New data elements
Use of Extensions

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Content

- Extensions in DATEX II
- Levels
- Rules in UML
- Representation in XSD
- Representation in XML
- News in DATEX II Version 2.0
- Schema generation tool
- Questions

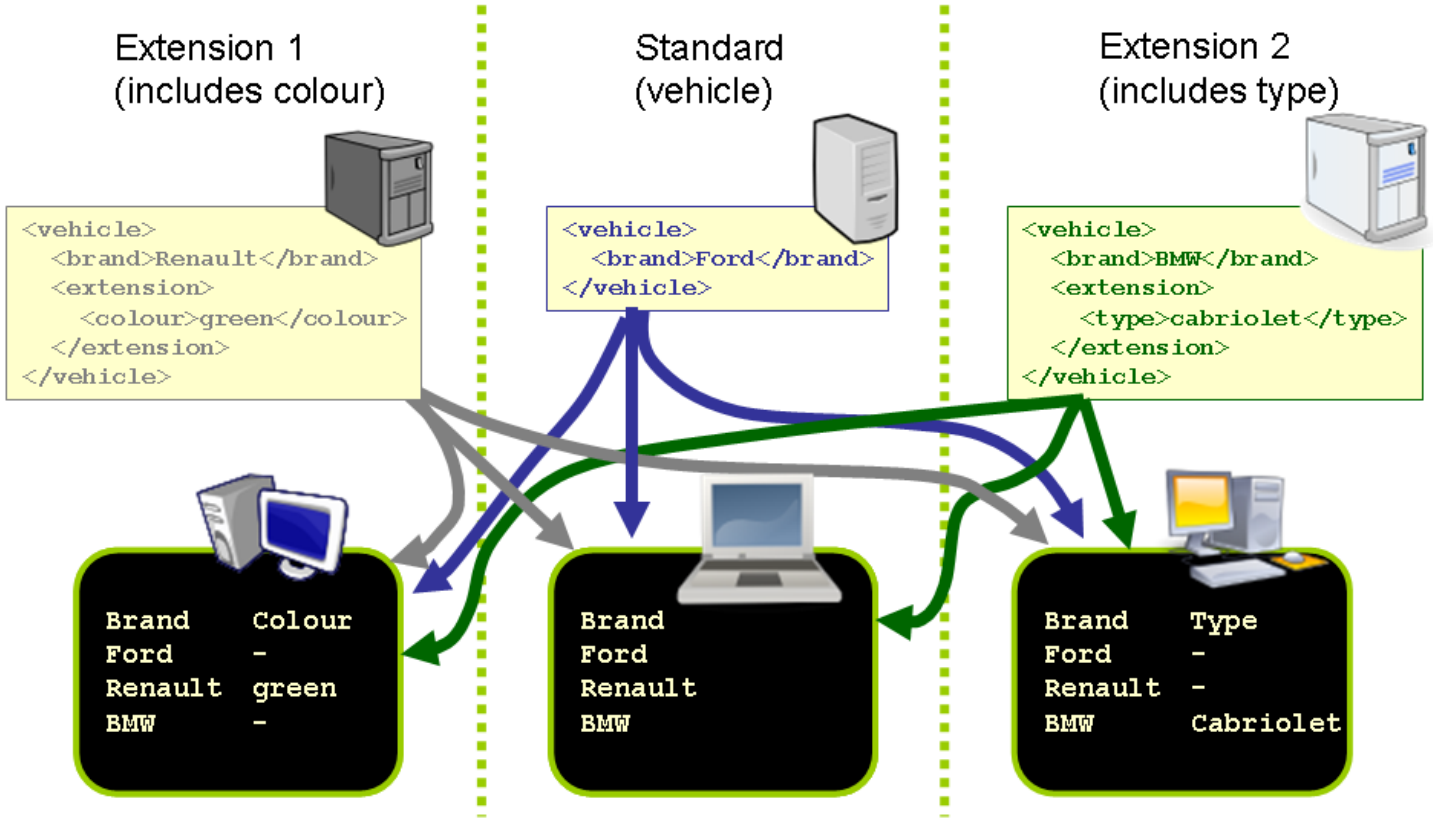
Extensions in DATEX II

- DATEX II designed to be extended
- It was known from the beginning that local or national extensions are needed
- Possible to publish extension on DATEX II web site

