

# Inggeo-Tool

**A web application for 3D-model based automated tunnel profile generation**

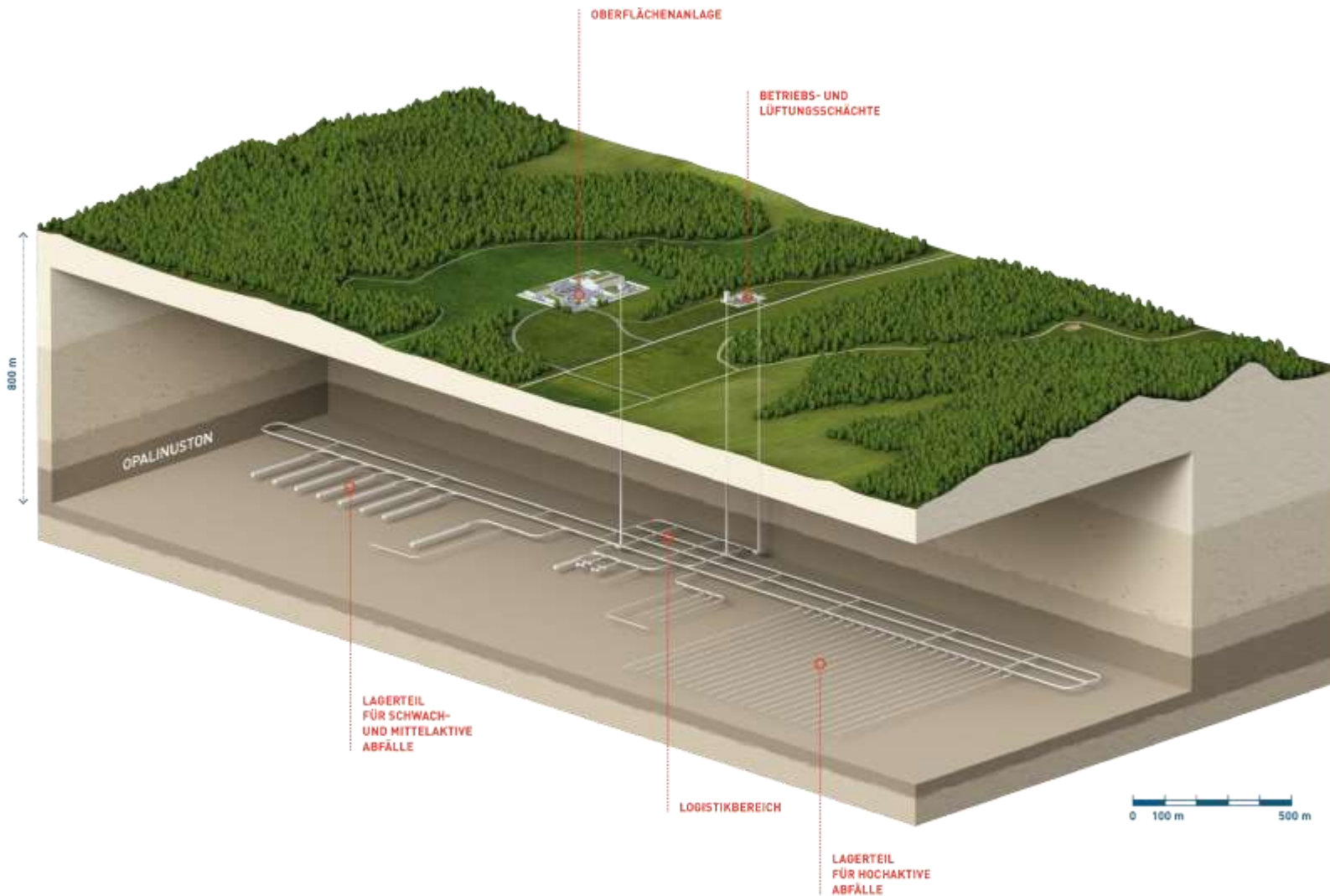
Yvo Weidmann, GEOIDEE ([yvo.weidmann@geoidee.ch](mailto:yvo.weidmann@geoidee.ch))

Paul Gabriel, GiGa infosystems ([paul.gabriel@giga-infosystems.com](mailto:paul.gabriel@giga-infosystems.com))

Dr. Dirk Arndt, Nagra ([dirk.arndt@nagra.ch](mailto:dirk.arndt@nagra.ch))

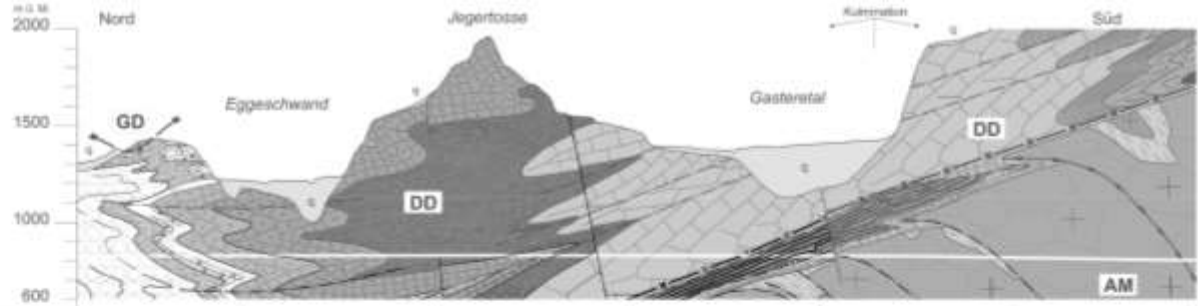
Dr. Marco Filipponi, Nagra ([marco.filipponi@nagra.ch](mailto:marco.filipponi@nagra.ch))

