DATEX II User Forum
20/21 March 2012 - Stockholm

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Hands-on session:
How to create a DATEX II profile?

Please note …..

- **These slides do not represent the complete hands-on workshop**
  - The step-by-step procedure is not exactly shown here
  - In fact, some interesting aspects are shown in a loose order
  - Without background knowledge, it might be difficult to understand
- **We consider to publish the hands on workshop in a different manner**
  - maybe some kind of Webinar
  - Please be patient
- **Please also note the link list on slide 21**

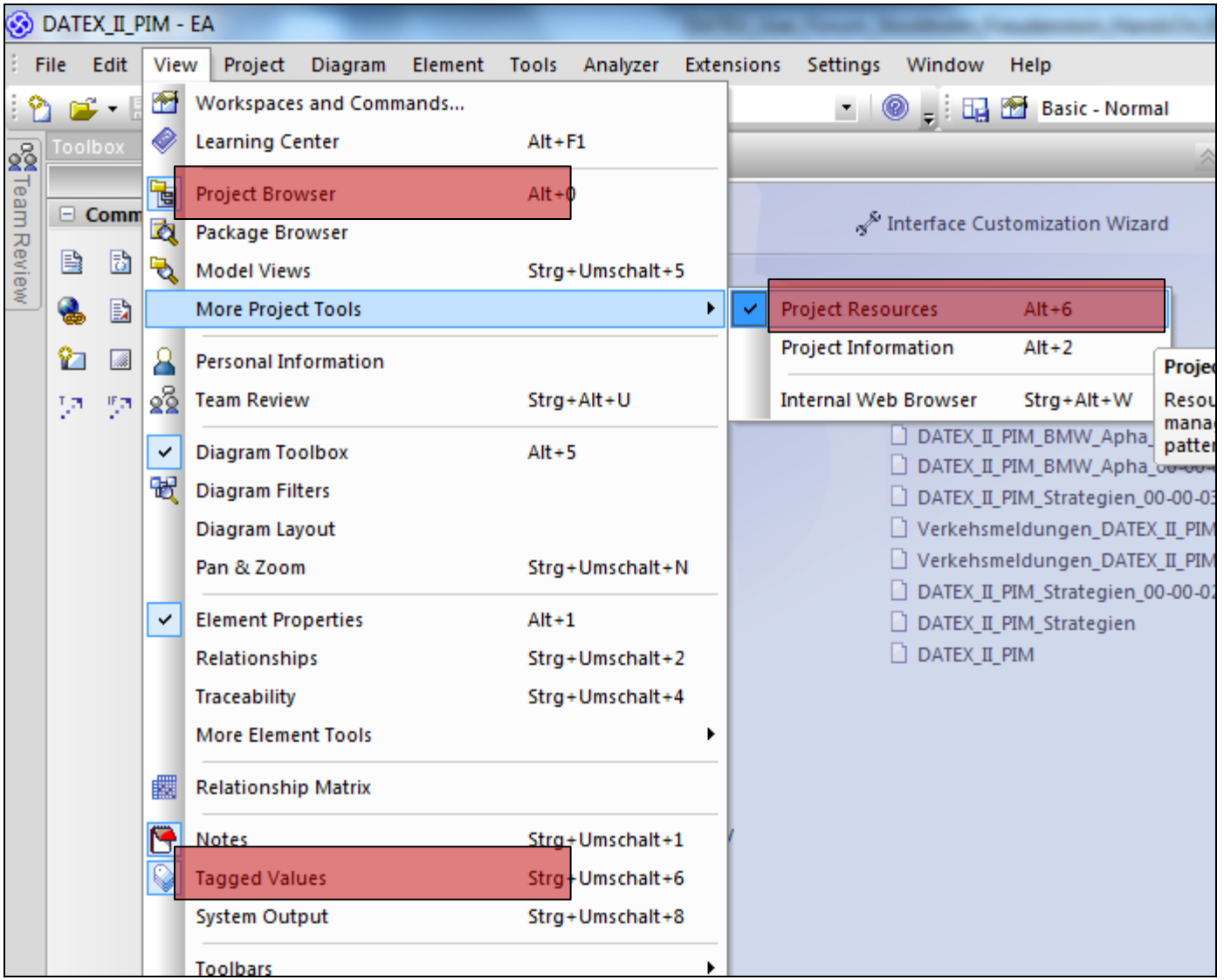
Hands on workshop

- **Is it a presentation?**
  - Yes and No. In deed I will present some practical work (both with Powerpoint and additional software tools)
  - **But you can participate, too!**
- **What do I need as a listener?**
  - Nothing.
  - **But when you want to be an "active listener":**
  - A laptop and the software tools I informed about last week (see also following slides)
- **What can I do?**
  - You can reflect my step-by-step procedure to better understand it
- **Questions allowed from audience?**
  - I'll try my best to answer all questions, but please bear with me, if we have to continue to get through the programme; I can not deal with individual technical problems

