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Inland Transport Committee

Working Party on Customs Questions affecting Transport

Group of Experts on Conceptual and Technical Aspects of Computerization of the TIR Procedure

First session
Geneva, 27–29 January 2021
Item 7 (a) of the provisional agenda
eTIR conceptual, functional and technical documentation version 4.3: Introduction

UML symbols glossary, example of the elaboration of a class diagram, UMM/UML glossary, Cost Benefit Analysis of the eTIR system and Joint Statement on the computerization of the TIR procedure*

Note by the secretariat

I. Introduction - Mandate

The Inland Transport Committee during its eighty-second session (23–28 February 2020) approved (ECE/TRANS/294, para. 84[1]) the establishment of the Group of Experts on Conceptual and Technical Aspects of Computerization of the TIR Procedure (WP.30/GE.1) and endorsed its ToR[2] (ECE/TRANS/WP30/2019/9 and ECE/TRANS/WP.30/2019/9/Corr.1) pending approval by UNECE Executive Committee (EXCOM). EXCOM during its Remote informal meeting of members of the Executive Committee (20 May 2020) approved the establishment of the Group of Experts on Conceptual and Technical Aspects of Computerization of the TIR Procedure (WP.30/GE.1) until 2022, based on the terms of reference included in document

* This document was submitted late for processing since clearance in finalizing this document took longer than anticipated.

[1] Decision of the Inland Transport Committee para. 84 / ECE/TRANS/294 www.unece.org/fileadmin/DAM/trans/doc/2020/itc/ECE-TRANS-294e.pdf

[2] Terms of reference of the newly established Group approved by the Inland Transport Committee and the Executive Committee (EXCOM) of UNECE www.unece.org/fileadmin/DAM/trans/bcf/wp30/documents/2019/ECE-TRANS-WP30-2019-09e.pdf and corrigendum www.unece.org/fileadmin/DAM/trans/bcf/wp30/documents/2019/ECE-TRANS-WP30-2019-09c1e.pdf

ECE/TRANS/WP.30/2019/9 and Corr.1, as contained in document ECE/TRANS/294 (ECE/EX/2020/L.2, para. 5(b)).[3]

The terms of reference of the Group stipulate that the Group should focus its work on preparing a new version of the eTIR specifications, pending the formal establishment of TIB. More specifically the Group should (a) prepare a new version of the technical specifications of the eTIR procedure, and amendments thereto, ensuring their alignment with the functional specifications of the eTIR procedure; (b) prepare a new version of the functional specifications of the eTIR procedure, and amendments thereto, ensuring their alignment with the conceptual specifications of the eTIR procedure; (c) prepare amendments to the conceptual specifications of the eTIR procedure, upon requests by WP.30.

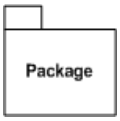
This document presents the UML symbols glossary, and example of the elaboration of a class diagram (TIR Operation example), the UMM/UML glossary, the Cost Benefit Analysis of the eTIR system: summary, limitations and recommendations as well as the Joint Statement on the computerization of the TIR procedure and References.

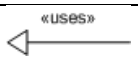
[3] Decision of EXCOM , ECE/EX/2020/L.2 / para. 5(b) www.unece.org/fileadmin/DAM/commission/EXCOM/Agenda/2020/Remote_informal_mtg_20_05_2020/Item_4_ECE_EX_2020_L.2_ITC_Sub_bodies_E.pdf

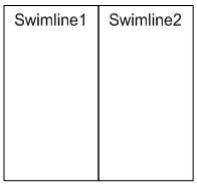
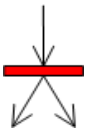
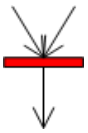
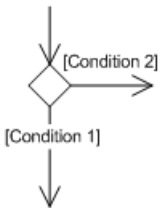
II. Annex IV

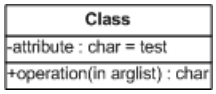
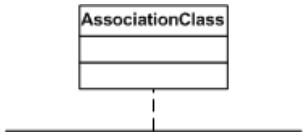
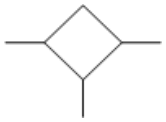
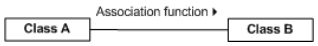
A. UML

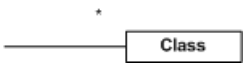
1. UML symbols glossary

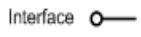
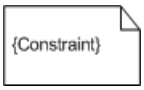
Package diagram	
Package	
Dependency	

Use case diagram	
System	
Use case	
Actor	
Communication	
Uses	
Comment	

Activity diagram	
Swimlane	
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	

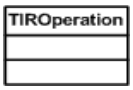
Multiplicities (cardinalities)	
Exactly one	
Many (zero or more)	
Optional	

General symbols	
Interface	
Constraint	
Comment	

2. Elaboration of a class diagram – TIR Operation example

On the basis of the requirements contained in Annex I, we will construct the part of the class diagram depicting the TIR operation.