# Rapid generation of tunnel-profiles



Inggeo-Tool - automated tunnel profile generation

Requested output to be generated automatically

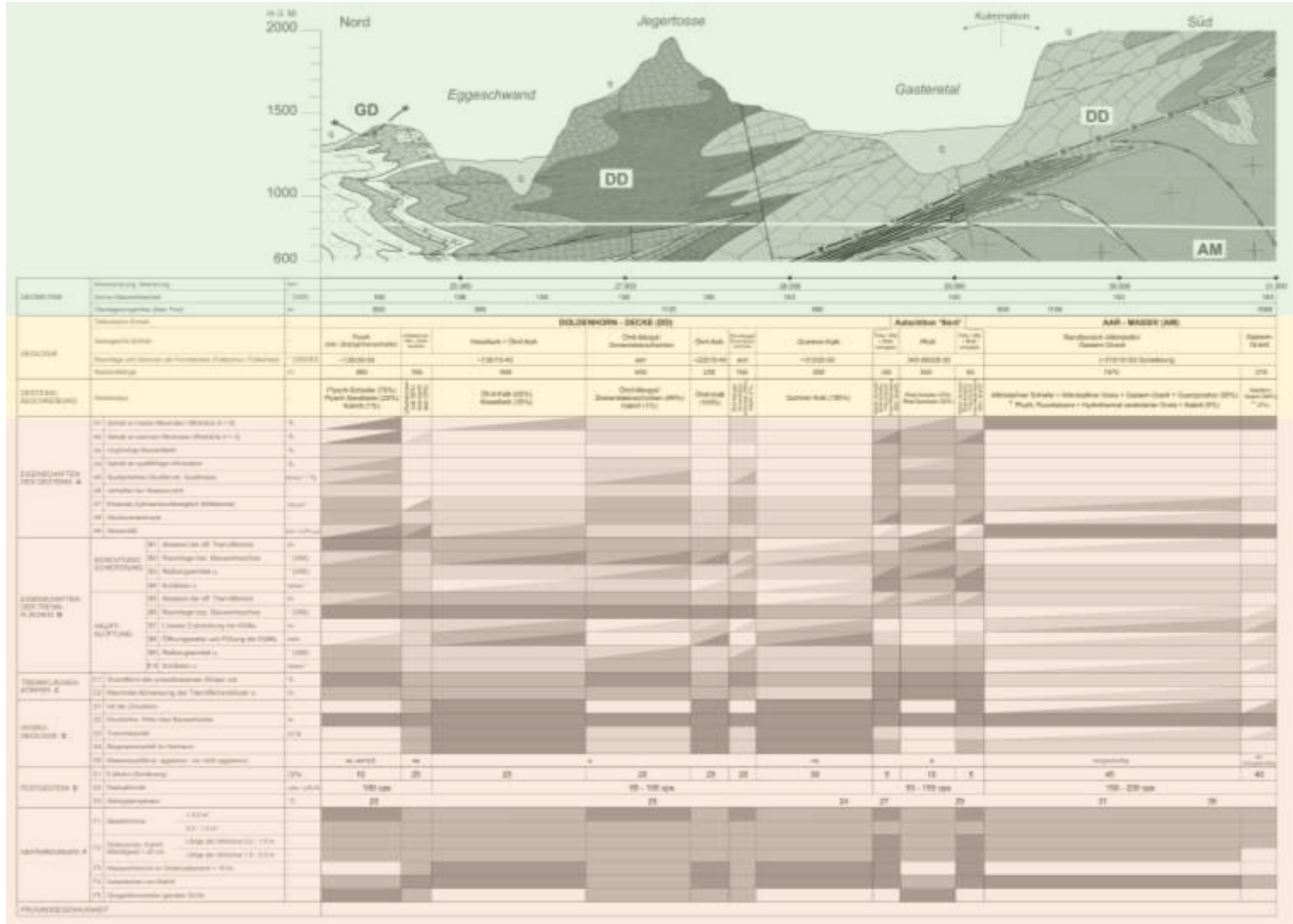


LAGE/PROF	Beschreibung / Bemerkung	Höhe	BOLLENHORN - DECKE (B)						AAR - MASEY (AM)					
			Flach	Steil	Senkrecht	Senkrecht	Senkrecht	Senkrecht	Flach	Steil	Senkrecht	Senkrecht		
PROF 001	...	2000	...	...	...	...	...	...	...	...	...	...	...	...
PROF 002	...	1500	...	...	...	...	...	...	...	...	...	...	...	...
PROF 003	...	1000	...	...	...	...	...	...	...	...	...	...	...	...
PROF 004	...	600	...	...	...	...	...	...	...	...	...	...	...	...

Inggeo-Tool - automated tunnel profile generation

SIA-199

Requested output to be generated automatically



Inggeo-Tool - automated tunnel profile generation

SIA-199

Further data Geology Profile

Motivation

**Data**

Approach

Exchange

Results

## 3D tetrahedral geological-model



nagra.

