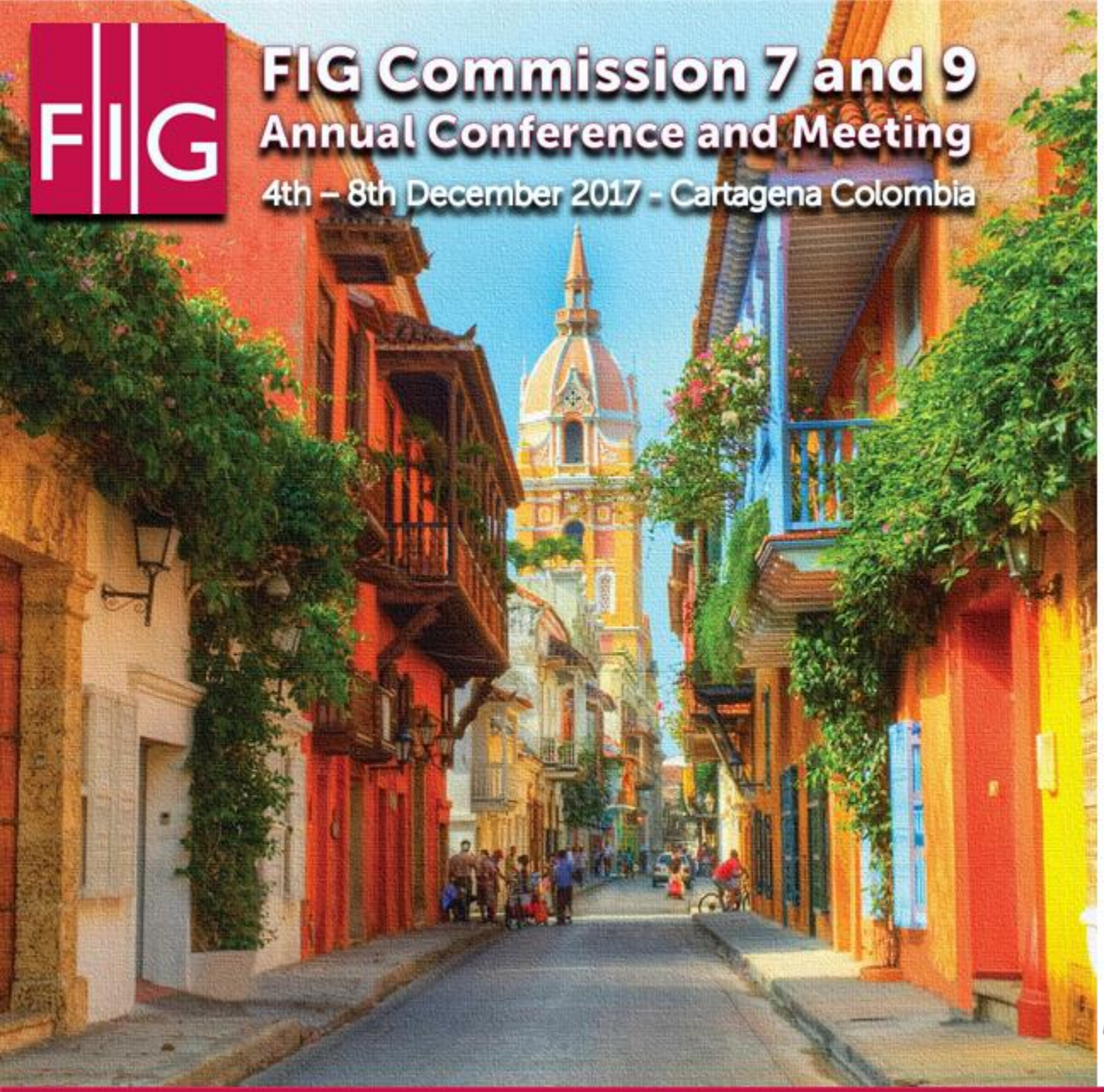

THE MODEL DRIVEN ARCHITECTURE APPROACH FOR ISO 19152:2012 (LADM) IMPLEMENTATION

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INCIGE

Proyecto

Modernización de la Administración de Tierras en Colombia

Universidad de los Andes

Agencia de Implementación
Bogotá, Colombia

Proyecto
Modernización de la Administración de Tierras en Colombia

Schweizerische Eidgenossenschaft
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Un proyecto de :
Embajada de Suiza en Colombia
Cooperación Económica y Desarrollo (SECO)