Levels

- **Level A**
  - The ”core” model that has been harmonized and will be standardized
- **Level B**
  - Level B extensions added to Level A
  - Full interoperability with Level A
    - A level B extension will not break a Level A Client
    - Level A Client can understand the Level A part of any Level B extended client
    - Two different Level B clients can understand each others level A part
  - A commonly used Level B extension could be a candidate for inclusion in Level A
- **Level C**
  - No interoperability with Level A and Level B
  - Use the same methodology and tools

Level B interoperability



Rules in UML

Level B

What we can do

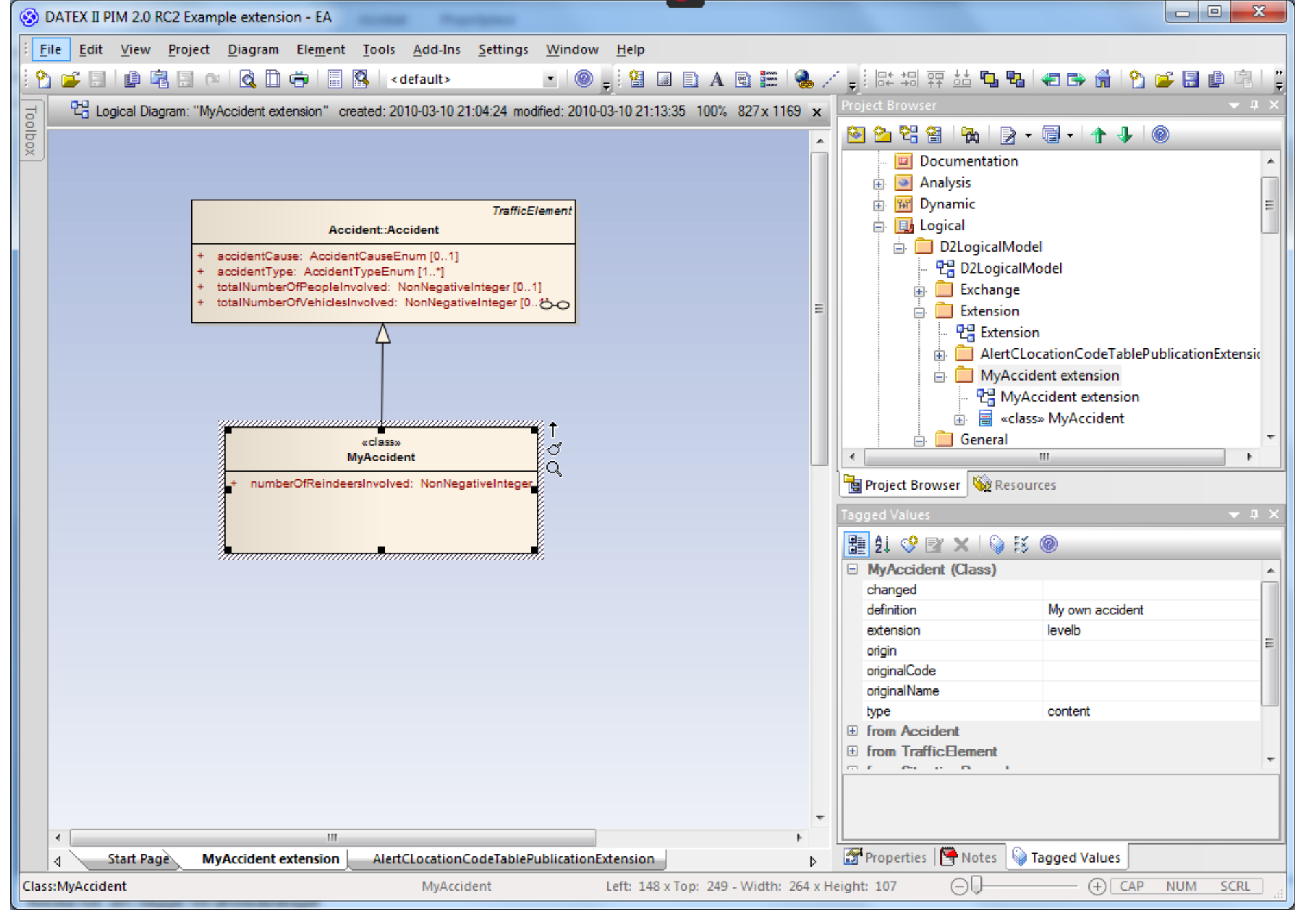
- “Add” attributes to new or existing classes
- “Add” associations to new or existing classes
- Create new classes, enums and data types
- Reuse existing classes, enums and data types

