DomesticWaybillNumber" minOccurs="0" maxOccurs="1"/>
      <element type="CMR-Number" minOccurs="0" maxOccurs="1"/>
      <element type="AWB-Number" minOccurs="0" maxOccurs="1"/>
      <element type="SeaWaybillNumber" minOccurs="0" maxOccurs="1"/>
      <element type="CountryOfExportation" minOccurs="0" maxOccurs="1"/>
      <element type="CountryOfDestination" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="GeneralTransportInformation" content="textOnly"
dt:type="string" dt:maxLength="70"/>
```

```
   <ElementType name="RequestedRoute" content="textOnly" dt:type="string"
dt:maxLength="70"/>
   <ElementType name="RequestedRoutesAndTariff" content="textOnly"
dt:type="string" dt:maxLength="70"/>
   <ElementType name="ConsignmentText" content="eltOnly">
      <element type="GeneralTransportInformation" minOccurs="0" maxOccurs="1"/>
      <element type="RequestedRoute" minOccurs="0" maxOccurs="1"/>
      <element type="RequestedRoutesAndTariff" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="GoodsItem" content="eltOnly">
      <element type="GoodsItemSpecifications" minOccurs="1" maxOccurs="1"/>
      <element type="PackageDetails" minOccurs="1" maxOccurs="1"/>
      <element type="ProductDetails" minOccurs="1" maxOccurs="1"/>
      <element type="DangerousGoodsDetails" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="GroupSequentialNumber" content="textOnly" dt:type="int"
dt:maxLength="5"/>
   <ElementType name="GeneralText" content="textOnly" dt:type="string"
dt:maxLength="210"/>
   <ElementType name="GoodsItemSpecifications" content="eltOnly">
      <element type="GroupSequentialNumber" minOccurs="1" maxOccurs="1"/>
      <element type="GeneralText" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="NumberOfPackages" content="textOnly" dt:type="int"
dt:maxLength="8"/>
   <ElementType name="TypeOfPackages" content="textOnly" dt:type="string"
dt:maxLength="7"/>
   <ElementType name="TypeOfPackagesText" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="PackageLength" content="textOnly" dt:type="int"
dt:maxLength="15"/>
   <ElementType name="PackageWidth" content="textOnly" dt:type="int"
dt:maxLength="15"/>
   <ElementType name="PackageHeigth" content="textOnly" dt:type="int"
dt:maxLength="15"/>
   <ElementType name="NoOfSpecPackages" content="textOnly" dt:type="int"
dt:maxLength="15"/>
   <ElementType name="PackageDetails" content="eltOnly">
      <element type="NumberOfPackages" minOccurs="1" maxOccurs="1"/>
      <element type="TypeOfPackages" minOccurs="0" maxOccurs="1"/>
      <element type="TypeOfPackagesText" minOccurs="0" maxOccurs="1"/>
      <element type="PackageLength" minOccurs="0" maxOccurs="1"/>
      <element type="PackageWidth" minOccurs="0" maxOccurs="1"/>
      <element type="PackageHeigth" minOccurs="0" maxOccurs="1"/>
      <element type="NoOfSpecPackages" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="GoodsDescription" content="textOnly" dt:type="string"
dt:maxLength="140"/>
   <ElementType name="ProductDetails" content="eltOnly">
      <element type="GoodsDescription" minOccurs="1" maxOccurs="1"/>
   </ElementType>
   <ElementType name="DangerousGoodsInfo" content="textOnly" dt:type="string"
dt:maxLength="350"/>
   <ElementType name="DangerousGoodsDetails" content="eltOnly">
      <element type="DangerousGoodsInfo" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="PreCarriage" content="eltOnly">
      <element type="TransportStageGeneralInfo" minOccurs="1" maxOccurs="1"/>
      <element type="TransportStageLocations" minOccurs="1" maxOccurs="1"/>
   </ElementType>
   <ElementType name="ModeOfTransport" content="textOnly" dt:type="string"
dt:maxLength="3"/>
```

```
   <ElementType name="CarrierName" content="textOnly" dt:type="string"
dt:maxLength="35"/>
   <ElementType name="MeansOfTransportId" content="textOnly" dt:type="string"
dt:maxLength="17"/>
   <ElementType name="MeansOfTransportNationality" content="textOnly"
dt:type="string" dt:maxLength="3"/>
   <ElementType name="TransportStageGeneralInfo" content="eltOnly">
      <element type="ModeOfTransport" minOccurs="1" maxOccurs="1"/>
      <element type="CarrierName" minOccurs="0" maxOccurs="1"/>
      <element type="MeansOfTransportId" minOccurs="0" maxOccurs="1"/>
      <element type="MeansOfTransportNationality" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="PlaceOfDeparture" content="textOnly" dt:type="string"
