Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Office of Topography swisstopo
Swiss Geological Survey

wissen wohin
savoir où
sapere dove
knowing where

swisstopo

The new oil –
Profitable storage and usage of geological data

2nd European meeting on 3D geological modelling

20th and 21st November 2014

Salomè Michael & Roland Baumberger

Mission of GSO

Geological Survey Organisations usually are in charge of:
- Production of products and data
- Supply of products and data

Production
- Past: Analogue data did not need any harmonisation
- Up to now: autonomic production per department
- Recently: Need for harmonisation identified, but huge resources needed

Supply
- Internet! Download it!
- But: Offered data is often harmonised to minimum extent only
- Really bad situation

Commitment

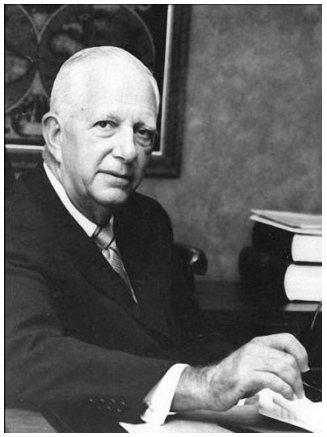
“80% of political decisions are based on spatial data”

GSO have to make sure that the data they provide is easily
- accessible and manageable,
- of immediate benefit to the users
- readily usable in a client’s typical workday

It is our task to acquire, process, produce, store, supply and distribute geological data in a beneficial/profitable way.

We need to invent, develop and adapt methodologies, processes and tools to support the clients at their best.

One of the most successful inventions in recent times



Malcom McLean (1913 – 2001)

- Inventor of the shipping container

- 18th century: Wooden boxes in England
- 19th century: Different formats of early containers
- 20th century:
  - «Laadkist» in the NL
  - 20s: Standardised railway container in England
  - 40s: pa container used by Deutsche Bahn
  - 40s: Swiss Container cars for railway transport
  - 1956: 58 containers are shipped on a marine vessel for the first time
  - 1961: ISO defined the container

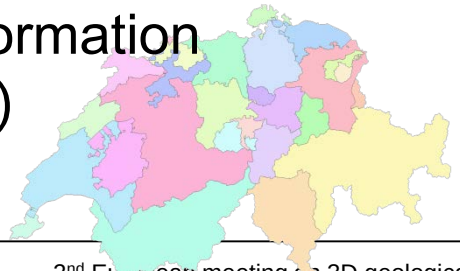
How to work together?

Containers:

