DISCOVERING, SHARING 3D MODELS IN A FAIR WAY

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BRGM

GSEU Workshop: Towards a 3D Geomodel of Europe | Session 3: Transboundary and Large-Scale Models - 12-13/10/2026

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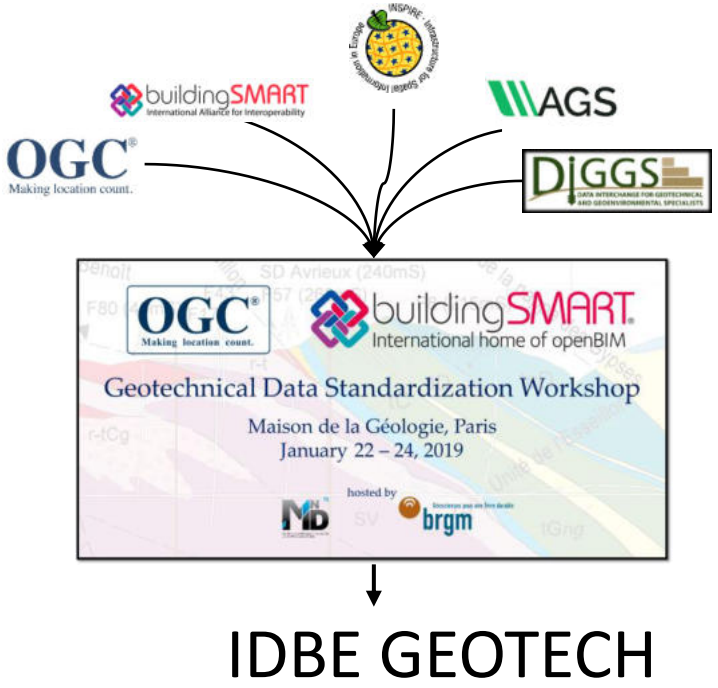
No AI was used to generate that presentation

STARTING POINT

In 2016 (EU EPOS Geological Information and Modeling - Thematic Core Services)

- Lack of ««metadata »» about 3D models => before exchanging them, 1st let's know
  - where they are and have a simple description of them
  - ⇒ To assess whether they are fit for purpose
- /!\

  - «« metadata »» term is a rabbit hole
  - Exchanging 3D models is not about sharing viewers (conclusion from OGC / buildingSMART workshop)

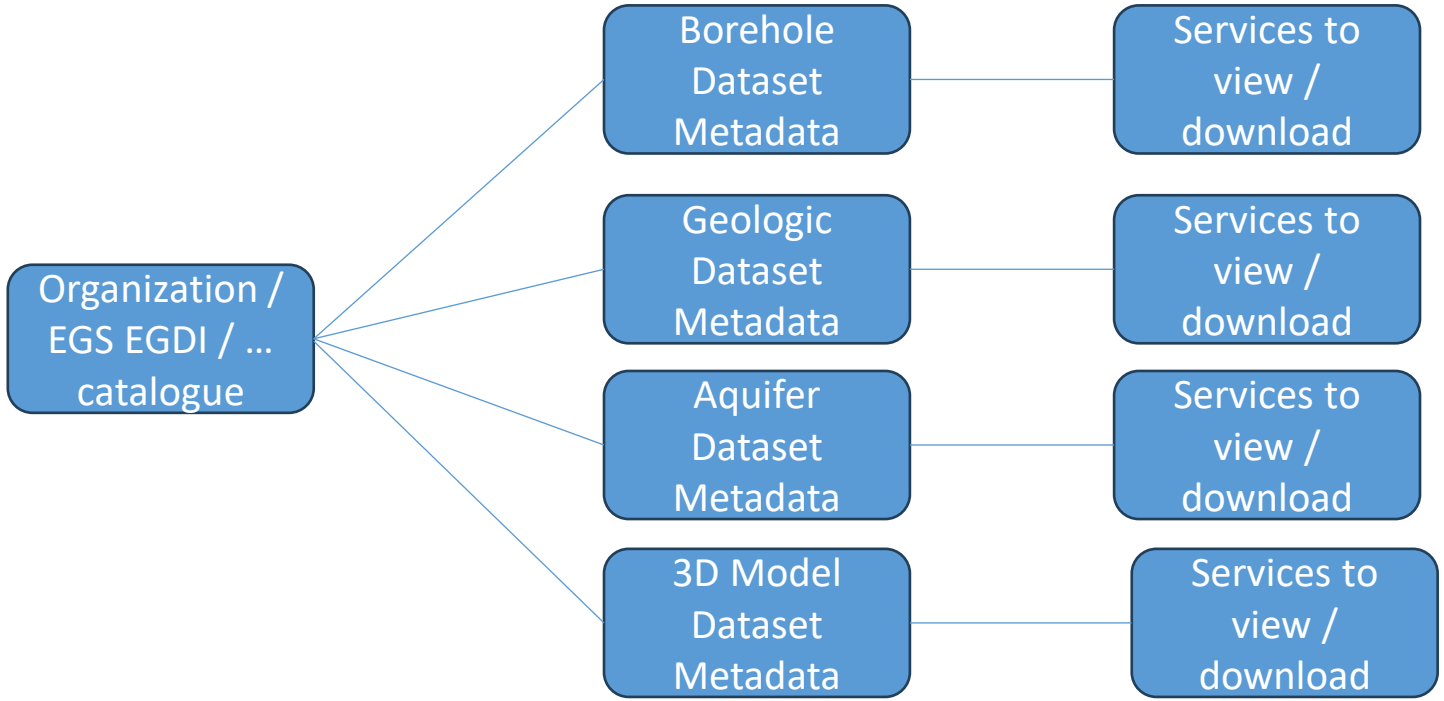




STARTING POINT

3D Models metadata….

- «« Metadata »»
  - Overloaded term => rabbit hole
  - Attempts to describe 3D Models using the same ISO standards we have for cataloguing datasets (ex : EGDI catalogue, CUPIDON at BRGM etc…)
    - Too many specific properties required => no point in Shoehorning them into a not relevant standard
  - ⇒ Need to have a real data model describing 3D Models
  - ⇒ Implementation target



Why doing differently ?

STARTING POINT

From 3D Models metadata … to a data structure describing them

- List of properties (18/11/2016 ! – ten years ago)

	Information element name		Cardinal	Information element description	Initial questions BRGM Olivier Morel	Feedback BRGM (	Feedback BRGM (Christelle Loiselet) - cardinalities	Feedback BRGM (F. Robida)	Feedback ISPRA (C.D'Ambrogi)	Feedback BGS (Holger Kessler)	Feedback GFZ (Rainer Hainer) ISO19139 file	Feedback GFZ (Rainer Hainer) SensorML file	Feedback GEUS
	Title		1	The title of the model			Should be mandatory						
	Keyword		1..Many	List of keywords from thesaurs to be defined ?			Should be mandatory	Yes (including theme)					
	Publication date time		1	Date of the release of the model			Should be mandatory		I think that we have to consider also the creation date that may differ from				

