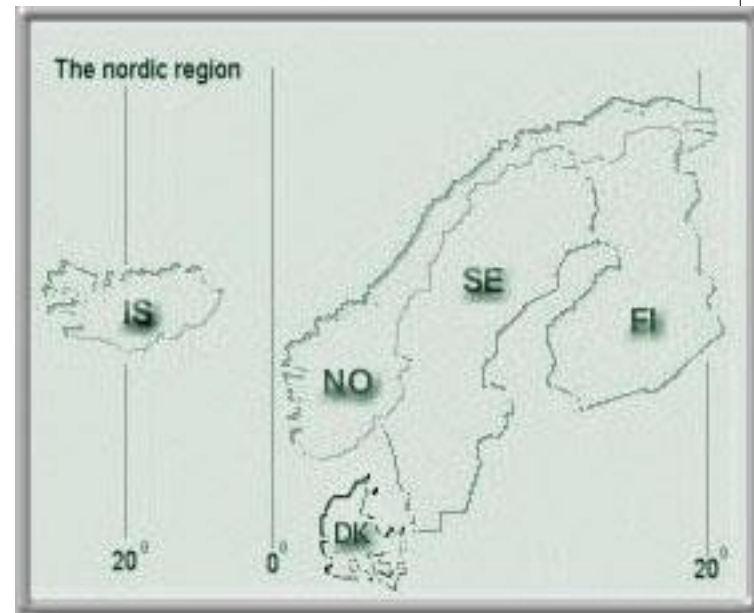


Implementation of ISO 19118 Encoding

Joint Nordic Implementation project



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SINTEF



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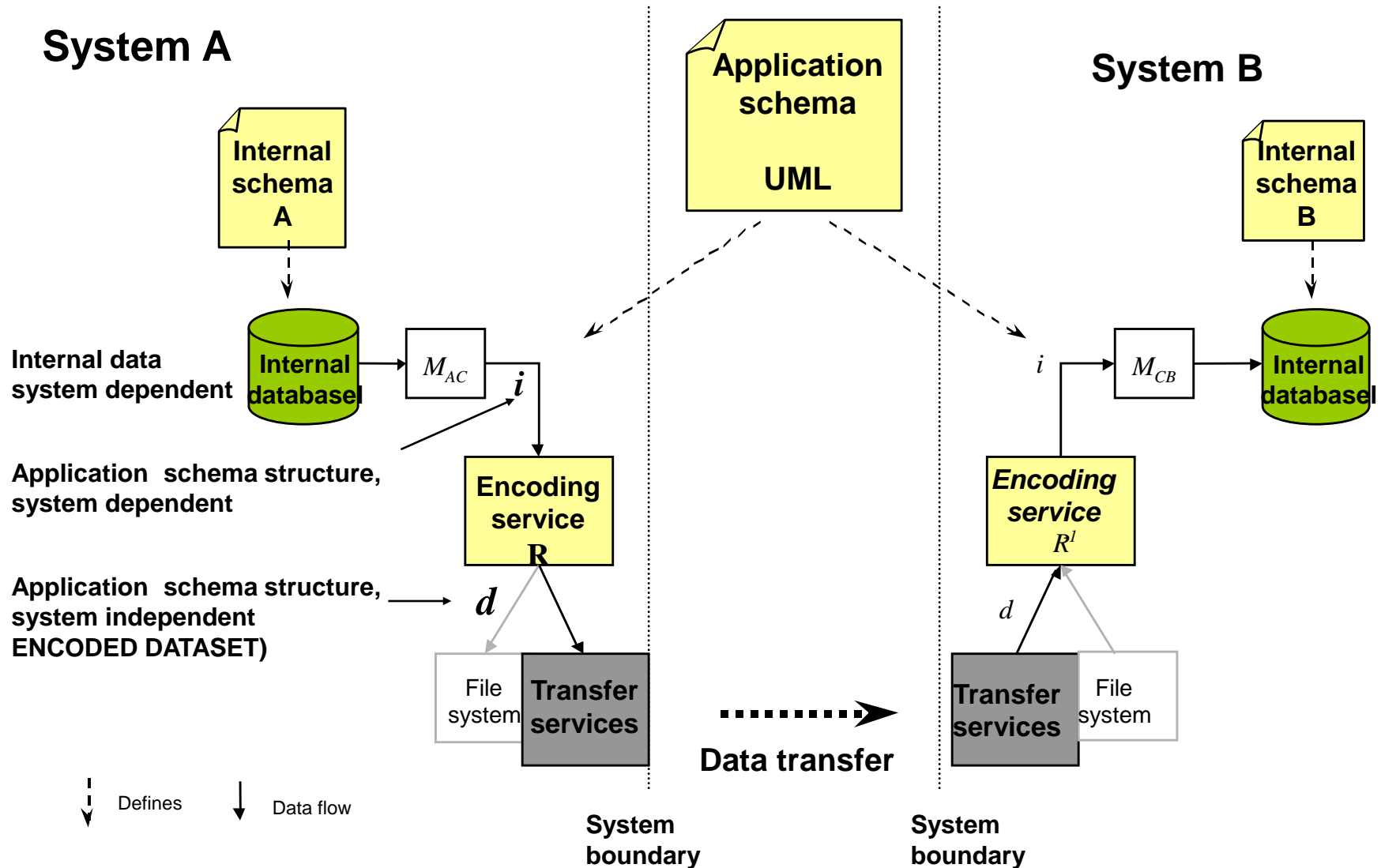
Objectives