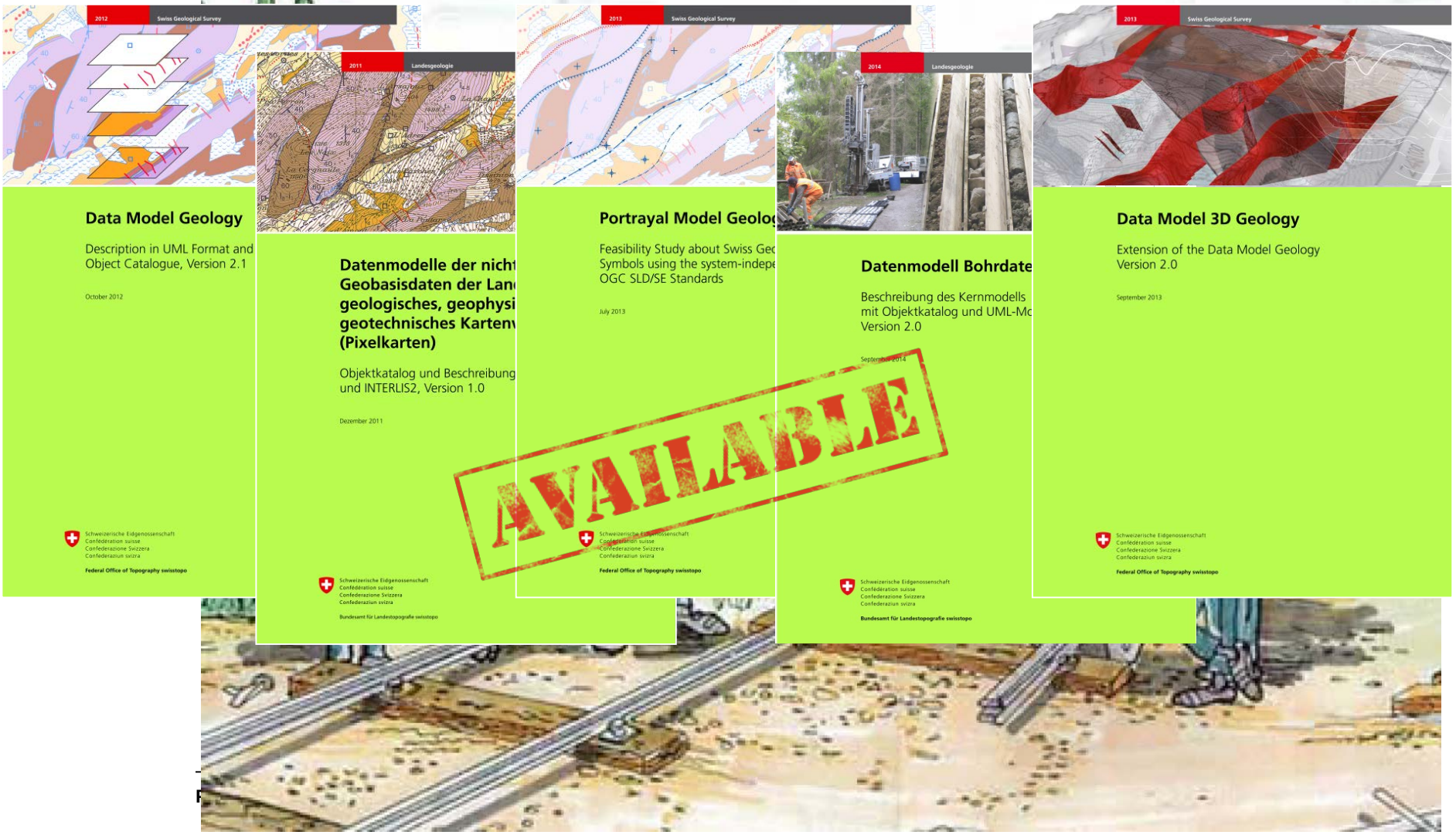
– 40’’ and 20’’ equivalents (+ others)
– standardised locking mechanism

Geological data:

– Between different users: enterprises / organisations / cantons / countries
  → different software in use
– Between any type of modelling software
  → standardised 2D and 3D data formats
– Between different Data Models
  → without loss of any information (geometry, semantics, …)



Swiss Data Models



Data Model Geology

- The Data Model Geology is the basis for the compilation of a seamless, nationwide vector dataset of Switzerland
- It facilitates the handling of different geological datasets in a GIS-environment
- To avoid multiple expressions for a particular object we defined standard terms
- Standardisation means: Ease of users queries and data analysis

→ Aim: Fully standardised attributed datasets in either 2D or 3D

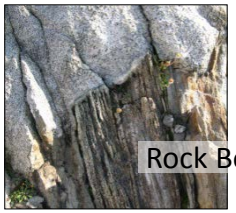
Data Model Geology

Data organisation
(structure and semantics)

- 8 Themes
- 50 Classes
- Object types & attributes

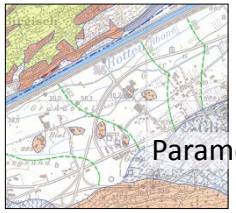
still missing:

- Standardised values for lithostratigraphic units (HARMOS, to be finished by the end of 2014)