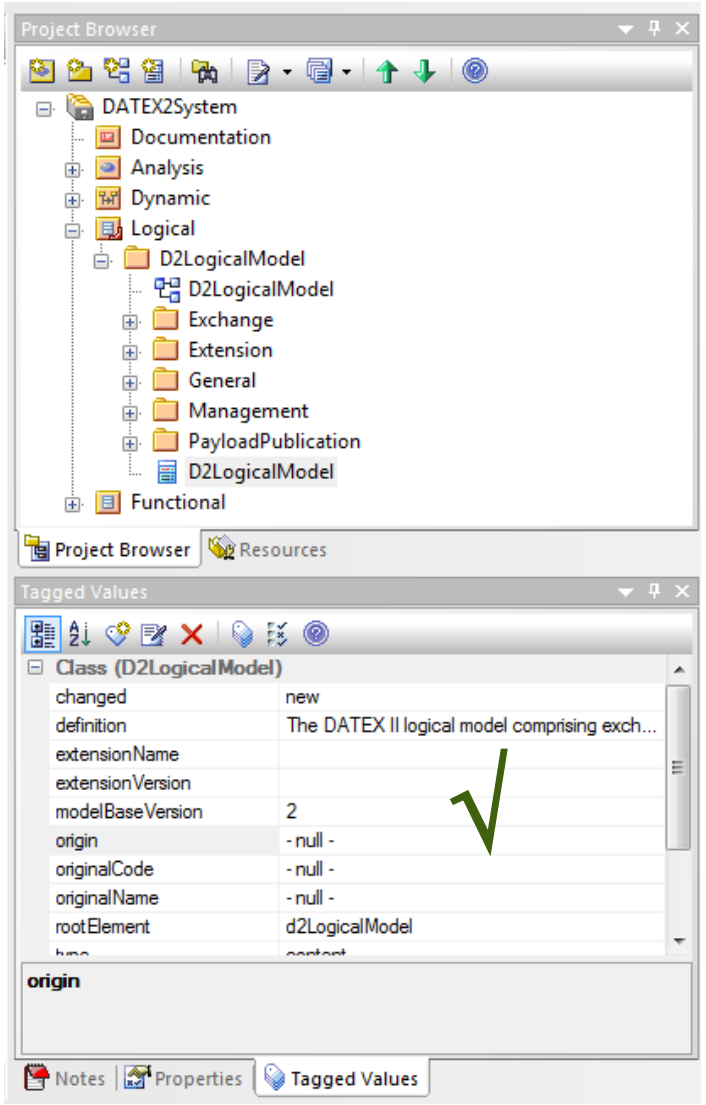
Requirements for following the lecture

1	Laptop with Windows 7	Windows XP should work as well (other platforms are currently not supported by the DATEX Tool).
2	Enterprise Architect	This tool is used for modelling the UML. Current version available for buying is 9.3. For modelling the DATEX structures, the smallest edition, “Desktop”, is sufficient. Older versions of EA: I can confirm proper modelling with version 7.5, but most likely even older versions should work, too. To get a copy free of charge, you can use the 30 day evaluation version, which is fully operational (proposed to select “Professional” version). (There is also an “EALite” version, which is a read only freeware. Note that you can use it to have a look at the UML model, but it cannot be used to participate the step-by-step course). Please be ready to use this tool (installation via typical installation routine).
3	DATEX model	It’s an .eap file to be used with Enterprise Architect (see above). Please download the latest copy (see on the right).
4	DATEX Tool	Please download the latest copy (see on the right). The Tool is used to create a DATEX II profile out of the DATEX data model. The files inside the ZIP have to be extracted and can be used without further installation (“D2conversion.exe”).
5	XML-Viewer	It is useful to have some XML Viewer/Editor available (e.g. XML Notepad)

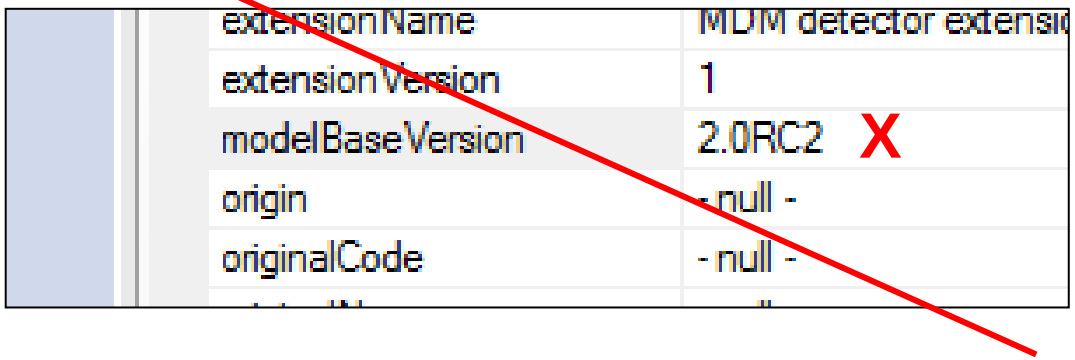
Handling Enterprise Architect



Handling Enterprise Architect



Check your version!



