Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

armasuisse
Bundesamt für Landestopografie swisstopo
Kartografie

The New Swiss National Map Series

CartoTalks, TU Wien 04.06.2013

Mark Wigley
Esri Switzerland

Introductions

What is my history and my role?

Having worked directly in the cartographic industry for over 23 years in both England and Switzerland I moved into the software side of cartography about 6 years ago and I am now a member of the Esri Switzerland's professional services team working on the swisstopo national mapping project (Genius).

Agreement?

The Bundesamt für Landestopografie, or swisstopo, have kindly agreed to me presenting this information and it was the project leader, Dominik Käuferle, who supplied most of the information you will see here today.

Topics

- An Overview
- The new Product Base (DCM)
- The new cartographic Design
- The source data (TLM)
- The Production Workflow (DCM)
  - Extras
- Project Standpoint: 2013

An Overview: How it all began, way back in 1999

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Vorstudie

Vektordaten und Optimierung der Nachführung der Landeskarte 1:25 000

im Auftrag des Bundesamtes für Landestopographie, 3084 Wabern

erstellt durch:

Prof. Dr. Lorenz Hurni
Dr. Christoph Brandenberger
Institut für Kartographie (IKA)
ETH Hönggerberg
CH-8093 Zürich
www.karto.ethz.ch

Zürich, den 26. März 2001

Pilot Study: Vector data and Optimising the Updating of the Swiss National 1:25 000 mapping series

26.03.2001

An Overview: The Pilot Study- 2001

- „... Diese Erfahrungen sollen mittelfristig in den Entwurf einer zentralen Datenbank zur Verwaltung der kartografischen Daten (samt geometrischen und grafischen Attributen, redaktionellen Anweisungen und Links zu anderen Datensätzen) fliessen...“

  These experiences should in the medium-term flow into the design of a centralized database for managing cartographic data (including geometric and graphic attributes, editorial guidance and links to other datasets)

- „... Hier sind allerdings bedeutende technische Probleme in Zusammenarbeit mit dem Bereich Topografie und Privatfirmen (Lieferfirmen) zu lösen.“

  There are however significant technical problems concerning the cooperation between the internal topographic department, and the private companies (suppliers) which will need to be solved.

  The main conclusion from this Study was that the way forward would require both:
  - *Vector data; for flexibility*
  - *Database support; for containing the multitude of complex standards*

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The new Product Base (DCM):
DCMs and GIS cartography

- DCM = Digital Cartographic Model
  - Geometries, Attributes = GIS data
  - Designed to cater for mapping needs
  - Driven by a seamless database
  - One DCM per scale (DCM25, DCM50... DCM1M)
- GIS powered cartography
  - Cartography using GIS data with GIS software and **database driven**

The new Product Base (DCM):
Feature Properties

The Past

Graphic files:

- Data layers
- Simple geometries
- Symbols

The Future

Database feature properties:

- Multiple feature classes (e.g. building, streets….)
- Complex geometries
  - Topography
- Complex symbol
- Multiple attributes
- Complex Relationships classes
- Field Overrides
- Representations

The new Product Base (DCM):
Relational data management

Information stored over different tables with links between the scales:

1:50‘000 Geometry

ID-Nummer	Koordinaten
50.13546	x,y
50.86547	x,y
50.24657	x_1, y_1; x_2, y_2
50.44684	x_1, y_1; x_2, y_2

Point object attributes

ID-Nummer	Objektart	Richtung	Name
50.13546	Baum		
50.86547	Höhle	60°	Höllloch

Relationships
1:50‘000 to 1:100‘000:

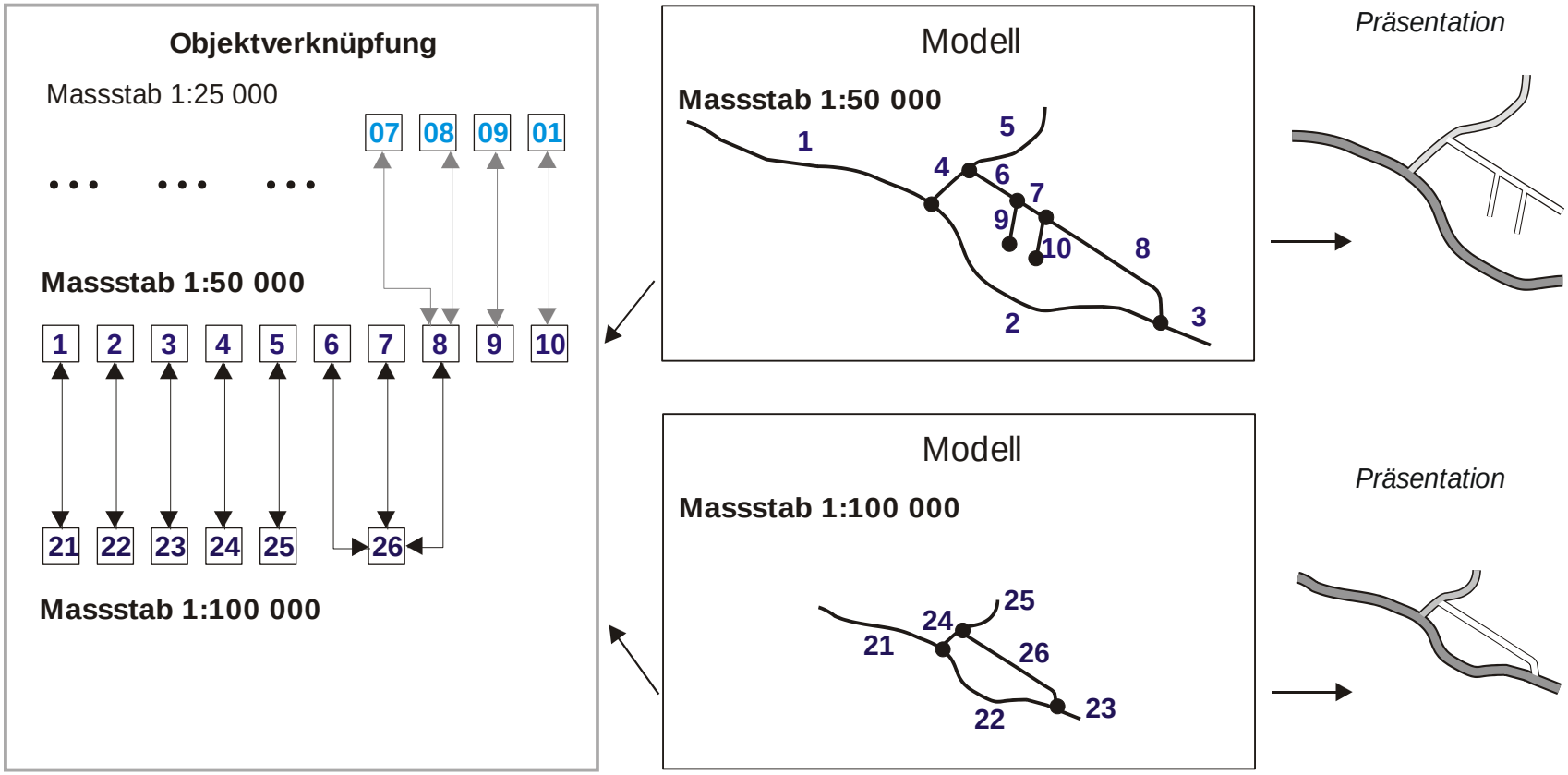
ID-Nummer	ID-Nummer
50.44684	100.46325
50.24657	100.67891

Polyline attributes

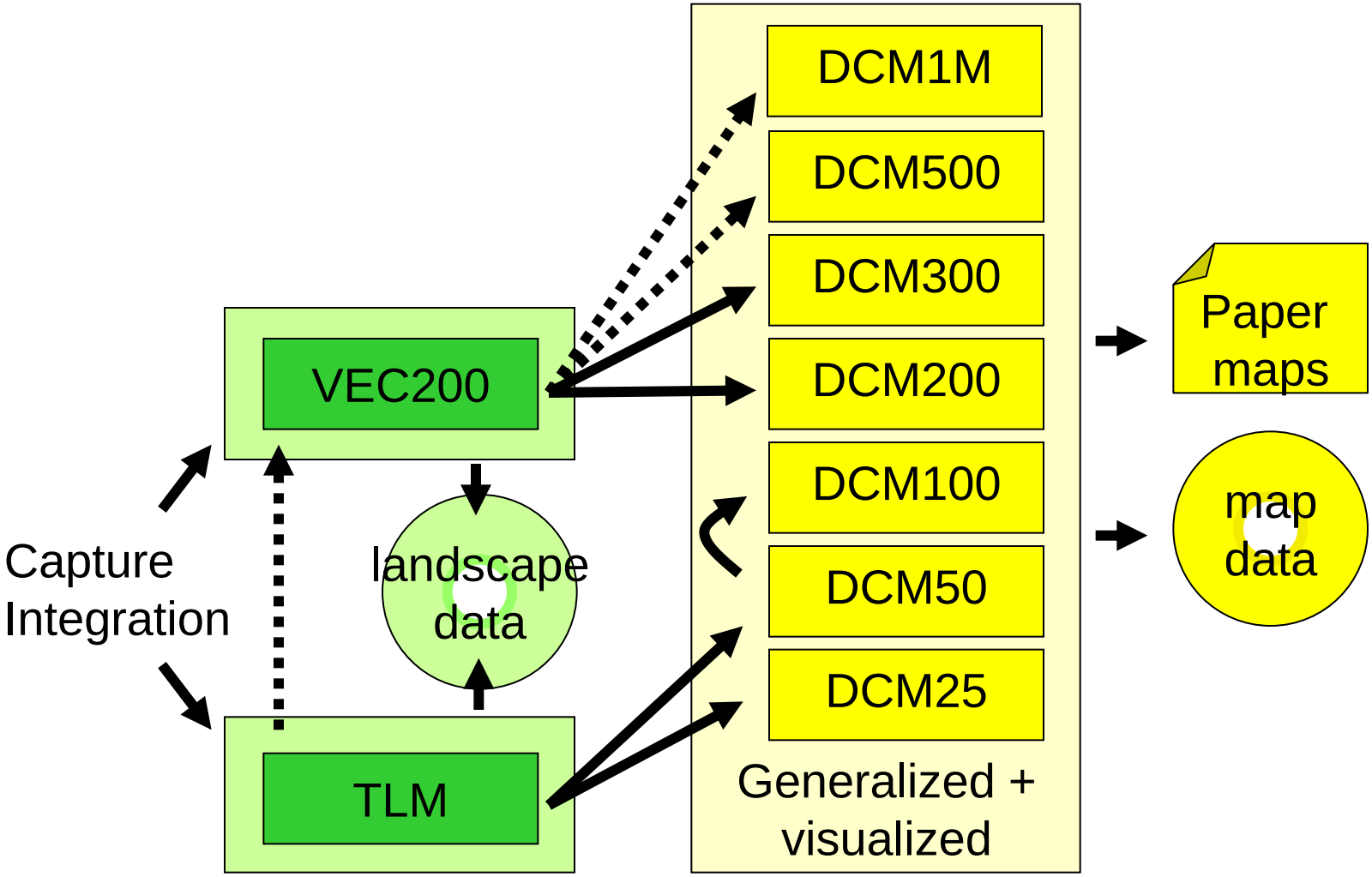
ID-Nummer	Objektart	Name	SAW
50.24657	Fussweg		ja
50.44684	Autobahn	A1	nein

The new Product Base (DCM):
Object links

Object relationships between scales to keep track of the features origins.