Rock Bodies


Local Add. Information


Geomorphology


Parameter & Modelling


Tectonics


Anthropogenic Features

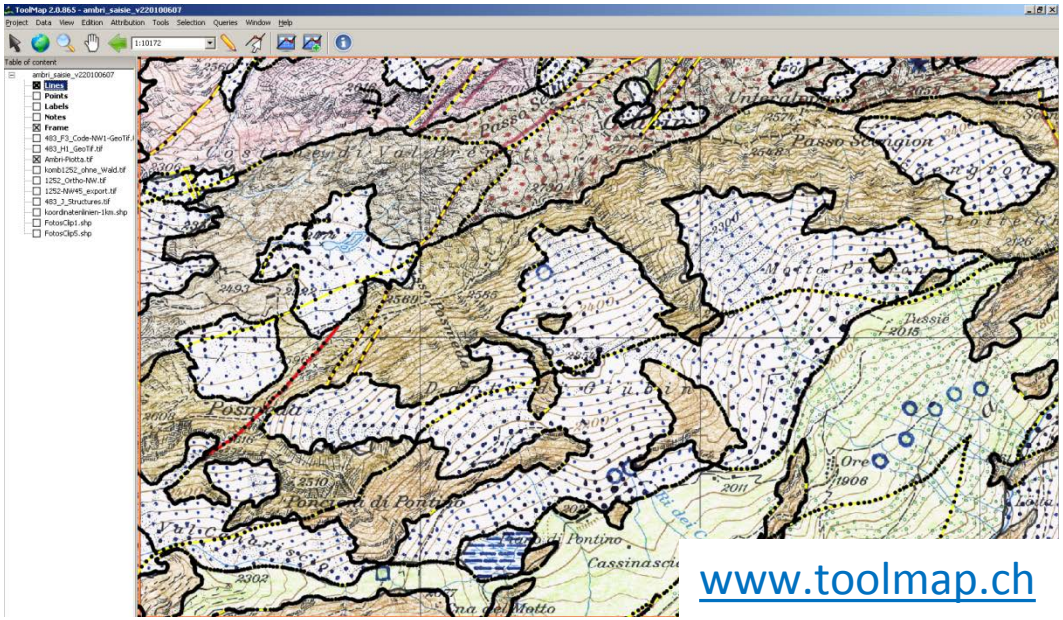

Measurements
Spatial Orientation


Hydrogeology

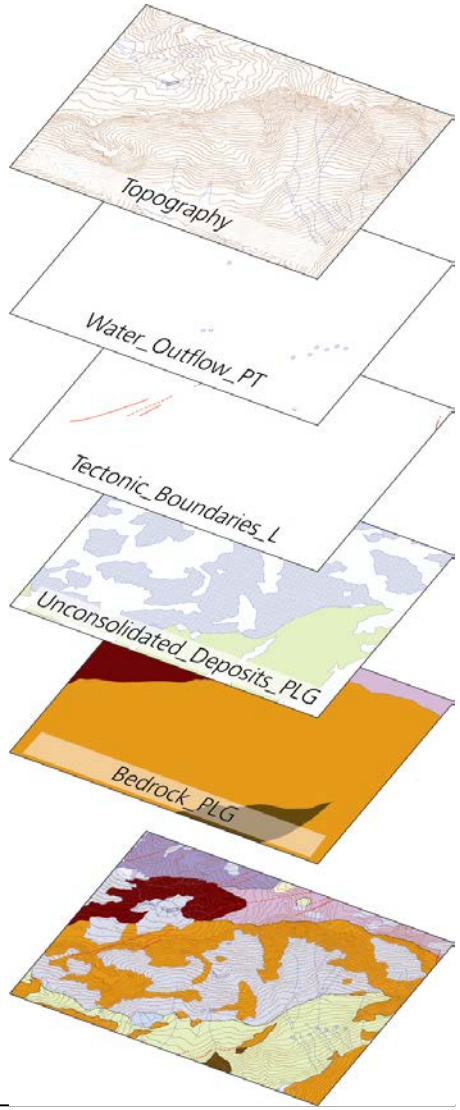
AVAILABLE

From data acquisition to 2D datasets

- Digitisation of the field map in ToolMap^2, based on a predefined Data Model
- Automatic export (shapefiles) according to the predefined Data Model



