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ECONOMIC COMMISSION FOR EUROPE

INLAND TRANSPORT COMMITTEE
Working Party on Customs Questions
affecting transport

Reference Model for the TIR Procedure Computerization Project

Note: This document presents the reference model for the TIR Procedure Computerization Project in accordance with the UN/CEFACT Modelling Methodology. The Reference Model will be expanded and refined as the work progresses and as feedback is received from modelling work carried out by the Informal ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure.

SOURCE : Informal ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure
STATUS : Working document
ACTION : For expansion and refinement

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0. Introduction

0.1 Background to the document

At its ninety-fifth session, the Working Party expressed the view that, following the conclusions of Phases I and II of the TIR revision process, the next logical step was to provide the TIR regime with the legal and administrative basis to allow for the use of modern information, management and control technology based on highly automated and secured electronic procedures. The Working Party recognized that computerization of the TIR procedure was inevitable (a) in the light of today's extremely rapid technological developments, based on Internet and Smart Card technologies, particularly affecting international transport and trade, (b) the ever increasing need for improved efficiency of Customs transit procedures and (c) the fight against fraudulent activities which must be conducted with the most appropriate and effective means (TRANS/WP.30/190, paragraph 26).

The Working Party felt that the existing and widely varying national Customs procedures, administrative practices and legal requirements in the Contracting parties to the Convention should be taken into account during this process. Computerization of the TIR procedure, based on the TIR regime as revised during Phases I and II of the TIR revision process, would therefore have to focus on the possibility of linking national Customs transit procedures via a standard electronic and/or paper-based data file containing all information of the TIR Carnet. The newly to be created electronic data file would need to be compatible with most if not all possible technical EDI solutions applied or yet to be applied in the Contracting Parties (TRANS/WP.30/190, paragraph 27).

The link between national Customs procedures and the transfer of data files should be possible via (a) international EDI systems, as is being done in the New Computerized Transit System (NCTS), (b) Smart Cards that could be filled-in and carried along by the transport operator as well as filled-in, read and validated by Customs authorities or (c) the present paper-based TIR Carnets, possibly supplemented by bar-code and TIR Carnet holder identification system (TRANS/WP.30/190, paragraph 28).

The Working Party was of the view that, whatever system is to be used, the approach taken in computerization of the TIR regime must be courageous and forward looking and should be able to accommodate all possible technological solutions likely to be implemented in the years ahead (TRANS/WP.30/190, paragraph 29).

In order to make solid progress in this complex field, the Working Party decided to follow established practice and to establish an ad hoc group of experts on the computerization of the TIR regime which should be composed of experts from interested countries and industry groups (TRANS/WP.30/190, paragraph 30).

The Working Party, at its ninety-sixth session, felt that the expert Group, after having highlighted weaknesses and limitations of the current system, should, in particular:

- identify the objectives, procedures and required resources for the computerization of the TIR procedure and determine the role of the various actors (secretariat, Governments, IRU, etc.) in this process;
- analyze all administrative and legal requirements relevant for the computerization of the TIR regime;
- study suitable technological solutions in this respect, and

- take account of experiences made with similar automated systems at the national as well as at subregional levels, such as the NCTS, with a view to preparing possible alternative solutions and scenarios, specifying the benefits as well as the disadvantages of the various approaches (TRANS/WP.30/192, paragraph 37).

The ad hoc Expert Group (hereafter referred to as "Ad hoc Group") met twice in 2001, on 19 February and on 21 June.

With regard to the objectives of the computerization process, the Ad hoc Group decided that those identified by the Working Party at its ninety-fifth session had kept their validity TRANS/WP.30/2001/13, paragraphs 13-14).

The Ad hoc Group reconsidered the fundamental approaches for computerization of the TIR procedure and agreed that, knowing that computerization of the TIR procedure was a continuing process, involving various stages of development, none of the options could be excluded for the time being. Efforts should be pursued at the national level to prepare the national Customs legislation for the acceptance of electronic data processing and interchange techniques and the electronic signature (TRANS/WP.30/2001/13, paragraphs 18-19).

The Ad hoc Group acknowledged that, regardless of the finally selected approach, from a legal point of view, the amount of changes to be made to the TIR Convention could be limited and that it would basically be sufficient to amend the Convention with either a definition of the TIR Carnet, that would include the use of portable electronic files or introduce one new article which would allow for the use of new technologies in general, including the acceptance of electronic signatures, leaving the existing text of the Convention as it stands. Special provisions dealing with the legal and technical specification of the accepted new technologies could be inserted into a separate, newly to be created Annex (TRANS/WP.30/2001/13, paragraph 23).

With regard to the role played by the various actors in the computerization process, the Ad hoc Group agreed that the computerization process would have consequences for the persons and organizations dealing with the issuance and organization and functioning of the guarantee system, as well as for Customs authorities, whose task it is to check and process the provided data and ensure the goods' unaltered arrival at the Customs office of destination. In addition, the use of automated risk management would influence the work of Customs authorities and associations at the national level, as well as the work of the international organization, the insurers and the TIRExB. However, the Ad hoc Group felt that at that time it was not appropriate to pursue this subject, as it depended on a variety of, as yet unknown, factors (TRANS/WP.30/2001/13, paragraphs 26-27).

On the basis of the outcome of the work performed by the Ad hoc Group, the Working Party mandated the secretariat to convene meetings of special expert groups. These special groups should address the two major problems the Ad hoc Group had encountered in the pursuit of its work:

- To study the conceptual and technical aspects of the computerization process of the TIR Procedure, including the financial and administrative implications of its introduction, both at the national and at the international level, and prepare a draft of electronic messages to allow for an interchange of electronic data, nationally, between Contracting Parties and with international organizations;
- To study in detail the impact of the various approaches that had been identified by the Ad hoc Group on the existing legal text of the TIR Convention as well as the repercussions it could have on international private law, national administrative procedures and to draft a description of the role that the various actors (in particular: national associations, international organization, insurers and TIRExB) could play in the TIR Convention, once the paper-based system would be complemented and/or replaced by a system functioning on the basis of the electronic interchange of information (TRANS/WP.30/2001/13, paragraph 31)

On the basis of this mandate, the Informal ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure (hereafter referred to as "Expert Group), at its first session, adopted its Terms of Reference, which stipulate that the Expert Group shall:

- List and analyse the data elements required for the operation of a TIR transport at the national and international level, as stipulated in the TIR Convention as well as in resolutions and recommendations, adopted by the Administrative Committee (in particular Annexes 1,4, and 9 of the TIR Convention) and make an inventory of possible new features which could be included into the electronic version of the TIR procedure. On that basis, the group shall draw up flow charts, reflecting the actual and future stages of the TIR procedure. Within the context of its work, the group shall also study the use of standardized codes, ensuring a uniform understanding and interpretation of the data elements in the TIR Carnet.
- List and analyse the existing information and telecommunication systems and study to what extent the experiences gained at the national and international level can be included in the development of a computerized TIR procedure.
- Prepare conclusions with regard to the computerization of the TIR procedure, reflecting the results of the work under (a) and (b) and taking account of the financial implications they might have on the national and international level (TRANS/WP.30/2002/11, Annex 1)

The Informal ad hoc Expert Group on the Legal Aspects of Computerization of the TIR Procedure shall:

- Study in detail the impact of the various approaches of the computerization process on the existing legal provisions of the TIR Convention as well as the repercussions it could have on national administrative procedures;
- Draft a description of the role the various actors (in particular: national association, international organization, insurers and TIRExB) could play in the TIR Convention, once the paper based system would be complemented and/or replaced by a system functioning on the basis of the electronic interchange of information (Terms of reference still to be adopted).

Both informal ad hoc Expert Groups shall report to the Working Party on the progress of their work. At the completion of its work, each ad hoc Expert Group shall draw up a working document containing concrete proposals for further action, to be discussed and approved by the Working Party.

So far, the informal ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure has met twice (24-25 January 2002 and 14-15 November 2002). The report of the first meeting (ExG/COMP/2002/3) was presented to the Working Party at its one-hundredth session (TRANS/WP.30/200, paragraph 46). The report of the second meeting (ExG/COMP/2002/10), containing an analysis of the actors involved in the process and the fifty individual data elements in the current TIR Carnet, was endorsed by the Working Party at its one-hundred-and-third session (TRANS/WP.30/206, paragraph 33).

At its second meeting, the informal ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure discussed at length the conceptual and hierarchical data models, describing the information contained in the TIR Carnet, but felt it could not reach agreement on any of them. Some experts questioned the usefulness of such complex models, whereas others expressed the view that they were not in a position to judge to what extent the models actually represented the structure of information in the current TIR Carnet. For these reasons, the Expert Group decided to revert to his matter at a later stage and mandated the secretariat to organize a meeting with some IT specialists to study which model is best suited for the purposes of the Expert

Group. The Expert Group further welcomed the secretariat's proposal to use in the future the Unified Modelling Language-standard (UML) (ExG/COMP/2002/10, paras. 11 and 12).

At their meeting, which took place on 3 July 2003, the IT specialists held an extensive exchange of views on the suitability of the, UML based, UN/CEFACT Modelling Methodology (UMM) as a methodology to model business processes like the TIR procedure. As such, UMM provides a procedure for specifying, in an implementation-independent manner, business processes involving information exchange. Although the IT specialists noted that it could be worthwhile to study other methodologies, they recognized that the process of selecting a methodology is very complex and time consuming. They agreed that this work has already been done by the UN/CEFACT team in the elaboration of UMM and that UMM offers the necessary tools to describe the TIR business process, a uniform approach for the work of the Expert Group and a valuable base for future improvements in the TIR procedure. Seeing that the activities, undertaken by the Expert Group so far, fitted well into UMM, and that the approach endorsed by the Expert Group in the project overview was in line with the UMM, they invited the secretariat to prepare a first draft document for discussion by the Expert Group at its forthcoming meeting. The scope of the first phase of the work of the Expert Group being the analysis of the current system - the 'as-is' description of the TIR procedure - the IT specialists decided to limit this first document to the Business Domain Modelling, the first step in UMM. Furthermore, the IT specialists recommended having a full implementation of the methodology, including a first descriptive part describing the so-called 'vision' of the project. Moreover, they emphasized the necessity to adapt UMM, as it would be necessary with any other methodology, to the particulars of the TIR business process (ExG/COMP/2003/2, paragraph 6).

At its one-hundred-and-fifth session, the Working Party was informed orally of the progress made by the Expert Group at its third meeting, which took place on 1 and 2 September 2003 in Budapest. The Working Party endorsed the work undertaken by the Expert Group and took particular note of three issues, where the Expert Group had expressed that it needed further guidance from the Working Party. These issues were:

(a) the definition of the scope of the project, which had been formulated by the Working Party as being "the computerization of the TIR Procedure". The Expert Group felt that the Working Party should clarify in more detail what was meant exactly by this wording. Within this context, the Expert Group also noted that the term "TIR Procedure" was an undefined term, making it impossible to describe exactly the boundaries of the project;

(b) The description of the approach on how to achieve the computerization of the TIR Procedure. In view of political and technical developments, having taken place over the last few years, the Working Party was requested to provide a more detailed guidance to the Expert Group on which approach the computerization project should pursue;

(c) The title of the project. For practical reasons, the secretariat had proposed to refer in the future to the "eTIR Project" as a short name for the project to computerize the TIR Procedure. The Expert Group felt it was not in a position to decide on this issue and decided to refer the matter to the Working Party for further discussion (TRANS/WP.30/210, paras 27-31)

At its one-hundred-and-sixth session, the The Working Party confirmed that:

(a) the final objective of the computerization of the TIR procedure encompasses the computerization of the whole TIR Carnet life cycle from distribution issuance and via the TIR transport to return and repository and that it should, ultimately be aimed at replacing the current paper TIR Carnet. The Working Party agreed that the process to achieve this objective may be challenging , requiring the input of considerable human and financial input, both at the international and the national level. Therefore, the Working Party agreed that a step-by-step approach seemed the only feasible alternative to achieve any tangible results in the near future. To that end, it mandated the secretariat, as a first step, in

cooperation with the Expert Group (a) to work out concrete proposals on how to exchange the so-called 'static' data-elements contained in the TIR Carnet (data elements which remain unchanged throughout the TIR Transport) between the competent authorities of Contracting Parties, possibly also including the data contained in the ITDBOnline as a preliminary step, (b) to conduct a feasibility study on the practicability of such proposals and, ultimately, (c) to propose a pilot along one of the major transit corridors to implement them.

The Working Party agreed that, as a next step, the integration of the so-called 'dynamic' data elements (data elements which may be amended or updated in the course of the TIR Transport) should be considered. Further steps should then address the issue of inclusion of additional features, such as security related information and advance cargo information.

Once these tangible steps had been achieved, the Expert Group could focus its attention on further, outstanding, issues in relation to the computerization of the TIR procedure.

(b) The Working Party agreed that the approach of the computerization process should, until further notice, be focused on the establishment of an international, centralized database, whose aim it should be to facilitate the secure exchange of data between national Customs systems. At a later stage, the sharing and exchange of data with other bodies concerned (such as TIRExB, international organizations, national associations and the international guarantee), should not be excluded.

(c) The Working Party agreed that the Project to Computerize the TIR Procedure could, in future, be referred to as "eTIR-project" (TRANS/WP.30/212, para. 26).

0.2 Introduction to the reference model

Just as it is not possible to build a decent and secure house without a proper plan, which has been drawn up by a qualified architect, it is not possible to computerize a system without first designing the necessary models, outlining all the elements and procedures of which it consists. And just as the construction of a small garden shed does not require the same planning as the construction of a hundred storey high commercial building, different systems will require different modelling techniques, in function of their aim and complexity.[1]

This document contains the full description of the TIR Procedure Computerization Project.

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.

Business Modelling provides a formalized way to describe how the TIR procedure operates and thus enables a common understanding of its key features and requirements. It can be used as a tool to provide a range of e-business solutions covering all or part of the TIR procedure and based on a variety of technologies. The models also facilitate the detection of opportunities for simplification and harmonization.

[1] See also IS architecture artistry. G. Gage, IDG Communication Publication, July 1991

This document is first intended to facilitate the work of the Informal ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure and to provide modelling support. In addition it should facilitate the work to be undertaken by the Informal ad hoc Expert Group on Legal Aspects of Computerization of the TIR Procedure within the framework of formulating the E-business requirements (Chapter 2 of the Reference Model). The final version of the Reference Model will be submitted to the Working Party on Customs Questions affecting Transport (WP.30) and the Administrative Committee for the TIR Convention (AC.2) for endorsement as well as being a reference for any future work in the TIR procedure Computerization Project. In addition, every single chapter of the Reference model will, upon completion, be submitted for endorsement to the WP.30 (see Table 0.3).

0.2.1 Phases and Workflows

According to Rational Unified Process and UMM, every project passes through a series of standard phases. The phases are inception, elaboration, construction and transition. For each phase, a number of workflows is required. The workflows identified for computerization projects are: Business Domain Modelling, e-Business requirements, Analysis, Design, Implementation, Test and Deployment. The UMM focuses on the inception and elaboration phases and limits itself to the first four workflows, not encompassing the Implementation, Test and Deployment workflows. The description of the work during every phase, indication the main or 'high level' activities, is shown in Table 0.1.

Phase	High level activities
Inception	o Idea is conceived, and initially documented using the UMM. o Main workflows are: 1) Business Domain Modelling, and 2) e-Business requirements.
Elaboration	o Idea is further refined and expanded o Main workflows are 1) Analysis, and 2) Design o The outcome – deliverables – is compared with the already defined models, requirements and references contained in the 'repository'. o New models or enhancements to existing models are incorporated into the repository
Construction	o Messages are designed o Software development o Main workflows are 1) Implementation, 2) Testing, and 3) Deployment
Transition	o Testing o Main workflow is Deployment

Table 0.1 Activities associated with each phase

In the Inception and Elaboration phases the UMM concentrates on workflows needed to understand the business needs to produce business scenarios, business objects and areas of business collaboration. They are:

- Business Domain Modelling
- e-Business requirements
- Analysis
- Design

Within each of these workflows a set of deliverables is produced (see Table 0.2). The whole process is iterative so that additions and changes can be validated and incorporated into any of the workflows as they are discovered. Additions and changes should be a natural result of maintenance and enhancement.

UML Deliverables	Business Domain Modelling Workflow	e-Business requirements Workflow	Analysis Workflow	Design Workflow
Package diagram	x			
Class diagram	x	x	x	x
Use case description	x	x	x	
Use case diagram	x	x	x	x
Sequence diagram			x	x
Collaboration diagram			x	x
Statechart (state machine) diagram			x	x
Activity diagram	x	x	x	x
Component diagram				x
Deployment diagram				x
Requirements list	x	x	x	
Glossary	x	x	x	

Table 0.2 UMM Deliverables

Every workflow focuses on specific aspects of the project. The Business Domain Modelling describes the scope of the project within the whole system, enabling a common understanding of the functioning of the current TIR procedure – the “as-is” situation – to all 'stakeholders' and defines the high-level business requirements. The e-Business requirements workflow captures the detailed user requirements in the computerized environment to be developed and further elaborates the use cases described in the previous phase of the work. The third workflow, the Analysis, translates the requirements identified in earlier phases into specifications that can be followed by software developers and message designers. Finally, in the Design workflow, the specification devised during the Analysis workflow will be used to develop the messages and the collaborations required to exchange these messages.

Each and every workflow will be terminated by a formal validation by the relevant bodies.

0.2.2 Structure of the document

The underlying document follows the methodology and structure presented above. The four main chapters correspond to the four workflows of the Inception and Elaboration phases. In addition, a number of annexes also forms part of the present Reference Model.