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IGAC
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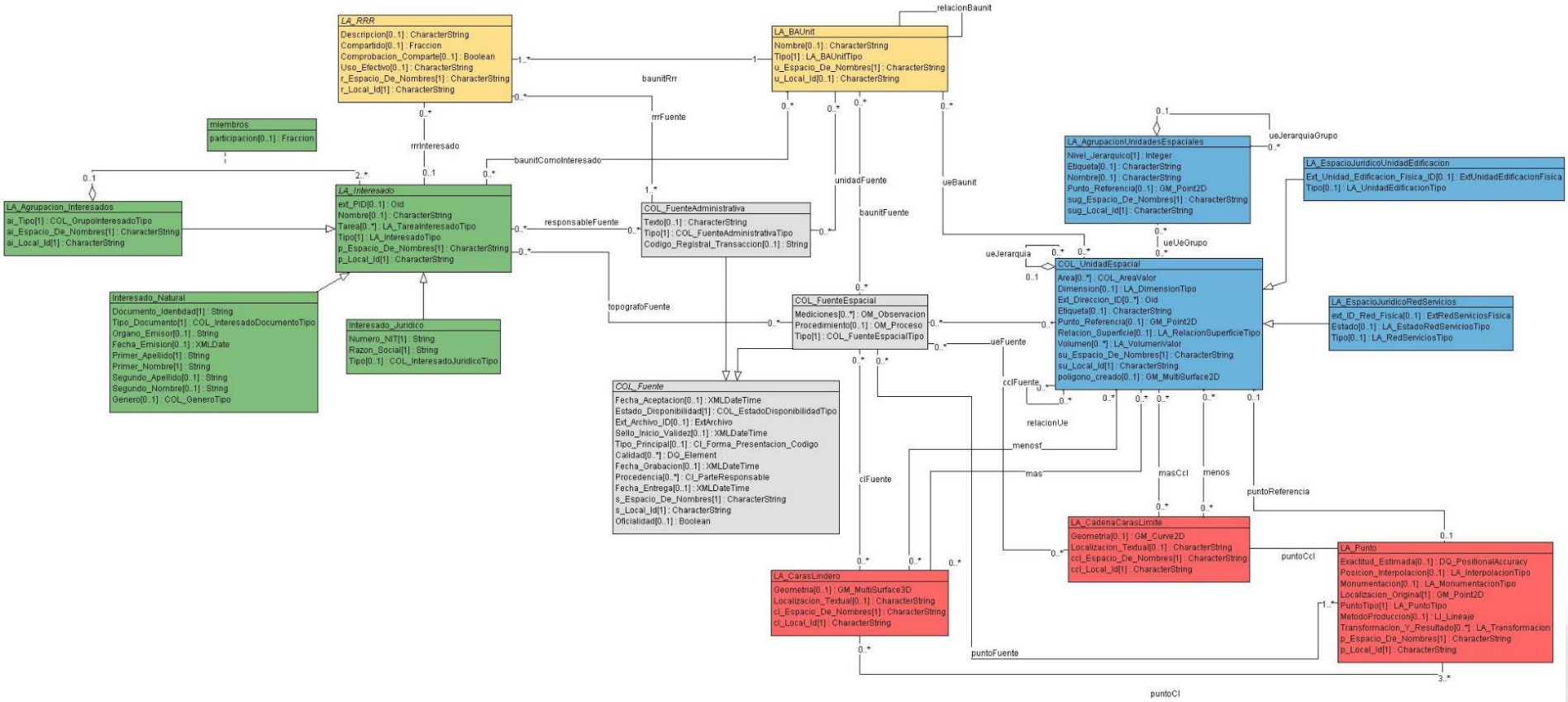
Model Driven Approach – MDA

- **Model** as the primary source for constructing a system from documenting and analysis to maintenance and enhancement
  - Agile development process
  - Reduces gaps between design and deployment
  - Standardizes viewpoints
- Focuses the discussion on the model not in artifacts

LADM_COL (the core model) – and now?

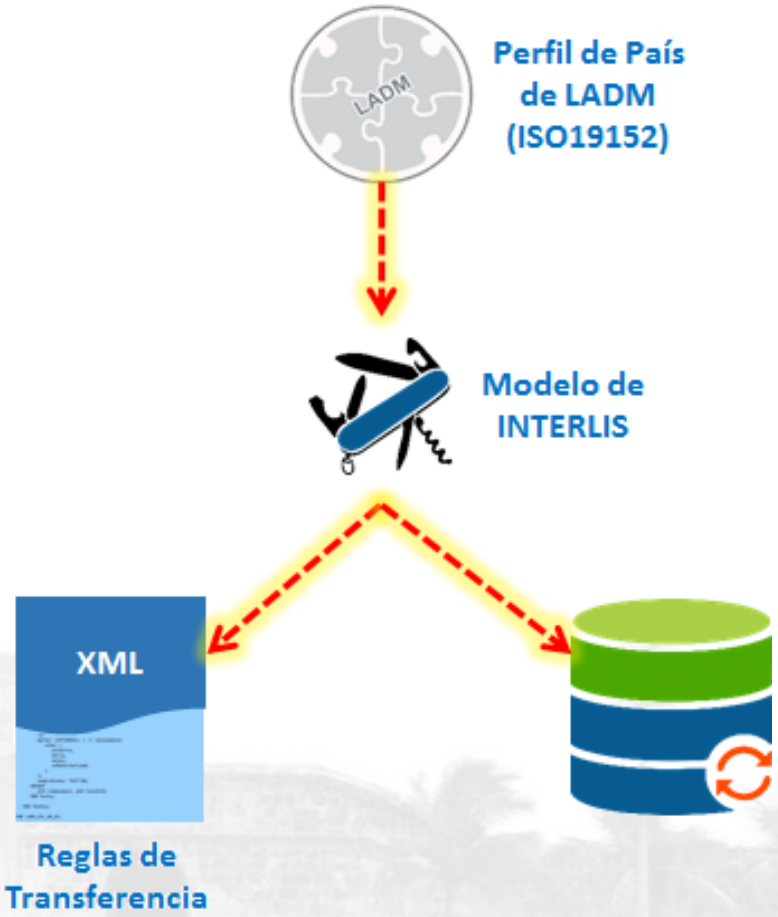


Why INTERLIS?