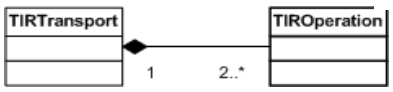
First, we draw the class:



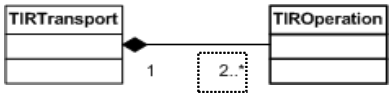
In the list of Requirements, only two requirements deal with the TIR operation:

Req.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 two to many is more advisable). A TIR operation is part of one and only one TIR transport.

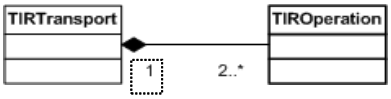
Req. 13 The TIR operation is started at one and only one customs office and terminated at one and only one customs office. A customs office can start and terminate any number of TIR operations. Requirement 10 first stipulates that *a TIR transport is composed of TIR operations*. UML uses a line terminated by a black diamond to indicate the composition (◆———):



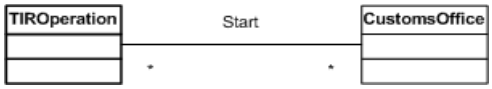
It also states that the number of TIR operations within a TIR transport is at the moment limited to 10 with the current paper system and has a minimum of 2 (these limitations should be extensible; therefore a two to many is more advisable). This is translated in UML by indicating on the TIR operation side of the line "2..*" (multiplicity). The multiplicity indicates the number of objects participating in the relationship:



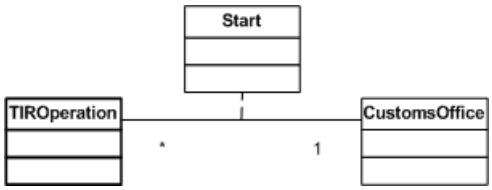
Finally, requirement 10 says that *a TIR operation is part of one and only one TIR transport*. This is translated by writing "1" on the TIR transport side of the relationship:



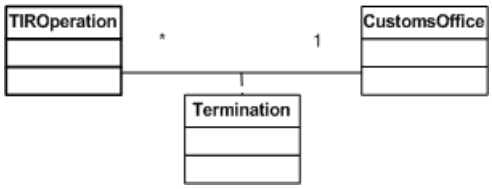
Requirement 13 contains information about two relationships between the classes *TIR Operation* and c*ustoms Office*. First, we will identify the two relationships, which are called "associations". Requirement 13 stipulates that *the TIR operation is started at … customs office….* ***Start*** is therefore the first association between the classes *TIR Operation* and c*ustoms Office*:



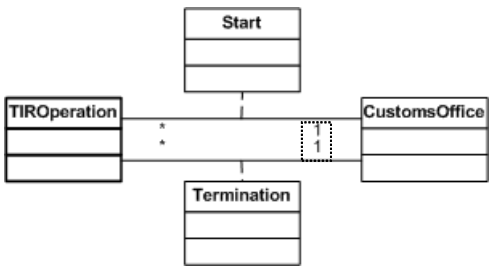
In case the association itself contains information, UML uses a different symbol called "association class". This is the case for the *Start* association which contains information, such as the starting date of the TIR operation:



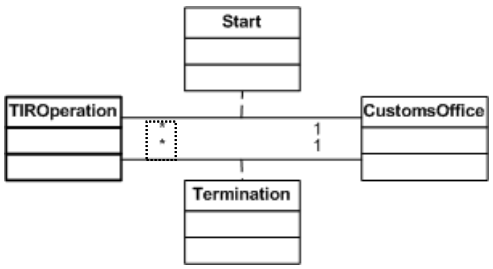
The second association, *Termination*, can be identified in Requirement 13: *the TIR operation is… and terminated at … customs office*. Following the logic of the previous association, the association is depicted as an association class:



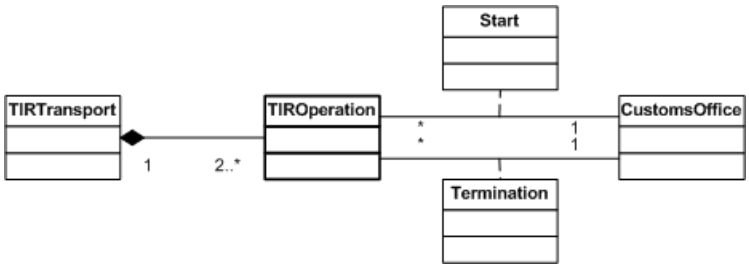
The multiplicities of these two associations are identical. The words *one and only one* indicate that a TIR operation has to start at a customs office and cannot start at more than one. This is translated in UML by inserting "1" on the c*ustoms Office* side of the association:



In addition, *a customs office can start and terminate any number of TIR operations*. This is translated in UML by inserting "*" (meaning from zero to any number) on the *TIR operation* side of the association:



Finally, in order get the full picture of all relationships involving the *TIR operation* class, the sub part of the high-level class diagram can be drawn:



When looking at the complete high-level diagram, one should not forget the fact that, although all relationships are depicted in one, single diagram, this does not change the way in which each single relationship should be read.

III. Annex V

A. 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*

Term	*Definition*	*Source*
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 modelling process. For example: order is a business entity class.	*UMM*
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)*

Term	*Definition*	*Source*
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 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 is brought from an executable architectural baseline to the point at which it is ready to be transitioned to the user community.	*Unified 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*

Term	*Definition*	*Source*
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	An 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 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.	*UN/CEFACT SIMAC*
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	*Rational Unified Process*

Term	*Definition*	*Source*
	with persistent characteristics. An entity class defines a set of entity objects, which participate in several use cases and typically survive those use cases.	
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*.	*Rational Unified Process*
	A named set of operations that characterize the behaviour of an element.	
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 the raising of a signal or the call of an operation.	*Rational Unified 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*

Term	*Definition*	*Source*
method	(1) 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*, behaviour 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 14662).	*(MoU)*
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*

Term	*Definition*	*Source*
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	*Rational Unified Process*

Term	*Definition*	*Source*
	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*.	
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 affect 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.	*Rational Unified Process*
	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.	
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	A 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 sense, an arbitrary system instance.	*Rational Unified Process*

Term	*Definition*	*Source*
	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.	*Rational Unified Process*
	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*.	
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 Modelling 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	*Rational Unified Process*

Term	*Definition*	*Source*
	(objects, tasks, nodes). In the Unified Process, it is a view of the *use-case model*.	
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*

III. Annex VI

A. Cost Benefit Analysis of the eTIR system: summary, limitations and recommendations

VI.1. Background

At its forty-eighth session, further to requests from the Inland Transport Committee (ITC), the Working Party on customs Questions affecting Transport (WP.30) and the Informal Ad hoc Expert Group on Conceptual and Technical aspects of Computerization of the TIR Procedure (GE.1 or "Expert Group"), the TIR Executive Board (TIRExB) mandated the secretariat to conduct a Cost Benefit Analysis (CBA) of the eTIR Project (TIRExB/REP/2011/48final para. 10). Consequently, taking into account the funds available in the TIRExB consultancy budget line and the task to be undertaken, the TIR secretariat requested the relevant services of the United Nations Office at Geneva (UNOG) to issue a tender. In line with the applicable United Nations procurement principles, rules and procedures, UNOG sent out a request for quotes to five companies. Two companies submitted bids, which were evaluated. The contract was awarded to the qualified bidder, whose bid substantially conformed to the requirements set forth in the solicitation documents and who had been evaluated as being most cost-efficient for the United Nations.

At its twentieth session, the Expert Group welcomed the draft CBA, presented in Informal documents GE.1 Nos. 6a, 6b, 6c, 6d and 6e (2012). The Expert Group expressed its general consent with the methodology used by the consultants, while, at the same time, raising preliminary comments on various assumptions used by the consultants in the course of the CBA. Inter alia, the Expert Group was of the opinion that the two scenarios described in the CBA (gradual introduction of eTIR Carnets versus the one time replacement of the paper TIR system by an electronic system, the so-called "big-bang" scenario) were too optimistic and requested the unrealistic "big-bang" scenario, to be replaced by a more pessimistic (i.e.: more realistic) one. In reply to suggestions that the scenarios used should be based on complex forecasts on the long-term development of transport flows between TIR Contracting Parties, the secretariat recalled that the CBA had been adjudged to the consultants on the basis of a clear mandate and with a limited budget and that, therefore, it was unrealistic to expect them to undertake such a complex simulation exercise, in addition to their work so far. To wrap up its initial discussions on the issue, the Expert Group requested additional time in order to provide the secretariat in writing with its comments on the draft CBA and proposed that eTIR focal points would also be given the opportunity to submit their contributions. Further to this request, the secretariat sent an e-mail to eTIR focal points, soliciting their considerations on the draft CBA.