- ✓ verification for ISO/TC 211 that its model-based approach to interoperability is feasible and beneficial
- ✓ feedback to the standardsproposal in the 19100-series
- ✓ increased awareness of the ISO 19100 standards family (among the participating countries and in the rest of the world)
- ✓ hands-on experience for further use in Finland ,Norway, Denmark , Sweden and Iceland



ISO 19118 encoding & Data interchange

ISO 19118 Encoding



Requirements/referencens

Software

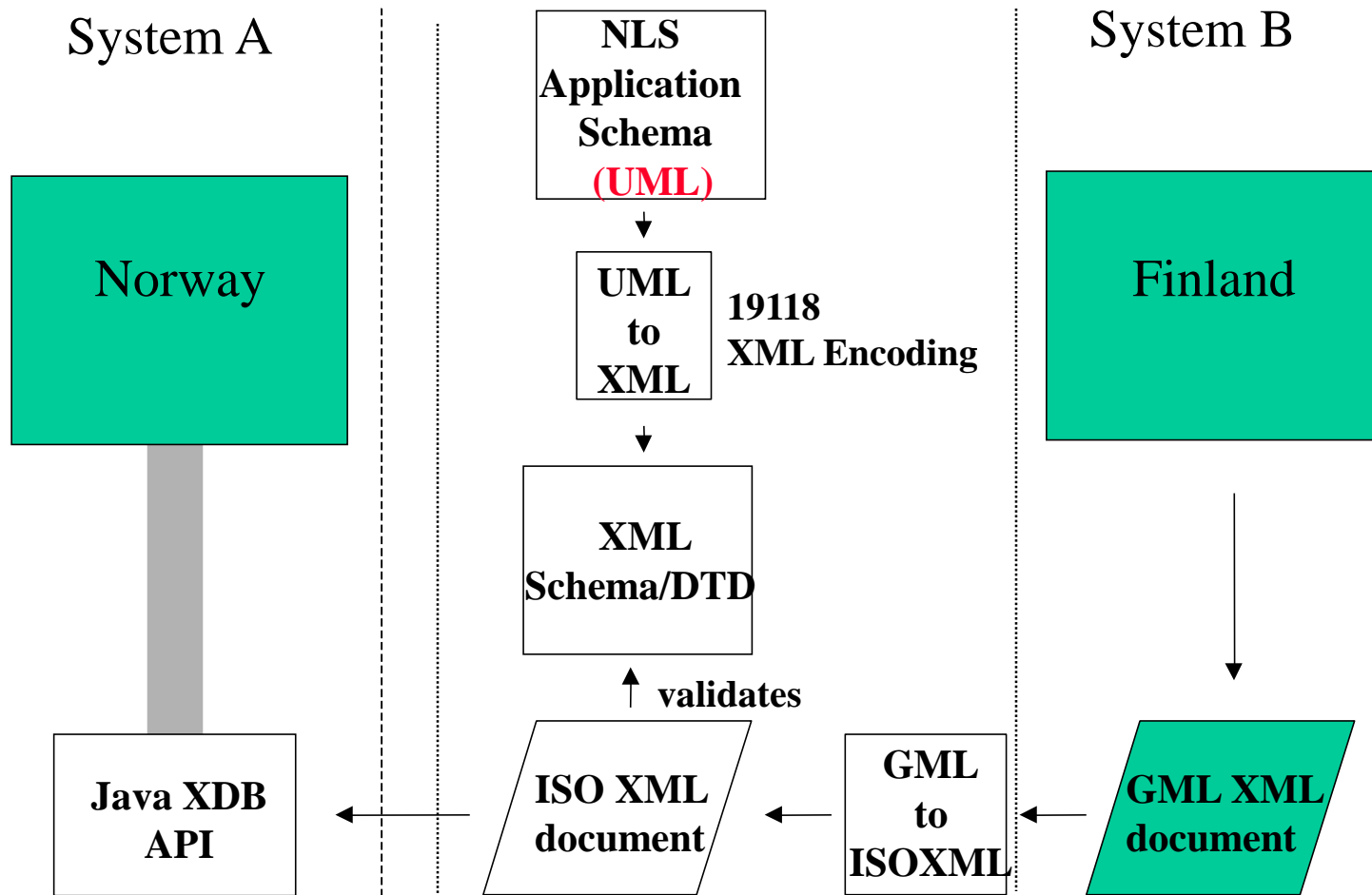
- ✓ Rational Rose 98 or higher (modeler edition).
- ✓ Breeze XML Studio version 2.2 (www.breezefactor.com)
- ✓ Java runtime version

