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1. Introduction

This manual is to explain the concept, the purpose and the usage of a set of mapping templates.

These mapping templates (to be designated simply by templates hereafter) were developed in the context of Activity 1, SubAct 1.1, Task 1.1.3 of the EU Project e-IMPACT.

The purpose of these templates is to assist any person (to be designated by adopter hereafter) in the process of adopting e-Freight messages in the context of its own business.

Briefly, the templates present the data structure of the e-Freight messages and their constituents, organized in a tabular layout. The rows contain the data elements (see 2. – Background). The columns have diversified nature (data characteristics/definitions, notes, cardinality, applicability and source/destination of data).

From the reading of the filled row/column intersections the adopter can figure out the current e-Freight messages' definitions and by filling the adequate intersections (see 4. – Templates' Layout) the adopter can configure the e-Freight messages to its business needs.

It is not in scope of the templates to provide a revision of the e-Freight messages' definitions.

1.1 – Audience

This manual and the templates are to be used by everyone interested in using e-Freight messages and has, or is developing, and IT application to support its business, or already uses electronic messages for document interchange in other formats.

It is essential to have deep knowledge of the business scenario, context, requirements and data, where e-Freight is being applied.

<p>Important: It is this degree of involvement that will support the adequate choices during the message specification.</p>
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It is useful to have some IT basic knowledge mainly on data modelling and data mapping.

It is an advantage to have past experience in the adoption of any kind (standard or not) of electronic messages' format. Due to past experience of this document development team, several notes are present having in mind EDIFACT users. However the general principals behind them are applicable to the context of other syntaxes.

Basic training in the use of spreadsheet is useful.



1.2 – Complementary Documents

By the nature of the toolkit, this manual and the templates are complemented by other documents. For the process of defining the messages to use, the document “e-IMPACT_Rules_and_Recommendations” is of essential reading.

2. Background

In the recent years, “a number of EU funded research and development projects have been addressing the issues of information and communication technologies in transport and logistics”¹. One of these projects is e-Freight, and one of its results was a common framework containing the definitions of a set of messages to support business documents interchange between several actors in the logistics and transport business.

This common framework was incorporated into ISO/IEC 19845 – “Information Technology – Universal Business Language Version 2.1 (UBL v2.1)”². UBL v2.1 models the processes and defines the documents supporting the interaction between logistics actors.

However there are three issues that need to be addressed in order to transform these results into practical solutions:

- e-Freight itself defines extensions to the definitions in UBL v2.1, both in terms of the existent messages in UBL and in terms of additional messages, since not all the common framework was included in UBL v2.1³.
- Simultaneously e-Freight messages included in the UBL v2.1 are a subset of the corresponding messages in UBL v2.1 since not all elements of the standard are used in e-Freight.
- It is difficult to apply the e-Freight definitions into practice mainly in situations of existent messages interchanges processes, lack of knowledge or experience in an adoption process of standards, and limited resources.

To address these issues, e-IMPACT project has as one of its goals the development of a toolkit containing a set of artefacts or tools. The choice of which artefacts to include was done in the context of Task 1.1.1, in Sub-Activity 1.1 of Activity 1 of e-IMPACT. A future adopter of e-Freight can use the artefacts in the toolkit that he finds convenient when going through the process of adopting e-Freight.

One of the identified artefacts is a set of templates to assist the e-Freight adopter in the mapping process between the e-Freight messages and its own messages in use even if they are also based on standards or internal data models.

¹ Pedersen, Jan Tore – “*One Common Framework for Information and Communication Systems in Transport and Logistics – Facilitating Interoperability*”, June, 2011.

² UBL v2.1 can be found at <http://docs.oasis-open.org/ubl/UBL-2.1.html>.

³ However it is known that steps are being taken in order to incorporate the missing issues in a future revision of UBL.



3. Mapping Templates List

Here is the list of the templates in the toolkit. The templates' filename format is

"e-IMPACT-<name in the column Name>-<UBL version> - MapTemplate - v<template version>.xlsx"

where "UBL version" is used as reference for the templates, and "template version" is the version of the template itself⁴. Currently UBL version is 2.1 and template version is 01.