The requirements list and the glossary (TIR glossary) are two key cross-reference documents which are used throughout the process to ensure that all business requirements, terms, and definitions are recorded. These two documents are maintained as and recorded in Annexes 1 and 2 respectively.

Annex 3 contains a UML Symbols Glossary, describing the specific terms and symbols of the language to allow non-UML literates to understand the numerous diagrams contained in this document.

Annex 4 contains a UMM/UML Glossary, describing the specific terms used by the UMM methodology.

Annexes 5 and 6 contain the lists of, respectively, figures and tables contained in underlying document.

In Annex 7 the reader can find all references to the documents used to elaborate this document.

In addition, some chapters or annexes may be added in the future to reflect the specificities of the TIR Procedure Computerization Project.

0.2.3 Stakeholders responsibility chart

The computerization of the TIR Procedure is a project involving numerous stakeholders. Most of them have specific roles to play in the project and they are interdependent. Figure 0.1 shows the roles of the stakeholders and dependencies between them; dependency arrows also indicate the reporting directions, in other words, who reports to whom.

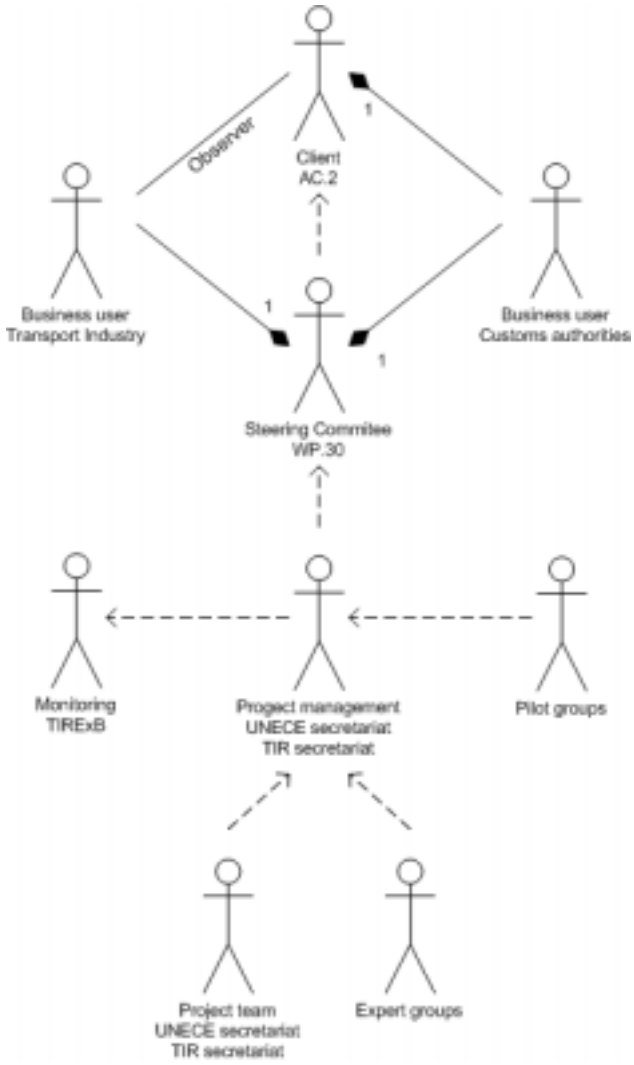


Figure 0.1 Stakeholders responsibility chart

0.2.4 Review and validation status

The table below presents the revisions and the validation dates for the various parts and versions of the reference model.

	Version	**Validated by … on …**[2]			
		COMP[3]	**LEGAL**[4]	**WP.30**[5]	**AC.2**[6]
REFERENCE MODEL					
1. BUSINESS DOMAIN MODELLING					
1.1 Vision	1.2	2/3/2004			
1.2 TIR procedure domain	1.2	2/3/2004			
1.3 TIR Carnet life cycle use cases	1.2	2/3/2004			
1.4 Elaborate the use cases					
1.6 Entity classes	1.0	2/9/2003			
1.6 High level class diagram					
2. E-BUSINESS REQUIREMENTS					
3. ANALYSIS WORKFLOW					
4. DESIGN WORKFLOW					
ANNEX 1 - REQUIREMENTS LIST					
ANNEX 2 - TIR GLOSSARY					

Table 0.3 Review and validation status

[2] This table contains the dates on which the various versions of parts of the reference model have been validated (endorsed) by the different groups. The cells in grey indicate that endorsement by that specific group is not required.

[3] Informal ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure

[4] Informal ad hoc Expert Group on Legal Aspects of Computerization of the TIR Procedure

[5] Working Party on Customs Questions affecting Transport

[6] Administrative Committee for the TIR Convention, 1975

1. Business Domain Modelling

The purpose of the Business Domain Modelling workflow is:

- To present the scope of the project;
- To understand the structure and dynamics of processes within the current TIR procedure;
- To ensure that all stakeholders involved have a common understanding of the current TIR procedure;
- To understand the daily business in the TIR procedure, without reference to an electronic solution;
- To formulate the high-level business requirements which will serve as a basis for a subsequent detailed analysis.

In an international project such as the computerization of the TIR procedure, it is absolutely indispensable that every stakeholder involved has a common vision of the project. Therefore, the first part of the Business Domain Modelling describes this vision in light of the background and the mandates given to the various groups involved.

Once the vision is clearly defined, the high level analysis of the TIR procedure domain can be undertaken, followed by a more detailed analysis enabling a deeper understanding of the functioning of the TIR procedure. To this end, the domain is divided into areas and a use case analysis is drawn up for each area of interest. Already at this level some areas will be left aside because they are not part of the scope of the project. The requirements list and the TIR glossary are also filled-in accordingly. The list of entity classes and the high-level class diagram, established during this workflow, contribute to the development of the TIR glossary.

Deliverables from the Business Domain Model workflow include:

- Scope of the Business Domain and the boundaries of the project;
- Business Domain use case diagram with its description and business domain activity diagram;
- Use case diagram, use case description and activity diagram for each area;
- TIR entity classes, definitions and a high level class diagram;
- List of business requirements (including non-functional requirements);
- TIR glossary.

1.1 Vision

This first part of the work aims at reaching agreement on the objectives, the business needs and the scope of the business domain. This also involves identifying the business opportunities and specifying the boundaries of the business domain being modelled.

1.1.1 Project title and abbreviation

The title given by the WP.30 to the project is:

TIR Procedure Computerization Project

The abbreviation used for the project is:

eTIR

1.1.2 Objectives

This chapter gives a brief description of the purpose of the project.

The final objectives of the eTIR Project are:

- Integrating the computerized TIR procedure in the overall process of technological development in international transport, trade and Customs procedures:
  - Simple and cost effective data capture and data transmission;
  - Facilitation of global intermodal application of the TIR Procedure;
  - Real time exchange of information among actors.
- Improving the efficiency and quality of the TIR procedure:
  - Reduction of processing times at border crossings and final destination;
  - Increased efficiency of internal administrative and control procedures;
  - Increased accurary and reduction of errors;
  - Reduction of costs;
  - Prograssive replacement of paper TIR Carnet;
  - Full use of international standard codes in order to eliminate language barriers;
  - Availability of advance cargo information.
- Reducing the risk of fraud and improving security:
  - Automatic generation of data for risk assesment;
  - Facility to implement early-warning system;
  - Easy access to information for control and risk management purposes.

1.1.3 Boundary of the eTIR Project

The final objective of the eTIR project encompasses the computerization of the whole TIR Carnet life cycle (from issuance and distribution via the TIR transport to return and repository) and is ultimately aimed at replacing the current paper TIR Carnet. However, the eTIR Project will inevitably have repercussions on other parts of the TIR Procedure. Therefore, it is important to identify the boundaries of the project in order to realize the full impact the project may have and to

ensure that the views of all stakeholders are taken into due account. The boundaries are defined along two axes: stakeholders and information

Stakeholders

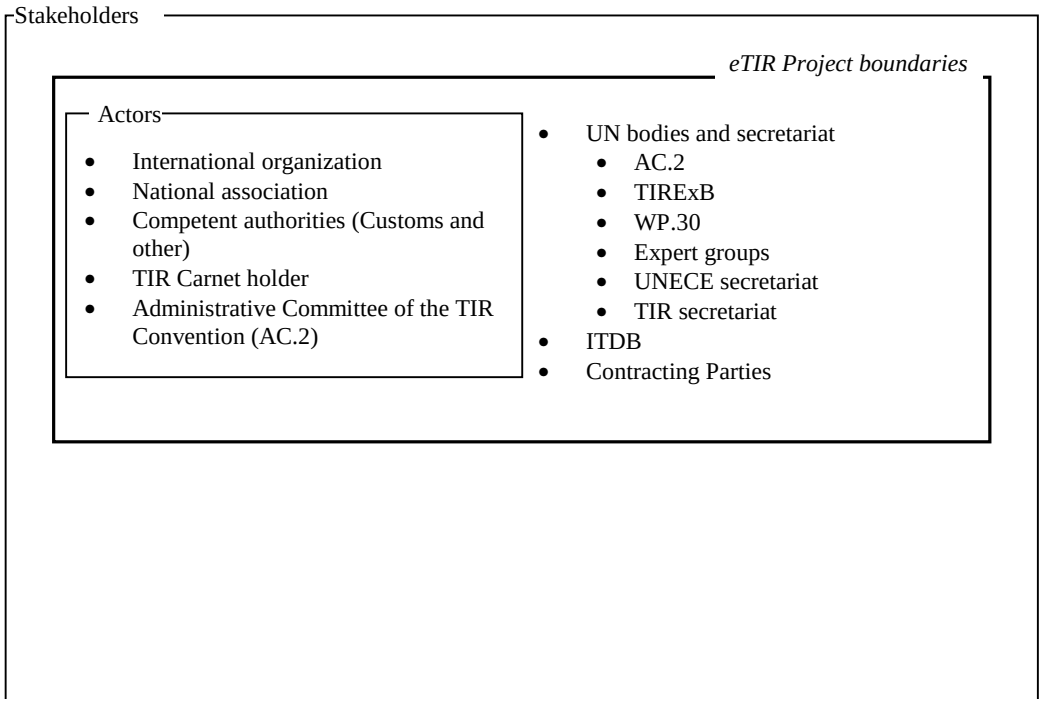
A stakeholder is defined as someone (or something) who is materially affected by the outcome of the system but may or may not be an actor of the system. Actors are stakeholders who are involved in the specific project as users and are thus part of the reference model. Stakeholders inside the boundary of the system are involved in the project as active participants in the work and/or members of decision-making bodies; those outside the boundary may participate in meeting to ensure any future compatibility where necessary.

- International organization
- National association
- Competent authorities (Customs and other)
- TIR Carnet holder
- Administrative Committee of the TIR Convention (AC.2)

- UN bodies and secretariat
  - AC.2
  - TIRExB
  - WP.30
  - Expert groups
  - UNECE secretariat
  - TIR secretariat
- ITDB
- Contracting Parties

- Control system for TIR Carnets
- Guarantee providers
- Printing office
- UNTDED-ISO7372 Maintenance Agency
- NCTS
- ASYCUDA++
- National computer systems
- Other transport industry
- Other control authorities

Figure 1.1 shows the stakeholder inside and outside the boundaries of the project and emphasises those that are also actors.



- Control system for TIR Carnets
- Guarantee providers
- Printing office
- UNTDED-ISO7372 Maintenance Agency
- NCTS
- ASYCUDA++
- National computer systems
- Other transport industry
- Other control authorities

Figure 1.1 Stakeholders and actors

Information

The data elements inside the boundaries have already been identified and are listed in the report of the Second meeting of the Expert Group (ExG/COMP/2002/10, Annex 4). These data elements reflect the information contained in the current, paper-based, TIR carnet and provide the basis for the elaboration of a minimal set of data to be computerized. However, this set may need to be further amended in the course of the project, when the Group addresses other issues, such as, for example, security.

Before being annexed to underlying document, the data elements will be submitted to the Maintenance Agency (MA) of the UN Trade Data Elements Directory (UNTDED) in order to ensure that they meet international standards.

1.1.4 Business Opportunity and Problem Statement

Technological developments in international transport, trade and Customs procedures

The extremely rapid technological developments in Internet applications, world-wide wireless communication systems and smart card technologies have led to simple and cost effective data transmission possibilities on a world-wide level with increasingly secure authentication procedures. These technologies have and increasingly will affect profoundly the way and means how international transport and trade operations as well as Customs procedures are carried out.

EDI technologies are today used by all major freight forwarding companies and by many road transport companies engaged in international transport. Also Customs authorities increasingly use these technologies to enhance efficiency of internal administrative and control mechanisms and to improve service quality at border crossing points.

The reasons for such rapid introduction of EDI technologies – unthinkable only five years ago – are cost benefits and the superior service quality in terms of accuracy, speed, tracing, controlling, billing and other value-added features which are associated with the use of these computer-based technologies. Traditional paper-based documents and procedures no longer fit into such an environment unless they are accompanied or supported by computer readable data files. Any modern international Customs transit system with the objective of facilitating international transport and trade simply cannot ignore these rapid developments.

Efficiency of the TIR Customs transit procedure

Freight forwarding and transport companies as well as Customs authorities constantly have to improve the efficiency of their operations and to increase service quality. This will become increasingly important since international goods transport, particular road transport, is forecast to increase considerably in the coming years, also along the East-West European transport corridors (European Union – Russian Federation, CIS countries and beyond) and on the Southeast-European axis (European Union – Turkey –Iran (Islamic Republic)/Middle East). These trends, together with the tremendous growth of smaller and time-sensitive shipments, will substantially increase the volume of international shipments and thus the workload of Customs authorities. At the same time the resources allocated to Customs services, both in terms of manpower and installations, are decreasing in many countries.

Statistics show that there exist no alternatives to the TIR Customs transit procedure for international road transport. In 2000 more than 500,000 TIR operations were terminated in the Russian Federation. The CIS countries alone accounted for more than half a million of TIR Carnets issued. Bulgaria, Iran (Islamic Republic of), Romania and Turkey also issued more than 900,000 TIR Carnets to their transport operators in 2000. Even with the extension of the Community and Common Transit Systems to the EU accession countries in the coming years, the use of the TIR procedure will probably further increase, particularly once the countries in the Middle East, Northern Africa and Asia apply fully the TIR procedure and China accedes to the TIR Convention.

Thus, the TIR Customs transit regime will remain the backbone for efficient international road transport at the pan-European level and it seems thus indispensable to adapt it to the already existing and emerging needs of the transport industry and the Customs authorities involved.

In the 1970's, when the paper-based TIR Carnet was introduced in its present form, it not only provided proof of the required guarantee coverage, but it also constituted the administrative basis for further trade facilitation as well as effective Customs administration and control of transit operations. Today the TIR Carnet has lost this role to a large extent (apart from the fact that it is no longer in line with the format and layout of modern trade documents as recommended in the UN Layout key). In fact, there are even situations where the use of the TIR Carnet interferes with the concept of effective Customs transit administration and control, as the information contained in the TIR Carnets is often no longer used directly by Customs authorities, but has to be inserted manually into the various national computer systems which are increasingly used by Customs authorities. In some cases the white and green vouchers in the TIR Carnet are no longer used for Customs control, even though they still have to be filled-in by TIR Carnet holders. Apart from the risk of errors during repetitive data entry (ironically this had been one of the major advantages of the TIR Carnet replacing national Customs documents) these manual procedures are time-consuming and require resources which Customs authorities should use more effectively for other purposes.

The TIR Carnet also seems to become a burden for TIR Carnet holders as it is difficult, expensive and time-consuming to be filled-in and requires tailor-made software and hardware solutions, while multiple data entries in the TIR Carnet vouchers are often no longer needed for Customs control purposes (see above). Furthermore, the use of TIR Carnets results in millions of physical handling and shipment operations between a centralized printer and the IRU in Switzerland, between national associations and TIR transport operators in more than 40 countries and vice versa, until their final storage at the IRU premises in Switzerland. All these physical movements are a potential source for errors and fraud. They also are reflected in the costs of TIR Carnets, not to mention those incurred by the international EDI Carnet control system.

In terms of Customs efficiency, the paper-based TIR Carnet therefore has already and will increasingly become the weakest link in the TIR transport chain, unless it is complemented and ultimately replaced by electronic procedures. The introduction of new Customs procedures, such as the New Computerized Transit System (NCTS), client-oriented automated Customs declarations

systems already available or being installed in virtually all major ports and airports or the electronic Customs procedures applicable for land transport in North America support this view.

Experience shows that automated Customs transit systems do not only reduce processing times at border crossing and final destination, but also allow Customs authorities to offer value-added services to transport operators and freight forwarders, such as on-line information on the status of transit operations. There is no reason why only the road transport industry should not be allowed to benefit from the possibilities of modern technologies in dealing with Customs authorities.

The fight against fraudulent activities

The fight against misuse of Customs transit systems is of utmost importance to all parties, as the facilities of these procedures can only be granted if Customs duties and taxes at risk are not jeopardized or can be easily recovered in case of misuse.

In contrast to its modest origins, Customs transit systems involve today thousands of operations every day. In such an environment, individual and manual processing and control of documentation by Customs officers, as in the past, has become ineffective and is no longer possible without causing long delays. The visual checking of paper-based documents, Customs stamps, ID-numbers, etc. must be complemented and/or replaced by automated systems which can verify authenticity of persons and data (documents) and automatically generate data for risk assessment of sensitive cargoes, destinations, etc. Effective risk management systems with the capability to act in anticipation of emerging problems are not only indispensable at the national level (Customs authorities and national associations), but, as a result of the centralized TIR guarantee system and the increase in international organized crime, also at the international level (international insurers, IRU, TIR Executive Board (TIRExB). The revised TIR Convention (Phase I) has provided the legal and administrative means to establish such a coordinated approach and modern EDI technologies allow its efficient functioning.