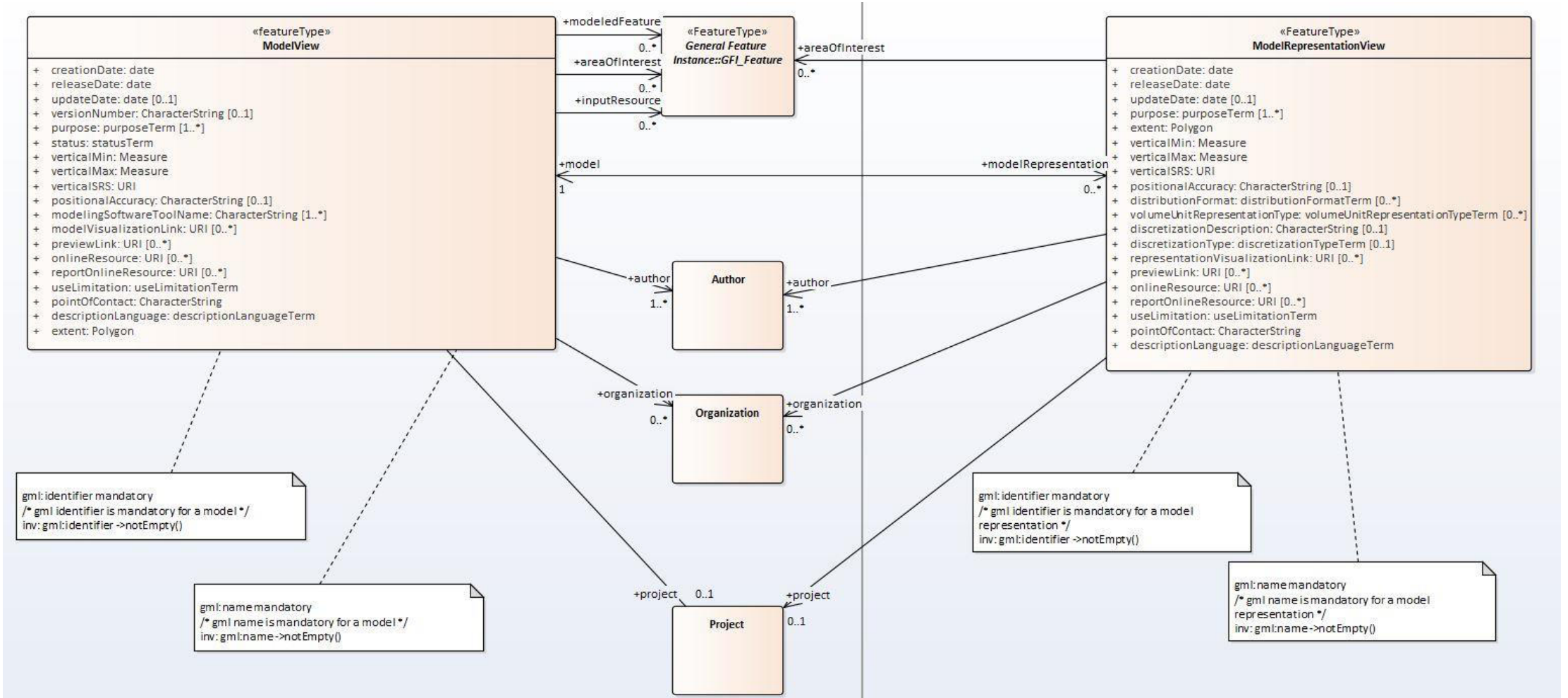
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General information	Title		1	The title of the model			Should be mandatory						
	Keyword		1..Many	List of keywords from thesaurs to be defined ?			Should be mandatory	Yes (including theme)					
	Publication date time		1	Date of the release of the model			Should be mandatory		I think that we have to consider also the creation date that may differ from				
	Publication release number		1	Label for versioning the model (in case of several release of the same object study)		??? No versioning at the moment because if we add a data it is a				not clear what that is			
	Input model used		1	Parent model reference, the model derives from		not here --> of model description section		Probably not here		not totally sure that what is			Why not 1..Many? What if parent moddel consist of more than one model?
	Model family		1	Reference to a model family	It allows to gather in falmily all versions / alternate models in a group to allow research. To discuss the potential benefit ?	???		What does it mean ?	This info is particularly useful and the benefit for users can be relevant				Why is this needed when there is a Publication release number? Wouldn't this metadata form a serie of different versions / alternate models history?
	Authors		1..Many	List of the authors having produced the model			Should be mandatory						
		Name	1	Name of the organization									
		Organization	1	Author's organization									
	Contact		1..Many	List of contacts about the model	Detail the contact structure		Should be mandatory						
		Name	1	Name of the contact									
		Email	1	Email for the contact									
	DOI		1	The DOI of the model		DOI or PID ??? We							
	Client Organization		1..Many	Organization financing									
	Project		1..Many	Projects financing for been made									
		Project Name	1	Name of the project									
		Project URL	1..Many	Links to project web p									
	Location												
		Shape perimeter	1	Polygon for the flat 2D perimeter									

Model location	Location								Must be mandatory					If we should follow INSPIRE, it would be recomended to use the term Mapping Frame which indicates the surface on which the MappedFeature is projected.
		Shape perimeter	1	Polygon for the flat 2D projected hull / perimeter	Or we do latitude / longitude, min / max ? Probably simple	we need lat/long min max and if possible xmin, xmax, ymin	Must be mandatory		lat/lon is simple but the perimeter is more informative, especially for		yes	yes	
		SRS	1	SRS in which the polygon's coordiantes are expressed						what is this ?			Why not the SRS in which the models coordinates are expressed? Also, what about metadata for the models vertical SRS?
		Zmin	1	Minimum Depth of the model (in meters)			Must be mandatory						
		Zmax	1	Maximum depth of the model (in meters)			Must be mandatory			in OD, or depth below			
		Precision	1	???		not here of model description section		Do we mean scale (analogy with maps)?	??	this is tricky, as precision can be expressed in many ways and is often not possibly in an explicit			
	Toponym Location		1..Many					Agree with GFZ. Toponyms could be added to keywords ?				is this part of metadata? Or should this be provided via gazetteers? Gazetteer that for example provides a list of geographic names and descriptions for the given coordinates	
		Country	1									Remove this	
		Region	1..Many									Remove this	
		City	1..Many									Remove this	

STARTING POINT

From 3D Models metadata … to a data structure describing them

- A real data model
  - ISO 191xx compliant (OGC, INSPIRE, …)
  - vCard style like GeoSciML, EarthResourceML Lite



STARTING POINT

From 3D Models metadata … to a data structure describing them

- With a specification following OGC specification

gml:identifier

External stable identifier of the model. The ModelView/gml:identifier property shall contain a unique identifier for the Model and should be formatted as an absolute URI conformant to RFC 3986.

/req/epos-lite/modelview-identifier-card	A Model SHALL have an identifier.
/rec/epos-lite/modelview-identifier	The identifier SHOULD resolve to an EPOS Lite ModelView representation of a Model.

gml:name

The title of the model. The property ModelView/gml:name is mandatory with a max cardinality of 1.

/req/epos-lite/modelview-name-card	A Model SHALL have exactly 1 name.

gml:description

Motivations of the modeling process in the initiating project. Description of what we expect to understand with the model.

The property ModelView/gml:description is optional with a max cardinality of 1.

creationDate

Creation date of the model.

The property creationDate:Primitive::Date is mandatory with a max cardinality of 1.

/req/epos-lite/modelview-creationDate-card	A Model SHALL have exactly 1 creationDate.

releaseDate

Date of release of the model.

EPOS Lite vocabularies

Geology is a descriptive science and uses vocabularies extensively.

