EGIP Pilot – Data model

BRGM

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Version	*Date*	*Author*	*Description*	*Distribution*
0.1	16/05/2014	S.Grellet, P. Calcagno	First version of the document using data model 1.2	A.Manzella, E.Trumpy, M.Alcanie
0.2	02/06/2014	S.Grellet, P. Calcagno	Update using data model 1.3 following 27/05/2014 teleconference (S.Grellet / E.Trumpy)	A.Manzella, E.Trumpy, M.Alcanie
1.0	11/06/2014	S.Grellet, P. Calcagno	Document promoted to V1.0 for broader dissemination. Data model structure remains unchanged (1.3)	All EGIP Partners

Content

1 Introduction

This document describes how information should be structured within the EGIP Pilot (Stage 0).

For EGIP pilot implementation it defines into more technical details elements identified in Appendix 2 of the "Feasibility Study for a European Geothermal Information Platform" (WP3 D3.2) (see Appendix 2 "Technical Document For EGIP Implementation). Appendix 2 already identified possible candidate elements for a fully Inspire compliant EGIP portal.

Two information types have been identified by the feasibility study:
- Structured information : information corresponding to datasets,
- Unstructured information : related to documents.

Both aspects are addressed by this document.

2 Reading the document

The document should be read as follows:
- Part 3 "UML Data Model" tackles structured information
- Part 4 "Unstructured information - documents" tackles un-structured information

Part 3 "UML Data Model" contains:
- First a narrative description of the data model defined. Class diagrams are vectorised. They support high zoom levels on the document. Some will be easier to read above 100% on a computer screen.
- A feature catalogue with the definition of the classes, attributes, associations
- The content of the codeList to be used in the pilot

3 UML Data Model

3.1 Methodology

This EGIP pilot aims at proving interoperability in a distributed geothermal information system is feasible amongst the partners. In that respect, full Inspire compliancy from a semantic interoperability point of view is not achieved as the classes described below are not directly related to the Inspire defined ones.

However, the technical elements are aligned with Inspire technical interoperability principles as the service stack to be deployed involves CSW, WMS and WFS.

In order to ease the deployment of the webservices at partner's level, the conceptual model has been designed applying an OGC SimpleFeature (SF-0)[1] view on the classes. Thus non-spatial and spatial property types used are voluntarily restricted.

3.2 Description

A generic *GeothermalData* class has been defined to mutualise all the attributes shared by *TemperatureUnit, TemperatureLine, HeatFlowLine, HeatFlowUnit* classes.
This class is abstract thus is does not have to be implemented in the webservices. Its 4 specialisations (*TemperatureUnit, TemperatureLine, HeatFlowLine, HeatFlowUnit* classes) are to be used and inherit its attributes.