The IRU, acting in accordance with Article 6 of the TIR Convention, maintains data banks with commercial information of their member associations and on the TIR Carnet users as well as information on stolen, misused or otherwise risk-prone TIR Carnets. By means of the SafeTIR system, the IRU also obtains from Customs authorities on-line information on terminated TIR Carnets covering more than 80 per cent of all TIR transports.

The international insurers certainly also have detailed information available on all Customs claims lodged in the framework of the TIR Convention which should comprise information on the reasons for such claims, countries, operators and types of goods involved as well as the amount of duties and taxes thereon.

The TIRExB, as a governmental organ, also has detailed information on all TIR Carnet holders as well as on the their status (authorized, excluded or withdrawn). It also has detailed information on approved Customs seals and stamps as well as on the numerous legal arrangements made between national associations and Customs authorities in the Contracting Parties to the Convention.

Some of this information is already today available to Customs authorities or to the private sector, but no concerted efforts have yet been made to share or combine this information neither at the national and international levels nor between these levels. With a view to enhancing pro-active risk management capabilities by Customs authorities, private associations and the international guarantee providers of the TIR system, it seems therefore indispensable that Customs enforcement authorities, the TIRExB as well as the international TIR guarantee providers pool their knowledge and data. In line with national data protection laws, such information could, in the future, be made available on-line and on the basis of well-defined criteria. An integrated information system would not only provide for systematic information about trends in criminal activities, but could also allow

automated risk assessment on a case by case basis, thus speeding-up border crossing and termination procedures for the very large majority of transport operators (TRANS/WP.30/2001/5, paras. 15-30).

The Expert Group, when validating the Business Opportunity and Problem Statement at its fourth session on 1-2 March 2004, fully recognized the fact that the statement as reflected in underlying Chapter should be judged and analyzed within the context of its historical setting. In 2001, when identifying the existing problems and formulating the challenges/opportunities ahead in the field of computerization of the TIR Procedure, the Ad Hoc Expert Group on Computerization was not in a position to judge a number of developments which would take place in the course of time, which would put some of the issues raised in a different light. In particular, the Expert Group stressed that major achievements had already been obtained with regard to the implementation of a control system for TIR Carnets, where considerable concerted efforts had been undertaken by Customs authorities and the private sector to exchange and share information.

The Expert Group, when validating the Business Opportunity and Problem Statement at its fourth session on 1-2 March 2004, fully recognized the fact that the statement as reflected in underlying Chapter should be judged and analyzed within the context of its historical setting. In 2001, when identifying the existing problems and formulating the challenges/opportunities ahead in the field of computerization of the TIR Procedure, the Ad Hoc Expert Group on Computerization had not been in a position to judge a number of developments which would take place in the course of time, which would put some of the issues raised in a different light. In particular, the Expert Group stressed that major achievements had already been obtained with regard to the implementation of a control system for TIR Carnets, where considerable concerted efforts had been undertaken by Customs authorities and the private sector to exchange and share information (See ExG/COMP/2004/10).

1.1.5 References

This item contains the references to documents that relate directly to the scope of the Business Domain, that is the computerization of the TIR procedure. Other references are contained in Annex 7 of the Reference Model:

- Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention, 1975);
- TIR Handbook (ECE/TRANS/TIR/6);
- Reports of the Working Party on Customs Questions affecting Transport (WP.30) (TRANS/WP.30/190; TRANS/WP.30/192; TRANS/WP.30/194; TRANS/WP.30/198; TRANS/WP.30/200; TRANS/WP.30/206; TRANS/WP.30/210; TRANS/WP.30/212;
- Reports of the Ad hoc Expert Group on Computerization: TRANS/WP.30/2001/5; TRANS/WP.30/2001/13;
- Terms of Reference of the Informal Ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure and of the Informal Ad hoc Expert Group on the Legal Aspect of Computerization of the TIR Procedure: TRANS/WP.30/2002/7;
- Project Overview of the Informal Ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure: ExG/cOMP/2002/5;
- Reports of the Informal Ad hoc Expert Group on Conceptual and Technical Aspects of Computerization of the TIR Procedure: ExG/COMP/2002/3; ExG/COMP/2002/10; ExG/COMP/2003/5; ExG/COMP/2004/10.

1.1.6 Scope of the project

The scope of the project is to allow for the use of electronic data interchange in the so-called "TIR Carnet life cycle" without changing its basic philosophy.

The following elements of the TIR procedure are inside the scope of the project:

- TIR Carnet life cycle:
  - Issuance and distribution of TIR Carnets;
  - TIR Transport;
  - Return and repository of the TIR Carnets;

The following elements of the TIR procedure are outside the scope of the project:

- Approval of the guarantee chain;
- Approval of the association;
- Approval of transport operators;
- Approval of vehicles;
- Management of a control system for TIR Carnets (Recommendation of 20 October 1995);
- Administration of the TIR Convention;
- Organization and functioning of the guarantee system.

When outlining the contents of the eTIR Project, the WP30 and the Expert Group have already identified a number of tasks which shall be included. The key statements are reproduced here after:

- Analysis of the actual and future functioning of the TIR procedure (TRANS/WP.30/2002/5; ExG/COMP/2002/7);
- Development of a standard set of messages allowing for an effective communication between parties involved (ExG/COMP/2002/5);
- Preparation of the required amendments to the TIR Convention (TRANS/WP.30/2002/5; ExG/COMP/2002/7);
- Description of roles and responsibilities of all actors involved in an electronic environment (TRANS/WP.30/2002/7);
- Estimation of the costs generated by a computerized environment (cost/benefit analysis) (TRANS/WP.30/2002/5; ExG/COMP/2002/7);
- Inventory of impact on national administrative procedures and national infrastructure (TRANS/WP.30/2002/7).

1.1.7 Constraints

This Chapter describes which issues of a technical, political, economical or other nature have to be taken into account when designing and describing the eTIR Project. Some such issues may limit the possibilities for the project, whereas others may represent dependencies or even create opportunities.

The Requirement List of Annex I specifies how each of these constraints has to be addressed.

Technical constraints

- Data protection
- Security
- Compatibility or interfacing with the following projects
  - ITDB
  - SafeTIR
  - NCTS
  - ASYCUDA^{++}
  - UNTDED
  - National Customs systems
  - UNeDOCS
- A complete migration overnight towards a computerized environment is not realistic.

Political constraints

- The TIR Convention should be changed as little as possible;
- Certain Contracting Parties may not want to directly exchange information with other Contracting Parties.

Economic constraints

- Limited resources available at the national and international level

Other constraints

- ...

1.1.8 Stakeholders' needs

Stakeholders' needs will be recorded in the requirements list (see Annex 1).

1.2 TIR procedure domain

The TIR procedure is a very wide domain, composed of numerous interconnected systems. As seen under 1.1.5, the current project is limited in its scope to a part of the overall TIR procedure: the TIR Carnet.

1.2.1 TIR Procedure package diagram

The following package diagram is intended to show the division of the domain into systems and the dependencies among those systems. It also visualizes the fact that the scope of the current project is limited to the "TIR Carnet life cycle".

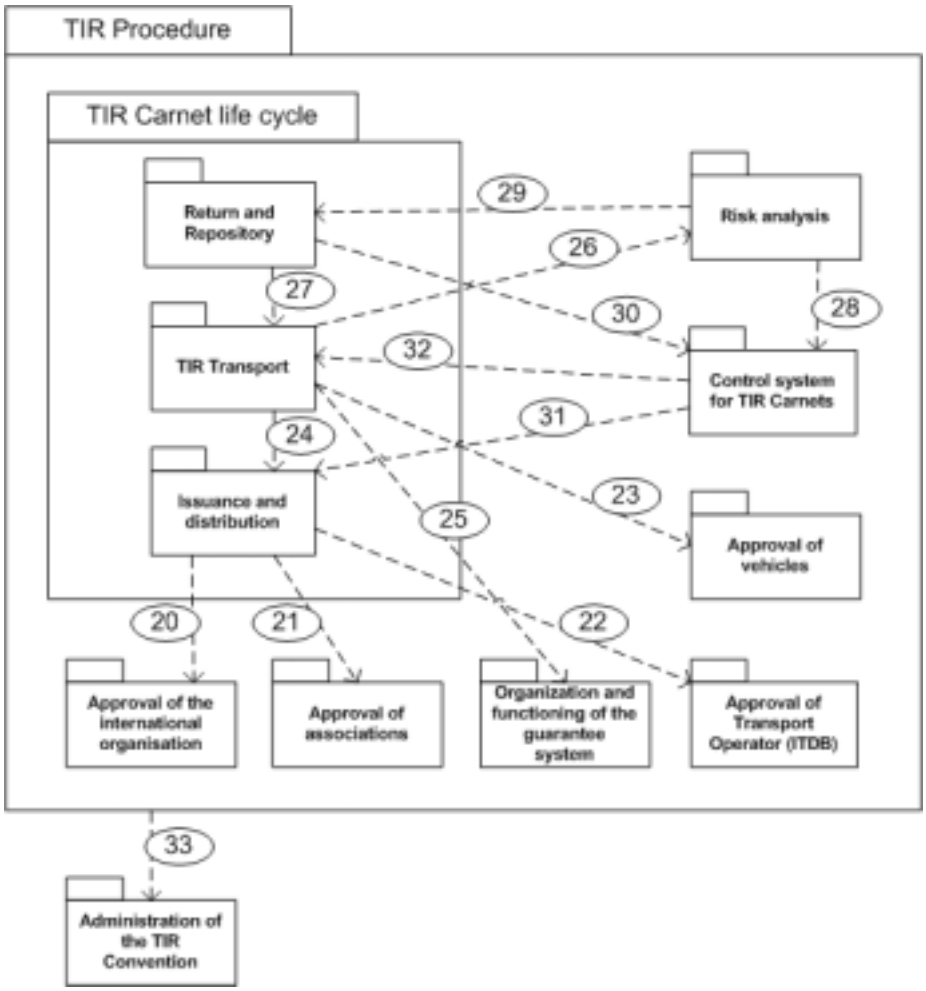


Figure 1.2 TIR procedure package diagram

1.2.2 TIR Procedure package diagram description

Name	**TIR procedure package diagram**
Description	The TIR procedure is an International Customs Procedure governed by the TIR Convention, 1975. A detailed description of the procedure can be found in the introduction of the TIR Handbook distributed by the TIR Secretariat. The TIR procedure is composed of numerous interconnecting systems to allow for the functioning of the procedure. The system we are most interested in for the current project is the TIR Carnet system. It can be defined by listing all functions and uses of the TIR Carnet. It is composed of sub-systems, namely: the issuance and distribution system, the TIR transport system and the return and repository. • The function of the issuance and distribution sub-system by the international organization and the national associations is to provide transport operators with TIR Carnets in order to allow them to perform TIR transports; • The TIR transport sub-system is the central system of the TIR procedure. It links the transport industry to the customs offices involved in a TIR transport and allows them to exchange the necessary information; • The transport operators, the associations and the international organization manage the return and repository sub-system. Its function is to centralize the storage of the used TIR Carnet and to check that no problems have occurred during the TIR transport; Other systems outside the scope of the current project but of importance for the well functioning of the TIR procedure are: • Approval of the guarantee chain; • Approval of the association; • Approval of transport operators; • Approval of vehicles; • Control system for TIR Carnets; • Organization and functioning of the guarantee system; • Risk analysis system. • Administration of the TIR Convention. In the package diagram, the dependencies between all systems are indicated with dashed arrows. The dependencies are numbered according to the Requirements 20 to 33 of which they are the consequences.
Actors	Transport industry, Customs, Guarantee chain.
Performance Goals	Facilitate border crossing in international transport of goods.
Preconditions	Ratification of the TIR Convention by Contracting Parties and implementation of the TIR system.

Requirements Covered	20-33

Table 1.1 TIR procedure package diagram description

1.3 TIR Carnet life cycle use cases

Now that we have described the domain, we can concentrate on the scope of the eTIR Project, the TIR Carnet system.

1.3.1 Actors of the TIR Carnet life cycle

Before describing the use cases of the TIR Carnet life cycle, we will identify all the actors who play a role in the course of the TIR Carnet life cycle. By definition any person, entity or system playing a role in the TIR Carnet life cycle is an actor. The actors have already been identified when setting the boundaries of the project and they are:

- International organization,
- National association,
- Competent authorities (Customs and other),
- TIR Carnet holder,
- Administrative Committee of the TIR Convention (AC.2).

Each actor plays one or more roles in the course of the TIR Carnet life cycle. Therefore, the actors are often considered and defined according to one of the roles they play. For example, the actor “Customs authority” can play the role of Customs office of entry (en route) for incoming TIR transports but also play the role of Customs office of exit (en route) for outgoing TIR Transports.

As a consequence, we will identify all aspects of each actor through the roles he performs within the context of the TIR Convention. The following description of the actors by means of the role they play is essential for understanding the rest of the chapter.

International organizations and national associations

International organizations and national associations can be described according to their two main roles in the TIR carnet life cycle: the guaranteeing role and the issuing role. Figure 1.5 shows the relation between the international organizations and national associations, taking account of these roles.

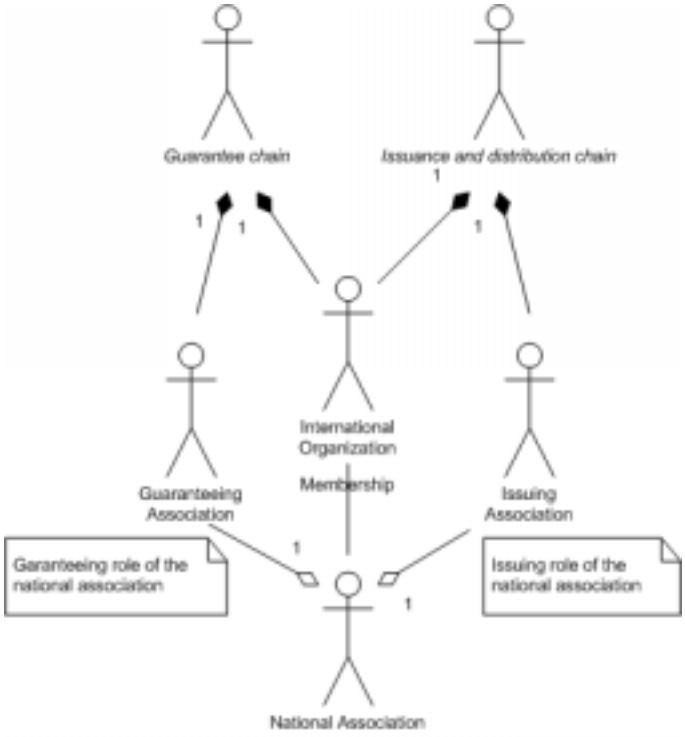


Figure 1.5 International organizations and national associations

Competent authorities

The various competent authorities (Customs and other) can be structured in such a way that they reflect the generalization of the roles they have in common. Figure 1.4 reflects the various aspects of the competent authorities (mainly Customs authorities) in the course of the TIR Carnet life cycle.

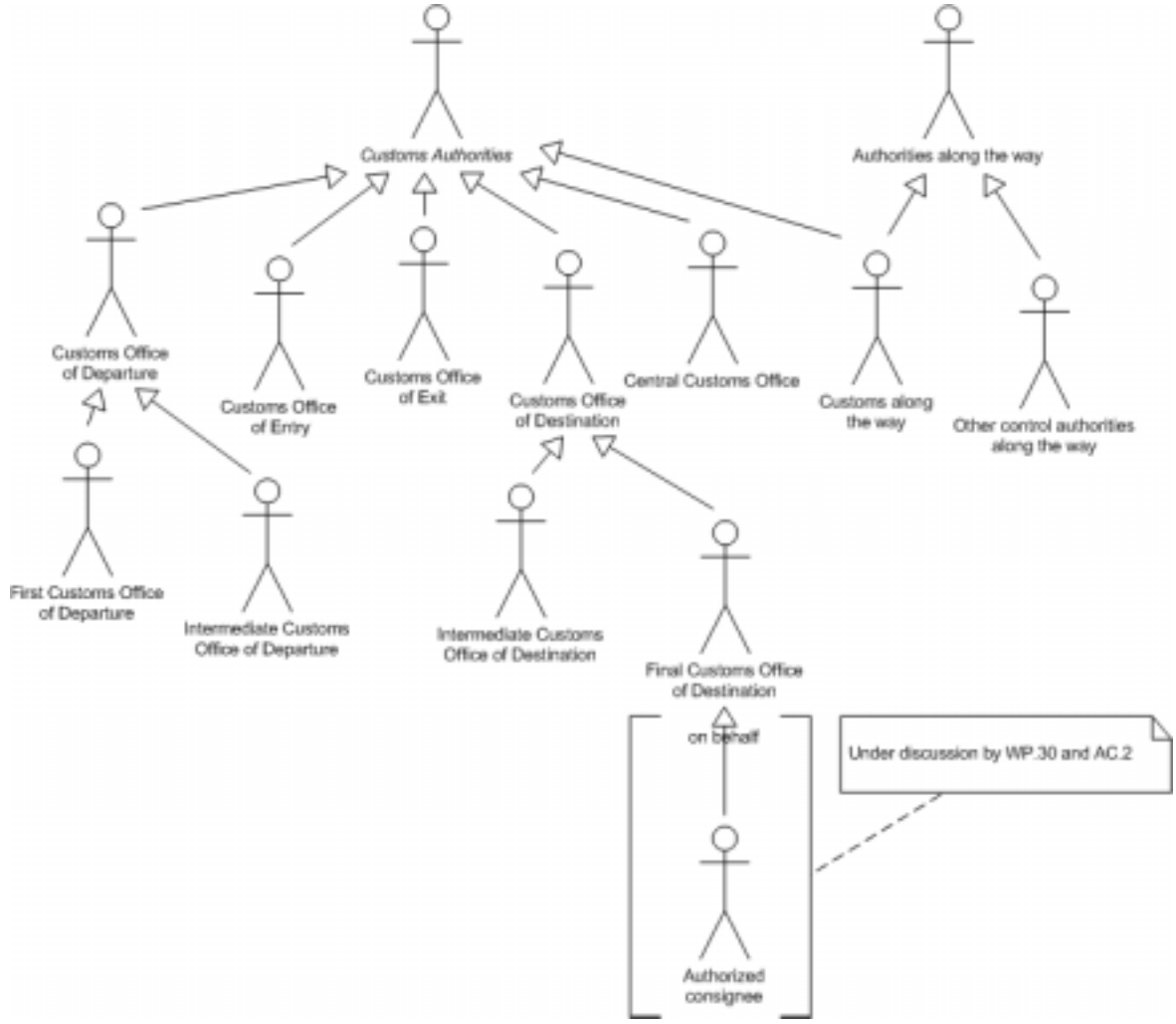


Figure 1.4 Customs authorities and other authorities

TIR Carnet holder

The TIR Carnet holder fulfils a central role in the TIR Carnet life cycle. This role is reflected in various use cases. Among these, the use case in which he provides data on the TIR transport and certifies them is certainly a crucial one. It can also happens that other persons, on his behalf, fill-in and certify the information that he must provide. Figure 1.6 shows the TIR Carnet holder and the agents who may provide data on his behalf.