On the basis of all comments received, the consultants prepared an updated version of the CBA, which was presented as Informal document No. 12 at the Expert Group's twenty-first session. The Expert Group took note that, apart from apparent mistakes in the calculations and lack of textual consistency, the CBA was final. The Expert Group agreed on the methodology used by the consultants, but felt that some costs, e.g. training, and indirect benefits were missing from the calculations. The Expert Group agreed with the proposal by the secretariat to prepare a revision of Informal document No. 12, correcting all remaining mistakes, for circulation among the network of eTIR focal points. Furthermore, it requested the secretariat to prepare a document, for consideration at its twenty-second session, containing a summary of the consultants' CBA, in combination with an assessment of the limitations of the analysis, i.e. the missing costs and benefits, as well as recommendations.

At its twenty-second session, the Expert Group welcomed Informal document GE.1 No. 2 (2013), discussed it and slightly revised the wording of the recommendations. The IRU expressed reservations with regard to the final CBA, the corresponding assessment made by the TIR secretariat and the recommendations by the Expert Group (see ECE/TRANS/WP.30/2013/10, para. 16). After responding to the IRUs reservations (see ECE/TRANS/WP.30/2013/10, para. 17), the Expert Group requested the secretariat to include a revised version of Informal document GE.1 No. 2 (2013) as an annex to the eTIR Reference Model and submit it to WP.30 for consideration.

VI.2. Summary of the Cost Benefit Analysis

VI.2.1. Disclaimer

The CBA, as contained in Informal document GE.1 No. 12 Rev.1 (2012), reflects the views of the consultants and not those of the UNECE secretariat. The UNECE secretariat's contribution has been limited to ensuring that the CBA methodology has been properly applied and preparing the underlying summary.

VI.2.2. Objective and methodology

The main objective of the eTIR CBA is to compare the costs and the benefits of the implementation of an eTIR system under various assumptions, exploring different technological options and assuming different scenarios over a period of twelve years, i.e. two years for the development and deployment of a centralized exchange platform (the "so-called" eTIR international system), followed by ten years of progressively increased usage. In line with standard CBA methodology, costs and benefits are discounted to allow their comparison at present value. For the purpose of the eTIR CBA, a discount rate of 5 per cent is used. Returns on investment (ROI) and Net Present Values (NPV) are used to compare the various technological options.

The assumptions are based on various sources, e.g. the eTIR Reference Model, as well as the consultants' expertise in the field of information and communication technology (ICT) projects, in particular software development projects.

VI.2.3. Technological options

The CBA identifies six technological options to implement a centralized eTIR international system.

- At premises: a new data centre will be established to host the eTIR international system. This implies the purchase and maintenance of a completely new data centre (space, network, hardware and software).
- UNOG: the eTIR international system will run on machines hosted and maintained at the United Nations at Geneva (UNOG) data centre.
- UNICC: the eTIR international system will run on machines hosted and maintained at the United Nations International Computing Center (UNICC) data centre.

- IaaS (Infrastructure as a Service): the eTIR international system will run on a shared infrastructure in cloud.[4]
- PaaS (Platform as a Service): the eTIR international system will run on a shared platform in cloud.
- SaaS (Software as a Service): the eTIR international system will be provided as a service by a cloud provider.

The technical assessment, presented in Annex of the CBA, identifies PaaS as the best option, followed by UNOG and UNICC.

VI.2.4. Scenarios

The CBA considers two different scenarios over a period of 12 years. It is assumed that, at the end of this period, all 57 Contracting Parties (CP) to the TIR Convention would have upgraded their customs IT systems to ensure the connectivity with the eTIR international system, according to the following schedule:

Table VI.1
Annual number of Contracting Parties upgrading their IT system

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
No. of Contracting Parties		3	3	3	5	10	10	5	5	5	4	4

The two scenarios differ from each other by the number of TIR transports that would be handled solely electronically every year, i.e. making full use of the eTIR international system. In the first scenario, the number of computerized TIR transports would gradually reach the current annual number of TIR Carnets used (approx. 3 million). In the second scenario, only half of those would be computerized after the twelfth year. The following table shows the annual number of computerized TIR transports for both scenarios.

Table VI.2
Number of fully computerized TIR transports (thousands)

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Scenario 1			100	700	800	1 200	1 300	2 000	2 500	2 600	2 800	3 000
Scenario 2			50	300	400	500	600	1 000	1 200	1 300	1 400	1 500

VI.2.5. Costs

The following costs categories are considered:

- Development costs
- Initial costs
- Operational and hosting costs
- Helpdesk costs
- Costs to adapt national applications

For each cost category, minimal and maximum costs are estimated.

