

KOGIS – geocat.ch

Catalog Gateway Protocol

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1. Management Summary

This document describes a protocol for the communication between geographic metadata servers. It is specifically designed for the federation of metadata servers in the Swiss geocat.ch project. Considering existing geographic metadata service protocols it was specifically designed to allow for a cost effective implementation by all partners using different platforms.

The protocol builds on SOAP (Simple Object Access Protocol) as a message packaging mechanism. This allows the use of the SOAP infrastructure provided by many platforms (e.g. .NET, Java, Perl etc.) and helps reduce the implementation effort to the query formulation and result management. For this purpose a simple query structure is presented in XML whereby the operators are taken from the OpenGIS Catalog Service protocol and the attribute identification builds on the ISO 19115 Geographic Metadata standard. Results are passed either in a minimal set of attributes (GM03Small profile) or in one of the Swiss profiles of the ISO 19115 standard (GM03Core, GM03Comprehensive). Error handling is based on the SOAP fault mechanism. Session handling is not required as the protocol is stateless.

This specification presents a first level of the protocol that satisfies the basic needs in the geocat.ch project. Based on practical experience in this project, a revision is planned that might yield into a Swiss Norm later on. Comments and suggestions are therefore welcome and should be sent to KOGIS, c/o Bundesamt für Landestopographie, Mr. André Schneider, Seftigenstrasse 264, CH-3084 Wabern, Andre.Schneider@swisstopo.ch.

Similar protocols have been implemented in other projects like the giGateway of the British Association for Geographic Information (AGI) (<http://www.gigateway.co.uk>) or the gateway of the Canadian Geospatial Data Infrastructure (CGDI) (<http://geodiscover.cgdi.ca/gdp/index.jsp>).

Revised in version 1.0:

- GM03Small: purpose, positionName and extent/description are now multilingual
- GM03Small: topicCategory is now multivalued
- GM03Small: pointOfContact/role is now multivalued
- GM03Small: optional entries may have also the attribute 'notSupported'
- Sample of chapter 5.2 corrected
- Full text search using /MD_Metadata/* added
- Supported formats: GM03Profile deleted and "GM03Comprehensive" replaces "GM03Extended"
- New element in GM03Small: metadataSetURI

2. Introduction

2.1. Frame Conditions

The project geocat.ch wants to provide a discovery service for geographic data. It was decided to build this service as a federated system in which each data owner is free to build an own metadata service to publish information about available data or to join an existing service. The crucial point for the end user is to get access to all pertinent information within the federated system in a transparent way. A discovery service application will provide the transparent access with a user interface to query all accessible catalog servers with one single query formulation.

Though metadata is being structured with standards like ISO 19115 or FGDC, you can never assume that all catalog services provide the same data structures and the same query functionality. This is particularly true for the metadata solutions that were built before the ISO 19115 standard was established. The gateway protocol provides a conceptual model that allows for the mapping between different metadata servers independent of their internal data structures and query functionality.

2.2. Goals

A catalog gateway protocol needs to be defined

- to manage a connection between a gateway application (client) and an external server (server);
- to be able to send a query from the client to the server;
- for the client to be able to receive query results from the server.

This query mechanism must be

- independent of the platform/system/vendor of both the client and the server;
- independent of the programming language used on either side;
- independent of the network protocol used between the client and the server;
- independent of the internal metadata schema used by the server.

The protocol must support multiple languages and spatial query criteria. It must operate transparently to the end user, i.e. automated without manual interventions. Any kind of synchronization, hand-shake or time-out-checks between client and server must be possible.

The conventions defined in this protocol between the exchanging partners must be as small as possible as large as needed, i.e. minimal and complete. It must be fully described for simple implementation by all partners. Last but not least it must be relatively cheap to implement.

This document describes the protocol for searching metadata about geographic data sets. This protocol can be used in a very general way between a query client and a metadata server. However, the main purpose of the definition is to

define, how the metadata server of the Swiss geocat.ch project can access metadata servers provided by other bodies than the Swiss Federal Government that were built around other data structures and on other technologies. For the partners involved in the geocat.ch project, the commonly used OpenGIS Catalog Service and the Z39.50 protocols were considered to be too general for a cost effective implementation. OGC Catalog Service, for example, requires an SQL like query language that not all partners can provide easily. Z39.50 allows any kind of metadata structure to be transferred by using an extensive negotiation process. Though very generic and thus open for future requirements, this will add costs that can not easily be recovered in the relatively small community of geographic metadata service providers. Nevertheless, it is intended to build as much as possible on the experiences of these services protocols to make it possible to “upgrade” to them in a later stage. This is done, for instance, by using the same query key words like the SQL definitions of OGC Catalog Service.

The aim is to federate metadata services in a way that a user query to the geocat.ch service is at the same time run against

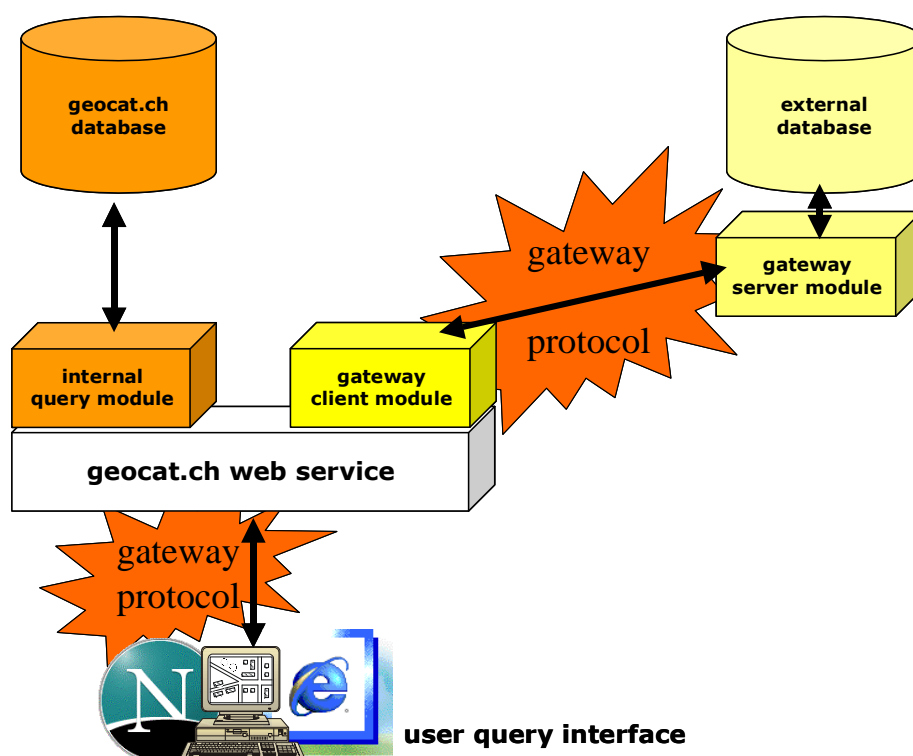
- a) the database of the geocat service and
- b) the metadata services of other providers mainly in Switzerland

in order to provide a comprehensive result without having to integrate all metadata into the geocat.ch database.

2.3. Non-Goals

Formatting of results (typesetting, sorting etc.) is not part of the protocol.

2.4. Overview of the Architecture



The figure above shows the three-tiers architecture of the geocat.ch service with the user query interface, the web application service and the database. In a first phase, the gateway protocol establishes the link between the geocat.ch web application service and the remote gateway server. No assumptions are made on how the gateway server is organized. The protocol is also fully transparent to the user query client. It is a hidden server-side functionality. In a second phase, the geocat.ch service will also provide the gateway interface and thus act as a gateway server to other metadata services.

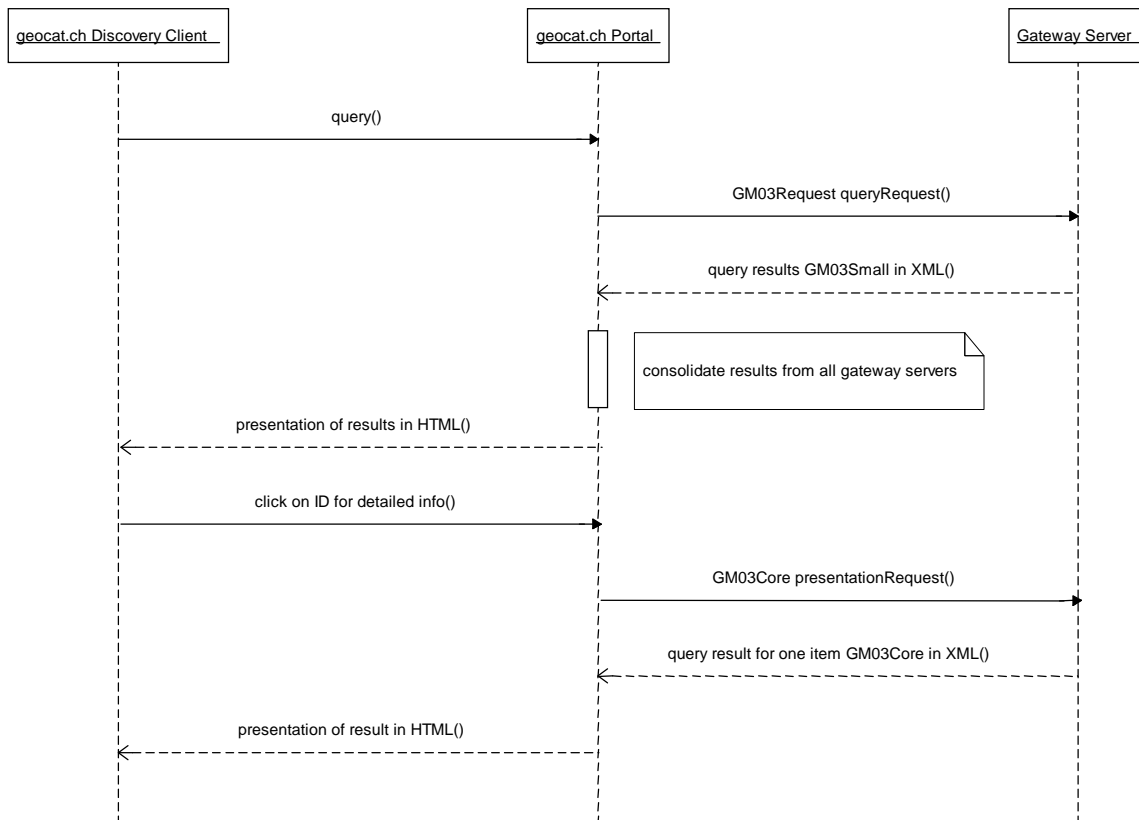
For clarity of the concept the terms **gateway client** and **gateway server** will be used to define the client part of the geocat.ch gateway that refers the user queries to the remote server, respectively the server part of the remote server that receives the queries and sends the results. Both are called **nodes** in the communication process, whereby one node becomes the **sending node**, the other the **receiving node**.