- **Intelligent transport systems - DATEX II data exchange specifications for traffic management and information CEN/TS 16157 (Part 1 – 3)**
  - Wide range of traffic data in standard model
  - Selection of those elements, which are really used by the interface
  - Creation of XML-schema exactly to the interface's needs (tool based)
  - Adding missing content by extension – fully backward compatible

Today

DATEX II Methodology Document

- Top level entry document into the DATEX II specification set
- Describes the way that modeling is handled in DATEX II
- Focusing on data model aspects
- Data modeling in DATEX II takes a formal, metamodel-based approach that allows the process of generating the transfer syntax to be implemented in software
- A tool that creates an XML schema from the DATEX II data model based on this methodology is available from this website

DATEX Level A, B, C

- **Level A**
  - Existing DATEX data model without any extensions
- **Level B-Extension**
  - Extension of existing messages, fully compatible with existing software
- **Level C-Extension**
  - New message content, based on DATEX II mechanisms (new namespace)

- **Top level entry point: "Logical:D2LogicalModel“**
  - publications
  - management information
  - exchange protocol meta-data

- **Supporting Information**

  (see the specific specification on the Exchange Platform Specific Model)
  - Analysis
  - Dynamic
  - Functional

Rules for Extensions

a) A model that is conforming to this Technical Specification may be extended. Extensions may either seek backwards compatibility to an existing model (denoted 'core model' in this clause), or they may create a new model not compatible to any previous model, but nevertheless using the methodology provided within this Technical Specification and – potentially – reusing classes taken from other, existing models. A compatible extension is denoted within this Technical Specification as a level B extension. Non-compatible extensions are denoted as level C extensions.

b) All extensions shall fully comply with all other rules presented so far in this document.

c) An extended model shall provide extension name and version number in two tagged values called "extensionName" and "extensionVersion" on the “d2LogicalModel” element and on any other root level elements (defined using a “rootElement” tagged value), that shall be usable in conjunction with extended elements.

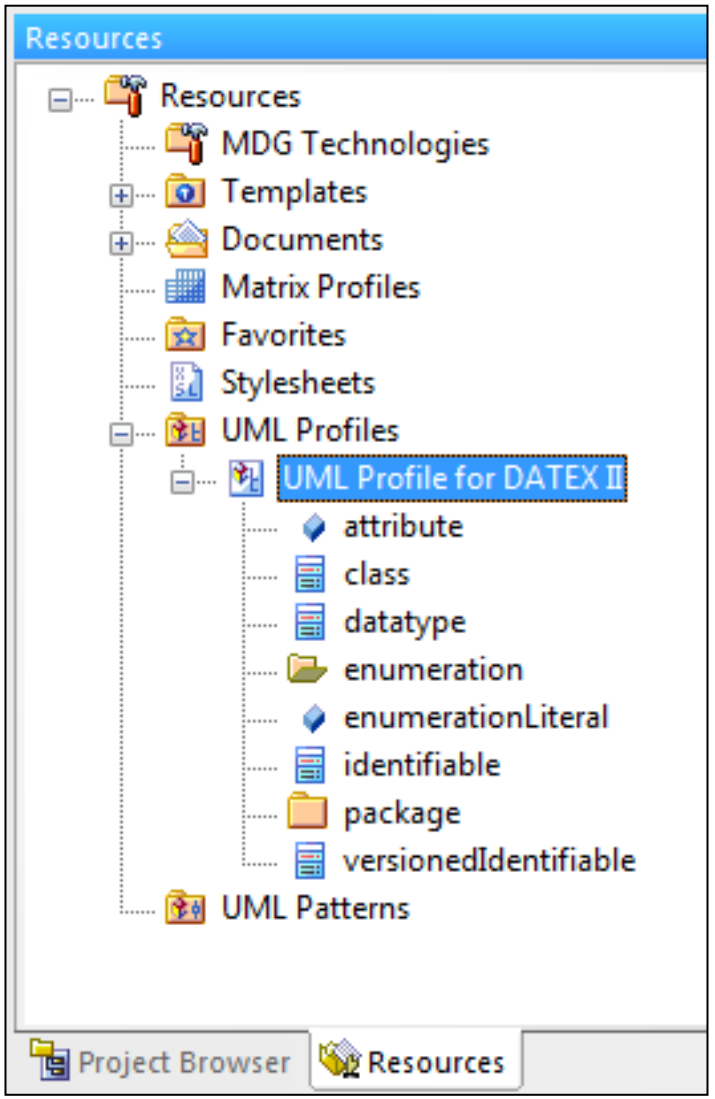
d) Classes belonging to an extension and having a superclass not belonging to the extension (i.e. extension classes that inherit from the core model) shall have an "extension" tagged value with values either "levelb" or "levelc". Extensions that do not add new root classes (i.e. classes that have a “rootElement” tagged value) are called “level B extensions”. These extensions shall set the “extension” tagged values to “levelb”. They are backwards compatible with the standard model on message level. Extensions that introduce new root classes are called “level C extensions” and shall set the “extensions” tagged value to “levelc”.

e) Classes belonging to an extension may not become superclasses of classes in the core model, i.e. specializations from a class from the extension to a class in the core model may not be added to the model.