Name	Initials	Type	Origin
CommonLibrary	-	Data Dictionary	UBL v2.1 with extensions of e-Freight
TransportServiceDescriptionRequest	TSDR	Message	UBL v2.1 with extensions of e-Freight
TransportServiceDescription	TSD	Message	UBL v2.1 with extensions of e-Freight
TransportExecutionPlanRequest	TEPR	Message	UBL v2.1 with extensions of e-Freight
TransportExecutionPlan	TEP	Message	UBL v2.1 with extensions of e-Freight
GoodsItemItinerary	GII	Message	UBL v2.1 with extensions of e-Freight
TransportProgressStatusRequest	TPSR	Message	UBL v2.1 with extensions of e-Freight
TransportProgressStatus	TPS	Message	UBL v2.1 with extensions of e-Freight
TransportationStatusRequest	TSR	Message	UBL v2.1 with extensions of e-Freight
TransportationStatus	TS	Message	UBL v2.1 with extensions of e-Freight
MultimodalWaybill	MWB	Message	e-Freight
CommonReportSchema	CRS	Message	e-Freight

For simplicity purposes, in this document the templates will be identified by the expression in the column Name in the above table.

⁴ The template version changes according to the procedures defined for the governance structure that will be proposed for e-Freight Adoption Toolkit.



4. Templates' Layout

The templates are spreadsheets. They are based on the spreadsheets provided by UBL v2.1⁵, but were modified in order to facilitate the mapping process and the choice of elements to use. They were done having in mind the practical usage.

Notes about the terminology used in this document.

Typically UBL refers to Business Information Entities (BIE) according to what it is defined in ISO/TS 15000-5:2005 Electronic Business Extensible Markup Language (ebXML) – Part 5: ebXML Core Components Technical Specification, Version 2.01. In practical terms, they all end up in being XML elements that are used or not in the messages. For the purpose of this document the term “element” is preferred.

Having this in mind, it may be complementary used the words “composite” and “simple” if the context of the text requires this qualification for clarity purposes. The “composite” word will be used to refer ABIE and ASBIE indifferently, and “simple” word will be used to refer BBIE. So we will have “composite element” and “simple element” when appropriate.

4.1 – Columns changes

One modification was the removal and the addition of columns. The removed columns are related with formal definitions that can be found in the original UBL spreadsheets.

The remaining columns are divided in sections based on the colour of their heading cells (each section corresponds to just one colour).

The yellow and grey sections correspond to columns present in the UBL spreadsheets, where the yellow ones are normative and the grey ones are non-normative. Apart of “UBL Name” columns, the option to leave these columns was their usefulness to understand the meaning, type and context (position in the structure) of each element.

The lilac, light blue, grey and light brown columns were added. The lilac ones provide guidelines for the application of the elements in a sense of a more practical approach.

The others were included to help the mapping between the e-Freight elements and several available syntaxes, ERP formats⁶ or the adopter’s internal applications data models. The number of columns, name and meaning in each section depends on each syntax’s characteristics⁷, or on the internal data model.

Following is a brief description of the purpose of all them.

Column	Description
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⁵ Example: <http://docs.oasis-open.org/ubl/os-UBL-2.1/mod/maindoc/UBL-TransportationStatus-2.1.xls> for message TransportationStatus.

⁶ Example: SAP IDoc.

⁷ At the moment of the development of the toolkit, the group didn’t have sufficient knowledge of ANSI X.12 in order to provide a clear and complete set of columns for this syntax. However, as ANSI X.12 is a widely used in several contexts, it is strongly advised to give more attention to this in the future.



<p>UBL Name</p>	<p><i>(from UBL spreadsheet):</i> The UBL name is derived from the Dictionary Entry Name according to the UBL Naming and Design Rules.</p> <p>If any disparity exists between the UBL Name listed here and the corresponding UBL Name in the schemas, the version in the schemas should be considered the correct one.</p>
<p>Representation Term</p>	<p><i>(from UBL spreadsheet):</i> Representation Term is metadata specified by the ebXML CCTS on the basis of ISO 11179 naming rules.</p> <p>A Representation Term is an element of the name that describes the form in which the property is represented.</p>
<p>Data Type Qualifier</p>	<p><i>(from UBL spreadsheet):</i> A qualifier is a word or words which help define and differentiate one data type from another of the same type -- for example, to distinguish those items constrained by particular code lists.</p>
<p>Data Type</p>	<p><i>(from UBL spreadsheet):</i> The data type distinguishes the lexical constraints on an item's value, plus any supplemental pieces of distinguishing information.</p> <p>Unqualified data types in UBL are based on UN/CEFACT core component types.</p>
<p>Associated Object Class</p>	<p><i>(from UBL spreadsheet):</i> This is the object class at the other end of this association. It is an ABIE in this model.</p>
<p>Alternative Business Terms</p>	<p><i>(from UBL spreadsheet):</i> Business Terms (optional) consists of one or more synonyms by which the Business Information Entity is commonly known and used in a specific Context. A Business Information Entity may have several Business Terms or synonyms. These may be used to map BIEs to a controlled vocabulary, to other vocabularies, or to labels for forms presentation.</p>
<p>Cardinality</p>	<p><i>(from UBL spreadsheet):</i> The optionality and potential occurrences of the BIE.</p> <p>0..1 – optional and only one 1 – mandatory and only one 0..n – optional and maximum of n 1..n - mandatory and maximum of n</p> <p>where the letter 'n' represents an unlimited number, and an actual number in place of the letter 'n' is the maximum.</p>
<p>Component Type</p>	<p><i>(from UBL spreadsheet):</i> There are three BIE Types:</p> <p>Basic BIE (BBIE -- white rows), Associate BIE (ASBIE -- green rows; “an association”), and Aggregate BIE (ABIE -- pink rows; “an aggregate”).</p>