2.5. Versions of the Protocol

The previous hierarchy level system (prototype phase) has become obsolete because the missing information for a first complete version is now available. For the protocol to be extensible in the future, a version numbering is introduced. Each request contains the version number of the protocol that it uses. Furthermore, the server administrator of each server should indicate to the managers of the gateway clients, which version the server supports. A version request is not yet planned in the current version but could be added in a later version. Servers supporting a higher version should also support requests with a lower version (backward compatible).

3. Overview of the Communication Process

The following sequence diagram shows the communication between the Discovery Client, the geocat.ch Portal and the Gateway Server(s). The gateway protocol covers only the part between the geocat.ch Portal and the Gateway Server(s).



When the Portal receives a query from the Discovery Client it translates it into the query request format specified in the gateway protocol. The portal then sends the query request to all gateway servers defined in its gateway server directory. The gateway server interprets the XML request and translates it into a query to its own database. The results of the query are then formatted according to the result specifications (XML, still to be defined according to the Interlis 2 requirements). This XML is sent back within the SOAP envelope to the Portal. The Portal receives results from several servers asynchronously and needs to consolidate the results from the different servers. Given the federated character of the system a response time can not be imposed on a particular server. This is a critical section because a slow Gateway Server can delay the delivery to the client. Therefore, if a result is not delivered from a Gateway Server within a specified time, the Gateway Client should ignore that server and display a message on the result page indicating which servers have been considered in the result and which ones were not delivering a result within due time. But as this document specifies the server communication client behaviour

is in no way prescribed here.

Once the XML results are properly formatted they are sent back to the Discovery Client where they are displayed. The formatting is described in chapter 7.

When browsing through the results the user might want to get more information on one particular data set. For this purpose, each dataset has a link, which contains the ID of the dataset and the server name of the gateway server that delivered this record. The Portal translates this link into a presentation request to the respective Gateway Server. The Gateway Server retrieves the detailed record and formats it in the XML format for the requested profile. This result is passed to the Portal, formatted, sent to the Discovery Client and displayed.

A gateway server can also be a gateway client to another gateway server. In general, such a server should not forward client requests to other servers without knowing where the request came from. This is required to avoid endless loops. The header element `referenceID` (see 5.3.3) is supposed to remain the same for one request no matter whether the message is forwarded or not. Therefore a server can identify if a message has already passed by looking at its `referenceID`. Though, no rules are established for the format of the `referenceID`, it is assumed that each server issues different `referenceIDs` for different requests. However, if ever possible UUID, Interlis ObjectID mechanism or a comparable scheme should be used to avoid the use of identical `referenceIDs` on different servers.

4. Session Handling/Password Protection

Session handling is normally used in Web services to protect both client and server. In general, http requests to a gateway server can be made without any identification of the client. This means that the service will be open to everyone. This is no larger security problem than putting a web server on the Internet.

All content made available to the geocat.ch portal is assumed to be public. Specific user roles and password protected access are not foreseen in the gateway protocol.

Another particular security issue is uploading of data to a server via the Internet. Uploading of data is not required in the gateway protocol and can therefore be blocked by the server.

Given these conditions, neither session handling nor client identification is required in the gateway protocol.

5. Packaging of the Requests/Responses

5.1. Introduction

The Simple Object Access Protocol (SOAP) version 1.1 is used to package calls from the client to the server and the replies to the client. For the gateway protocol SOAP packages are transferred with the XML over http binding.

SOAP is an XML based packaging structure, which like in post services provides an envelope to calls and replies. Within the envelope an optional header and one or more body sections can be present. SOAP is selected because it is widely supported with tools and infrastructures by all major platforms (e.g. Windows .NET, Java) and because it works in the general context proposed for the identification and use of web services (UDDI, WSDL). For a cost effective implementation many free tools and standard facilities of the common operating system platforms can be used. Furthermore, SOAP provides in a standardized way all that is needed for calling remote servers (e.g. error handling) and therefore helps the developer concentrate on the very task at hand.

Here is an example of the SOAP envelope:

```
<?xml version='1.0' ?>
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
  <env:Header>
    ...
  </env:Header>
  <env:Body>
    ...
  </env:Body>
</env:Envelope>
```

A rudimentary XML schema for SOAP without the details about roles, updates, faults etc. would look like this:

```
<?xml version = '1.0' encoding='UTF-8'?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <xsd:element name ="Envelope" type ="envelopeType"/>

  <xsd:complexType name ="envelopeType">
    <xsd:sequence>
      <xsd:element name ="Header" minOccurs ="0"/>
      <xsd:element name ="Body" maxOccurs ="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
```

5.2. Example

A request structure for the geocat.ch gateway could then look like this:

```
<?xml version='1.0' encoding='UTF-8'?>
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">

  <env:Header>
    <gch:requestID xmlns:gch="http://www.geocat.ch/2003/05/gateway/header"
      env:mustUnderstand="true">
      <gch:version>1.0</gch:version>
      <gch:sendingNodeId>www.geocat.ch</gch:sendingNodeId>
      <gch:referenceId>uuid:093a2da1-q345-739r-ba5d-
pqff98fe8j7d</gch:referenceId>
      <gch:messageId>uuid:09233523-345b-4351-b623-5dsf35sgs5d6</gch:messageId>
      <gch:dateAndTime>2003-05-08T13:20:00.000-05:00</gch:dateAndTime>
    </gch:requestID>
  </env:Header>

  <env:Body>
    <gcq:catalogGatewayRequest
      xmlns:gcq="http://www.geocat.ch/2003/05/gateway/query">
      <gcq:queryRequest>

        <gcq:criteria>
          <gcq:expression>
            <gcq:attribute>MD_Dataidentification/abstract/
              textGroup/plainText </gcq:attribute>

            <gcq:operator>like</gcq:operator>
            <gcq:value>%soil%</gcq:value>
          </gcq:expression>

          <gcq:concatenatedExpression>
            <gcq:concatenationOperator>and</gcq:concatenationOperator>
            <gcq:expression>
              <gcq:attribute>MD_Dataidentification/MD_Keywords/keyword/
                textGroup/plainText</gcq:attribute>

              <gcq:operator>eq</gcq:operator>
              <gcq:value>farming</gcq:value>
            </gcq:expression>
          </gcq:concatenatedExpression>

          <gcq:concatenatedExpression>
            <gcq:concatenationOperator>and</gcq:concatenationOperator>
            <gcq:expression>
              <gcq:attribute>MD_Dataidentification/contact/organisationName/
                textGroup/plainText</gcq:attribute>

              <gcq:operator>like</gcq:operator>
              <gcq:value>Swisstopo%</gcq:value>
            </gcq:expression>
          </gcq:concatenatedExpression>
        </gcq:criteria>

        <gcq:format>
          <gcq:profile>GM03Count</gcq:profile>
        </gcq:format>
      </gcq:queryRequest>
    </gcq:catalogGatewayRequest>
  </env:Body>
</env:Envelope>
```

This query searches for the number of entries, which have the word “soil” in the abstract, the keyword “farming”, and “Swisstopo” in the organization name. The

result is expected in the “count” profile saying that only the number of occurrences is returned.

The corresponding response will be:

```
<?xml version='1.0' encoding='UTF-8'?>
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">

  <env:Header>
    <gch:requestID xmlns:gch="http://www.geocat.ch/2003/05/gateway/header"
      env:mustUnderstand="true">
      <gch:version>1.0</gch:version>
      <gch:sendingNodeId>www.geocat.ch</gch:sendingNodeId>
      <gch:referenceId>uuid:093a2da1-q345-739r-ba5d-
pqff98fe8j7d</gch:referenceId>
      <gch:messageId>uuid:04163518-255f-4351-c693-5dsf32sgs5d6</gch:messageId>
      <gch:responseTo>uuid:09233523-345b-4351-b623-5dsf35sgs5d6</gch:responseTo>
      <gch:dateAndTime>2003-05-08T13:22:10.000-05:00</gch:dateAndTime>
    </gch:requestID>
  </env:Header>

  <env:Body>
    <gcq:catalogGatewayRequest
      xmlns:gcq="http://www.geocat.ch/2003/05/gateway/query">
      <gcq:queryResult>
        <gcq:count>4
        </gcq:count>
      </gcq:queryResult>
    </gcq:catalogGatewayRequest>
  </env:Body>

</env:Envelope>
```

The message is thus packaged into a SOAP envelope, which contains a Header with message identification information and a Body with the request or the response. SOAP also provides a standardized structure to handle errors using the Fault element in the Body, which could be adapted to the needs of the geocat.ch gateway protocol.