www.toolmap.ch



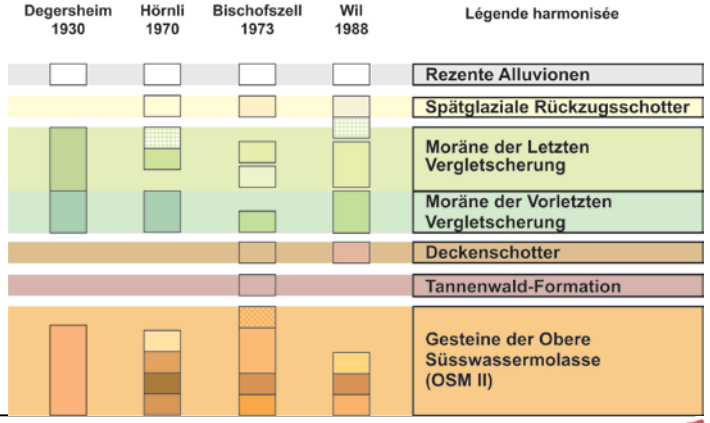
AVAILABLE

Production geological maps / datasets

Vector datasets
(2006 – 2012)

Geometric revision
(starting 2015)

HARMOS Project
(2011 – 2014)

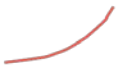
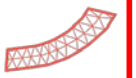
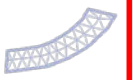
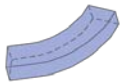
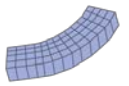


Paper & pixel maps
(1930 – 2030)

AVAILABLE

Data Model goes 3D

- Extension (relevant themes and classes) and Expansion (new themes and classes) of the DMG-2D
- Changes in geometry types from 2D to 3D
- Introduction of new geometry types

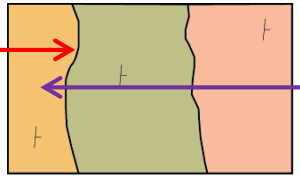
2D representation		3D representation		Example
Point		Point		Dip measurement
Point		Line		Drill hole
Line		Line		Hinge line
Line		Surface		Fault
Polygon		Surface		Rock body
Polygon		Shell		Rock body
Polygon		Volume		Rock body