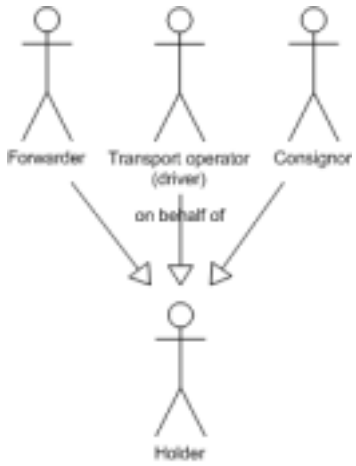


Figure 1.6 TIR Carnet holder and agents

Administrative Committee of the TIR Convention (AC.2)

The AC.2 has a supervisory role with regard to the TIR Carnet life cycle. We will see in the detailed analysis of the use cases that some use cases in connection with that role are performed by the TIRExB.

1.3.2 TIR Carnet life cycle use case diagram

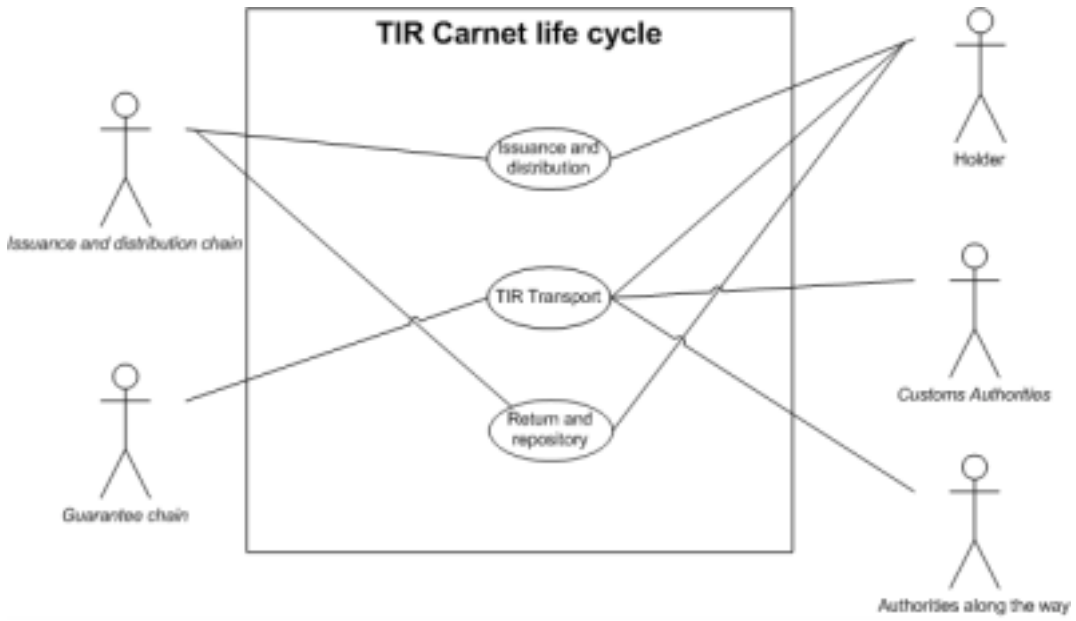


Figure 1.3 TIR Carnet life cycle use case diagram

1.3.3 TIR Carnet life cycle use case description

Name	**TIR Carnet life cycle use case**
Description	High level view of all activities related to the paper TIR Carnet and the actors involved.
Actors	Guarantee chain, Customs authorities, Holder, Authorities along the way
Performance Goals	Allows the exchange of information between parties involved.
Preconditions	• Approval of the guarantee chain; • Approval of the association; • Approval of transport operators; • Approval of vehicles; • Management of the guarantee chain; • Administration of the TIR Convention.
Postconditions	-
Scenario	An international organization prints (organises the printing) of the TIR Carnets and distributes them to the authorised national associations. An authorised transport operator (TIR Carnet Holder) can then request from its national association a TIR Carnet. The National association issues the carnet to the TIR Carnet Holder. The TIR Carnet is then used by the Holder to perform a TIR Transport. The TIR Carnet represents, not only the international customs document, but also the guarantee. Once the TIR Transport has been ended, the TIR Carnet is returned to the

	Holder, then to the association and finally to the International organisation.
Alternative Scenario	In case of fraud, Customs authorities may keep the Carnet until the case is solved.
Special requirements	-
Extension Points	-
Requirements Covered	-

