### DATEX II v2.3

# SCHEMA GENERATION TOOL GUIDE

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## 2 INTRODUCTION





### 1. Introduction

#### 1.1. Objective

This deliverable documents the work on converting the DATEX II UML PIM into an XML Schema. The first chapter "UML To XSD Conversion Process" describes the used tools and the entire conversion process. Necessary mapping rules for such a conversion are written in the second chapter. The last chapter describes in detail the derived XML Schema.

#### 1.2. Document structure

This document is structured as follows:

- Section 1 gives an overview on the objectives of this document, its structure and how it fits into the whole set of DATEX II reference documents.
- Section 2 describes the UML to XSD conversion process

#### 1.3. DATEX II reference documents

Reference in this document	DATEX II document	Document version	Date
[Modelling methodology]	DATEX II Modelling methodology	2.3	30-09-2014
[Data model]	DATEX II Data model	2.3	30-09-2014
[Schema generationtool]	DATEX II schema generation tool	2.3	30-09-2014
[Exchange PSM]	DATEX II Exchange PSM	2.3	30-09-2014
[WSDL]	DATEX II Push/Pull	2.3	30-09-2014
[XML schema]	DATEX II v2.3 schema	2.3	30-09-2014
	Supporting documentation		
[User guide]	DATEX II User guide	2.3	30-09-2014
[Software developers guide]	DATEX II dev guide	2.3	30-09-2014
[XML schematoolguide]	DATEX II Schema generation tool	2.3	30-09-2014
	guide		
[Extension guide]	DATEX II Extension guideline	2.3	30-09-2014
[Profile guide]	DATEX II Profile guideline	2.3	30-09-2014
[Exchange PIM]	DATEX II Exchange PIM	1.01	08-02-2005

# 3 UML TO XSD CONVERSION PROCESS





### 2. UML To XSD Conversion Process

To derive an XML Schema from an UML model a conversion process is needed. Some tools must be used to facilitate a more or less automated way of converting UML into XML Schema. The first subchapter lists the needed tools and explains which software program is suitable for which part of the work.

4

A tailor-made transformation has to be used to create an XML Schema which is easy to generate and easy to use. The second subchapter explains the work flow of that automated process in detail.

Despite the automated process there may still be a couple of issues left which need to be resolved manually. These issues and the work required are described in the next part of this chapter.

This transformation runs in the context of a windows based application. The usage of the programme is also described in a separate subchapter.

#### 2.1. Used Tools

2.1.1. Enterprise Architect

Enterprise Architect of Sparx Systems has been used to create the platform independent DATEX II UML model. EA has a typical Windows look and feel and is easy to use. A free trial version and a full version for purchase are downloadable at <a href="http://www.sparxsystems.com.au">http://www.sparxsystems.com.au</a>. EA provides the possibility to use UML version 2.0 to create models. Its integrated XSD export capabilities are very useful for some quick results. Particular attention should be drawn to the export of UML models in XMI 1.1 which is the basis for DATEX II conversion.

#### 2.1.2. XMLSpy

Altova's XMLSpy is a convenient software tool to work with the derived XML Schema. A downloadable version is available at <u>http://www.altova.com</u>. It supports both XML Schema and XML. Its integrated XSL processor enables easy transformation. Also the validation feature has been used to check the correctness of the XML Schema and the derived XML files.

The above tool is only an example other tools free or commercial exists the can validate, view and process XML files and XML Schemas.

#### 2.1.3. Tailor-made transformation

To convert the XMI file derived from the UML model into the XSD it is necessary to use a tailor made conversion tool. The tool is built on Microsoft's ".NET 2.0" framework. The rules for the transformation are described in the DATEX II Methodology document.

#### 2.2. Automated Conversion Process

The following figure shows the work flow for an automated conversion process with the help of tools described in the previous section.

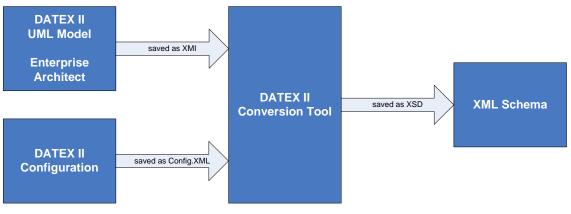


Figure 1 - conversion work flow

Having produced the XMI file from the UML model, a configuration file is required to control the conversion process. Upon selecting the XMI file and choosing the destination folder with the DATEX II conversion tool, the transformation process from XMI file to XSD schema file takes place.

These generated XSD files can be validated using a variety of XML tools including a web form offered by the World Wide Web Consortium W3C (<u>http://www.w3.org/2001/03/webdata/xsv</u>) or Altova's XML Spy.

#### 2.3. Manual Work

This chapter describes the creation of the XMI file within Enterprise Architect and the way to configure the tailor-made conversion tool.

2.3.1. Export an XMI file At first you have to select the root package "D2LogicalModel" within the project view.

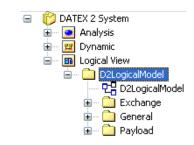


Figure 2 - select the package "D2LogicalModel"

Then you have to click the right mouse button and select the menu item "Import/Export"  $\rightarrow$  "Export package to XMI file...".