2D to 3D Data transformation

Kind: geological outline

Status: in general

L



PLG

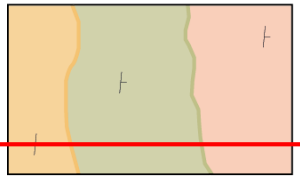
Kind: geological outline

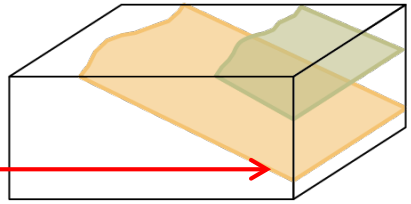
Status: in general

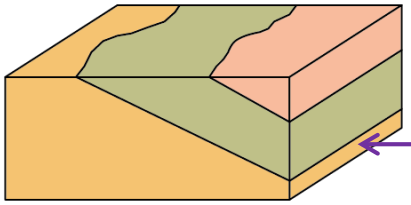
Type: Top

LithoStrat: Lower Freshwater Molasse

SURF







V

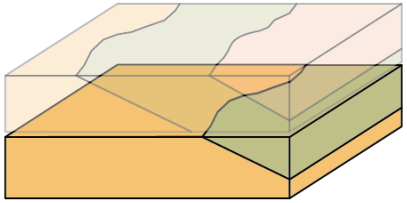
Kind: Lower Freshwater Molasse

Litho: Sandstone

Chrono_T: Burdigalian

Chrono_B: Aquitanian

Tecto: Plateau Molasse



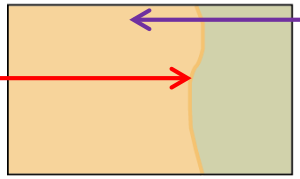
Kind: geological outline

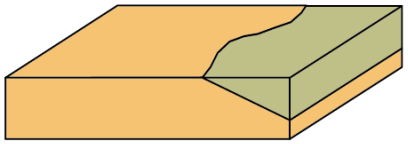
Status: in general

Type: Top

LithoStrat: Lower Freshwater Molasse