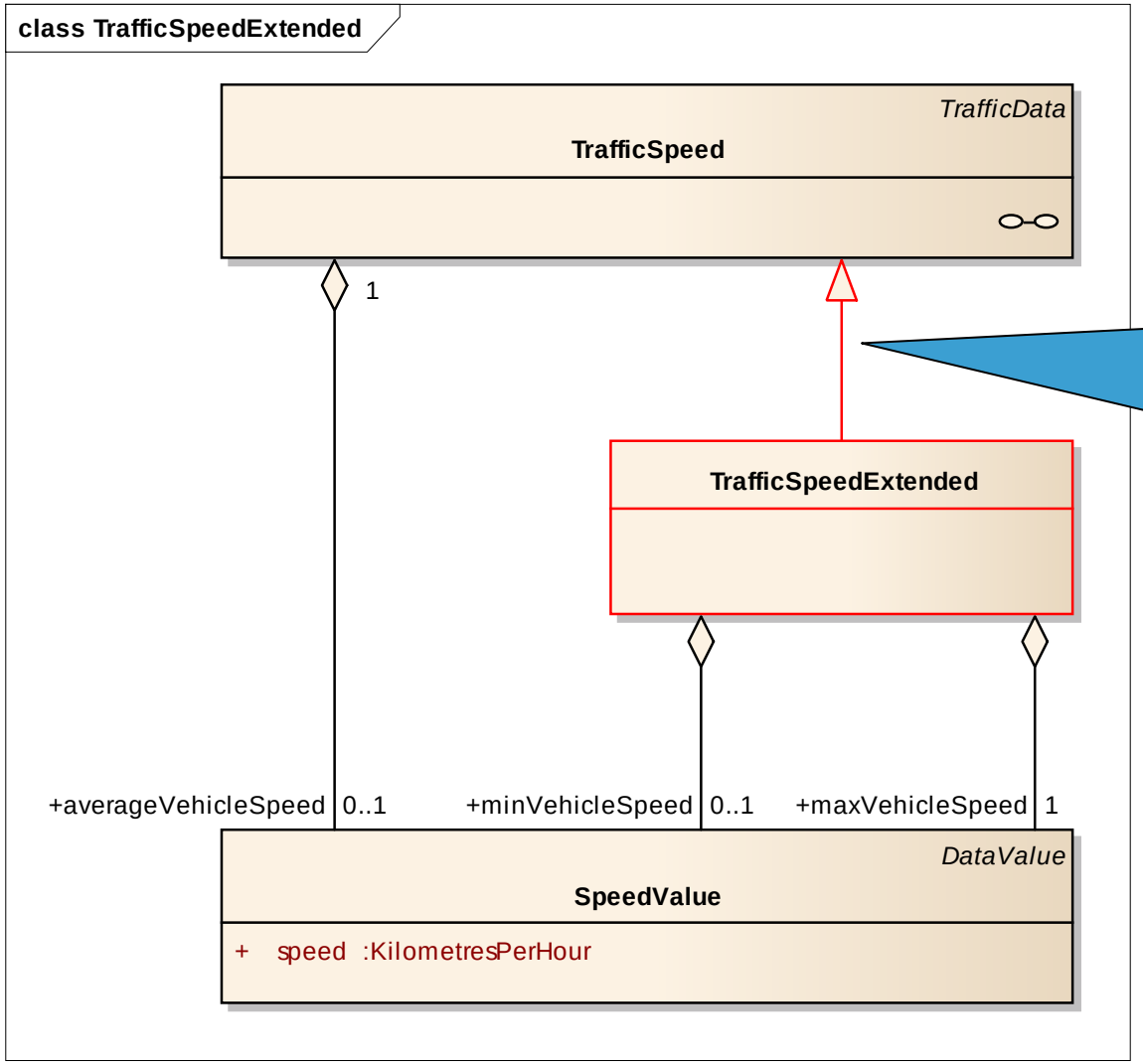
f) UML Associations may be added to the extended model that have a core model class on their source end and an extension class on their target end. Thus, existing classes from the core model may become components from containers in the extensions model (class reuse), but classes from the extensions shall not become components of existing containers in the core model.

g) Data types and enumerations of the core model may be reused in extensions.