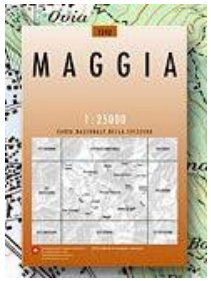


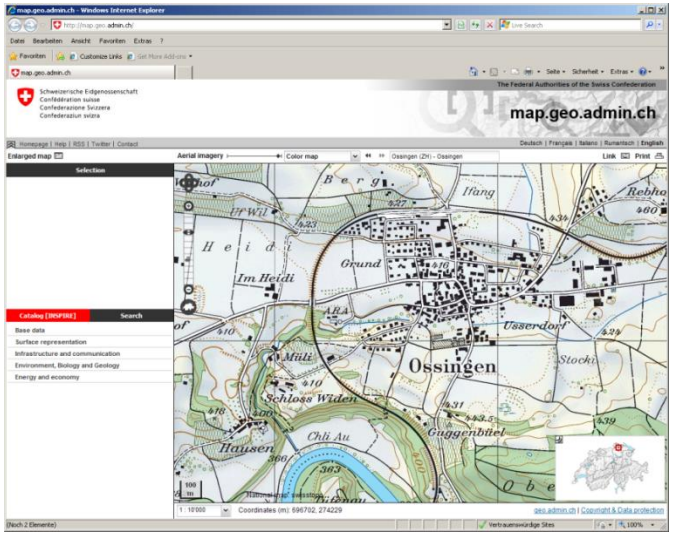
The new Product Base (DCM):
Data organisation within the databases

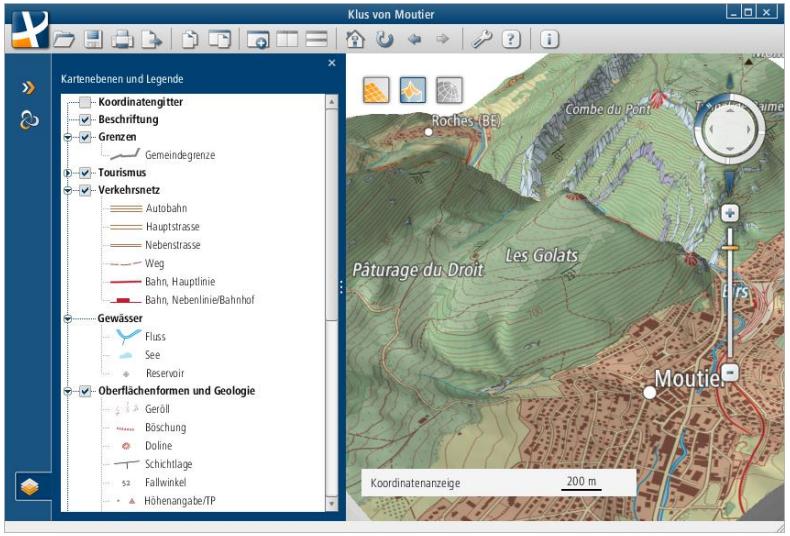


The new Product Base (DCM):
Products

- Print products
- Web services
- Mobile services



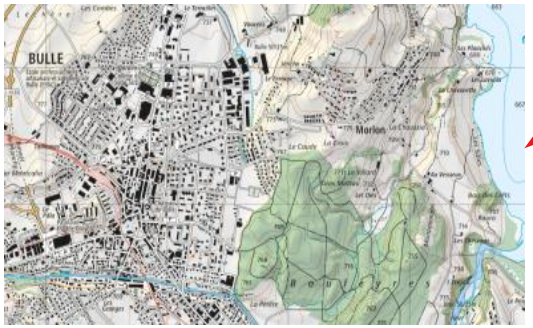




The new Product Base (DCM):
Cartographic designs

DCM database

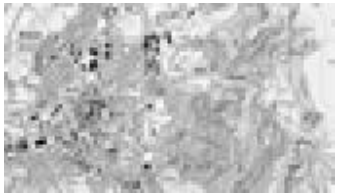
The Topographic map



The new finalized National Map Series design as standard representation

Base maps

e.g. light colours



e.g. grayscale

New Possibilities

Customized maps

- New selection
- New symbols
- New fonts
- New colours
- New contents
- New extent

New Possibilities

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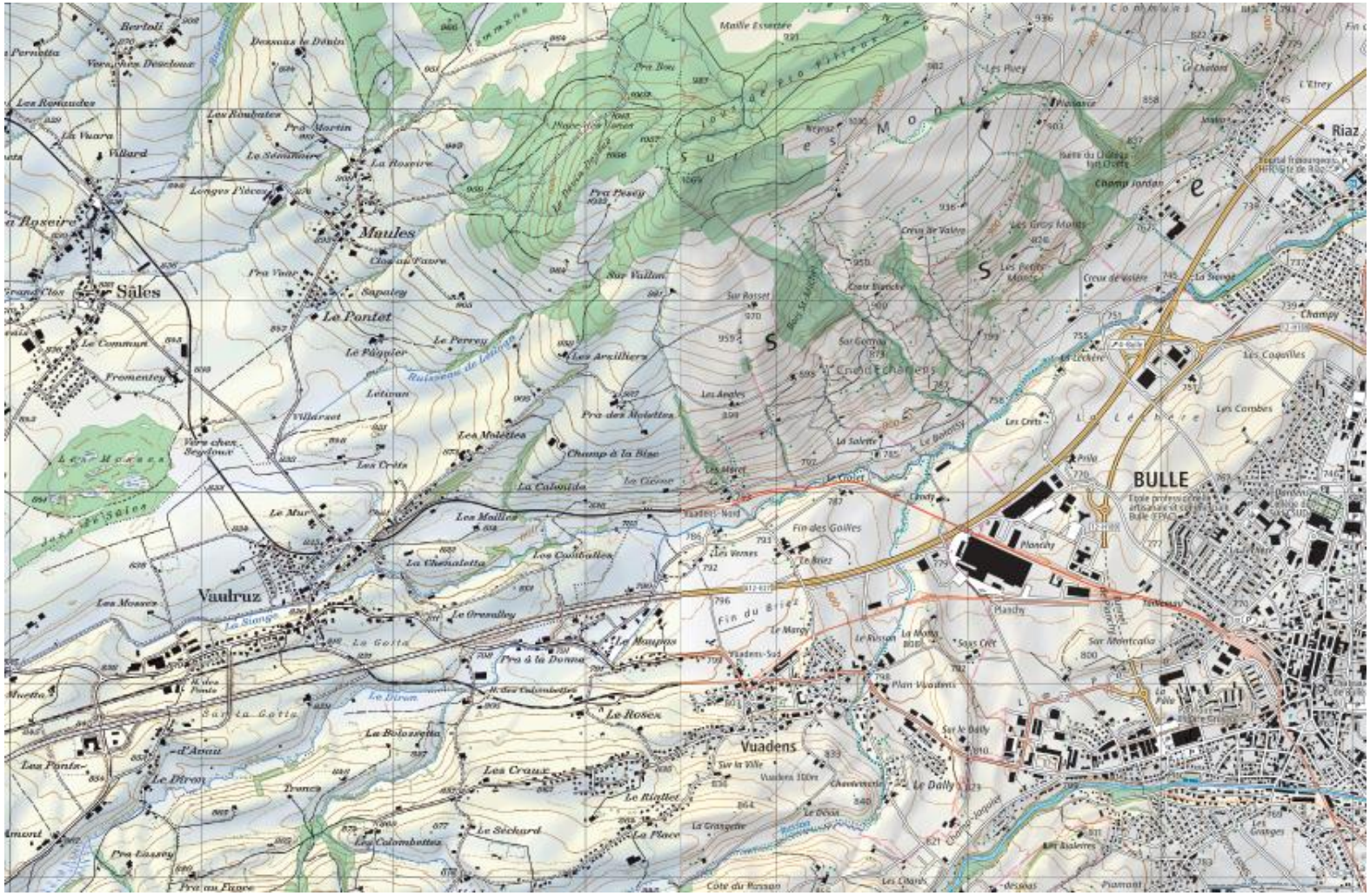
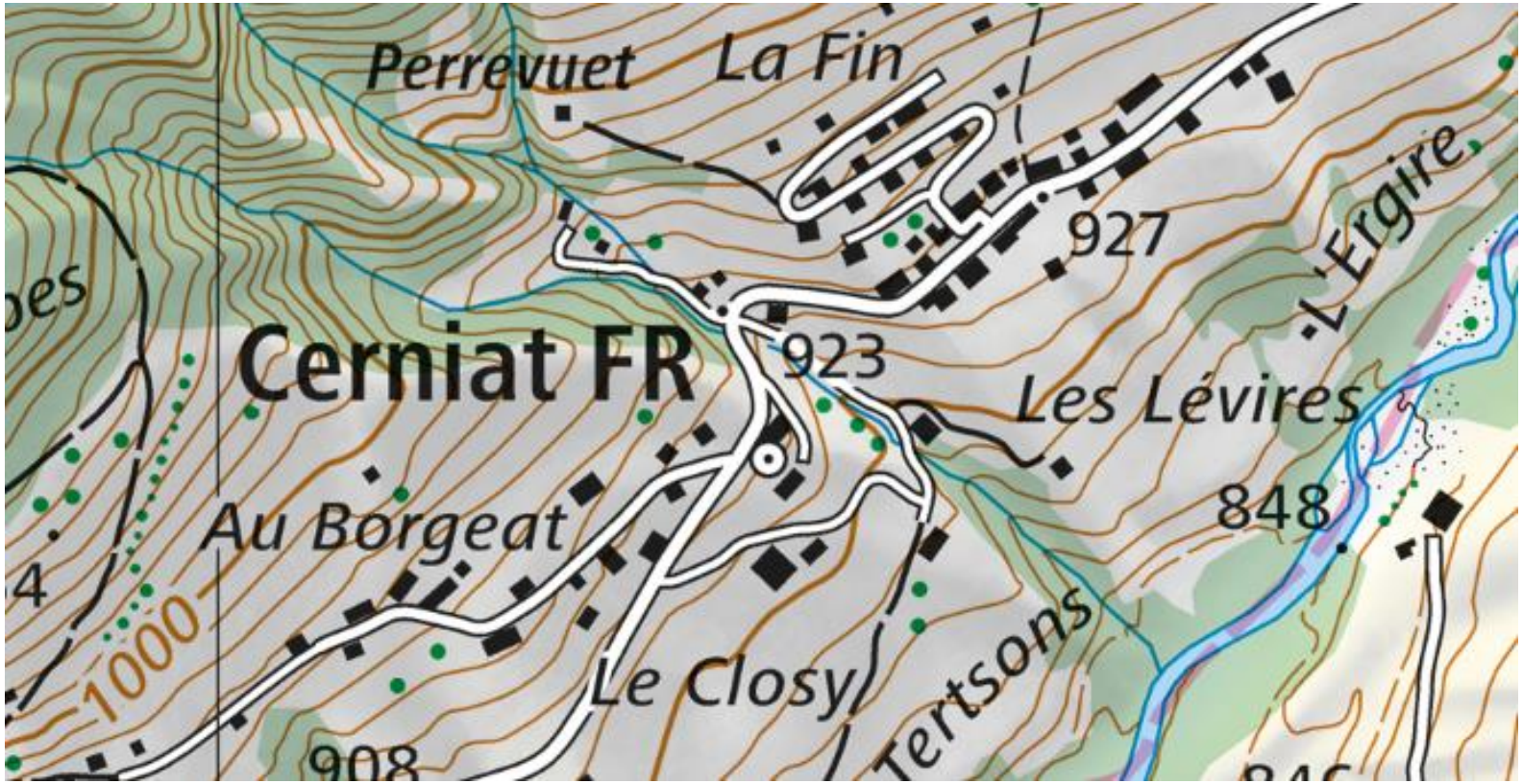
The new cartographic Design:
some new features…