[1] *http://portal.opengeospatial.org/files/?artifact_id=42729*

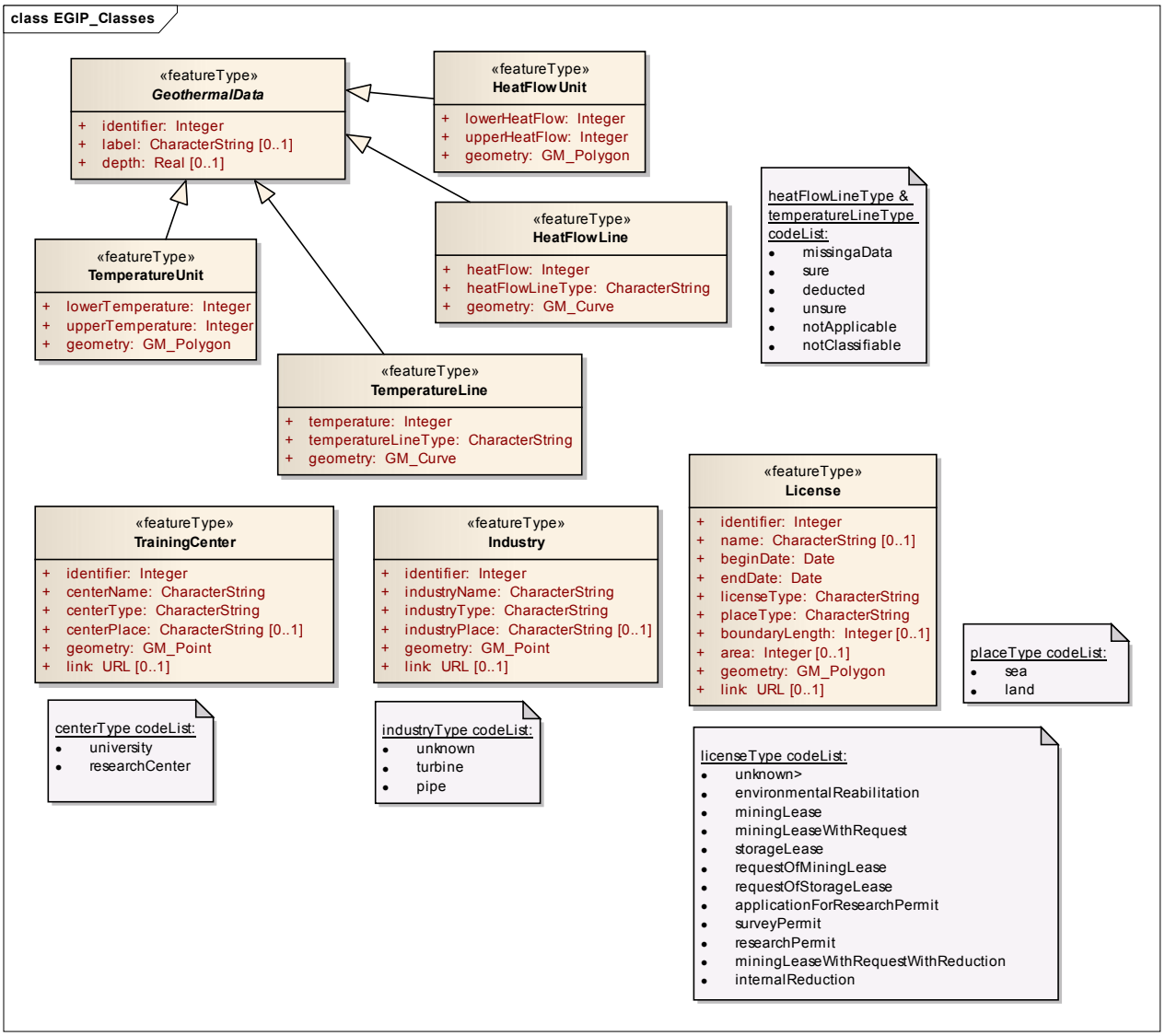

Figure 1 – class diagram: Main EGIP Spatial Classes

Many documents are defining a context for geothermal exploitation in a country. As the administrative levels and the geometry of that “geothermal exploitation context” could differ from one country to another a geothermal management area class has been defined.

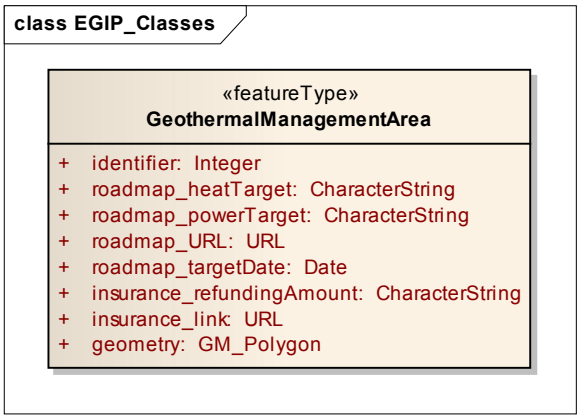

Figure 2 - class diagram: EGIP geothermal management area

3.3 Feature catalogue

Type	Package	Stereotypes
GeothermalData	EGIP_pilot	«featureType»
GeothermalManagementArea	EGIP_pilot	«featureType»
HeatFlowLine	EGIP_pilot	«featureType»
HeatFlowUnit	EGIP_pilot	«featureType»
Industry	EGIP_pilot	«featureType»
License	EGIP_pilot	«featureType»
TemperatureLine	EGIP_pilot	«featureType»
TemperatureUnit	EGIP_pilot	«featureType»
TrainingCenter	EGIP_pilot	«featureType»