Using the DATEX II profile for generating new components



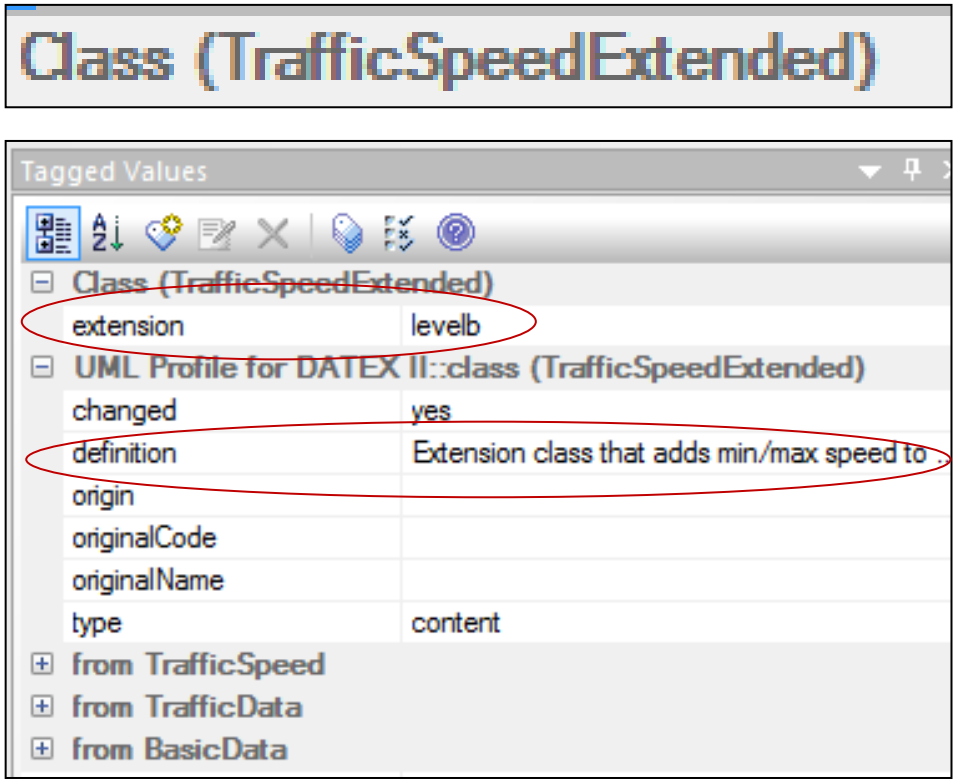
Extension



This is no generalisation. although the same sort of arrow is used

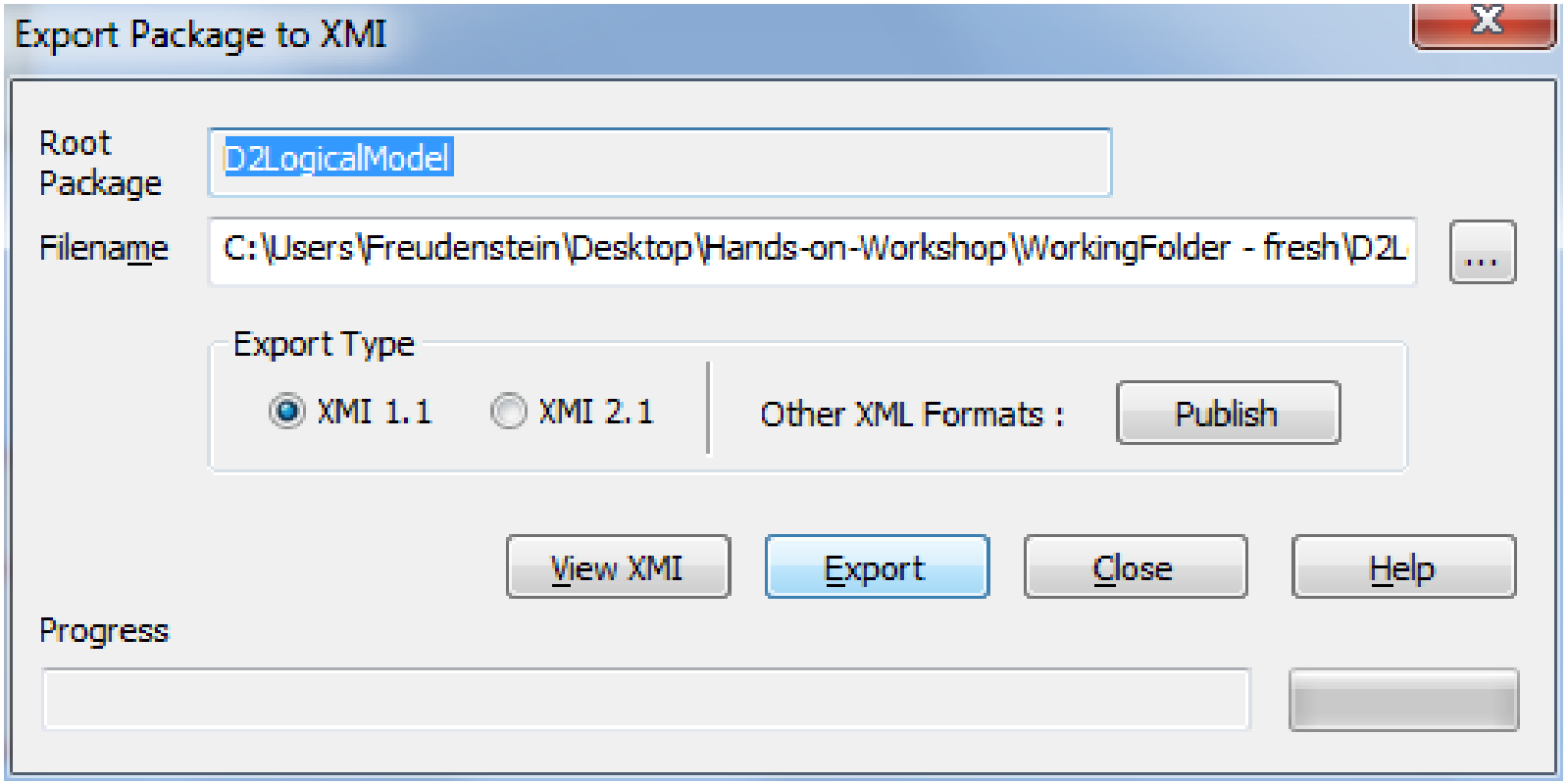
Tagged Values – The following Tagged Values are obligatory:

- **"definition" - text**
  - for every package
  - for every component
  - for every attribute
  - for aggregations, in case two or more aggregations are connecting the same two components
- **"order" - unique number within object**
  - for every attribute
  - for every literal
  - for every aggregation (on target)
- **"extension" – "levelb"**
  - for a Level B component
- **"extensionName" and "extensionVersion"**
  - in class D2LogicalModel, when using an extension

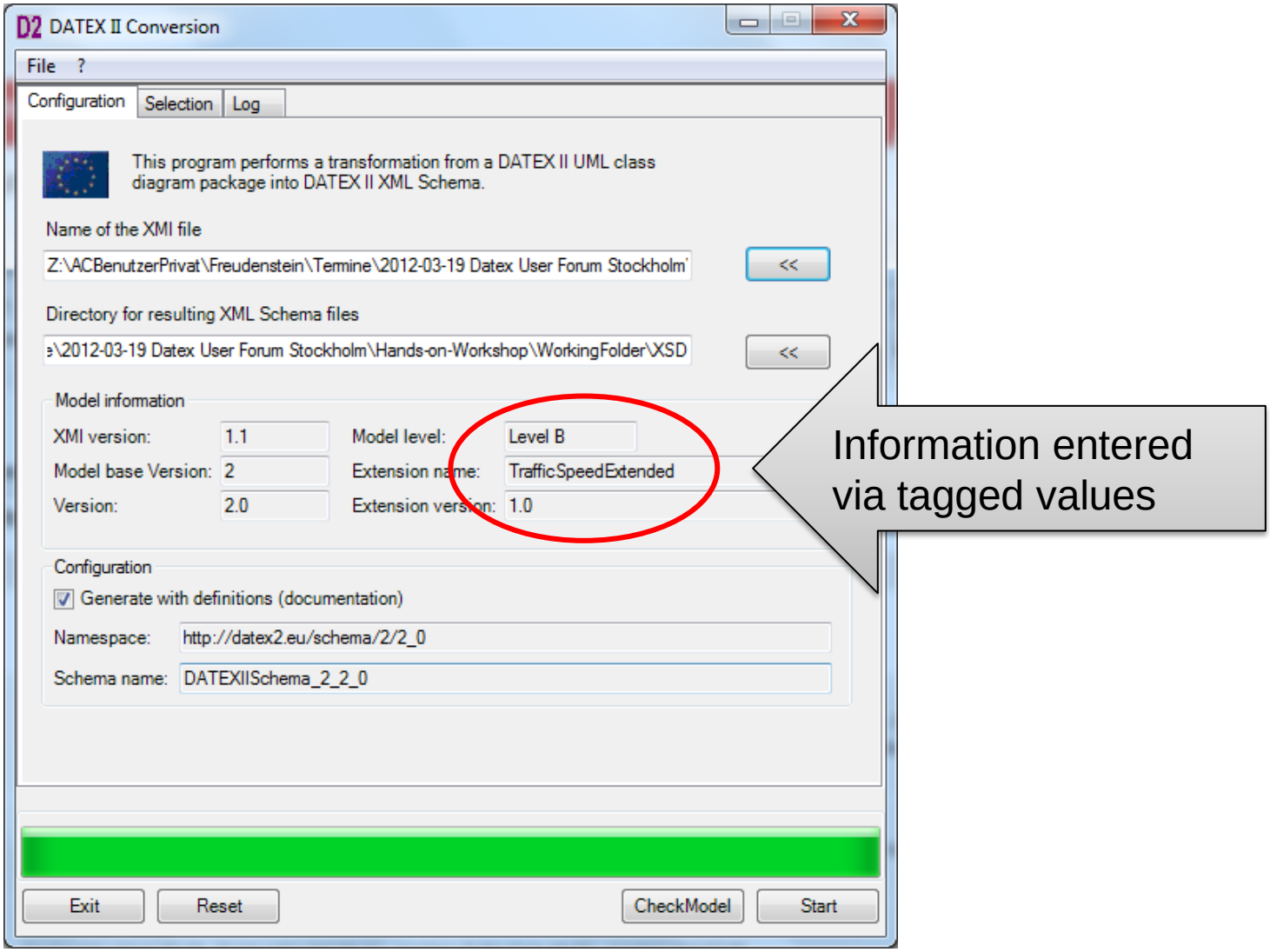


Export to XMI

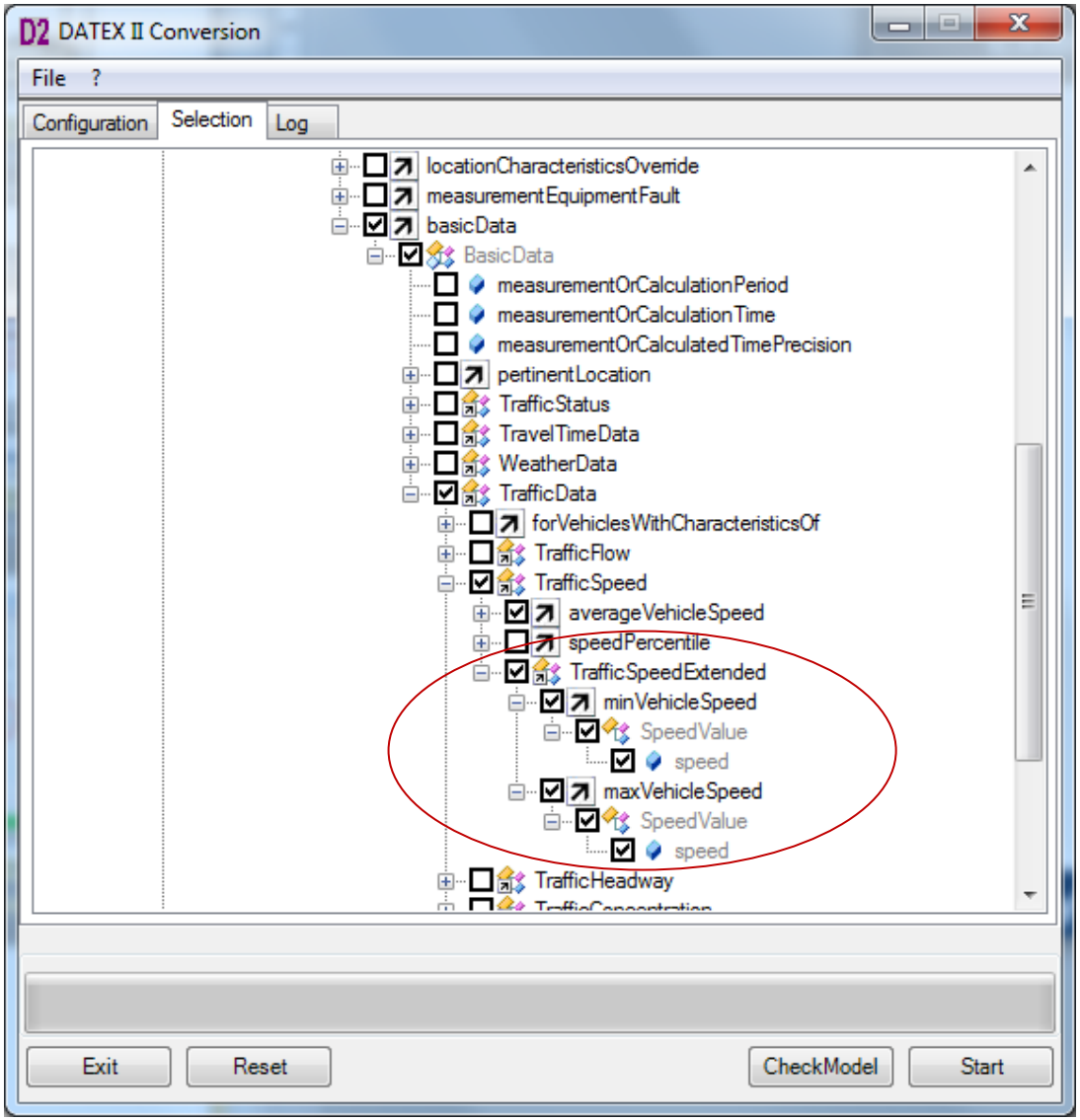
- **Exchange format between UML and DATEX Tool is standardized XMI**
- **Whole package “D2LogicalModel” has to be exported**



Extension


DATEX II Conversion
File ?
Configuration
Selection
Log
This program performs a transformation from a DATEX II UML class diagram package into DATEX II XML Schema.
Name of the XMI file
Z:\ACBenutzerPrivat\Freudenstein\Termine\2012-03-19 Datex User Forum Stockholm
<<
Directory for resulting XML Schema files
e\2012-03-19 Datex User Forum Stockholm\Hands-on-Workshop\WorkingFolder\XSD
<<
Model information
XMI version: 1.1
Model base Version: 2
Version: 2.0
Model level: Level B
Extension name: TrafficSpeedExtended
Extension version: 1.0
Configuration
Generate with definitions (documentation)
Namespace: http://datex2.eu/schema/2/2_0
Schema name: DATEXIISchema_2_2_0
Exit
Reset
CheckModel
Start
Information entered via tagged values