The new cartographic Design:
New Text Fonts

The Frutiger® Neue LT Pro font family



The new cartographic Design:
Roads

- A new Road classification according to the width and surface type
- Colour fillings added for major roads at all scales
- Cul-de-sac's representation

The new cartographic Design:
Railways

- New red railways at all scales to help reduce masking

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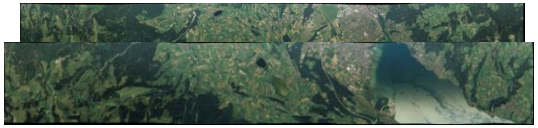
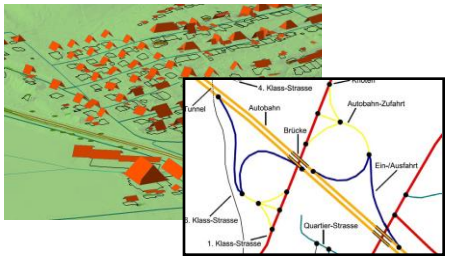
The source data (TLM)

The Topographic Landscape Model (TLM) Production line

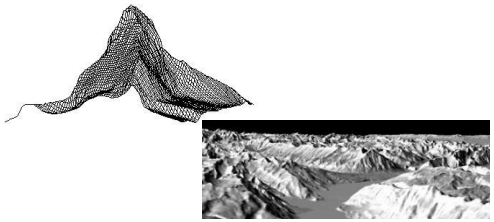


Aerial imagery

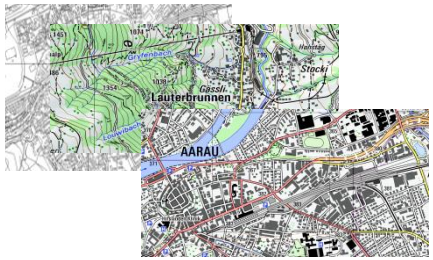
Orthophotos



GIS Datasets 2D and 3D



Terrainmodels

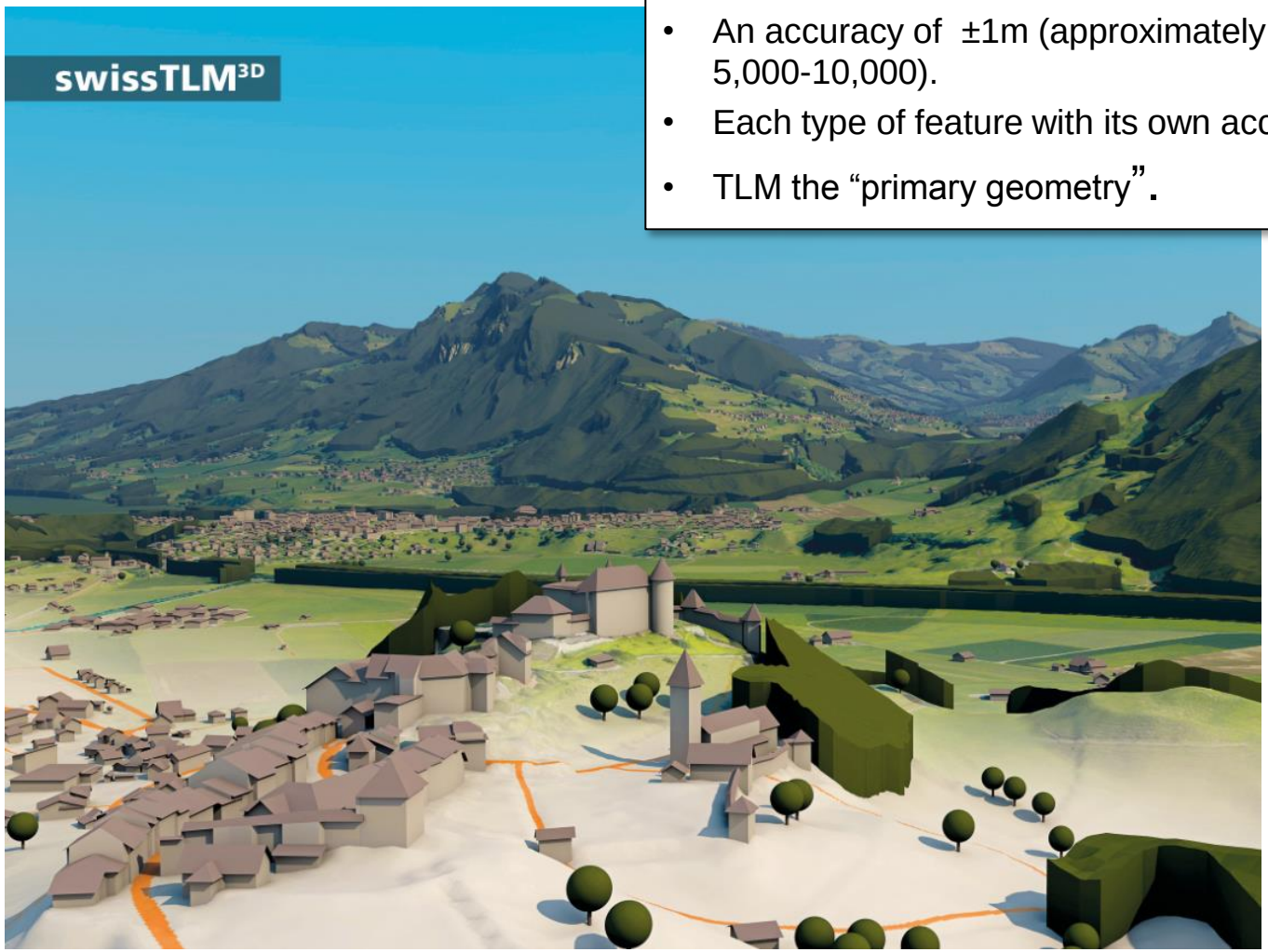


Digital cartographic maps

Maps

The source data (TLM)
swissTLM^{3D}

- 3D: all objects have x, y and z coordinates.
- An accuracy of ±1m (approximately scale 5,000-10,000).
- Each type of feature with its own accuracy.
- TLM the “primary geometry”.



