EXÉRCITO BRASILEIRO

DSGTOOLS:

a toolbox for database management and vector data quality in QGIS

FOSS4G BOSTON 2017

WHO ARE WE?

- Brazilian Army Geographic Service Bureau (DSG)
- 100+ years mapping the Brazilian territory
- One of the legal responsible for the Brazilian geospatial standards

DSGTOOLS TEAM

- Luiz Andrade:
  - Cartographic Engineer: Graduated @ Military Institute of Engineering in 2005
  - Python GIS Developer
  - https://github.com/lcoandrade

- Philipe Borba:
  - Cartographic Engineer: Graduated @ Military Institute of Engineering in 2012
  - Python GIS Developer
  - https://github.com/phborba

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WHAT WAS OUR PRIMARY MOTIVATION?

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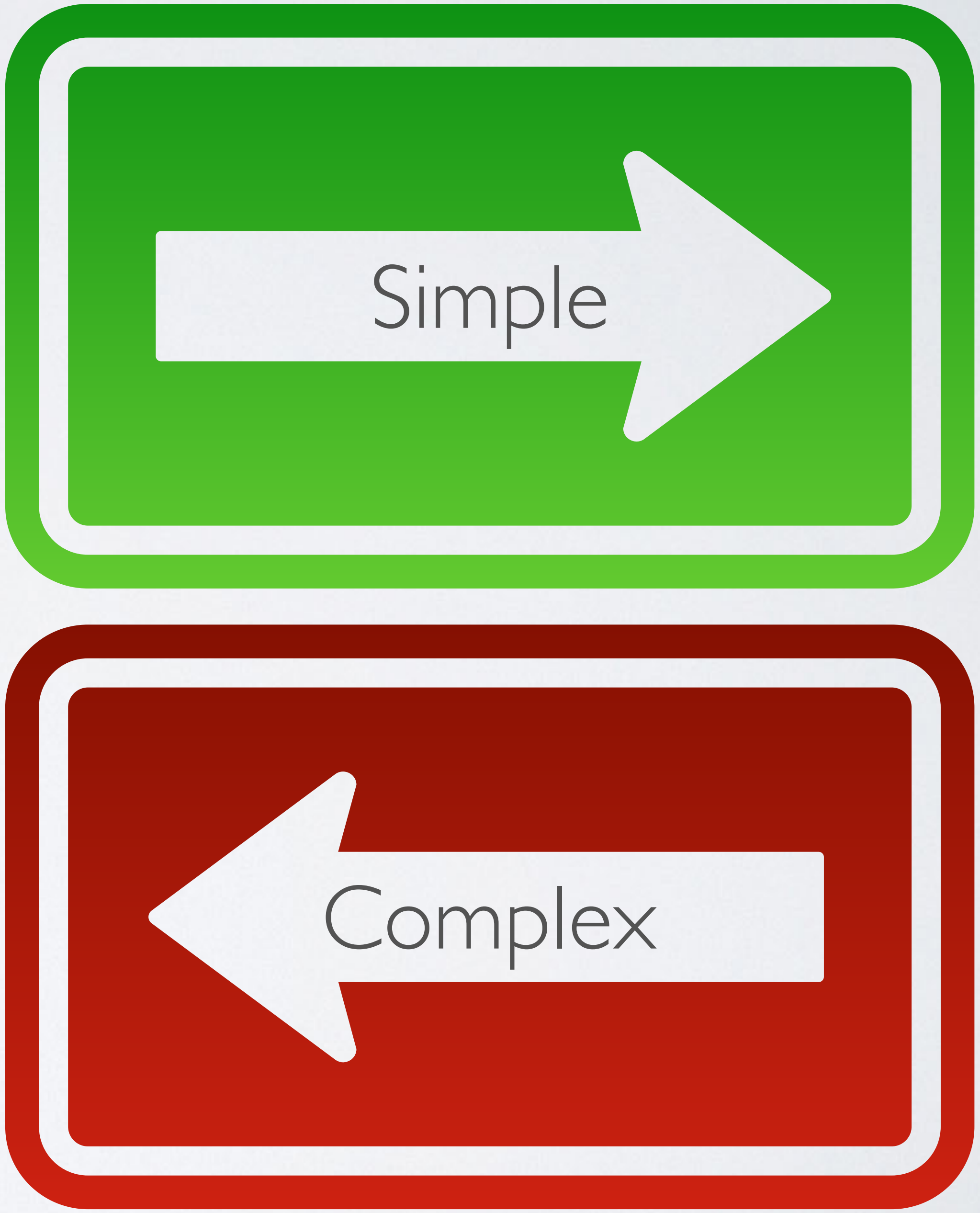
WHAT WAS OUR PRIMARY MOTIVATION?

- Break the proprietary chains

WHAT WAS OUR PRIMARY MOTIVATION?

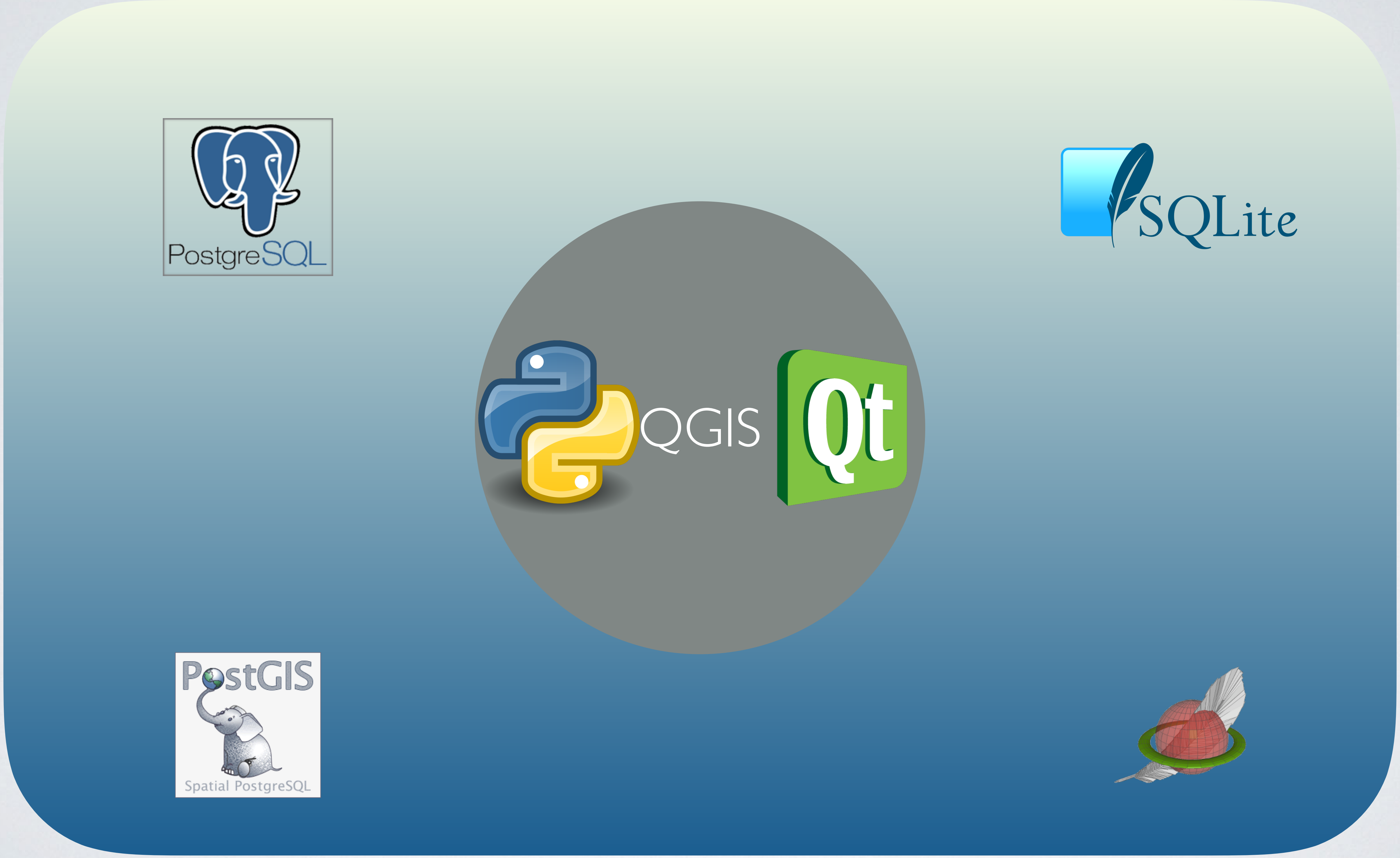
- Provide seamless way to execute complex tasks, because:
  - Our staff is mainly composed GIS users
  - This means they are not DBAs, Programmers or anything like that