PIM	40 3 Reviewale 17102006			
	Import package from XMI file	Ctrl+Alt+I	Import/Export	Þ
The second secon	Export package to XMI file	Ctrl+Alt+E	Transform Current Package	Ctrl+Skift+H
	CSV Import/Export		Contents	,
c	Import NET XML Eile		Bookmarks	

Figure 3 - the menu item "Export package to XMI file..."

In the following dialog please select the path and file name for the resulting XMI file and make sure that only the option "Export Diagrams" is selected, XMI version is 1.1 and start the export by pressing the "Export" button.

Export Pa	ickage to XMI	×
Root Package	Logical	
Filename:	Z:\Source\Datex2\DATEX II Conversion 1.1\DATEX 2 Conversion.root\Testmod	
Stylesheet	(Optional stylesheet to post process XMI content)	
	General Options       For Export to Other Tools         ✓ Export Diagrams       ✓ Enable full EA Roundtrip         △ Export Alternate Images       ×MI Type:         ✓ Write Log file       ✓ Unisys/Rose Format	
	Use DTD Generate Diagram Images Format:	r
Progress	View XMI Export Close Help	

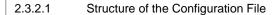
Figure 4 - Enterprise Architect XMI export dialog

The diagrams are needed to determine if dead links are contained in the model. The check itself and the exigency are described further in the "The model contains unused links or inheritances" chapter.

Now the XMI file should be created at the specified location and can be used by the tailor-made conversion tool.

#### 2.3.2. Conversion Tool configuration

The conversion tool can be configured using an XML file found in the same directory as the tool. This configuration file lists the names of the packages which are used to generate namespaces.



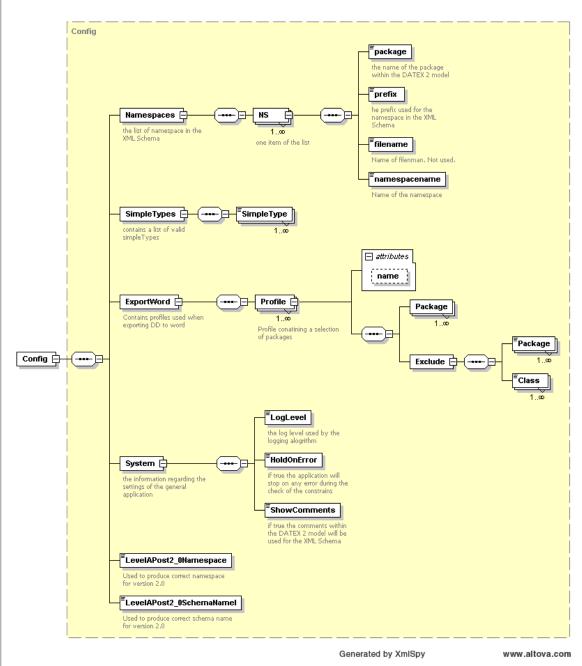


Figure 5 - XML Schema of the configuration file

Figure 5 shows the structure of the set-up. Any changes made need to follow this approach. Currently no more than one namespace can be used.

2.3.2.2 Configuration of the logging algorithm

The logging algorithm provided by this conversion tool has four logging levels which can be used in the configuration file.

Level	Name	Description
0	System	the logging algorithm is switched off and no log file will be produced
1	Error	only error messages will be shown in the log file
2	Warning	warnings and error messages will be shown in the log file
3	Debug	all information will be shown in the log file

#### 2.3.2.3 System Flags

There are two system flags embedded in the configuration file to steer the general behaviour of the conversion tool.

The first flag is "HoldOnError". If this flag is set to "true" the check of constrains at the beginning of the conversion process will stop on any error or violation found, otherwise only a warning will be shown and the conversion process will continue.

The second flag is "ShowComments". If this flag is set to "true" the definitions (tagged value) of the classes and elements will be converted into the XML Schema, otherwise the definitions will be left out.

#### 2.4. Conversion Tool

As described earlier, a tailor-made windows based program is used to carry out the tailor-made conversion between a DATEX II model and XML Schema.

2.4.1. Title bar

Title bar System requirements

This conversion tool requires the Microsoft .Net-Framework 2.0 as a system requirement. The .Net-Framework can be downloaded without charge from the Microsoft Download Centre - .Net-Framework 2.0

The conversion tool consists of the following files which have to be within the application directory.