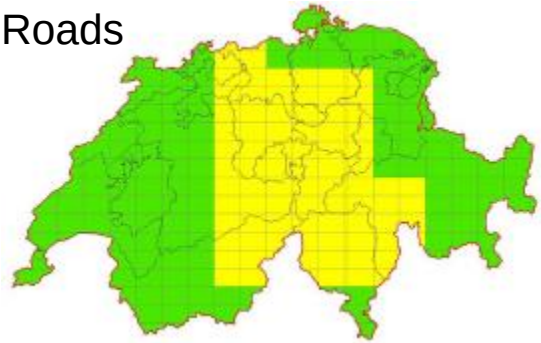
The source data (TLM)
3D Client for 3D and DTM editing

22 Zoll Screen
with ArcGIS + TOPGIS
tools

20 Zoll PLANAR Stereo
screen with Stereo Analyst for
ArcGIS + TOPGIS tools

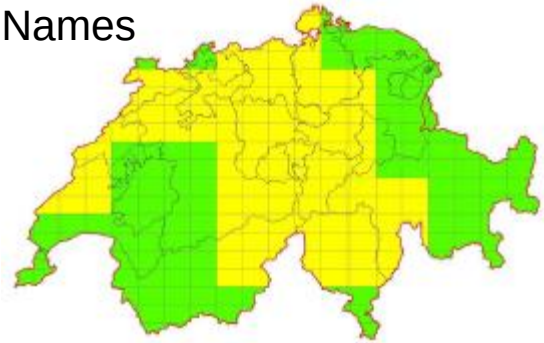
The source data (TLM)
Still under construction…

Roads

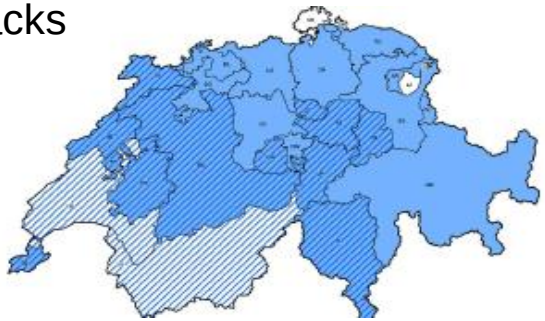


Public transport

Names



Hiking tracks



… finished ~2016

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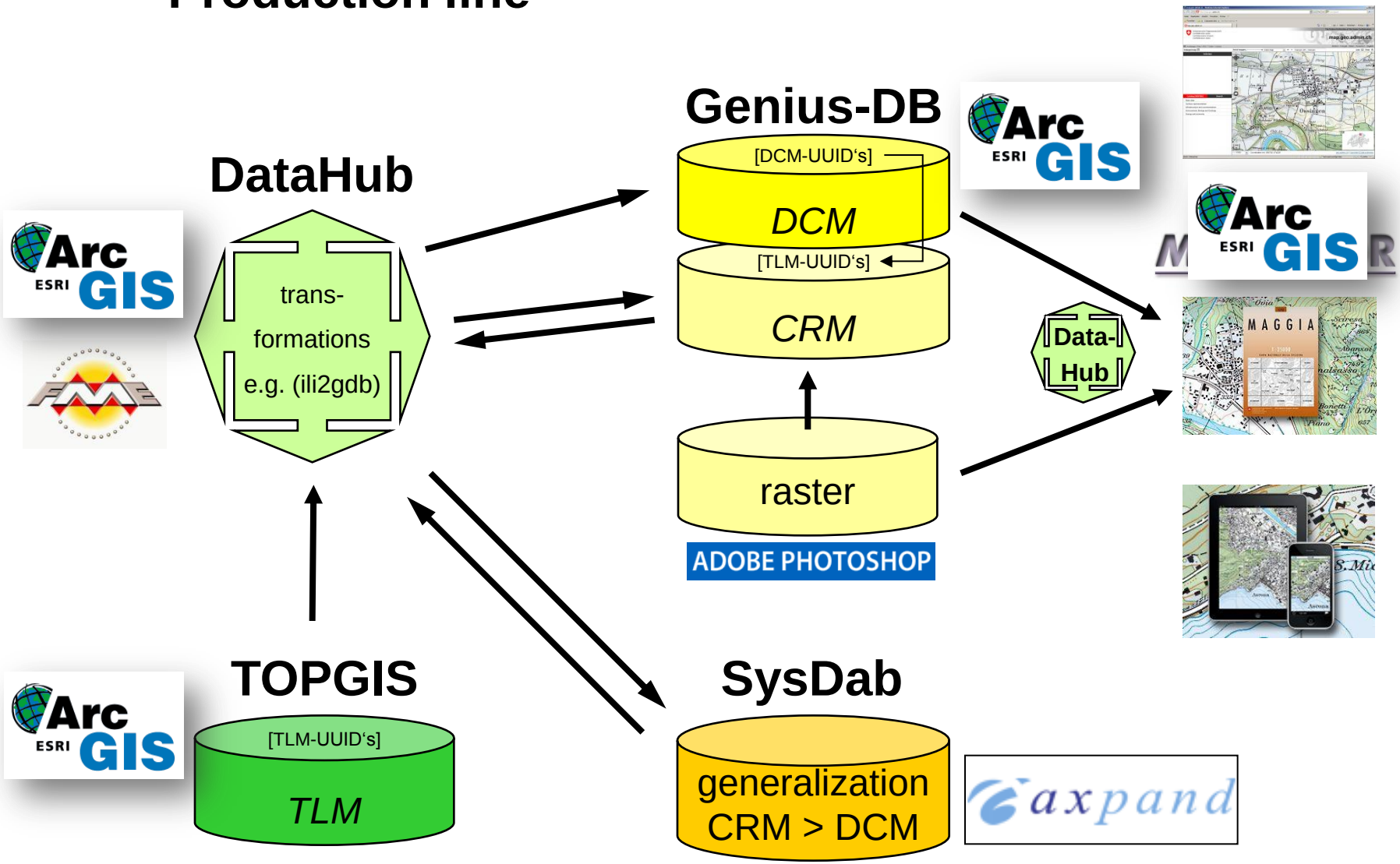
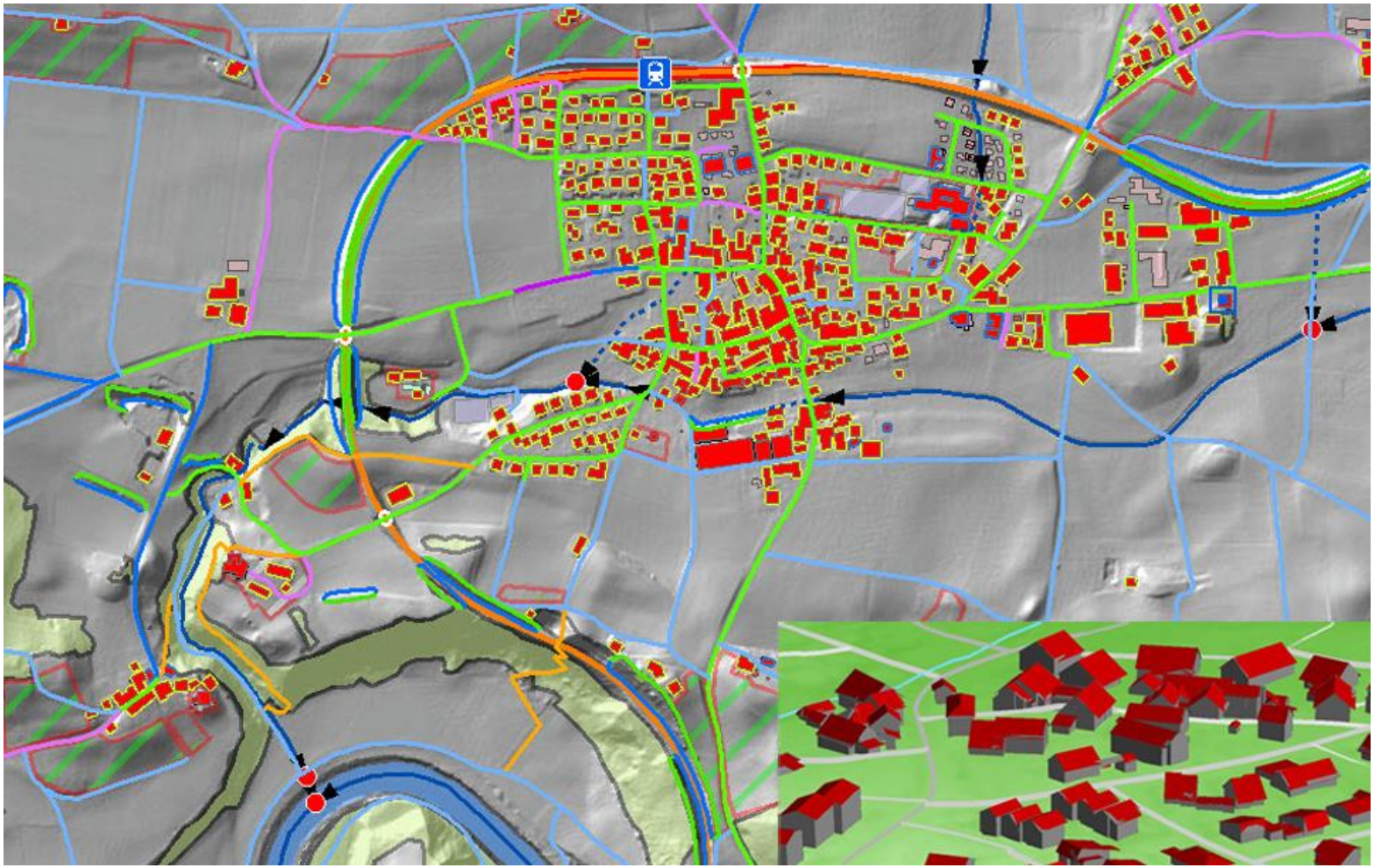
The Production Workflow (DCM)