Simple

Complex

CHOSEN TECHNOLOGY



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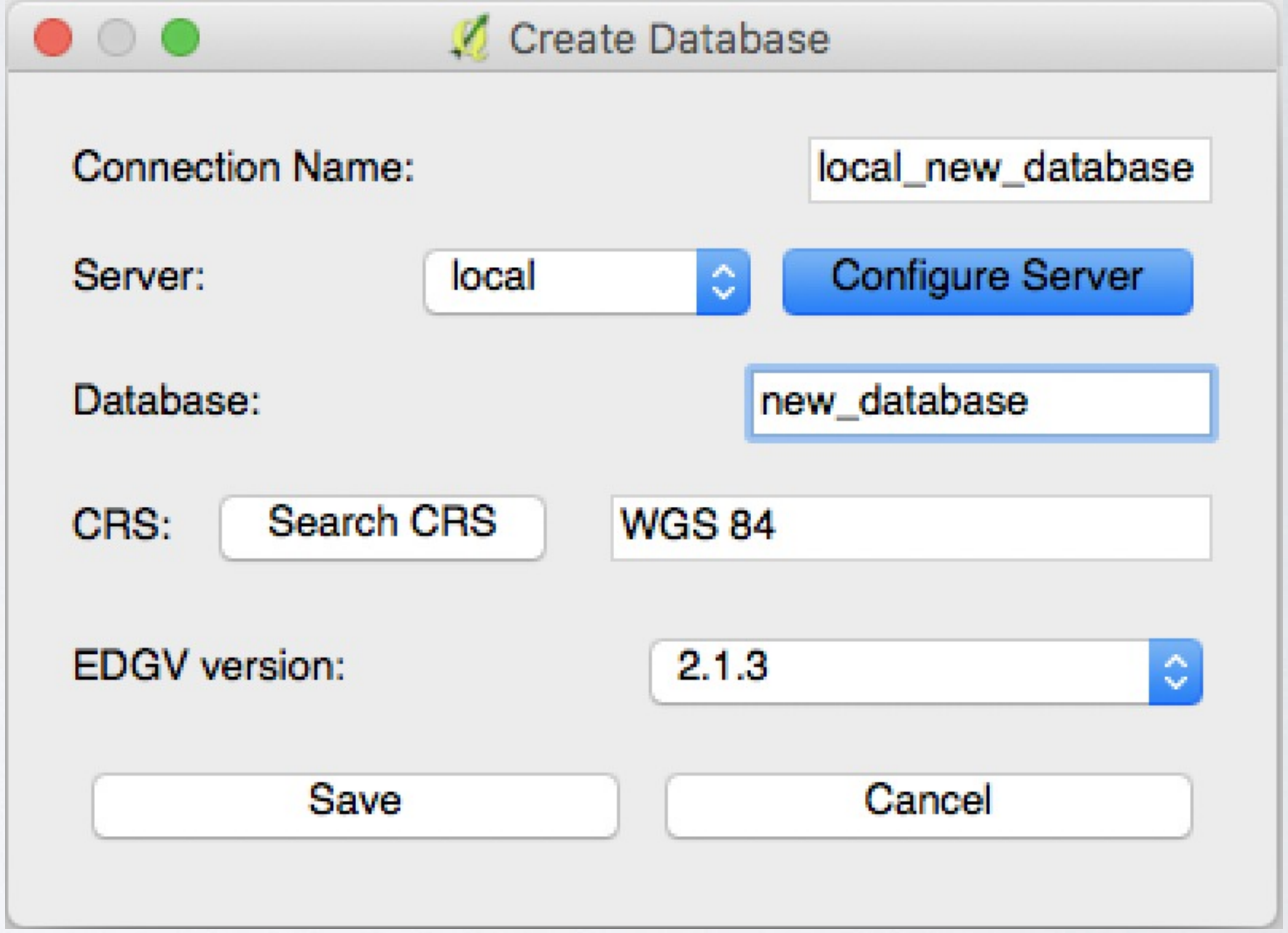
WHAT DOES DSGTOOLS PROVIDE?

First of all (and most important)

A seamless way to build the Brazilian conceptual model (226 layers omg!)



Connection Name: local_new_database

Server: local

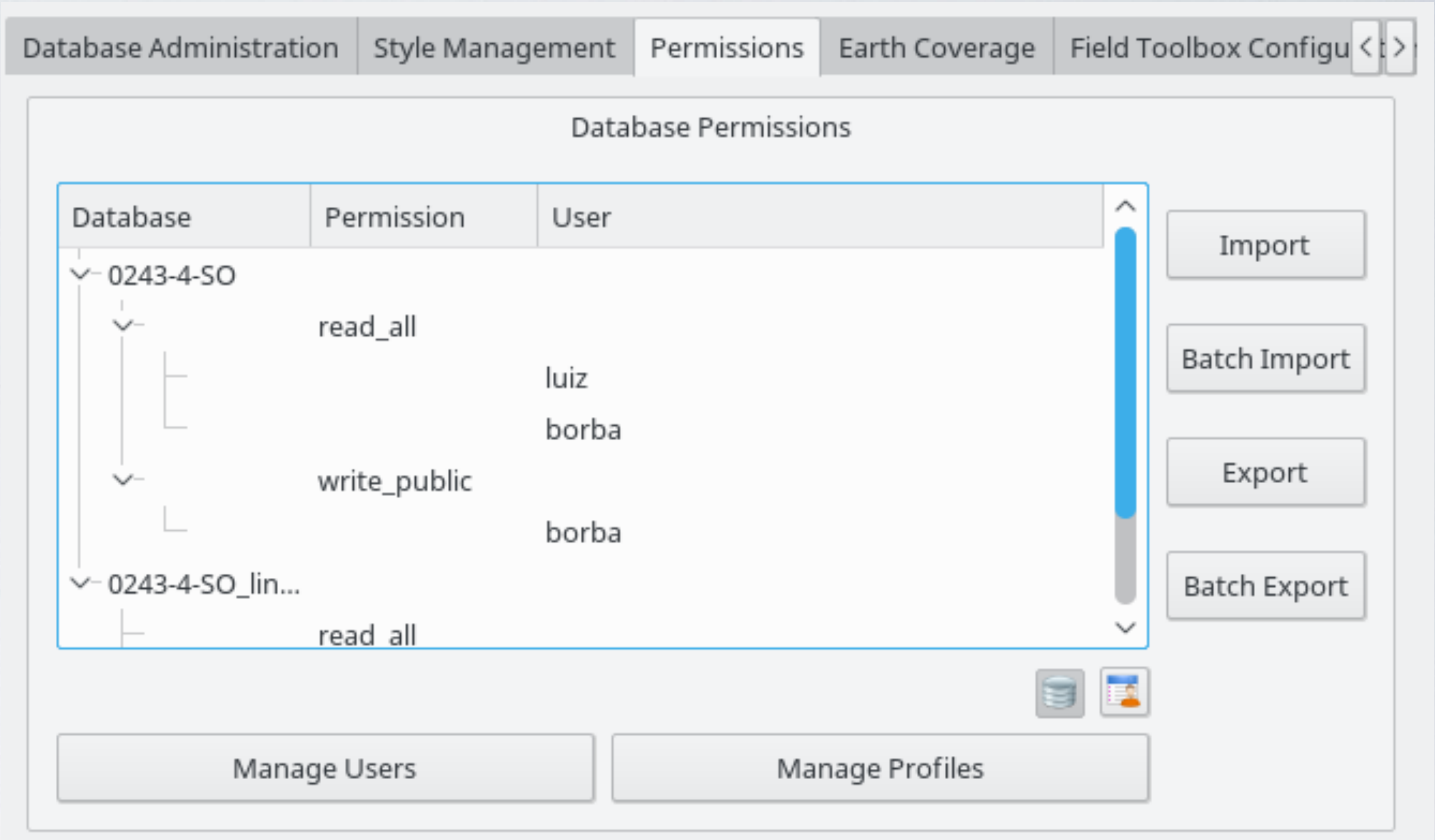
Database: new_database

CRS: WGS 84

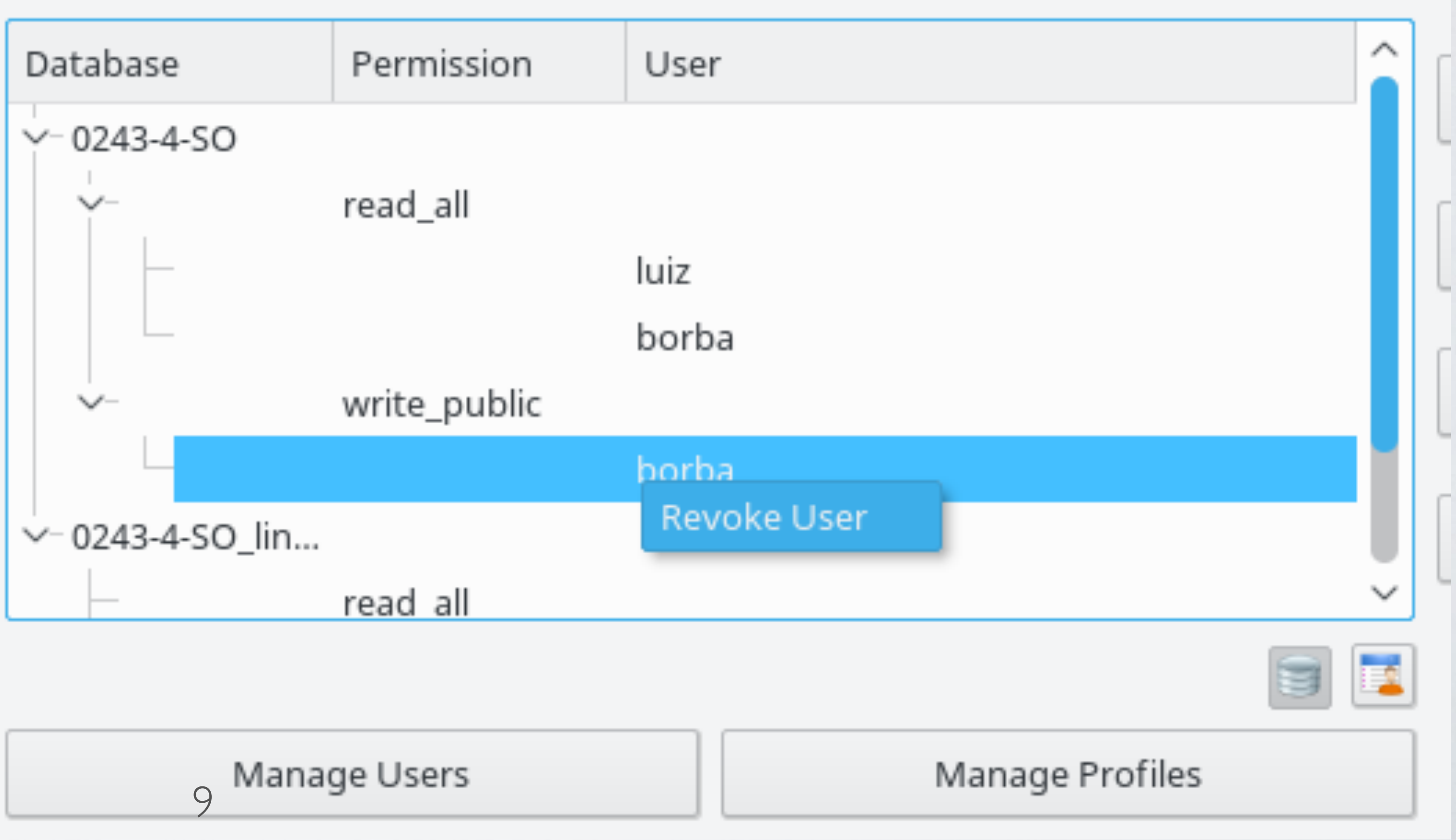
EDGV version: 2.1.3

WHAT DOES DSGTOOLS PROVIDE?