5.3. Header Information

The namespace for the header is proposed as <http://www.geocat.ch/2003/05/gateway/header>. The header contains the common SOAP header information and the following requestIDType:

requestIDType
+version : String
+sendingNodeId : String
+referenceId : String
+messageId : String
+responseTo : String
+dateAndTime : String

Here is the XMLSchema for the header:

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <xsd:element name="requestID" type="requestIDType"/>

  <xsd:complexType name="requestIDType">
    <xsd:sequence>
      <xsd:element name="version" type="xsd:string"/>
      <xsd:element name="sendingNodeId" type="xsd:string"/>
      <xsd:element name="referenceId" type="xsd:string"/>
      <xsd:element name="messageId" type="xsd:string"/>
      <xsd:element name="responseTo" type="xsd:string" minOccurs="0"/>
      <xsd:element name="dateAndTime" type="xsd:dateTime"/>
    </xsd:sequence>
  </xsd:complexType>

</xsd:schema>
```

ReferenceId, messageId and responseTo could use the universal unique identifier (uuid) convention, but this is only a recommendation, not a requirement. The universal unique identifier is a 128-bit, unique identifier, formatted as a string consisting of 8 hexadecimal digits followed by a hyphen, then three groups of 4 hexadecimal digits each followed by a hyphen, then 12 hexadecimal digits. A tool named uuidgen.exe provides a set of 256 GUIDs based on the time of day, the date, and a unique number contained in your network card. This is available from Microsoft. The W3C provides a Java programming language class for UUID generation (org.w3c.util.UUID). However, any other numbering system could be used. The uniqueness needs only be assured for the node initiating the dialogue, so an ID like 1, 2 or 3 would be perfectly valid. An alternative to the UUID could be the Interlis 2 numbering system.

Though this header information is not fully required in a synchronized http communication it is useful for message tracking, logging and system monitoring purposes. Furthermore, it helps in creating test cases for new servers being connected.

5.3.1. version

The version element gives the information about the version of the protocol used. This helps the partners to assure compatibility with older versions of the protocol. Currently, only the value 1.0 is allowed for the version.

5.3.2. sendingNodeid

The sendingNodeid is a string identifying the node sending a message. It is suggested to provide a Web address or an IP number.

5.3.3. referenceID

The referenceid is used to identify a request-response dialogue. All related messages must have the same referenceid whereby the node starting the dialogue provides the referenceID.

5.3.4. messageID

Each message is identified with a unique ID. The ID must only be unique for the sending node, but the uuid numbering could be used to make it unique between all nodes.

5.3.5. dateAndTime

The dateAndTime element helps for monitoring server response times and for synchronizing messages from different servers. The sending node generates the Date/Time value when writing the message. The format is the dateTime format as defined by XML Schema. The timezone shift is optional, e.g. 2003-05-08T13:22:10.000+01:00 or 2003-05-08T13:22:10.000.

5.3.6. responseTo

The responseTo element returns the messageID of the requesting message. This helps the sender to synchronize responses.

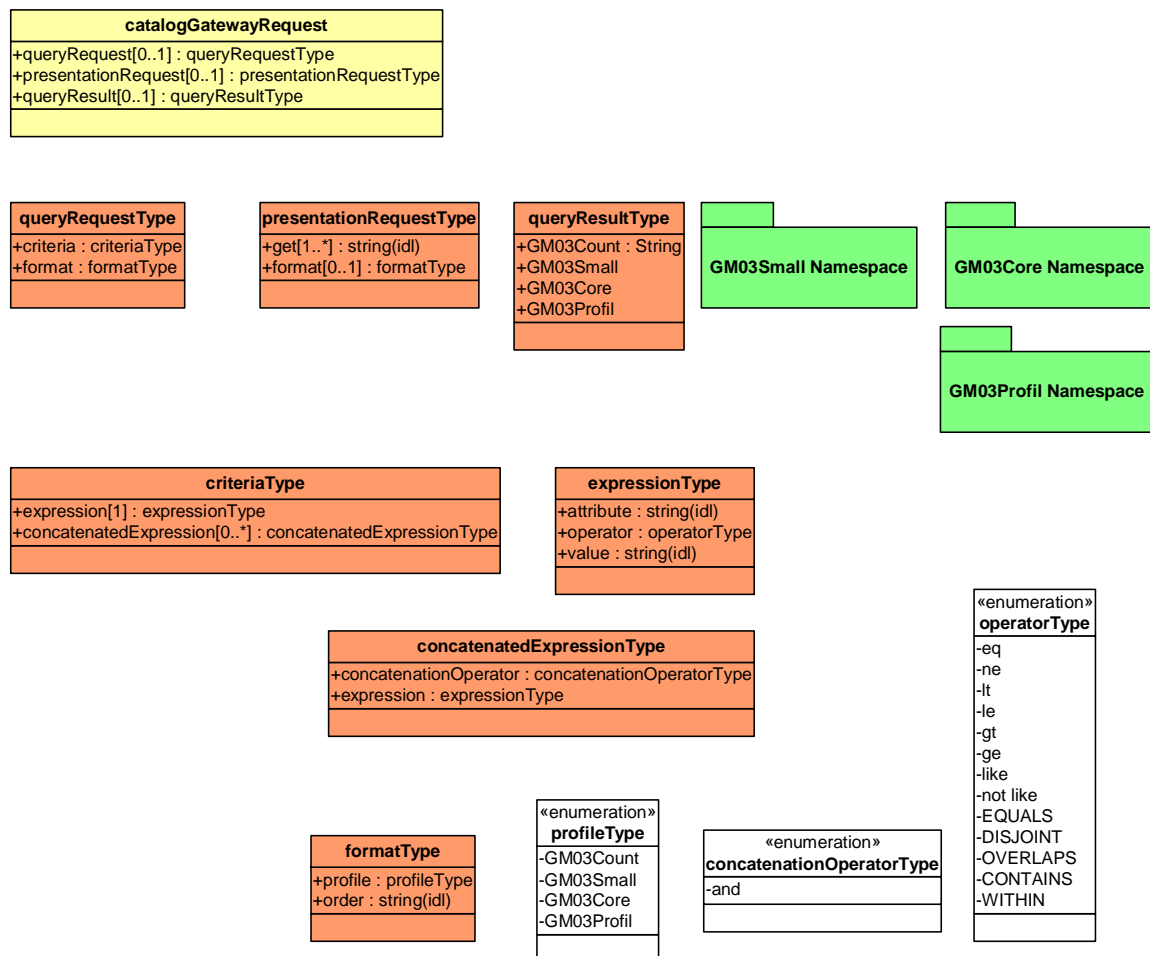
5.4. Body Information

The body section contains the query request or the result according to the structure described in the next two sections.

6. Request Syntax

The request namespace is defined as <http://www.geocat.ch/2003/05/gateway/query>.

Two requests, the query request and the presentation request, are defined. For the presentation of results, a query result element is defined. The following diagram gives an overview of the types and elements defined for the protocol:



This structure is described in the following XML Schema:

```

<?xml version = "1.0" encoding = "UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">

  <xsd:element name = "catalogGatewayRequest">
    <xsd:complexType>
      <xsd:choice>
        <xsd:element name = "queryRequest"
          type = "queryRequestType"/>
        <xsd:element name = "presentationRequest"
          type = "presentationRequestType"/>
        <xsd:element name = "queryResult"

```

```
    type = "queryResultType" />
  </xsd:choice>
</xsd:complexType>
</xsd:element>

<xsd:complexType name="queryRequestType">
  <xsd:sequence>
    <xsd:element name="criteria" type="criteriaType"/>
    <xsd:element name="format" type="formatType" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="criteriaType">
  <xsd:sequence>
    <xsd:element name="expression" type="expressionType"/>
    <xsd:element name="concatenatedExpression"
      type="concatenatedExpressionType"
      minOccurs="0"
      maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="expressionType">
  <xsd:sequence>
    <xsd:element name="attribute" type="xsd:string"/>
    <xsd:element name="operator" type="operatorType"/>
    <xsd:element name="value" type="xsd:string"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="concatenatedExpressionType">
  <xsd:sequence>
    <xsd:element name="concatenationOperator"
      type="concatenationOperatorType"/>
    <xsd:element name="expression" type="expressionType"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:simpleType name="operatorType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="eq"/>
    <xsd:enumeration value="ne"/>
    <xsd:enumeration value="lt"/>
    <xsd:enumeration value="le"/>
    <xsd:enumeration value="gt"/>
    <xsd:enumeration value="ge"/>
    <xsd:enumeration value="like"/>
    <xsd:enumeration value="not like"/>
    <xsd:enumeration value="EQUALS"/>
    <xsd:enumeration value="DISJOINT"/>
    <xsd:enumeration value="OVERLAPS"/>
    <xsd:enumeration value="CONTAINS"/>
    <xsd:enumeration value="WITHIN"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="concatenationOperatorType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="and"/>
  </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="formatType">
```

```

<xsd:sequence>
  <xsd:element name="profile" type="profileType">
    <xsd:element name="order" type="xsd:string"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:simpleType name="profileType">
<xsd:restriction base="xsd:string">
  <xsd:enumeration value="GM03Count"/>
  <xsd:enumeration value="GM03Small"/>
  <xsd:enumeration value="GM03Core"/>
  <xsd:enumeration value="GM03Comprehensive"/>
</xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="presentationRequestType">
<xsd:sequence>
  <xsd:element name="get" type="xsd:string" maxOccurs="unbounded"/>
  <xsd:element name="format" type="formatType" minOccurs="0"/>
</xsd:sequence>
</xsd:complexType>

<xsd:complexType name="queryResultType">
<xsd:sequence>
  <xsd:element name="GM03Count" minOccurs="0"/>
  <xsd:any
    namespace="http://www.geocat.ch/2003/05/gateway/GM03Small"
    minOccurs="0" maxOccurs="unbounded"/>
  <xsd:any
    namespace="http://www.geocat.ch/2003/05/gateway/GM03Core"
    minOccurs="0" maxOccurs="unbounded"/>