References

- ✓ NLS Cadaster Application Schema, version 1.0, 2000-12-07
- ✓ ISO CD 19118.2 Encoding, ISO/TC 211 N917, 2000-05-09 and ISO 19118 XML Based encoding rules, 2000-09-25, which outlines the changes planned in ISO CD 19118.3.
- ✓ ISO/DIS 19107 Spatial, ISO/TC211 N1032, 2000-12-19
- ✓ ISO/DIS 19115 Metadata, ISO/TC211 N1024, 2000-12-12
- ✓ ISO CD 19103.1 Conceptual Schema Language ISO/TC211 N755, 1999-07-21 (updated for comment in WG1 autumn 2000).
- ✓ Sun's XML Data Binding (XDB): java.sun.com/xml



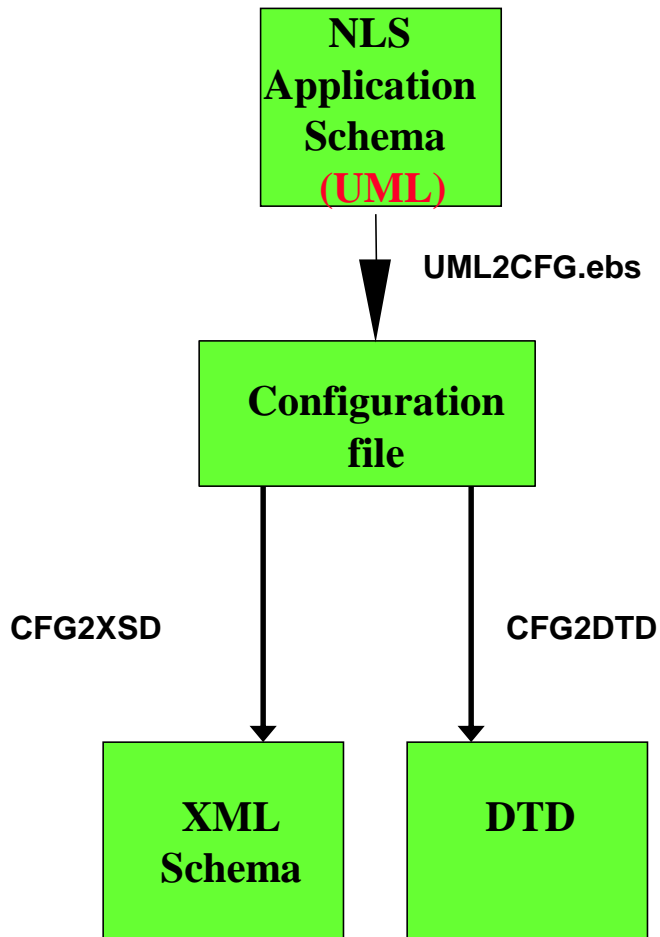
Encoding process



The goal of the test case is to demonstrate information exchange between two different systems using the ISO/TC 211 model-based approach. The systems are selected by the Finnish Mapping Authority (Kartakeskus Oy) (System B) and by the Norwegian Mapping Authority (System A). System B is capable of exporting a XML document based on OpenGIS GML specification.