Table 1 - Types defined in the feature catalogue

3.3.1 Spatial object types

3.3.1.1. GeothermalData

GeothermalData **(abstract)**	
Name:	geothermal data
Definition:	An abstract base class for geothermal data elements.
Status:	Proposed
Stereotypes:	«featureType»
Identifier:	null
Attribute: **identifier**	
Value type:	Integer
Definition:	External object identifier.
Multiplicity:	1
Attribute: **label**	
Value type:	CharacterString
Definition:	Label to be used within cartographic representation (e.g. 75°C or 75°C - 85°C)
Multiplicity:	0..1
Attribute: **depth**	
Value type:	Real
Definition:	Depth at which the geothermal data element is observed
Multiplicity:	0..1

3.3.1.2. GeothermalManagementArea

GeothermalManagementArea	
Name:	geothermal management area
Definition:	An management area defined for geothermal purposes.
Status:	Proposed
Stereotypes:	«featureType»
Identifier:	null
Attribute: **identifier**	
Value type:	Integer
Definition:	External object identifier.
Multiplicity:	1
Attribute: **roadmap_heatTarget**	

GeothermalManagementArea	
Value type:	CharacterString
Definition:	Year foreseen production (or installation) : Heat.
Multiplicity:	1
Attribute: **roadmap_powerTarget**	
Value type:	CharacterString
Definition:	Year foreseen production (or installation) : Power.
Multiplicity:	1
Attribute: **roadmap_URL**	
Value type:	URL
Definition:	Link to the document defining the roadmap for the geothermal management area.
Multiplicity:	1
Attribute: **roadmap_targetDate**	
Value type:	Date
Definition:	Roadmap year target.
Multiplicity:	1
Attribute: **insurance_refundingAmount**	
Value type:	CharacterString
Definition:	Refunding amount in % (format : 000).
Multiplicity:	1
Attribute: **geometry**	
Value type:	GM_Polygon
Definition:	Geometry of the geothermal management area.
Multiplicity:	1
Attribute: **insurance_link**	
Value type:	URL
Definition:	Link to the document defining the insurance conditions for the geothermal management area.
Multiplicity:	1

3.3.1.3. HeatFlowLine

HeatFlowLine	
Name:	heat flow line
Subtype of:	GeothermalData
Definition:	Represents heat flow isolines.
Status:	Proposed
Stereotypes:	«featureType»
Identifier:	null
Attribute: **geometry**	
Value type:	GM_Curve
Definition:	Geometry of the HeatFlowLine
Multiplicity:	1
Attribute: **heatFlow**	
Value type:	Integer
Definition:	Value in mW/m2.
Multiplicity:	1
Attribute: **heatFlowLineType**	
Value type:	CharacterString
Definition:	Type of heatflow line. Defined in the Isoline type codeList.
Multiplicity:	1

3.3.1.4. HeatFlowUnit

HeatFlowUnit	
Name:	heat flow unit
Subtype of:	GeothermalData
Definition:	Describes a polygon (a surface with the same heat flow value).
Status:	Proposed
Stereotypes:	«featureType»
Identifier:	null
Attribute: **geometry**	
Value type:	GM_Polygon
Definition:	Geometry of the HeatFlowUnit.
Multiplicity:	1
Attribute: **lowerHeatFlow**	
Value type:	Integer
Definition:	Lower value in mW/m2.
Multiplicity:	1
Attribute: **upperHeatFlow**	
Value type:	Integer
Definition:	Upper value in mW/m2.
Multiplicity:	1

3.3.1.5. Industry

Industry	
Name:	industry
Definition:	Geothermal related Industry.
Status:	Proposed
Stereotypes:	«featureType»
Identifier:	null
Attribute: **geometry**	
Value type:	GM_Point
Definition:	Localisation of the training center. Decimal degree, format: gg.dddd.
Multiplicity:	1
Attribute: **identifier**	
Value type:	Integer
Definition:	External object identifier.
Multiplicity:	1
Attribute: **industryName**	
Value type:	CharacterString
Definition:	Name of the industry.
Multiplicity:	1
Attribute: **industryPlace**	
Value type:	CharacterString
Definition:	Where the industry is located.
Multiplicity:	0..1
Attribute: **industryType**	
Value type:	CharacterString
Multiplicity:	1
Attribute: **link**	
Value type:	URL
Definition:	A link to a website providing further information on the training center.
Multiplicity:	0..1