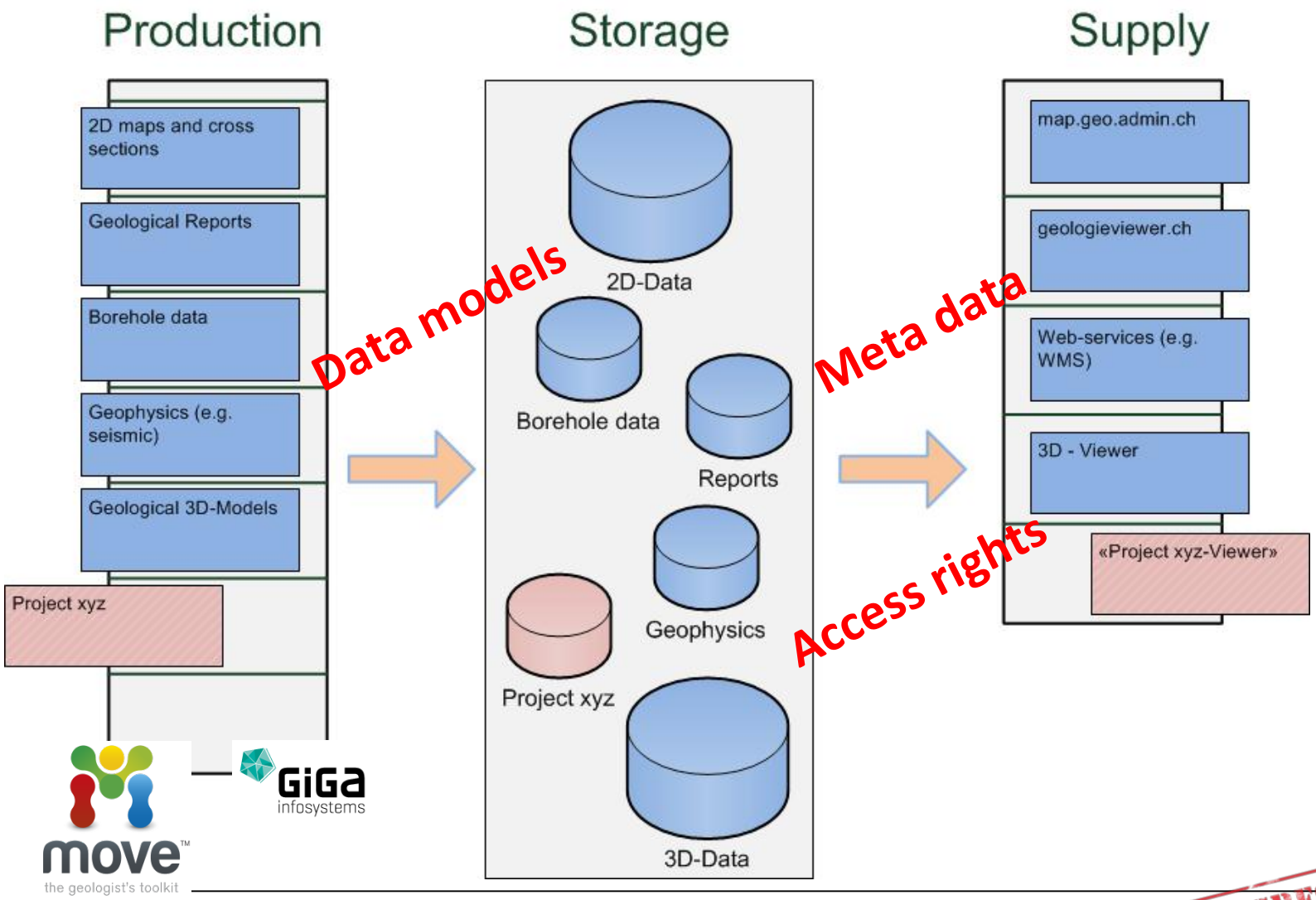
L





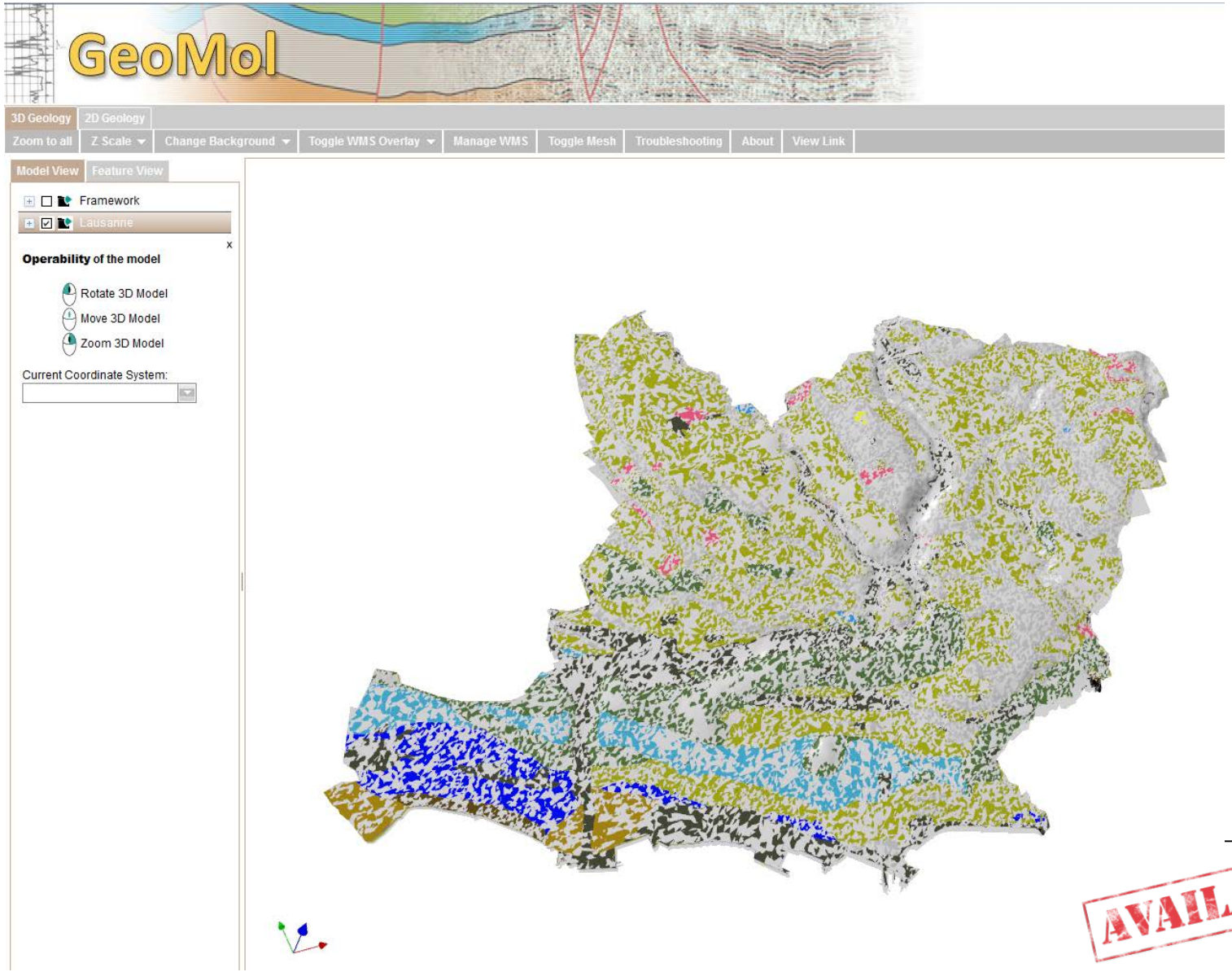
PLG

System view



WORK IN PROGRESS

Distribution: Data visualisation



Distribution: Data analysis

Integration into user's systems

- Data supplied to / obtained by the user needs to be fully attributed according to the Data Models
- Data in use by the user also needs to be attributed based on the DM
- Seamless merging data sets allows the user to immediately processing the downloaded data
- Requirements
  - Integrated, trans-dimensional Data Models
  - Standardised and automated exchange protocols
  - Standardised data formats