Configuration, XML-schema/DTD



Configuration files:

The **UML2CFG.ebs** were used to produce the following three configuration files:

UML model	Configuration file
NLS Application Schema.mdl	NLS.cfg.xml
All ISO Combined.mdl	19107p.cfg.xml
	19115c.cfg.xml

XML Schema and DTD production

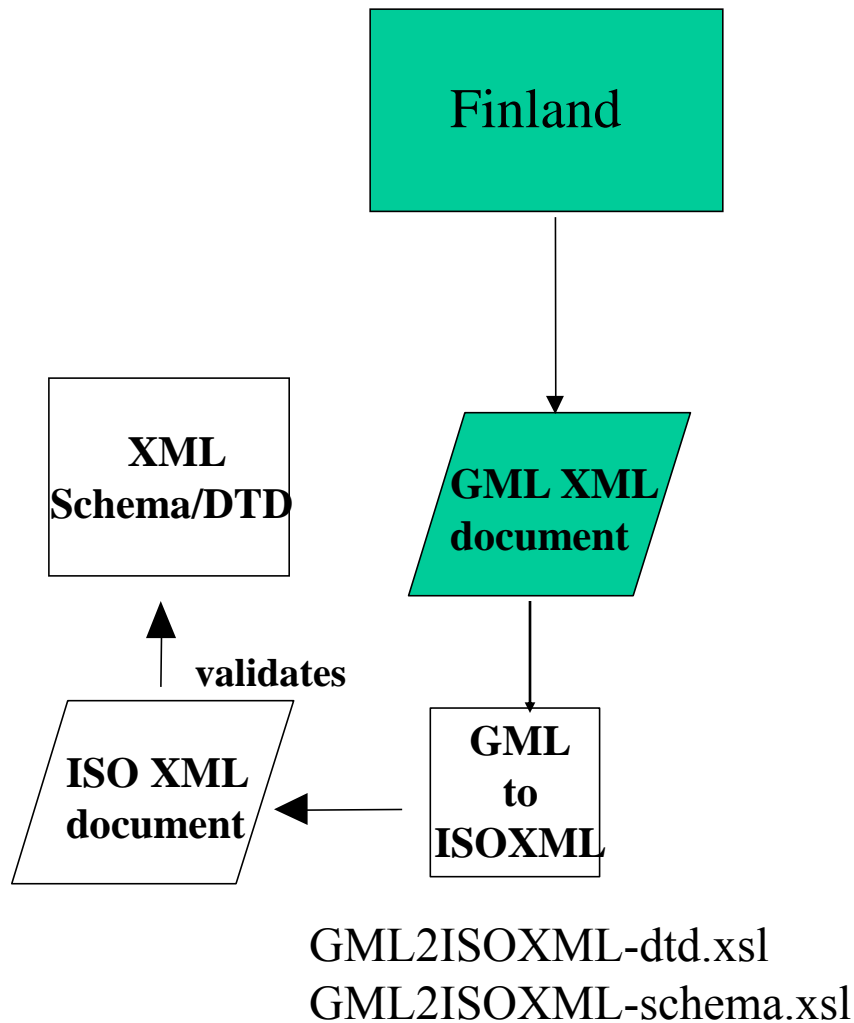
Produces automatically the corresponding DTD and XSD files using the bat-files:

CFG2DTD
CFG2XSD

Equal for 19107p and 19115c.



