OGC™Catalogue Services Specification 2.0.0 (with Corrigendum) –
EO Application Profile for CSW 2.0

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i. Preface

This document explains how Catalogue Services based on the HMA (Heterogeneous Earth Observation Missions Accessibility) Application Profile for the OGC™ Catalogue Services Specification v2.0.0 (with Corrigendum) [OGC 04-021r3] are organised and implemented for the discovery, retrieval and management of Earth Observation products metadata. This document has used the ISO19115/ISO19119 Application Profile [OR1] as input.

ii. Submitting organisations

The following organisations will submit the original document or its revisions to the OGC™ Catalogue Services Specification 2.0 Revision Working Group.

- **ESA – European Space Agency**

- **Spacebel s.a.**

- **Con terra**

- **GIM**

- **Spot Image**

The editors would like to acknowledge that this work is the result of collaboration and review of many organizations and would like to thank for the comments and contributions from:

- **ASI**

- **CNES**

- **DLR**

- **Eumetsat**

- **EUSC**

- **MDA**

- **JRC**

Note: this does not imply a complete endorsement from these organizations.

iii. Document contributor contact points

All questions regarding this document should be directed to the editor or the contributors:

Contact	Organisation	Email
Marc Gilles	Spacebel	Marc.gilles@spacebel.be
Yves Coene	Spacebel	Yves.coene@spacebel.be
Jolyon Martin	ESA	Jolyon.martin@esa.int
Jerome Gasperi	CNES	Jerome.gasperi@cnes.fr
Bernhard Buckl	DLR	Bernhard.Buckl@dlr.de
Peter Meisl	MDA	pm@mdacorporation.com
Franck Sery	ASU	franck.sery@astrium.eads.net
Frank Cadé	EUMETSAT	franck.cade@eumetsat.int
Giovanni Rum	ASI	giovanni.rum@asi.it
Didier Giacobbo	Spot Image	Didier.giacobbo@spotimage.fr
Uwe Voges	Conterra	voges@conterra.de
Steven Smolders	GIM	Steven.smolders@gim.be

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			Section 8.4.2 added.	Added distributed search.
			Section 1 updated	Added description of types of profiles.

v. Changes to the OGC™® Abstract Specification

To be confirmed as result of ongoing work.

vi. Future work

At this stage, the current document is a work in progress which is performed in parallel with the schema definition.

vii. Foreword

This document, through its implementation profile, references several external standards and specifications as dependencies:

1. Unified Modeling Language (UML) Version 1.3, The Object Management Group (OMG): http://www.omg.org/cgi-bin/doc?formal/00-03-01

2. The Extensible Markup Language (XML), World Wide Web Consortium, http://www.w3.org/TR/1998/REC-xml-19980210

3. W3C Recommendation (24 June 2003): SOAP Version 1.2 Part 1,Messaging Framework, http://www.w3.org/TR/SOAP/

4. WSDL, Web Services Description Language (WSDL) 1.1, http://www.w3.org/TR/wsdl

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Introduction

This specification is part of a set that describe services for managing Earth Observation (EO) data products. The services include collection level, and product level catalogues, online-ordering for existing and future products, on-line access etc. These services are put into context in an overall document [NR3- Best Practices for EO Products].

The services proposed in this profile are intended to support the identification (EO) data products from previously identified data collections. In other words, the search and present of metadata from catalogues of EO data products. The intent of this profile is to describe a cost effective interface that can be supported by many data providers (satellite operators, data distributors …), most of whom have existing (and relatively complex) facilities for the management of these data. The strategy is to reuse as far as possible the SOAP binding defined in the ISO Application Profile [OR1] as csw201.ApIso-soap-binding.wsdl, except the schemas defining the information model. To achieve a cost effective interface, some choices present in [OR1] will be limited by textual comments.

EO data product collections are usually structured to describe data products derived from a single sensor onboard a satellite or series of satellites. Products from different classes of sensors usually require specific product metadata. The following classes of products have been identified so far: radar, optical, atmospheric. The proposed approach is to identify a common set of elements grouped in a common (HMA) schema and extend this common schema to add the sensors specific metadata.