Definition	<i>(from UBL spreadsheet):</i> This is the unique semantic business meaning of the Business Information Entity.
Examples	<i>(from UBL spreadsheet):</i> These are illustrative values that a typical user might utilize, but is under no obligation to to so.
UN/TDED Code	<i>(from UBL spreadsheet):</i> The UN Trade Data Element Dictionary (ISO 7372) code for this BIE.
Current Version	<i>(from UBL spreadsheet):</i> The version number of this BIE. Can be used to generate change logs.
Analyst Notes	<i>(from UBL spreadsheet):</i> This is a list of comments, queries, and notes made during data modelling. It is not part of the normative schemas.
CCL Dictionary Entry Name	<i>(from UBL spreadsheet):</i> Core Component Dictionary Entry Name: This is the Dictionary Entry Name of the correlated core component in the UN/CEFACT Core Component Library 08B (in those cases where a direct correlation exists).
Editor's Notes	<i>(from UBL spreadsheet):</i>
Changes from Previous Version	<i>(from UBL spreadsheet):</i>
Notes (e-IMPACT)	Notes, remarks and comments made during the template designing process.
e-IMPACT Cardinality	When the cardinality defined in the e-Freight differs from UBL definition (see Core Profiles below). Not used in the Common Library template.
Primitive Data Type	Programming language independent data type, sufficiently simple and common to embrace the most possible programming languages.
Usage Rules	Applicable usage rule of the element from the process perspective.
Usage Conditions	Applicable usage conditions of the element from the process perspective.
Usage Validations	Applicable usage validations of the element from the process perspective.
EDIFACT D.16A candidate messages	Typically EDIFACT messages model business documents. But comparing with the e-Freight messages, it can be seen that several EDIFACT messages provide the same or similar data for the same e-Freight message.
EDIFACT D.16A segment/group segment	Typically EDIFACT groups or segment groups model parts of business documents (a header, a line, etc). From the e-Freight perspective, this corresponds to composite elements.
EDIFACT D.16A data element	EDIFACT data element according to EDIFACT definition and that it is mapped against e-Freight elements that are simple



	elements.
EDIFACT D.16A data element type	EDIFACT data element type according to EDIFACT definition.
EDIFACT D.16A data element size	EDIFACT data element size to EDIFACT definition.
EDIFACT D.16A code list	When applicable, is the EDIFACT code list corresponding to be used in a particular data element.
EDIFACT usage conditions	When applicable, it defines constrains, rules or validations that condition the usage of the group of segments, segments, or data elements. Normally this appears written in the Message Implementation Guidelines.
EDIFACT example	Representation of segments and/or data elements according to the EDIFACT syntax. Normally this appears written in the Message Implementation Guidelines.
EDIFACT usage notes	Notes assisting or complementing the usage of the group of segments, segment or data element. Normally this appears written in the Message Implementation Guidelines.
ANSI X.12 stuff...	ANSI X.12 columns similar to EDIFACT columns in terms of purpose.
ANSI X.12 stuff...	ANSI X.12 columns similar to EDIFACT columns in terms of purpose.
Internal application schema/table	Application data structures containing data to be mapped with the data element.
Internal application field	Fields in the data structures that can be mapped to the element.
Internal application field type	Field type of the above field.
Internal application field size	Field size of the above field.
Internal application conditions	Conditions resulted from constrains from the adopter application.
Internal application modules/screens/pages	Modules, screens or pages in which the element is used, affects or is affected by.
Internal application rules	Specific rules applied to the element in the context of the adopter application.

The columns' organization is not rigid. The adopter may change the order, remove or add columns according to its own requirements.

However it is recommended to keep a copy of the original template.

4.2 – Line changes

Each line corresponds to one BIE that, as said above, it is simply designated by element.