  <xsd:any
    namespace="http://www.geocat.ch/2003/05/gateway/GM03Comprehensive"
    minOccurs="0" maxOccurs="unbounded"/>
</xsd:sequence>
</xsd:complexType>
</xsd:schema>

```

6.1. Query Request

The query request contains a compulsory criteria section and an optional format section.

6.1.1. criteria

The criteria section contains one expression element and optionally concatenated expression elements. Expression and concatenated expressions are combined to define the overall criteria for the metadata selection.

6.1.1.1. expression

An expression specifies the selection expression in a query criteria section. It is composed of an attribute, an operator and a value. Attributes are specified as XPath expressions. The following comparison operators are allowed in predicates:

- **eq**: equal (=). attribute **eq** value.
- **ne**: not equal (!=). attribute **ne** value.
- **lt**: less than (<). attribute **lt** value.
- **le**: less or equal (<=). attribute **le** value.
- **gt**: greater than (>). attribute **gt** value.
- **ge**: greater or equal (>=). attribute **ge** value.
- **like**: text comparison for containment. attribute **like** value.
- **not like**: text comparison for non-containment. attribute **not like** value.

Value can be a number, a character or a character string. For characters and character strings the following character wildcards are allowed:

- **%**: 0 or more characters. E.g. %land for Iceland, England, Ireland.
- **_**: exactly 1 character. E.g. l_eland for Iceland or Ireland.

The following geometric comparison operators are allowed in comparison predicates:

- **EQUALS**: geometry is exactly identical. attribute **EQUALS** value.
- **DISJOINT**: geometry is disjoint. attribute **DISJOINT** value.
- **OVERLAPS**: geometry overlaps. attribute **OVERLAPS** value.
- **CONTAINS**: geometry contains other geometry. attribute **CONTAINS** value.
- **WITHIN**: geometry is within other geometry. attribute **WITHIN** value.

In the current ISO 19115 model, these operators are only applicable to attributes of type EX_BoundingPolygon and EX_GeographicBoundingBox.

A previous version of the gateway protocol proposed that the geometry values had to be specified in the form of well-known texts as defined in the OGC Simple Features Specifications and in the OGC Catalog Service (e.g. POLYGON((600000 200000, 601000 200000, 601000 201000, 600000 201000, 600000 200000)). From all the geometry types defined in the OGC simple features specifications and in the OGC catalog service specifications only POINT, LINESTRING, POLYGON and ENVELOPE would have been supported in the gateway protocol. Here the corresponding extract of the specifications in BNF (Bakus-Naur-Form):

```

<geometry literal> :=
  <Point Tagged Text>
  | <LineString Tagged Text>
  | <Polygon Tagged Text>
  | <Envelope Tagged Text>
<Point Tagged Text> :=
  POINT <Point Text>
<LineString Tagged Text> :=
  LINESTRING <LineString Text>
<Polygon Tagged Text> :=
  POLYGON <Polygon Text>
<Point Text> := EMPTY | <left paren> <Point> <right paren>

```

```

<Point> := <x> <space><<y>
<x> := numeric literal
<y> := numeric literal
<LineString Text> := EMPTY
    | <left paren> <Point > {<comma> <Point > }... <right paren>
<Polygon Text> := EMPTY
    | <left paren> <LineString Text > {<comma> < LineString Text > }...<right
paren>
<Envelope Tagged Text> ::=
    ENVELOPE <Envelope Text>
<Envelope Text> := EMPTY
| <left paren> > <WestBoundLongitude> <comma> EastBoundLongitude> <comma>
NorthBoundLatitude <comma> <SouthBoundLatitude> < <right paren>
<WestBoundLongitude> := numeric literal
<EastBoundLongitude> := numeric literal
<NorthBoundLatitude> := numeric literal
<SouthBoundLatitude> := numeric literal

```

This specification would have fully supported the geometry specifications of the OGC Catalog Services. Given the fully XML based nature of the gateway protocol, it was suggested to use XML also within the geometry specification. Therefore, a simplified OGC Geographic Markup Language (GML) version 3.0 syntax is proposed for the gateway protocol. Compared to other known XML representations of geometry (e.g. Interlis 2, VML, SVG) GML has the advantage of a simple specification of map projections (EPSG code), which counts particularly in the international metadata exchange, but also within countries that use several map projections.

As the precision of the geometries in a metadata server is not crucial to finding geographic data sets, there is no need to specify geometries other than polygons based on linearly interpolated rings. The following XSD specifies the structure of the geometries to be used to express geometric query conditions based on GML 3.0:

```

<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">

```

```

  <element name="Polygon" type="gml:PolygonType"/>

```

```

  <!-- this type is copied and adapted from GML 3.00 -->
  <xsd:complexType name="PolygonType">

```

```

    <xsd:annotation>

```

```

      <xsd:documentation>

```

A Polygon is a special surface that is defined by a single surface patch. The boundary of this patch is coplanar and the polygon uses planar interpolation in its interior. It is backwards compatible with the Polygon of GML 2, GM_Polygon of ISO 19107 is implemented by PolygonPatch.

```

    </xsd:documentation>

```

```

  </xsd:annotation>

```

```

  <attribute name="gid" type="string" use="optional" />

```

```

  <attribute name="srsName" type="anyURI" use="optional">

```

```

    <xsd:annotation>

```

```

      <xsd:documentation>

```

In general this reference points to a CRS instance of gml:CoordinateReferenceSystemType (see coordinateReferenceSystems.xsd). For well known references it is not required that the CRS description exists at the location the URI points to (Note: These "WKCRS"-ids still have to be specified). If no srsName attribute is given, the CRS must be specified as

part of the larger context this geometry element is part of.

```

    </xsd:documentation>
  </xsd:annotation>
</xsd:attribute>
<xsd:sequence>
  <xsd:element name="exteriorRing" type="LinearRingType"
minOccurs="0"/>
  <xsd:element name="interiorRing" type="LinearRingType"
minOccurs="0" maxOccurs="unbounded"/>
</xsd:sequence>
</xsd:complexType>

```

```

<!-- this type is copied and adapted from GML 3.00 -->

```

```

<xsd:complexType name="LinearRingType">

```

```

  <xsd:annotation>

```

```

    <xsd:documentation>

```

A LinearRing is defined by four or more coordinate tuples, with linear interpolation between them; the first and last coordinates must be coincident.

```

    </xsd:documentation>

```

```

  </xsd:annotation>

```

```

  <xsd:sequence>

```

```

    <xsd:element name="pos" type="DirectPositionType"

```

```

      minOccurs="4" maxOccurs="unbounded" />

```

```

  </xsd:sequence>

```

```

</xsd:complexType>

```

```

<!-- this type is copied from GML 3.00 -->

```

```

<xsd:complexType name="DirectPositionType">

```

```

  <xsd:annotation>

```

```

    <xsd:documentation>

```

DirectPosition instances hold the coordinates for a position within some coordinate reference system (CRS). Since DirectPositions, as data types, will often be included in larger objects (such as geometry elements) that have references to CRS, the "srsName" attribute will in general be missing, if this particular DirectPosition is included in a larger element with such a reference to a CRS. In this case, the CRS is implicitly assumed to take on the value of the containing object's CRS.

```

    </xsd:documentation>

```

```

  </xsd:annotation>

```

```

  <xsd:simpleContent>

```

```

    <xsd:extension base="doubleList">

```

```

      <xsd:attribute name="srsName" type="xsd:anyURI" use="optional">

```

```

        <xsd:annotation>

```

```

          <xsd:documentation>

```

In general this reference points to a CRS instance of

gml:CoordinateReferenceSystemType (see coordinateReferenceSystems.xsd). For

well known references it is not required that the CRS description exists at

the location the URI points to (Note: These "WKCRS"-ids still have to be

specified). If no srsName attribute is given, the CRS must be specified as

part of the larger context this geometry element is part of, e.g. a geometric

element like point, curve, etc. It is expected that the attribute will be

specified at the direct position level only in rare cases.

```

          </xsd:documentation>

```

```

        </xsd:annotation>

```

```

      </xsd:attribute>

```

```

      <xsd:attribute name="dimension"

```

```

        type="xsd:positiveInteger" use="optional">

```

```

        <xsd:annotation>

```

```

          <xsd:documentation>

```

The attribute "dimension" is the length of coordinate sequence (the number of entries in the list). This is determined by the coordinate reference system.

```

          </xsd:documentation>

```

```

    </xsd:annotation>
  </xsd:attribute>
</xsd:extension>
</xsd:simpleContent>
</xsd:complexType>

<!-- this type is copied from GML 3.00 -->
<xsd:simpleType name="doubleList">
  <xsd:annotation>
    <xsd:documentation>
XML List based on XML Schema double type. An element of this type contains a
space-separated list of double values
    </xsd:documentation>
  </xsd:annotation>
  <xsd:list itemType="xsd:double"/>
</xsd:simpleType>
</xsd:schema>

```

This GML based polygon definition allows the specification of projections in the “srsName” attribute at the polygon level or at the directPositionType (coordinate) level. The use of the EPSG encoding of projection systems is strongly recommended (cf. European Petroleum Survey Group www.epsg.org)

For the extent polygon (/MD_Metadata/identificationInfo/extent/geographicElement/polygon), geographic coordinates (lat. / long.) are assumed. Here an example of a triangle polygon in Swiss projection CH1903/LV03:

```

<gml:Polygon srsName="EPSG:21781">
  <gml:exteriorRing>
    <gml:pos dimension = "2"> 200000.0 600000.0</gml:pos>
    <gml:pos dimension = "2"> 300000.0 700000.0</gml:pos>
    <gml:pos dimension = "2"> 200000.0 700000.0</gml:pos>
    <gml:pos dimension = "2"> 200000.0 600000.0</gml:pos>
  </gml:exteriorRing>
</gml:Polygon>

```

Here the details of the EPSG definitions for the 1903 Swiss projection:

CH1903 / LV03	
Parameter	Value
Name	CH1903 / LV03
EPSG Code	21781
Conversion / Map Projection	Swiss New Grid (19922)
Coord Operation Method	Oblique Mercator (9815)
Latitude of projection centre	46° 57' 8.66000" N
Longitude of projection centre	7° 26' 22.5" E
Scale factor at natural origin	1.000 unity
Easting at projection centre	600000 metre
Northing at projection centre	200000 metre
Datum	CH1903 (6149)
Prime Meridian	Greenwich (8901)

Ellipsoid	Bessel 1841 (7004)
Semi-major axis	6377397.155 metre
Inverse flattening	299.1528128

Note: the GML representation of geometries and the EPSG code are only used in the polygon attribute. The bounding box extents (EX_GeographicBoundingBox) are indicated in double precision values. "Datum-less" latitude/longitude is assumed for all envelope coordinates as specified in the ISO 19115 specifications for bounding box extents (EX_GeographicBoundingBox).

6.1.1.2. Attribute identification

Attributes are identified in an XPath syntax indicating the path from the root (/) of a document/record down to its leaf. The path is derived from the graphical UML schema (Swiss profiles) according to the following rules:

- The root symbol / is the starting point for all attributes. A **free text search** over all accessible attributes is defined with the root symbol /.
- Attribute identification starts at the MD_Metadata object with **/MD_Metadata**.
- Attributes of a class are directly appended to the class name with a separating slash (/), like e.g. **/MD_Metadata/dateStamp**.
- Aggregations are appended to the aggregating class using a slash (/) and the aggregation's role name, like e.g. **/MD_Metadata/identificationInfo**.
- Abstract classes do not appear explicitly but only implicitly in their derived classes, e.g. the attribute abstract of the abstract class MD_Identification appears in the class MD_DataIdentification as **/MD_Metadata/identificationInfo/abstract**, the attribute keyword of the aggregated class MD_Keywords of the abstract class MD_Identification appears like **/MD_Metadata/identificationInfo/descriptiveKeywords/keyword**
- Attributes using a specified data type are combined with the attributes of the data type but without mentioning the name of the data type. E.g. the attribute contact of MD_Metadata is defined as CI_ResponsibleParty, so it will contain **/MD_Metadata/contact/individualName**, **/MD_Metadata/contact/organisationName**, **/MD_Metadata/contact/positionName**, **/MD_Metadata/contact/contactInfo/phone/voice** etc.

The GM03Request profile is defined to specify the attributes over which queries can be specified. In GM03Request the following attributes are supported:

```

/MD_Metadata/*
/MD_Metadata/fileIdentifier
/MD_Metadata/dateStamp
/MD_Metadata/identificationInfo/pointOfContact/role
/MD_Metadata/identificationInfo/pointOfContact/individualName
/MD_Metadata/identificationInfo/pointOfContact/positionName/
textGroup/plainText

```

```
/MD_Metadata/identificationInfo/pointOfContact/organisationName/  
                                                                    textGroup/plainText  
/MD_Metadata/identificationInfo/language  
/MD_Metadata/identificationInfo/purpose/textGroup/plainText  
/MD_Metadata/identificationInfo/topicCategory  
/MD_Metadata/identificationInfo/abstract/textGroup/plainText  
/MD_Metadata/identificationInfo/citation/title/textGroup/plainText  
/MD_Metadata/identificationInfo/citation/date/date  
/MD_Metadata/identificationInfo/citation/date/dateType  
/MD_Metadata/identificationInfo/descriptiveKeywords/keyword/  
                                                                    textGroup/plainText  
/MD_Metadata/identificationInfo/extent/description/textGroup/plainText  
/MD_Metadata/identificationInfo/extent/geographicElement/polygon  
/MD_Metadata/identificationInfo/extent/geographicElement/westBoundLongitude  
/MD_Metadata/identificationInfo/extent/geographicElement/eastBoundLongitude  
/MD_Metadata/identificationInfo/extent/geographicElement/southBoundLatitude  
/MD_Metadata/identificationInfo/extent/geographicElement/northBoundLatitude  
/MD_Metadata/identificationInfo/extent/geographicElement/  
                                                                    geographicIdentifier/code/textGroup/plainText
```

The ID of MD_Metadata is set as an attribute named 'objid'. This attribute is not queryable with the gateway protocol.

It is possible to use the expression /MD_Metadata/* to perform a full text search. It is up to the gateway to dispatch the search on the appropriate fields (the exact fields concerned are left to the appreciation of the gateway service manufacturer or administrator).

Note: There is an important difference between the Swiss profile and the ISO 19115 model. The Swiss profile introduces multilingual texts for important textual attributes. For the identification of these attributes the construction **"/textGroup/plainText"** has to be added to the XPath that the ISO 19115 model would produce.

6.1.1.3. Nesting of expressions

No parenthesis are, thus when expressions are concatenated only the concatenation expression defines the combination of search criteria. No hierarchy or nesting is assumed. For later versions, nesting of expressions could be discussed.

The following concatenation operators are allowed in concatenation expressions:

- **and**: logical and.

The logical or expression is not supported in this version. The or expression could be added, when eventually nesting and parenthesis are introduced in a later version. In the current state, it would only create confusion.

6.1.2. format

The format element defines how the results must be presented. Generally, results are presented in XML as formed using the Interlis 2 XML encoding from an Interlis 2 model (cf. chapter 7). The following elements are defined:

6.1.2.1. profile

With the profile value, the client can indicate which attributes – according to a profile definition – must be presented for each record found by the server. The following profiles are supported:

- **GM03Count:** only give the number of found records. This profile is only provided for technical reasons in order to quickly test connections, response times, query formulation etc. It is not intended to use this profile in the end user context.
- **GM03Small:** minimal set of attributes to help the user in the discovery of geographic data.
- **GM03Core:** the Swiss core profile subset of the ISO 19115 standard.
- **GM03Comprehensive:** the Swiss comprehensive set of attributes.

6.1.2.2. order

The order element specifies, according to which attribute the server should order the results. The server can ignore this element. Nevertheless it is often useful to receive the results in a specified order and if the server can support ordering of results, it must do so.

6.2. Presentation Request

The presentation request asks the gateway server to provide detailed information for one or several metadata records. The gateway client simply specifies the required MD_Metadata objids in a get element. Not all servers will be able to support all formats. The minimal requirement is to present the GM03Core. The query procedure would be like that: first the query request is sent and the results are returned in GM03Small. With the objid the request can be refined to get a more detailed description of a data set (GM03Core or GM03Comprehensive). If the remote server only supports GM03Core, then GM03Core is returned even though GM03Comprehensive have been requested.

```
<?xml version='1.0'?>
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
  <env:Header>
    <gch:requestID xmlns:gch="http://www.geocat.ch/2003/05/gateway/header"
      env:mustUnderstand="true">
      <gch:version>1.0</gch:version>
      <gch:sendingNodeId>www.geocat.ch</gch:sendingNodeId>
      <gch:referenceId>uuid:093a2da1-q345-739r-ba5d-
pqff98fe8j7d</gch:referenceId>
      <gch:messageId>uuid:09567523-345b-4351-b623-5dsf35sgs5d6</gch:messageId>
      <gch:dateAndTime>2003-05-08T13:22:00.000-05:00</gch:dateAndTime>
    </gch:requestID>
  </env:Header>
  <env:Body>
    <gcq:presentationRequest
      xmlns:gcq="http://www.geocat.ch/2003/05/gateway/query">
      <gcq:get>xMetatax215</gcq:get>
      <gcq:get>xMetatax102</gcq:get>
```

```
<gcq:format>
  <gcq:profile>GM03Core</gcq:profile>
</gcq:format>
</gcq:presentationRequest>
</env:Body>

</env:Envelope>
```

6.2.1. **get**

The get element specifies, which record must be presented. The value is the /MD_Metadata/objid given by the gateway server in a previous request. One or more get elements can be specified in one request.

6.2.2. **format**

The format element is the same as used in the query request (cf. above).

7. Result Presentation

Query results are presented in a SOAP message. In addition to the header of the query request, the responseTo element needs to be specified and repeats the messageID of the message to which the server delivers the current results.

The structure of the result is described by an XMLSchema for the GM03Small profile and by an Interlis 2 schema for the GM03Core, GM03Comprehensive in chapter 9.3 below (also an XMLSchema is available). The encoding of the transfer for the schemas described in Interlis 2 (GM03Core or GM03Comprehensive) is in XML according to the Interlis 2 XML encoding rules.

Rules regarding mandatory and optional fields in GM03Small:

Mandatory fields: the gateway server has to provide valid values for the fields marked as mandatory.

Optional fields: if no value is available, the gateway server should send no tag (or empty tags)

Fields not supported: if a field is not present in the gateway's metadata, the server can note it by setting the attribute 'notSupported' of the field to 'true'. This is valid only for optional fields, as mandatory fields values have to be provided.

The result can also be a count element indicating how many results were found (see chapter 5.2 for details).

8. Error Handling

Errors are handled with the SOAP fault mechanism. Besides the standard faults VersionMismatch, MustUnderstand, DataEncodingUnknown some specific error messages at the Sender and Receiver level can be defined in <http://www.geocat.ch/2003/05/gateway/faults>. Below is an example of a fault caused by a wrong attribute name.

```
<?xml version='1.0' ?>
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:gcf="http://www.geocat.ch/2003/05/gateway/faults">

  <env:Body>
    <env:Fault>
      <env:Code>
        <env:Value>env:Sender</env:Value>
        <env:Subcode>
          <env:Value>gcf:malformed request</env:Value>
        </env:Subcode>
      </env:Code>
      <env:Reason>
        <env:Text xml:lang="en">Malformed request</env:Text>
      </env:Reason>
      <env:Detail>
        <gcf:attribute>/MD_metadata/abstr</gcf:attribute >
      </env:Detail>
    </env:Fault>
  </env:Body>
</env:Envelope>
```

It is proposed to specify the following Sender details:

- format: wrong format
- attribute: unknown attribute
- operator: unknown operator
- value: wrong value type

For the Receiver the following details can be specified:

- database: database fault.

Details are helpful in tracking and eliminating problems. Additional details can be defined in the course of the development of gateway clients and servers in the geocat.ch project.

9. Annex

9.1. Normative References

The following standards are used in these specifications:

[SOAP 1.1] "Simple Object Access Protocol (SOAP) 1.1" Don Box, David Ehnebuske, Gopal Kakivaya, Andrew Layman, Noah Mendelsohn, Henrik Frystyk Nielsen, Satish Thatte, Dave Winer (See <http://www.w3.org/TR/2000/NOTE-SOAP-20000508/>)

[INTERLIS 2] "INTERLIS 2 – Referenzhandbuch" Ausgabe vom 2003-05-13 (deutsch) KOGIS (See <http://www.interlis.ch>.)

[ISO 19115] Revised text of 19115 Geographic information - Metadata, as sent to the ISO Central Secretariat for registration as FDIS, 2002-12-17, (See <http://www.isotc211.org/protdoc/211n1377/>, password protected).

[Swiss Profile] "GM03 Metadatenmodell, SN 612050", Working Draft, Version 1.3 vom 13. Oktober 2003, KOGIS (See <http://www.kogis.ch>)

[OpenGIS GML] OpenGIS® Geography Markup Language (GML), Implementation Specification, Version 3.0, Open GIS Consortium, Inc., 2003-01-29 , OGC 02-023r4, (See <http://www.opengis.org/techno/documents/02-023r4.pdf>)

9.2. Frequently Asked Questions

9.2.1. Request for Comments (RFC) Process

The discussion of the protocol was started in February 2003 amongst the potential gateway partners of the geocat.ch project. It is assumed that these partners pass the requirements to their respective system provider for comments. A first version of the protocol will be tested with some partners to gain experience with it. Then after adaptations a final version of the protocol will be published to a wider community for comments.

9.2.2. Cheapest solution

It is commented that data replication would be a cheaper solution than the gateway. Data replication is possible in the geocat.ch project using the import/export functionality based on Interlis 2/XML.

9.2.3. No own server in the Internet

It is asked how organizations without an own server in the Internet can participate in the gateway infrastructure.

The gateway protocol relies on online available gateway servers. Only organizations with such a server can be included in the live connections of the gateway. Organizations without an own gateway server can participate in the

geocat.ch project by providing their metadata directly into the geocat.ch server or by uploading their metadata with the import function of geocat.ch.

9.3. GM03Small: XSD Description for the Result Presentation

The GM03Small is composed from the following attributes:

```

/MD_Metadata/fileIdentifier
/MD_Metadata/dateStamp
/MD_Metadata/dataSetURI
/MD_Metadata/metadataSetURI
/MD_Metadata/identificationInfo/language
/MD_Metadata/identificationInfo/purpose/textGroup/plainText
/MD_Metadata/identificationInfo/purpose/textGroup/language
/MD_Metadata/identificationInfo/purpose/textGroup/country
/MD_Metadata/identificationInfo/purpose/textGroup/characterSetCode
/MD_Metadata/identificationInfo/topicCategory
/MD_Metadata/identificationInfo/abstract/textGroup/plainText
/MD_Metadata/identificationInfo/abstract/textGroup/language
/MD_Metadata/identificationInfo/abstract/textGroup/country
/MD_Metadata/identificationInfo/abstract/textGroup/characterSetCode
/MD_Metadata/identificationInfo/citation/title/textGroup/plainText
/MD_Metadata/identificationInfo/citation/title/textGroup/language
/MD_Metadata/identificationInfo/citation/title/textGroup/country
/MD_Metadata/identificationInfo/citation/title/textGroup/characterSetCode
/MD_Metadata/identificationInfo/citation/date/date
/MD_Metadata/identificationInfo/citation/date/dateType
/MD_Metadata/identificationInfo/pointOfContact/role
/MD_Metadata/identificationInfo/pointOfContact/individualName
/MD_Metadata/identificationInfo/pointOfContact/positionName/textGroup/plainText
/MD_Metadata/identificationInfo/pointOfContact/positionName/textGroup/language
/MD_Metadata/identificationInfo/pointOfContact/positionName/textGroup/country
/MD_Metadata/identificationInfo/pointOfContact/positionName/textGroup/characterSetCode
/MD_Metadata/identificationInfo/pointOfContact/organisationName/textGroup/plainText
/MD_Metadata/identificationInfo/pointOfContact/organisationName/textGroup/language
/MD_Metadata/identificationInfo/pointOfContact/organisationName/textGroup/country
/MD_Metadata/identificationInfo/pointOfContact/organisationName/textGroup/characterSetCode
/MD_Metadata/identificationInfo/descriptiveKeywords/keyword/textGroup/plainText
/MD_Metadata/identificationInfo/descriptiveKeywords/keyword/textGroup/language
/MD_Metadata/identificationInfo/descriptiveKeywords/keyword/textGroup/country
/MD_Metadata/identificationInfo/descriptiveKeywords/keyword/textGroup/characterSetCode
/MD_Metadata/identificationInfo/extent/description/textGroup/plainText
/MD_Metadata/identificationInfo/extent/description/textGroup/language
/MD_Metadata/identificationInfo/extent/description/textGroup/country
/MD_Metadata/identificationInfo/extent/description/textGroup/characterSetCode
/MD_Metadata/identificationInfo/extent/geographicElement/polygon
/MD_Metadata/identificationInfo/extent/geographicElement/westBoundLongitude
/MD_Metadata/identificationInfo/extent/geographicElement/eastBoundLongitude

```

```

/MD_Metadata/identificationInfo/extent/geographicElement/southBoundLatitude
/MD_Metadata/identificationInfo/extent/geographicElement/northBoundLatitude
/MD_Metadata/identificationInfo/extent/geographicElement/
geographicIdentifier/code/textGroup/plainText
/MD_Metadata/identificationInfo/extent/geographicElement/
geographicIdentifier/code/textGroup/language
/MD_Metadata/identificationInfo/extent/geographicElement/
geographicIdentifier/code/textGroup/country
/MD_Metadata/identificationInfo/extent/geographicElement/
geographicIdentifier/code/textGroup/characterSetCode

```

This is the description of the GM03Small profile for the minimal result presentation. The description is given in XML Schema.

```

<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <xsd:import namespace="GML" schemaLocation="GML_simplified.xsd"/>

  <xsd:element name="MD_Metadata">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="fileIdentifier" type="gm03small:optionalString"
minOccurs="0"/>
        <xsd:element name="dateStamp" type="xsd:date"/>
        <xsd:element name="dataSetURI" type="gm03small:optionalString"
minOccurs="0"/>
        <xsd:element name="metadataSetURI" type="gm03small:optionalString"
minOccurs="0"/>
        <xsd:element name="identificationInfo" maxOccurs="unbounded">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="language" type="LanguageCodeISO"
maxOccurs="unbounded"/>
              <xsd:element name="purpose"
type="gm03small:optionalPT_FreeText" minOccurs="0"/>
              <xsd:element name="topicCategory"
type="gm03small:optionalTopicCategory" minOccurs="0" maxOccurs="unbounded"/>
              <xsd:element name="abstract" type="PT_FreeText"/>
              <xsd:element name="citation">
                <xsd:complexType>
                  <xsd:sequence>
                    <xsd:element name="title" type="PT_FreeText"/>
                    <xsd:element name="date" maxOccurs="unbounded">
                      <xsd:complexType>
                        <xsd:sequence>
                          <xsd:element name="date" type="xsd:date"/>
                          <xsd:element name="dateType"
type="CI_DateTypeCode"/>
                        </xsd:sequence>
                      </xsd:complexType>
                    </xsd:element>
                  </xsd:sequence>
                </xsd:complexType>
              </xsd:element>
              <xsd:element name="pointOfContact" minOccurs="0"
maxOccurs="unbounded">
                <xsd:complexType>
                  <xsd:sequence>

```

```

        <xsd:element name="role" type="CI_RoleCode"
maxOccurs="unbounded"/>
        <xsd:element name="individualName" type="xsd:string"
minOccurs="0"/>
        <xsd:element name="positionName" type="PT_FreeText"
minOccurs="0"/>
        <xsd:element name="organisationName" type="PT_FreeText"
minOccurs="0"/>
        </xsd:sequence>
        <xsd:attributeGroup ref="gm03small:notSupportedGroup"/>
    </xsd:complexType>
</xsd:element>

    <xsd:element name="descriptiveKeywords" maxOccurs="unbounded"
minOccurs="0">
        <xsd:complexType>
            <xsd:sequence>
                <xsd:element name="keyword" type="PT_FreeText"
maxOccurs="unbounded"/>
            </xsd:sequence>
            <xsd:attributeGroup ref="gm03small:notSupportedGroup"/>
        </xsd:complexType>
    </xsd:element>

    <xsd:element name="extent" maxOccurs="unbounded" minOccurs="0">
        <xsd:complexType>
            <xsd:sequence>
                <xsd:element name="description"
type="gm03small:optionalPT_FreeText" minOccurs="0"/>
                <xsd:element name="geographicElement" minOccurs="0"
maxOccurs="unbounded">
                    <xsd:complexType>
                        <xsd:sequence>
                            <xsd:element name="polygon" type="GML:Polygon"
minOccurs="0"/>
                            <xsd:element name="westBoundLongitude"
type="xsd:double" minOccurs="0"/>
                            <xsd:element name="eastBoundLongitude"
type="xsd:double" minOccurs="0"/>
                            <xsd:element name="southBoundLatitude"
type="xsd:double" minOccurs="0"/>
                            <xsd:element name="northBoundLatitude"
type="xsd:double" minOccurs="0"/>
                            <xsd:element name="geographicIdentifier"
minOccurs="0">
                                <xsd:complexType>
                                    <xsd:sequence>
                                        <xsd:element name="code" type="PT_FreeText"/>
                                    </xsd:sequence>
                                    <xsd:attributeGroup
ref="gm03small:notSupportedGroup"/>
                                </xsd:complexType>
                            </xsd:element>
                        </xsd:sequence>
                    </xsd:complexType>
                </xsd:element>
            </xsd:sequence>
        </xsd:complexType>
    </xsd:element>
</xsd:sequence>
</xsd:complexType>

```

```
</xsd:element>

</xsd:sequence>
<xsd:attribute name="objid" type="xsd:string" use="required"/>
</xsd:complexType>
</xsd:element>

<xsd:complexType name="PT_Group">
  <xsd:sequence>
    <xsd:element name="plainText" type="xsd:string"/>
    <xsd:element name="language" type="LanguageCodeISO" minOccurs="0"/>
    <xsd:element name="country" type="CountryCodeISO" minOccurs="0"/>
    <xsd:element name="characterSetCode" type="MD_CharacterSetCode"
minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:complexType name="PT_FreeText">
  <xsd:sequence>
    <xsd:element name="textGroup" type="PT_Group" minOccurs="0"
maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<xsd:attributeGroup name="notSupportedGroup">
  <xsd:attribute name="notSupported" type="xsd:boolean" use="optional"
default="false" />
</xsd:attributeGroup>

<xsd:complexType name="optionalPT_FreeText" >
  <xsd:complexContent>
    <xsd:extension base="gm03small:PT_FreeText">
      <xsd:attributeGroup ref="gm03small:notSupportedGroup"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="optionalString" >
  <xsd:simpleContent>
    <xsd:extension base="xsd:string">
      <xsd:attributeGroup ref="gm03small:notSupportedGroup"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:complexType name="optionalTopicCategory" >
  <xsd:simpleContent>
    <xsd:extension base="gm03small:MD_TopicCategoryCode">
      <xsd:attributeGroup ref="gm03small:notSupportedGroup"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>

<xsd:simpleType name="LanguageCodeISO">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="aa"/>
    <xsd:enumeration value="ab"/>
    <xsd:enumeration value="af"/>
    <xsd:enumeration value="am"/>
    <xsd:enumeration value="ar"/>
    <xsd:enumeration value="as"/>
    <xsd:enumeration value="ay"/>
    <xsd:enumeration value="az"/>
  </xsd:restriction>
</xsd:simpleType>
```