VI.2.5.1. Development costs

The development costs of the three components of the eTIR international system have been estimated separately:

(a) the kernel (ensuring the electronic exchange of eTIR messages);

(b) the web base user interface, which would serve as backup to the kernel, and

[4] The term “cloud” refers to cloud computing, i.e. the usage of (shared) computing resources (hardware and software) made available by specialized companies as services over the Internet.

(c) the administration console.

The system dimension of each component has been estimated by means of a function point analysis (FPA) and adjusted on the basis of an estimated processing complexity. On that basis (and by using the Constructive Cost Model (COCOMO) II methodology), the development costs and schedule have been estimated. The development costs of the entire eTIR international system range between 924,800 and 1,127,000 US$.

VI.2.5.2. Initial Costs

Setting up the eTIR international system will require different costs, depending on the technological options selected. Table VI.3 presents the minimum and maximum estimated initial costs for each option. They include, but are not limited to, purchasing facilities, hardware and software, as well as training and recruitment activities.

Table VI.3
Initial costs
(United States dollars)

	Min	*Max*
At premises	1 255 000	1 450 000
UNOG	681 500	792 500
UNICC	632 000	743 000
IaaS	632 000	743 000
PaaS	142 000	183 000
SaaS	10 000	15 000

VI.2.5.3. Operational and hosting costs

Operating and maintaining the eTIR international system will imply annual costs. Most of those costs depend on the number of TIR transports that will be handled by the system. The costs will also vary greatly, depending on the technological options selected. Table VI.4 presents the minimum and maximum estimated annual variable costs for each option, in case 3 million TIR transport would be handled by the system. Variable costs include, depending on the option, costs for testing, backup, staff, training, audit, insurance and management as well as fees paid to cloud operators.

Table VI.4
Annual operational and cloud costs
(United States dollars)

	Min	*Max*
At premises	340 419	526 059
UNOG	194 739	243 259
UNICC	167 719	257 059
IaaS	113 402	153 126
PaaS	159 116	180 816
SaaS	1 500 000	3 000 000

By dividing the above-mentioned costs by 3 million, a unit cost operational and cloud cost per TIR transport has been calculated. On that basis, the annual variable costs for each scenario have been estimated.

VI.2.5.4. Helpdesk costs

The eTIR Reference Model requires only a minimal helpdesk, the main function of which it is to assist countries in connecting their IT systems to the eTIR international system. Such a helpdesk would be composed of 2 IT specialists, working 40 hours a week. The initial costs

to establish such a helpdesk would range from 24,500 to 44,000 US$. The operating and personnel costs have been estimated between 126,180 and 216,600 US$ per annum.

VI.2.5.5. Costs to adapt national applications

It is assumed that countries already have, or will, develop IT systems that process TIR operations nationally or regionally. Therefore, the only costs that have been assessed are aimed at;

(a) ensuring that all information required by the eTIR international system can be entered and stored in the national IT system;

(b) integrating eTIR web services in the national applications handling TIR operations and

(c) developing the interfaces (web services) required by the eTIR international system.

On the basis of an estimated project plan, adapting national customs IT system would cost between 120,000 and 150,000 US$ per country.

VI.2.5.6. Other costs

The consultants have considered that there would be no other costs, including from the trader/transport community.

VI.2.6. Benefits

A fully computerized TIR system will generate direct annual benefits for customs, the guarantee chain and holders. The various benefits have been estimated independently, before calculating the average benefits of computerization per TIR transport.

VI.2.6.1. For customs

The direct benefits for customs have been derived from the comparison between the time required to process a paper-based TIR Carnet and the estimated time it would take to process the equivalent electronic information, once the system would be fully computerized. Taking also into account that some customs administrations already receive information in an electronic form and that not all time reductions lead to actual saving in personnel costs, the savings for customs administrations are estimated at 4,311,428 US$ per annum, if 3 million TIR transports are computerized.

VI.2.6.2. For the guarantee chain

The guarantee chain’s costs related to printing, distribution and archiving of TIR Carnets are estimated at 2 US$ per TIR Carnet, resulting in potential savings of 6 million US$ per year, in case the entire TIR system becomes paperless.

VI.2.6.3. For the holders

The benefits for the holders, resulting from the reduction in time to begin a TIR transport (i.e. difference between the time to fill in a paper TIR Carnet and the time to input data electronically) as well as the reduction in time spent at borders could reach 16,437,504 US$ per annum.

VI.2.7. Results of the CBA

In order to include a factor of incertitude (inherent to such a large-scale project) into the analysis, a 20 per cent risk ratio to both costs and benefits has been introduced, i.e. costs have been increased by 20 per cent and benefits decreased by 20 per cent. On the basis of the risk-adjusted and discounted costs and benefits, the annual cash flows, ROI and NPV have been calculated for each technological option and for both scenarios over a 12-years period. Tables VI.5 and VI.6 present the final results of the CBA of the eTIR system.