Table 1.2 TIR Carnet life cycle use case description

1.3.4 High level activity diagram of the TIR Carnet life cycle

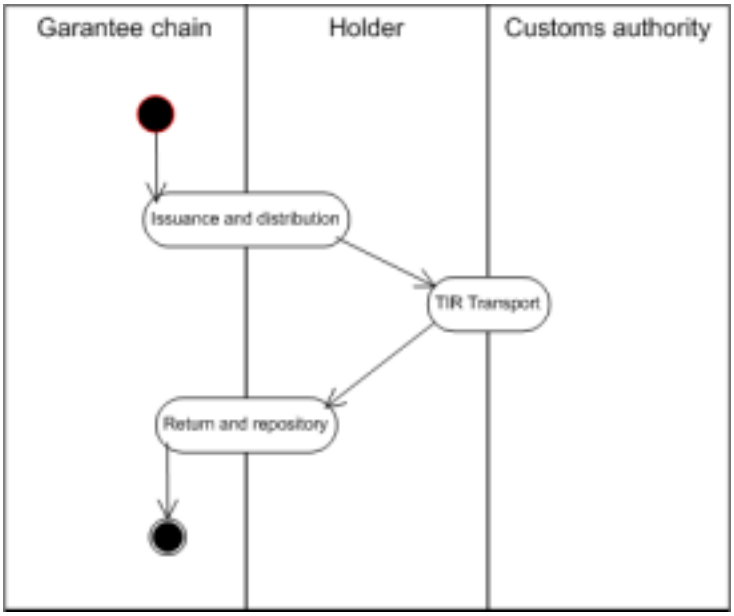


Figure 1.4 TIR Carnet life cycle activity diagram

1.4 Elaboration of use cases

1.4.1 Issuance and distribution use case

Issuance and distribution use case diagram

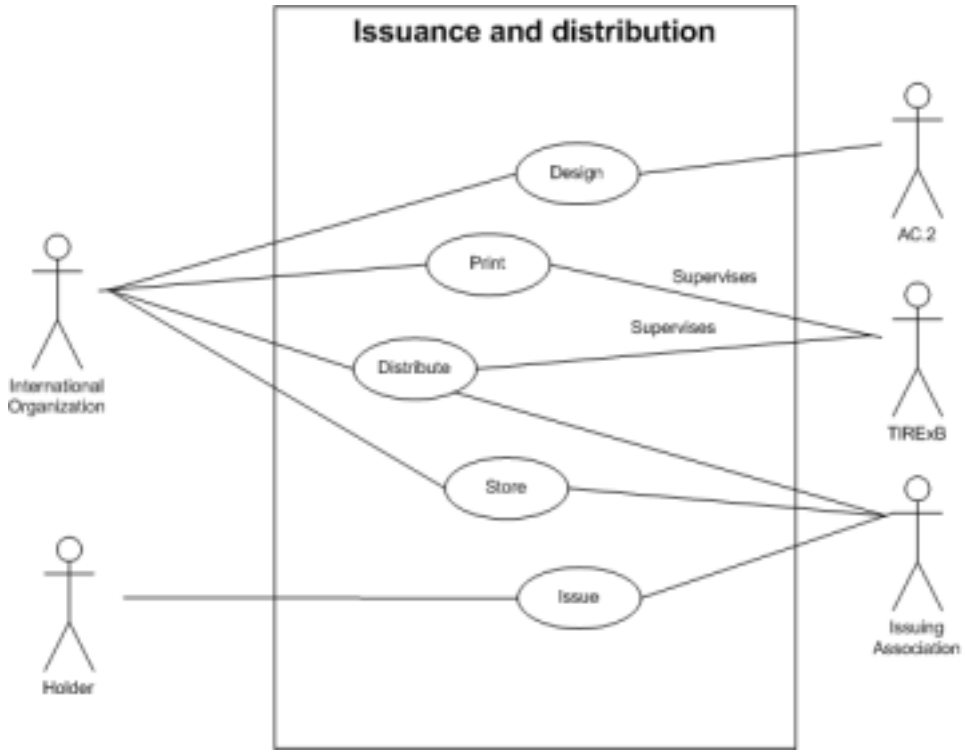


Figure 1.5 Issuance and distribution use case diagram

Issuance and distribution use case description

Activity diagram of the issuance and distribution use case

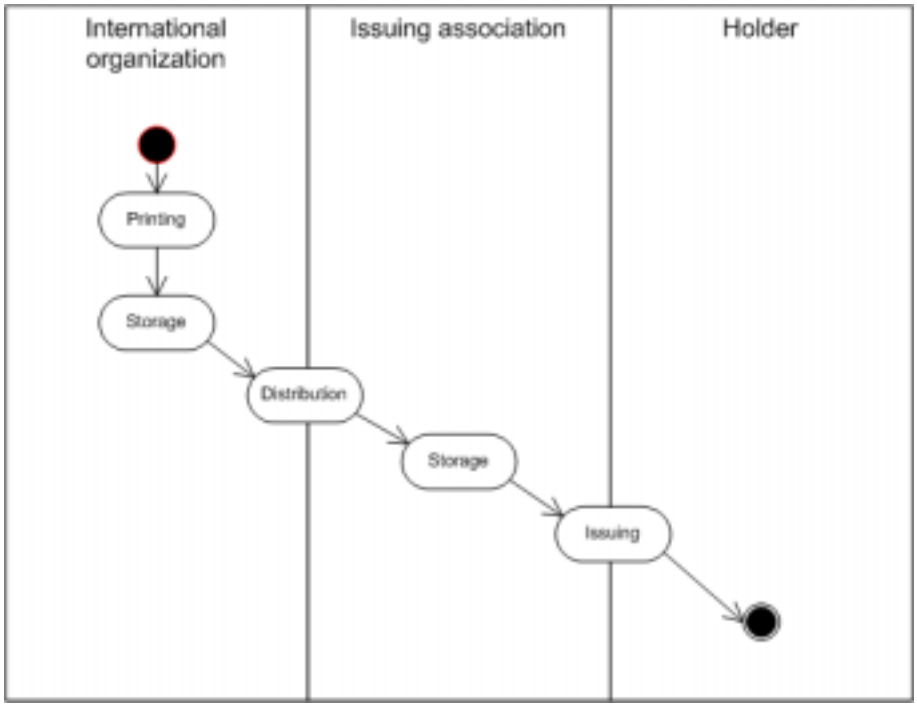


Figure 1.6 Issuance and distribution activity diagram

1.4.2 TIR transport use case

TIR transport use case diagram

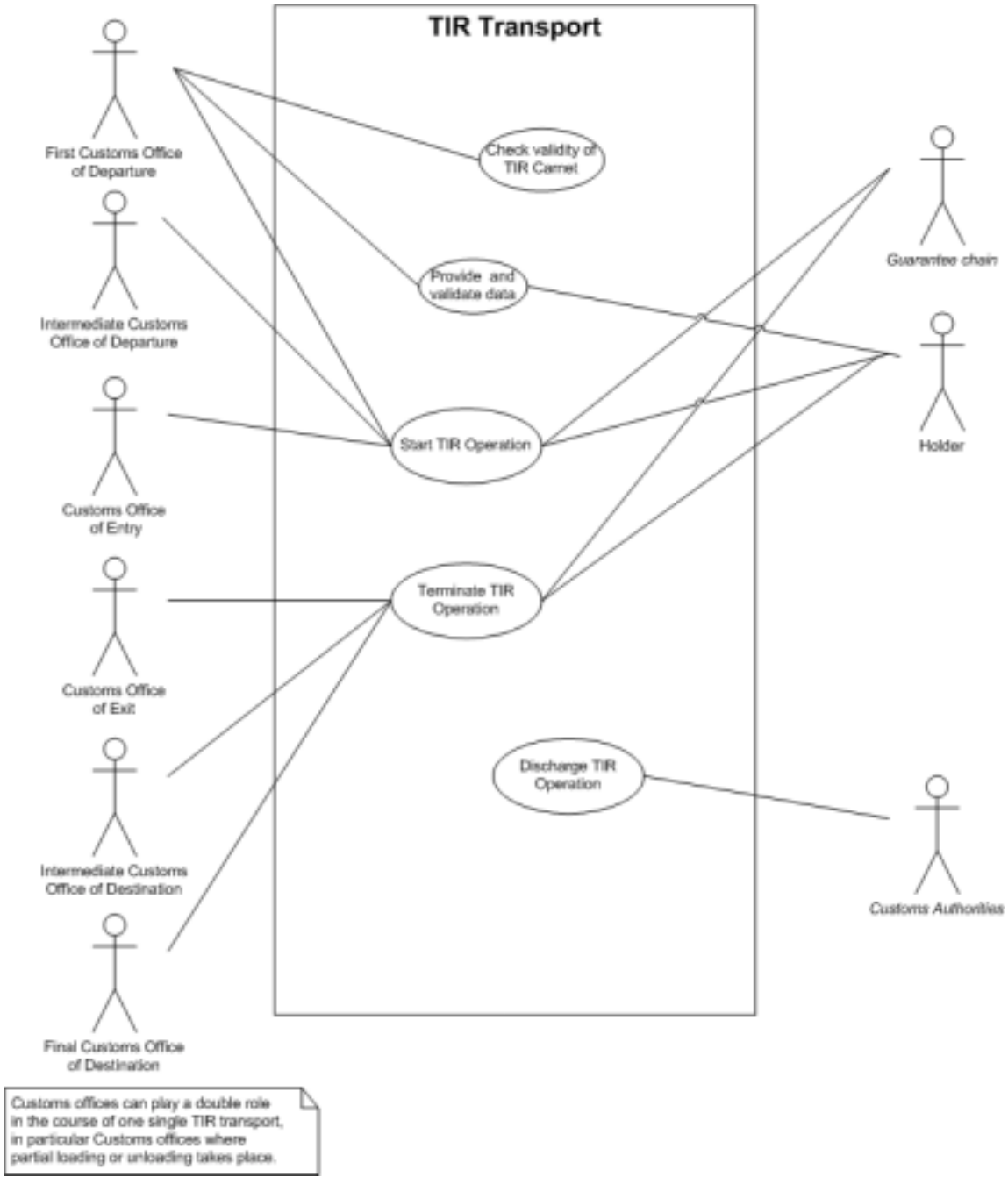


Figure 1.7 TIR transport use case diagram

TIR transport use case description

Activity diagrams of the TIR transport use case

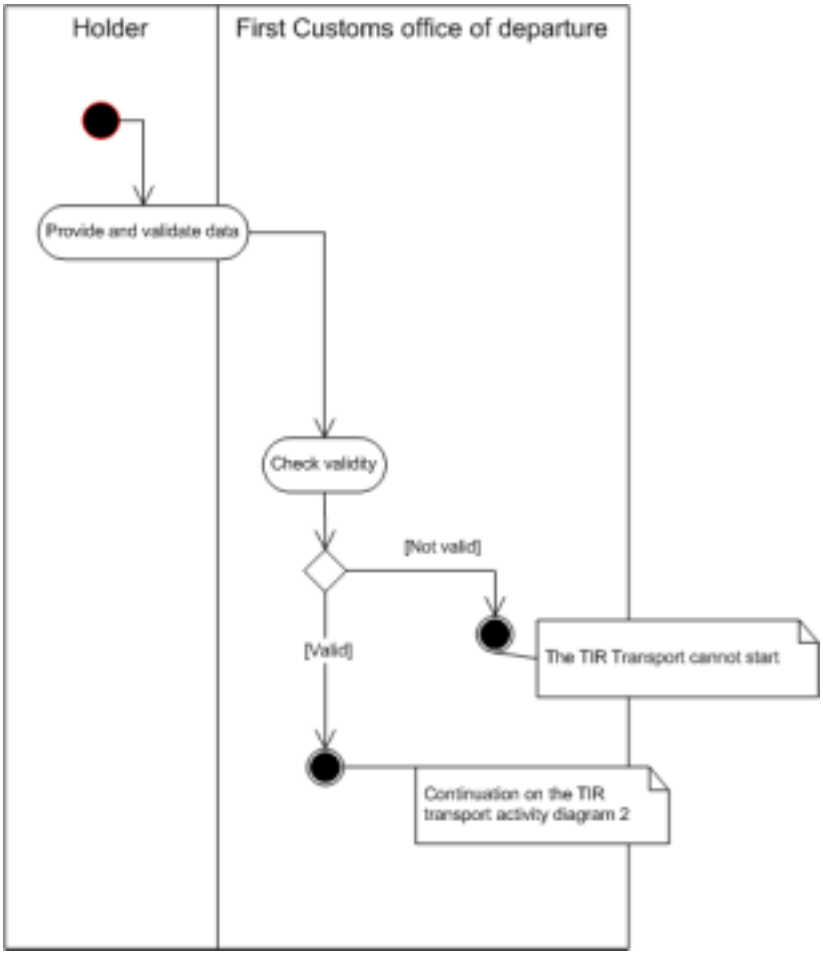


Figure 1.8 TIR transport activity diagram 1

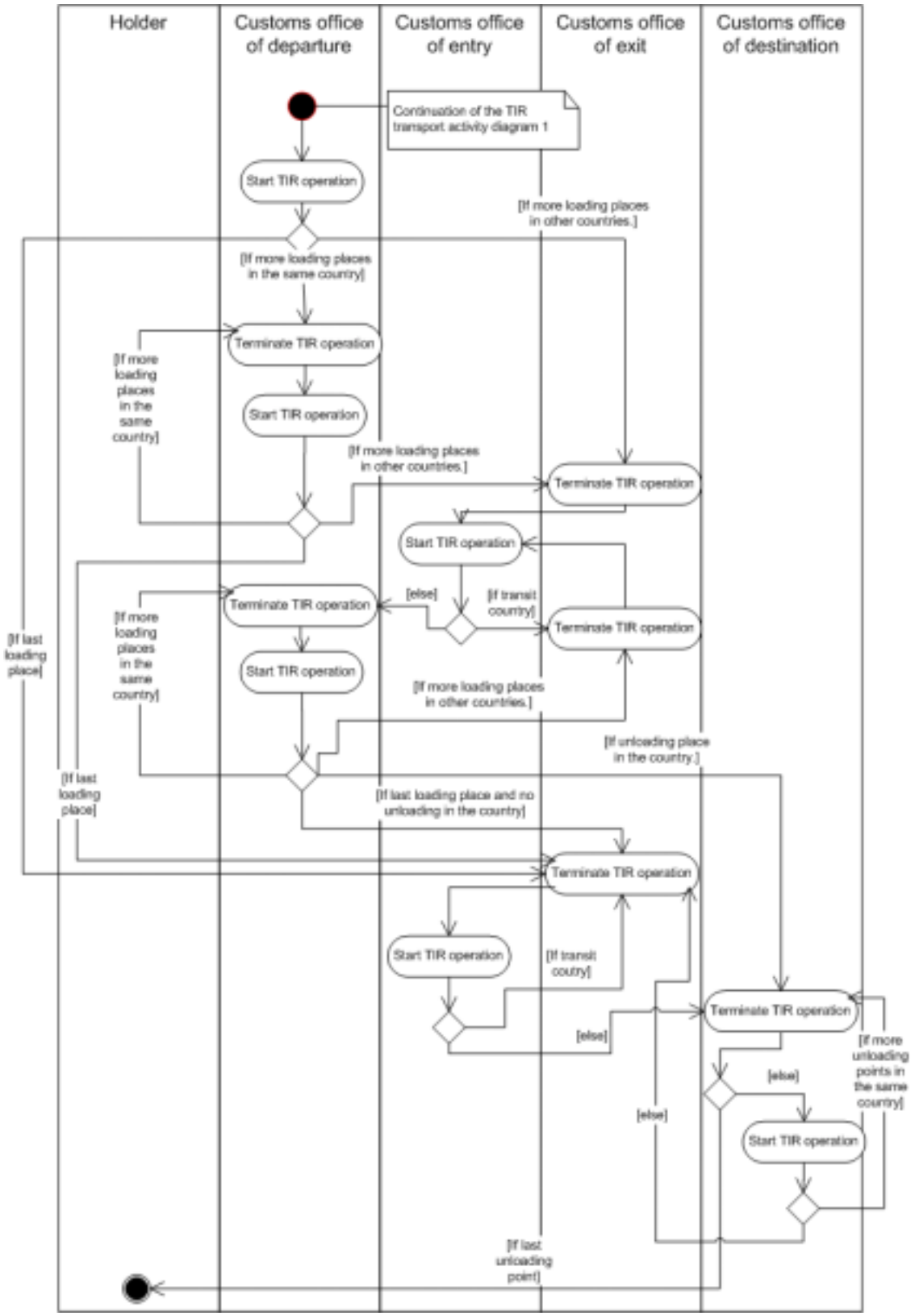


Figure 1.9 TIR transport activity diagram 2

1.4.3 Return and repository use case

Return and repository use case diagram

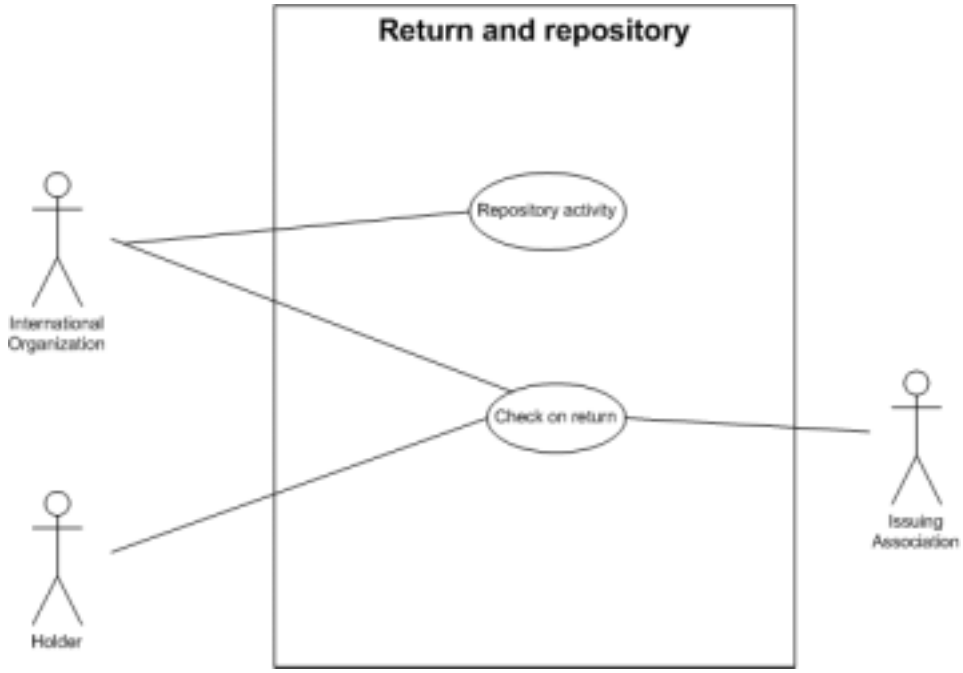


Figure 1.10 Return and repository use case diagram

Return and repository use case description

Activity diagram of the return and repository use case

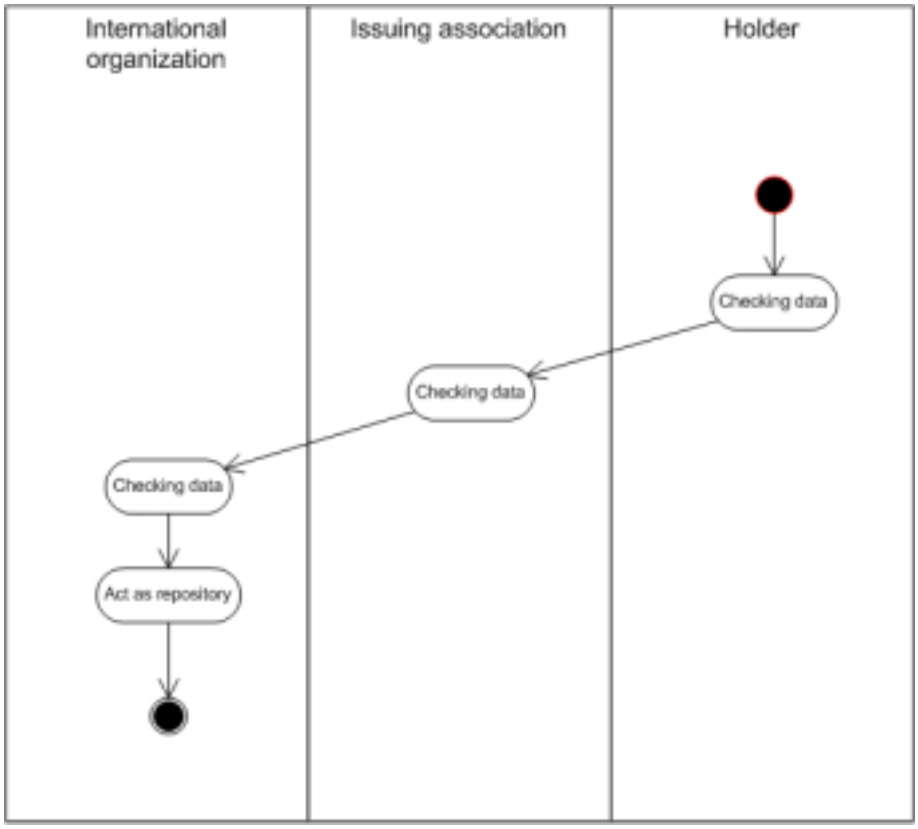


Figure 1.11 Return and repository activity diagram

1.4.4 Discharge use case

Discharge use case diagram

Discharge use case description

Activity diagram of the discharge use case

1.4.5 Start TIR operation use case

Start TIR operation use case diagram

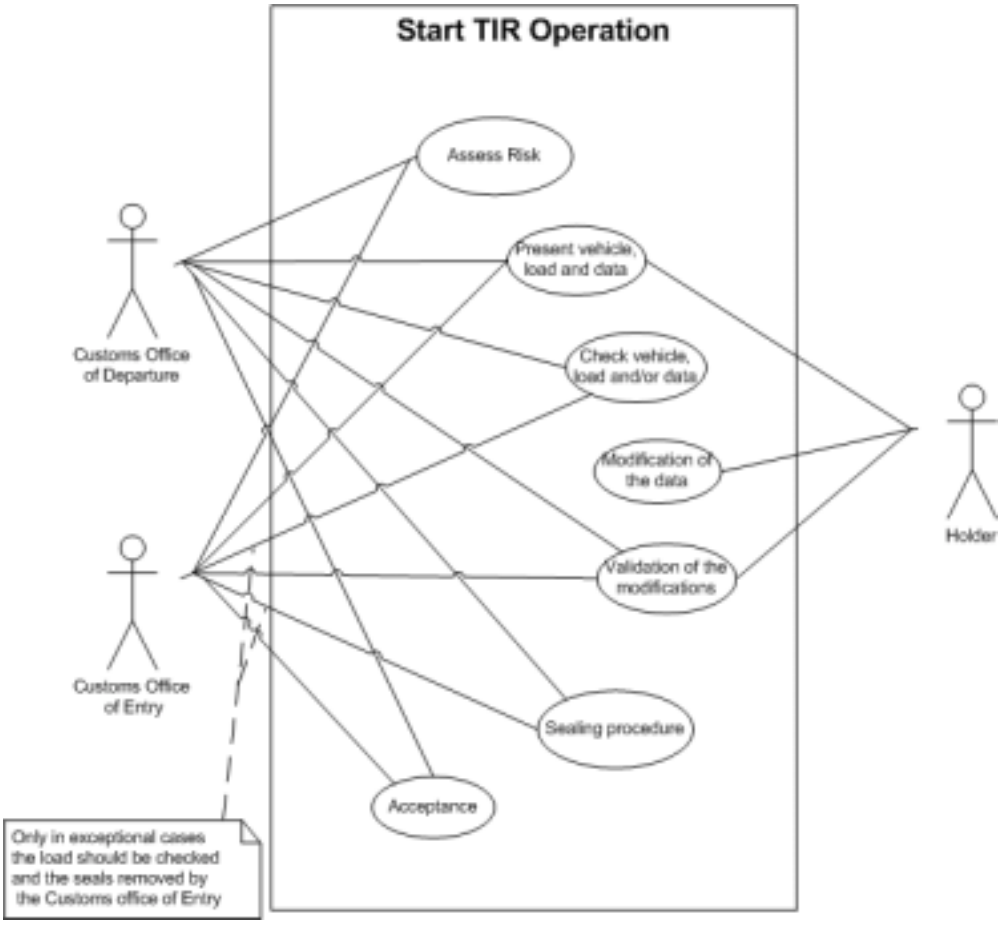


Figure 1.12 Start TIR operation use case diagram

Start TIR operation use case description

Activity diagram of the start TIR operation use case

1.4.6 Terminate TIR operation use case

Terminate TIR operation use case diagram

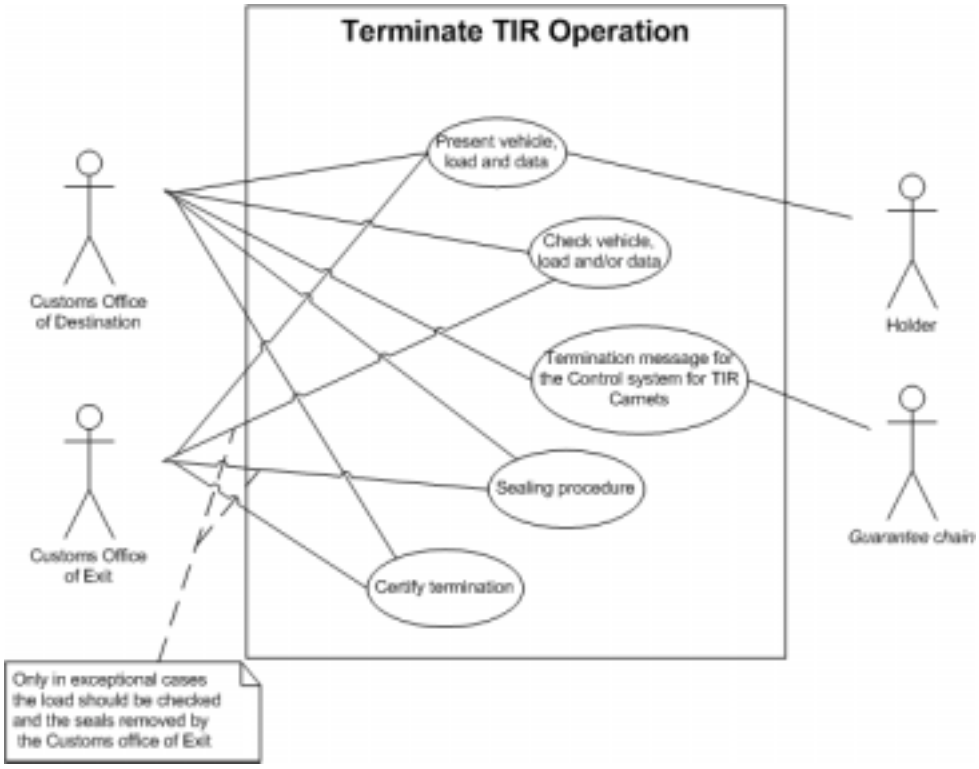


Figure 1.13 Terminate TIR operation use case diagram

Terminate TIR operation use case description

Activity diagram of the terminate TIR operation use case

1.5 Entity classes

Entity classes describe “things” representing characteristics within the TIR procedure, which can take on a certain value or responsibility. Examples of entity classes are persons, places, concepts or situations.