GiGa-infosystems

GEOIDEE

Motivation

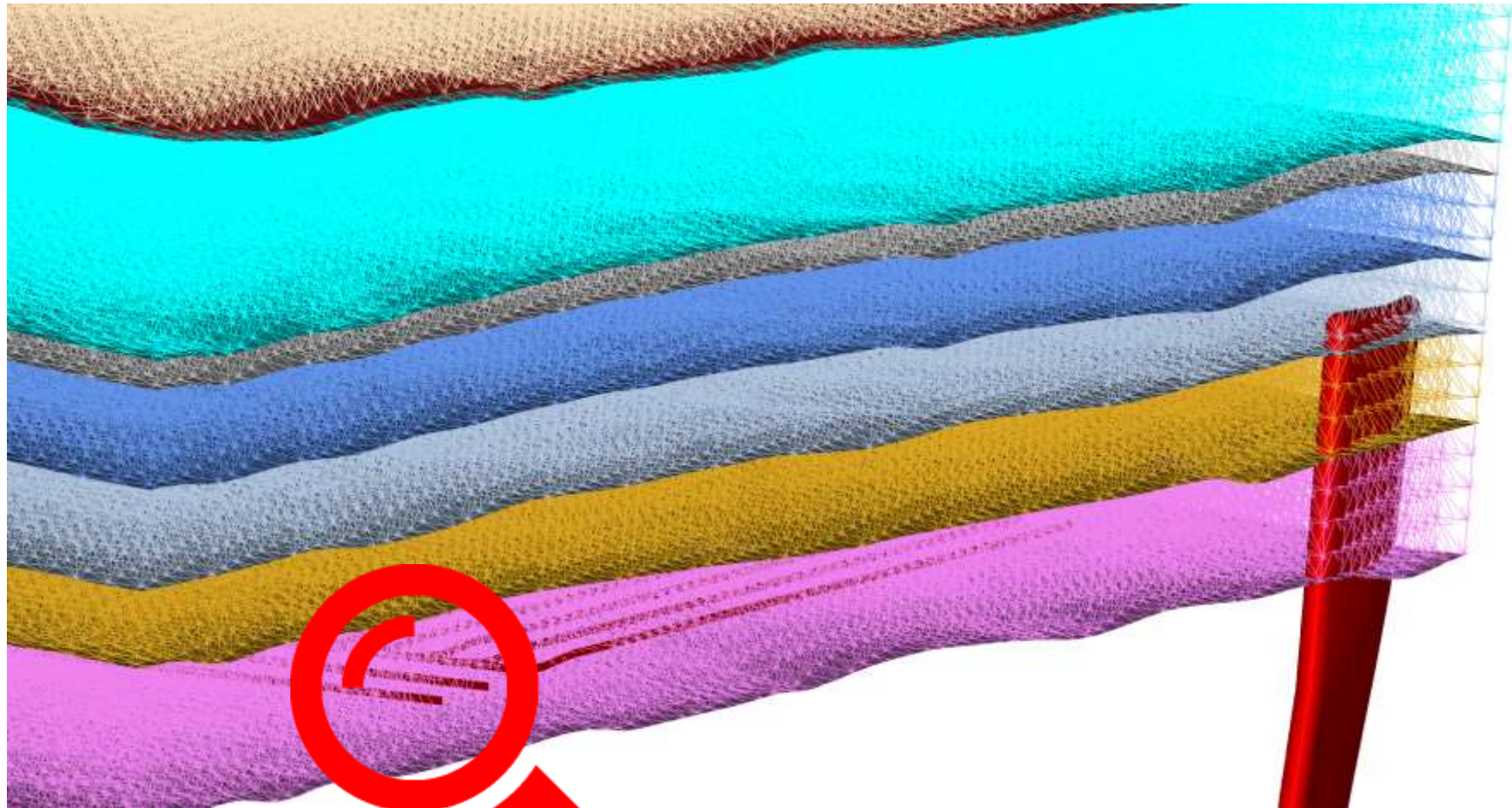
**Data**

Approach

Exchange

Results

## 3D tetrahedral geological-model

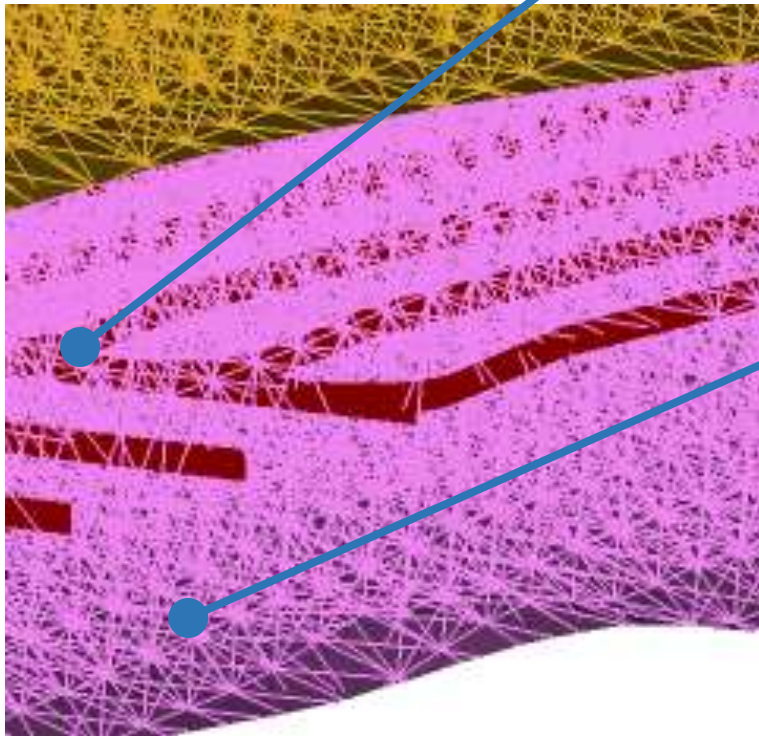


nagra.

GiGa-infosystems

GEOIDEE

## 3D tetrahedral geological-model



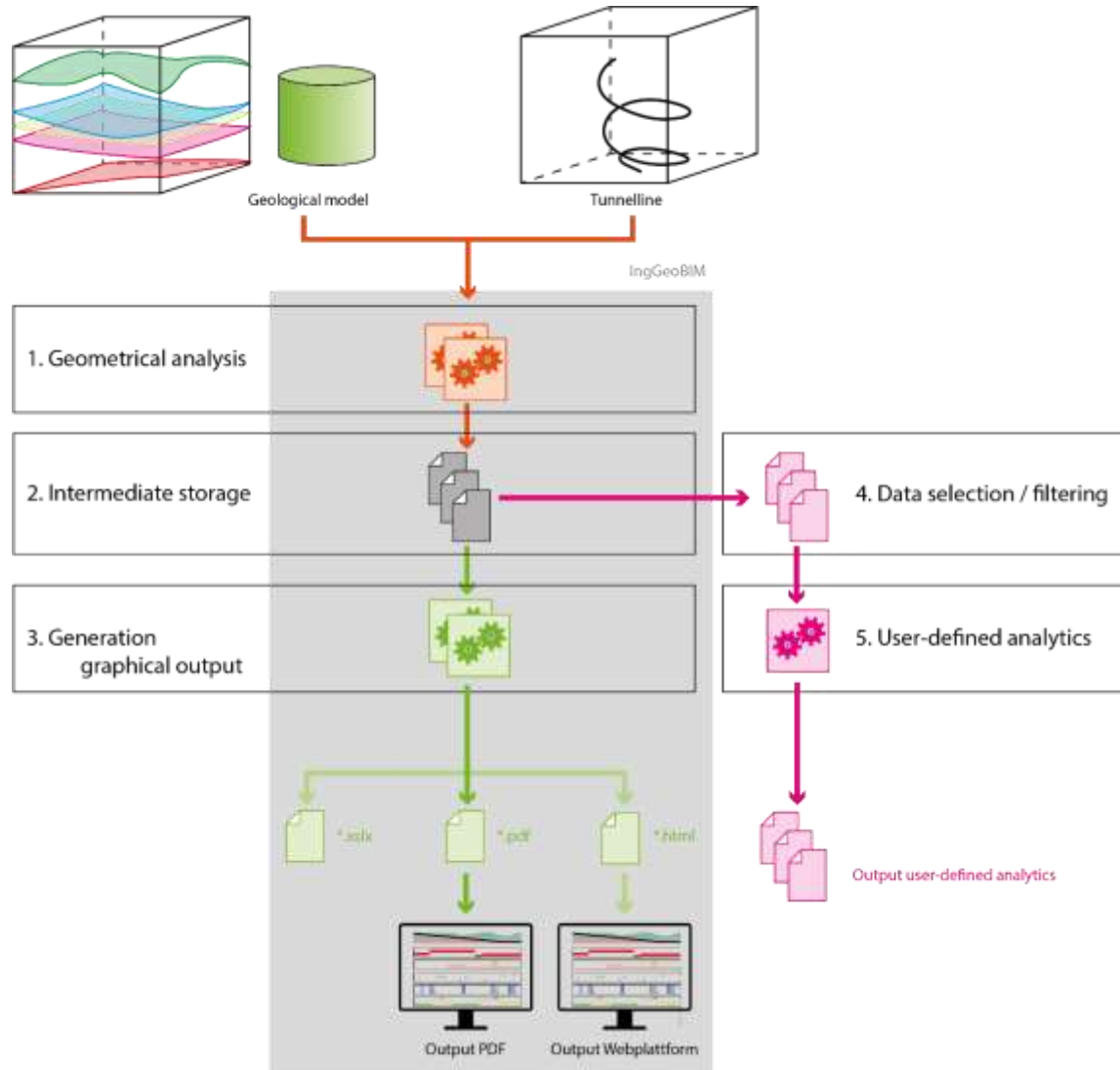
Planned tunnel-axis

Tetrahedral mesh

- Geological formation
- Attached Key-Value-Pair of further data / information

```
...  
"name": "hydrogeo_temp_p005",  
"value": "12.0";  
"name": "hydrogeo_temp_p095",  
"value": "32.0";  
"name": "hydrogeo_value",  
"value": "Porenenaquifer";  
...
```