Limitation

- Not possible to derive new “extension” classes from existing abstract classes (create new types)
- Not allowed to change ANYTHING to existing classes, attributes and enumerations

Extension in UML

- Do the extensions in UML
- Easy to share extensions (export to XMI)
- Schema generation tool will generate schema and check constrains


DATEX II PIM 2.0 RC2 Example extension - EA
File Edit View Project Diagram Element Tools Add-Ins Settings Window Help
<default>
Logical Diagram: "MyAccident extension" created: 2010-03-10 21:04:24 modified: 2010-03-10 21:13:35 100% 827 x 1169
Toolbox
TrafficElement
Accident::Accident
+ accidentCause: AccidentCauseEnum [0..1]
+ accidentType: AccidentTypeEnum [1..*]
+ totalNumberOfPeopleInvolved: NonNegativeInteger [0..1]
+ totalNumberOfVehiclesInvolved: NonNegativeInteger [0..
«class»
MyAccident
+ numberOfReindeersInvolved: NonNegativeInteger
Start Page
MyAccident extension
AlertCLocationCodeTablePublicationExtension
Project Browser
Documentation
Analysis
Dynamic
Logical
D2LogicalModel
D2LogicalModel
Exchange
Extension
Extension
AlertCLocationCodeTablePublicationExtensi
MyAccident extension
MyAccident extension
«class» MyAccident
General
Project Browser
Resources
Tagged Values
MyAccident (Class)
changed
definition My own accident
extension levelb
origin
originalCode
originalName
type content
from Accident
from TrafficElement
Properties
Notes
Tagged Values
Class:MyAccident
MyAccident
Left: 148 x Top: 249 - Width: 264 x Height: 107
CAP NUM SCRL

Representation in XSD

- **When generating the Schema all complexTypes get an extra element [classname]Extension of the type _ExtensionsType which is defined as follows**

```
<xs:complexType name="_ExtensionsType">
  <xs:sequence>
    <xs:any namespace="##any" processContents="lax" minOccurs="0"
    maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

- **This means that every class can be extended with anything and, if extended, it's known where the extension can be found.**

Representation in XSD

- When the tool finds an extension class, it generates a type that look like this

```
<xs:complexType name="_MyClassExtensionsType">
 <xs:sequence>
    <xs:element name = "myClass" type
    ="D2LogicalModel:MyClass" minOccurs="1">
    <xs:any namespace="##other" processContents="lax"
    minOccurs="0" maxOccurs="unbounded"/>
 </xs:sequence>
</xs:complexType>
```

- [ClassName]ExtensionsType will be used as type on [Classname]Extension element instead of ExtensionType.

Representation in XML

Normal, non extended complexType