3.3.1.6. License

License	
Name:	License
Definition:	Exploration and production licenses.
Status:	Proposed
Stereotypes:	«featureType»
Identifier:	null
Attribute: **area**	
Value type:	Integer
Definition:	Area in km2.
Multiplicity:	0..1
Attribute: **beginDate**	
Value type:	Date
Definition:	Starting date of the license.
Multiplicity:	1
Attribute: **boundaryLength**	
Value type:	Integer
Definition:	Length of the boundary in km.
Multiplicity:	0..1
Attribute: **endDate**	
Value type:	Date
Definition:	Ending date of the license.
Multiplicity:	1
Attribute: **geometry**	
Value type:	GM_Polygon
Definition:	Delineation of the location covered by the licence.
Multiplicity:	1
Attribute: **identifier**	
Value type:	Integer
Definition:	External object identifier.
Multiplicity:	1
Attribute: **licenseType**	
Value type:	CharacterString
Definition:	Type of license. Defined in the License type codeList.
Multiplicity:	1
Attribute: **link**	
Value type:	URL
Definition:	A link to a website or a document providing further information on the license.
Multiplicity:	0..1
Attribute: **name**	
Value type:	CharacterString
Definition:	Name of the concession.
Multiplicity:	0..1
Attribute: **placeType**	
Value type:	CharacterString
Definition:	Type of place covered by the licence. Defined in the placeType codeList.
Multiplicity:	1

3.3.1.7. TemperatureLine

TemperatureLine	
Name:	temperature line
Subtype of:	GeothermalData
Definition:	Represents temperature isolines.

TemperatureLine	
Status:	Proposed
Stereotypes:	«featureType»
Identifier:	null
Attribute: **geometry**	
Value type:	GM_Curve
Definition:	Geometry of the TemperatureLine
Multiplicity:	1
Attribute: **temperature**	
Value type:	Integer
Definition:	Value in °C.
Multiplicity:	1
Attribute: **temperatureLineType**	
Value type:	CharacterString
Definition:	Type of temperature line. Defined in the Isoline type codeList.
Multiplicity:	1

3.3.1.8. TemperatureUnit

TemperatureUnit	
Name:	temperature unit
Subtype of:	GeothermalData
Definition:	Describes a polygon (a surface with the same temperature value).
Status:	Proposed
Stereotypes:	«featureType»
Identifier:	null
Attribute: **geometry**	
Value type:	GM_Polygon
Definition:	Geometry of the TemperatureUnit
Multiplicity:	1
Attribute: **lowerTemperature**	
Value type:	Integer
Definition:	Lower value in ° C.
Multiplicity:	1
Attribute: **upperTemperature**	
Value type:	Integer
Definition:	Upper value in ° C.
Multiplicity:	1

3.3.1.9. TrainingCenter

TrainingCenter	
Name:	training center
Definition:	Geothermal related training center.
Status:	Proposed
Stereotypes:	«featureType»
Identifier:	null
Attribute: **centerName**	
Value type:	CharacterString
Definition:	Name of the training center.
Multiplicity:	1
Attribute: **centerType**	
Value type:	CharacterString
Definition:	Type of training center. Defined in the Training Center Type codeList.
Multiplicity:	1

TrainingCenter	
Attribute: **geometry**	
Value type:	GM_Point
Definition:	Localisation of the training center. Decimal degree, format: gg.dddd
Multiplicity:	1
Attribute: **identifier**	
Value type:	Integer
Definition:	External object identifier.
Multiplicity:	1
Attribute: **link**	
Value type:	URL
Definition:	A link to a website providing further information on the training center.
Multiplicity:	0..1
Attribute: **centerPlace**	
Value type:	CharacterString
Definition:	Where the institution is located.
Multiplicity:	0..1

3.3.2 Imported types (informative)

This section lists definitions for feature types, data types and enumerations and code lists that are defined in other application schemas. The section is purely informative and should help the reader understand the feature catalogue presented in the previous sections. For the normative documentation of these types, see the given references.