1   Scope

A profile constrains one or more base specifications to meet the needs of a particular domain. ISO 19106 (Profiles) distinguishes two kinds of profiles, depending upon whether the profile restricts or extends the base specifications. The current document is a profile restricting and extending the CSW ISO Application Profile for use by the Earth Observation (EO) community.

This proposed application profile document describes the interfaces, bindings and encodings required to discover, search and present metadata from catalogues of Earth Observation products. The profile presents a minimum specification for catalogue interoperability within the EO domain, with extensions for specific classes of data.

2   Conformance

Conformance may be tested via the HMA prototype Acceptance Test Plan [NR4].

3   References

3.1   *Normative references*

    [NR0]   OGC Catalogue Services Specification, v2.0.0 (with Corrigendum)
                    OGC 04-021r3

    [NR1]   OGC Filter Encoding Implementation Specification, version 1.1.0
                    OGC 04-095

[NR2]   OWS Common Implementation Specification, May 2005
OGC 05-008c1

[NR3]   OpenGIS Catalogue Services – Best Practices for EO Products
OGC-05-057r4

[NR4]   HMA Prototype Acceptance Test Plan
HMA-PL-SPB-AV-001

[NR5]   GML 3.1.1 Application schema for Earth Observation products
OGC 06-xxxr1

[NR6]   W3C Recommendation January 1999, Namespaces In XML,
http://www.w3.org/TR/2000/REC-xml-names

[NR7]   W3C Recommendation 6 October 2000, Extensible Markup Language (XML) 1.0 (Second Edition), http://www.w3.org/TR/REC-xml

[NR8]   W3C Recommendation 2 May 2001: XML Schema Part 0: Primer, http://www.w3.org/TR/2001/REC-xmlschema-0-20010502/

[NR9]   W3C Recommendation 2 May 2001: XML Schema Part 1: Structures, http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/

[NR10]   W3C Recommendation 2 May 2001: XML Schema Part 2: Datatypes, http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/

[NR11]   W3C Recommendation (24 June 2003): SOAP Version 1.2 Part 1: Messaging Framework, http://www.w3.org/TR/SOAP/

[NR12]   WSDL, Web Services Description Language (WSDL) 1.1. Available [online]: http://www.w3.org/TR/wsdl

3.2   *Other references*

[OR1]   ISO19115/ISO19119 Application Profile for CSW 2.0
OGC 04-038r4

[OR2]   HMA Operational Scenarios Technical Note
HMA-TN-ASU-SY-0001

4   Terms and definitions

For the purposes of this document, the following terms and definitions apply:

4.1.
Application profile
set of one or more base standards and – where applicable – the identification of chosen clauses, classes, subsets, options and parameters of those base standards that are necessary for accomplishing a particular function [ISO 19101, ISO 19106]

4.2.
client
software component that can invoke an **operation** from a **server**

4.3.
data level
stratum within a set of layered levels in which data is recorded that conforms to definitions of types found at the application model level [ISO 19101]

4.4.
dataset series (dataset collection[1])
collection of datasets sharing the same product specification [ISO 19113, ISO 19114, ISO 19115]. In the earth observation context, a collection typically corresponds to datasets (i.e. products) derived from data acquired by a single sensor onboard a satellite or series of satellites.

4.5.
geographic dataset
dataset with a spatial aspect [ISO 19115]

4.6.
geographic information
information concerning phenomena implicitly or explicitly associated with a location relative to the Earth [ISO 19128 draft]

4.7.
georesource
geographic information of a specific type (e.g. geographic dataset, geographic application, geographic service)

4.8.
identifier
a character string that may be composed of numbers and characters that is exchanged between the client and the server with respect to a specific identity of a resource

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[1] Due to historical reasons we´ll mainly use the term 'dataset collection' in this document although the term 'dataset series' is used in the ISO/TC211 Terminology Maintenance Group.

4.9.
interface
named set of operations that characterise the behaviour of an entity [ISO 19119]

4.10.
metadata dataset (metadataset)
metadata describing a specific dataset [ISO 19101]

4.11.
metadata entity
group of metadata elements and other metadata entities describing the same aspect of data

NOTE 1   A metadata entity may contain one or more metadata entities.