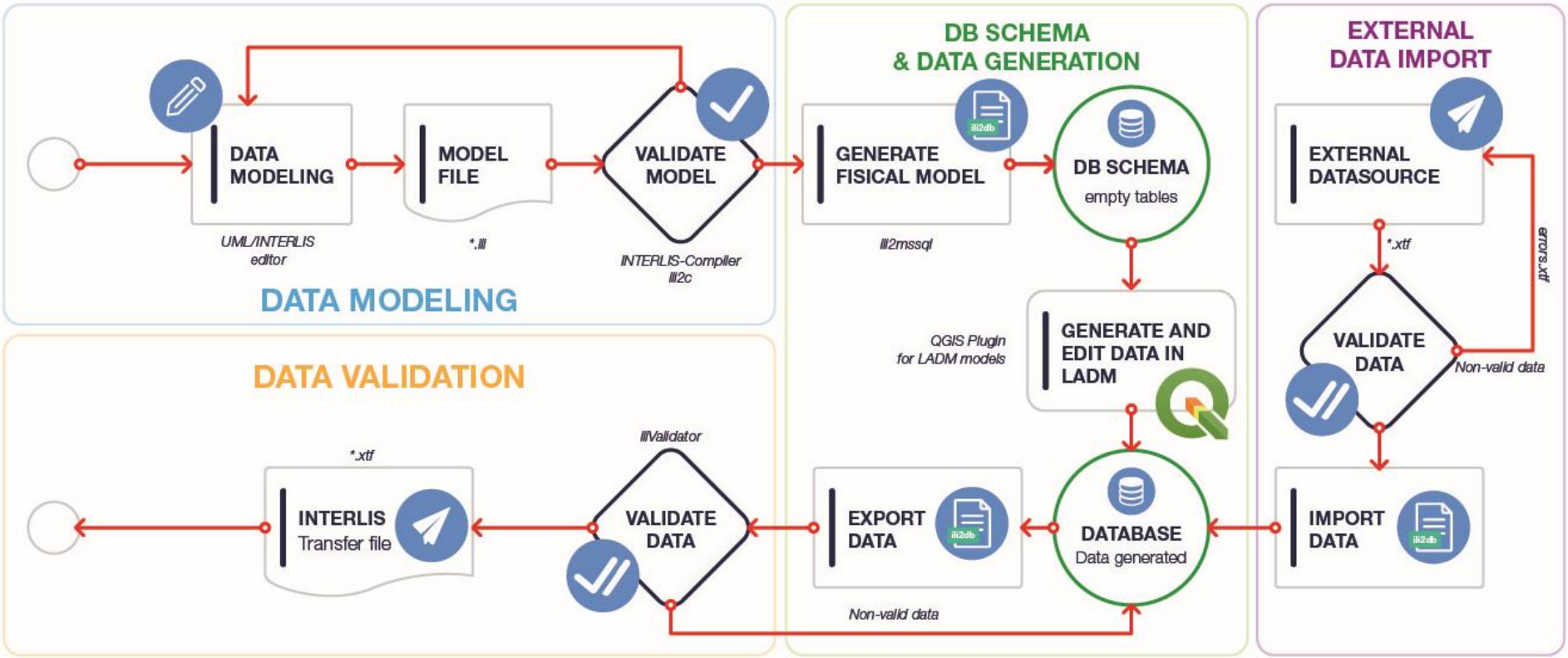
- LADM: typically described with a **UML class diagram**
- But: **UML as a semi-formal language** for describing conceptual data models (Naja & Giger, 2006) is not very precise for computer assisted DB implementations; no geometry types; **data exchange is not purpose of UML**
- **INTERLIS as a formal language** (with a strict syntax) for describing **conceptual data models**, includes an **exchange format (XML)** derived from the model; geometry types and constraints can be defined in the model
- Translating LADM UML class diagrams to INTERLIS is straight forward…
- …and **computer processable data models** and **data exchange formats** are obtained (software independent)

Why INTERLIS? – this is important

- Object oriented language for formal data model description
  → allows **computer supported DB implementation**
- Model based XML exchange format
  → allows **automated and massive data validation** against the underlying model
- Complete tool chain available
  → jump start for **any LADM implementation**