3.3.2.1. CharacterString

CharacterString	
Package:	Text
Reference:	Geographic information -- Conceptual schema language [ISO/TS 19103:2005]

3.3.2.2. Date

Date	
Package:	Date and Time
Reference:	Geographic information -- Conceptual schema language [ISO/TS 19103:2005]

3.3.2.3. GM_Curve

GM_**Curve**	
Package:	Geometric primitive
Reference:	Geographic information -- Spatial schema [ISO 19107:2003]

3.3.2.4. GM_Point

GM_**Point**	
Package:	Geometric primitive
Reference:	Geographic information -- Spatial schema [ISO 19107:2003]

3.3.2.5. GM_Polygon

GM_**Polygon**	
Package:	Geometric primitive
Reference:	Geographic information -- Spatial schema [ISO 19107:2003]

3.3.2.6. Integer

Integer	
Package:	Numerics
Reference:	Geographic information -- Conceptual schema language [ISO/TS 19103:2005]

3.3.2.7. Real

Real	
Package:	Numerics
Reference:	Geographic information -- Conceptual schema language [ISO/TS 19103:2005]

3.3.2.8. URL

URL	
Package:	Citation and responsible party information
Reference:	Geographic information -- Metadata [ISO 19115:2003/Cor 1:2006]

3.4 Code list values

3.4.1 centerType

Code	Value
1	university
2	researchCenter

3.4.2 heatFlowLineType & temperatureLineType

Code	Value
0	missingData
1	sure
2	deducted
3	unsure
8	notApplicable
9	notClassifiable

3.4.3 industryType

Code	Value
0	unknown
1	turbine
2	pipe

3.4.4 licenseType

Code	Value
0	unknown
1	environmentalReabilitation
2	miningLease
3	miningLeaseWithRequest
4	storageLease
5	requestOfMiningLease
6	requestOfStorageLease
7	applicationForResearchPermit
8	surveyPermit
9	researchPermit
10	miningLeaseWithRequestWithReduction
11	internalReduction

3.4.5 placeType

Code	Value
1	sea
2	land

3.5 Web services to be deployed

Spatial classes described in the UML data model will be exposed using WMS 1.3 and WFS (ideally 2.0). Datasets and corresponding services will have metadata compliant with Inspire Implementing Rules. Those metadata will be exposed using CSW 2.0.2.

4 Unstructured information - documents

4.1 Methodology

Regulations, roadmap, economics and insurance are various types of documents.
As such they will be described using DublinCore metadata[2].

4.2 Description

Dublin core metadata element set comprises of the following fifteen terms[3]

1. Title
2. Creator
3. Subject
4. Description
5. Publisher
6. Contributor
7. Date
8. Type
9. Format
10. Identifier
11. Source
12. Language
13. Relation
14. Coverage
15. Rights

[2] *http://en.wikipedia.org/wiki/Dublin_Core*
[3] *http://dublincore.org/documents/2012/06/14/dcmi-terms/?v=terms#*

4.3 EGIP Pilot specificity

4.3.1 Use of the element “Subject”

In the feasibility study, typologies have been identified to better identify documents. It is proposed to reuse them in the “Subject” as its definition is "The topic of the resource. Typically, the subject will be represented using keywords, key phrases, or classification codes. Recommended best practice is to use a controlled vocabulary.”

4.3.1.1. “Subject” entry to differentiate documents

Regulations
Roadmap
Economics
Insurance

4.3.1.2. “Subject” entry for regulation

Environmental
Licencing
Grid access

4.3.1.3. “Subject” entry for economics

Royalties
Taxes
Feed-in-tariff
Support schema

4.3.1.4. “Subject” entry for insurance

Private
Public

4.3.2 Use of the element “Coverage”

Each partner should refer to its country in that element so that documents can be searched/filtered by country.

4.4 Web services to be deployed

DublinCore metadata describing documents will be made available using CSW 2.0.2