NOTE 2   A metadata entity is equivalent to a class in UML terminology [ISO 19115].

4.12.
metadata schema
conceptual schema describing metadata

NOTE   ISO 19115 describes a standard for a metadata schema. [ISO 19101]

4.13.
metadata section
subset of metadata that defines a collection of related metadata entities and elements [ISO 19115]

4.14.
operation
specification of a transformation or query that an object may be called to execute [ISO 19119]

4.15.
parameter
variable whose name and value are included in an operation **request** or **response**

4.16.
qualified name
name that is prefixed with its naming context

EXAMPLE   The qualified name for the road no attribute in class Road defined in the Roadmap schema is RoadMap.Road.road_no. [ISO 19118].

4.17.
request
invocation of an **operation** by a **client**

4.18.
response
result of an **operation,** returned from a **server** to a **client**

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4.19.
schema
formal description of a model [ISO 19101, ISO 19103, ISO 19109, ISO 19118]

4.20.
server
service instance
a particular instance of a **service** [ISO 19119]

4.21.
service
distinct part of the functionality that is provided by an entity through interfaces [ISO 19119]

capability which a service provider entity makes available to a service user entity at the interface between those entities [ISO 19104 terms repository]

4.22.
service interface
shared boundary between an automated system or human being and another automated system or human being [ISO 19101]

4.23.
service metadata
metadata describing the **operations** and **geographic information** available at a **server** [ISO 19128 draft]

4.24.
state
condition that persists for a period

NOTE   The value of a particular feature attribute describes a condition of the feature [ISO 19108].

4.25.
transfer protocol
common set of rules for defining interactions between distributed systems [ISO 19118]

4.26.
version
version of an Implementation Specification (document) and XML Schemas to which the requested operation conforms

NOTE   An OWS Implementation Specification version may specify XML Schemas against which an XML encoded operation request or response must conform and should be validated.

5   Symbols and abbreviations

5.1   *Symbols (and abbreviated terms)*

Some frequently used abbreviated terms:

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API   Application Program Interface

BPEL   Business Process Execution Language

COTS   Commercial Off The Shelf

CQL   Common Query Language

CRS   Coordinate Reference System

CSW   Catalogue Service-Web

DCE   Distributed Computing Environment

DC   Dublin Core

DCMI   Dublin Core Metadata Initiative

DCP   Distributed Computing Platform

EO   Earth Observation

HMA   Heterogeneous Missions Accessibility

HTTP   HyperText Transport Protocol

ISO   International Organisation for Standardisation

OGC   Open GIS Consortium

SOAP   Simple Object Access Protocol

SQL   Structured Query Language

UML   Unified Modeling Language

URI   Uniform Resource Identifier

URL   Uniform Resource Locator

URN   Uniform Resource Name

UTF-8 Unicode Transformation Format-8

WSDL   Web Service Definition Language

W3C   World Wide Web Consortium

XML   eXtensible Markup Language

5.2   UML notation

Some of the diagrams in this document are presented using the Unified Modeling Language (UML) static structure diagram. The UML notations used in this document are described in Figure 1, below.

