Standardized Data Modeling and its Benefits

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SUMMARY

The Swiss Federal Act on Geoinformation [1] caused an intense activity in the creation of data models in Switzerland. By end of 2016 a total of 160 data models will be created for the Swiss National Spatial Data Infrastructure (NSDI). The data modeling language INTERLIS was chosen to define all data models in a standardized and easy accessible form. Through the model based INTERLIS approach easy sharing of high quality data between all parties (government agencies, private companies) becomes a reality.

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1. INTRODUCTION

Data modeling in the geo information space has a long tradition in Switzerland. Already in early 1990 the cadastral surveying model was published with the data modeling language INTERLIS in a standardized system neutral form (AV93). AV93 and its successor DM01 allowed public authorities and private companies to exchange standardized land information data in a system neutral format, thereby enabling to all parties the freedom of system choice.

The success of the original AV93/DM01 approach led to a private sector initiated project proposing the integration of the public-law restrictions (PLR) into the cadaster. In 2007, with the Federal Act on Geoinformation, the scope of activities was massively broadened again. The goal is to establish a National Spatial Data Infrastructure (NSDI) giving access for all participants to geo related information at minimal costs. In the NSDI not only the land information (cadastre, registration of right) and PLR layers are published, but also all other geo related information layers of the federal government. In the NSDI context the usage of a common standardized data modeling / integration concept like INTERLIS becomes essential for success.

2. INTERLIS LANGUAGE

The first version of the data modelling language INTERLIS was introduced in Switzerland in the late 1980s (Dorfschmid et al [2]) and has become a Swiss standard in 1998 (SN 612030). INTERLIS [3] is an object-oriented conceptual schema language (CSL), which is being used to precisely define (spatial) data models in textual form with a rigid computer processable syntax. INTERLIS has a unique set of features which sets it well apart from other modelling standards (i.e. UML, XML-Schema or EXPRESS):

- INTERLIS can be used to describe relational or object-oriented data models in a system neutral way;
- INTERLIS can be easily understood by application and IT experts, therefore bridging the gap between IT and application domains;
- INTERLIS is precise enough to be directly processed by modern software tools;
- each INTERLIS data model automatically defines a system neutral XML based data exchange format;
- the language has built-in geometric data types (point, poly-line, polygon), making it especially suitable for models in the geoinformation domain;
- it is possible to quality check INTERLIS data against INTERLIS data models, thereby enabling fully automated quality control of spatial data including geometric attributes;

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- INTERLIS is compatible with the most relevant international standards (UML, XML Schema, XML, GML).

But INTERLIS has not only an interesting set of features; it is also supported by a wide range of free and commercial tools for many years:

- the INTERLIS compiler checks the syntactical correctness of an INTERLIS data model (free);
- the INTERLIS checker can quality check INTERLIS XML data against INTERLIS data models (free);
- the INTERLIS UML editor is used to create INTERLIS models from UML diagrams or to visualize existing INTERLIS data models as UML diagrams (free);
- data translators can convert data sets from many GIS systems / databases to and from INTERLIS XML (free and commercial);
- schema tools can generate database schemata directly from INTERLIS data models (free and commercial);
- there is even a web based data server / map server based on INTERLIS (commercial).

More information, also in English, about the INTERLIS language and its tools are available at the official INTERLIS web site www.interlis.ch.

3. BENEFITS

3.1 Automated Quality Control

As the transfer format is directly derived from data model it becomes possible to check data against the data model. That property can be used to establish automated internet check services. In a typical usage scenario data is exported by the data collector in the system neutral format, sent to the internet check service for quality control and is finally transmitted to a portal server for publishing if the no errors in the dataset are found. The common INTERLIS data model is used to configure both check service and portal server.
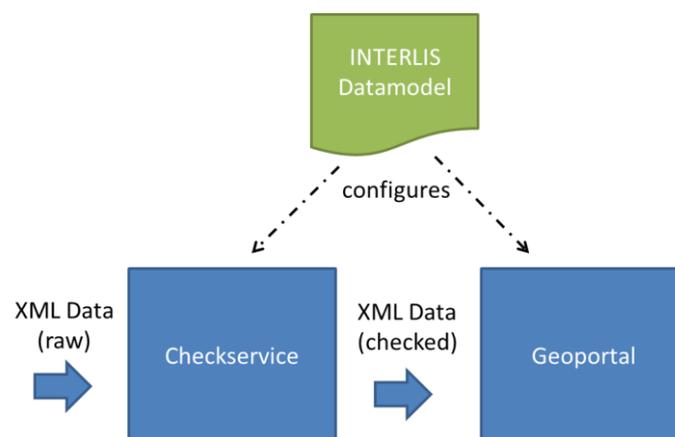

Figure 1: Checkservice Dataflow

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3.2 Generation of Databases

Several commercial and non-commercial tools have been developed to generate database schema directly from INTERLIS data models. With the help of the tools it becomes possible to create vendor specific database schemes (i.e. Oracle, ESRI) from the same INTERLIS data model.

3.3 Public Model Repositories

In the context of an NSDI it is important to keep the many data models easily accessible and well organized. The Swiss government therefore publishes all INTERLIS data models in a public model repository at models.geo.admin.ch. Model repositories may be linked to other model repositories. Tools like the INTERLIS compiler or INTERLIS checker can automatically find the proper model by searching the repository and linked sub-repositories.

Name	Last modified	Size	Description
ARE/	15-Jan-2015 16:38	-	
ASTRA/	15-Jan-2015 16:38	-	
BABS/	15-Jan-2015 16:38	-	
BAFU/	09-Mar-2015 17:24	-	
BAK/	15-Jan-2015 16:39	-	
BAKOM/	15-Jan-2015 16:39	-	
BAV/	04-Mar-2015 08:25	-	
BAZL/	15-Jan-2015 16:39	-	
BFE/	06-Mar-2015 14:19	-	
BFS/	15-Jan-2015 16:40	-	
BJ/	15-Jan-2015 16:40	-	
BLV/	02-Dec-2014 09:54	-	
BLW/	15-Jan-2015 16:40	-	
CH/	20-Feb-2015 12:44	-	
ENSI/	15-Jan-2015 16:41	-	
VBS/	15-Jan-2015 16:42	-	
V_D/	15-Jan-2015 16:42	-	
ilimodels.xml	12-Mar-2015 13:29	251K	
ilisite.xml	12-Nov-2012 09:36	1.1K	
robots-disallow.txt	11-Feb-2014 17:02	26	
swisstopo/	15-Jan-2015 16:42	-	

Figure 2: Model Repository models.geo.admin.ch

4. CONCLUSIONS

INTERLIS allows us to share standardized data models across multiple organizations and to exchange data in multivendor environments. System independent quality control becomes possible as the system neutral transfer format is directly derived from the standardized data model. In complex NSDI environments a common data modelling / data integration concept is the foundation for collaboration and therefore key to success.

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BIOGRAPHICAL NOTES

Michael Germann is co-founder and CEO of infoGrips LTD, Zürich Switzerland and member of the Swiss Land Aministration Foundation (SLM). In 1988, he received a master's degree in computer science from ETH Zürich. His main interests are software development, data modelling, data quality control and the implementation of spatial data infrastructures. He worked on several Swiss standards including INTERLIS and was part-time member of the Swiss delegation to ISO TC211.

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