User permission management



Database	Permission	User
0243-4-SO		
	read_all	
		luiz
		borba
	write_public	
		borba
0243-4-SO_lin...		
	read_all	



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0243-4-SO		
	read_all	
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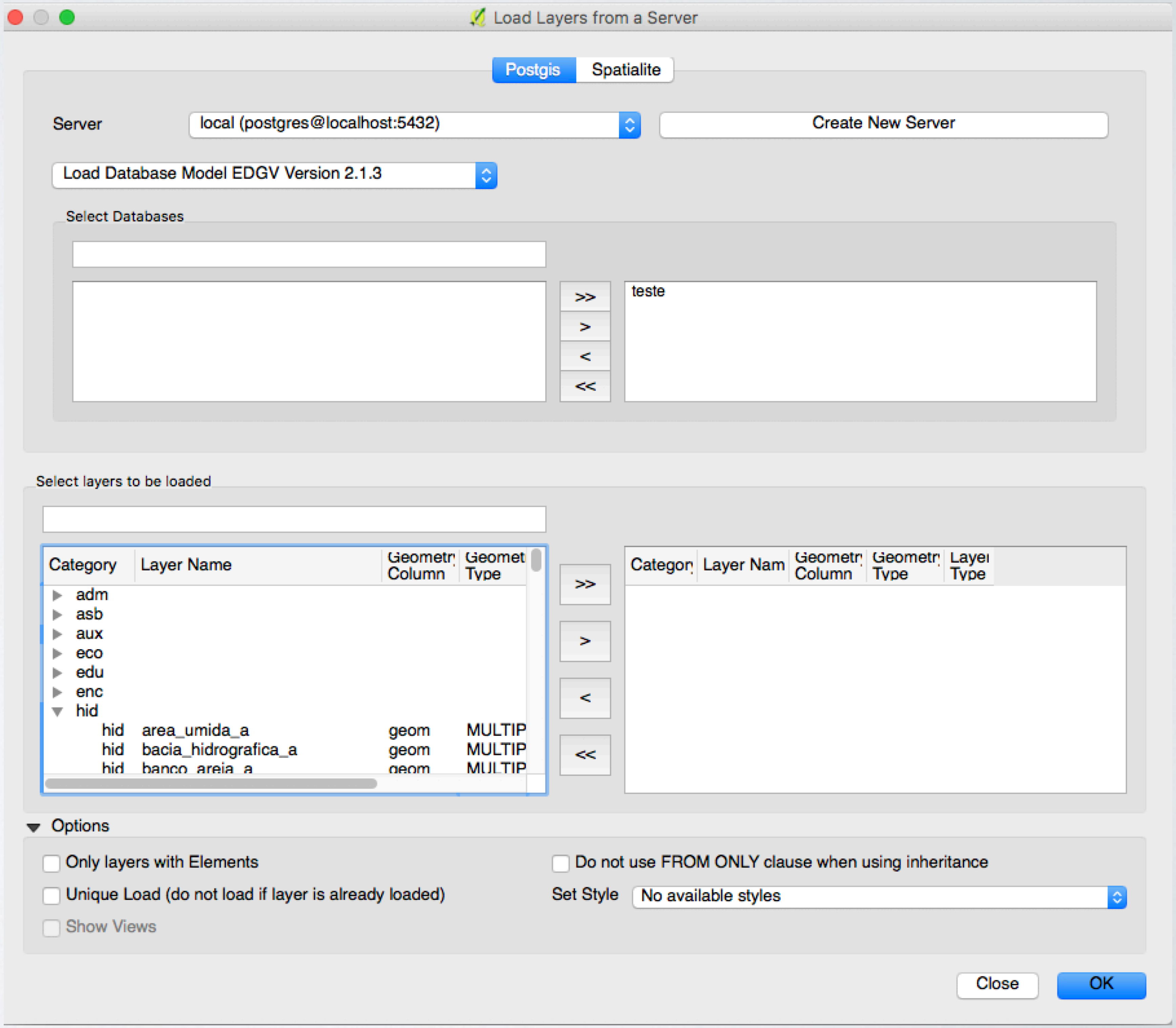
		borba
0243-4-SO_lin...		
	read_all	

WHAT DOES DSGTOOLS PROVIDE?

Generic way to load PostGIS databases



Load Layers from a Server

Server: local (postgres@localhost:5432)

Load Database Model EDGV Version 2.1.3

Select Databases

teste

Select layers to be loaded

Category	Layer Name	Geometr Column	Geomet Type
▶ adm			
▶ asb			
▶ aux			
▶ eco			
▶ edu			
▶ enc			
▼ hid			
hid	area_umida_a	geom	MULTIP
hid	bacia_hidrografica_a	geom	MULTIP
hid	banco_areia_a	geom	MULTIP

Categor	Layer Nam	Geometr Column	Geometr Type	Layer Type

▼ Options

☐ Only layers with Elements

☐ Unique Load (do not load if layer is already loaded)

☐ Show Views

☐ Do not use FROM ONLY clause when using inheritance

Set Style: No available styles

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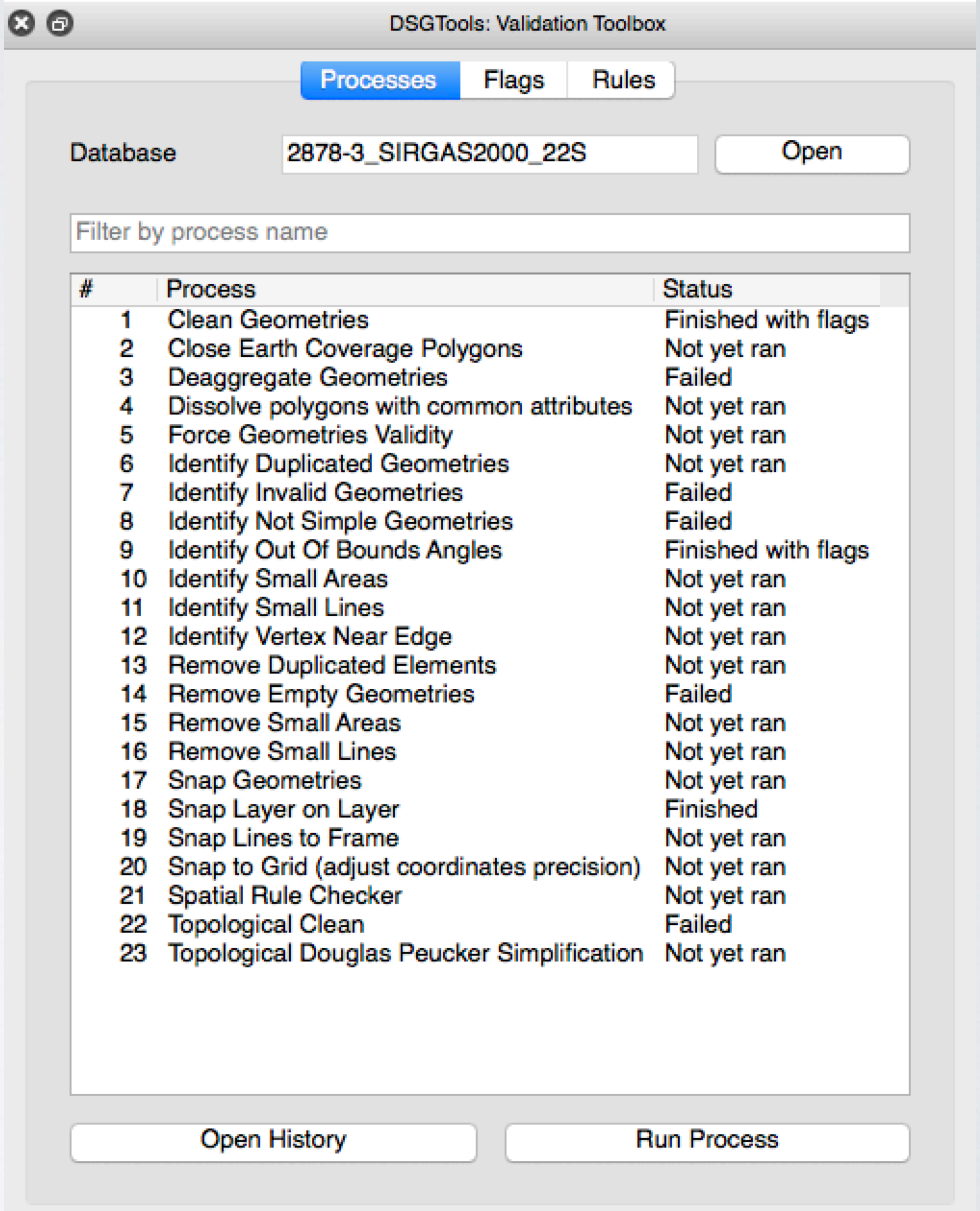
WHAT ABOUT OUR "MAIN COURSE”?