Table VI.5
Costs, Benefits, ROI and NPV for scenario 1
(United States dollars)

	Premises	*UNOG*	*UNICC*	*PAAS*	*IAAS*	*SAAS*
Development costs	1 127 000	1 127 000	1 127 000	1 127 000	1 127 000	–
Initial costs	1 450 000	792 500	743 000	183 000	743 000	15 000
Oper. + Hosting costs	2 981 001	1 378 468	1 456 668	1 024 624	867 717	17 000 000
Sub-total costs	5 558 001	3 297 968	3 326 668	2 334 624	2 737 717	17 015 000
Help Desk costs	2 210 000	2 210 000	2 210 000	2 210 000	2 210 000	2 210 000
National App costs	8 550 000	8 550 000	8 550 000	8 550 000	8 550 000	8 550 000
Total Costs	**16 318 001**	**14 057 968**	**14 086 668**	**13 094 624**	**13 497 717**	**27 775 000**
Total Costs (incl. 20% risk factor)	**19 581 601**	**16 869 561**	**16 904 001**	**15 713 549**	**16 197 260**	**33 330 000**
Discounted Costs (incl. risk factor)	14 979 069	12 941 676	12 950 077	12 391 640	12 470 894	23 464 073
Benefits for Customs (incl. 20% risk factor)	19 550 000	19 550 000	19 550 000	19 550 000	19 550 000	19 550 000
Total Benefits (incl. 20% risk factor)	121 210 000	121 210 000	121 210 000	121 210 000	121 210 000	121 210 000
Discounted Customs Benefits (incl.risk factor)	13 255 247	13 255 247	13 255 247	13 255 247	13 255 247	13 255 247
Discounted Overall Benefits (incl.risk factor)	82 182 532	82 182 532	82 182 532	82 182 532	82 182 532	82 182 532
ROI for Customs	-12%	2%	2%	7%	6%	-44%
Overall ROI	**449%**	**535%**	**535%**	**563%**	**559%**	**250%**
Net present value	**67 203 464**	**69 240 856**	**69 232 456**	**69 790 892**	**69 711 639**	**58 718 460**

Table VI.6
Costs, Benefits, ROI and NPV for scenario 2
(United States dollars)

	Premises	*UNOG*	*UNICC*	*PAAS*	*IAAS*	*SAAS*
Development costs	1 127 000	1 127 000	1 127 000	1 127 000	1 127 000	–
Initial costs	1 450 000	792 500	743 000	183 000	743 000	15 000
Oper. + Hosting costs	2 981 001	668 962	706 912	497 244	421 098	8 250 000
Sub-total costs	5 558 001	2 588 462	2 576 912	1 807 244	2 291 098	8 265 000
Help Desk costs	2 210 000	2 210 000	2 210 000	2 210 000	2 210 000	1 286 300
National App costs	8 550 000	8 550 000	8 550 000	8 550 000	8 550 000	8 550 000
Total Costs	**16 318 001**	**13 348 462**	**13 336 912**	**12 567 244**	**13 051 098**	**18 101 300**
Total Costs (incl. 20% risk factor)	**19 581 601**	**16 018 155**	**16 004 295**	**15 080 693**	**15 661 317**	**21 721 560**
Discounted Costs (incl. risk factor)	14 979 069	12 362 151	12 337 675	11 543 030	12 523 940	15 492 843
Benefits for Customs (incl. 20% risk factor)	9 487 500	9 487 500	9 487 500	9 487 500	9 487 500	9 487 500
Total Benefits (incl. 20% risk factor)	58 822 500	58 822 500	58 822 500	58 822 500	58 822 500	58 822 500
Discounted Customs Benefits (incl.risk factor)	6 406 022	6 406 022	6 406 022	6 406 022	6 406 022	6 406 022
Discounted Overall Benefits (incl.risk factor)	39 717 335	39 717 335	39 717 335	39 717 335	39 717 335	39 717 335
ROI for Customs	-57%	-48%	-48%	-45%	-49%	-59%
Overall ROI	**165%**	**221%**	**222%**	**244%**	**217%**	**156%**
Net present value	**24 738 266**	**27 355 184**	**27 379 660**	**28 174 305**	**27 193 395**	**24 224 492**

Finally, the profitability of the project for single customs administration has been assessed, indicating that, from when approximately 30,000 TIR operations per year are fully computerized, the investment in both the eTIR international system and the costs to adapt a national IT system become profitable.

