Land Governance in an Interconnected World

ANNUAL WORLD BANK CONFERENCE ON LAND AND POVERTY
WASHINGTON DC, MARCH 19-23, 2018

ISO 19152 Implementation using the **INTERLIS** based **LADM** Country Profile of **Colombia**

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INTRODUCTION

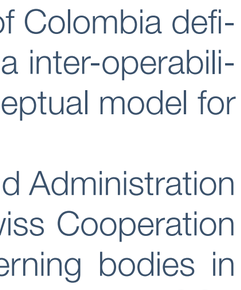
The new Multipurpose Cadaster of Colombia defines, as a standard to achieve data inter-operability, the ISO 19152 (LADM), a conceptual model for land administration.

The Project "Modernization of Land Administration in Colombia", financed by the Swiss Cooperation (SECO), has supported the governing bodies in developing a Colombian profile called LADM-COL and suggested, for its actual implementation, to apply the conceptual description language INTERLIS.

For this language, a tool chain is available to implement any data model described in INTERLIS, following a Model Driven Architecture (MDA) approach. The Project development team contributed to the evolution and completion of these tools, and integrated them in a web based system which consists of several modules for validation, storage, visualization and downloading of data according to LADM-COL models.

MATERIALS | METHODS

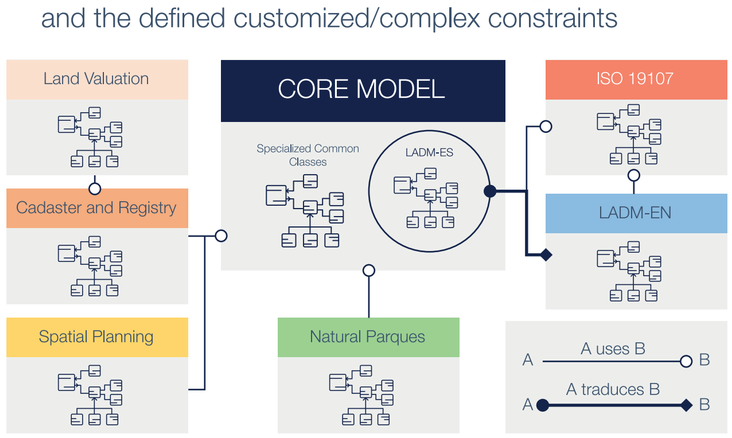
WHY INTERLIS? ADVANTAGES



- Allows precise description of conceptual data models and therefore direct implementation in a DB scheme by use of special software
- Includes an XML based exchange format derived from the model
- Facilitates automated data validation against an underlying model, including complex constraints (e.g. topology)
- Data storage and exchange independent of a vendor's system/software

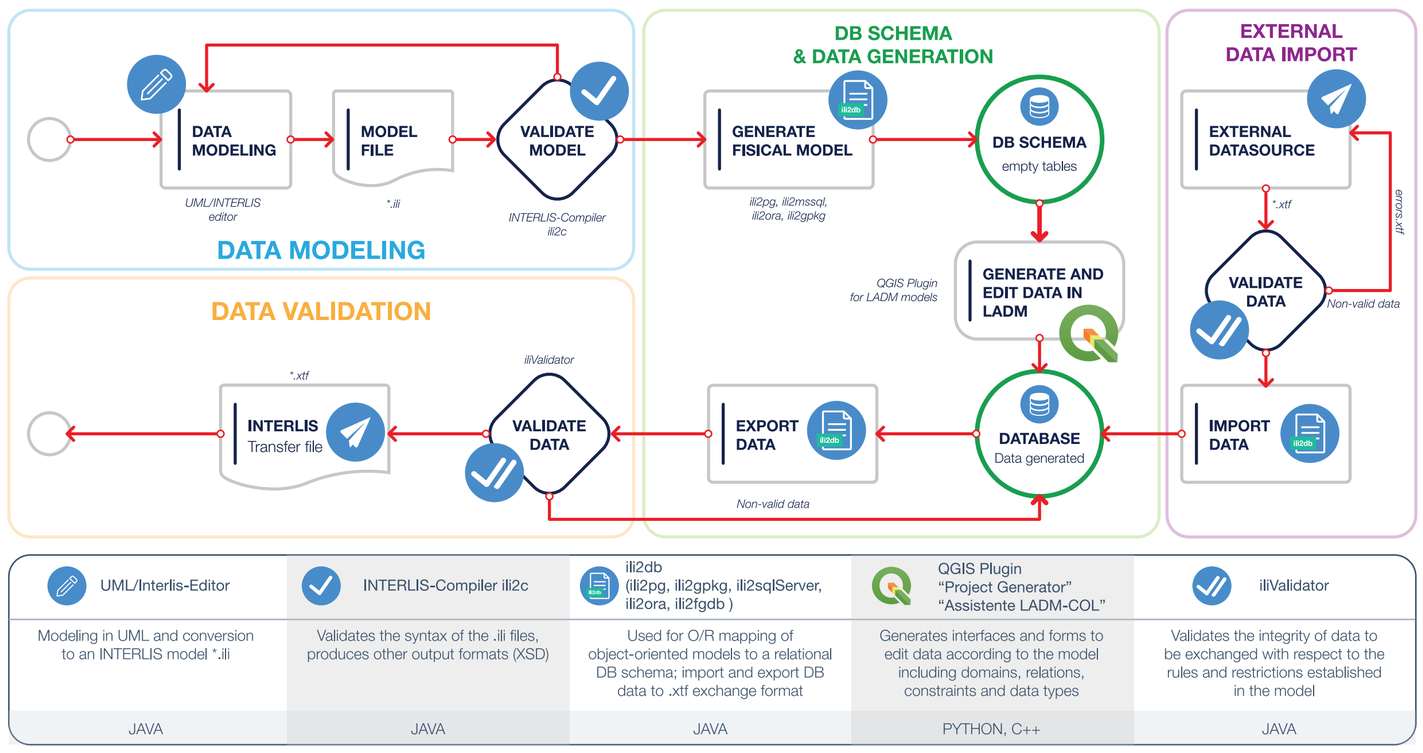
INTERLIS BASED LADM IMPLEMENTATION STEPS