```
<xsd:enumeration value="ba" />
<xsd:enumeration value="be" />
<xsd:enumeration value="bg" />
<xsd:enumeration value="bh" />
<xsd:enumeration value="bi" />
<xsd:enumeration value="bn" />
<xsd:enumeration value="bo" />
<xsd:enumeration value="br" />
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<xsd:enumeration value="lo" />
<xsd:enumeration value="lt" />
<xsd:enumeration value="lv" />
<xsd:enumeration value="mg" />
<xsd:enumeration value="mi" />
```

```
<xsd:enumeration value="mk" />
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<xsd:enumeration value="mn" />
<xsd:enumeration value="mo" />
<xsd:enumeration value="mr" />
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<xsd:enumeration value="uz" />
<xsd:enumeration value="vi" />
<xsd:enumeration value="vo" />
<xsd:enumeration value="wo" />
<xsd:enumeration value="xh" />
<xsd:enumeration value="yo" />
```

```
<xsd:enumeration value="zh" />
<xsd:enumeration value="zu" />
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="CountryCodeISO">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="AF" />
    <xsd:enumeration value="AX" />
    <xsd:enumeration value="AL" />
    <xsd:enumeration value="DZ" />
    <xsd:enumeration value="AS" />
    <xsd:enumeration value="AD" />
    <xsd:enumeration value="AO" />
    <xsd:enumeration value="AI" />
    <xsd:enumeration value="AQ" />
    <xsd:enumeration value="AG" />
    <xsd:enumeration value="AR" />
    <xsd:enumeration value="AM" />
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    <xsd:enumeration value="AZ" />
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    <xsd:enumeration value="BH" />
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    <xsd:enumeration value="BB" />
    <xsd:enumeration value="BY" />
    <xsd:enumeration value="BE" />
    <xsd:enumeration value="BZ" />
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    <xsd:enumeration value="CV" />
    <xsd:enumeration value="KY" />
    <xsd:enumeration value="CF" />
    <xsd:enumeration value="TD" />
    <xsd:enumeration value="CL" />
    <xsd:enumeration value="CN" />
    <xsd:enumeration value="CX" />
    <xsd:enumeration value="CC" />
    <xsd:enumeration value="CO" />
    <xsd:enumeration value="KM" />
    <xsd:enumeration value="CG" />
    <xsd:enumeration value="CD" />
    <xsd:enumeration value="CK" />
    <xsd:enumeration value="CR" />
    <xsd:enumeration value="CI" />
    <xsd:enumeration value="HR" />
    <xsd:enumeration value="CU" />
  </xsd:restriction>
</xsd:simpleType>
```

```
<xsd:enumeration value="CY" />
<xsd:enumeration value="CZ" />
<xsd:enumeration value="DK" />
<xsd:enumeration value="DJ" />
<xsd:enumeration value="DM" />
<xsd:enumeration value="DO" />
<xsd:enumeration value="EC" />
<xsd:enumeration value="EG" />
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<xsd:enumeration value="LV" />
<xsd:enumeration value="LB" />
```

```
<xsd:enumeration value="LS" />
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<xsd:enumeration value="LU" />
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<xsd:enumeration value="RU" />
<xsd:enumeration value="RW" />
<xsd:enumeration value="SH" />
<xsd:enumeration value="KN" />
<xsd:enumeration value="LC" />
```

```
<xsd:enumeration value="PM" />
<xsd:enumeration value="VC" />
<xsd:enumeration value="WS" />
<xsd:enumeration value="SM" />
<xsd:enumeration value="ST" />
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<xsd:enumeration value="SB" />
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<xsd:enumeration value="TV" />
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<xsd:enumeration value="UA" />
<xsd:enumeration value="AE" />
<xsd:enumeration value="GB" />
<xsd:enumeration value="US" />
<xsd:enumeration value="UM" />
<xsd:enumeration value="UY" />
<xsd:enumeration value="UZ" />
<xsd:enumeration value="VU" />
<xsd:enumeration value="VE" />
<xsd:enumeration value="VN" />
<xsd:enumeration value="VG" />
<xsd:enumeration value="VI" />
<xsd:enumeration value="WF" />
<xsd:enumeration value="EH" />
<xsd:enumeration value="YE" />
<xsd:enumeration value="ZM" />
<xsd:enumeration value="ZW" />
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="CI_RoleCode">
```

```
<xsd:restriction base="xsd:string">
  <xsd:enumeration value="resourceProvider" />
  <xsd:enumeration value="custodian" />
  <xsd:enumeration value="owner" />
  <xsd:enumeration value="user" />
  <xsd:enumeration value="distributor" />
  <xsd:enumeration value="originator" />
  <xsd:enumeration value="pointOfContact" />
  <xsd:enumeration value="principalInvestigator" />
  <xsd:enumeration value="processor" />
  <xsd:enumeration value="publisher" />
  <xsd:enumeration value="author" />
  <xsd:enumeration value="editor" />
  <xsd:enumeration value="partner" />
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="MD_CharacterSetCode">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="ucs2" />
    <xsd:enumeration value="ucs4" />
    <xsd:enumeration value="utf7" />
    <xsd:enumeration value="utf8" />
    <xsd:enumeration value="utf16" />
    <xsd:enumeration value="a8859part1" />
    <xsd:enumeration value="a8859part2" />
    <xsd:enumeration value="a8859part3" />
    <xsd:enumeration value="a8859part4" />
    <xsd:enumeration value="a8859part5" />
    <xsd:enumeration value="a8859part6" />
    <xsd:enumeration value="a8859part7" />
    <xsd:enumeration value="a8859part8" />
    <xsd:enumeration value="a8859part9" />
    <xsd:enumeration value="a8859part10" />
    <xsd:enumeration value="a8859part11" />
    <xsd:enumeration value="a8859part13" />
    <xsd:enumeration value="a8859part14" />
    <xsd:enumeration value="a8859part15" />
    <xsd:enumeration value="a8859part16" />
    <xsd:enumeration value="jis" />
    <xsd:enumeration value="shiftJIS" />
    <xsd:enumeration value="eucJP" />
    <xsd:enumeration value="usAscii" />
    <xsd:enumeration value="ebcdic" />
    <xsd:enumeration value="eucKR" />
    <xsd:enumeration value="big5" />
    <xsd:enumeration value="GB2312" />
  </xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="MD_TopicCategoryCode">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="farming" />
    <xsd:enumeration value="biota" />
    <xsd:enumeration value="boundaries" />
    <xsd:enumeration value="climatologyMeteorologyAtmosphere" />
    <xsd:enumeration value="economy" />
    <xsd:enumeration value="elevation" />
    <xsd:enumeration value="inlandWaters" />
    <xsd:enumeration value="environment" />
    <xsd:enumeration value="geoscientificInformation" />
    <xsd:enumeration value="health" />
    <xsd:enumeration value="imageryBaseMapsEarthCover" />
  </xsd:restriction>
</xsd:simpleType>
```

```
<xsd:enumeration value="intelligenceMilitary"/>
<xsd:enumeration value="location"/>
<xsd:enumeration value="oceans"/>
<xsd:enumeration value="planningCadastre"/>
<xsd:enumeration value="society"/>
<xsd:enumeration value="structure"/>
<xsd:enumeration value="transportation"/>
<xsd:enumeration value="utilitiesCommunication"/>
</xsd:restriction>
</xsd:simpleType>

<xsd:simpleType name="CI_DateTypeCode">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="creation"/>
    <xsd:enumeration value="publication"/>
    <xsd:enumeration value="revision"/>
  </xsd:restriction>
</xsd:simpleType>
```

9.4. </xsd:schema>

Request samples

Fulltext search with date condition:

```
<?xml version="1.0" ?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

  <soapenv:Header>
    <gch:requestID xmlns:gch="http://www.geocat.ch/2003/05/gateway/header">
      <gch:version>1.0</gch:version>
      <gch:sendingNodeId>sendingNode</gch:sendingNodeId>
      <gch:referenceId>11</gch:referenceId>
      <gch:messageId>11</gch:messageId>
      <gch:responseTo>11</gch:responseTo>
      <gch:dateAndTime>2004-07-28T11:57:01.536+01:00</gch:dateAndTime>
    </gch:requestID>

  </soapenv:Header>

  <soapenv:Body>
    <gcq:catalogGatewayRequest
      xmlns:gcq="http://www.geocat.ch/2003/05/gateway/query">
      <gcq:queryRequest>
        <gcq:criteria>
          <gcq:expression>
            <gcq:attribute>/MD_Metadata/*</gcq:attribute>
            <gcq:operator>like</gcq:operator>
            <gcq:value>%Amtlichen%</gcq:value>
          </gcq:expression>
          <gcq:concatenatedExpression>
            <gcq:concatenationOperator>and</gcq:concatenationOperator>
            <gcq:expression>
              <gcq:attribute>/MD_Metadata/*</gcq:attribute>
              <gcq:operator>like</gcq:operator>
              <gcq:value>%Vermessung%</gcq:value>
            </gcq:expression>
          </gcq:concatenatedExpression>
          <gcq:concatenatedExpression>
            <gcq:concatenationOperator>and</gcq:concatenationOperator>
            <gcq:expression>
              <gcq:attribute>/MD_Metadata/identificationInfo/citation/date/date</gcq:attribute>
              <gcq:operator>gt</gcq:operator>
              <gcq:value>2002-07-20</gcq:value>
            </gcq:expression>
          </gcq:concatenatedExpression>
        </gcq:criteria>
        <gcq:format>
          <gcq:profile>GM03Small</gcq:profile>
          <gcq:order/>
        </gcq:format>
      </gcq:queryRequest>
    </gcq:catalogGatewayRequest>

  </soapenv:Body>

</soapenv:Envelope>
```

Polygon search:

```

<?xml version="1.0" ?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

  <soapenv:Header>
    <gch:requestID xmlns:gch="http://www.geocat.ch/2003/05/gateway/header">
      <gch:version>1.0</gch:version>
      <gch:sendingNodeId>sendingNode</gch:sendingNodeId>
      <gch:referenceId>12</gch:referenceId>
      <gch:messageId>12</gch:messageId>
      <gch:responseTo>12</gch:responseTo>
      <gch:dateAndTime>2004-07-28T12:02:18.892+01:00</gch:dateAndTime>
    </gch:requestID>