Production line



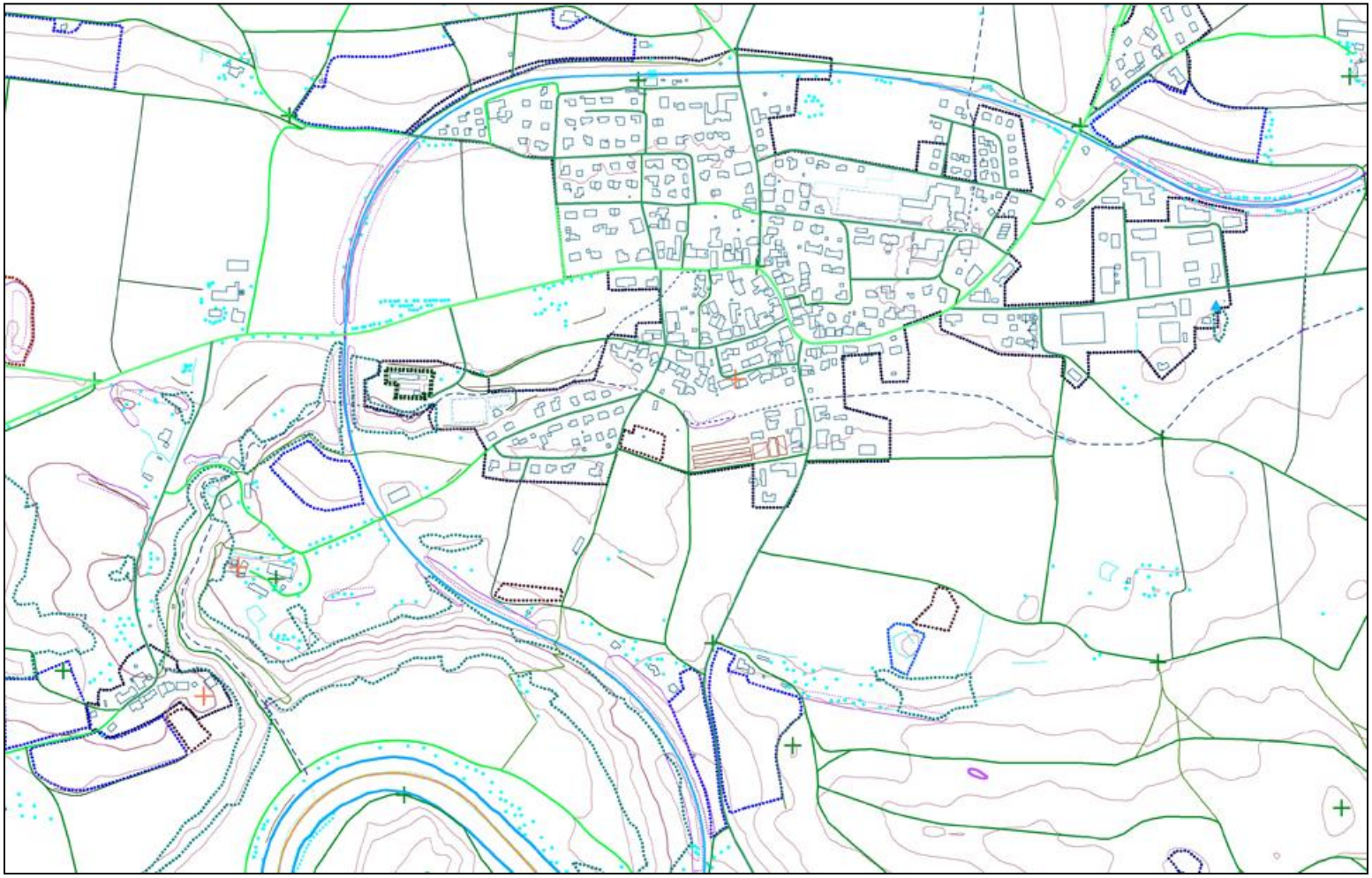
The Production Workflow (DCM)

Step 1: The Topographic Landscape Model TLM



The Production Workflow (DCM)

Step 2: The Cartographic reference model (CRM). TLM minus all non-cartographic information.

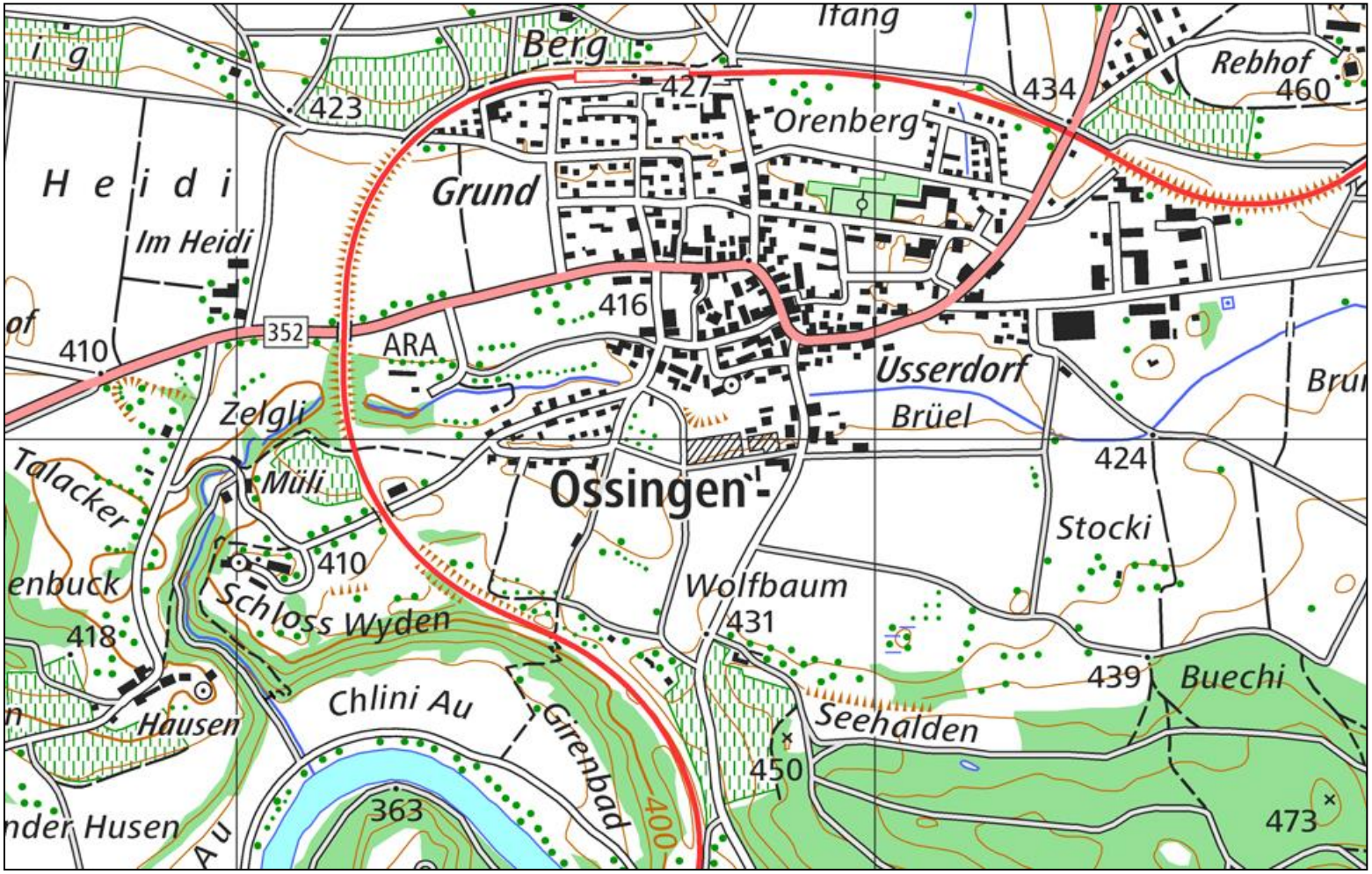


The Production Workflow (DCM)

Step 3: The automatically generalized and symbolised Digital Cartographic Model (DCM)

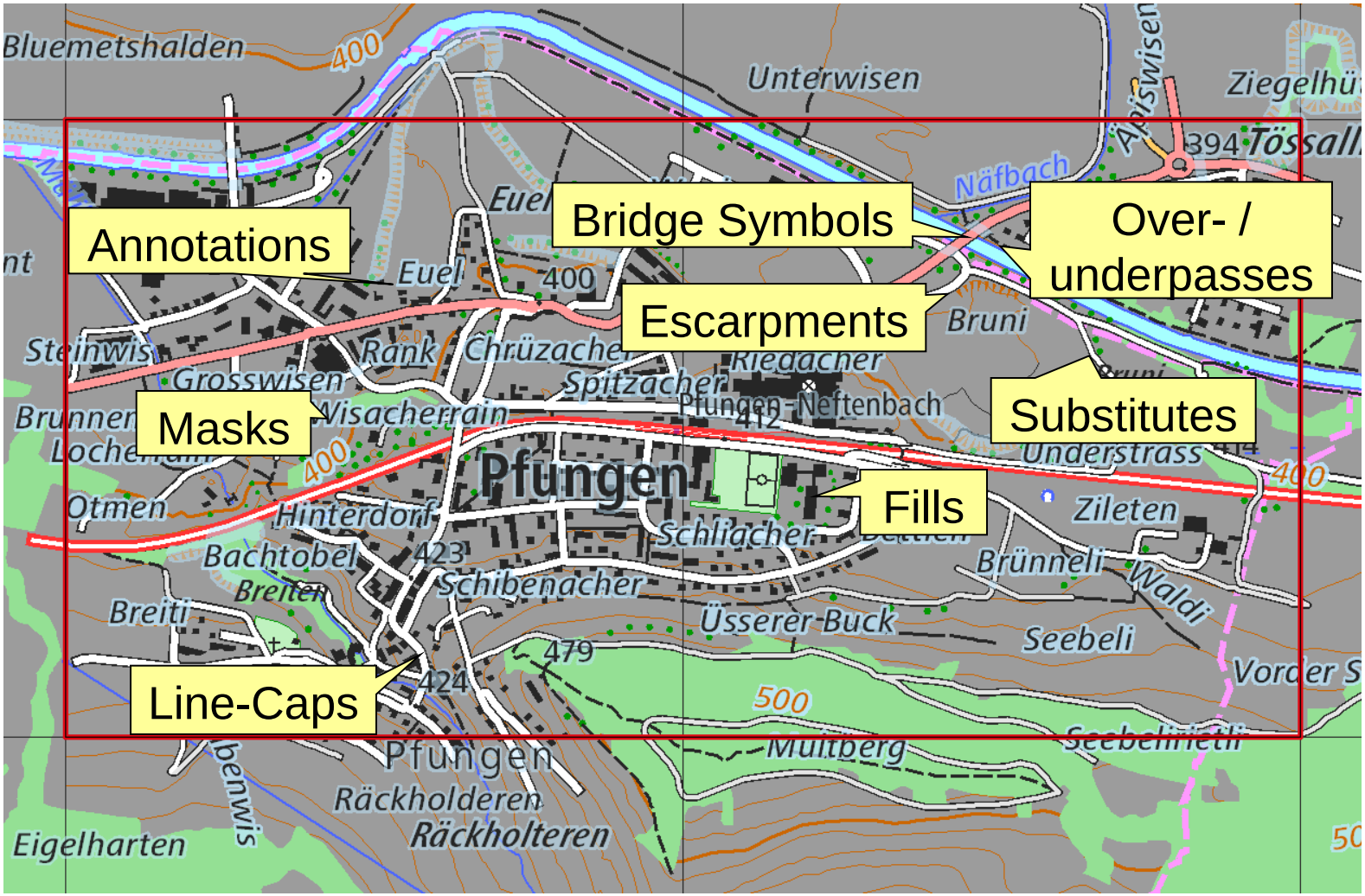
The Production Workflow (DCM)