Table 1 lists the vocabularies to be used in ModelView within the context of EPOS. Each of them is implemented using externally managed vocabularies as specified in clause 7.2.4

Vocabulary	Description
purposeTerm	Vocabulary containing terms describing the purpose of the Model and ModelRepresentation. A reference registry has been set up by EPOS TCS GIM https://data.geoscience.earth/ncl/ModelPurpose
statusTerm	Vocabulary containing terms describing the current status of the Model. A reference registry has been set up by EPOS TCS GIM https://data.geoscience.earth/ncl/ModelStatus
useLimitationTerm	Vocabulary containing terms describing the use limitation. A reference registry has been set up by EPOS TCS GIM https://data.geoscience.earth/ncl/UseLimitation
descriptionLanguageTerm	Vocabulary of terms describing the language used in the description of the Model and ModelRepresentation. The reference list identified by EPOS TCS GIM is the one based on [ISO 639-2] in alignement with practices from INSPIRE (see : INSPIRE Technical Guidance for the implementation of INSPIRE dataset and service metadata based on ISO/TS 19139:2007 - V 2.0.1 - 2017 - https://inspire.ec.europa.eu/id/document/tg/metadata-iso19139) So far there is no resolvable URI available for language codes provided by ISO. An attempt is available here (https://def.isotc211.org/ontologies/00639/VersionUndefined/ISO00639LanguageCodes.rdf) but its content does not resolve (ex : http://def.isotc211.org/iso00639/-2/ISO00639LanguageCodes/code/LanguageCode/English)

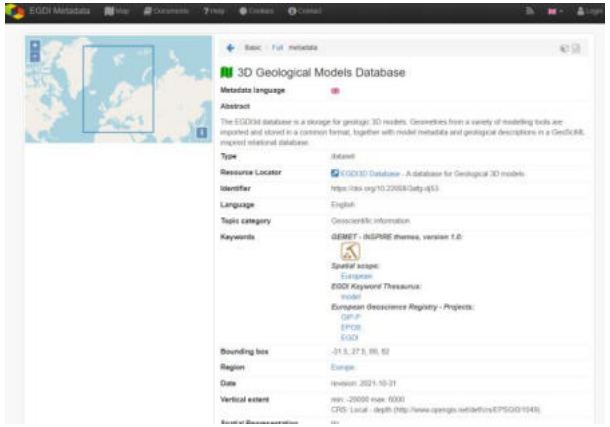
Each element (Class, property, association) has a clear definition

Each property based on a codeList has dedicated entry in Eurogeosurvey's European Geoscience Registry

STATUS UPDATE IN 2026

Seems to work ☺

EGDI Metadata



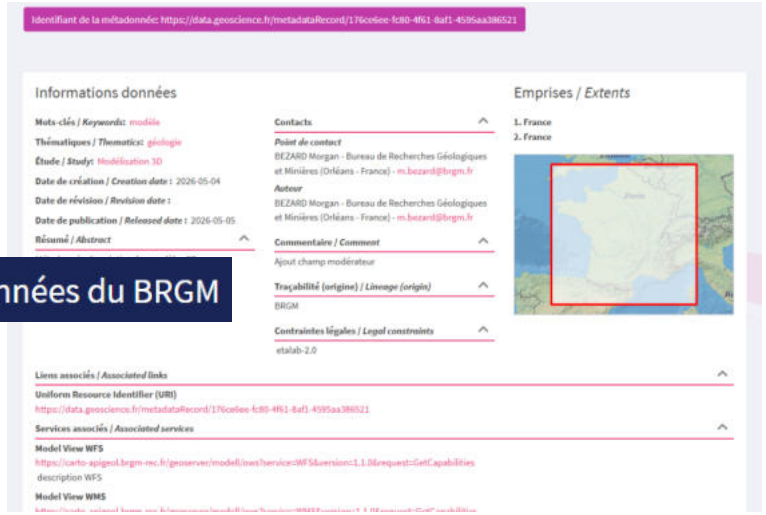


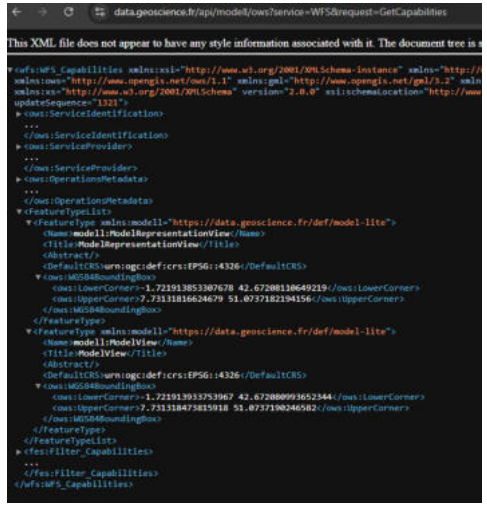
Organization / EGS EGDI / … catalogue

3D Model Dataset Metadata

Services to view / download vCard

Catalogue - entrepôt de données du BRGM

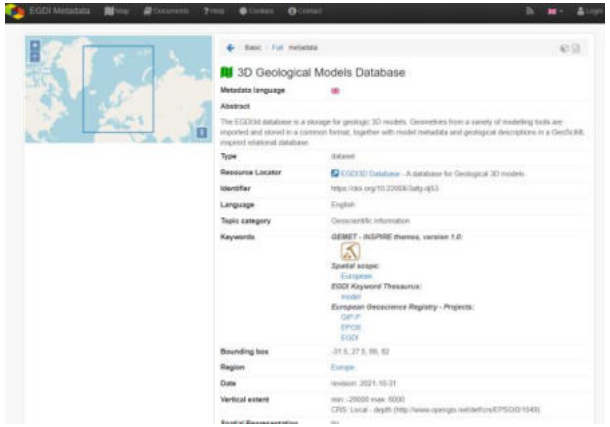




STATUS UPDATE IN 2026

Seems to work ☺

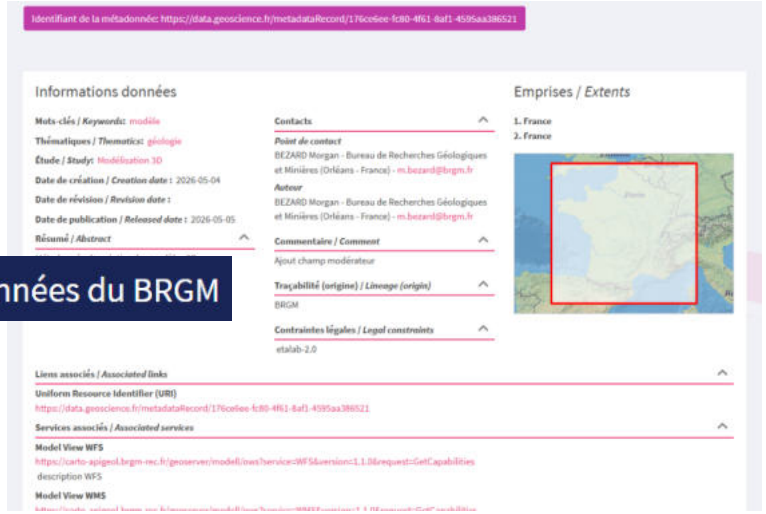
EGDI Metadata

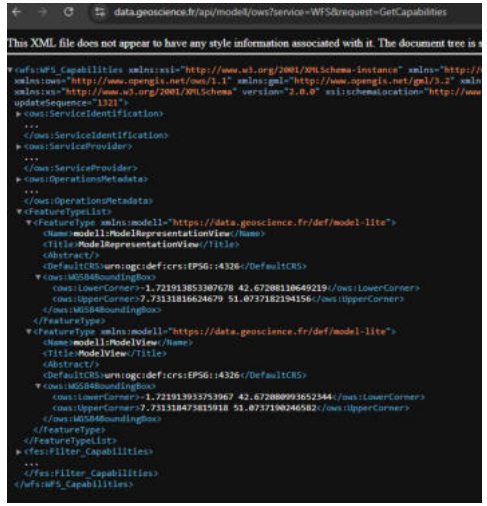




Organization / EGS EGDI / … catalogue → 3D Model Dataset Metadata → Services to view / download vCard ⇢ Clients