```
<xs:complexType name="PayloadPublication" abstract="true">
    <xs:sequence>
        <xs:element name="feedType" type="D2LogicalModel:String" minOccurs="0"/>
        <xs:element name="publicationTime" type="D2LogicalModel:DateTime"/>
        <xs:element name="publicationCreator" type="D2LogicalModel:InternationalIdentifier"/>
        <xs:element name="payloadPublicationExtension" type="D2LogicalModel:_ExtensionType"
    minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="lang" type="D2LogicalModel:Language" use="required"/>
</xs:complexType>
```

Representation in XML

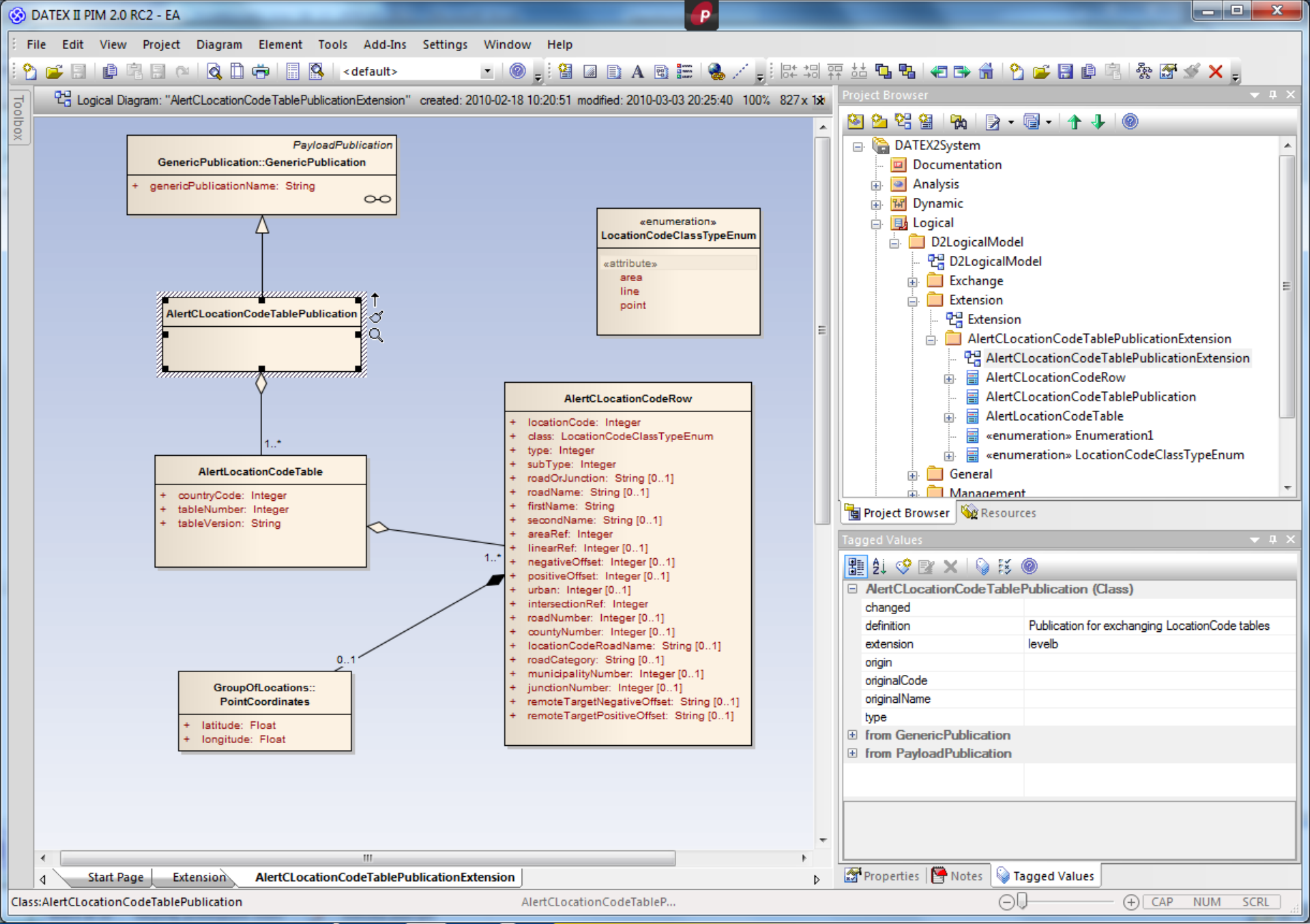
```
<xs:complexType name=”Accident">
      <xs:complexContent>
         <xs:extension base="D2LogicalModel:TrafficElement">
            <xs:sequence>
                <xs:element name="accidentCause" type="D2LogicalModel:AccidentCauseEnum"
      minOccurs="0"/>
                ….
               <xs:element name="accidentExtension" type="D2LogicalModel:_AccidentExtensionType"
      minOccurs="0"/>
            </xs:sequence>
         </xs:extension>
       </xs:complexContent>
</xs:complexType>