Topological toolbox for PostGIS databases



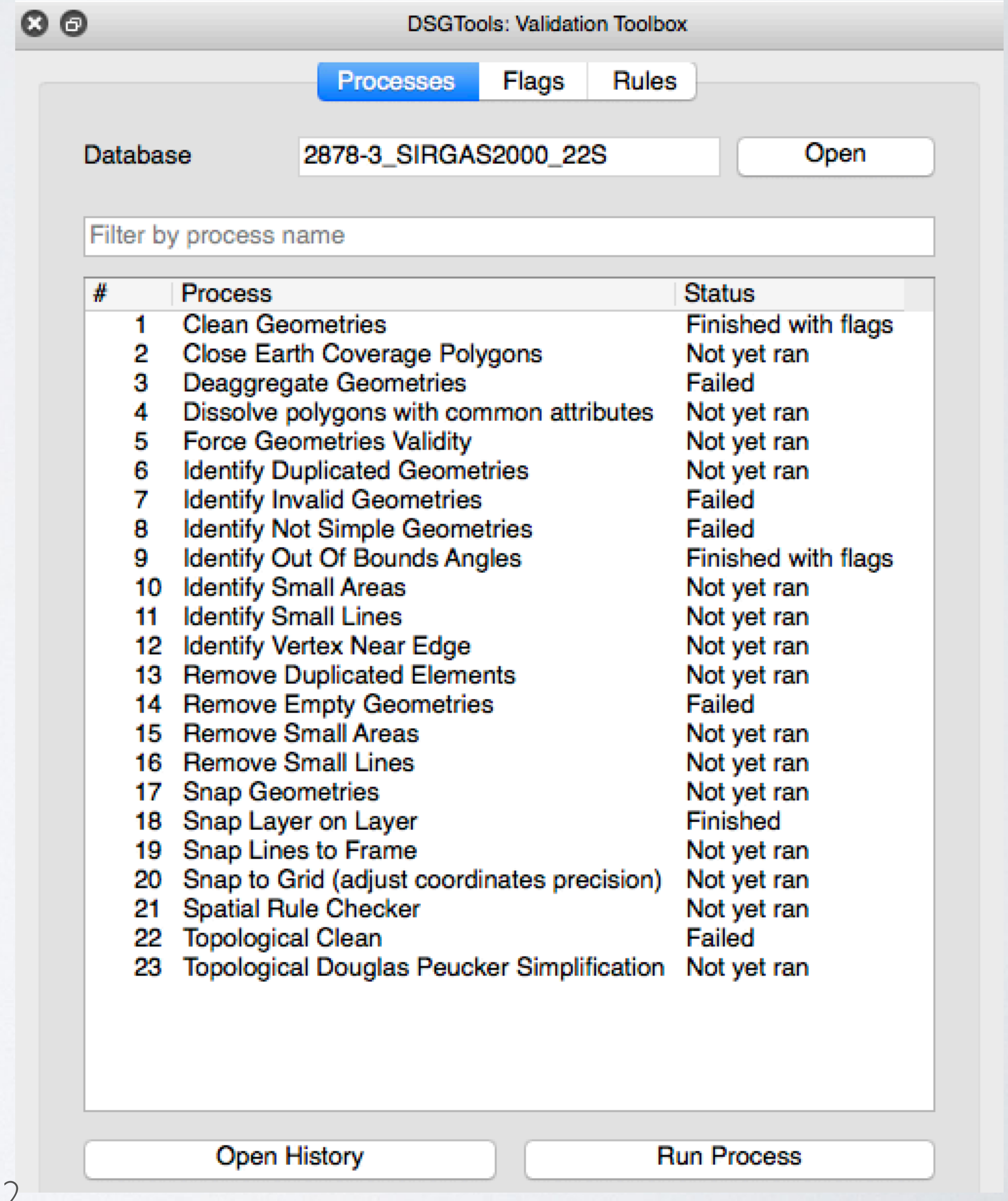
Database: 2878-3_SIRGAS2000_22S

Filter by process name

#	Process	Status
1	Clean Geometries	Finished with flags
2	Close Earth Coverage Polygons	Not yet ran
3	Deaggregate Geometries	Failed
4	Dissolve polygons with common attributes	Not yet ran
5	Force Geometries Validity	Not yet ran
6	Identify Duplicated Geometries	Not yet ran
7	Identify Invalid Geometries	Failed
8	Identify Not Simple Geometries	Failed
9	Identify Out Of Bounds Angles	Finished with flags
10	Identify Small Areas	Not yet ran
11	Identify Small Lines	Not yet ran
12	Identify Vertex Near Edge	Not yet ran
13	Remove Duplicated Elements	Not yet ran
14	Remove Empty Geometries	Failed
15	Remove Small Areas	Not yet ran
16	Remove Small Lines	Not yet ran
17	Snap Geometries	Not yet ran
18	Snap Layer on Layer	Finished
19	Snap Lines to Frame	Not yet ran
20	Snap to Grid (adjust coordinates precision)	Not yet ran
21	Spatial Rule Checker	Not yet ran
22	Topological Clean	Failed
23	Topological Douglas Peucker Simplification	Not yet ran

PROVIDED PROCESSES

- 24 processes
- Separated in:
  - problem identification
  - problem correction
- Capable of dealing with problems such as occurrence of gaps and overlaps
- The processes are based on SQL queries or QGIS' processing algorithms in a transparent way
- All processes make layer modification using the edit buffer, thus not making unwanted commits



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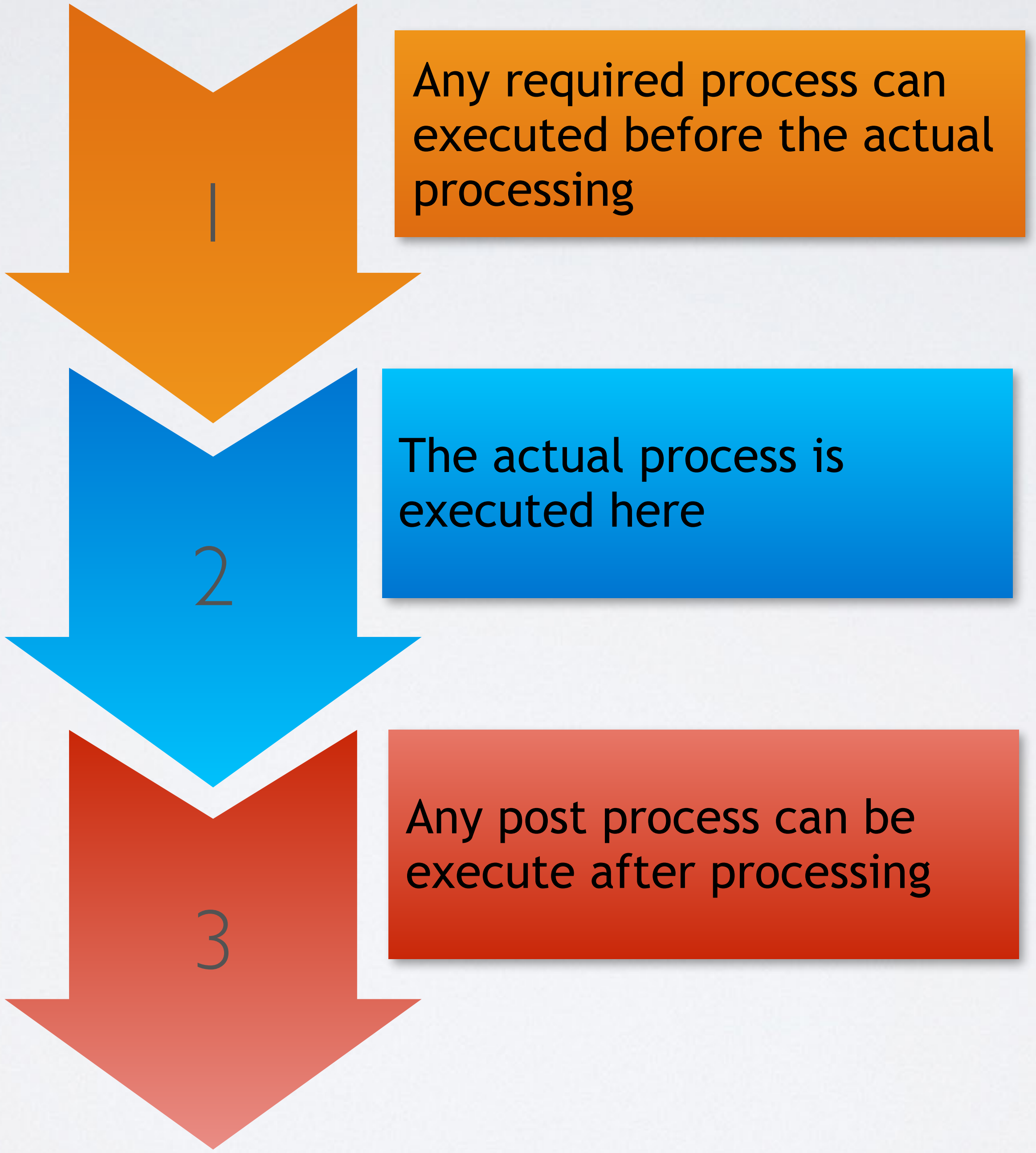
GENERAL PROCESS STRUCTURE