VI.2.8. Conclusions and recommendations

Combining their technical assessment with the results of the CBA, the consultants have made the following conclusions and recommendations:

- The eTIR system should be implemented as soon as possible to maximize its benefits;
- The best technical option to implement the eTIR international system is to use a Platform as a Service (cloud solution), closely followed by Iaas, UNICC and UNOG options;
- In scenario 2, even if the project does not have a positive ROI for customs alone, it remains a very profitable project overall.
- Processing annually 30,000 TIR operations electronically is sufficient to justify the investment in eTIR for any single customs administration.

VI.3. Assessment of the Cost Benefit Analysis by the secretariat

VI.3.1. Scope

VI.3.1.1. General

As highlighted by the Expert Group, when analysing earlier versions, the CBA does, unfortunately, not take into account any indirect benefits from the computerization of the TIR system. Indirect benefits can range from increased transport facilitation (due to the availability of advance information) to, ultimately, increased security of the TIR system, which is beneficial to both customs and the guarantee chain.

Furthermore, contrary to the consultants' assumption, both transport operators and the guarantee chain may incur costs from the introduction of the eTIR system.

VI.3.1.2. Technological options

The technological options in the CBA allow for a good comparison of the various hosting possibilities of the eTIR international system. Nevertheless, all analysed technological options are based on the development of the eTIR international system from scratch. The use (and configuration) of "off the shelf" solutions has not been considered, neither in the technical evaluation nor in the CBA.

VI.3.1.3. Scenarios

The two scenarios analysed by the consultants are relatively straightforward as they do not take into account any future political or economic developments. Over a decade, many factors may have a significant influence on the annual number of TIR transports. The following, non-exhaustive list, contains an overview of potential events, which may significantly influence the use of the TIR system and, thus, the eTIR international system:

- The ratification and use of the TIR Convention by new countries (e.g. China, Pakistan);
- The extension or creation of other transit agreements as alternatives to the TIR system (e.g. Turkey joining the Common Transit Convention);
- The creation or extension of Customs Unions (e.g. the Russian Federation-Belarus-Kazakhstan Customs Union);
- Variations in trade flows, which could significantly affect international road transport patterns;
- The fluctuation in energy prices, which has direct repercussions on the modal split of international transport.

It should be stressed that, although possibly important, the probabilities as well as the effects of such events occurring (as well as others) remain very difficult to estimate and require dedicated studies. The combined effects are even more difficult to analyse and, thus, it seems

understandable that the consultants have not taken them into account in the CBA. However, the two scenarios proposed by the consultants allow comparing two significantly different patterns in the usage of the eTIR international systems and their influence on the profitability of the project.

VI.3.2. Assumptions

The consultants' assumptions are sound and generally based on concrete reference material.[5] However, considering that some of the favoured options envisage that the eTIR international system be hosted in an international data centre in Geneva, the labour costs, calculated as a weighted average of European wages, seem too low.

VI.3.3. Methodological aspects

VI.3.3.1. Function point analysis

The FPA, used for the estimation of the development costs of the three components of the eTIR international system, allows for a realistic assessment of the complexity of each function to be performed by each component and allows, therefore, a realistic estimation of the development efforts for the whole system.

VI.3.3.2. Costs

The consultants have undertaken a very detailed analysis of the costs attributable to the various technological options. They thoroughly listed and priced development, equipment, helpdesk and maintenance costs for a system that can handle 3 million TIR transport per year. On the basis of optimistic and pessimistic assumptions, they have calculated minimum and maximum costs. Yet, to be on the safe side, they considered only maximum costs and have increased them by a 20 per cent risk factor.

However, the assumption that total variable costs can be divided by the number of TIR transports in order to calculate unitary costs is questionable. Indeed, this may be a valid assumption for cloud solutions, but it does not take into account that, for some options, the variable costs are not fully scalable (e.g. personnel or infrastructure costs). Furthermore, some costs may be missing or underestimated, in particular those that relate to personnel costs (see III.2), as well as training costs.

VI.3.3.3. Benefits

The consultants' estimation of the benefits is purely based on the difference in time required to provide and process electronic information compared to paper, together with the consequences of reducing the processing time for customs officers and the time spent at customs offices for transport operators. To be on the safe side, any benefits have been decreased by a 20 per cent risk factor. Therefore, the consultants did indirectly take into account that the benefits of a computerized system may not automatically lead to savings in personnel costs and that some benefits are already present today, e.g. the obligation to provide advance information on incoming TIR transports in the EU.