Step 4: The semi-automatic, manually refined and completed Digital Cartographic Model (DCM)



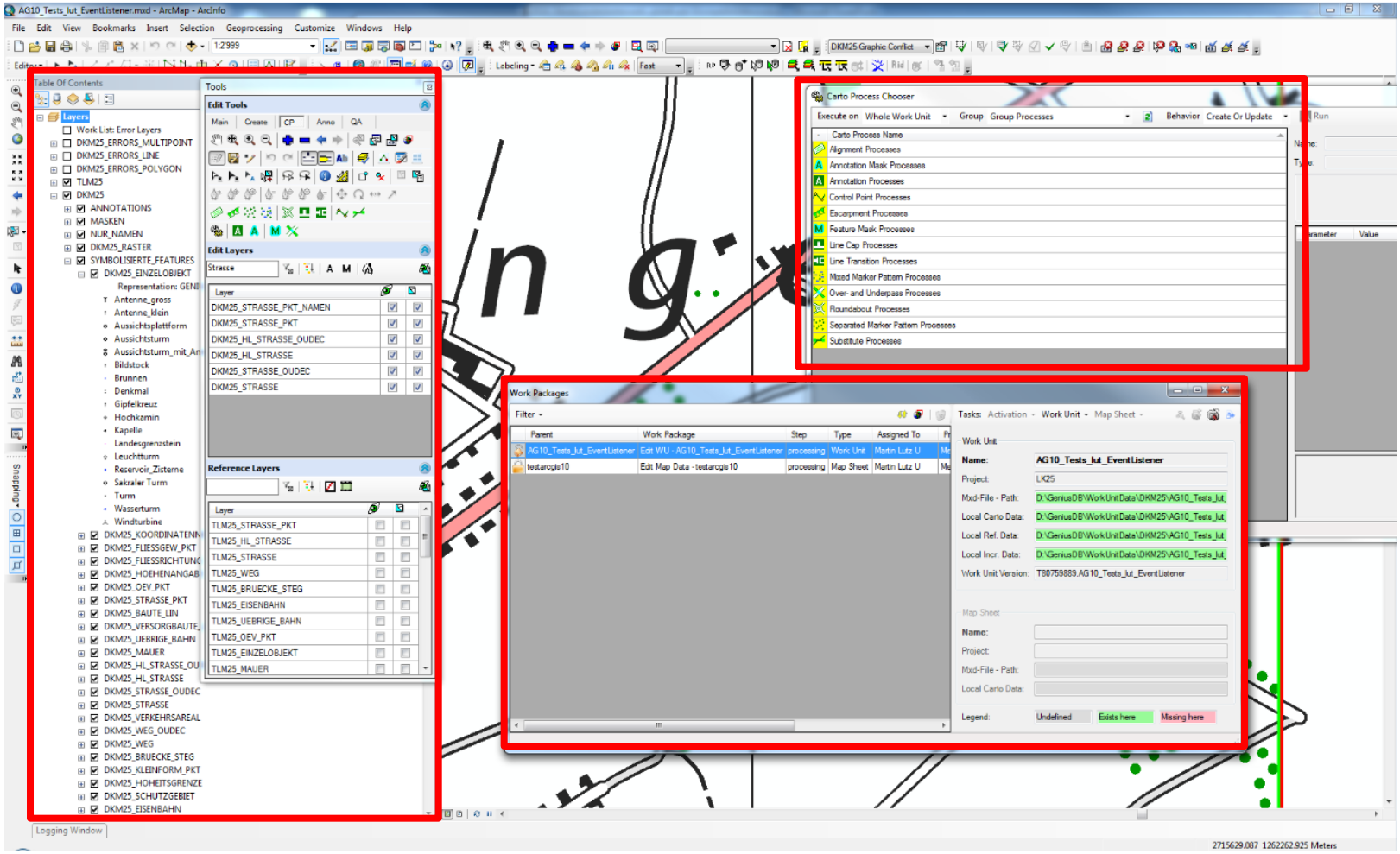
The Production Workflow (DCM)

Esri Switzerland GdbProcess Framework: Carto Processes



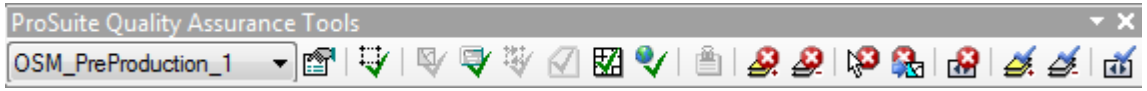
The Production Workflow (DCM)

Esri Switzerland GdbProcess Framework: Configuration and Management Tool



The Production Workflow (DCM)

Esri Switzerland GdbProcess Framework: Quality Assurance



- Automated workflows
- Configurable and extendable tests
- Batch-enabled or interactive control
- Ergonomic correction tools
- Performance: Complete TLM in 20h tested (15 Mio. Features, 200 Feature Classes running a multitude of tests)

Quality Conditions

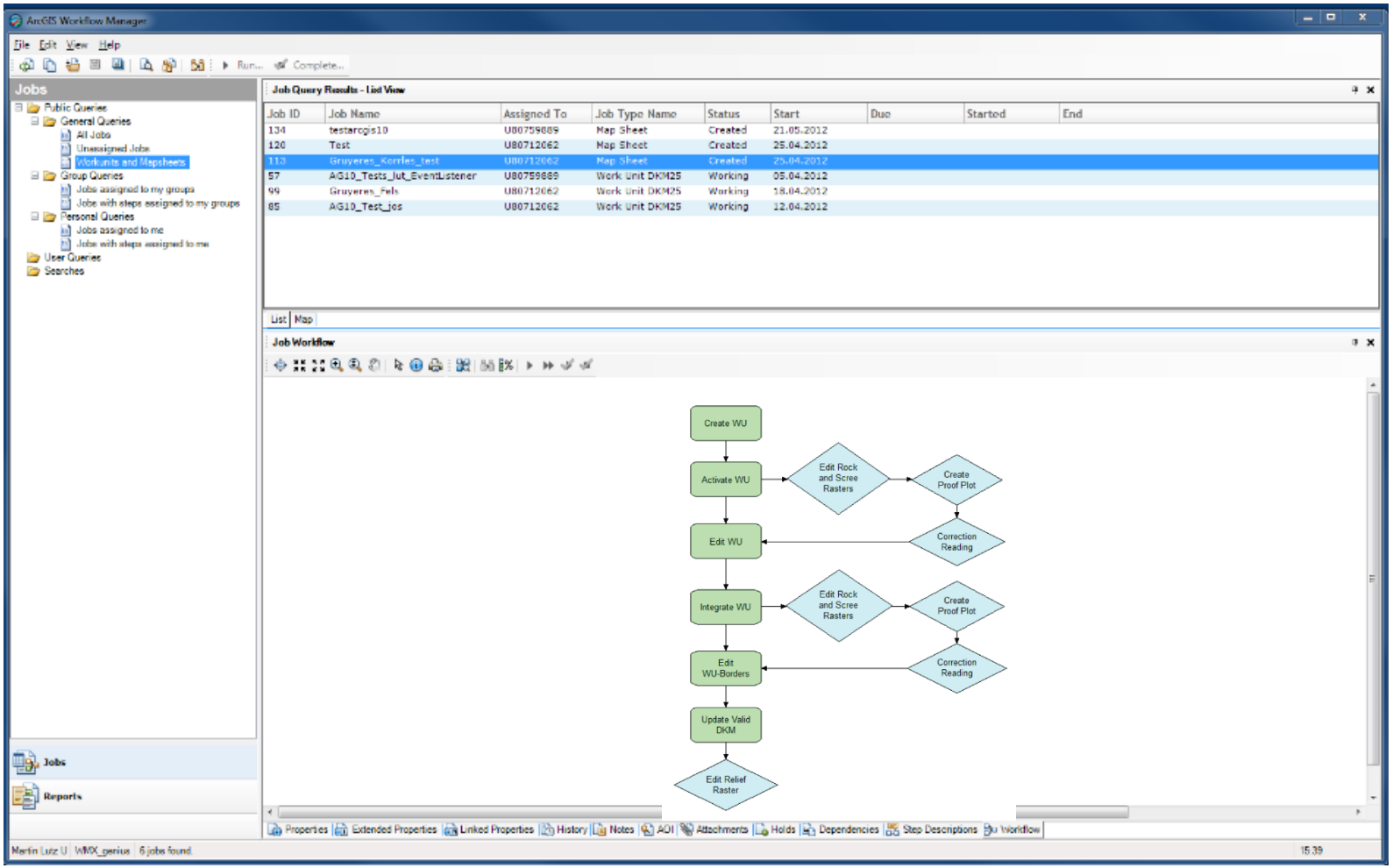
Assign Quality Conditions... Remove

Find: 0 of 0 Next Previous Match Case Filter Rows

Condition Name	Test	Allow Errors	Allow Errors (Condition Default)	Stop On Error	Stop On Error (Condition Default)	Condition Descriptic
OSM_Eisenbahn_L_DoppelteGeometrie	QaDuplicateGeometrySelf	Use Default	False	Use Default	False	
OSM_Eisenbahn_L_EinfacheGeometrie	QaSimpleGeometry	Use Default	False	Use Default	False	
OSM_Eisenbahn_L_LeereGeometrien	QaNonEmptyGeometry	Use Default	False	Use Default	False	
OSM_Gebaeude_F_DoppelteGeometrie	QaDuplicateGeometrySelf	Use Default	False	Use Default	False	
OSM_Gebaeude_F_EinfacheGeometrie	QaSimpleGeometry	Use Default	False	Use Default	False	
OSM_Gebaeude_F_LeereGeometrien	QaNonEmptyGeometry	Use Default	False	Use Default	False	
OSM_Gewaesser_L_DoppelteGeometrie	QaDuplicateGeometrySelf	Use Default	False	Use Default	False	
OSM_Gewaesser_L_EinfacheGeometrie	QaSimpleGeometry	Use Default	False	Use Default	False	
OSM_Gewaesser_L_LeereGeometrien	QaNonEmptyGeometry	Use Default	False	Use Default	False	
OSM_Landnutzung_F_DoppelteGeometrie	QaDuplicateGeometrySelf	Use Default	False	Use Default	False	
OSM_Landnutzung_F_EinfacheGeometrie	QaSimpleGeometry	Use Default	False	Use Default	False	