<xs:complexType name="_AccidentExtensionType">
  <xs:sequence>
    <xs:element name="MyAccident" type="D2LogicalModel:MyAccident" minOccurs="0"/>
     <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
   </xs:sequence>
</xs:complexType>

<xs:complexType name="MyAccident">
      <xs:sequence>
         <xs:element name="numberOfReindeersInvolved" type="D2LogicalModel:NonNegativeInteger"/>
      </xs:sequence>
```

New in DATEX II Version 2.0

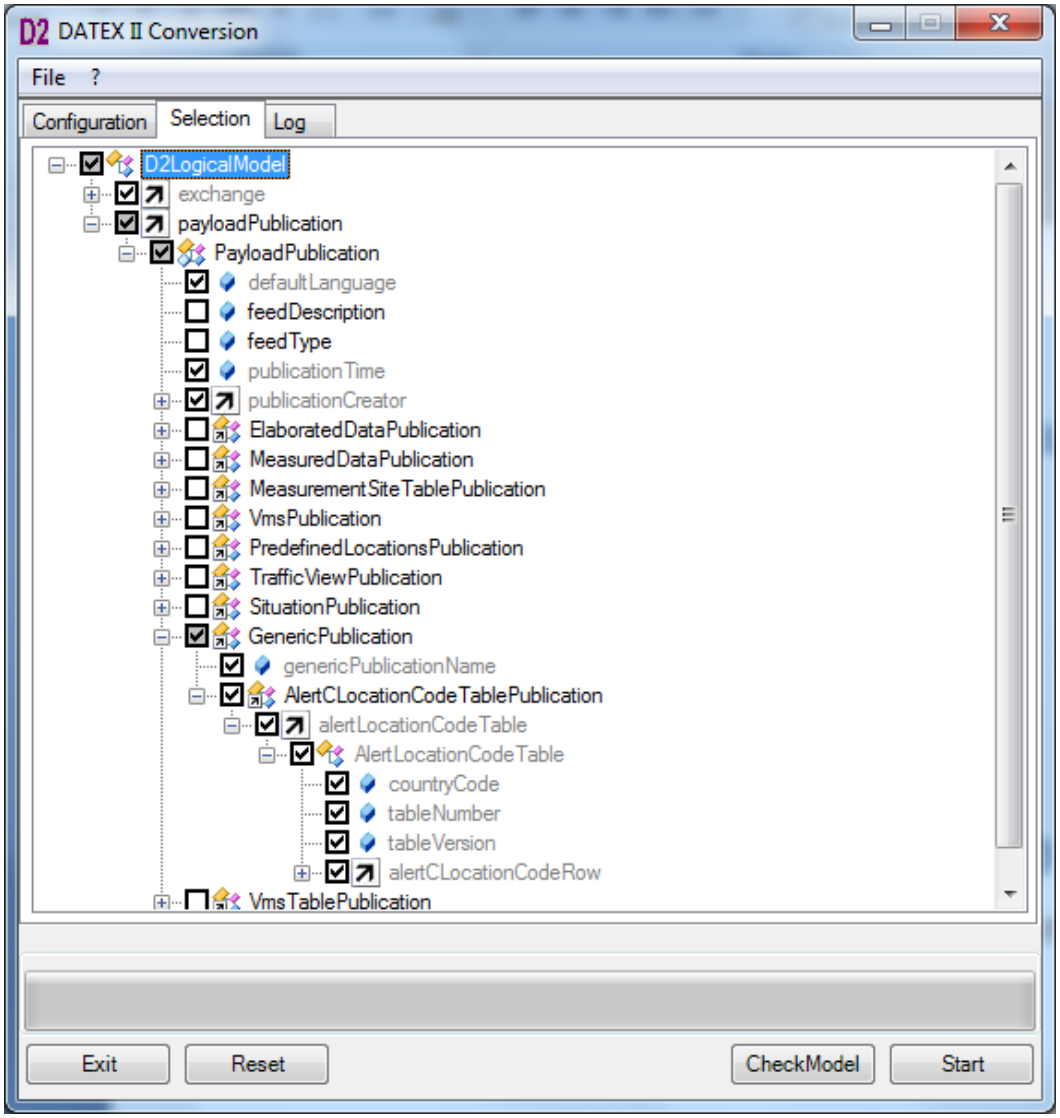
- The limitation, not possible to create new types, has to some point been resolved.
- The model now includes ”hook” classes at certain places
- GenericPublication
- GenericSituationRecord

- These should be used to create Level B extension, when you would like to create new types of Publication or SituationRecord.

- Schema tool sub-schema feature also supports selecting/de-selection extensions


DATEX II PIM 2.0 RC2 - EA
File Edit View Project Diagram Element Tools Add-Ins Settings Window Help
<default>
Logical Diagram: "AlertCLocationCodeTablePublicationExtension" created: 2010-02-18 10:20:51 modified: 2010-03-03 20:25:40 100% 827 x 1
Toolbox
PayloadPublication
GenericPublication::GenericPublication
+ genericPublicationName: String
«enumeration»
LocationCodeClassTypeEnum
«attribute»
area
line
point
AlertCLocationCodeTablePublication
1..*
AlertLocationCodeTable
+ countryCode: Integer
+ tableNumber: Integer
+ tableVersion: String
AlertCLocationCodeRow
+ locationCode: Integer
+ class: LocationCodeClassTypeEnum