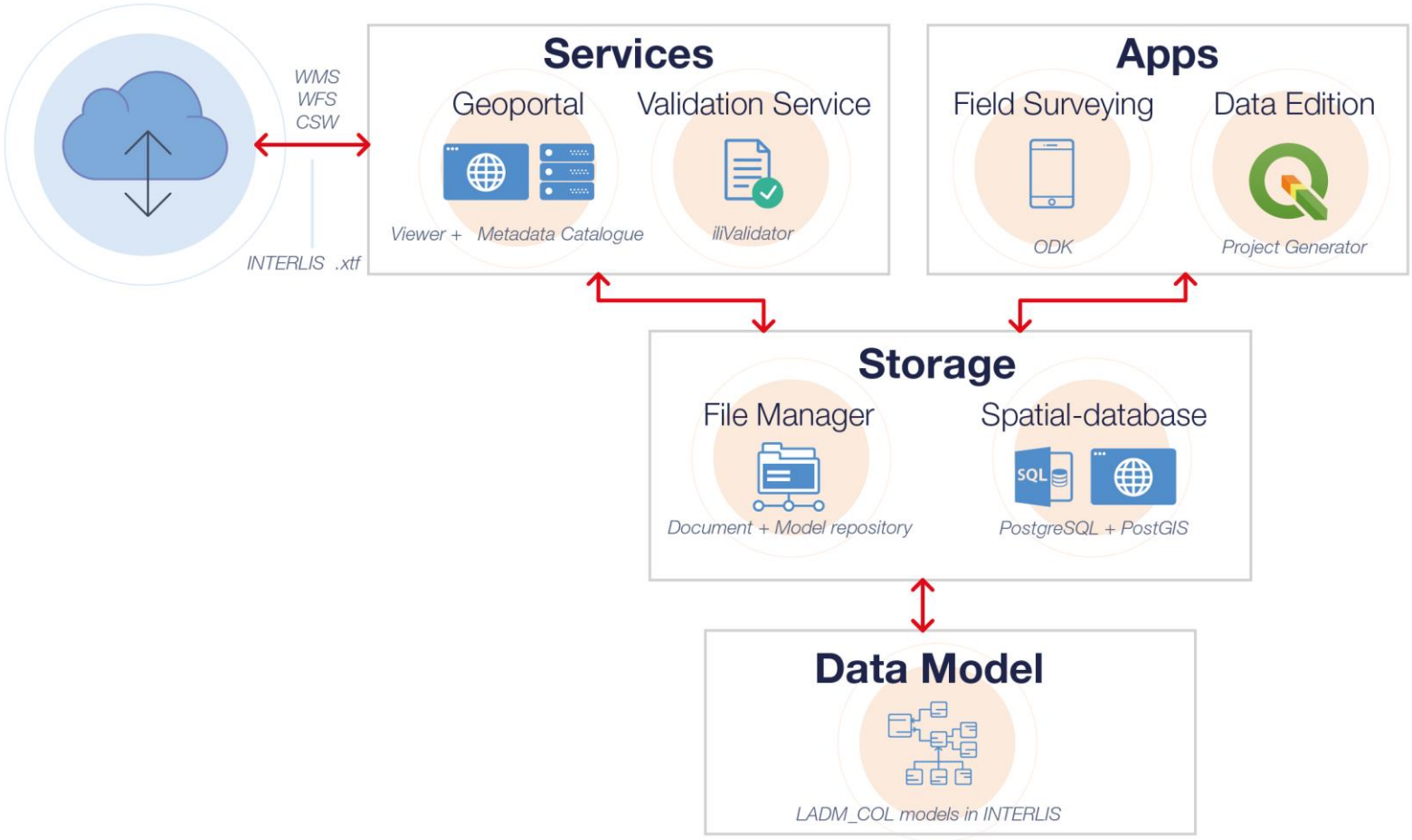


INTERLIS Model Implementation Workflow



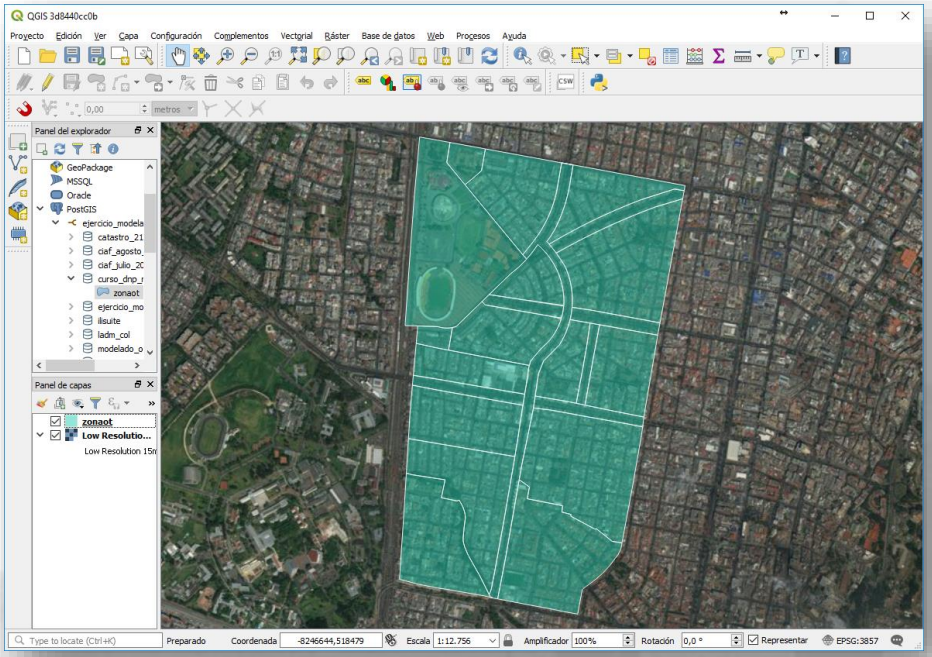
LADM Data Reception – System requirements