Catalogue - entrepôt de données du BRGM

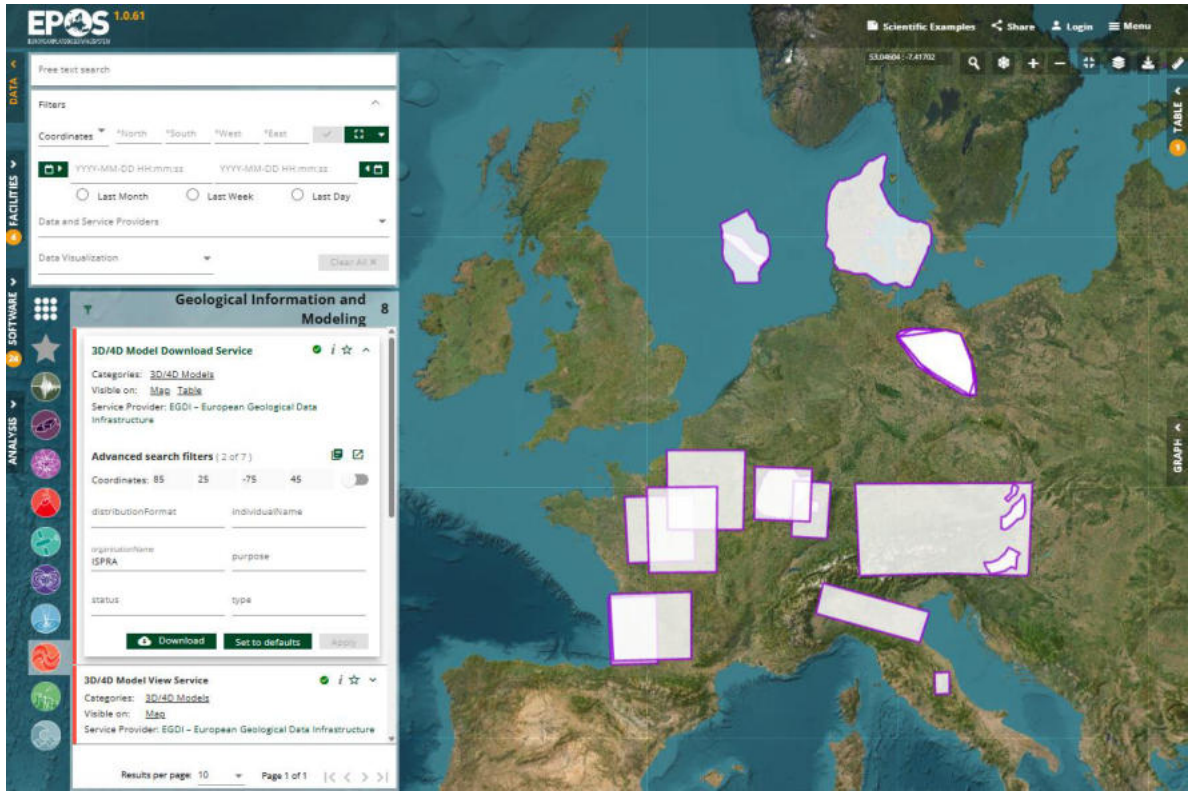


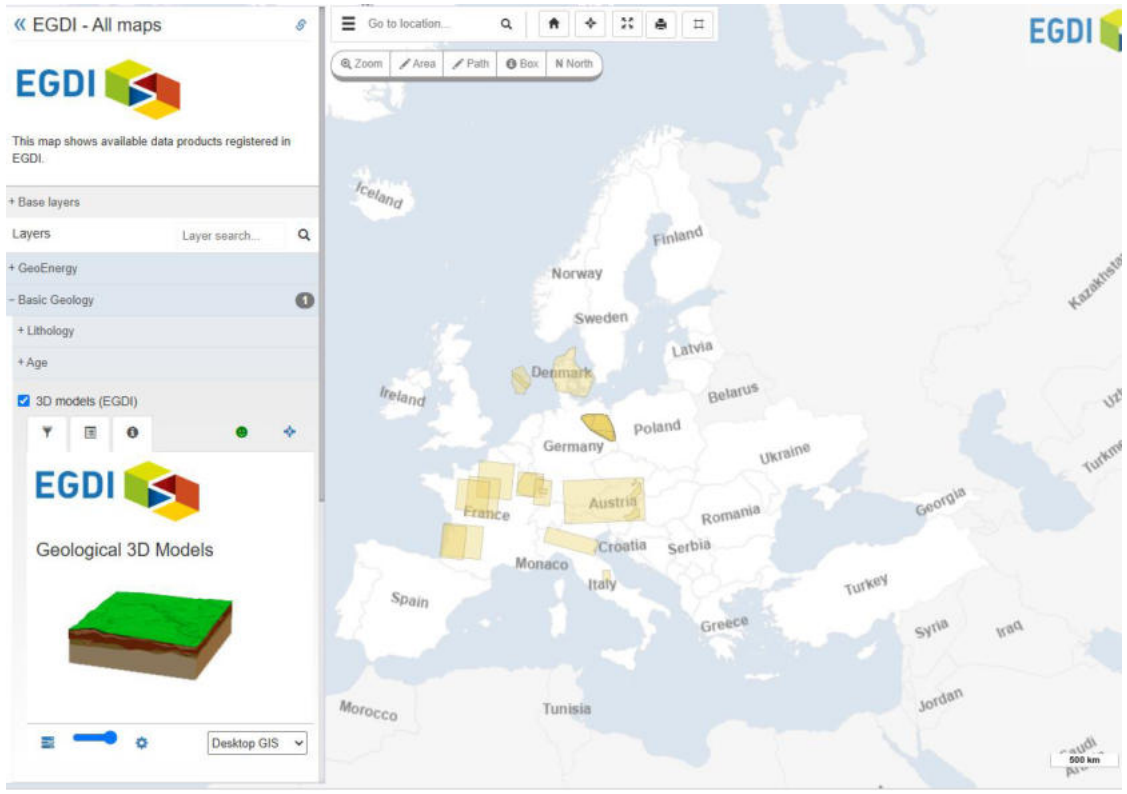


STATUS UPDATE IN 2026

Various clients reuse

- EGDI 3D Model dataset (sum of EU Geological Surveys) in

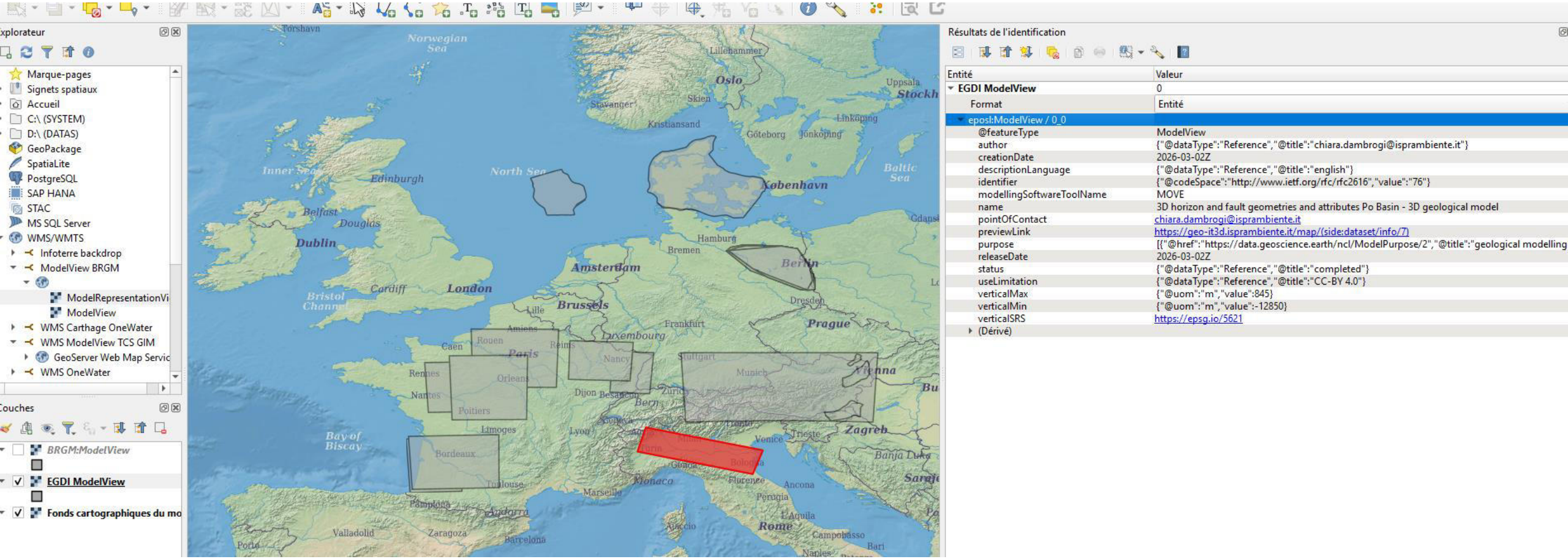




STATUS UPDATE IN 2026