Any required process can executed before the actual processing

The actual process is executed here

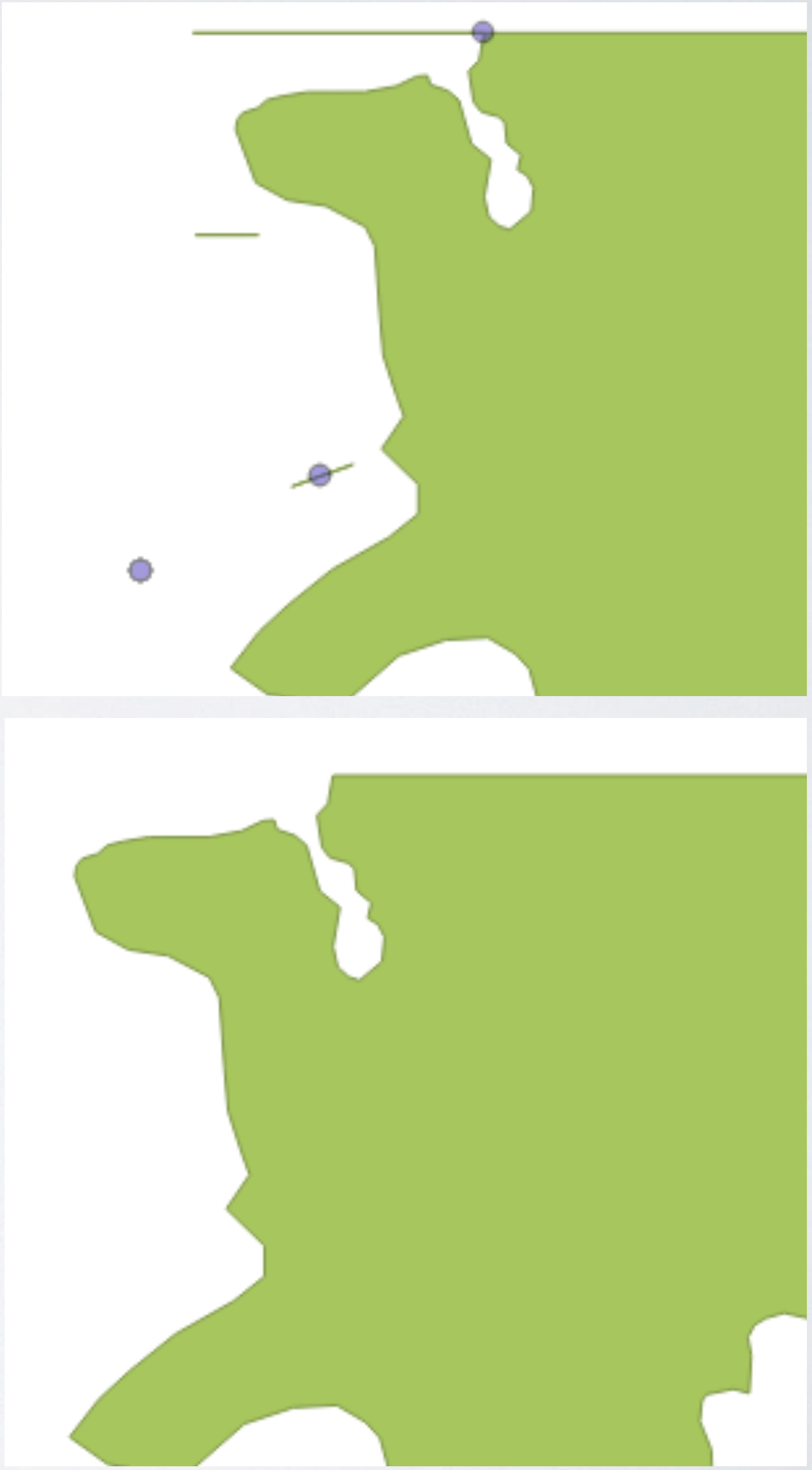
Any post process can be execute after processing

SIMPLE, YET USEFUL, SET OF PROCESSES

- Deaggregate geometries (only Python)
- Dissolve polygons with same attributes with size constraint (processing runalg)
- Identification/correction of invalid geometries (uses ST_MakeValid)
- Identification/removal of small geometries (only Python)
- Identification/removal of duplicated geometries (uses its own query)
- Removal of empty geometries (uses its own query)
- Snap to grid (useful do adjust coordinate precision)

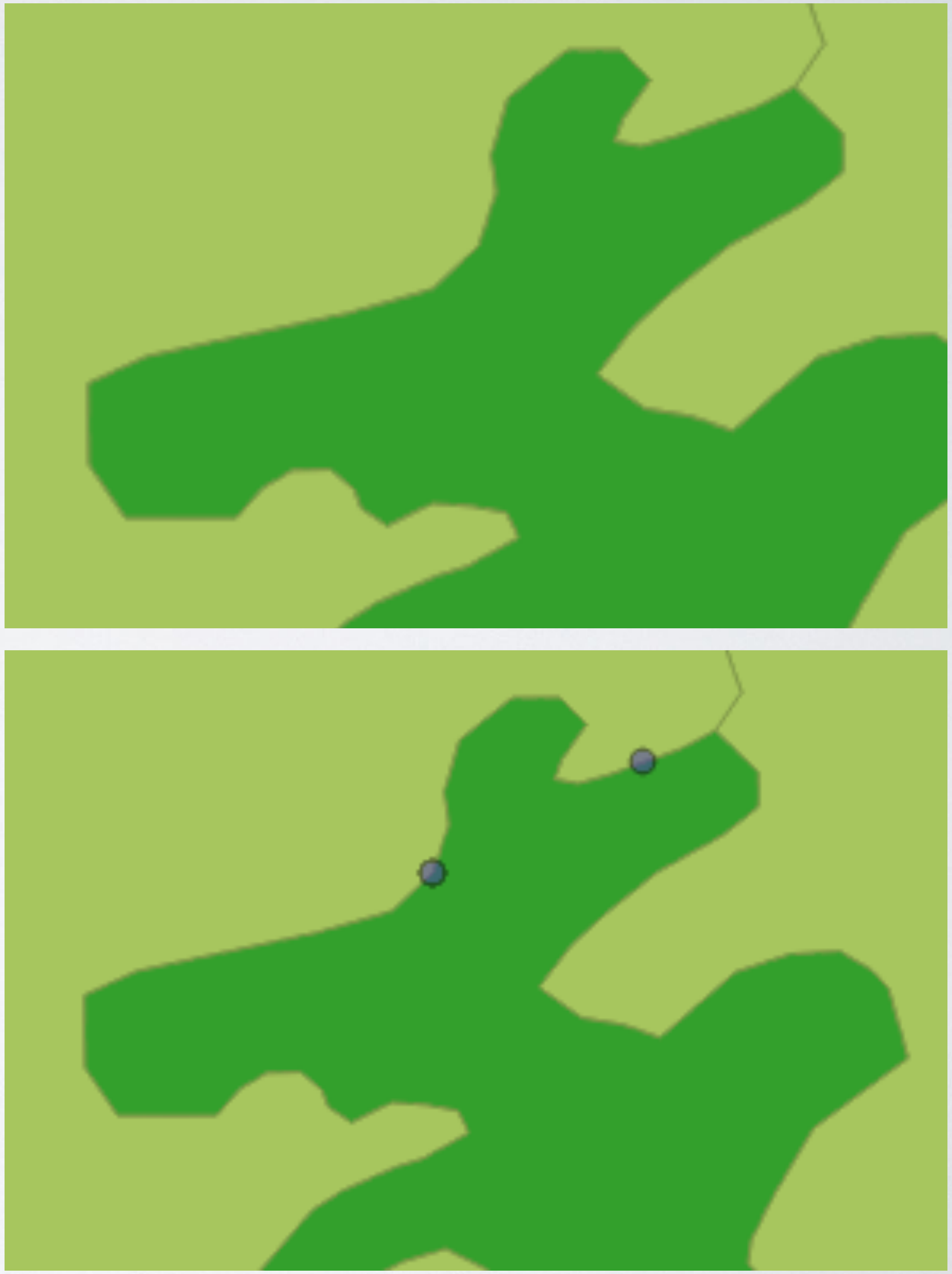
CLEAN GEOMETRIES PROCESS

- Based on GRASS topology
- Executes v.clean (break, rmsa and rmdangle) using QGIS' processing runalg