dt:maxLength="25"/>
   <ElementType name="PlaceOfDestination" content="textOnly" dt:type="string"
dt:maxLength="25"/>
   <ElementType name="TransportStageLocations" content="eltOnly">
      <element type="PlaceOfDeparture" minOccurs="1" maxOccurs="1"/>
      <element type="PlaceOfDestination" minOccurs="1" maxOccurs="1"/>
   </ElementType>
   <ElementType name="MainCarriage" content="eltOnly">
      <element type="TransportStageGeneralInfo" minOccurs="1" maxOccurs="1"/>
      <element type="TransportStageLocations" minOccurs="1" maxOccurs="1"/>
   </ElementType>
   <!-- TransportStageGeneralInfo and TransportStageLocations are described
above.-->
   <ElementType name="OnCarriage" content="eltOnly">
      <element type="TransportStageGeneralInfo" minOccurs="1" maxOccurs="1"/>
      <element type="TransportStageLocations" minOccurs="1" maxOccurs="1"/>
   </ElementType>
   <!-- TransportStageGeneralInfo and TransportStageLocations are described
above.-->
   <ElementType name="Equipment" content="eltOnly">
      <element type="EquipmentType" minOccurs="1" maxOccurs="1"/>
      <element type="EquipmentDetails" minOccurs="0" maxOccurs="1"/>
   </ElementType>
   <ElementType name="EquipmentType" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="EquipmentSizeAndType" content="textOnly" dt:type="string"
dt:maxLength="4"/>
   <ElementType name="OwnerIndication" content="textOnly" dt:type="string"
dt:maxLength="3"/>
   <ElementType name="NumberOfPallets" content="textOnly" dt:type="int"
dt:maxLength="15"/>
   <ElementType name="EquipmentDetails" content="eltOnly">
      <element type="EquipmentSizeAndType" minOccurs="0" maxOccurs="1"/>
      <element type="OwnerIndication" minOccurs="0" maxOccurs="1"/>
      <element type="NumberOfPallets" minOccurs="0" maxOccurs="1"/>
   </ElementType>
</Schema>
```

12.Annex E – Example of a XML message instance

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XML Spy v2.5 NT  - http://www.xmlspy.com -->
<!DOCTYPE TransportBooking SYSTEM "C:\Pharos\Booking.dtd">
<TransportBooking>
   <MessageInformation>
      <DocumentIdentification>
         <DocumentTypeCoded>335</DocumentTypeCoded>
         <DocumentIssueDate>2000-01-23</DocumentIssueDate>
      </DocumentIdentification>
      <MessageFunction>9</MessageFunction>
      <EdifactIdentification>
         <MessageType>IFTMBF</MessageType>
      </EdifactIdentification>
   </MessageInformation>
   <TransportService>
      <BasicService>3</BasicService>
      <RequestedPriority>3</RequestedPriority>
      <TypeOfGoodsIndicator>ZFR</TypeOfGoodsIndicator>
      <TermsOfDelivery>
         <LocationForTOD>DKCPH</LocationForTOD>
      </TermsOfDelivery>
   </TransportService>
   <ServiceProvider>
      <PartyAddressDetails>
         <Name>EuroCargo AB</Name>
      </PartyAddressDetails>
   </ServiceProvider>
   <ServiceBuyer>
      <PartyAddressDetails>
         <Name>Svendsson, H</Name>
      </PartyAddressDetails>
   </ServiceBuyer>
   <Consignment>
      <Consignor>
         <PartyAddressDetails>
            <Name>Svendsson Industrier AB</Name>
         </PartyAddressDetails>
      </Consignor>
      <Consignee>
         <PartyAddressDetails>
            <Name>Danish Foodstore Inc</Name>
         </PartyAddressDetails>
      </Consignee>
      <ConsignmentDateAndTime>
         <EarliestPickup>2000-02-10</EarliestPickup>
         <LatestDelivery>2000-02-20</LatestDelivery>
      </ConsignmentDateAndTime>
      <ConsignmentWeigthAndVolumes>
         <GrossWeigth>2500</GrossWeigth>
      </ConsignmentWeigthAndVolumes>
      <GoodsItem>
         <GoodsItemSpecifications>
            <GroupSequentialNumber>1</GroupSequentialNumber>
         </GoodsItemSpecifications>
         <PackageDetails>
            <NumberOfPackages>15</NumberOfPackages>
         </PackageDetails>
         <ProductDetails>
            <GoodsDescription>Food</GoodsDescription>
```

```
        </ProductDetails>
      </GoodsItem>
    </Consignment>
    <MainCarriage>
      <TransportStageGeneralInfo>
        <ModeOfTransport>4</ModeOfTransport>
      </TransportStageGeneralInfo>
      <TransportStageLocations>
        <PlaceOfDeparture>SEGOT</PlaceOfDeparture>
        <PlaceOfDestination>DKCPH</PlaceOfDestination>
      </TransportStageLocations>
    </MainCarriage>
</TransportBooking>
```