The Production Workflow (DCM)

ArcGIS Workflow Management

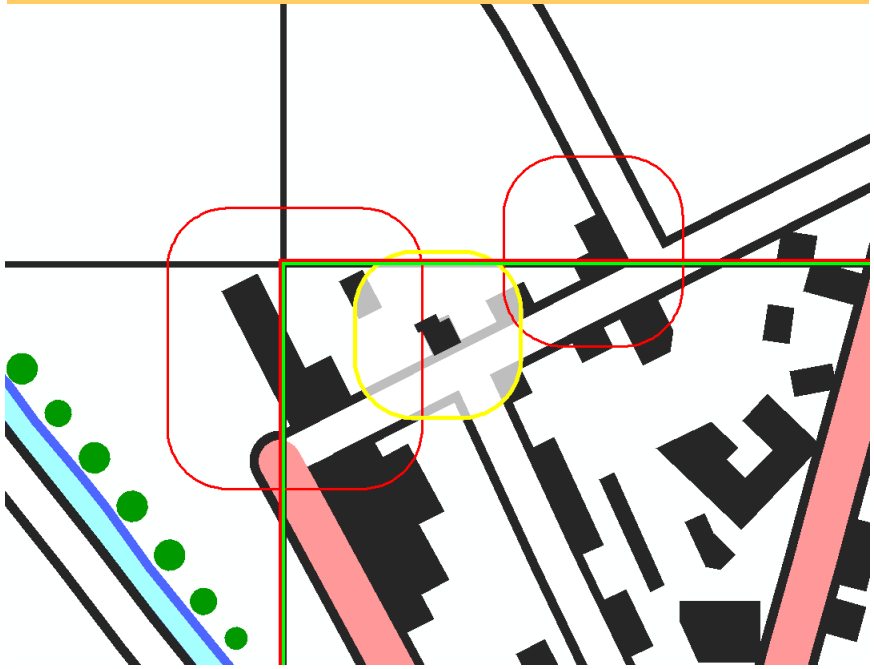


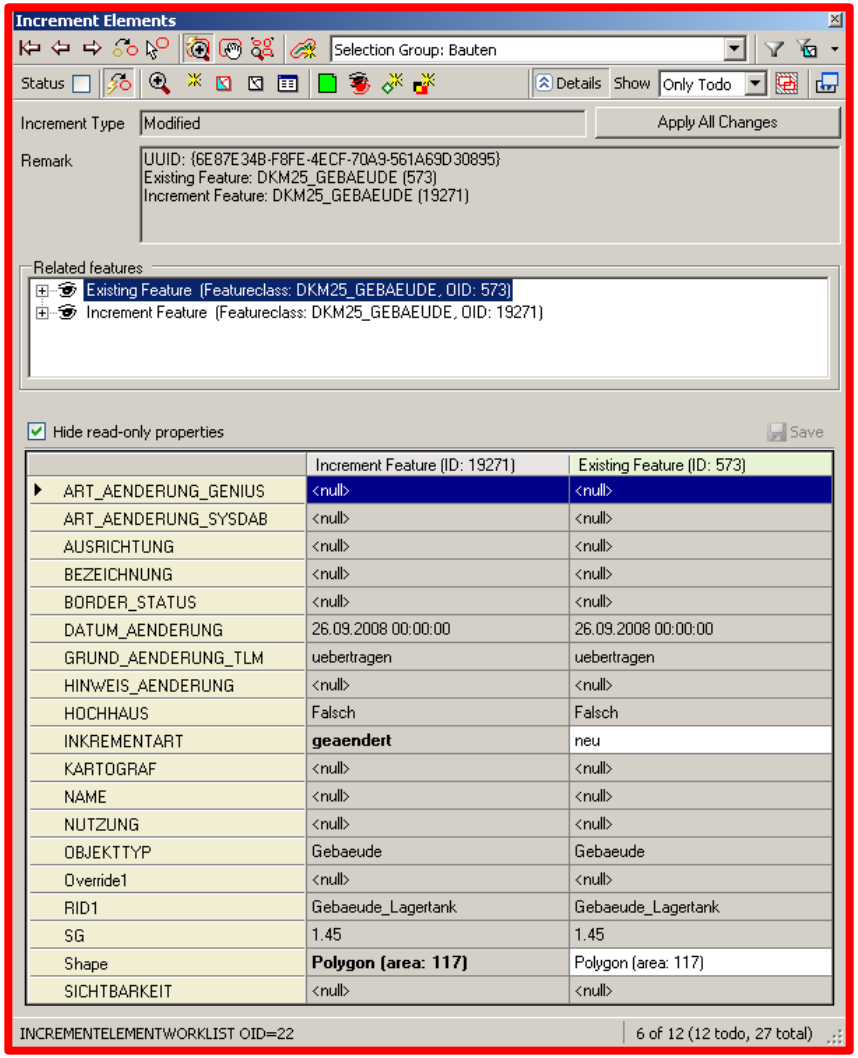
The Production Workflow (DCM)

Esri Switzerland Genius-DB incremental workflow

- Layers
  - Increment Element Representation
  - Increment Element WorkList
  - Increment Element WorkItems

MOD





	Increment Feature (ID: 19271)	Existing Feature (ID: 573)
ART_AENDERUNG_GENIUS	<null>	<null>
ART_AENDERUNG_SYSDAB	<null>	<null>
AUSRICHTUNG	<null>	<null>
BEZEICHNUNG	<null>	<null>
BORDER_STATUS	<null>	<null>
DATUM_AENDERUNG	26.09.2008 00:00:00	26.09.2008 00:00:00
GRUND_AENDERUNG_TLM	uebertragen	uebertragen
HINWEIS_AENDERUNG	<null>	<null>
HOCHHAUS	Falsch	Falsch
INKREMENTART	**geaendert**	neu
KARTOGRAF	<null>	<null>
NAME	<null>	<null>
NUTZUNG	<null>	<null>
OBJEKTTYP	Gebaeude	Gebaeude
Override1	<null>	<null>
RID1	Gebaeude_Lagertank	Gebaeude_Lagertank
SG	1.45	1.45
Shape	**Polygon (area: 117)**	Polygon (area: 117)
SICHTBARKEIT	<null>	<null>

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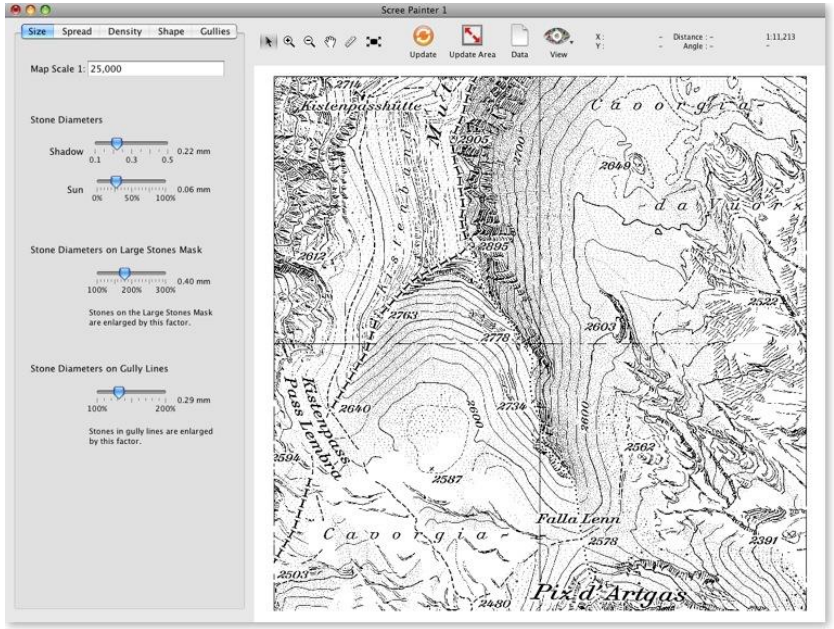
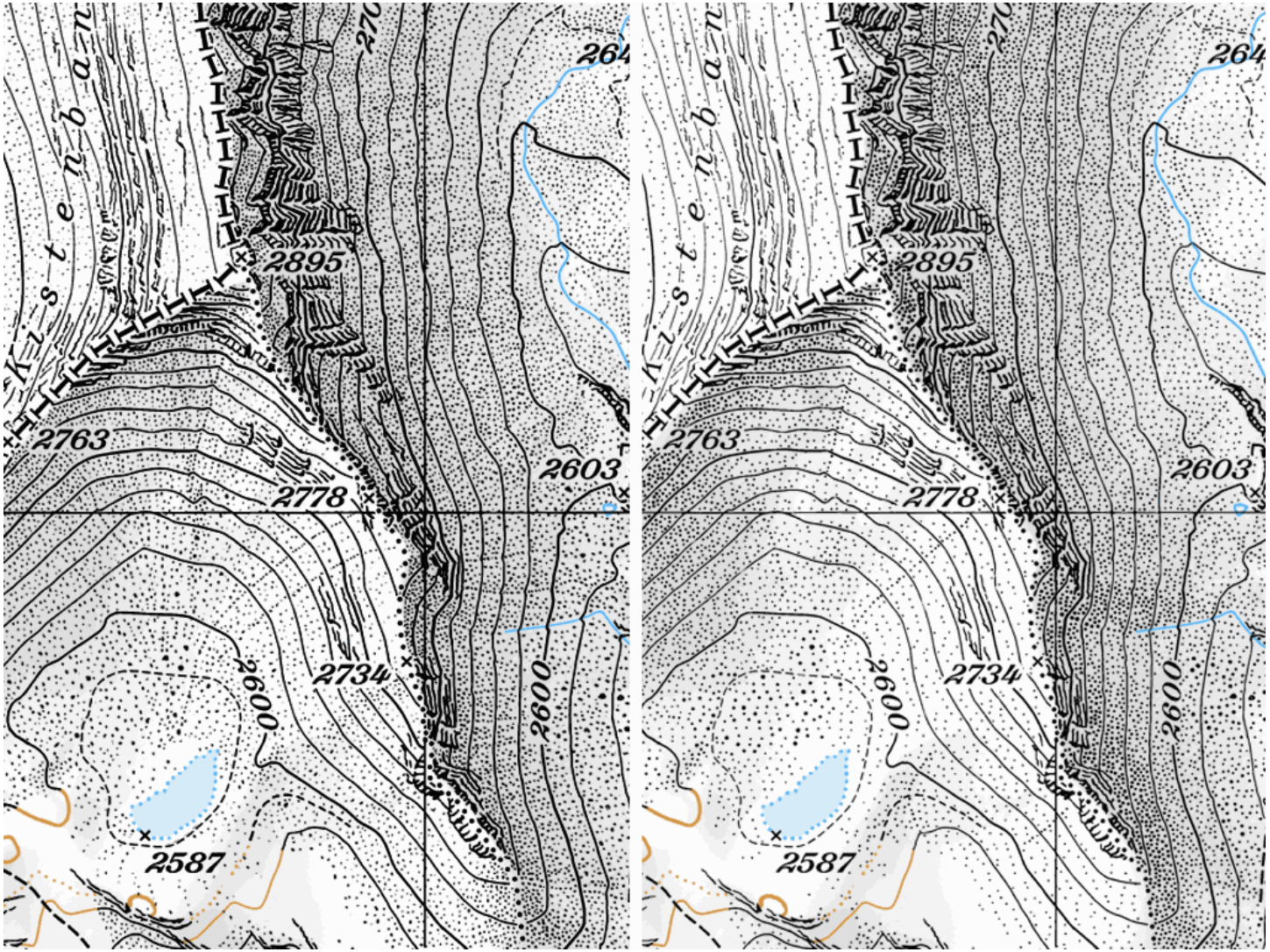
- *Project Standpoint: 2013*