Filename	Description
Config.xml	the configuration file
Config.xsd	the XML Schema of the configuration file
D2Conversion.chm	the online help file
D2Conversion.exe	the conversion tool itself
Logging.dll	the library with logging algorithm
RuleSet.dll	the library containing the conversion rules
MultiLingualString.xsd	definition of the MultiLingualString type
DATEXIIDD_template.dotx	a word template used when generating data dictionary
Reference.xsd	definition of Reference data type
VersionedReference.xsd	definition of VersionedReference data type

	Conversion				
File ?					
Configuration	Selection	Log			
	diagram pa		a transformation from a ATEX II XML Schema.	DATEX II UML class	~
Directory for	or resulting.	XML Schema	a files		
					<<
- Model info	mation				
XMI versio	on:		Model level:		
Model bas	e Version:		Extension name:		
Version:			Extension version:		
Configurati	ion				
Gener	ate with defi	initions (doci	umentation)		
Namespac	ce:				
Schema n	ame:				
Progress					
		aat			aakMadal Start
Progress Exit	Ret	set		Ch	eckModel Start
	Re		igure 6 - graphical use		eckModel Start
Exit 2. Ti title bar is t	itle bar	F tal bar at th	igure 6 - graphical use e top of a window indic <b>mize</b> and <b>Close</b> .	er Interface	eckModel Start
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Exit 2. Ti e title bar is t program syn D2 D/ 3. M e functions o	itle bar the horizon mbol, the b <b>ATEX II</b> lenu bar ffered by th	F tal bar at the buttons <b>Mini</b> <b>Conve</b> ne button ba	e top of a window indic mize and Close. rsion Figure 7 - menu ar and the button of the	er Interface cating the name of bar e entry field can be	the window. It also contai
Exit 2. Ti e title bar is t program syn D2 D/ 3. M e functions o ine help and	itle bar the horizon mbol, the b <b>ATEX II</b> lenu bar ffered by th	F tal bar at the buttons <b>Mini</b> <b>Conve</b> ne button ba	e top of a window indic mize and Close. rsion Figure 7 - menu ar and the button of the	er Interface cating the name of bar e entry field can be	the window. It also contai

File	) ?	
	Select XMI file	
	Select output path	
	Start Conversion	
	Export Dictionary	F11
	Exit	

Figure 9 - menu "File"

2.4.3.2 Menu "?"

The menu "?" offers the possibility to get the about dialog and the online help.

D2 D	D2DATEX II Conversion					
File	?					
		Help	hation from			
		About DATEX II Conversion	ma.			
N	ame	of the XMI file				

Figure 10 - menu "?"

2.4.4. Entry field

You can either enter the XMI source file and output directory path in the entry fields or use the buttons on the right to navigate to the file and directory.

	~~
)irectory for resulting XML Schema files	

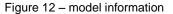
Figure 11 - entry fields

By using the buttons a number of checks are performed after the selection.

2.4.5. Model information

These fields will be set when the XMI files is opened. Model version, Extension name and Extension version are read from tagged values. Extension Level is set according to what extensions are found in the model.

Model information	
XMI version:	Model level:
Model base Version:	Extension name:
Version:	Extension version:



2.4.6. Configuration

In this section you can select whether you would like to generate a schema with documentation. If a Level A schema is generated then Namespace and Schema name are set automatically by the tool. If it's a Level C schema then these two fields have to be set manually.

Configuration Generate with definitions (documentaion) Namespace: Schema name:
Figure 13 - configuration
2.4.7. Button bar The button bar provides access to the main function of this conversion tool.
Figure 14 - button bar
The button "Exit" closes the dialog and finishes the program. The button "Reset" resets the dialog and clears the entry fields for a new conversion. The button "Start" launches the conversion of the given DATEX II model.
2.4.8. Progress bar The progress bar shows the progress of the constraint checking and the conversion process.
Progress
Figure 15 - progress bar showing the constrain-checking progress
After pressing the "Start" button a constraints check will be performed before the real conversion starts.
2.4.9. Selection tab On the selection tab it's possible to select/deselect parts of the UML model. This will create a Sub- Schema.

ſ	D2 DATEX	II Conversion	n	_	_				_	x
	File ?	all sold		Passa						
	Configuratio	on Selection	Log							
	÷▼		Publication oadPublic defaultLar feedDesc feedType publication publication Catalogue Elaborated Measured Measured Measured TrafficViev SituationP Situation Catalogue	ation nguage iption Time Creator Publication dDataPublica DataPublica uent Site Tabl cation dLocationsP wPublication ublication on	tion ePublication ublication					
	Exit	R	eset				Ch	eckModel	St	art
L				Figur	e 16 – Selec	tion tab				
ultiplicity 4.9.1	etc. The r Save S election m	he tree no menus are Selection nade to a f Selection	descrit		to access m w.	ienus to	save o	or load a	selectio	on or mod
-		ived selec	tion fror	n file.						
4.9.3 nly selec		te options n an attrib D2 Attribute Multiplicity Da	Options -		This will ope tion	n up a n	ew win	dow.	×	
		Original lowe	er bound 🛛 🕦		Modified Lower bo	und				
		Original Upp	er bound 1		Modified Upper bo	und				
							_			
								Close		

On the Multiplicity tab it's possible to tailor the multiplicity. Remark that it's only possible to modify the multiplicity in a compatible way.

On the Datatype tab information about the datatype is shown. If the datatype is an enumeration it's possible to select / deselect literals as shown below.