Mapping from GML format to ISO 19118 XML

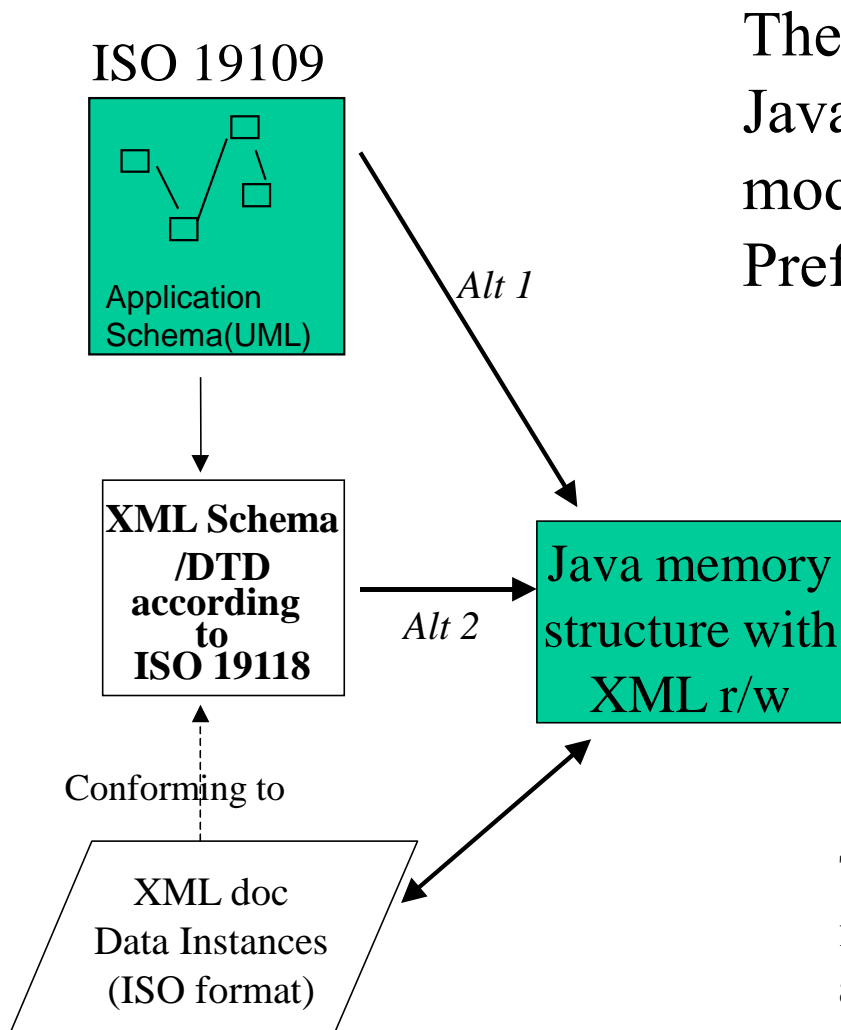


Two XSLT scripts implement a mapping from GML format to ISO 19118 XML Encoding format. There is currently no XSLT mapping from ISO 19118 XML format to GML format.

There are two mappings that results in almost equal XML files. The difference is that one is validated against a DTD, the other against an XML Schema.



XML Data binding



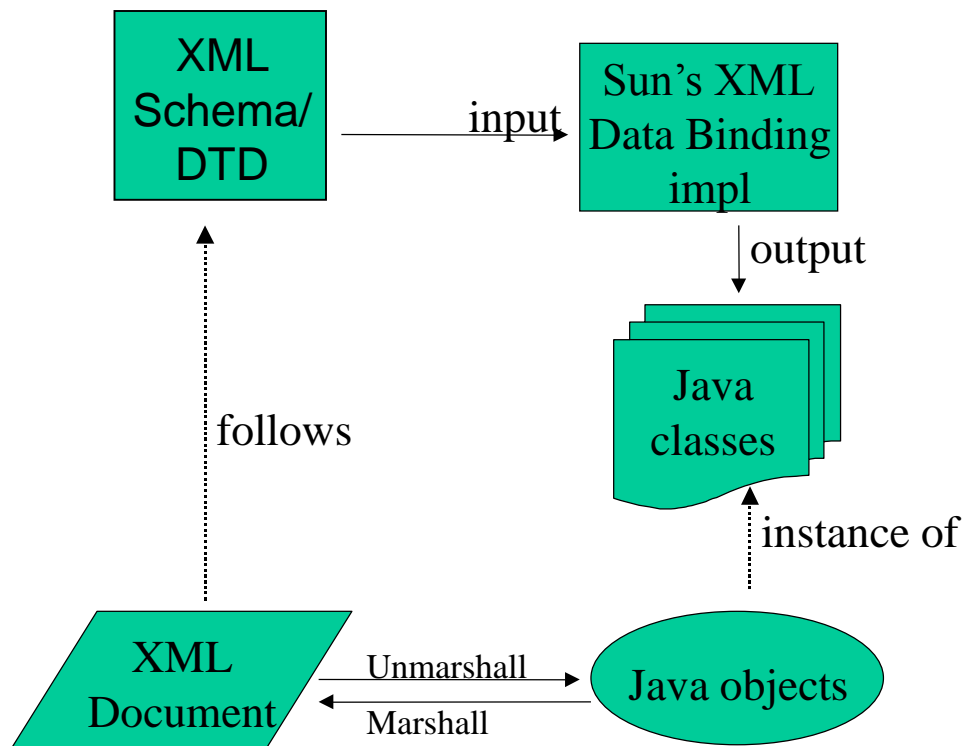
The goal is to provide the users with a set of Java classes for accessing the elements modelled in the Application Schema. Preferably the Java classes provide (Alt 2):