In the TIR procedure, the following classes have been identified:

- International Organization
- Association
  - Issuing Association
  - Guaranteeing Association
- Road Vehicle
- Sealed loading unit
  - Load compartment
  - Container
- TIR transport
- TIR operation
- TIR consignment
- TIR consignment element
- Good
- Customs office
- Country
- TIR Carnet Holder

1.6 High level class diagram

1.6.1 High level class diagram

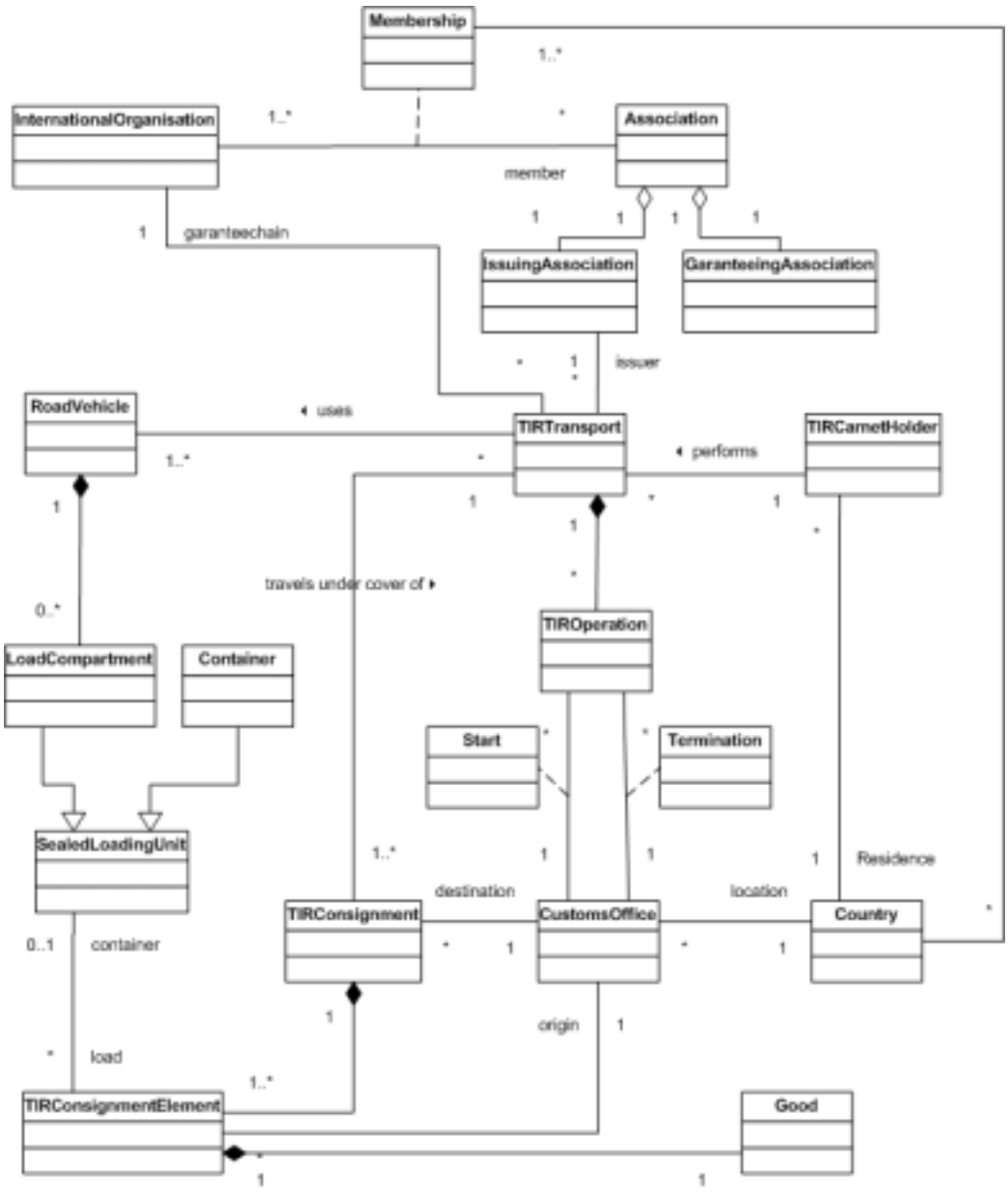


Figure 1.14 High level class diagram

1.6.2 High level class diagram description

The following diagrams are sub parts of the high level class diagram. This subdivision aims at simplifying the explanation by focusing on a specific class at the time, describing its particularities and analyzing its relations with other classes.

In order to fully understand its complexity, the following diagrams reflect the various parts of the high level class diagram of Figure 1.14, as seen from the perspective of its main classes.

International organization

Figure 1.15 International organization class and its relationships

Name	**International organization sub class diagram**
Description	Sub part of the high-level class diagram presenting the international organization class and all relations with other classes.
Central Class	International organization
Example instance of the central class	o IRU o …
Associated Classes	TIR transport, association
Associations and constraints	The international organization represents the *guarantee chain* for a TIR transport. A TIR transport can be associated to one and only one international organization. The International organization can represent the guarantee chain for an unlimited number of transports. (Req. 1) The international organization has *member* associations. The membership is associated to countries. An association has to be member of at least one international organization. An international organization can have any number of member associations. A membership can be associated to various countries (e.g. FEBETRA –IRU is a membership covering Belgium and Luxembourg) but one country is required for the existence of a membership. A country can be covered by various memberships. (Req. 2)
Requirements Covered	1 and 2

Table 1.3 International organization sub class diagram description

Association

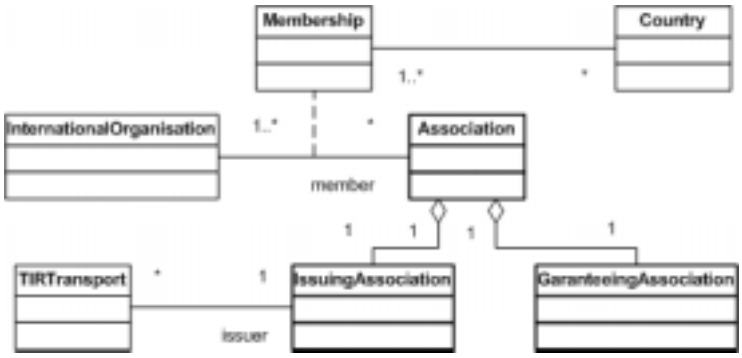


Figure 1.16 Association class and its relationships

Name	**Association sub class diagram**
Description	Sub part of the high-level class diagram presenting the association class and all relations with other classes.
Central Class	Association
Example instance of the central class	o FEBETRA o BGL o …
Associated Classes	TIR transport, international organization
Associations and constraints	An association has two roles represented by the subdivision of the association into the Issuing association, responsible of the issuance of the TIR Carnet to the transport operators, and the Guaranteeing association, responsible of the guarantee chain on its national territory. (Req. 3) The international organization has *member* associations. The membership is associated to countries. An association has to be member of at least one international organization. An international organization can have any number of member associations. A membership can be associated to various countries (e.g. FEBETRA –IRU is a membership covering Belgium and Luxembourg) but one country is required for the existence of a membership. A country can be covered by various memberships. (Req. 2) The issuing association *issues* TIR Carnets for the TIR transports. One and only one Issuing association is issuing the TIR Carnet for a TIR transport. The Issuing association can issues TIR Carnet for numerous TIR transports. (Req. 4)
Requirements Covered	2, 3 and 4

Table 1.4 Association sub class diagram description

Road vehicle

Figure 1.17 Road vehicle class and its relationships

Name	**Road vehicle sub class diagram**
Description	Sub part of the high-level road vehicle class diagram presenting the class and all relations with other classes.
Central Class	Road vehicle
Example instance of the central class	o Road tractor (Brand W, Model X, Chassis ref. Number Y, Plates ZZZZ) o Semi-Trailer (Brand M, Model N, Chassis ref. Number O, Plates PPPP) o …
Associated Classes	Load compartment, TIR transport
Associations and constraints	A road vehicle can serve in numerous TIR transports. A TIR transport is performed by the means of one or many road vehicles. (Req. 6) A road vehicle is composed of zero or many load compartments. A load compartment is part of a single road vehicle. (Req. 7)
Requirements Covered	5,6 and 7

Table 1.5 Road vehicle sub class diagram description

Sealed loading unit

Figure 1.18 Sealed loading unit class and its relationships

Name	**Sealed loading unit sub class diagram**
Description	Sub part of the high-level class diagram presenting the sealed loading unit class and all relations with other classes.
Central Class	Sealed loading unit
Example instance of the central class	o Container n° xxxxxxxxx o Load compartment of road vehicle of brand W, model X, chassis ref. Number Y and Plates ZZZZ approved for transports under customs seals. o …
Associated Classes	TIR consignment element
Associations and constraints	A sealed loading unit is a generalisation of a container and a load compartment on a truck. (Req. 8) A sealed loading unit can have numerous loads, called TIR consignments elements. A TIR consignment element is contained in one and only one sealed loading unit. In case of heavy and bulky goods (HBG), the TIR consignment element might not be contained in a sealed loading unit. (Req. 9)
Requirements Covered	8 and 9

Table 1.6 Sealed loading unit sub class diagram description

TIR transport

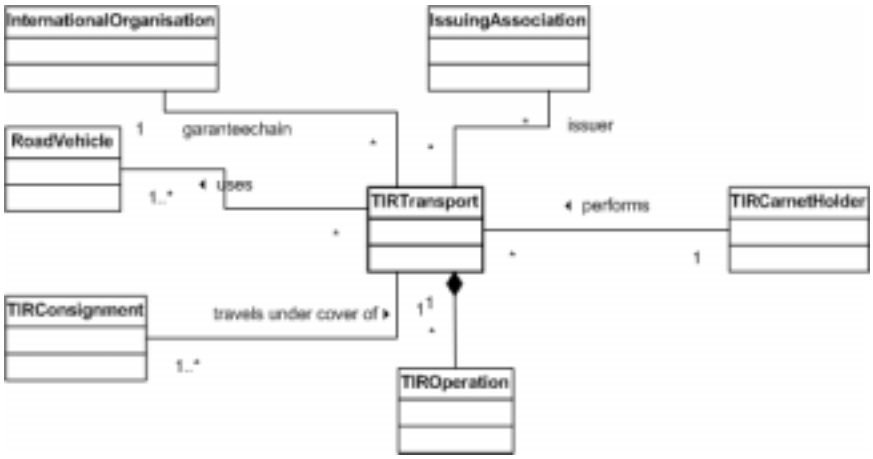


Figure 1.19 TIR transport class and its relationships

Name	**TIR transport sub class diagram**
Description	Sub part of the high-level class diagram presenting the TIR transport class and all relations with other classes.
Central Class	TIR transport
Example instance of the central class	o Transport of 2000kg of chocolate from Geneva to Moscow under cover of the TIR Carnet No. XC38000000. o Transport of 100 computers from Ankara to Madrid under cover of the TIR Carnet No. XC38999999. o …
Associated Classes	International organization, issuing association, road vehicle, TIR operation, TIR consignments, TIR Carnet Holder.

Associations and constraints	The international organization represents the *guarantee chain* for a TIR transport. A TIR transport can be associated to one and only one international organization. The international organization can represent the guarantee chain for an unlimited number of transports. (Req. 1) The issuing association *issues* TIR Carnets for the TIR transports. One and only one issuing association is issuing the TIR Carnet for a TIR transport. The issuing association can issue TIR Carnets for numerous TIR transports. (Req. 4) A road vehicle can serve in numerous TIR transports. A TIR transport is performed by means of one or many road vehicles. (Req. 6) A TIR transport is composed of TIR operations. The number of TIR operations within a TIR transport is at the moment limited to 10 with the current paper system and has a minimum of 2 (these limitations should be extensible; therefore a zero to many is more advisable). A TIR operation is part of one and only one TIR transport. (Req.10) A TIR consignment is associated to one and only one TIR transport. A TIR transport can carry from one to many TIR consignments. (Req.11) A TIR transport is performed by one and only one TIR Carnet holder. A TIR Carnet holder can perform any number of TIR transports. (Req. 12)
Requirements Covered	1,4,6,10,11 and 12

Table 1.7 TIR transport sub class diagram description

TIR operation

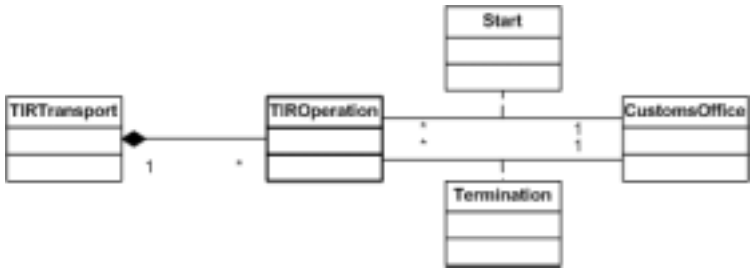


Figure 1.20 TIR operation class and its relationships

Name	**TIR operation sub class diagram**
Description	Sub part of the high-level class diagram presenting the TIR operation class and all relations with other classes.
Central Class	TIR operation
Example instance of the central class	o A transit operation trough Switzerland under cover of TIR Carnet N° XC380000XX starting in Geneva and terminated in Basel. o The first operation of a TIR transport under cover of TIR Carnet N° XC380000YY, starting in Moscow and terminated at the border point with Finland in Vyborg. o …
Associated Classes	TIR transport, Customs office
Associations and constraints	A TIR transport is composed of TIR operations. The number of TIR operations within a TIR transport is at the moment limited to 10 with the current paper system and has a minimum of 2 (these limitations should be extensible; therefore a zero to many is more advisable). A TIR operation is part of one and only one TIR transport. (Req.10) The TIR operation is started at one and only one Customs office and terminated at one and only one Customs office. A Customs office can start and terminate any number of TIR operations. (Req. 13)
Requirements Covered	10, 13

Table 1.8 TIR operation sub class diagram description

TIR consignment

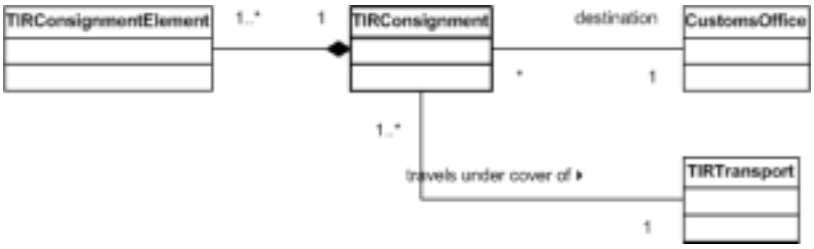


Figure 1.21 TIR consignment class and its relationships

Name	**TIR consignment sub class diagram**
Description	Sub part of the high-level class diagram presenting the TIR consignment class and all relations with other classes.
Central Class	TIR consignment
Example instance of the central class	o 200 kg of chocolate loaded in Geneva and 300 kg of almonds loaded in Bern transported under cover of TIR Carnet N° XC380000ZZ with destination Budapest. o 10 cars loaded in Turin transported under cover of TIR Carnet N° XC380000WW with destination Bratislava. o …
Associated Classes	TIR transport, TIR consignment element, Customs office.
Associations and constraints	A TIR consignment is associated to one and only one TIR transport. A TIR transport can carry from one to many TIR consignments. (Req.11) A TIR consignment is composed of one to many TIR consignment elements. A TIR consignment element is part of one and only one TIR consignment. (Req. 14) A TIR consignment a one and only one destination Customs office. A Customs office can be the destination of numerous TIR consignments. (Req. 15)
Requirements Covered	11,14 and 15

Table 1.9 TIR consignment sub class diagram description

TIR consignment element

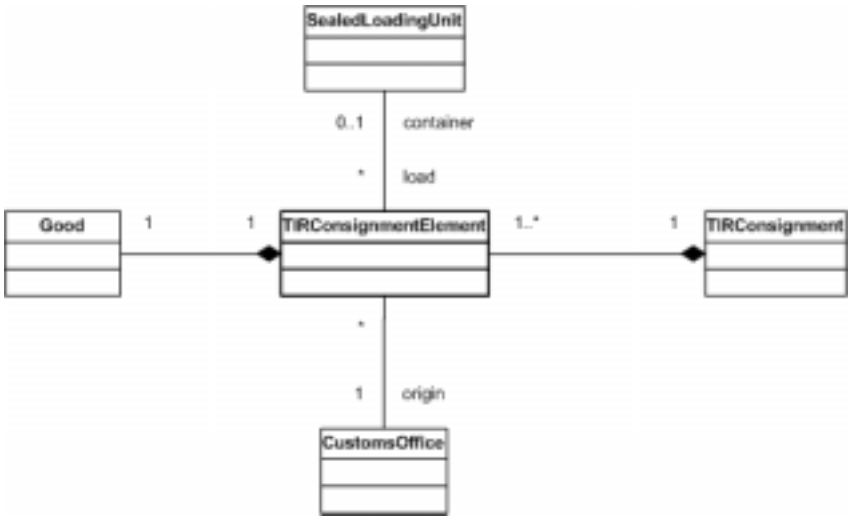


Figure 1.22 TIR consignment element class and its relationships

Name	**TIR consignment element sub class diagram**
Description	Sub part of the high-level class diagram presenting the TIR consignment element class and all relations with other classes.
Central Class	TIR consignment element
Example instance of the central class	o 200 kg of chocolate loaded in Geneva transported under cover of TIR Carnet N° XC380000ZZ with destination Budapest. o 10 cars loaded in Turin transported under cover of TIR Carnet N° XC380000VV with destination Budapest. o …
Associated Classes	Sealed loading unit, TIR consignment, good, Customs office
Associations and constraints	A sealed loading unit can have numerous loads, called TIR consignments elements. A TIR consignment element is contained in one and only one sealed loading unit. In case of heavy and bulky goods (HBG), the TIR consignment element might not be contained in a sealed loading unit. (Req. 9) A TIR consignment is composed of one to many TIR consignment elements. A TIR consignment element is part of one and only one TIR consignment. (Req. 14) The TIR consignment element is composed of a single good type. (Req. 16) A TIR consignment element is loaded at a single Customs office, called the origin. A Customs office can be the origin for any number of TIR consignment elements.(Req.17)
Requirements Covered	9, 14, 16 and 17

Table 1.10 TIR consignment element sub class diagram description

Good

Figure 1.23 Good class and its relationships

Name	**Good sub class diagram**
Description	Sub part of the high-level class diagram presenting the good class and all relations with other classes.
Central Class	Good
Example instance of the central class	o Chocolate o Car o …
Associated Classes	TIR consignment element
Associations and constraints	The TIR consignment element is composed of a single good type. (Req. 16)
Requirements Covered	16