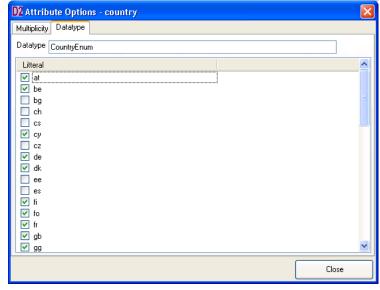


Figure 18 – Attribute options, enumerations

2.4.9.4 Relation options

Relation options is only selectable when a relation node is selected in the tree. When selected a new windows is shown.

D2 Relation options			×
Multiplicity			
Original lower bound	0	Modified Lower bound	
Original Upper bound	1	Modified Upper bound	
			Close

Figure 19 – Relation options

Here it's possible to modify the multiplicity on the relation. Remark that it's only possible to modify the multiplicity in a compatible way.



Members menu is only accessible when a class is selected. It shows all attributes and relations for a class including those that are inherited.

We be a class number       Image in the state of the sta					
StuatorPublication Prelation Stuator default_anguage PrevioadTublication Attribute readDecipion PayloadTublication Attribute publicationTime Constraints publicationTime PayloadTublication Attribute publicationTime PayloadTublication Attribute publicationTime PayloadTublication Attribute publicationTime PayloadTublication Attribute publicationTime PayloadTublication Attribute publicationTime PayloadTublication PayloadTublication The PayloadTublication Attribute publicationTime PayloadTublication Attribute publicationTime PayloadTublication PayloadTublication Figure 20 – Members window 4.10. Log tab the Log tab the same information that is written to the log is shown.					
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Figure 20 – Members window .10. Log tab the Log tab the same information that is written to the log is shown. D2 DATEX II Conversion File ? Configuration Selection Log 08:48:56 - [3] - reading of namespace information successful 08:48:56 - [3] - reading of predefined simpletype information successful 08:48:56 - [0] - reading of predefined simpletype information successful 08:48:56 - [0] - reading of configuration file complete 08:59:41 - [0] - Start loading '51_018.xml'				Close	
.10. Log tab the Log tab the same information that is written to the log is shown. D2 DATEX II Conversion File ? Configuration Selection Log 08:48:56 - [3] - reading of namespace information successful 08:48:56 - [3] - reading of predefined simpletype information successful 08:48:56 - [0] - reading of predefined simpletype information successful 08:48:56 - [0] - reading of configuration file complete 08:59:41 - [0] - Start loading '51_018.xml'				C1036	
File       ?         Configuration       Selection       Log         08:48:56 - [3] - reading of namespace information successful       08:48:56 - [3] - reading of predefined simpletype information successful         08:48:56 - [3] - reading of predefined simpletype information successful       08:48:56 - [0] - reading of configuration file complete         08:59:41 - [0] - Start loading '51_018 xml'       Start loading '51_018 xml'		information that	is written	to the log is sho	
Configuration         Selection         Log           08:48:56 - [3] - reading of namespace information successful         08:48:56 - [3] - reading of predefined simpletype information successful           08:48:56 - [3] - reading of predefined simpletype information successful         08:48:56 - [0] - reading of configuration file complete           08:59:41 - [0] - Start loading '51_018 xml'         08:59:41 - [0] - Start loading '51_018 xml'	D2 DATEX II Conve	ersion			
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08:48:56 - [3] - reading of namespace information successful 08:48:56 - [3] - reading of predefined simpletype information successful 08:48:56 - [0] - reading of configuration file complete 08:59:41 - [0] - Start loading '51_018.xml'	Configuration Sele	ection Log			
08:48:56 - [3] - reading of predefined simpletype information successful 08:48:56 - [0] - reading of configuration file complete 08:59:41 - [0] - Start loading '51_018 xml'					
	08:59:41 - [0] - Start	t loading '51_018.x	n file comp ml'	lete	
Exit Reset CheckModel	Exit	Reset			CheckModel Start
		Hesel			Start Start

2.4.11. Application configuration

The configuration of this application is located in the XML file "Config.xml" in the program directory.

If the configuration file can not be read at start up, the application will not be able to make the conversion.

0	
2	The configuration file for this Application could not be read

Figure 22 - error message "Load Error"

If this error occurs, please ensure that there is a configuration file located in the application directory and that it is called "Config.xml".

2.4.12. Conversion process

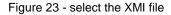
The following paragraphs describe the steps of the conversion of a DATEX II UML model into DATEX II XML Schema.

2.4.12.1 select source file

To select the source file, either enter the name with its full path for the extracted XMI file in the entry field for "Name of the XMI file", or use the button on the right to navigate to the XMI file.

Using the latter, the following dialogue box will appear:

Select the XMI	file				? 🔀
Look in:	PIM v1.0033		•	+ 🗈 💣 🎟	•
listory	C XSD	00_JHB_PIM_V1_00033.xml			
Desktop					
My Documents					
My Computer					
<b>(</b>					
My Network Places	File name:			-	Open
Haces	Files of type:	EA XMI file (*.xml)		•	Cancel



After confirming the entry a check of the source XMI file will be performed. If the test is successful the path will be shown in the entry field, otherwise the following message box will appear.