Not all the elements are used in the e-Freight messages, even when making part of UBL. For these cases, their designation in the column “UBL Name” is strikethrough.

If the element is composite and it is not used, it means that its contained elements are not used in the context of that particular composite element, even if the contained elements’ name is not strikethrough. But any of those contained elements, composite or simple, may be used in the context of other composite elements.

On the other hand, one of the extensions of e-Freight is the inclusion of additional elements, most of them composite. These elements have their name in *italic*.

When looking to composite elements that are ASBIE, attention must be given to the fact the designation in the “UBL Name” column will not be found in the Common Library template. The designation that must be looked up in the Common Library template is in column “Associated Object Class”.

4.3 – The special case of Common Library

The Common Library Mapping Template although having basically the same organization, it incorporates some differences due to its nature.

Before presenting these differences, it is important to explain the difference in nature between this and the other templates. While the other templates correspond to one specific message each, the Common Library template corresponds to the data dictionary common to all messages.

Considering that a message is an ABIE, then it is common to all the messages’ templates that the ABIE is the main grouping criteria. Each ABIE contains the elements that define them.

However, while for the messages’ templates there is only one ABIE present (the message itself) for each template, the Common Library template has all the ABIE’s that are not messages, alphabetically ordered. The “all” means all elements of UBL and extensions introduced by e-Freight.

Listed in the following table, extra columns were needed to help adopters when dealing with this template, by allowing them to find which elements they need to look at, and in which messages they apply.

Column	Description
Used by e-Freight	<p>The information in this column applies only to composite elements that are ABIE.</p> <p>This column compliments the state of the UBL name (not strikethrough or strikethrough). If it has a “Y” it means that the composite element is used in one e-Freight message, at least.</p> <p>Based on this, a filter can be set to filter in only the used composite elements.</p>
applied to e-Freight message ...	<p>For each e-Freight message, identified by its initials, there is one of these columns.</p> <p>For a particular column, if the cell corresponding to a certain</p>



	<p>element is filled then it means that the element is used in that particular message.</p> <p>For ABIE the cells are filled just with “Y”. Otherwise they are filled with the cardinality of the element in the message.</p>
User Cardinality	<p>For each element and for the message being adopted, put the cardinality that is adequate for the business scenario under work.</p> <p>Note that the aim of the column is different from the aim of the columns “applied to e-Freight message ...”.</p> <p>See the Important note below.</p>

To make easier the navigation over this template, every line part of an ABIE is grouped using the spreadsheet functionality of grouping lines. This way the adopter can expand or collapse just the lines of the ABIE being under assessment or consulted.

Important: **The Common Library template contains the relation between each element and all e-Freight messages. However, when dealing with a particular message, a copy of the template should be made. Changes that result from the assessment and choices over the message should be made over this copy.**

In practice, one copy of the Common Library template should exist for each message the adopter chooses to use.

5. Usage Guidelines

As stated in the Introduction, it is not purpose of the e-IMPACT project to redefine the e-Freight messages’ structure and contents. The purpose is to assist the adopters in using of what is currently available. This scope defines the limits and the direction of the work done.

Having this in mind, the only pieces related with the e-Freight framework are the above listed templates for the purpose already mention. There are no specific (or new) xsd’s in this toolkit since the existent ones that belong to the common framework are included in the toolkit by inherence. Simultaneously, the spreadsheets present in the toolkit, although having modifications over the UBL v2.1 versions, totally respect the element alignment, naming, definition and type. Exception to this is the inclusion of e-Freight elements that extend UBL, and the mark as not used elements in UBL since they not appear in the e-Freight definitions.



5.1 – Full Profile versus Core Profile

In the context of the e-Freight as defined in the Common Framework V1.0⁸, for all messages except MWB and CRS, two profiles are presented.

The **Full Profile** corresponds to the most complete message definition. It assumes that all elements are used in the messages. The “all” means all elements in UBL that are not strikethrough in the templates and the elements that result from the e-Freight extensions.

For EDIFACT Users: The analogy with EDIFACT is that the Full Profile of one message corresponds to the publisher definition of one message in the EDIFACT Directories.

The **Core Profile** corresponds to a minimal message definition that guarantees that can be used for its main purpose. The presented core profiles were deducted based on the requirements identified in a set of pilot projects developed during the e-Freight project. In the templates the core profiles are reflected in the columns “applied to e-Freight message ...” in the Common Library template.

For EDIFACT Users: Again, the analogy with EDIFACT is that the Core Profile of one message corresponds to a Message Implementation Guide (MIG) proposed by an association or group of interest (example: SMDG). It is a subset of the published standard.