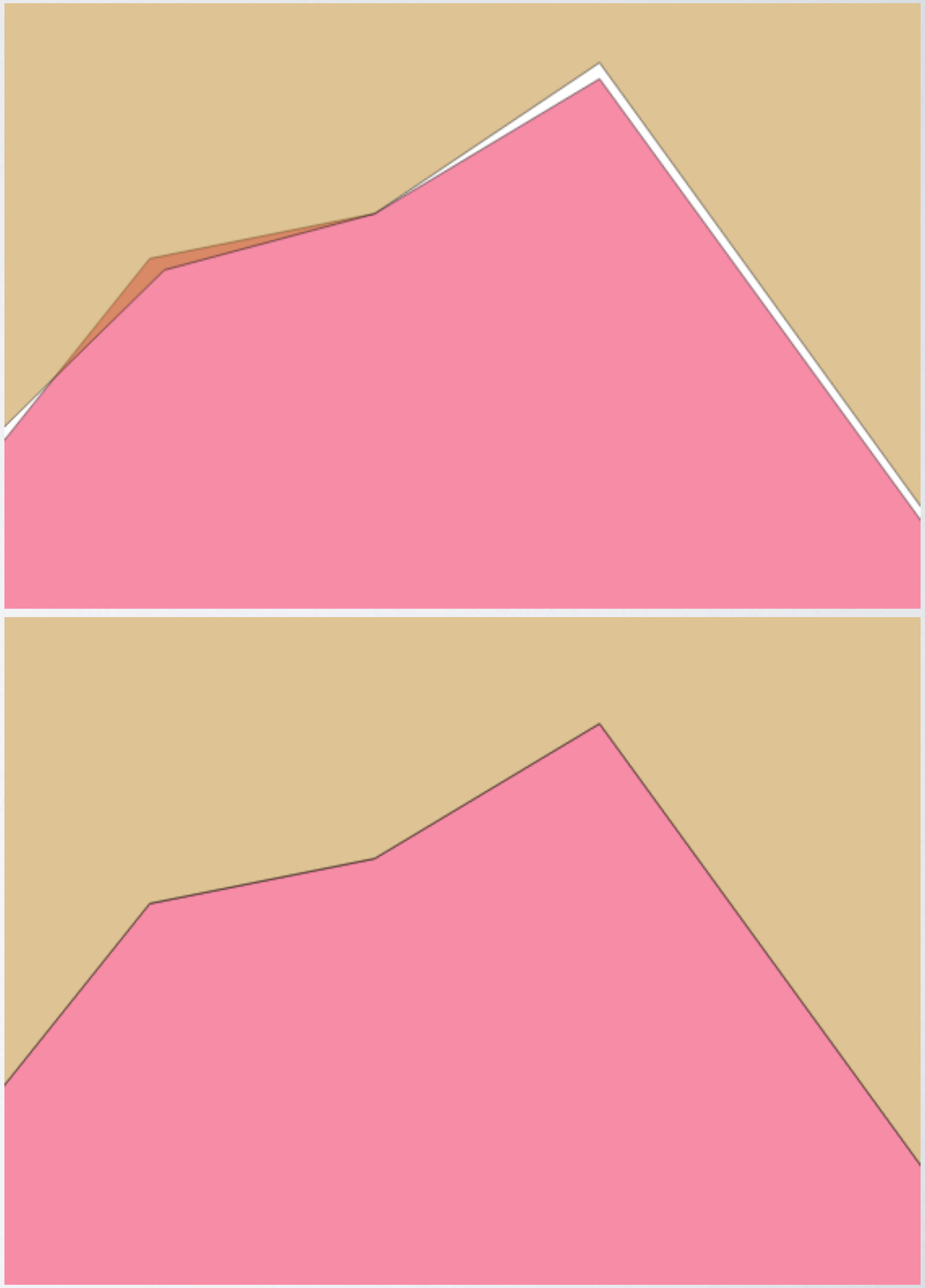
IDENTIFY VERTEXES NEAR EDGES

- Useful to determine geometry problems in general



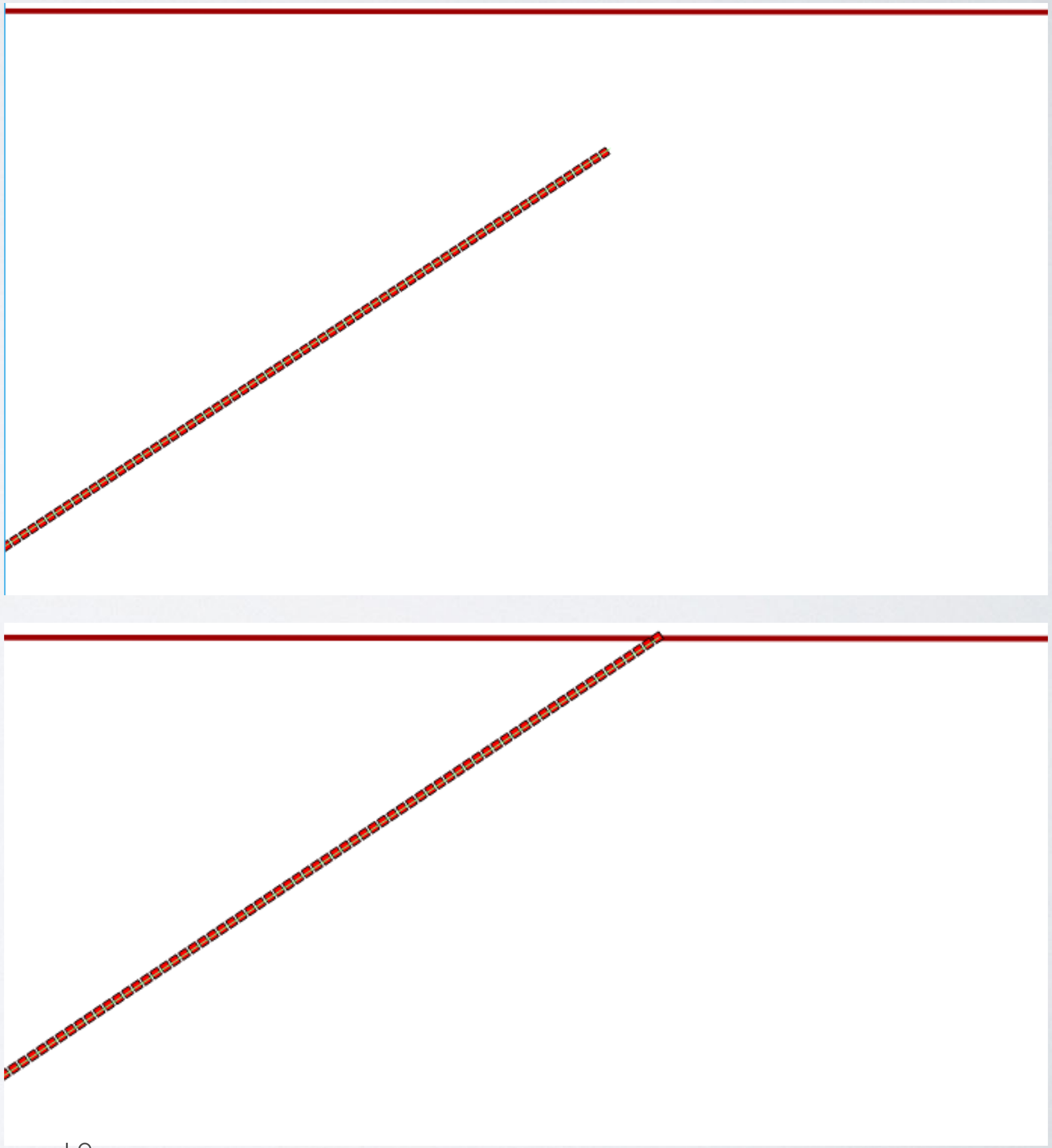
SNAP LAYER ON LAYER

- Python implementation of QgsGeometrySnapper
- On DSGTools until QGIS 3.0 (no binding until then)