# Overall workflow, inputs and outputs





## Structure and content exchange file

```

attributes:
  ▶ 0:      {}
  ▶ 1:      {}
  ▶ 2:      {}
  ▶ 3:      {}
  ▼ 4:
    attributes:

```

...

```

  ▶ 11:     {}
  ▼ 12:
    name:    "gebirgsspannungshklein_min"
    value:   "13"
  ▶ 13:     {}

```

...

```

segments:
  ▼ 0:
    azimuth: 148.30188405772907
    dip:     -12.438971532455497
    end:     41.717625138121
    id:      26942
    name:    "tet_INGGEO_30_USM"
    start:   0

```

...

Attributes  
geo-bodies

```

picture:
  ▶ 0:      {}
  ▶ 1:      {}
  ▼ 2:
    color:   {}
    geometryType: "Polygon"
    id:      26932
    name:    "tet_INGGEO_70_Villigen"
    vertices: []
  ▶ 3:      {}
  ▶ 4:      {}

```

...

Profile

```

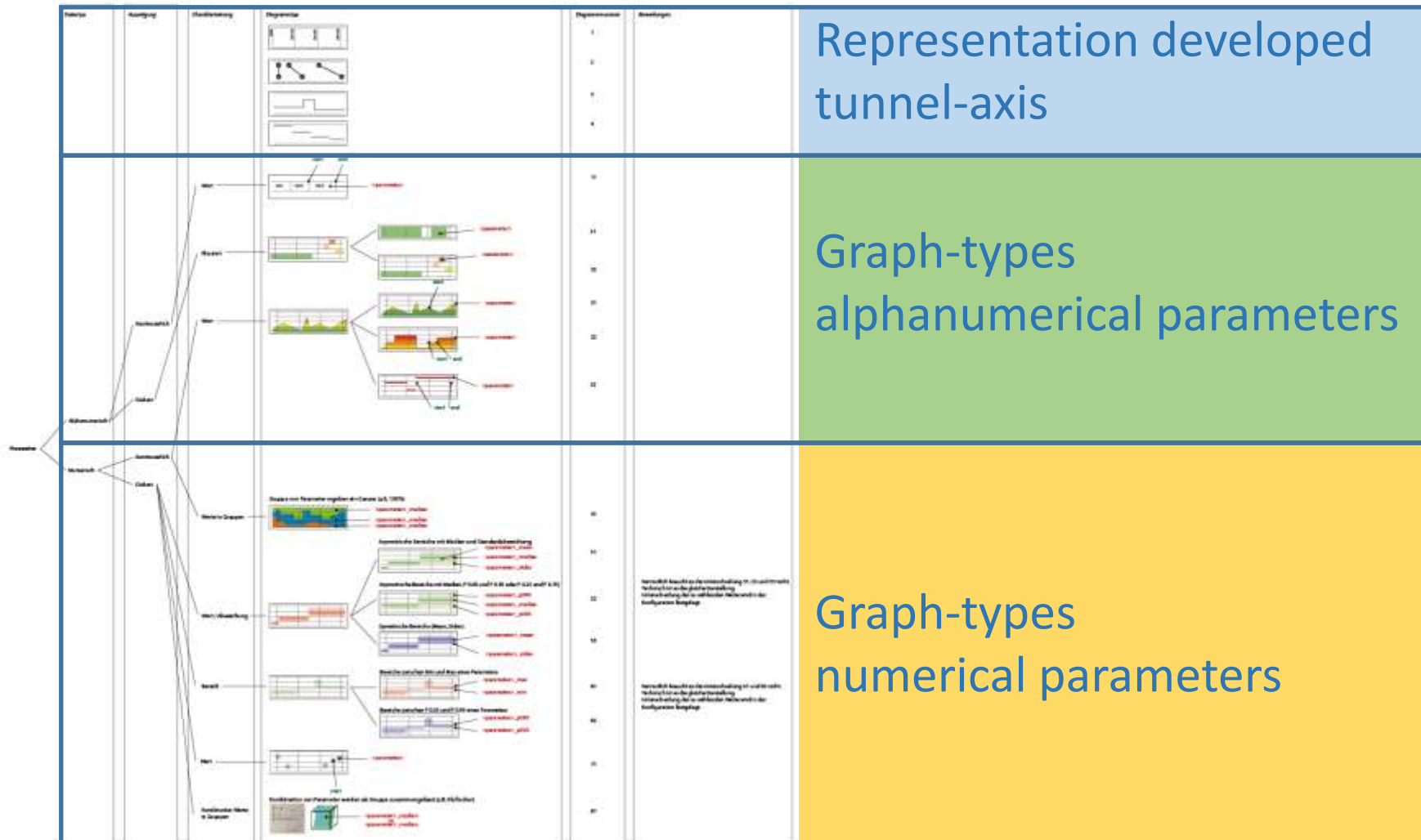
name:      "Intersection Axis"
vertices:
  ▶ 0:      {}
  ▶ 1:      {}
  ▼ 2:
    origin:
      x:     5434000
      y:     5681000
      z:     -900
      x:     47177.418031604895
      y:     -900
  ▶ 3:      {}