Various clients reuse

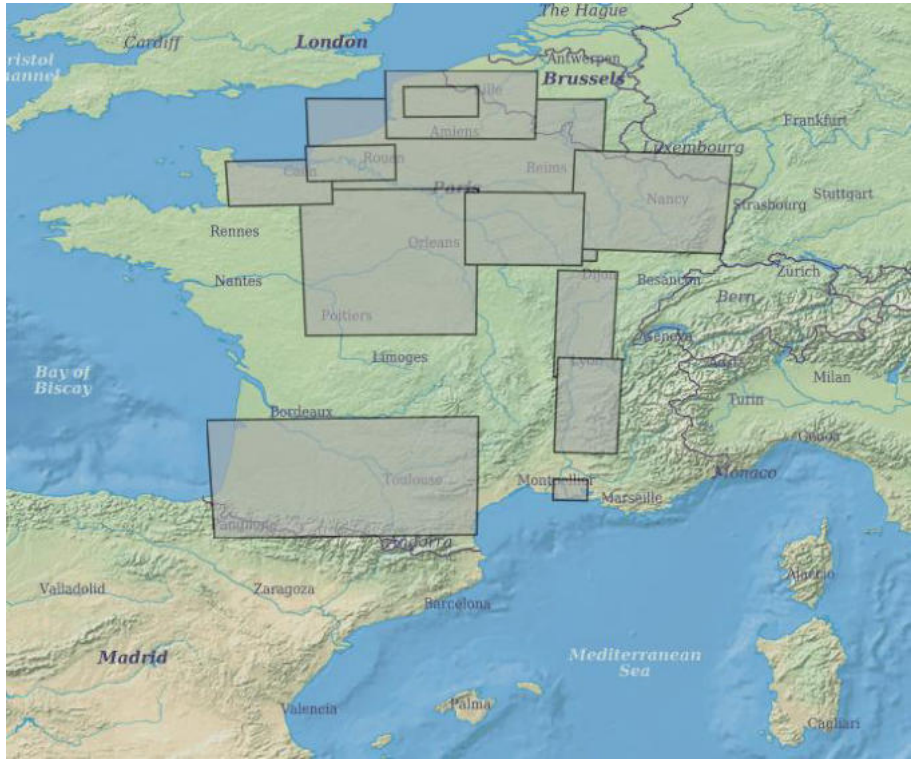
- EGDI 3D Model dataset (sum of EU Geological Surveys) in QGIS



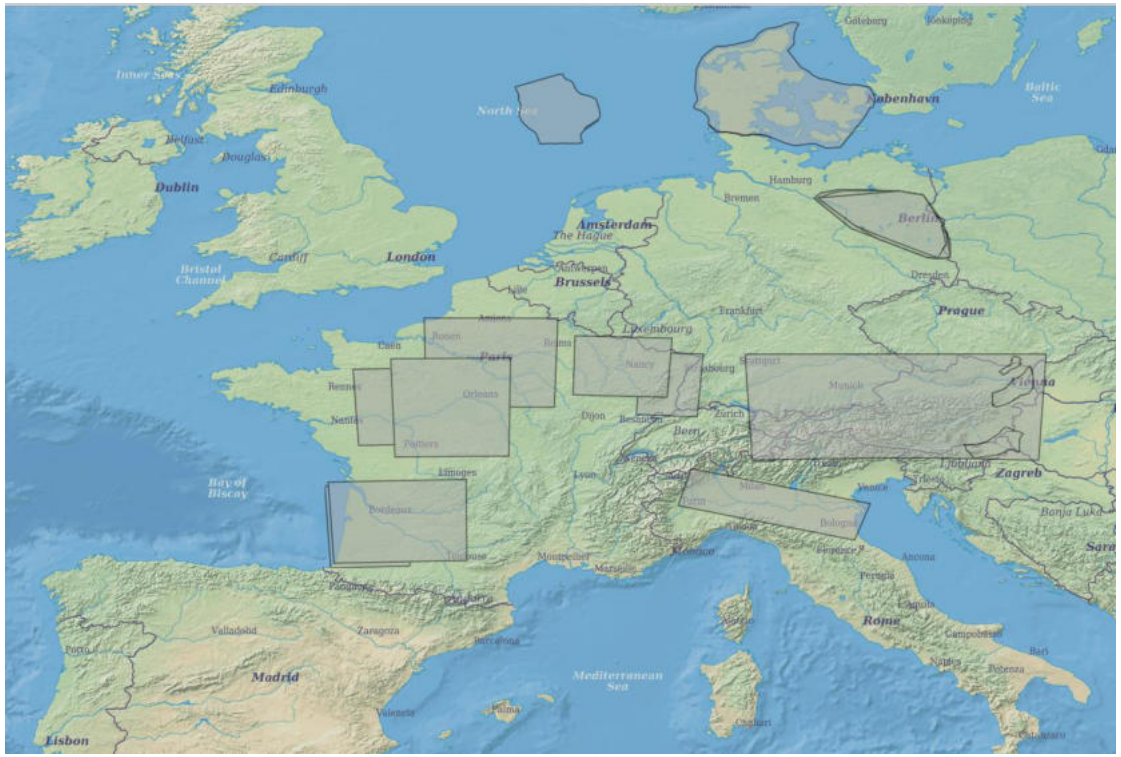
OPEN QUESTIONS

Dynamic transfert from organizations to EU level

- Interoperability between systems



?