Considering that providing advance information to customs and increasing security are major objectives of the eTIR project, it is unfortunate that the consultants have not even made an attempt to estimate those benefits. Those missing benefits would, most likely, largely offset the costs which remain missing or are underestimated.

VI.3.3.4. CBA

The consultants have used a standard cost benefit methodology, calculating the present value of future costs and benefits with a 5 per cent discount rate. The use of both ROI and NPV

[5] The functionalities of the eTIR system, taken into account by the consultants in the CBA, are those described in version 3.0 of the eTIR Reference Model (ECE/TRANS/WP.30/2011/4). In case Contracting Parties, when preparing for the introduction of a legal framework to enable the eTIR system, decide to introduce requirements which are new to or different from those described in the eTIR Reference Model, the results of the CBA might change or even lose relevance.

gives an approximate idea of the profitability and the actual value of the project, taking into account the various technological options. Most importantly, the ROI and NPV allow for an adequate comparison of the technological options for both scenarios.

VI.3.4. Conclusions

The CBA provides, for the various technological options, a good estimation of the profitability of the eTIR project as well as an approximation of the amounts that would be required to develop and maintain it. It shows that the profitability of the project for customs alone depends significantly on the future usage of the system, but that the overall ROI remains highly positive, even if the system would only be used for a limited number of TIR transports.

Despite the fact that some assumptions of the CBA can be criticized for underestimating some costs and benefits, the methodology used remains solid and, therefore, the CBA demonstrates that the eTIR project could be greatly beneficial for all the actors involved in the TIR procedure, in particular transport operators.

VI.4. Recommendations

On the basis of the results of the CBA and its own expertise, the Expert Group is of the view that:

(a) Considering that the eTIR project seems to be highly profitable for all parties involved in the TIR procedure, it is recommended that the eTIR system should be implemented, including at national level, as soon as the legal provision would be prepared and ratified, the technical specification completed and a project road map agreed on;

(b) Considering the large benefits for TIR Carnet holders, a potential avenue to explore for the financing of the eTIR international system seems to be through a contributory system per TIR transport, similar to the one used for TIRExB;

(c) Considering the commercial sensibility of the data that will be handled by the eTIR international system and in view of the relatively small costs differences with the cloud solution recommended in the CBA, it is recommended that the eTIR international system be hosted at UNICC or UNOG data centres;

(d) Considering the availability of message broker software on the market, it is recommended to consider the use of "off the shelf" solutions, including open source, for the development of the eTIR international system.

IV. Annex VII

Joint Statement on the computerization of the TIR procedure

Endorsed in Geneva, on 11 June 2015

We, *the representatives of the Contracting Parties at the session of the Administrative Committee for the TIR Convention, 1975*, on 11 June 2015,

Recognizing the significance of economic globalization and the role of transport and border crossing facilitation as a prerequisite for more efficient international trade and competitiveness,

Aware of the essential need for modern, efficient, and coordinated functions of both customs and transport operations at border crossings,

Conscious of the need to foster transport and border crossing facilitation by further enhancing of the existing legal framework offered by the TIR Convention,

Noting the decision of the ECE Inland Transport Committee of February 2014 to urge Contracting Parties to the TIR Convention to accelerate efforts to complete and launch the computerization of the TIR procedure,

Welcoming the progress made towards the finalization of the electronic TIR (eTIR) Reference Model,

Aware of the need to develop an appropriate legal framework that will allow the TIR procedure to function electronically,

Dedicated to further facilitate legitimate trade and transport, protect government revenues,

Emphasizing the importance of a systematic electronic exchange of information between customs administrations to further improve management and controls,

Considering the need to allow a step-by-step introduction of a computerized TIR procedure,

Convinced that the computerization will not only improve the TIR system but also allow it to expand beyond its current frontiers,

Recognizing that, in times where customs administrations have or are in the process to computerize all customs procedure, the TIR Convention would become even more attractive if computerized,

1. *Invite* all Contracting Parties to the TIR Convention, 1975 to support the computerization of the TIR system by:

(a) Constructively contributing to the development of a legal framework that would enable progressive implementation of a computerized TIR procedure;

(b) Considering the eTIR Reference Model and all relevant international standards when computerizing the management of TIR operation at the national level;

(c) Actively taking part in the finalization and implementation of the eTIR by means of an integrated approach, taking into account all technical, legal, administrative and financial aspects and, thus,

(d) Providing, to the extent possible, support to those Contracting Parties that wish to implement computerization by means of exchange of information and technical know-how.

2. *Invite* other United Nations Member States to join and implement the TIR Convention and in this way support customs transit facilitation, ensuring that the TIR Convention remains an effective, efficient transport and border crossing facilitation tool.

V. Annex X

References

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