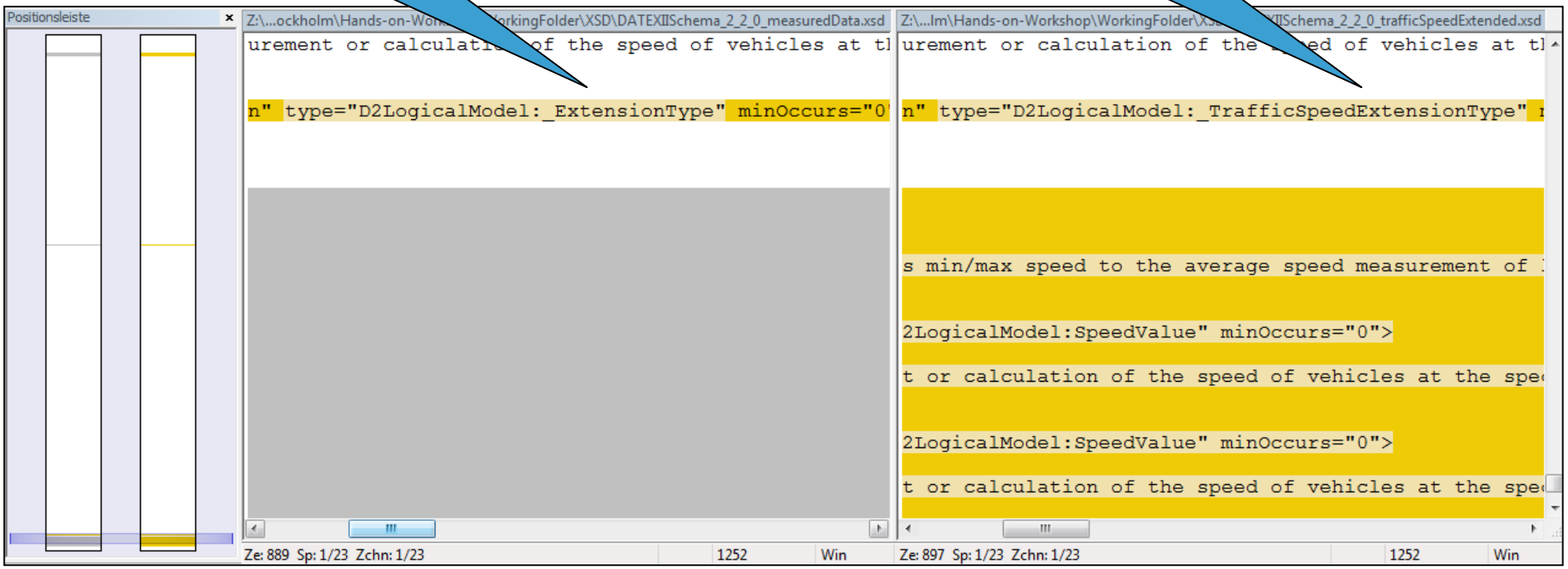
Selection of Extension in the official DATEX Tool:



Comparison not extended (left) and extended schema (right)

Default Extension type for every(!) component

Explicit Extension type for the Level B extension



XML with additional values from extension

```
<D2LogicalModel:measurementTimeDefault>2013-03-19T09:15:04.0Z</
D2LogicalModel:measurementTimeDefault>
<D2LogicalModel:measuredValue index="0">
<D2LogicalModel:measuredValue>
<D2LogicalModel:basicData xsi:type="D2LogicalModel:TrafficSpeed">
<D2LogicalModel:averageVehicleSpeed>
<D2LogicalModel:speed>47</D2LogicalModel:speed>
</D2LogicalModel:averageVehicleSpeed>
<D2LogicalModel:trafficSpeedExtension>
<D2LogicalModel:trafficSpeedExtended>
<D2LogicalModel:minVehicleSpeed>
<D2LogicalModel:speed>23</D2LogicalModel:speed>
</D2LogicalModel:minVehicleSpeed>
<D2LogicalModel:maxVehicleSpeed>
<D2LogicalModel:speed>61</D2LogicalModel:speed>
</D2LogicalModel:maxVehicleSpeed>
</D2LogicalModel:trafficSpeedExtended>
</D2LogicalModel:trafficSpeedExtension>
</D2LogicalModel:basicData>
</D2LogicalModel:measuredValue>
</D2LogicalModel:measuredValue>
```

Validation of XML against schema

XML instance	XSD (schema)	validates?
Without Error	TrafficSpeedExtended	YES
	D2	YES
With Error in Level A	TrafficSpeedExtended	NO
	D2	NO
With Error in Level B	TrafficSpeedExtended	NO
	D2	YES

Links

- **DATEX II**
  - http://www.datex2.eu
- **DATEX II Modelling Methodology**
  - http://www.datex2.eu/sites/www.datex2.eu/files/DATEX_II_Methodology_2.pdf
- **Enterprise Architect**
  - http://sparxsystems.eu/
  - http://www.sparxsystems.eu/enterprisearchitect/download-trial/
  - http://www.sparxsystems.com.au/bin/EALite.exe
- **DATEX platform independent model**
  - http://www.datex2.eu/sites/www.datex2.eu/files/DATEX_II_PIM.EAP
- **DATEX schema generation tool**
  - http://www.datex2.eu/sites/www.datex2.eu/files/DATEX_II_Schema_generation_tool.zip
- **DATEX schema**
  - http://www.datex2.eu/sites/www.datex2.eu/files/Schema-2.0.zip
- **XML Viewer**
  - http://www.microsoft.com/download/en/details.aspx?id=7973
- **Comparing files**
  - http://winmerge.org/

EasyWay

Thank you for your attention !

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