BRGM is building its 3D Models inventory
Based on that same specification (work in progress)

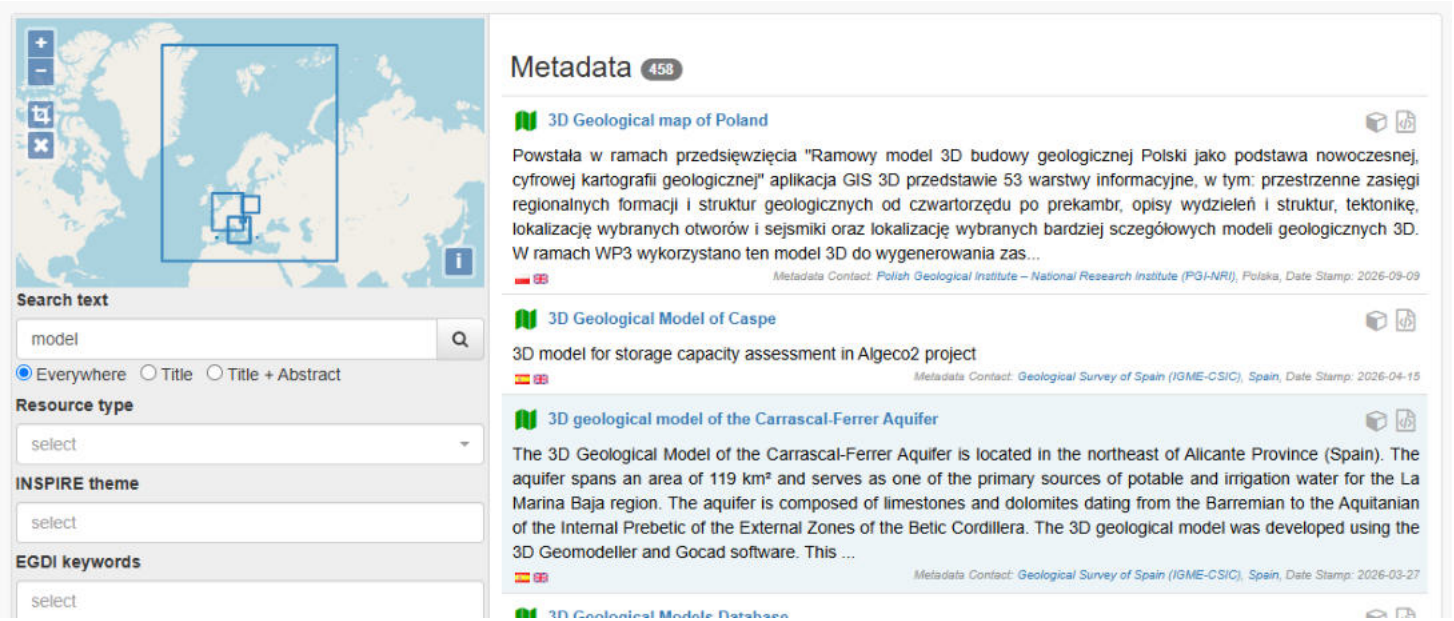
Less on the EU EGDI layer => need to ingest data dynamically from BRGM services

OPEN QUESTIONS

2 ways to carry out EU 3D Model inventory within EU Geol Surveys?

- In EGDI catalogue ?

  One using standards for geospatial catalogues ? (ISO 19115)





That's a topic discussed a while ago

EPOS Integrating European Research Infrastructures for solid Earth Scien

WP15
Geological Information and Modelling

22 - 23/02/2017
Metadata for 3D geological models Technical Workshop
EPOS : 3D/4D model approach

Sylvain Grellet, s.grellet@brgm.fr
Rainer Häner, rainer.haener@gfz-potsdam.de

NEXT STEPS

Overview

- Enriching ModelView and ModelRepresentationView with more attributes
  - BRGM working on it. Others ?
  - Push it to the OGC Geoscience Domain Working Group to have formal international specification

- Test the full roundtrips
  - Model -> Representation -> 3D Viewer
  - Share models files
  - Share modelling environment
    - Input data : in a FAIR way
    - Modelling tool / Algorithm

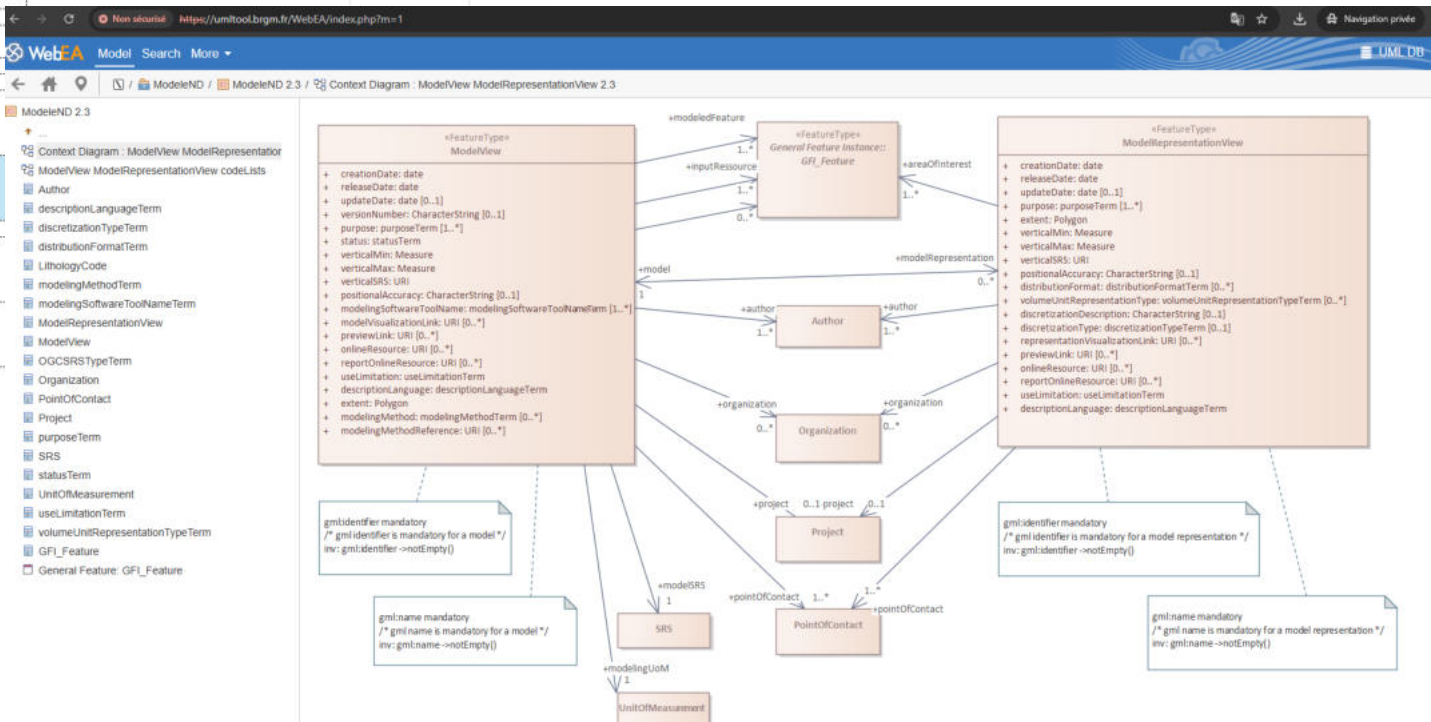
NEXT STEPS

Towards a stabilized and formal specification

- Enriching ModelView and ModelRepresentationView with more attributes
  - BRGM work. Others ?