```

Tunnel-axis

# Dependencies and rules for graphical representations

Inggeo-Tool - automated tunnel profile generation

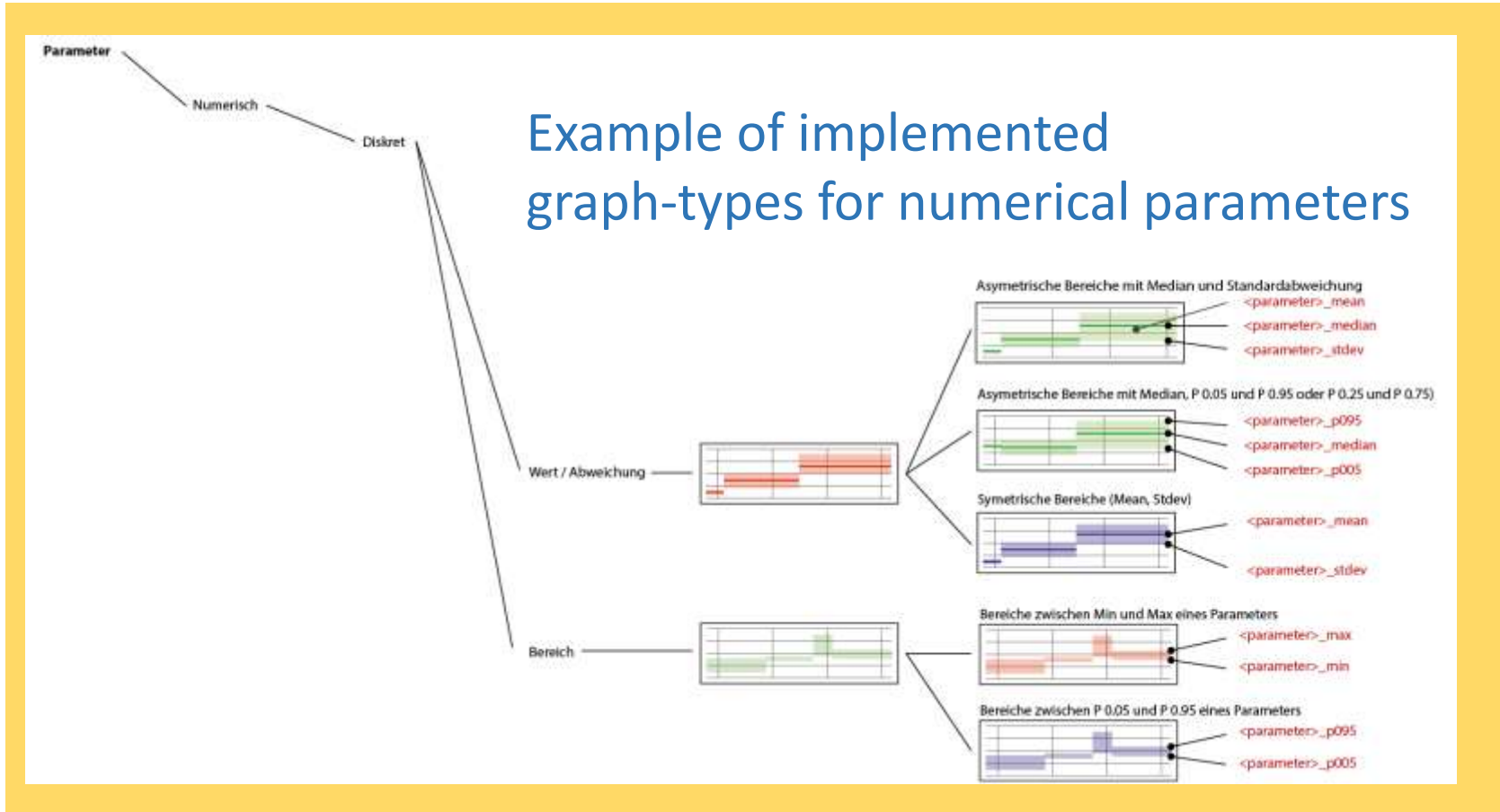


Representation developed tunnel-axis

Graph-types alphanumerical parameters

Graph-types numerical parameters

# Dependencies and rules for graphical representations



## User-access and –interface web-access

The screenshot shows a web browser window with the URL <https://nagra.giga-infosystems.com/inggeotool/jobs/new>. The interface includes a sidebar with 'Home' and 'Jobs' links, and a main form area. The form contains the following fields and values:

- NEU** (Project Name)
- Browse...** (File selection button)
- Model**: NI\_HAA\_Stollen\_ESP621781.ifc
- Model**: IngGeoModV1
- Template**: Vollständiges Template
- Spatial Reference System (SRS)**: CH1903+ / LV95
- Titel**: HAA-Stollen
- Untertitel**: Erste Version der geplanten Tunnellinie
- Bemerkung**: SGM2022

Callouts from the right side of the image point to these fields with the following text:

- Tunnel-axis to use** (points to the Model field)
- Geological model to use** (points to the Model field)
- Graphical template to use** (points to the Template field)
- Title and remarks to be set in output** (points to the Titel, Untertitel, and Bemerkung fields)

At the bottom right of the form are two buttons: **ABBRECHEN** and **SPEICHERN**.

# User-access and –interface web-access

Inggeo-Tool - automated tunnel profile generation

	Datum der Erstellung	Modell	Template	Tunnelname	Bemerkung	Job-Status
	24.10.2022 23:02	J0_IngGeoMod2.1	Vollständiges Template	J0.pl		renderer-finished
	24.10.2022 22:14	ZND_IngGeoMod2.1	Vollständiges Template	ZND_03.pl		renderer-finished
	24.10.2022 22:13	ZND_IngGeoMod2.1	Vollständiges Template	ZND_03.pl		renderer-finished
	24.10.2022 21:59	ZND_IngGeoMod2.1	Vollständiges Template	ZND_03.pl		renderer-finished
	24.10.2022 19:23	ZND_IngGeoMod2.1	Vollständiges Template	ZND_03.pl		renderer-finished
	24.10.2022 19:06	E3 INGGeo Tool	Vollständiges Template	NL_02.pl		renderer-finished
	24.10.2022 18:59	J0_IngGeoMod2.1	Vollständiges Template	J0_rampe.pl		renderer-finished
	24.10.2022 18:25	ZND_IngGeoMod2.1	Vollständiges Template	ZND_02.pl		renderer-finished
	24.10.2022 15:03	J0_IngGeoMod2.1	Vollständiges Template	J0.pl		renderer-finished
	24.10.2022 13:21	J0_IngGeoMod2.1	Vollständiges Template	J0.pl		renderer-finished
	24.10.2022 13:19	ZND_IngGeoMod2.1	Vollständiges Template	ZND_02.pl		renderer-finished
	24.10.2022 13:18	E3 INGGeo Tool	Vollständiges Template	3DF_TUR_NL_Betriebsschach		renderer-finished
	24.10.2022 12:56	J0_IngGeoMod2.1	Vollständiges Template	J0.pl		renderer-finished
	24.10.2022 12:06	ZND_IngGeoMod2.1	Vollständiges Template	ZND.pl		renderer-finished