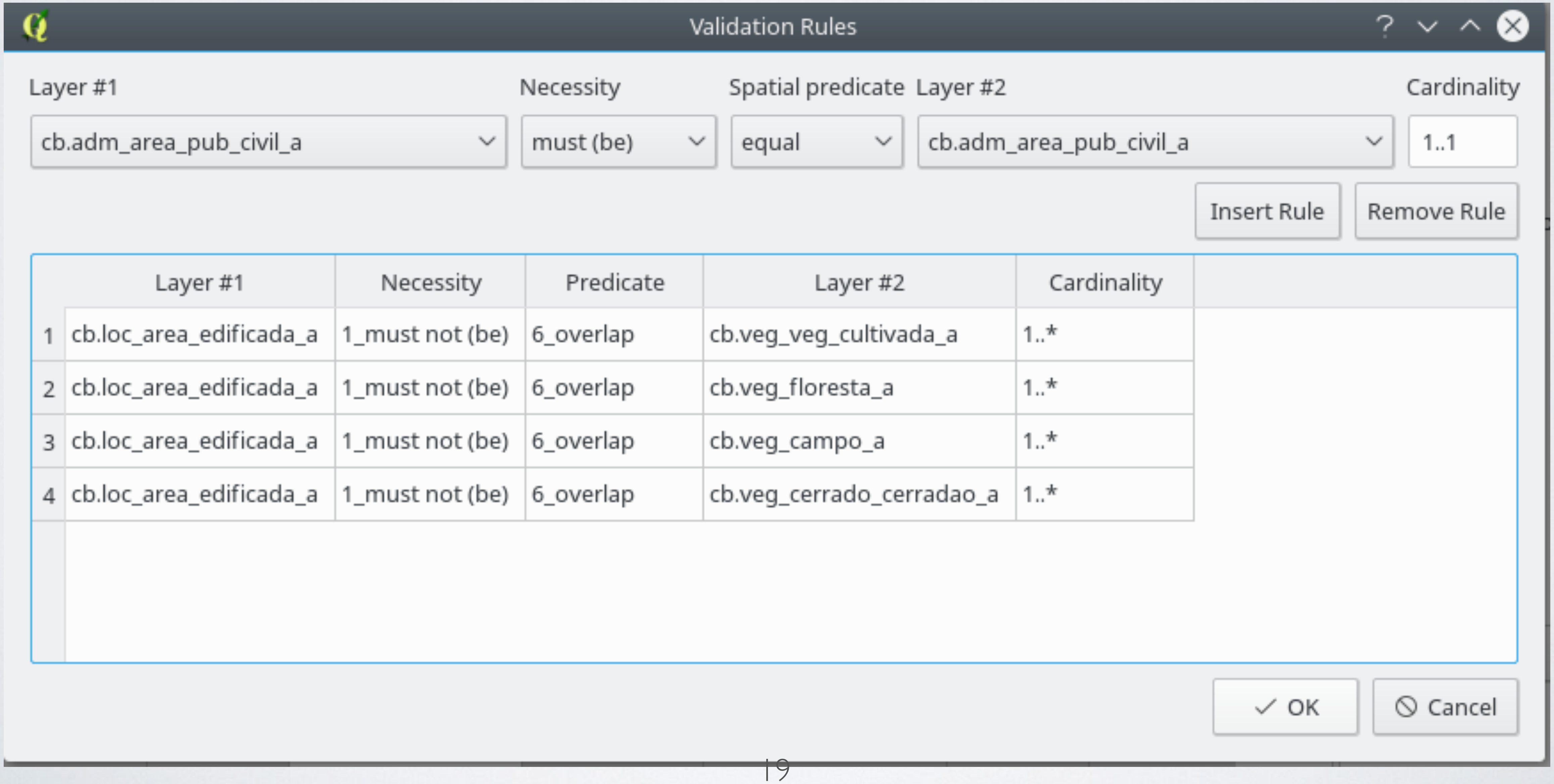
SNAP LINES TO FRAME

- Prolongs lines to a selected frame



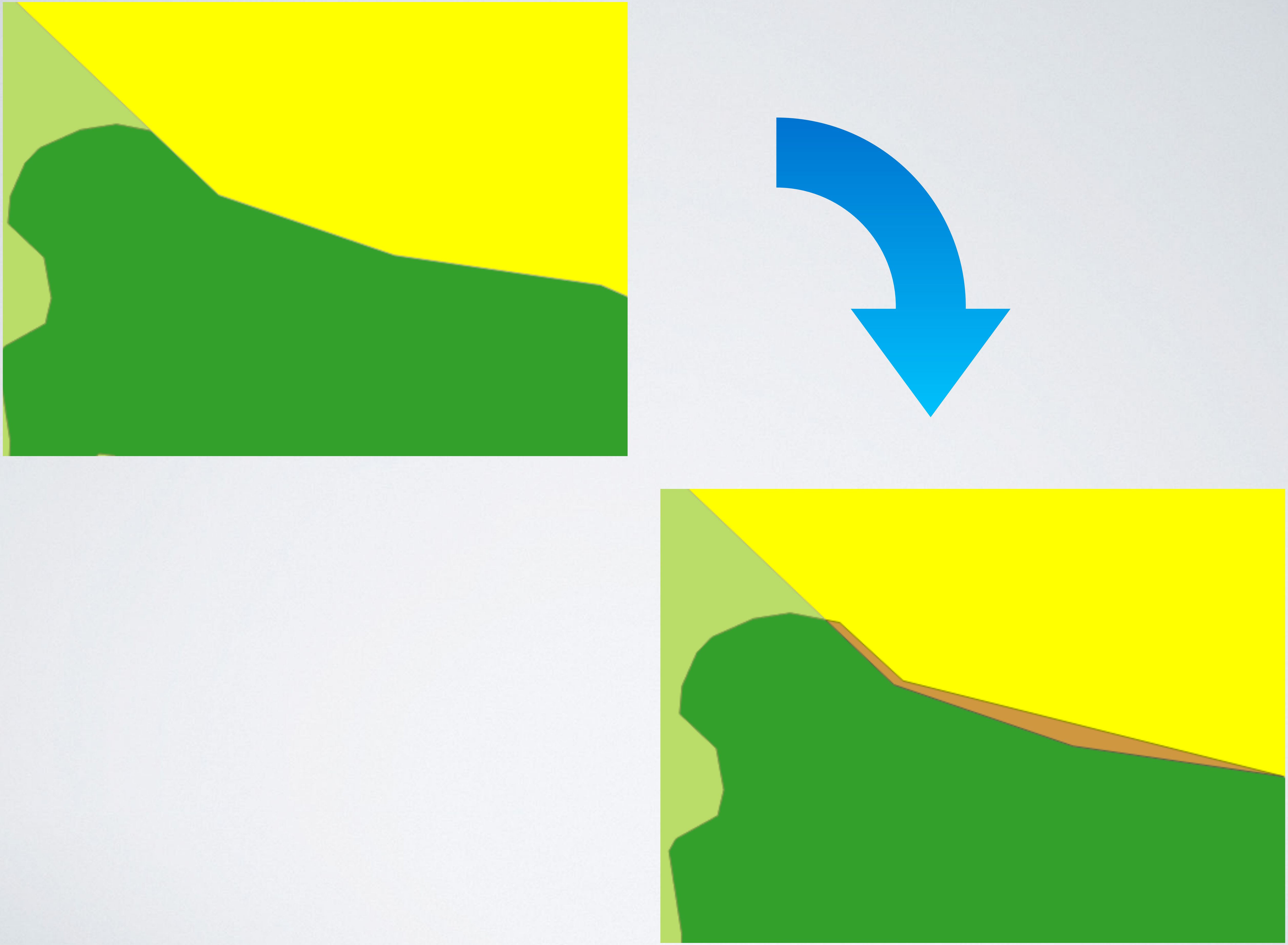
SPATIAL RULE CHECKER

- Verifies topology predicates
- Uses cardinality



Layer #1: cb.adm_area_pub_civil_a
Necessity: must (be)
Spatial predicate: equal
Layer #2: cb.adm_area_pub_civil_a
Cardinality: 1..1

	Layer #1	Necessity	Predicate	Layer #2	Cardinality
1	cb.loc_area_edificada_a	1_must not (be)	6_overlap	cb.veg_veg_cultivada_a	1..*
2	cb.loc_area_edificada_a	1_must not (be)	6_overlap	cb.veg_floresta_a	1..*
3	cb.loc_area_edificada_a	1_must not (be)	6_overlap	cb.veg_campo_a	1..*
4	cb.loc_area_edificada_a	1_must not (be)	6_overlap	cb.veg_cerrado_cerradao_a	1..*



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SPATIAL RULE ENFORCER

- Similar to Spatial rule checker
- Works on real time listening to the edit buffer signals

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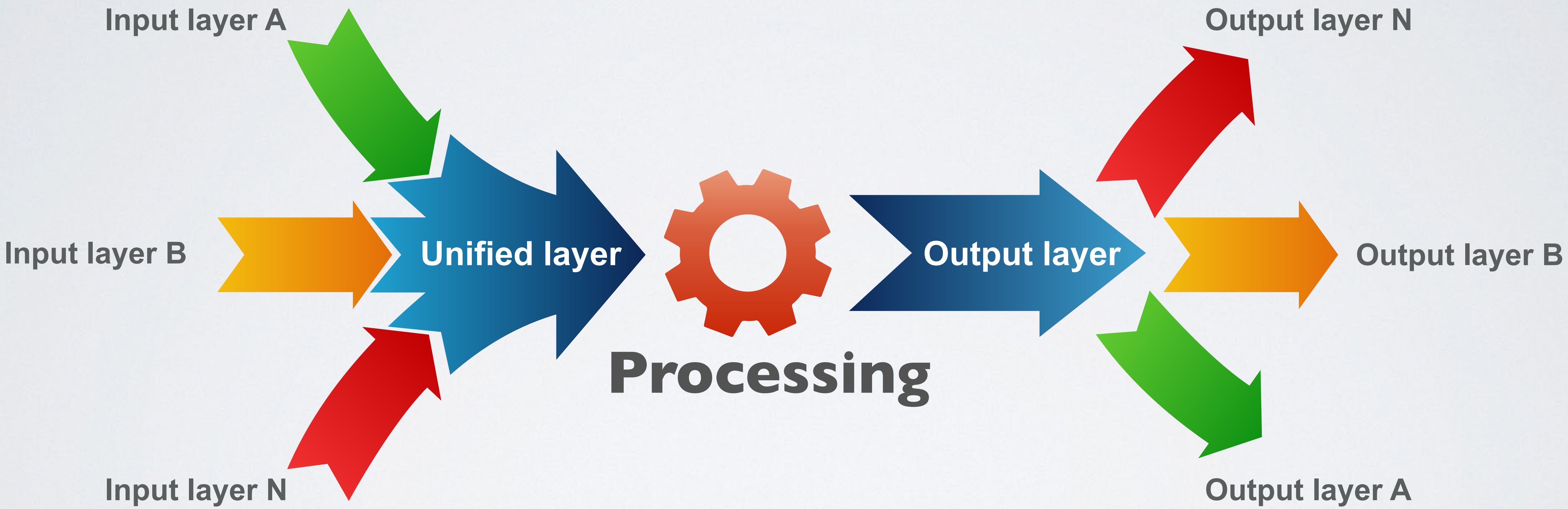
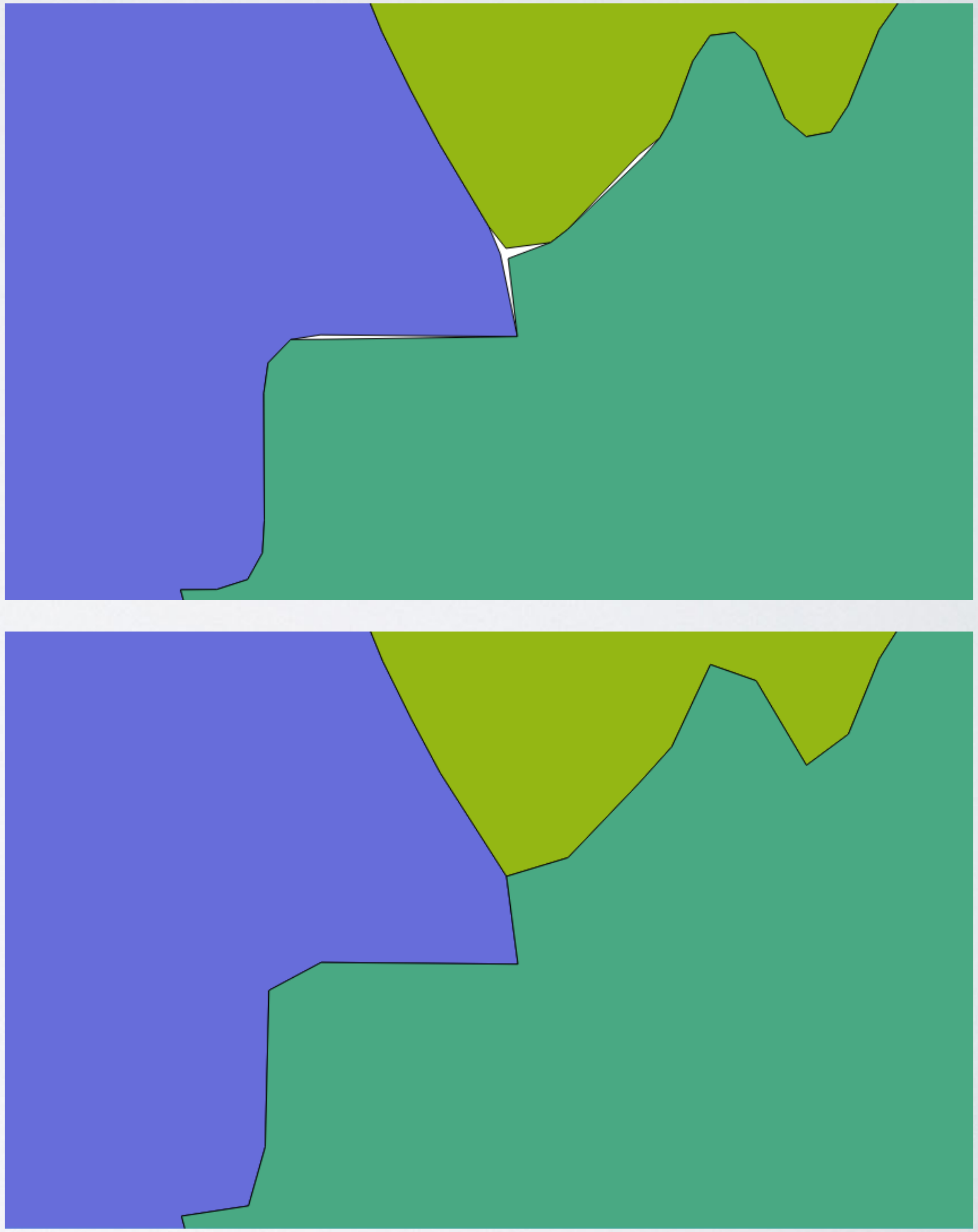
TOPOLOGICAL PROCESSES