property	cardinalit	description	type	To be filled by	Comment
gml:identifier	1	External stable identifier of the model.		generated	
gml:name	1	The title of the model		modeller	
gml:description	0..1	Motivations of the modeling process in the initiating project		modeller	
creationDate	1	Creation date of the model		modeller	
releaseDate	1	Date of release of the model		data manager	
updateDate	0..1	Date of update of the model		modeller	
versionNumber	0..1	Version tag of the model regarding its descriptive informations		modeller	
purpose	1..*	Purpose for which the model was done. **purposeTerm** https://data.geoscience.fr/ncl/ModPur		modeller	Purpose terms to be extended from https://data.geoscience.fr/ncl/ModPur ?
status	1	Status of the model **statusTerm** https://data.geoscience.earth/ncl/ModelStatus (name+description)		modeller	
author	1..*	Author of the model		modeller	
organization	0..*	Organization involved in producing the model		modeller	
project	0..*	Financing project for which the model has been made		modeller	
extent	1	Polygon for the flat 2D projected hull / perimeter along with its SpatialReferenceSystem (SRS)		modeller	
verticalMin	1	Minimum value for the vertical axis according to the vertical SRS		modeller	
verticalMax	1	Maximum value for the vertical axis according to the vertical SRS		modeller	
verticalSRS	1	URI to the description of a spatial reference system of the verticalMin and verticalMax values. The SRS will be a one dimensional vertical SRS AnyURI		modeller	EPSG:5720 par défaut ?
verticalUoM	1	Vertical Unit of Measure used for the modelling, e.g. m or km. **UnitOfMeasureTerm** https://data.geoscience.fr/ncl/uom	ReferenceType	modeller	
positionalAccuracy	0..1	Accuracy of the positioning of the model with regard its geometry		modeller	
areaOfInterest	0..*	Reference to entries in a geographical gazeetteer (ex : Geonames) describing the area concerned by the model (France, Paris basin, ...). ReferenceType		modeller	Geonames terms (e.g. grandes région administratives, départements)
modeledFeature	1..*	Feature which is the target of the modeling act (i.e = features which geometry or properties we try to compute). ReferenceType	ReferenceType	modeller	List of modelled geological objects, e.g. formations and faults, Free text field, **structured as GeoSciML GeologicFeatures**
inputResource	1..*	Resource taken as an input of the modeling act. Those can be structured or unstructured data such as borehole logs, geological architecture, model representation, field observations, topographic surface, documentation, ...	ReferenceType	modeller	e.g. modelling from boreholes, interpreted geological cross-sections Free text field,

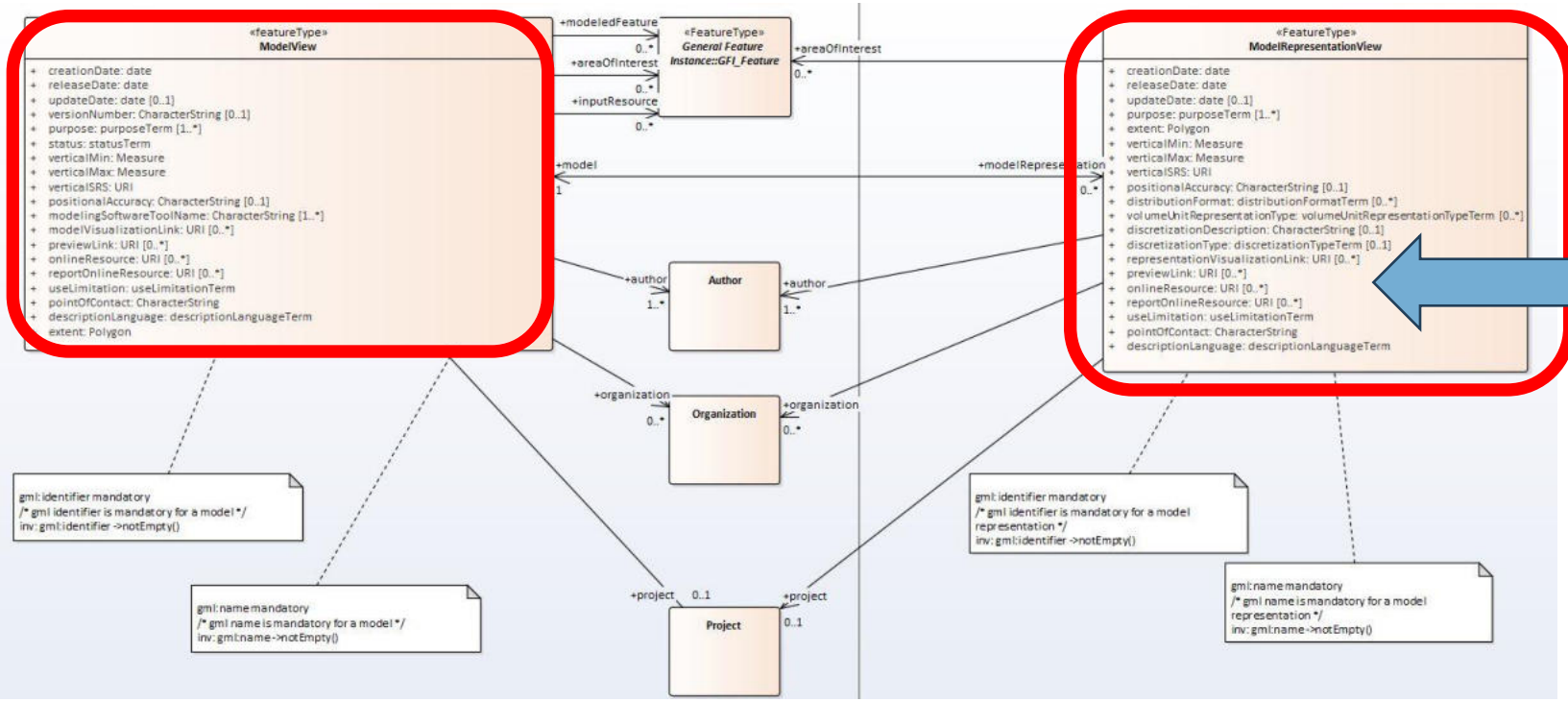
Color code
evolution of ModelView
new element



NEXT STEPS

Overview

- Test the full roundtrips
  - Model -> Representation -> 3D Viewer

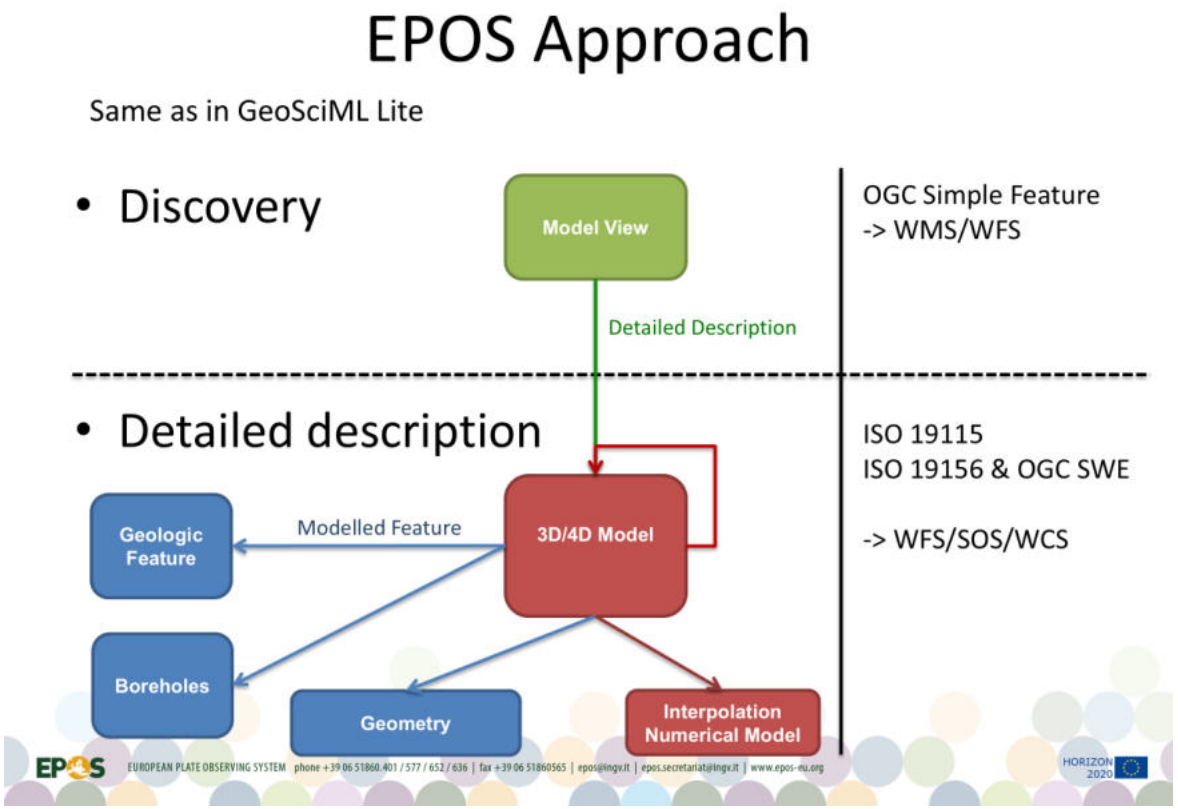




NEXT STEPS

Overview

- Test the full roundtrips
  - Share models files / modelling environment : Input data : in a FAIR way / Modelling tool / Algorithm