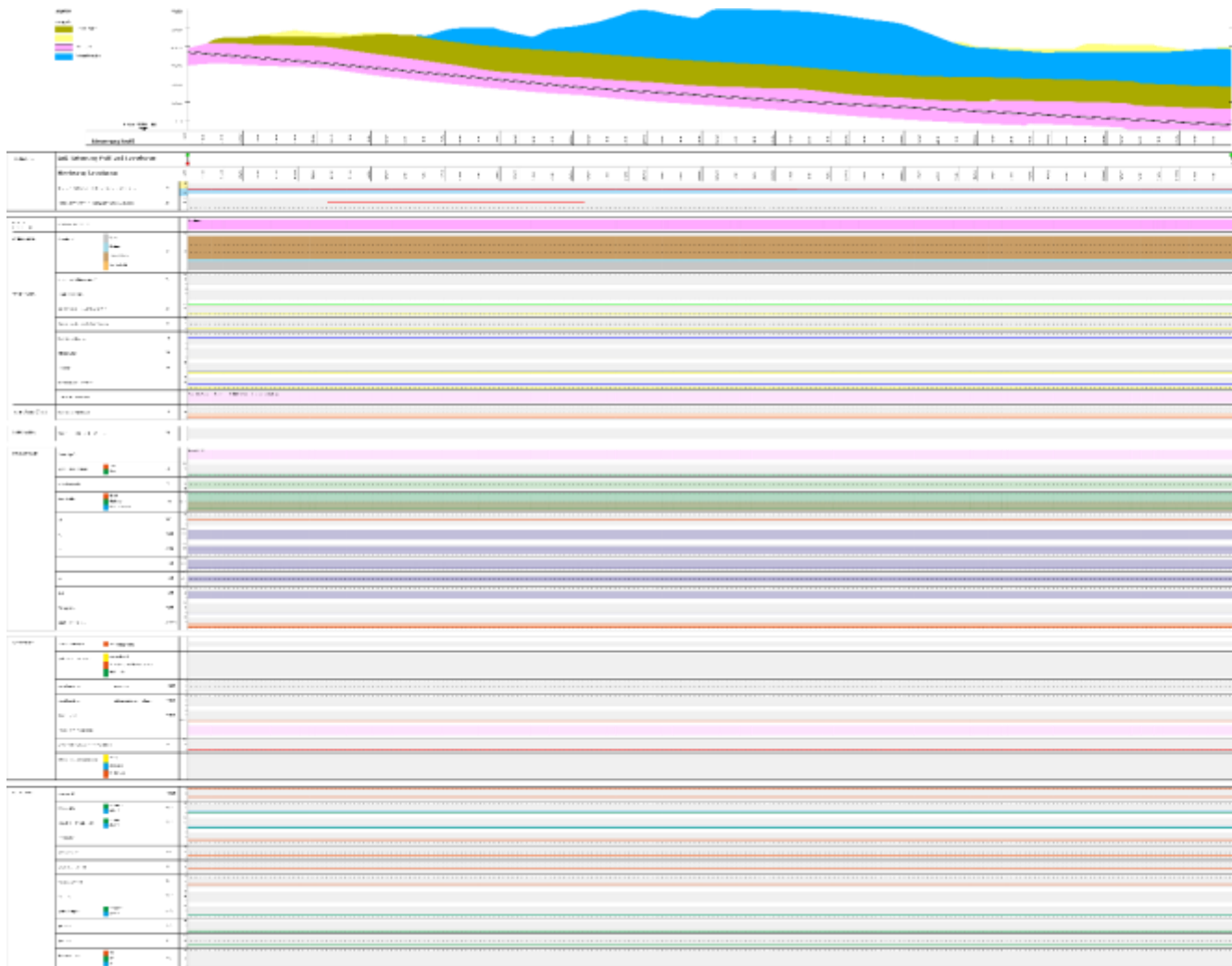
Download pdf/svg

Model used

Graphical template used

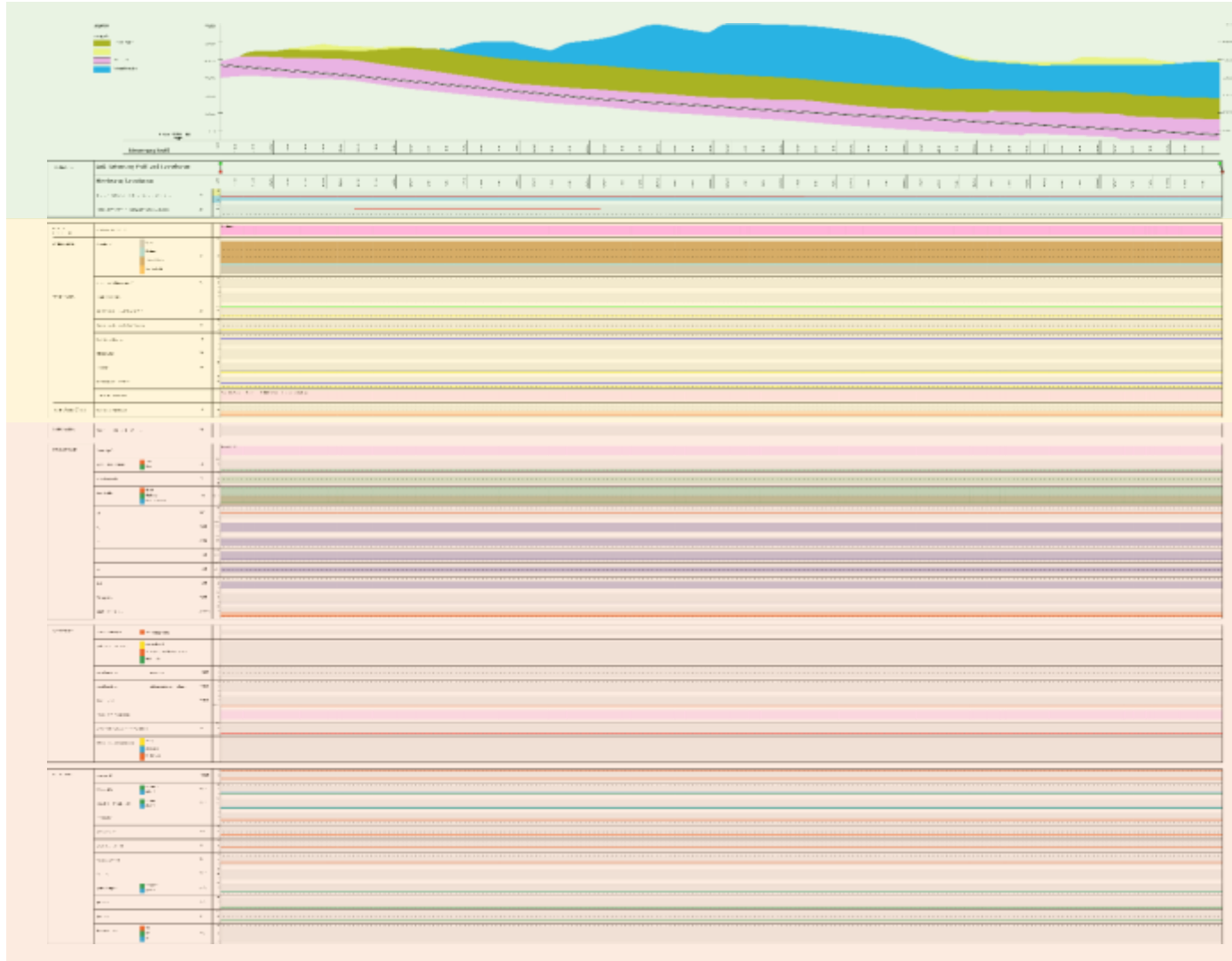
Tunnel-axis used

# Automatically created output (pdf, svg)



# Automatically created output (pdf, svg)

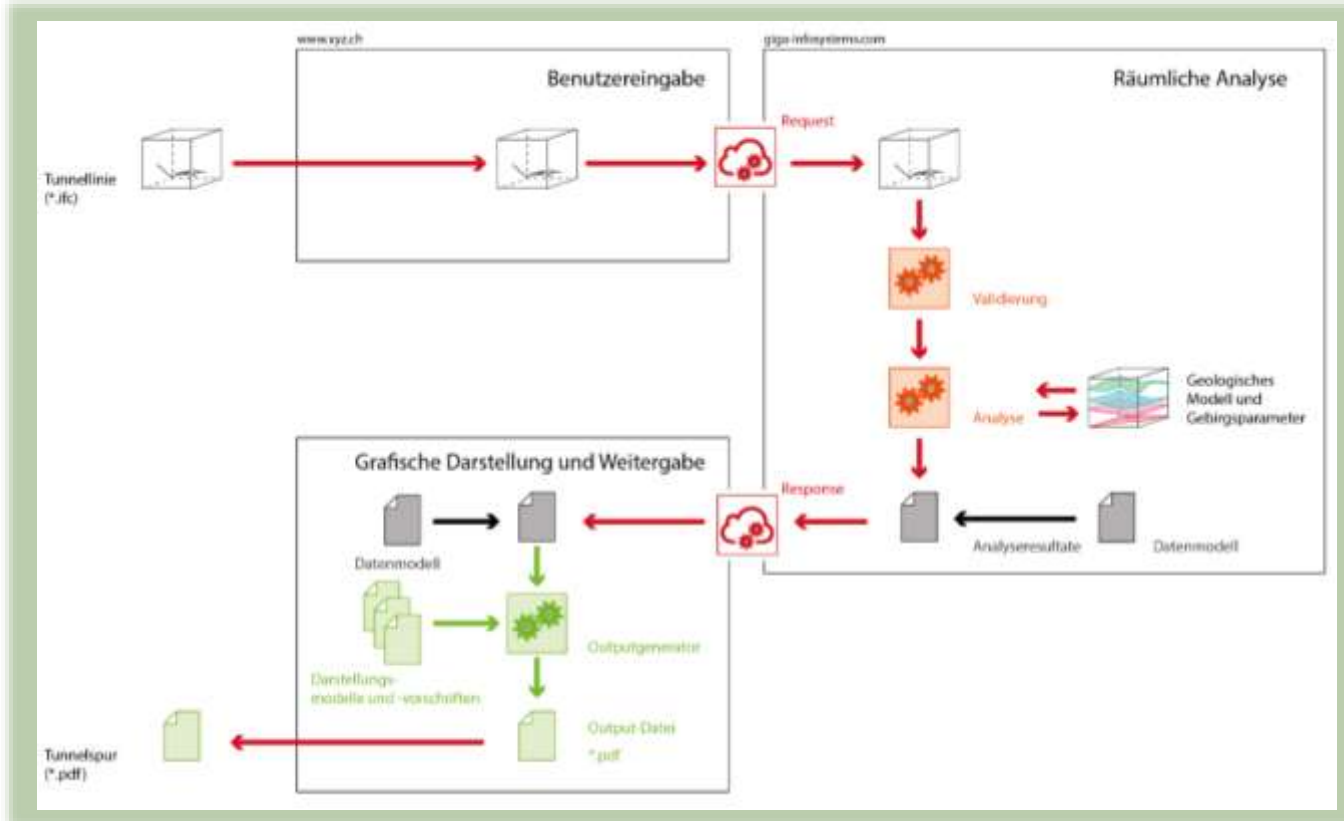
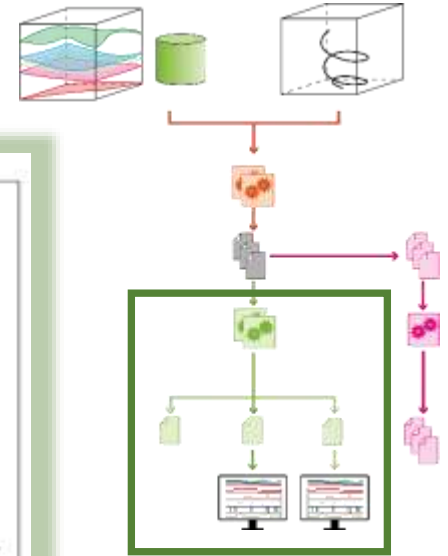
*Inggeo-Tool - automated tunnel profile generation*