Association between classes

Association Cardinality

Aggregation between classes   **Class Inheritance (subtyping of classes)**
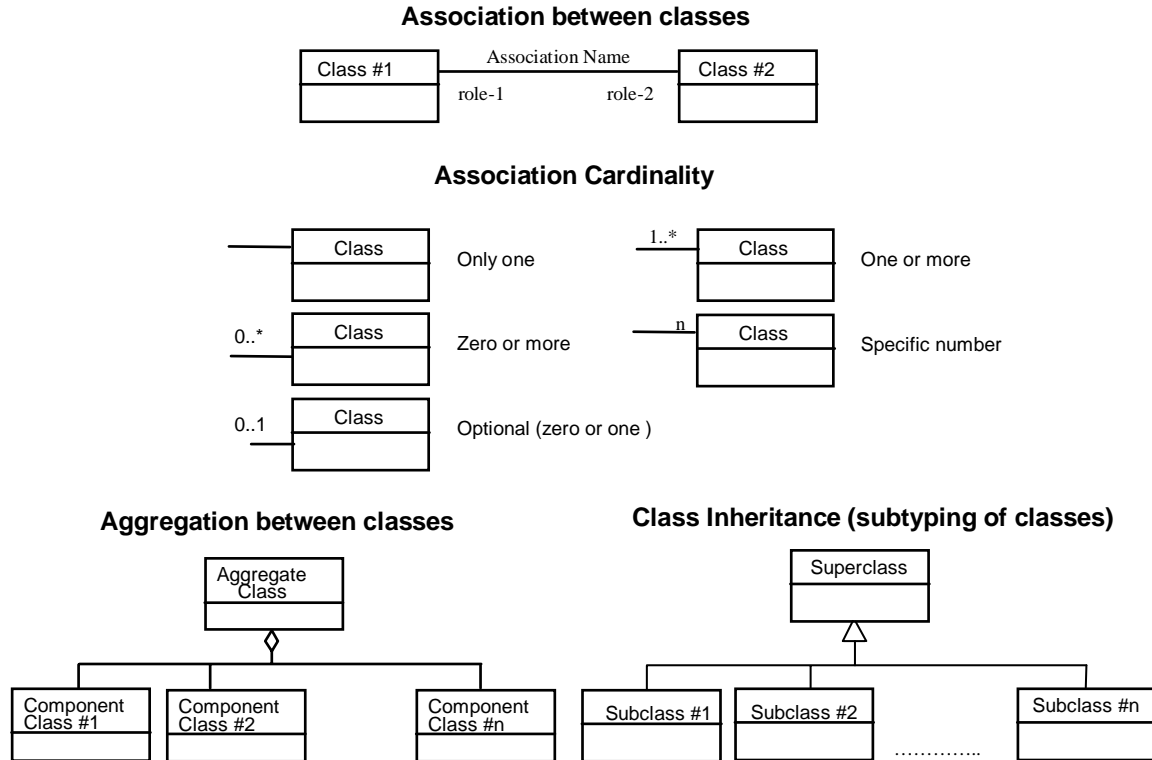
Figure 1 UML notations

In these UML class diagrams, the class boxes with a light background are the primary classes being shown in this diagram, often the classes from one UML package. The class boxes with a gray background are other classes used by these primary classes, usually classes from other packages.

In this diagram, the following stereotypes of UML classes are used:

<<Interface>> A definition of a set of operations that is supported by objects having this interface. An Interface class cannot contain any attributes.

<<Type>> A stereotyped class used for specification of a domain of instances (objects), together with the operations applicable to the objects. A Type class may have attributes and associations.

<<DataType>> A descriptor of a set of values that lack identity (independent existence and the possibility of side effects). A DataType is a class with no operations whose primary purpose is to hold the information.

<<CodeList>> A flexible enumeration that uses string values for expressing a list of potential values. If the list alternatives are completely known, an enumeration shall be used; if the only likely alternatives are known, a code list shall be used.

<<Enumeration>> A data type whose instances form a list of alternative literal values. Enumeration means a short list of well-understood potential values within a class.

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In this document, the following standard data types are used:

CharacterString – A sequence of characters

Boolean – A value specifying TRUE or FALSE

Integer – An integer number

Identifier – Unique identifier of an object

URI – An identifier of a resource that provides more information

URL – An identifier of an on-line resource that can be electronically accessed

5.3   Document terms and definitions

This document uses the specification terms defined in Subclause 5.3 of [NR2].

6   System context

This section focuses on the purpose, scope and policies of catalogue services that comply with the given profile. It documents special requirements and describes the context of use.

6.1   Application domain

The catalogue services proposed in this profile are intended to support the retrieval of EO products metadata possibly in two steps.

Step 1: identification of collections of interest through a catalogue of collections metadata.

Step 2: identification of EO products of interest within one or several collections though a catalogue of EO products metadata.

This profile covers step 2. It For the retrieval of EO products metadata, the defined interface should allow to implement both generic clients not aware of sensor specific metadata and more specialized clients aware of sensors specific metadata.