If an invalid source file was selected the following dialog box appears and the start button will be disabled.

Namesp	ace packages not found 🛛 🔀
8	The selected XMI file does not contain the pre-defined namespace packages!
	(OK]
	Figure 24 - no namespace found in source file

#### 2.4.12.2 Select target directory

To select a target directory you can either enter the path in the entry field by clicking on the right button or you can select the menu item "select output path".

Using the second method the following dialogue box will appear.

Browse For Folder 🛛 💽 🔀
Desktop     My Documents     My Computer     My Network Places     Recycle Bin     E Internet Explorer     bin
OK Cancel <u>N</u> ew Folder

Figure 25 - select target folder

After confirming the selection, the program checks whether the pre-defined namespace file exists in the selected folder. If it finds relevant files, the following message will pop up.

ĺ	File exis	st 🛛 🕅
	?	One or more XML Schema files already exist in the specified target directory. Overwrite these files?
		Yes No

Figure 26 - files in target directory already exists

Clicking on "Yes" the existing files will be overwritten. Clicking on "No" the path will not be selected. 3.1.1

2.4.12.3 Starting the conversion

By pressing the Start button the conversion will be started. While the conversion is in progress only the Exit button and the help is available. The conversion process first consists of checking the constrains in the model and afterwards the conversion itself.

3.1.2

2.4.12.4 Failures during constrains checking and conversion

A failure of any kind during the checking and the conversion process will stop the conversion program, no XML Schema files will be created and the following dialogue box appears. In addition a log file entry with a further description of the failure will be generated.



Figure 27 - dialog "Failure Conversion"

The following errors can occur during the constraints checking and conversion process.

2.4.12.5 No diagram information within the XMI file

If the XMI does not contain diagram information the following dialog appears.



Figure 28 - dialog "No diagrams found"

Without the diagram information the conversion can not be performed.

2.4.12.6 Violation of an constrains found

If the model contains an aggregation or composition which is of an invalid direction the following dialog appears.

Constrai	ns violation
8	Found 3 Aggregations or Compositions which are not of the correct direction 'Source -> Destination'. The check will continue but conversion will be stopped.
	<u> </u>
	Figure 29 - dialog "Constrains violation" with holdOnError true
	Constrains violation
	Found 3 connections which are not of the type Aggregation or Composition. The check will continue but conversion will be stopped.
	<u> </u>
	Figure 30 - dialog "Constrains violation" with holdOnError true
Constrai	ns violation
⚠	Found 1 Aggregations or Compositions which are not of the correct direction 'Source -> Destination'. Conversion will continue.
	OK