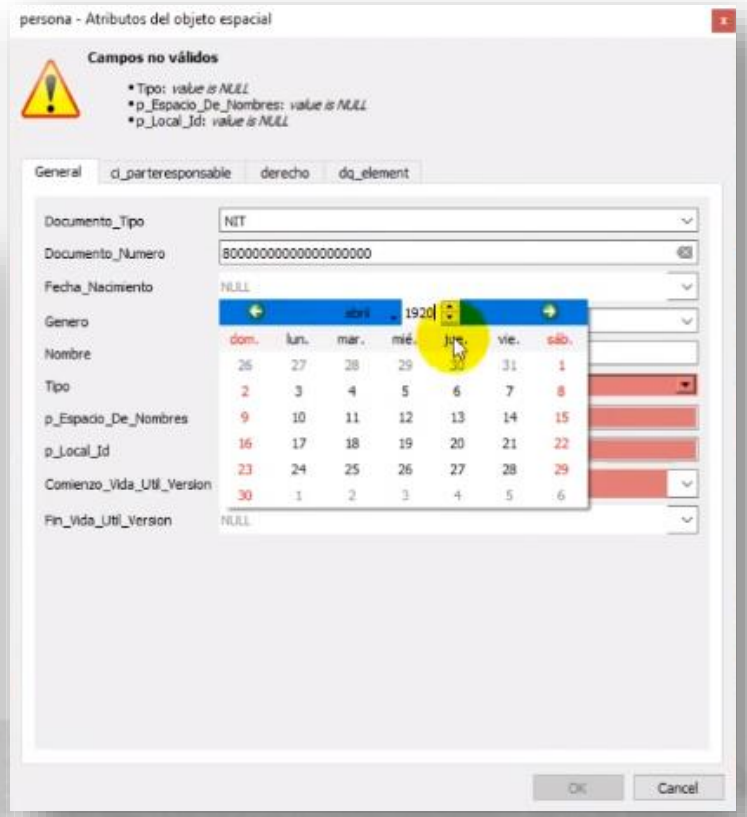
LADM Data Reception – Implemented architecture