Specials:
The ScreePainter

- Automatically paints scree
- Input: Shaded relief or DTM + Scree polygons + slope lines
- Constructed by Bernhard Jenny, ETH Zürich
- Completed project
- Open Source Freeware
- www.screepainter.com

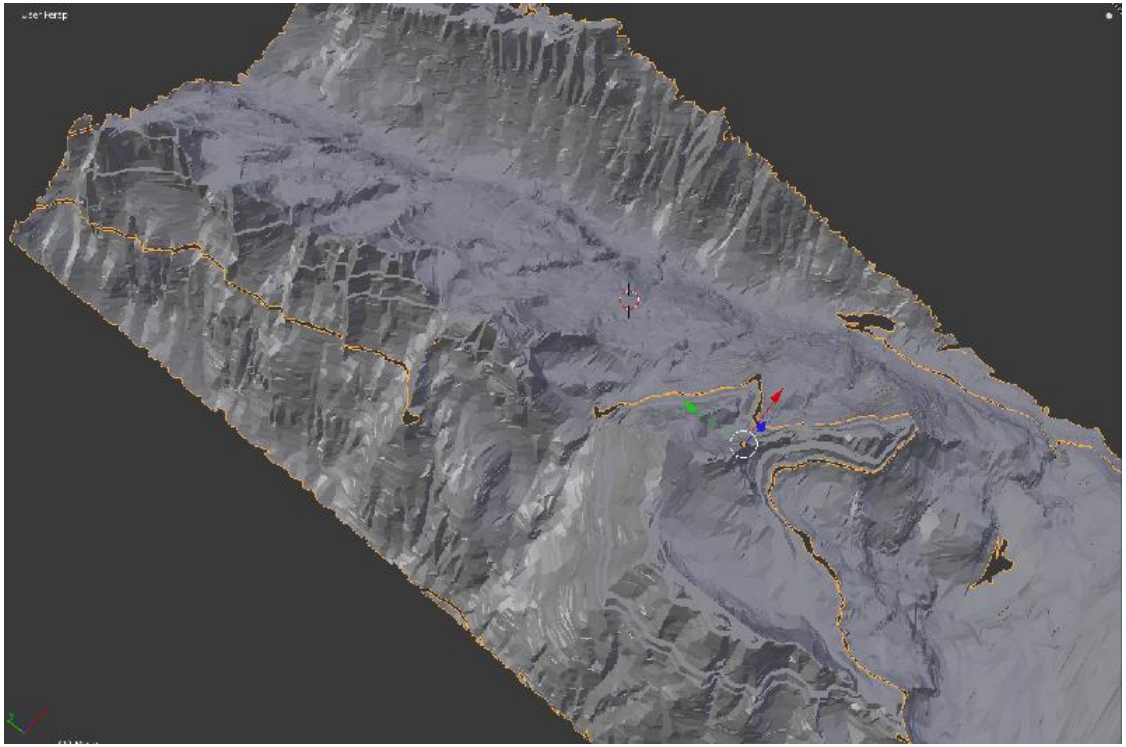


Specials:
The ScreePainter



Specials:
Rock representation

- Manual rock drawing is pertained in the DCM's
- A research project for automatic rock drawing is presently on-going with ETH Zürich



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Project Standpoint: 2013

Produced in 2011

Pre-study (Multi-variations)

Prototype started then frozen

Considering a DCM250

- Powerful systems built
- Production start March 2013
- Completed ~2019

DCM1M

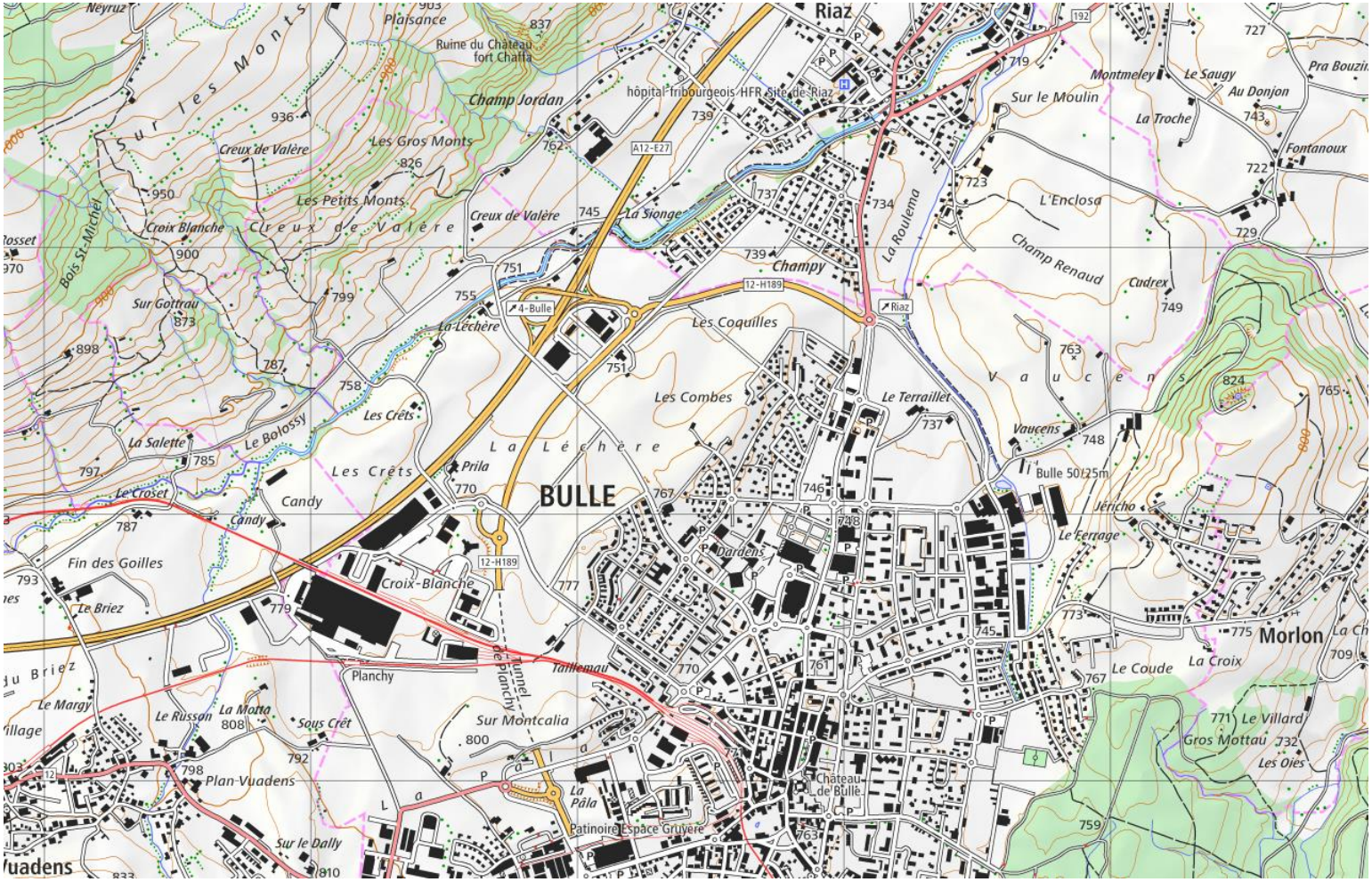
DCM500

DCM300

DCM200

DCM100

DCM50

DCM25

Thank you for listening!