**Further data** **Geology** **Profile**

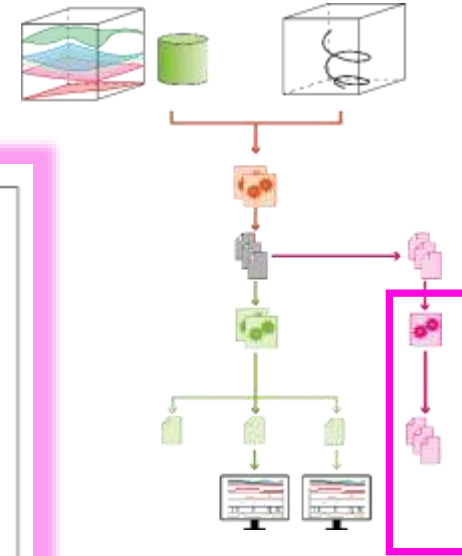
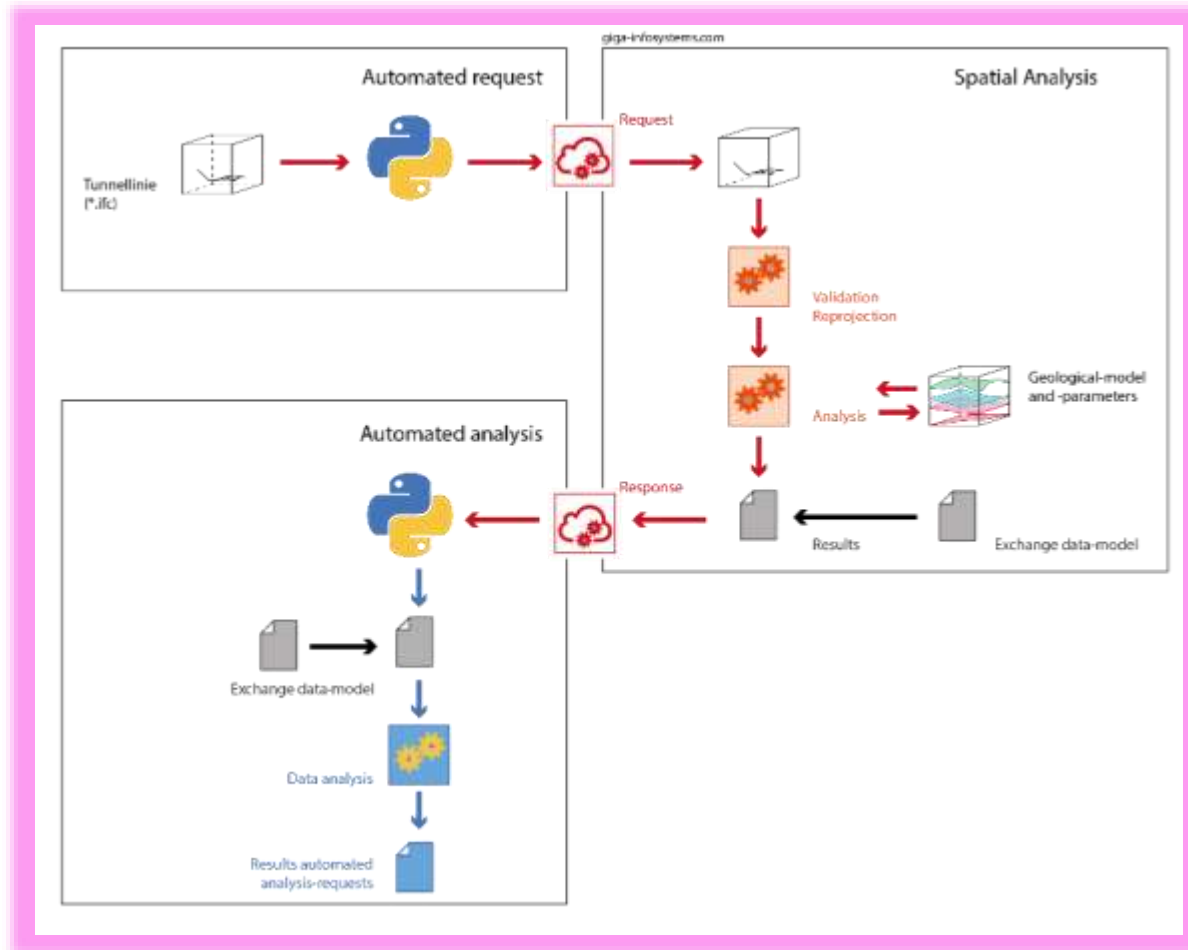
**Finally implemented workflow and access**

Ingeo-Tool - automated tunnel profile generation





**Finally implemented workflow and access**

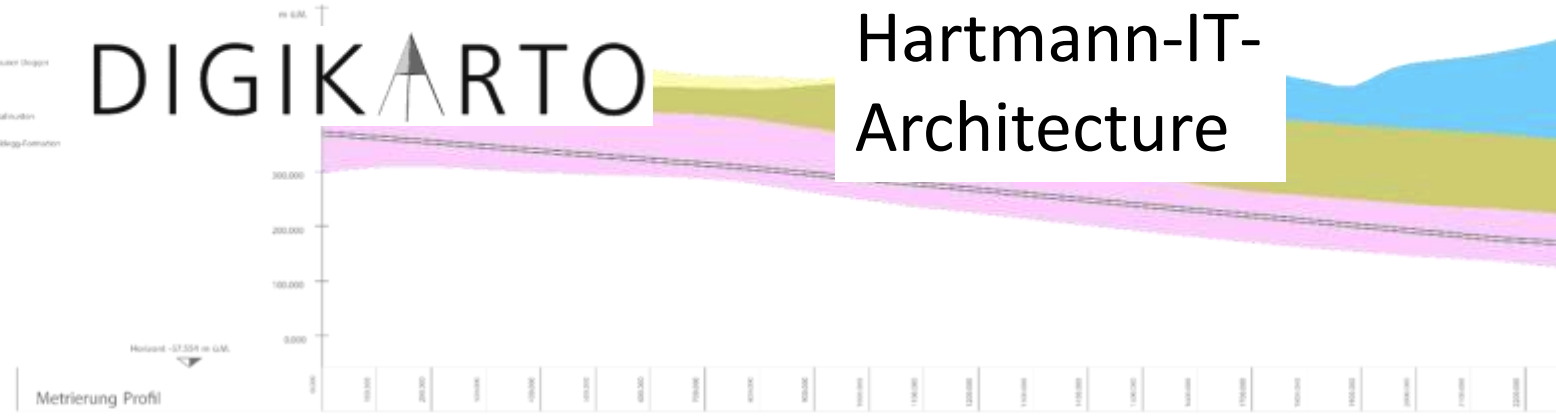


Legende

- Bräuner Drogen
- Opalinuston
- Wälgg-Formationen

# DIGIKARTO

## Hartmann-IT-Architecture



TUNNELACHSE		Link Metrierung Profil und Tunnelachse	
Metrierung Tunnelachse		[Profile View]	
Neigung Tunnelachse in Richtung aufsteigender Metrierung		E1	[Value]
Anmut Tunnelachse in Richtung aufsteigender Metrierung		E1	[Value]

GUTER/SCHLECHTER		Abweichung		
WÄLGG/OPALIN	Wälgggrub	DN	[Value]	
	Vollkommen Kohlenwasserstoff	DN	[Value]	
	BRÄUNER DROGEN	Ausfall Invertflächen	[Value]	[Value]
		Orientierung der Tunnelachsen Admit	E1	[Value]
Orientierung der Tunnelachsen Neigung		E1	[Value]	
Sanftschichtabstände		DN	[Value]	
Öffnungsweite		DN	[Value]	
Reinheitsgrad	DN	[Value]		

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