For the adopter, the exercise of adopting a particular message is to build the definition that will be between the Full and the Core profiles without new extensions, in order to respond to the business need.

5.2 – Approach the templates

Before start working with the templates, it is essential to know the requirements of the business scenario where the messages are being applied. The requirements should provide two sets of information that will guide the following work:

- Which documents are in place: This will guide you on the choice of the messages to use and their interaction.
- Which information to exchange: This will guide you on the identification of the elements to use in each message and its cardinality.

With this in mind then follow the sequence of steps.

⁸ See www.its.sintef9013.com/CF/v1/ as it is on Sep. 29th, 2016.



Step 1 Choose the e-Freight message to be adopted according to the document and/or the information to be exchanged and/or the stage of the business process where it is going to be applied.

Identify the applicable template and open it.

Step 2 Assess the simple elements in the message template. Consider that these elements are at header level of the message.

For most of the times there is little to do because e-Freight sets almost all the elements at this level as required (see the Cardinality and e-IMPACT Cardinality columns).

However, depending on the messages, there are elements at this level, that you can choose to use or not.

For EDIFACT Users: These correspond to data elements in segments at Level 0 or Level 1; typically segments UNH, BGM, DTM and FTX.

Step 3 Assess the composite elements in the message template.

These elements can be considered as header or detail. The distinction is done based on the cardinality of the element.

Typically a cardinality of 0..1 or 1 can mean the element is at header level. A cardinality of 0..n or 1..n can mean the element is at detail level.

Example: in all messages there is the element SenderParty with cardinality (e-IMPACT cardinality). This means that the message has one sender, not less, not more. So the SenderParty is at header level since it is the responsible party of sending the message.

Example: in the TransportationStatusRequest template, the element Consignment has cardinality 0..n. That means that you can have none to several consignments present, each one being a detail line of the document. So the Consignment is at detail level.

For EDIFACT Users: Composite elements at header level correspond to segment groups at Level 1 with reduced cardinality (≤ 9) and/or limited in the Message Implementation Guide, and where the business/process role does not repeat.

Example: although you can have several occurrences' of Name And Address (NAD) segment group, at this level only one occurrence identifies a "sender party".

Composite elements at detail level correspond to segment groups at Level 1 with high cardinality not limited in the MIG (they inherit the standard definition) and with repeating business/process role.



Example: on several occurrences of Consignment Information (CNI) segment group then the same thing in nature is present several times, and you distinguish between them by some data in the included segments and/or data elements (for instance, the B/L number in a RFF segment).

Step 4 For each composite element to be used, look for its definition in the Common Library template and expand it.

Step 5 Check which elements of the composite element under assessment are used in the chosen message and their cardinality, and that are part of the e-Freight definition (they are not strikethrough).

Step 6 Set up the cardinality of each adopted element according to the requirements but without compromising the definition expressed in the template. This should be placed in column "User Cardinality".

Example: if for a particular message, one element has cardinality 1..n, then it cannot have it changed to 0..n.

Regard that if an element that is not strikethrough has no cardinality information in the column corresponding to the message being worked, it still can be used. Simply put the required cardinality in the column "User Cardinality".

On the other hand, if an element has a 0..1 or 0..n cardinality and you are not going to use it, then put 0 in column "User Cardinality".

If nothing is placed in column "User Cardinality" then the default value is the cardinality applied in the context of the message being adopted.

For EDIFACT Users: In an EDIFACT message adoption scenario the above two steps correspond to the choice of Conditional elements to use, when departing from the standard.

However if the departure point is a MIG (published by an association or group of interest) that normally already has elements marked as "not used", then these elements should not be chosen in the adoption process. On the other hand, these documents also have elements marked as "required". Following the same principal, these should be adopted even if they will have dummy information.

Similar it is the setting up of the cardinality. If the data element in EDIFACT is 0..9, it cannot have 0..10 when being adopted.

Step 7 Map the chosen element to the other messages syntaxes' or internal application, as required.



Step 8 Write the applicable rules, references, etc. regarding the chosen element.

For EDIFACT Users: This step corresponds to the writing of usage notes or business rules that are placed in the MIG.

6. Examples

Examples of the templates usage can be found in the tool “e-IMPACT_Examples”, in particular section 3.2.

The examples are presented in the context of a hypothetical e-Freight adoption process. To make them interesting, the reader is driven through a business story where an analyst has to make some options on adopting e-Freight regarding the overall business goals.

The template are not alone in the Toolkit. The examples take this into account regarding specific points.