  </soapenv:Header>

  <soapenv:Body>
    <gcq:catalogGatewayRequest
      xmlns:gcq="http://www.geocat.ch/2003/05/gateway/query">
      <gcq:queryRequest>
        <gcq:criteria>
          <gcq:expression>

<gcq:attribute>/MD_Metadata/identificationInfo/extent/geographicElement/polygon</gcq:attribute>
          <gcq:operator>OVERLAPS</gcq:operator>
          <gcq:value>
            <gml:Polygon srsName="EPSG:4326">
              <gml:exteriorRing>
                <gml:pos>7.221597028 46.814340925</gml:pos>
                <gml:pos>7.049542112 46.720708593</gml:pos>
                <gml:pos>7.197794607 46.619473014</gml:pos>
                <gml:pos>7.345094773 46.746746568</gml:pos>
                <gml:pos>7.221597028 46.814340925</gml:pos>
              </gml:exteriorRing>
            </gml:Polygon>
          </gcq:value>
        </gcq:expression>
      </gcq:criteria>
      <gcq:format>
        <gcq:profile>GM03Small</gcq:profile>
        <gcq:order/>
      </gcq:format>
    </gcq:queryRequest>
  </gcq:catalogGatewayRequest>

</soapenv:Body>

</soapenv:Envelope>

```

9.5. GM03Small Response sample

```

<?xml version="1.0" ?>
<soapenv:Envelope xmlns:soapenv=http://schemas.xmlsoap.org/soap/envelope/
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

  <soapenv:Header>
    <requestID xmlns="http://www.geocat.ch/2003/05/gateway/header">
      <version>1.0</version>
      <sendingNodeId>sendingNode</sendingNodeId>
      <referenceId>11</referenceId>
      <messageId>11</messageId>
      <responseTo>11</responseTo>
      <dateAndTime>2004-07-28T11:57:01.536+01:00</dateAndTime>
    </requestID>

  </soapenv:Header>

  <soapenv:Body>
    <catalogGatewayRequest
      xmlns="http://www.geocat.ch/2003/05/gateway/query">
      <queryResult>
        <gcq:MD_Metadata objid="xMetadax12"
          xmlns:gcq="http://www.geocat.ch/2003/05/gateway/GM03Small">
          <gcq:fileIdentifier>12Ktz</gcq:fileIdentifier>
          <gcq:dateStamp>2004-07-28T00:00:00+01:00</gcq:dateStamp>

        <gcq:dataSetURI>http://www.fr.ch/sccg/de/geographie/images/europe.gif</gcq:da
        taSetURI>
          <gcq:metadataSetURI notSupported="true"/>
          <gcq:identificationInfo>
            <gcq:language>fr</gcq:language>
            <gcq:language>de</gcq:language>
            <gcq:purpose>
              <gcq:textGroup>
                <gcq:plainText>Als amtliche Vermessungen im Sinne des ZGB
                gelten die zur Anlage und Führung des Grundbuches vom Bund anerkannten
                Vermessungen. Die Daten der amtlichen Vermessung sollen als Grundlage für den
                Aufbau und den Betrieb von Landinformationssystemen dienen und für
                öffentliche und private Zwecke verwendet werden können.</gcq:plainText>
                <gcq:language>de</gcq:language>
              </gcq:textGroup>
              <gcq:textGroup>
                <gcq:plainText>La mensuration officielle au sens du CC
                désigne les mensurations exécutées en vue de l'établissement et de la tenue
                du registre foncier et reconnues par la Confédération. Les données de la
                mensuration officielle doivent servir à la constitution et à l'exploitation
                de systèmes d'information du territoire et doivent pouvoir être utilisées à
                des fins tant publiques que privées.</gcq:plainText>
                <gcq:language>fr</gcq:language>
              </gcq:textGroup>
            </gcq:purpose>
            <gcq:topicCategory>planningCadastre</gcq:topicCategory>
            <gcq:abstract>
              <gcq:textGroup>
                <gcq:plainText>La mensuration officielle au sens du CC
                désigne les mensurations exécutées en vue de l'établissement et de la tenue
                du registre foncier et reconnues par la Confédération. Les données de la
                mensuration officielle doivent servir à la constitution et à l'exploitation

```

```

de systèmes d'information du territoire et doivent pouvoir être utilisées à
des fins tant publiques que privées.</gcq:plainText>
  <gcq:language>fr</gcq:language>
</gcq:textGroup>
</gcq:textGroup>
  <gcq:plainText>Als amtliche Vermessungen im Sinne des ZGB
gelten die zur Anlage und Führung des Grundbuches vom Bund anerkannten
Vermessungen.Die Daten der amtlichen Vermessung sollen als Grundlage für den
Aufbau und den Betrieb von Landinformationssystemen dienen und für
öffentliche und private Zwecke verwendet werden können.</gcq:plainText>
  <gcq:language>de</gcq:language>
</gcq:textGroup>
</gcq:abstract>
<gcq:citation>
  <gcq:title>
    <gcq:textGroup>
      <gcq:plainText>Stand der Amtlichen Vermessung des Kantons
Freiburg</gcq:plainText>
      <gcq:language>de</gcq:language>
    </gcq:textGroup>
    <gcq:textGroup>
      <gcq:plainText>Situation de la mensuration officielle au
Canton de Fribourg</gcq:plainText>
      <gcq:language>fr</gcq:language>
    </gcq:textGroup>
  </gcq:title>
  <gcq:date>
    <gcq:date>2002-07-22+01:00</gcq:date>
    <gcq:dateType>creation</gcq:dateType>
  </gcq:date>
</gcq:citation>
<gcq:pointOfContact>
  <gcq:role>author</gcq:role>
  <gcq:individualName>PUPPELOPE</gcq:individualName>
  <gcq:organisationName>
    <gcq:textGroup>
      <gcq:plainText>Amtliche Vermessung Freiburg</gcq:plainText>
      <gcq:language>de</gcq:language>
    </gcq:textGroup>
    <gcq:textGroup>
      <gcq:plainText>Mensuration Officielle
Fribourgeoise</gcq:plainText>
      <gcq:language>fr</gcq:language>
    </gcq:textGroup>
  </gcq:organisationName>
</gcq:pointOfContact>
<gcq:descriptiveKeywords>
  <gcq:keyword>
    <gcq:textGroup>
      <gcq:plainText>Vermessung</gcq:plainText>
      <gcq:language>de</gcq:language>
    </gcq:textGroup>
    <gcq:textGroup>
      <gcq:plainText>Mensuration</gcq:plainText>
      <gcq:language>fr</gcq:language>
    </gcq:textGroup>
    <gcq:textGroup>
      <gcq:plainText>Surveying</gcq:plainText>
      <gcq:language>en</gcq:language>
    </gcq:textGroup>
  </gcq:keyword>
<gcq:keyword>
  <gcq:textGroup>

```

```
<gcq:plainText>Boden</gcq:plainText>
<gcq:language>de</gcq:language>
</gcq:textGroup>
<gcq:textGroup>
  <gcq:plainText>Sol</gcq:plainText>
  <gcq:language>fr</gcq:language>
</gcq:textGroup>
<gcq:textGroup>
  <gcq:plainText>Soil</gcq:plainText>
  <gcq:language>en</gcq:language>
</gcq:textGroup>
</gcq:keyword>
</gcq:descriptiveKeywords>
<gcq:descriptiveKeywords>
  <gcq:keyword>
    <gcq:textGroup>
      <gcq:plainText>Cadastre</gcq:plainText>
      <gcq:language>en</gcq:language>
    </gcq:textGroup>
    <gcq:textGroup>
      <gcq:plainText>Kataster</gcq:plainText>
      <gcq:language>de</gcq:language>
    </gcq:textGroup>
    <gcq:textGroup>
      <gcq:plainText>cadastre</gcq:plainText>
      <gcq:language>fr</gcq:language>
    </gcq:textGroup>
  </gcq:keyword>
</gcq:descriptiveKeywords>
<gcq:extent>
  <gcq:geographicElement>
    <gml:Polygon srsName="EPSG:4326"
      xmlns:gml="http://www.geocat.ch/2003/05/gateway/GML">
      <gml:exteriorRing>
        <gml:pos>6.77238895557 47.00333613913</gml:pos>
        <gml:pos>6.78702467701 46.43461043367</gml:pos>
        <gml:pos>7.37735003303 46.43646840372</gml:pos>
        <gml:pos>7.38067487955 47.00927446963</gml:pos>
        <gml:pos>6.77238895557 47.00333613913</gml:pos>
      </gml:exteriorRing>
    </gml:Polygon>
    <gcq:westBoundLongitude>6.7794</gcq:westBoundLongitude>
    <gcq:eastBoundLongitude>7.3807</gcq:eastBoundLongitude>
    <gcq:southBoundLatitude>46.4346</gcq:southBoundLatitude>
    <gcq:northBoundLatitude>47.0093</gcq:northBoundLatitude>
    <gcq:geographicIdentifier>
      <gcq:code>
        <gcq:textGroup>
          <gcq:plainText>Canton of Fribourg</gcq:plainText>
          <gcq:language>en</gcq:language>
        </gcq:textGroup>
        <gcq:textGroup>
          <gcq:plainText>Canton de Fribourg</gcq:plainText>
          <gcq:language>fr</gcq:language>
        </gcq:textGroup>
        <gcq:textGroup>
          <gcq:plainText>Kanton Freiburg</gcq:plainText>
          <gcq:language>de</gcq:language>
        </gcq:textGroup>
      </gcq:code>
    </gcq:geographicIdentifier>
  </gcq:geographicElement>
</gcq:extent>
```

```
        </gcq:identificationInfo>
      </gcq:MD_Metadata>
    </queryResult>
  </catalogGatewayRequest>

</soapenv:Body>
</soapenv:Envelope>
```

9.6. Interlis 2 Description for the Result Presentation

The Interlis 2 schema describes the structure of the result presentation used in the gateway protocol profiles (GM03_V18.ili). The document can be downloaded from the kogis website:

<http://www.geocat.ch/internet/geocat/de/home/documentation/gm03.html>