Figure 31 - dialog "Constrains violation" with holdOnError false

Constrains violation       Image: Constraint of the type Aggregation or Composition Conversion will continue.         Figure 32 - dialog "Constrains violation" with holdOnError false         For every violation one log file entry is generated.         15:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:19:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:10:10 - [1] - found a connection of type Aggregation which has a wrong direction relating of 14:10 - [1] - found a connection of type Aggregation which has a wrong direction relating of 14:10 - [1] - found a connection continue.         Cyclic loop found       [1] - [1]	
Conversion will continue.           Figure 32 - dialog "Constrains violation" with holdOnError false           For every violation one log file entry is generated.           15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:10:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 10:00 found           2.4.12.7         Cyclic loops found           If the model contains forbidden cyclic loops with an association with a class as start and end following dialog appears.           Figure 34 - dialog "cyclic loop failure" with holdOnError true           Image: Conversion will continue.           Image: Convers	
Figure 32 - dialog "Constrains violation" with holdOnError false For every violation one log file entry is generated. $\begin{array}{c} 15:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 15:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of Figure 33 - log file entry for each violation 2.4.12.7 Cyclic loops found If the model contains forbidden cyclic loops with an association with a class as start and end following dialog appears. \begin{array}{c} \hline cyclic \ loop \ found \ cyclic \ loops \ the conversion can not be performed! \hline cyclic \ loop \ found \ cyclic \ loop \ failure" with holdOnError true \hline cyclic \ loop \ found \ cyclic \ loop \ failure" with holdOnError true \hline cyclic \ loop \ found \ cyclic \ loop \ failure" with holdOnError true \hline cyclic \ loop \ found \ cyclic \ loop \ failure" with holdOnError true Figure 33 - dialog "cyclic \ loop \ failure" with holdOnError true \hline cyclic \ loop \ found \ cyclic \ loop \ failure" with holdOnError true Figure 35 - dialog "cyclic \ loop \ failure" with holdOnError trues Figure 35 - dialog "cyclic \ loop \ failure" with holdOnError trues Figure 35 - dialog "cyclic \ loop \ failure" with holdOnError trues Figure 35 - dialog "cyclic \ loop \ failure" with holdOnError trues Figure 36 - log file entry for a cyclic \ loop \ failure \ line \ the following. 09:00:54 - [1] - An cyclic \ loop \ found \ relating \ class \ lass 1 Figure 36 - log file entry for a cyclic \ loop \ failure \ file \ cyclic \ loop \ failure \ cyclic \ loop \ fail$	
For every violation one log file entry is generated. 15:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of Figure 33 - log file entry for each violation 2.4.12.7 Cyclic loops found If the model contains forbidden cyclic loops with an association with a class as start and end following dialog appears. <b>Cyclic loop found</b> <b>Cyclic loop found</b> <b>Cyclic loop found</b> <b>Figure 34</b> - dialog "cyclic loop failure" with holdOnError true <b>Cyclic loop found</b> <b>Cyclic loop </b>	(OK]
For every violation one log file entry is generated. $I_{5:10:30}^{1:10:30} - [1] - found a connection of type Aggregation which has a wrong direction relating of Figure 33 - log file entry for each violation 2.4.12.7 Cyclic loops found If the model contains forbidden cyclic loops with an association with a class as start and end following dialog appears. Cyclic loop found relating class Class1 Cyclic loop found relating class C$	alog "Constrains violation" with holdOnError false
$\begin{array}{c} 13:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:18:30 - [1] - found a connection of type Aggregation which has a wrong direction relating of 13:18:30 - [1] - An cyclic loops with an association with a class as start and end following dialog appears.   \begin{array}{c} \text{Cyclic loop found} & \hline (1) & \hline ($	
2.4.12.7Cyclic loops found If the model contains forbidden cyclic loops with an association with a class as start and end following dialog appears.Cyclic loop foundImage: Cyclic loop found Image: Cyclic loop found relating class Class1 Image: Cyclic loop file entry for a cyclic loop S1.2.1.1 2.4.12.8 Image: Cyclic loop found Image: Cyclic loop found relating class Class1 Image: Cyclic loop file entry for a cyclic loop Image: Cyclic loop S1.2.1.1 2.4.12.8 Image: Cyclic loop found Image: Cyclic loop Image: Cyclic loop Im	f type Aggregation which has a wrong direction relating class 'V
If the model contains forbidden cyclic loops with an association with a class as start and end following dialog appears. Cyclic loop found       Image: Cyclic loop found         Image: This DATEX 2 model contains 3 cyclic loops which are not allowed.       Image: Cyclic loop found         Image: This DATEX 2 model contains 3 cyclic loops which are not allowed.       Image: Cyclic loop found         Image: Cyclic loop found       Image: Cyclic loop failure         Image: Cyclic loop found       Image: Cyclic loop failure         Image: Cyclic loop found       Image: Cyclic loop failure         Image: Cyclic loop failure       Image: Cyclic loop failure         Image: Cyclic loop failure       Image: Cyclic loop failure         Image: Cyclic loop found cyclic loop failure       Image: Cyclic loop failure         Image: Cyclic loop found cyclic loop found relating class Class1       Image: Cyclic loop failure         Image: Cyclic loop found relating class Class1       Image: Cyclic loop failure         Image: Cyclic loop found relating class Class1       Image: Cyclic loop failure	ure 33 - log file entry for each violation
It is DATEX 2 model contains 3 cyclic loops which are not allowed. Therefor the conversion can not be performed!         Image: Cyclic loop found         Figure 34 - dialog "cyclic loop failure" with holdOnError true         Image: Cyclic loop found         Image: Cyclic loop         Image:	c loops with an association with a class as start and end of the I
Therefor the conversion can not be performed! OK Figure 34 - dialog "cyclic loop failure" with holdOnError true Cyclic loop found N This DATEX 2 model contains 3 cyclic loops which are not allowed. Conversion will continue. OK Figure 35 - dialog "cyclic loop failure" with holdOnError false Also a log file entry for each found cyclic loop is generated like the following. 09:00:54 - [1] - An cyclic loop found relating class Class1 Figure 36 - log file entry for a cyclic loop 3.1.2.1.1 2.4.12.8 Multiple inheritance found	nd 🛛 🔀
Figure 34 - dialog "cyclic loop failure" with holdOnError true          Cyclic loop found       Image: Cyclic loop found         Image: Cyclic loop found       Image: Cyclic loop swhich are not allowed.         Image: Cyclic loop found       Image: Cyclic loop failure         Image: Cyclic loop found       Image: Cyclic loop failure         Image: Cyclic loop failure       Image: Cyclic loop failure         Image: Cyclic loop found relating class Class1       Image: Cyclic loop failure         Image: Cyclic loop failure       Image: Cyclic loop failure         Image: Cyclic loop found relating class Class1       Image: Cyclic loop failure         Image: Cyclic loop failure       Image: Cyclic loop failure         Image: Cyclic loop failure       Image: Cyclic loop failure         Image: Cyclic loop found relating class Class1       Image: Cyclic loop failure         Image: Cyclic loop failure       <	FEX 2 model contains 3 cyclic loops which are not allowed. r the conversion can not be performed!
Cyclic loop found       Image: Cyclic loop found         Image: Image: Image: Cyclic loop found cyclic loop found relating class class1         Image: Image: Cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loop found relating class class1         Image: State of the cyclic loo	(ОК
This DATEX 2 model contains 3 cyclic loops which are not allowed.         Conversion will continue.         OK         Figure 35 - dialog "cyclic loop failure" with holdOnError false         Also a log file entry for each found cyclic loop is generated like the following.         09:00:54 - [1] - An cyclic loop found relating class Class1         Figure 36 - log file entry for a cyclic loop         3.1.2.1.1         2.4.12.8	lialog "cyclic loop failure" with holdOnError true
This DATEX 2 model contains 3 cyclic loops which are not allowed.         Conversion will continue.         OK         Figure 35 - dialog "cyclic loop failure" with holdOnError false         Also a log file entry for each found cyclic loop is generated like the following.         09:00:54 - [1] - An cyclic loop found relating class Class1         Figure 36 - log file entry for a cyclic loop         3.1.2.1.1         2.4.12.8	
Conversion will continue.         OK         Figure 35 - dialog "cyclic loop failure" with holdOnError false         Also a log file entry for each found cyclic loop is generated like the following.         09:00:54 - [1] - An cyclic loop found relating class Class1         Figure 36 - log file entry for a cyclic loop         3.1.2.1.1         2.4.12.8       Multiple inheritance found	
Figure 35 - dialog "cyclic loop failure" with holdOnError false Also a log file entry for each found cyclic loop is generated like the following. 09:00:54 - [1] - An cyclic loop found relating class Class1 Figure 36 - log file entry for a cyclic loop 3.1.2.1.1 2.4.12.8 Multiple inheritance found	
Also a log file entry for each found cyclic loop is generated like the following. D9:00:54 - [1] - An cyclic loop found relating class Class1 Figure 36 - log file entry for a cyclic loop 3.1.2.1.1 2.4.12.8 Multiple inheritance found	ОК
09:00:54 - [1] - An cyclic loop found relating class Class1 Figure 36 - log file entry for a cyclic loop 3.1.2.1.1 2.4.12.8 Multiple inheritance found	ialog "cyclic loop failure" with holdOnError false
Figure 36 - log file entry for a cyclic loop 3.1.2.1.1 2.4.12.8 Multiple inheritance found	yclic loop is generated like the following.
3.1.2.1.1 2.4.12.8 Multiple inheritance found	oop found relating class Class1
2.4.12.8 Multiple inheritance found	jure 36 - log file entry for a cyclic loop
If a multiple inheritance is used in the DATEX II model the following dialog appears and the obs stopped.	
Multiple Inheritance found	e found 🛛 🔀
Forbidden Multiple Inheritance was found. Conversion was stopped! Please refer to log file 'D2Conversion_2004728.log' for further information!	
OK	
Figure 37 - multiple inheritances found with holdOnError true	<u>OK</u>