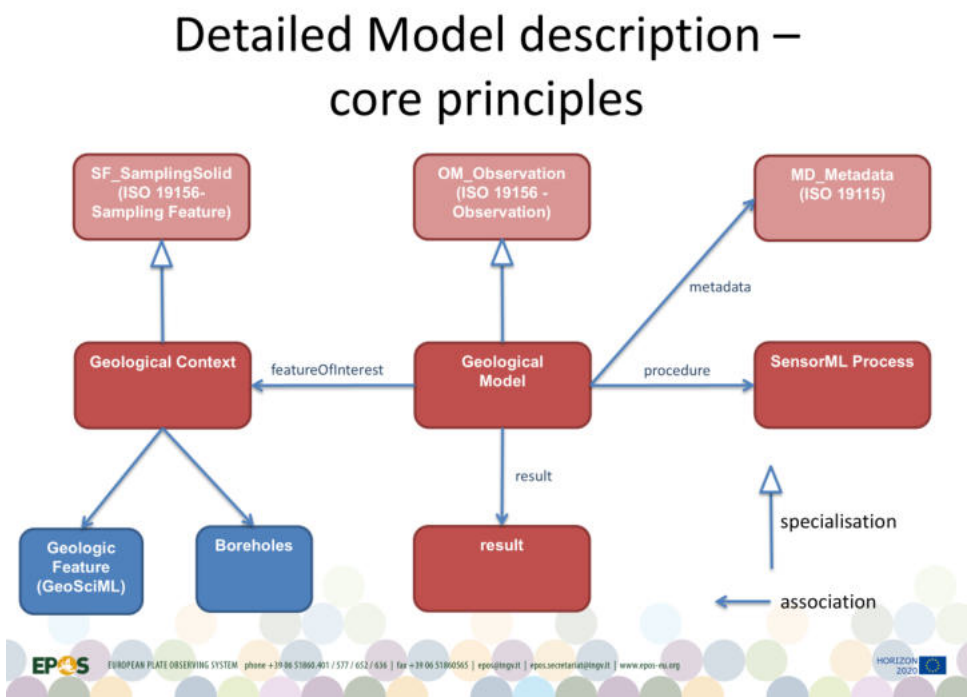


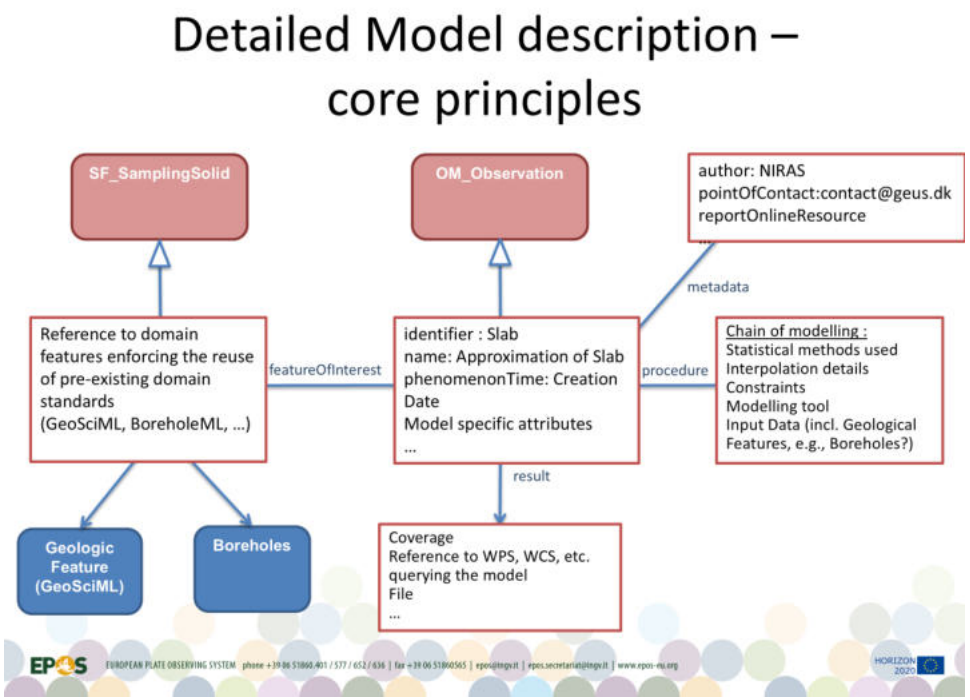
The approach foreseen in 2017 planned a comprehensive data model to describe in details a 3D Model

NEXT STEPS

Overview

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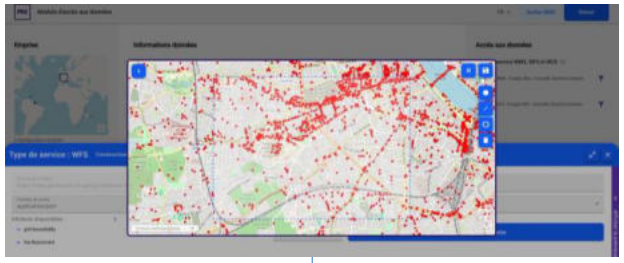


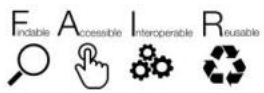
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NEXT STEPS

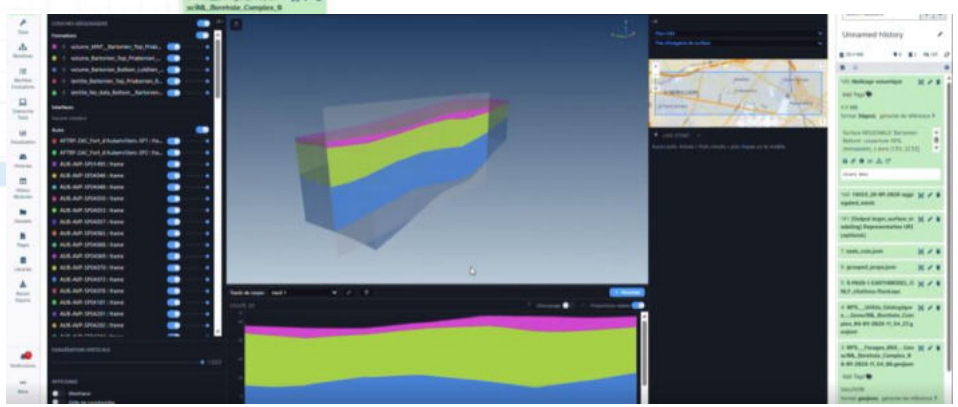
Overview

- Test the full roundtrips
  - Share models files / modelling environment : Input data : in a FAIR way / Modelling tool / Algorithm









The 2026 question

What if exchanging 3D models could be covered by exchanging workflows in a Virtual Research Environment like other communities (bio informatics, ecology, NASA-ESA tests un OGC Open Science Persistent Demonstrator …).
Workflow with their input data, cleaning, modelling algorithms, iterations and output data
Example on ForGeo BRGM work on an elementary workflow in Galaxy



PROJECTS CONTEXT

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

Géosciences pour une Terre durable
brgm

THANK YOU

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