- ✓ an API for accessing the Java memory structure corresponding as close as possible to the elements modelled in the UML Application Schema.
- ✓ an API for building the Java memory structure from an XML file/stream and for writing the Java memory structure to an XML file.

The XML file/stream referred to in the previous item is conforming to the XML Schema/DTD according to ISO 19118, which again is derived from the UML Application Schema.



Sun's XML Data Binding Specification – a higher level API



An implementation of XDB (XML Data Bindings) specification takes an XML Schema/DTD as input and generates Java classes. The generated Java classes will be directly corresponding to the XML elements defined in the XML Schema/DTD. The Java classes will have an API for accessing the properties of each class as well as marshal- and unmarshal- methods, that is methods for write and read of XML from and to Java memory structure



Overall summary

The results show that it is possible to use software tools to automate the generation of XML Schema (or DTD) based on an application schema expressed in UML using the XML Encoding rules.

However, on several points the UML diagrams in the different standards are not sufficient clear to allow a model-based approach. The resulting manual interpretation indicates that the standards need further work to achieve the goal of interoperability.



Summary

- ✓ The software tools created in this project demonstrates that the generation of XML Schema (or DTD) based on application schemas expressed in UML using the XML Encoding rules can be automated with minimal human intervention.
- ✓ However, manual intervention is sometimes required. Imprecise UML models and/or the wish for a more efficient encoding result in the need to define exceptions from the general XML Encoding rules and thus manual intervention.
- ✓ This may be caused by imprecise modelled classes that needs further interpretation, for example that some classes should have been modelled as basic types instead of data types or as data types instead of classes. Or that extensive use of inheritance has led to classes having a number of inherited attributes that are superfluous or inconsistent.

On several points the UML diagrams in the different standards are not sufficient clear to allow a model-based approach



Feedback to ISO 191xx standards

CSL:

The current version of CSL cannot be used for a model-based approach.

The Conceptual Schema Language standard defines the basic types used in the different standards and in application schemas. These types need to be defined in a consistent way. Currently the data types are modelled as plain classes even if they are basic types. Does that mean that they should have identity? It is therefore a need to introduce a new stereotype <<BasicType>>, i.e. a type that has defined a canonical encoding. A number of explicit modelled attributes and operations should either be explained or removed from the models.



Feedback to ISO 191xx standards

Spatial:

A profile of the Spatial schema had to be developed from scratch and could not be based directly on the existing Spatial UML model. This because the textual conformance clauses override the UML model and the correlation between the text and the model is insufficient.

Metadata:

Only a citation subset of the metadata schema was used. The only problem found was the definition of a class URL, which clearly is a basic data type.





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Joint Nordic Implementation Project

A nordic project on implementation of ISO/TC 211 Geographic Information Standards

Documents available

[Project plan](#)[Minutes](#)[Work packages](#)[Presentations](#)[Phase 2](#)[Phase 2 report](#) NEW

Upcoming meetings

Next meeting

Copenhagen

2001-02-08/09

[Workshop on
standards in action:
2001-03-07](#)

DISCLAIMER.

This is a joint nordic project, the participating experts takes no responsibility for the documents provided so far, this must not be misunderstood to be nordic standards.



[Http://www.statkart.no/standard/jnip](http://www.statkart.no/standard/jnip)

Scope

The purpose of the joint Nordic implementation test project is to verify that the ISO/TC 211 proposed standards are implementable and that they will fulfil the requirements of being a workable and useful set of standards. The scope of the project is to be "proof of concept" for a subset of the proposed standards from ISO/TC 211. The project will also generate feedback information to the committee work before the documents have reached not more than DIS level. Carrying trough the project will be an education task where the participants get more familiar with the standards and how to use them and can share this knowledge with others. The project shall develop an application schema according to the selected parts of 19100-series of standard proposals (see 6.2). The main focus of the project is the ability of the standards to support inter working and data sharing. This means that the