Multiple Inheritance found					
Forbidden Multiple Inheritance was found. Conversion will continue! Please refer to log file 'D2Conversion_20040729.log' for further information!					
ОК					
Figure 38 - multiple inheritances found with holdOnError false					
The log file will have an entry for every multiple inheritance found in the model.					
10:52:38 - [1] - A forbidden multiple inheritance was found relating class TrafficElement. 10:52:38 - [1] - A forbidden multiple inheritance was found relating class ExhaustPollution. 10:52:38 - [1] - A forbidden multiple inheritance was found relating class OperatorAction.					
Figure 39 - log file entry for three multiple inheritance					
2.4.12.9 The model contains unused links or inheritances During model development it may happen that an aggregation, composition or inheritance is not deleted correctly and therefore this connection is still part of the model.					
Dead links discovered       Image: Comparison of the model         Image: Comparison of the model       Image: Comparison of the model					
Figure 40 - dialog "Dead link discovered" for both values of holdOnError					
The log file will have an entry for every dead link found in the model.					
08:41:21 - [2] - a dead link between 'Record' and 'Situation' found! 08:41:22 - [2] - a dead link between 'Record' and 'TrafficView' found! Figure 41 - log file entry for two dead links					
2.4.12.10 Violation of the naming convention					
If the model contains a violation of the naming convention the following dialog appears.					
Naming convention violation					
A violation of the naming convention was discovered. Conversion was stopped! Please refer to log file 'D2Conversion_20040729.log' for further information!					
<u>OK</u>					
Figure 42 - dialog "Naming convention violation" with holdOnError true					
Naming convention violation					
A violation of the naming convention was discovered. Conversion will continue! Please refer to log file 'D2Conversion_20040729.log' for further information!					

Figure 43 - dialog "Naming convention violation" with holdOnError false

Also a log file entry for each violation is generated.



Figure 44 - log file entry for a violation





Figure 45 - dialog "Package error" for both values of holdOnError

The log file has an entry for every package without a related class diagram.

15:11:27 - [1] - no diagram for the package 'Exchange' found!

Figure 46 - log file entry for a violation

2.4.12.12 Error while converting the packages

If an error occurs during the conversion of the packages the following dialog appears.