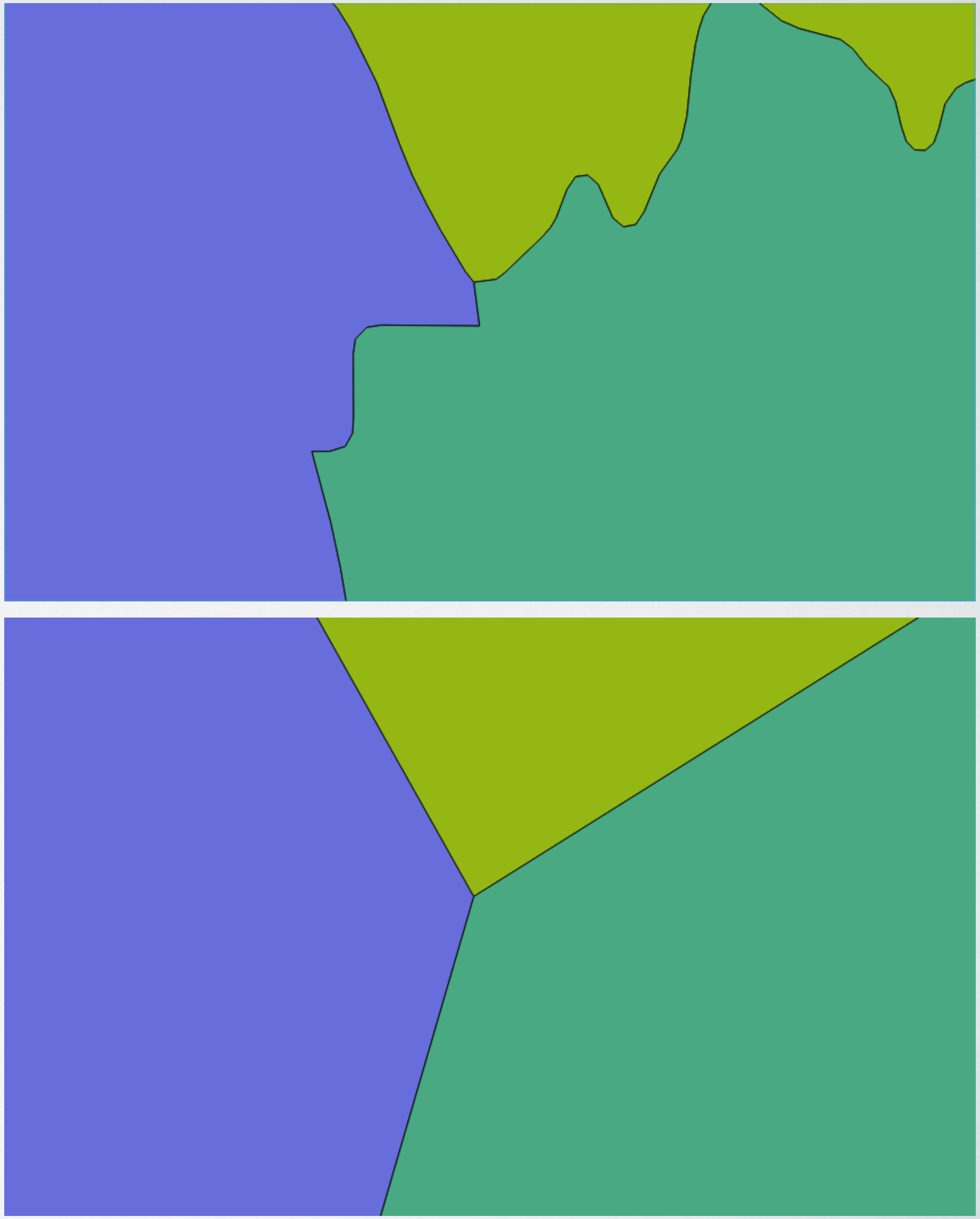
TOPOLOGICAL CLEAN (SIMILAR TO CLEAN GEOMETRIES)

- Great use to solve overlaps and gaps in all layers that form land cover (earth coverage)



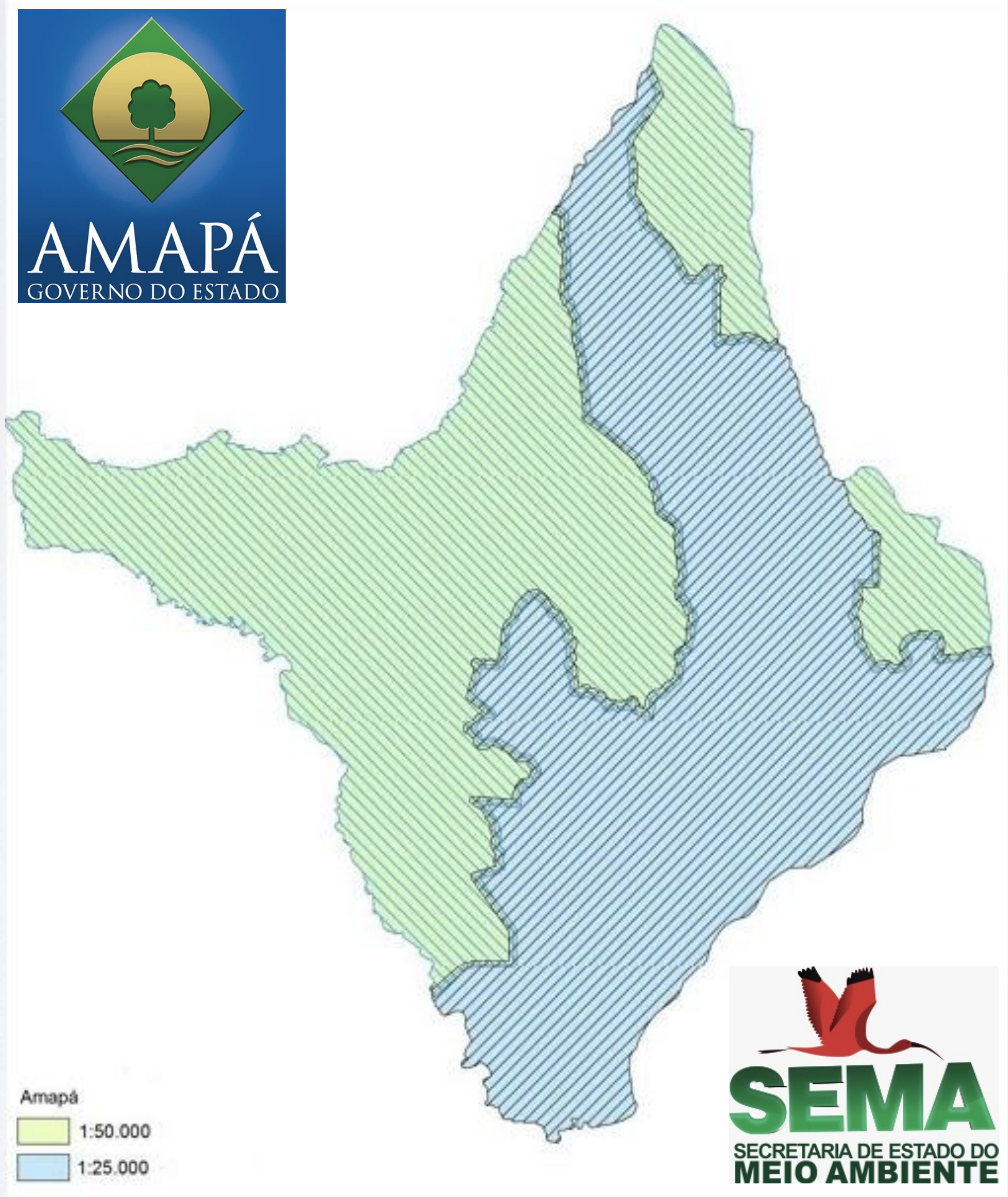
TOPOLOGICAL SIMPLIFICATION

- Great use to reduce the number of vertex without generating gaps and overlaps



DSG'S MAPPING PROJECTS USING DSGTOOLS

- Amapa state mapping
- Bahia state mapping
- Brazilian Army military exercise fields
- Other mapping projects around Brazil



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“Do. Or do not.There is no try.”

–Yoda (3 ABY)

https://github.com/lcoandrade/DsgTools/