QGIS Project Generator + LADM-COL Assistant

QGIS
Project Generator

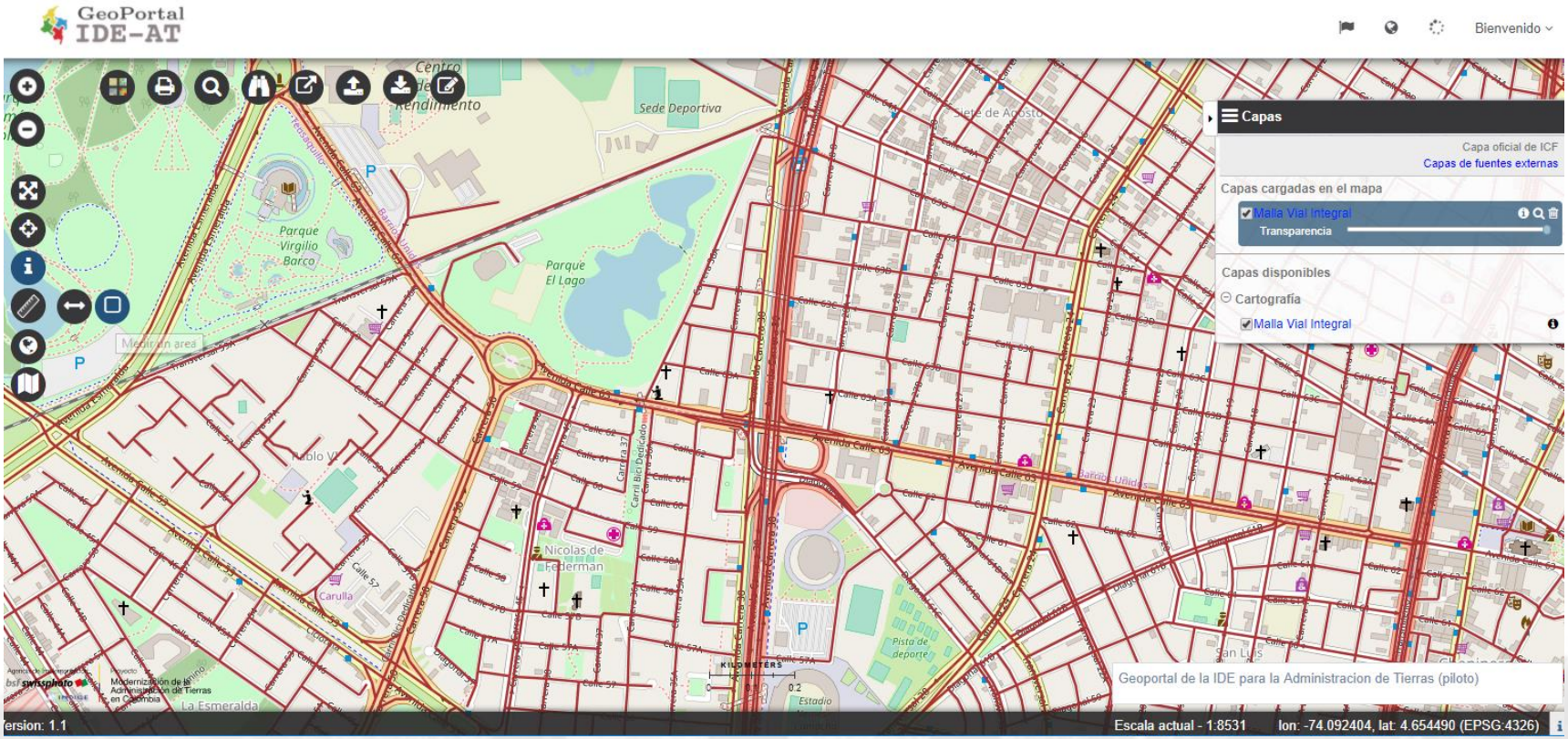




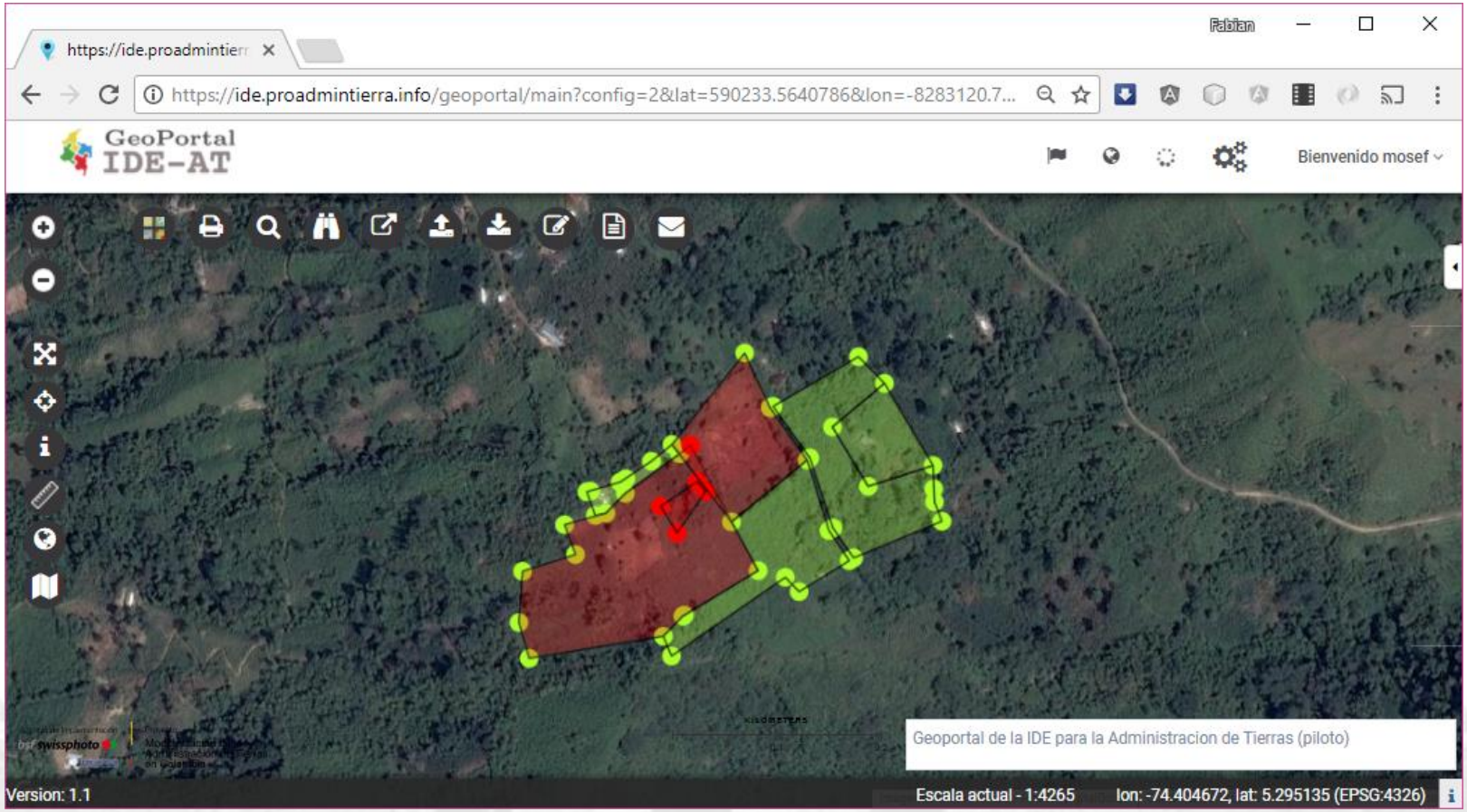
Web Portal

- A centralized access to main modules and services
- Requires autentication for certain functionalities/content

LIS Viewer – with special features...