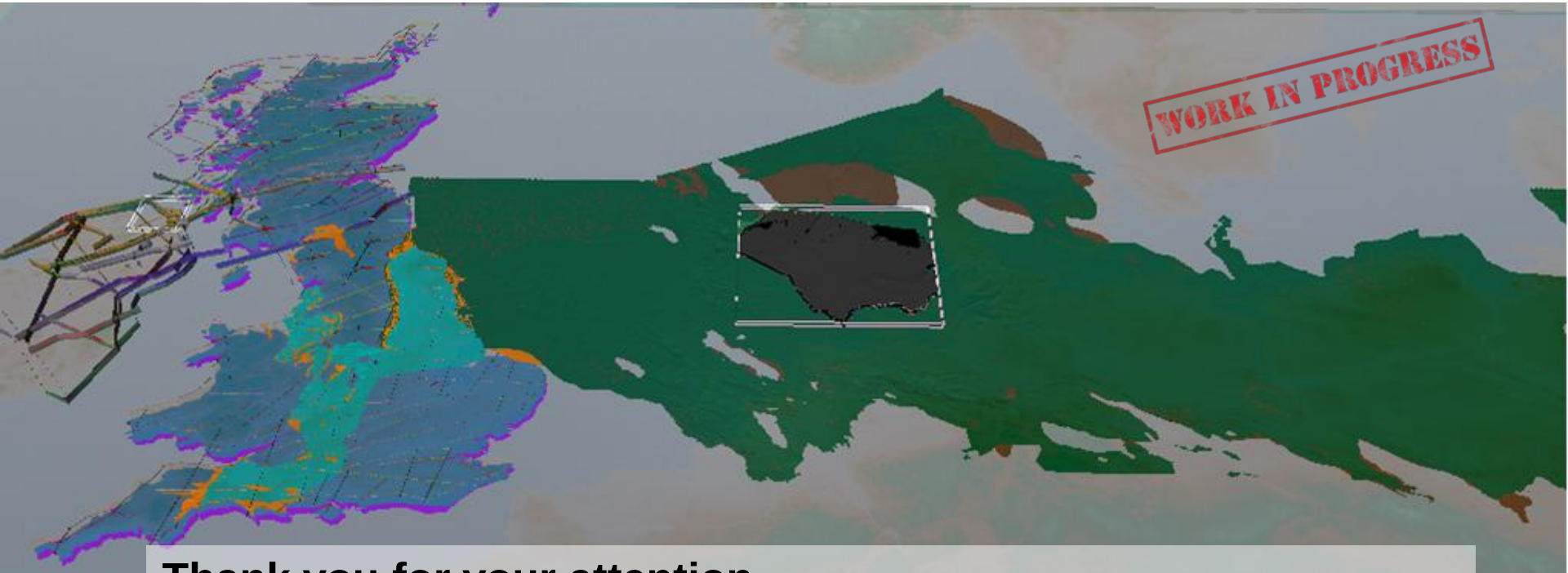
Outlook

"The economic benefit of one published geological map sheet is 6 to 8 times higher than the value of the input data"
→ 220 map sheets x 25m CHF = 5.5bn CHF x 6

Additionally, we need
- provide available data in new context and conditioned format
- to reduce the amount of work needed for post-processing the data by the client → economic benefit
- to ensure the availability of comprehensive datasets, nationwide and trans-nationally → economic benefit
- to de-complicate the data exchange between data suppliers and clients

The data is available – we need to hook the clients

Questions & answers



Thank you for your attention

Contact
roland.baumberger@swisstopo.ch
salome.michael@swisstopo.ch