Table 1.11 Good sub class diagram description

Customs office

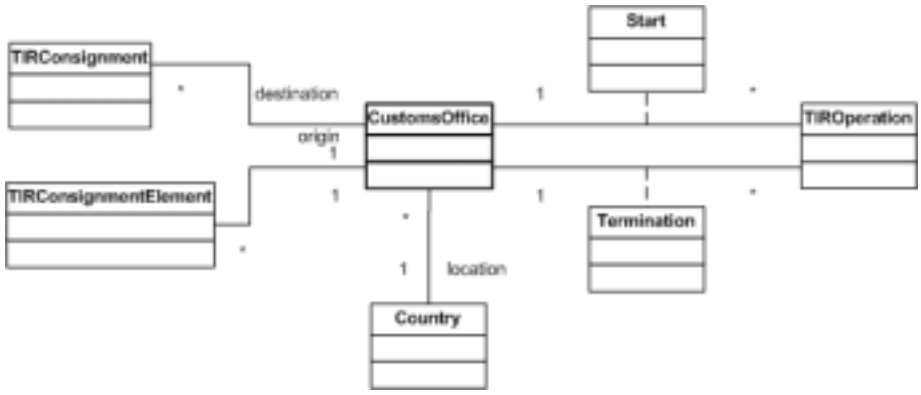


Figure 1.24 Customs office class and its relationships

Name	**Customs office sub class diagram**
Description	Sub part of the high-level class diagram presenting the Customs office class and all relations with other classes.
Central Class	Customs office
Example instance of the central class	o ??
Associated Classes	TIR operation, TIR consignment, TIR consignment element, country
Associations and constraints	The TIR operation is started at one and only one Customs office and terminated at one and only one customs office. A customs office can start and terminate any number of TIR operations. (Req. 13) A TIR consignment a one and only one destination Customs office. A Customs office can be the destination of numerous TIR consignments. (Req. 15) A TIR consignment element is loaded at a single Customs office, called the origin. A Customs office can be the origin for any number of TIR consignment elements.(Req.17) A Customs office is located in one and only one country. A country can have any number of Customs offices. (Req. 18)
Requirements Covered	13,15,17 and 18

Table 1.12 Customs office sub class diagram description

Country

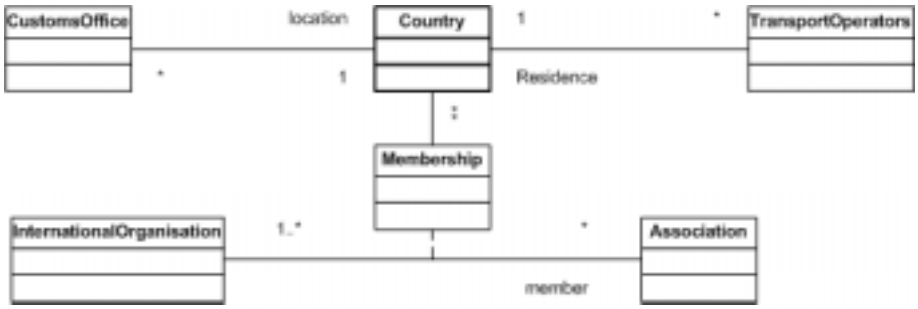


Figure 1.25 Country class and its relationships

Name	**Country sub class diagram**
Description	Sub part of the high-level class diagram presenting the country class and all relations with other classes.
Central Class	Country
Example instance of the central class	o Switzerland o Luxembourg o …
Associated Classes	Membership (international organization and association), Customs office, transport operator
Associations and constraints	The international organization has *member* associations. The membership is associated to countries. An association has to be member of at least one international organization. An international organization can have any number of member associations. A membership can be associated to various countries (e.g. FEBETRA –IRU is a membership covering Belgium and Luxembourg) but one country is required for the existence of a membership. A country can be covered by various memberships. (Req. 2) A Customs Office is located in one and only one country. A country can have any number of Customs offices (Req. 18) A transport operator as a residence in one and only one country. A country can be the residence of numerous transport operators. (Req. 19)
Requirements Covered	2, 18 and 19

Table 1.13 Country sub class diagram description

TIR Carnet Holder

Figure 1.26 Transport operator class and its relationships

Name	**TIR Carnet Holder sub class diagram**
Description	Sub part of the high-level class diagram presenting the transport operator class and all relations with other classes.
Central Class	TIR Carnet Holder
Example instance of the central class	o THALMANN TRANSPORTE AG o RAB-TRANS - Sp.z o.o. o …
Associated Classes	TIR transport, country
Associations and constraints	A TIR transport is performed by one and only one TIR Carnet holder. A TIR Carnet holder can perform any number of TIR transports. (Req. 12) A transport operator has a residence in one and only one country. A country can be the residence of numerous transport operators. (Req. 19)
Requirements Covered	12 and 19

Table 1.14 Transport operator sub class diagram description

2. e-Business requirements

To be filled-in at a later stage.

3. Analysis workflow

To be filled-in at a later stage.

4. Design workflow

To be filled-in at a later stage.

Annex 1 – Requirements list

The requirements list provides an artefact for storing discrete, measurable business requirements and constraints. As requirements and constraints are discovered in performing the modelling steps they are added to this running list by the secretariat. Note: requirements shall be referenced in all modelling artefacts, and if necessary, each requirement should reference modelling artefact(s) that are based on it.

Req. #	Statement	Source	Date	Status
1	The international organization represents the guarantee chain for a TIR transport. A TIR transport can be associated to one and only one international organization. The international organization can represent the guarantee chain for an unlimited number of transports.			Used in 1.6
2	The international organization has member associations. The membership is associated to countries. An association has to be member of at least one international organization. An international organization can have any number of member associations. A membership can be associated to various countries (e.g. FEBETRA –IRU is a membership valid for Belgium but also for Luxembourg) and a country can be covered by various memberships.			Used in 1.6
3	An association has 2 roles represented by the subdivision of the association into the issuing association, responsible of the issuance of the TIR Carnet to the transport operators, and the guaranteeing association, responsible of the guarantee chain on its national territory.			Used in 1.6
4	The issuing association issues TIR Carnets for TIR transports. One and only one issuing association is issuing the TIR Carnet for a TIR transport. The issuing association can issues TIR Carnet for numerous TIR transports.			Used in 1.6
5				
6	A road vehicle can serve in numerous TIR transports. A TIR transport is performed by means of one or many road vehicles.			Used in 1.6
7	A road vehicle is composed of zero or many load compartments. A load compartment is part of a single road vehicle.			Used in 1.6
8	A sealed loading unit is a generalisation of a container and a load compartment on a truck.			Used in 1.6
9	A sealed loading unit can have numerous loads, called TIR consignments elements. A TIR consignment element is contained in one and only one sealed loading unit. In case of heavy and bulky goods (HBG), the TIR consignment element might not be contained in a sealed loading unit.			Used in 1.6
10	A TIR transport is composed of TIR operations. The number of TIR operations within a TIR transport is at the moment limited to 10 with the current paper system and has a minimum of 2 (these limitations should be extensible; therefore a zero to many is more advisable). A TIR operation is part of one and only one TIR transport.			Used in 1.6
11	A TIR consignment is associated to one and only one TIR transport. A TIR transport can carry from one to many TIR consignments.			Used in 1.6

12	A TIR transport is performed by one and only one TIR Carnet holder. A TIR Carnet holder can perform any number of TIR transports.			Used in 1.6
13	The TIR operation is started at one and only one Customs office and terminated at one and only one Customs office. A Customs office can start and terminate any number of TIR operations.			Used in 1.6
14	A TIR consignment is composed of one to many TIR consignment elements. A TIR consignment element is part of one and only one TIR consignment.			Used in 1.6
15	A TIR consignment a one and only one destination Customs office. A Customs office can be the destination of numerous TIR consignments.			Used in 1.6
16	The TIR consignment element is composed of a single good type.			Used in 1.6
17	A TIR consignment element is loaded at a single Customs office, called the origin. A Customs office can be the origin for any number of TIR consignment elements.			Used in 1.6
18	A Customs Office is located in one and only one country. A country can have any number of Customs offices.			Used in 1.6
19	A transport operator as a residence in one and only one country. A country can be the residence of numerous transport operators.			Used in 1.6
20	The printing and distribution of TIR Carnets can only be performed by an approved international organisation.	Art. 6.2 bis Annex 8 Art.10(b)		Used in 1.2.1
21	Only an approved ass00ociation can issue TIR Carnets.	Art. 6.1		Used in 1.2.1
22	The TIR Carnet shall be issued only to authorised persons.	Art. 6.3		Used in 1.2.1
23	A TIR transport can only be performed with an approved vehicle or container.	Art. 3.a.(i)		Used in 1.2.1
24	A TIR transport must be performed under cover of TIR Carnet.	Art. 3.b		Used in 1.2.1
25	A TIR transport must be guaranteed.	Art. 3.b		Used in 1.2.1
26	Customs authorities can use the national and international risk analysis data to asses risk during the TIR Transport.			Used in 1.2.1
27	When the TIR Transport is completed, the TIR Carnet is returned to the holder, then to the association and finally to the international organisation.			Used in 1.2.1
28	The International organisation uses the control system for TIR Carnets to check returned TIR Carnets.			Used in 1.2.1
29	The risk analysis can be performed with data stored in the repository.			Used in 1.2.1
30	The risk analysis can be performed with data from the control system for TIR Carnets.			Used in 1.2.1
31	The control system for TIR Carnets stores the data regarding the distribution of TIR Carnets.			Used in 1.2.1
32	The control system for TIR Carnets stores data on the termination of TIR operation at Customs offices of destination.			Used in 1.2.1
33	The TIR procedure is defined by TIR Convention.			Used in 1.2.1

Annex 2 – TIR glossary

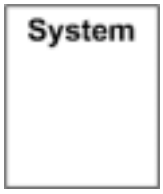
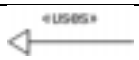
The TIR glossary captures any terms and acronyms the reader might need to understand about the TIR procedure domain. The glossary is maintained in a running list by the secretariat throughout the requirements gathering/modelling process. This document is used to define terminology associated with TIR procedure business process modelling as well as terminology specific to it, explaining terms (or groups of terms from a sub-business domain) that may be unfamiliar to the reader of the use-case descriptions or other project documents. Often, this document can be used as an informal data dictionary, capturing data definitions so that use-case descriptions and other project documents can focus on what the system shall do with the information. Reference may be made to external documents that give such details.

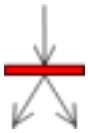
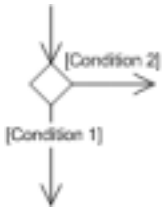
Term	Definition	Source
Container	An article of transport equipment (liftvan, movable tank or similar structure): 1. fully or partially enclosed to constitute a compartment intended for containing goods; 2. of a permanent character and accordingly strong enough to be suitable for repeated use; 3. specially designed to facilitate the transport of goods by one or more modes of transport without intermediate unloading; 4. designed for ready handling, particularly when being transferred from one mode of transport to another; 5. designed to be easy to fill and to empty, and 6. having an internal volume of one cubicle metre or more	Art. 1 (j)
Customs office	Any Customs office of a Contracting Party	Secretariat
Customs office of departure	Any Customs office of a Contracting Party where the TIR transport of a load or part load of goods begins	Art. 1 (k)
Customs office of destination	Any Customs office of a Contracting Party where the TIR transport of a load or part load of goods ends	Art. 1 (l)
Good	Commodity, merchandise	Webster
Guarantee chain (International guarantee system)	System managing the liability of national associations for TIR Carnets issued by them and for those which remain undischarged in their national territory	Secretariat
Guaranteeing Association	An association approved by the Customs authorities of a Contracting Party to act as surety for persons using the TIR procedure	Art. 1 (q)
International Organization	International organization, as referred to in Article 6, paragraph 2, that is authorized by the TIR Administrative Committee to take on responsibility for the effective organization and functioning of an international guarantee system provided that it accepts this responsibility	Art. 6, 2 bis
Issuing Association	An association approved by the Customs authorities of a Contracting Party to issue TIR Carnets	Secretariat
Load compartment	Compartment intended for containing goods	Secretariat
National Association	An association approved by the Customs authorities of a Contracting Party to issue TIR Carnets and/or to act as surety for persons using the TIR procedure	Secretariat
Road Vehicle	Not only any power-driven road vehicle but also any trailer or semi-trailer designed to be coupled thereto	Art. 1 (g)
Sealed loading unit	Any part of a container or load compartment suited for sealing under the conditions stipulated by the TIR Convention	Secretariat
TIR consignment	Goods carried under cover of a TIR Carnet having a common destination.	Secretariat
TIR consignment	Part of a TIR consignment, composed of a single good type and	Secretariat

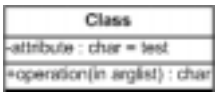
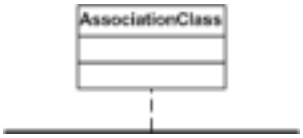
element	having a common loading place.	
TIR operation	The part of a TIR transport that is carried out in a Contracting Party from a Customs office of departure or entry (en route) to a Customs office of destination (en route)	Art. 1 (b)
TIR transport	The transport of goods from a Customs office of departure to a Customs office of destination under the procedure, called the TIR procedure, laid down in the TIR Convention	Art. 1 (a)
TIR Carnet holder	The person to whom a TIR Carnet has been issued in accordance with the relevant provisions of the TIR Convention and on whose behalf a Customs declaration has been in the form of a TIR Carnet indicating a wish to place goods under the TIR procedure at the Customs office of departure ()	Article 1 (o)

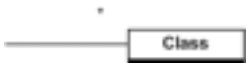
Annex 3 – UML symbols glossary

Package diagram	
Package	
Dependency	

Use case diagram	
System	
Use case	
Actor	
Communication	
Uses	
Comment	

Activity diagram	
Swimline	
Action state	
State	
Initial state	
Final state	
Control flow	
Object flow	
Transition (fork)	
Transition (joint)	
Decision	

Class diagram	
Class	
Object	
Association	
Association class	
N-ary association	
Generalization	
Composition	
Aggregation	
Association roles	
Association function and reading direction	

Multiplicities (cardinalities)	
Exactly one	
Many (zero or more)	
Optional	

General symbols	
Interface	
Constraint	
Comment	

Annex 4 – UMM/UML glossary

Term	Definition	*Source*
abstract class	A class that cannot be directly instantiated.	*Unified Modelling User Guide*
abstraction	The essential characteristics of an entity that distinguish it from all other kinds of entities. An abstraction defines a boundary relative to the perspective of the viewer.	*Unified Modelling User Guide*
activity diagram	Shows behaviour with control structure. Can show many objects over many uses, many objects in single use case, or implementation of method. Encourages parallel behaviour.	*UML Distilled*
actor	Someone or something, outside the system or business that interacts with the system or business.	*Rational Unified Process*
aggregation	A special form of association that specifies a whole-part relationship between the aggregate (the whole) and a component (the part).	*Unified Modelling User Guide*
analysis classes	An abstraction of a role played by a design element in the system, typically within the context of a *use-case realization*. Analysis classes may provide an abstraction for several role, representing the common behaviour of those roles. Analysis classes typically evolve into one or more design elements (e.g. design classes and/or capsules, or design subsystems).	*Rational Unified Process*
analysis	The part of the software development process whose primary purpose is to formulate a model of the problem *domain*. Analysis focuses on what to do, design focuses on how to do it. See *design*.	*Rational Unified Process*
API	Application Protocol Interface.	
architecture	The organizational structure of a system. An architecture can be recursively decomposed into parts that interact through interfaces, relationships that connect parts, and constraints for assembling parts. Parts that interact through interfaces include *classes*, *components* and *subsystems*.	*Rational Unified Process*
artifact	(1) A piece of information that (1) is produced, modified, or used by a process, (2) defines an area of responsibility, and (3) is subject to version control. An artefact can be a *model*, a *model element*, or a *document*. A document can enclose other documents.	*Rational Unified Process*
association	A structural relationship that describes a set of links, in which a link is a connection among objects; the semantic relationship between two or more classifiers that involves the connections among their instances.	*Unified Modelling User Guide*
attributes	An attribute defined by a *class* represents a named property of the class or its objects. An attribute has a *type* that defines the type of its instances.	*Rational Unified Process*
binary association	An association between two classes.	*Unified Modelling User Guide*
BPAWG	UN/CEFACT Business Process Analysis Working Group. Responsible for analysing and understanding the key elements of international transactions and working for the elimination of constraints.	*UN/CEFACT*
Boolean	An enumeration whose values are true and false.	*Unified Modelling User Guide*
business domain model	The first stage in UN/CEFACT unified process.	*UMM*
business entity class	Group of Items which are structured in the same way: that serves the fundamental missions of the company, that has legal and/or commercial basis, which may participate in exchanges with partners, which will be implemented into objects (object technology) through a	*UMM*

	modelling process. For example: order is a business entity class.	
business entity	Something that is accessed, inspected, manipulated, produced, and son on in the business.	*UMM*
business expert	A person who is knowledgeable about the business area being modelled.	*UMM*
Business Operational View (BOV)	A perspective of business transactions limited to those aspects regarding the making of business decisions and commitments among organizations, which are needed for the description of a business transaction.	*(Open-edi Reference Model - ISO/IEC 14662).*
business process	The means by which one or more activities are accomplished in operating business practices.	*UMM*
business rule	Rules, regulations and practices for business.	*UMM*
business	a series of processes, each having a clearly understood purpose, involving more than one organization, realized through the exchange of information and directed towards some mutually agreed upon goal, extending over a period of time.	*(Open-edi Reference Model - ISO/IEC 14662). (MoU)*
cardinality	The number of elements in a set.	*Unified Modelling User Guide*
class	A description of a set of objects that share the same *attributes*, *operations*, *methods*, *relationships*, and semantics. A class may use a set of interfaces to specify collections of operations it provides to its environment. See: *interface*.	*Rational Unified Process*
class diagram	shows static structure of concepts, types, and classes. Concepts show how users think about the world; types show interfaces of software components; classes show implementation of software components. (UML Distilled) A diagram that shows a collection of declarative (static) *model elements*, such as *classes*, *types*, and their contents and *relationships*. (Rational Unified Process).	*UML Distilled/ Rational Unified Process*
collaboration diagram	(1) A collaboration diagram describes a pattern of interaction among objects; it shows the objects participating in the interaction by their links to each other and the *messages* they send to each other. Unlike a sequence diagram, a collaboration diagram shows the relationships among the instances. Sequence diagrams and collaboration diagrams express similar information, but show it in different ways. See: *sequence diagram*.	*Rational Unified Process*
component	A physical, replaceable part of a system that packages implementation and conforms to and provides the realization of a set of interfaces. A component represents a physical piece of implementation of a system, including software code (source, binary or executable) or equivalents such as scripts or command files.	*Rational Unified Process*
component diagram	A diagram that shows the organizations and dependencies among *components*.	*Rational Unified Process*
component interface	A named set of operations that characterize the behaviour of a component.	*OMG*
composition	A form of aggregation with strong ownership and coincident lifetime of the parts by the whole; parts with nonfixed multiplicity may be created after composite itself, but once created they live and die with it; such parts can also be explicitly removed before the death of a composite.	*Unified Modelling User Guide*
constraint	A semantic condition or restriction. Certain constraints are predefined in the UML, others may be user defined. Constraints are one of three extensibility mechanisms in UML. See: *tagged value*, *stereotype*.	*Rational Unified Process*
construction	The third phase of the software development life cycle, in which the software	*Unified*