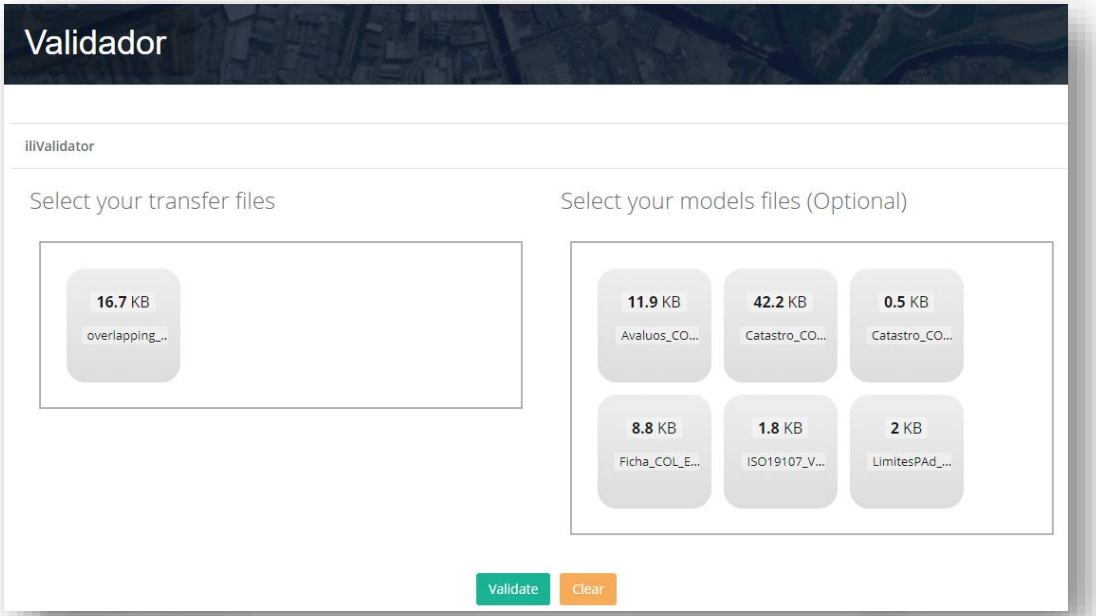


LIS Viewer – with special features...

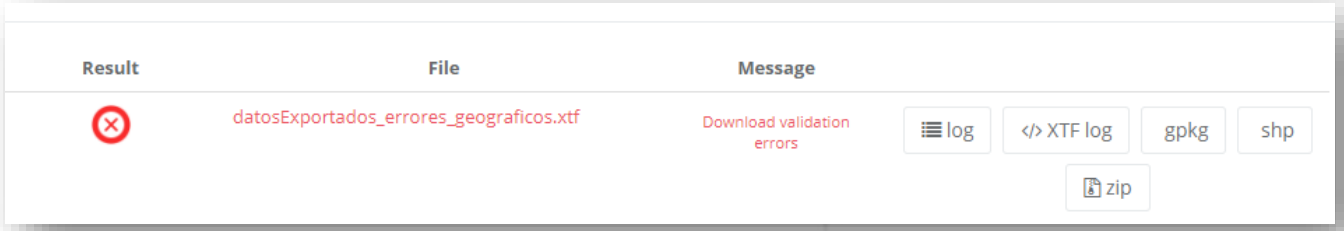


Validation Service

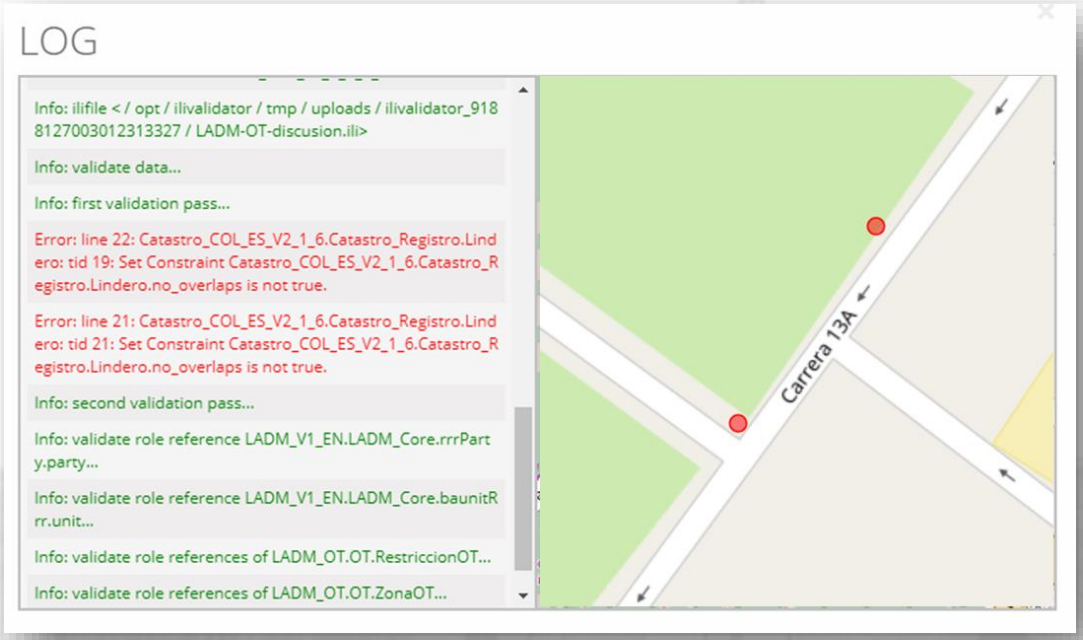
- Web-based, roles + permissions configurable
- Validates data integrity against constraints in the model
- Error reports includes location and tech details