Figure 47 - error while converting packages

The error may be due to a missing element in the XMI file for example.

2.4.12.13 Error while converting the classes

If an error occurs during the conversion of the classes the following dialog appears.



Figure 48 - error while converting classes

The error may be due to a missing element in the XMI file for example.

2.4.12.14 Missing data type of an attribute

If an attribute has no data type the following dialog appears. The data type of this attribute will be set as "xs:string" and the conversion will **not** be stopped.

Data typ	oe missing 🛛 🔀
⚠	No data type found for element 'alertCLocationCountryCode' in class 'AlertCLocationTable'. The data type is set to the default value 'xs:string'.
	(OK

Figure 49 - no data type for an attribute found

#### 2.4.12.15 Cyclic references found

Before finishing the conversion process it is checked if any cyclic references exist between the namespaces. These cyclic references cause problems while validating the XML Schema with several tools.

Cyclic r	references 🛛 🔀
8	Forbidden cyclic references between namespaces found! Conversion will be stopped
	OK
Figure	50 - dialog "Cyclic references" with holdOnError true
Cyclic r	eferences 🛛 🗙
1	Forbidden cyclic references between namespaces found! Conversion will be continue

Figure 51 - dialog "Cyclic references" with holdOnError false

The log file contains two entries for every cyclic loop.

11:28:41 - [1] - Forbidden cyclic references between namespace 'Payload' and 'General' found! 11:28:41 - [1] - Forbidden cyclic references between namespace 'General' and 'Payload' found!

#### 2.4.12.16 Extension check

Checks will be done for the tagged value *extension*. If the tag contains any values other than "levelb" or "levelc" then an error will be raised.

#### 2.4.12.17 General conversion errors

If a general error occurs the description of the error will be shown in the following dialog. For example if the existing XML Schema files in the specified location are read-only. Therefore the new XML Schema files cannot be written to the specified location.



Figure 52 - a general conversion error has been occurred

2.4.12.18 Successful conversion

If the conversion finishes successfully the following dialog appears indicating that the XML Schema files have been created at the specified location.

Convers	ion complete 🛛 🛛
(į)	The conversion finished successfully
	OK

Figure 53 - conversion successful

2.4.13. logging algorithm

The logging algorithm provides additional information about the conversion process. For example the result of the constraints checking is listed within the log files. The log files are created on a daily basis. The entries of the log file have different levels as described in a previous chapter.

```
09:23:58 - [0] - log started with log level = Debug = 3
09:23:58 - [3] - reading of namespace information successful
09:23:58 - [3] - reading of the data type conversion table successful.
09:23:58 - [0] - reading of configuration file complete
09:24:11 - [0] - start checking the constrains
09:24:11 - [3] - the model does not contain forbidden cycles.
09:24:16 - [3] - the model is according to the naming convention
09:24:19 - [3] - no forbidden multiple inheritance found
09:24:19 - [0] - checking the constrains successful finished
09:24:19 - [0] - start conversion of 'PIM v29.xml'
09:24:19 - [3] - creation of XML Schema file for namespace D2LogicalModel
09:24:19 - [3] - creation of XML Schema file for namespace General
09:24:19 - [3] - creation of XML Schema file for namespace Publication
09:24:21 - [2] - The class 'PoliceOperation' is an empty element.
09:24:31 - [3] - XML Schema output path D:\
09:24:31 - [3] - saving of XML Schema file D2LogicalModel.xsd for namespace D2LogicalModel
09:24:31 - [3] - saving of XML Schema file General.xsd for namespace General
09:24:31 - [3] - saving of XML Schema file Publication.xsd for namespace Publication
09:24:31 - [3] - number of packages = 83
09:24:31 - [3] - number of classes = 270
09:24:31 - [3] - number of attributes = 333
09:24:31 - [3] - number of enumerations = 772
09:24:31 - [3] - number of associations = 163
09:24:31 - [3] - number of generalization = 104
09:24:32 - [0] - the conversion finished successfully
09:24:33 - [0] - log finished
```

Figure 54 - sample log file of a successful conversion

The figure above shows a sample log file of a successful conversion with the logging level 3 defined in the configuration file. The first column shows the time of the event followed by the logging level number. The last column is the underlying text of this log file entry.

#### 2.5. Constraints that are checked by the conversion tool

The following table shows the constraints which are checked by the conversion tool.

Constraint	
An aggregation or compos	ition is not navigable.
Only aggregations and cor	npositions are allowed.
Cyclic references are not a	allowed.
A multiplicity other than 1	or not set at the source of an aggregation or composition is not allowed.
Multiple Inheritance is not	allowed
The naming convention ha	is to be fulfilled.
No cyclic references betwe	een the namespaces are allowed.
Naming convention	
Extension tagged values	
Attribute scope check	
If two or more associations	s in a class points to the same class then a role is required
Target class tagged value	should point to a existing class
The first part of the version	and modelBaseVersion tagged values has to be the same number.

# 4 ANNEX





### 3. Annex

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