	is brought from an executable architectural baseline to the point at which it is ready to be transitioned to the user community.	*Modelling User Guide*
control classes	A class used to model behaviour specific to one, or a several use cases.	*Rational Unified Process*
datatype	A descriptor of a set of values that lack identity and whose operations do not have side effects. Data types include primitive pre-defined types and user-definable types. Pre-defined types include numbers, string and time. User-definable types include enumerations.	*Rational Unified Process*
delegation	The ability of an object to issue a message to another object in response to a message.	*Unified Modelling User Guide*
deliverables	An output from a process that has a value, material or otherwise, to a customer or other stakeholder.	*Rational Unified Process*
dependency	A semantic relationship between two things in which a change to one thing (the independent thing) may affect the semantics of the other thing (the dependent thing).	*Unified Modelling User Guide*
deployment diagram	A diagram that shows the configuration of run-time processing nodes and the *components*, *processes*, and *objects* that live on them. Components represent run-time manifestations of code units. See: *component diagram*.	*Rational Unified Process*
design	The part of the software development process whose primary purpose is to decide how the system will be implemented. During design, strategic and tactical decisions are made to meet the required functional and quality *requirements* of a system. See *analysis*.	*Rational Unified Process*
design patterns	A specific solution to a particular problem in software design. Design patterns capture solutions that have developed and evolved over time, expressed in a succinct and easily applied form.	*Rational Unified Process*
design view	The view of a system's architecture that encompasses the classes, interfaces and collaborations that form the vocabulary of the problem and its solution; a design view addresses the functional requirements of a system.	*Unified Modelling User Guide*
diagram	A graphical depiction of all or part of a *model*. .	*Rational Unified Process*
Document type definition	See DTD.	
domain	An area of knowledge or activity characterized by a family of related systems. An area of knowledge or activity characterized by a set of concepts and terminology understood by practitioners in that area.	*Rational Unified Process*
DTD	Document Type Definition.	
EDI message	An approved, published, and maintained formal description of how to structure the data required to perform a specific business function, in such a way as to allow for the transfer and handling of this data by electronic means.	*(MoU)*
EDIFACT messages	A electronic message formats based on UN/EDIFACT standard set developed and maintained by the UN/EDIFACT Working Group which are in UN/TDID directories.	*UN/CEFACT*
edifact working group	To develop and maintain UN/EDIFACT, the support of harmonised implementations and the use of multi-lingual terminology.	
elaboration phase	The second *phase* of the process where the product *vision* and its *architecture* are defined.	*Rational Unified Process*
electronic business	a generic term covering information definition and exchange requirements within and between enterprises, including customers.	*(MoU)*
electronic commerce	Electronic Commerce is doing business electronically. This includes the sharing of standardised unstructured or structured business information by	*UN/CEFACT SIMAC*

	any electronic means (such as electronic mail or messaging, World Wide Web technology, electronic bulletin boards, smart cards, electronic funds transfers, electronic data interchange, and automatic data capture technology) among suppliers, customers, governmental bodies and other partners in order to conduct and execute transactions in business, administrative and consumer activities.	
Electronic Data Interchange (EDI)	The automated exchange of any predefined and structured data for business among information systems of two or more organizations.	*(Open-edi Reference Model Standard - ISO/IEC 14662). (MoU)*
entity classes	A class used to model information that has been stored by the system, and the associated behaviour. A generic class, reused in many use cases, often with persistent characteristics. An entity class defines a set of entity objects, which participate in several use cases and typically survive those use cases.	*Rational Unified Process*
enumerations	A list of named values used as the range of a particular attribute type. For example, RGBColor = {red, green, blue}. Boolean is a predefined enumeration with values from the set {false, true}.	*Rational Unified Process*
EWG	UN/EDIFACT Working Group. To develop and maintain UN/EDIFACT, the support of harmonised implementations and the use of multi-lingual terminology.	
eXtensible Markup Language	See XML.	
Functional Service View (FSV)	A perspective of business transactions limited to those information technology interoperability aspects of IT Systems needed to support the execution of Open-edi transactions.	*(MoU)*
generalization	A taxonomic relationship between a more general element and a more specific element. The more specific element is fully consistent with the more general element and contains additional information. An instance of the more specific element may be used where the more general element is allowed. See: *inheritance*.	*Rational Unified Process*
implementation	A concrete realization of the contract declared by an interface; a definition of how something is constructed or computed.	
inception phase	The first *phase* of the Unified Process, in which the seed idea, request for proposal, for the previous generation is brought to the point of being (at least internally) funded to enter the *elaboration* phase.	*Rational Unified Process*
inheritance	The mechanism by which more specific elements incorporate structure and behaviour of more general elements related by behaviour. See *generalization*.	*Rational Unified Process*
instance	An individual entity satisfying the description of a *class* or *type*.	*Rational Unified Process*
interaction diagram	A diagram that shows an interaction, consisting of a set of objects and their relationships, including the messages that may be dispatched among them; interaction diagrams address the dynamic view of a system; a generic term that applies to several types of diagrams that emphasize object interactions, including collaboration diagrams, sequence diagrams and activity diagrams.	*Unified Modelling User Guide*
interface	A collection of *operations* that are used to specify a service of a *class* or a *component*. A named set of operations that characterize the ehaviour of an element.	*Rational Unified Process*
ISO	The International Organization for Standardization.	
Messages	A specification of the conveyance of information from one instance to another, with the expectation that activity will ensue. A message may specify	*Rational Unified*

	the raising of a signal or the call of an operation.	*Process*
messaging protocols	See Messages and Protocol.	
Metaclass	A class whose instances are classes. Metaclasses are typically used to construct *metamodels*.	
Metamodel	A model that defines the language for expressing a *model*.	*Rational Unified Process*
metaobjects	A generic term for all metaentities in a metamodeling language. For example, metatypes, metaclasses, metaattributes, and metaassociations.	*Rational Unified Process*
method	**(n)** A regular and systematic way of accomplishing something; the detailed, logically ordered plans or procedures followed to accomplish a task or attain a goal. (2) UML 1.1: The implementation of an operation, the algorithm or procedure that effects the results of an operation. The implementation of an operation. It specifies the algorithm or procedure associated with an operation.	*Rational Unified Process*
methodology	the science of method. A body of methods used in a particular branch of activity.	*COD*
model	A semantically closed abstraction of a system. In the Unified Process, a complete description of a system from a particular perspective ('complete' meaning you don't need any additional information to understand the system from that perspective); a set of model elements. Two models cannot overlap. A semantically closed abstraction of a subject system. See: *system*. Usage note: In the context of the MOF specification, which describes a *meta-metamodel*, for brevity the meta-metamodel is frequently referred to as simply the model.	*Rational Unified Process*
modelling tools	any device or implement used to carry out modeling whether manually or by a machine.	*COD*
naming	to give a string used to identify a *model element*.	*Rational Unified Process*
n-ary association	An association among three or more classes.	*Unified Modelling User Guide*
note	One of model elements which is a figure symbol to express an element in a diagram.	*UML Toolkit*
object diagram	A diagram that encompasses *objects* and their relationships at a point in time. An object diagram may be considered a special case of a class diagram or a collaboration diagram. See: *class diagram*, *collaboration diagram*.	*Rational Unified Process*
Object Oriented Approach	The development of classes of business objects may support and have an impact on the developments in the area of simplification of EDI and its standards. A business object is a true representation of a tangible concept stemming from real business usage.	
objects	An entity with a well-defined boundary and identity that encapsulates *state* and *behaviour*. State is represented by *attributes* and *relationships*, behavior is represented by *operations*, *methods*, and *state machines*. An object is an instance of a class. See: *class*, *instance*.	*Rational Unified Process*
OCL	Object Constraints Language; a formal language used to express side effect-free constraints.	*Unified Modelling User Guide*
OO-edi	Object Oriented edi.	
Open-edi	electronic data interchange among multiple autonomous organizations to accomplish an explicit shared business goal according to Open-edi standards (i.e. that complies with the Open-edi Reference Model Standard - ISO/IEC	*(MoU)*

	14662).	
operation signature	See Operation and Signature.	
operation	A service that can be requested from an object to effect behaviour. An operation has a ***signature***, which may restrict the actual parameters that are possible.	*Rational Unified Process*
package	A general purpose mechanism for organizing elements into groups. Packages may be nested within other packages.	*Rational Unified Process*
package diagram	shows groups of classes and dependencies among them.	*UML Distilled*
parameter	The specification of a variable that can be changed, passed, or returned.	*Unified Modelling User Guide*
patterns	offers useful bits of analysis, design, and coding techniques. Good examples to learn from; starting point for designs.	*UML Distilled*
phases	The time between two major project milestones, during which a well-defined set of objectives is met, artefacts are completed, and decisions are made to move or not move into the next phase.	*Rational Unified Process*
process view	The view of a system's architecture that encompasses the threads and processes that form the system's concurrency and synchronization mechanisms; a process view addresses the performance, scalability and throughput of the system.	*Unified Modelling User Guide*
projects	a plan; a scheme. A planned undertaking. A long-term task undertaken by a student to be sumitted for assessment.	*COD*
protocol	A specification of a compatible set of messages used to communicate between ***capsule***s. The protocol defines a set of incoming and outgoing messages types (e.g. operations, signals), and optionally a set of sequence diagrams which define the required ordering of messages and a state machine which specifies the abstract behaviour that the participants in a protocol must provide.	*Rational Unified Process*
prototype	A release that is not necessarily subject to ***change management*** and ***configuration control***.	*Rational Unified Process*
register	an official list in which items are recorded for reference (list of elementary data in which the meaning –i.e. semantics- of these data is defined).	
Registry	a place where registers are kept.	
Relationship	A semantic connection among model elements. Examples of relationships include ***associations*** and ***generalizations***.	*Rational Unified Process*
repository	Electronic store of structured information (such as EDIFACT messages, X12 messages, XML messages).	
requirement	A desired feature, property or behaviour of a system.	*Unified Modelling User Guide*
re-use	Further use or repeated use of an ***artefact***.	*Rational Unified Process*
scenario	A formal specification of a class of business activities having the same business goal.	*(ISO 19735 part I)*
schema	In the context of the MOF (Metadata Object Facility), a schema is analogous to a ***package*** which is a container of ***model elements***. Schema corresponds to an MOF package. Contrast: ***metamodel***, package corresponds to an MOF package.	*Rational Unified Process*
scope	the extent to which it is possible to range; the opportunity for action etc.	*COD*
semantics	relating to meaning in language; relating to the connotations of words.	*COD*

sequence diagram	A diagram that shows object interactions arranged in time sequence. In particular, it shows the objects participating in the interaction and the sequence of messages exchanged. Unlike a collaboration diagram, a sequence diagram includes time sequences but does not include object relationships. A sequence diagram can exist in a generic form (describes all possible ***scenarios***) and in an instance form (describes one actual scenario). Sequence diagrams and collaboration diagrams express similar information, but show it in different ways. See: ***collaboration diagram***.	*Rational Unified Process*
signature	The name and parameters of a behavioural feature. A signature may include an optional returned parameter.	*Rational Unified Process*
Simpl-EDI	Subsets of UN/EDIFACT messages especially designed for SMEs. Simpl-EDI (Simple Electronic Business) defines simplest processes and their required core data allowing the exchange of the minimum data to effect a business transaction electronically.	*UN/CEFACT SIMAC*
software developer	A person responsible for developing a software in accordance with project-adopted standards and procedures. This can include performing activities in any of the *requirements*, *analysis & design*, *implementation*, and *test* workflows.	*Rational Unified Process*
software solution	the act or a means of solving a problem or difficulty using a software.	*COD*
specification	A declarative description of what something is or does. Contrast: *implementation*.	*Rational Unified Process*
stakeholder	An individual who is materially affected by the outcome of the system.	*Rational Unified Process*
state diagram	shows how single object behaves across many use cases.	*UML Distilled*
state machine	A state machine specifies the behaviour of a *model element*, defining its response to events and the life cycle of the object. A behaviour that specifies the sequences of *states* that an object or an interaction goes through during its life in response to events, together with its responses and actions.	*Rational Unified Process*
statechart (state machine) diagram	A diagram that shows a state machine. See: *state machine*.	*Rational Unified Process*
states	A condition or situation during the life of an object during which it satisfies some condition, performs some activity, or waits for some event. Contrast: state [OMA].	*Rational Unified Process*
stereotype	A new type of modelling element that extends the semantics of the metamodel. Stereotypes must be based on certain existing types or classes in the metamodel. Stereotypes may extend the semantics, but not the structure of pre-existing types and classes. Certain stereotypes are predefined in the UML, others may be user defined. Stereotypes are one of three extensibility mechanisms in UML. See: constraint, tagged value.	*OMG*
sub-domain	An lower area of knowledge or activity characterized by a family of related systems contained by a domain.	
swimlane	A partition on an interaction diagram for organizing responsibilities for actions.	*Unified Modelling User Guide*
syntax rules	rules governing the structure of an interchange and its functional groups, messages, segments and data elements.	*(ISO 9735)*
system	As an instance, an executable configuration of a software application or software application family; the execution is done on a hardware platform. As a class, a particular software application or software application family that can be configured and installed on a hardware platform. In a general	*Rational Unified Process*

	sense, an arbitrary system instance. 1. A collection of connected units that are organized to accomplish a specific purpose. A system can be described by one or more models, possibly from different viewpoints. Synonym: physical system. 2. A top-level subsystem.	
templates	A pre-defined structure for an ***artefact***. Synonym: ***parameterized element***.	*Rational Unified Process*
test	A ***core process workflow*** in the software-engineering process whose purpose is to integrate and test the system.	*Rational Unified Process*
TMWG	UN/CEFACT Techniques and Methodologies Group. To research and identify techniques and methodologies which could be utilised by CEFACT and its working groups to enhance the process by which its deliverables are produced and integrated.	
traceability	The ability to trace a project element to other related project elements, especially those related to ***requirements***.	*Rational Unified Process*
transition phase	The fourth ***phase*** of the process in which the software is turned over to the user community; a relationship between two states indicating that an object in the first state will perform certain actions and enter the second state when a specified event occurs and conditions are satisfied.	*Unified Modelling User Guide*
type	Description of a set of entities which share common characteristics, relations, attributes, and semantics. A stereotype of class that is used to specify a domain of instances (objects) together with the operations applicable to the objects. A type may not contain any methods. See: ***class***, ***instance***. Contrast: ***interface***.	*Rational Unified Process*
UML	See Unified Modelling Language.	
UN/EDIFACT	(United Nations Electronic Data Interchange for Administration, Commerce and transport): "User application protocol, for use within user application systems for data to be interchanged, compatible with the OSI model."	*(UN/EDIFACT syntax implementation guidelines, UNTDID 1990). (MoU)*
Unified Modeling Language (UML)	a set of diagrams that communicate requirements regarding a business process.	
use case	The specification of a sequence of actions, including variants, that a system (or other entity) can perform, interacting with ***actors*** of the system. See: ***use-case instances***. A use-case class contains all main, alternate flows of events related to producing the 'observable result of value'. Technically, a use-case is a class whose instances are ***scenarios***.	*Rational Unified Process*
use-case analysis	The part of the software development process using use case methodology whose primary purpose is to formulate a model of the problem ***domain***. Analysis focuses on what to do, design focuses on how to do it.	
use-case diagram	A diagram that shows the relationships among ***actors*** and ***use cases*** within a system.	*Rational Unified Process*
use-case instance	A sequence of actions performed by a system that yields an observable result of value to a particular actor.	*Rational Unified Process*
use-case model	A model that describes a system's functional ***requirements*** in terms of ***use cases***.	
use-case realization	A use-case realization describes how a particular use case is realized within the ***design model***, in terms of collaborating objects.	*Rational Unified Process*

use-case view	An ***architectural view*** that describes how critical use cases are performed in the system, focusing mostly on architecturally significant components (objects, tasks, nodes). In the Unified Process, it is a view of the ***use-case model***.	*Rational Unified Process*
view elements	A view element is a textual and/or graphical projection of a collection of *model elements*.	*Rational Unified Process*
view	A simplified description (an abstraction) of a model, which is seen from a given perspective or vantage point and omits entities that are not relevant to this perspective. See also *architectural view*.	*Rational Unified Process*
workflow	A sequence of activities in the Rational Unified Modelling Methodology.	
XML (eXtensible Markup Language)	XML is designed to enable the exchange of information (data) between different applications and data sources on the World Wide Web. XML is a simplified subset of the Standard Generalized Markup Language (SGML). XML allows construction of structured data (trees) which rely on composition relationships. XML schemas are used to define data models.	*UN/CEFACT SIMAC*

Annex 5 – List of tables

Annex 6 – List of figures

Annex 7 – References

To be filled-in at a later stage.