Validation Use Case – On failed

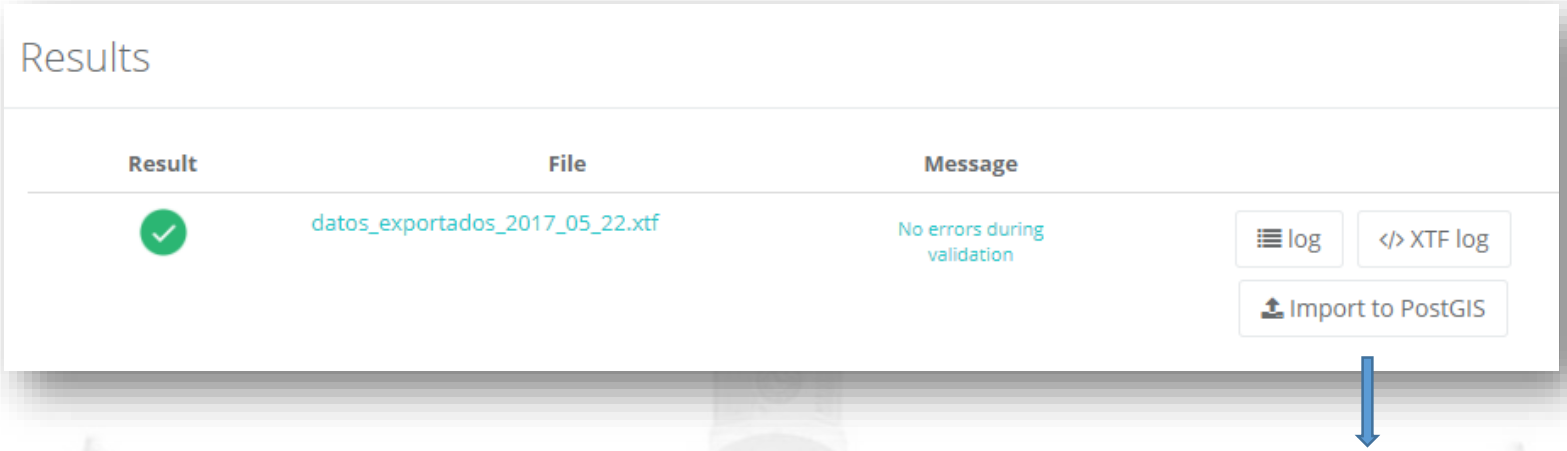


Multiple Output formats



Log + Errors Viewer

Validation Use Case – On succeed



Upload to PostgreSQL

Conclusions

- The use of **INTERLIS and the tools available**, allow to develop an information infrastructure based on **MDA**; → **facilitates LADM implementation**.
- The **Data Validation Service** of the developed web system **increases productivity in the quality control** process, through automagical and massive check of data against a given model and the included 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**.
- **Doing the step from the discussion on the conceptual model to its actual implementation contributed to gain new insights on LADM itself**

Future work (– end of 2019)

- Work on **integration of Colombian LAMP Profile** (ISO 19115) **and LADM** (metadata model described in INTERLIS → same tool chain and validation service can be employed in combination with Geonetwork)
- **Improving UML/INTERLIS-Editor compatibility** with other UML-Editors
- Continuous work on **QGIS plugins assisting LADM data edition** (mutation management → Versioned Object implementation)
- Test use/**benefit of extended (thematic) models in an operational SDI scheme** (cadaster-registry, spatial planning, protected areas/natural parks)
- **Performance tests** with massive data validation
- Develop open online courses in applying the MDA approach for LADM implementation using INTERLIS

Important links

- http://www.proadmintierra.info
- http://ide.proadmintierra.info
- https://github.com/AgenciaImplementacion

3 Demo sessions during lunch time

- **The LADM-COL model and INTERLIS**: from the UML diagram to an implementable INTERLIS data model → ***10 min***
- **Generate and validate data in a LADM-INTERLIS model**, using available Open Source tools → ***10 min***
- **A basic data infrastructure for LADM**: load, query and download LADM model conform data → ***10 min***

Muchas gracias!

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