1. Stake out technical (definitions, concepts) and institutional (stakeholders) framework for data modelling
2. Iterative process of conceptual data modelling with stakeholders
3. Formal model description with INTERLIS, model compilation
4. DB scheme generation with ili2db tool, testing and re-adjustments to the INTERLIS data model
5. Import data structured according to the model (e.g. cadaster entities), manipulating/editing data, exporting to INTERLIS transfer file
6. Validate received LADM-INTERLIS data against the model and the defined customized/complex constraints



RESULTS

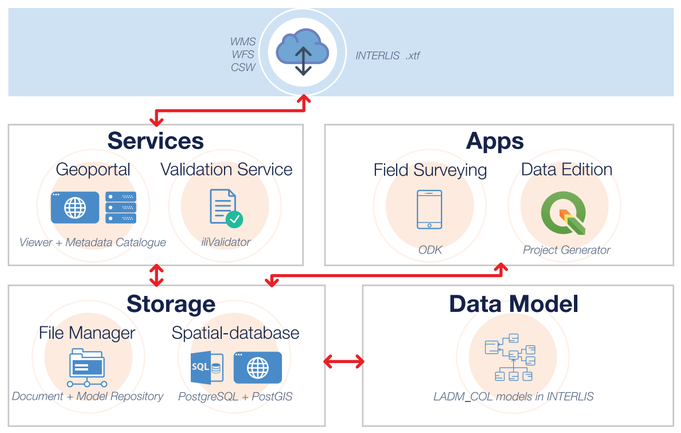
INTERLIS TOOL CHAIN ENHANCEMENT AND DEVELOPMENT FOR LADM IMPLEMENTATION



DEVELOPMENT OF MODEL AND WEB BASED DATA RECEPTION SYSTEM, USING FOSS COMPONENTS, COMPLIANCE WITH MDA

To comply with the MDA approach, the core of the system are the LADM-COL models, stored in a repository of official models; the interfaces and forms of the modules are adjusted semi-automatically to each model.

This considerably reduces the development phase and emphasizes the design.



PRINCIPLE MODULES

- Source Documents and Model Repository
- Massive data validation against underlying data model
- Automated DB Import and Data Publication
- GIS Viewer of imported and validated data with advanced functionalities
- Includes a structured data download (XTF, etc.)

RULE BASED DATA-VALIDATION EXAMPLE

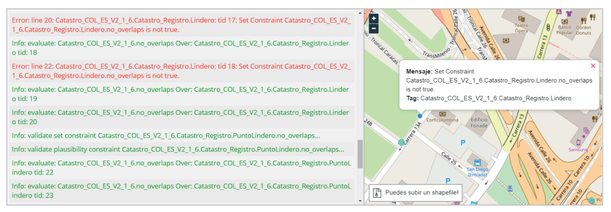
Example of a topological rule of the cadastre model of LADM-COL and results of a validated test data set. The "no_overlaps" function is implemented as a JAVA plugin, executed from iliValidator.

```
FUNCTION no_overlaps(
      Objects: OBJECTS OF ANYCLASS;
      SurfaceAttr : ATTRIBUTE OF @ Objects RESTRICTION ( SURFACE )
   ): BOOLEAN;
...
CLASS Terreno EXTENDS LA_UnidadEspacial =
   ...
   geometry (EXTENDED): MANDATORY GM_Surface2D;
   SET CONSTRAINT no_overlaps ( ALL, >> geometry );
END Terreno;
```

Section of the LADM-COL cadaster model in INTERLIS (incl. defined topological rules)

Test data set created with the QGIS Project Generator Plugin

Validation error report and visualization, generated from the validation service



CONCLUSIONS

- Use of **INTERLIS and the tools** now available, allow to develop an information infrastructure based on a MDA approach, which **greatly supports LADM implementation.**
- The **Data Validation Service** of the developed system **increases productivity in the quality control process**, through automatic check of data against a given model and the defined validation rules.
- The system stands out with its flexibility, low requirements in terms of hardware and the software components entirely based on FOSS (although hybrid solutions are possible too).
- The system, employable by administrations even with limited resources, can be considered as **a generic information infrastructure of Land Administration.**

ACKNOWLEDGEMENTS

All results of LADM-COL development and implementation presented in this poster, are an achievement of the Swiss Cooperation Project and its Colombian partner institutions

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Modernización de la Administración de Tierras en Colombia

POS 02-02