+ type: Integer
+ subType: Integer
+ roadOrJunction: String [0..1]
+ roadName: String [0..1]
+ firstName: String
+ secondName: String [0..1]
+ areaRef: Integer
+ linearRef: Integer [0..1]
+ negativeOffset: Integer [0..1]
+ positiveOffset: Integer [0..1]
+ urban: Integer [0..1]
+ intersectionRef: Integer
+ roadNumber: Integer [0..1]
+ countyNumber: Integer [0..1]
+ locationCodeRoadName: String [0..1]
+ roadCategory: String [0..1]
+ municipalityNumber: Integer [0..1]
+ junctionNumber: Integer [0..1]
+ remoteTargetNegativeOffset: String [0..1]
+ remoteTargetPositiveOffset: String [0..1]
1..*
0..1
GroupOfLocations::
PointCoordinates
+ latitude: Float
+ longitude: Float
Start Page
Extension
AlertCLocationCodeTablePublicationExtension
Project Browser
DATEX2System
Documentation
Analysis
Dynamic
Logical
D2LogicalModel
D2LogicalModel
Exchange
Extension
Extension
AlertCLocationCodeTablePublicationExtension
AlertCLocationCodeTablePublicationExtension
AlertCLocationCodeRow
AlertCLocationCodeTablePublication
AlertLocationCodeTable
«enumeration» Enumeration1
«enumeration» LocationCodeClassTypeEnum
General
Management
Project Browser
Resources
Tagged Values
AlertCLocationCodeTablePublication (Class)
changed
definition
Publication for exchanging LocationCode tables
extension
levelb
origin
originalCode
originalName
type
from GenericPublication
from PayloadPublication
Properties
Notes
Tagged Values
Class:AlertCLocationCodeTablePublication
AlertCLocationCodeTableP...
CAP NUM SCRL
EasyWay

Schema generation tool



Questions