6.2   Essential use cases

The use cases for this profile are the CSW ISO Application Profile use cases applied to Earth Observation. See [OR1]. More detailed use cases can be found in [OR2].

7   Information models

The scope of the information managed within this profile is the core metadata that are required to distinguish and identify EO Products. There are two levels of metadata that are traditionally identified for EO Products: collection level (i.e. "dataset collection") and product (i.e. "dataset") level. Collection level metadata are well managed by the existing ISO profile [OR1]. Product metadata are less well managed, for two reasons: redundancy and lack of key attributes.

This CSW information model supports the description of the following information resources:

Information resource	Description
Earth Observation Product	Mapped to "dataset" in OGC Terminology. Set of metadata that describe an EO Product.
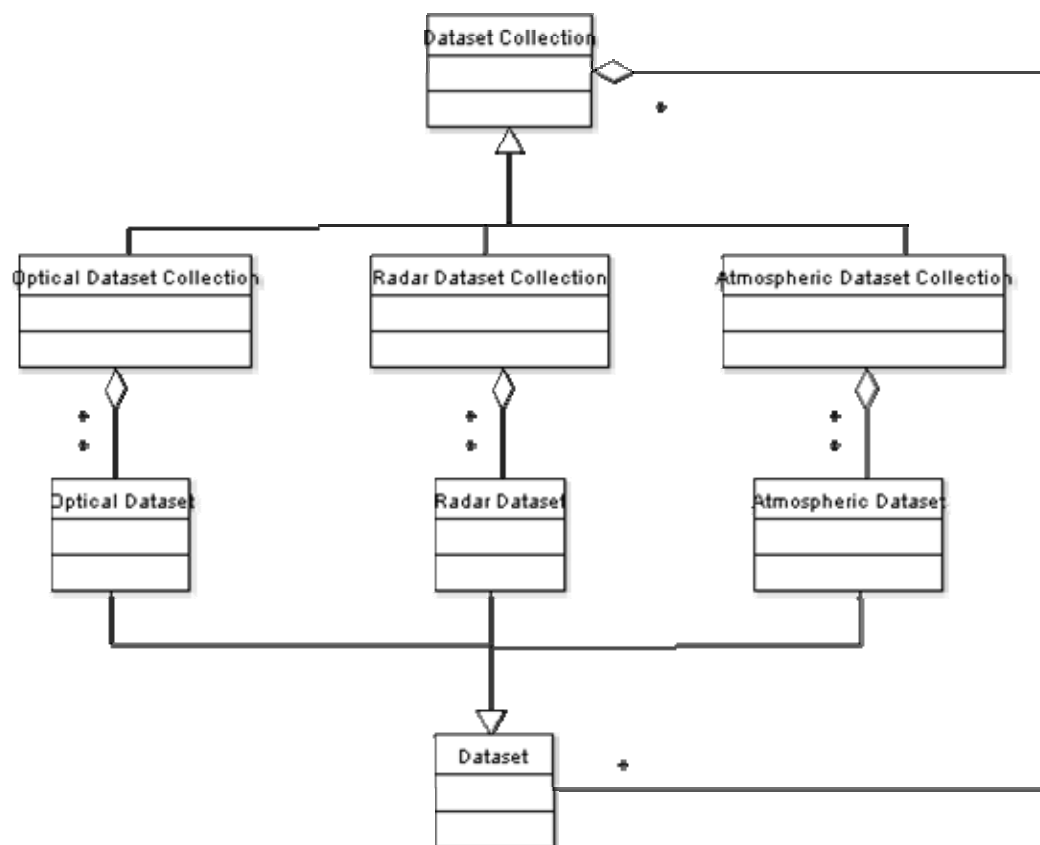
Figure 2: Relationship between EO dataset collections and datasets

7.1   EO Products Metadata Information Model

The following picture describes the layered structure of the schemas used to define the different classes of product metadata. The layer structure means that the upper layer main element type is defined by extending a type from the lower level schema.

Issue 1: The reuse of gmd elements has still to be clarified.
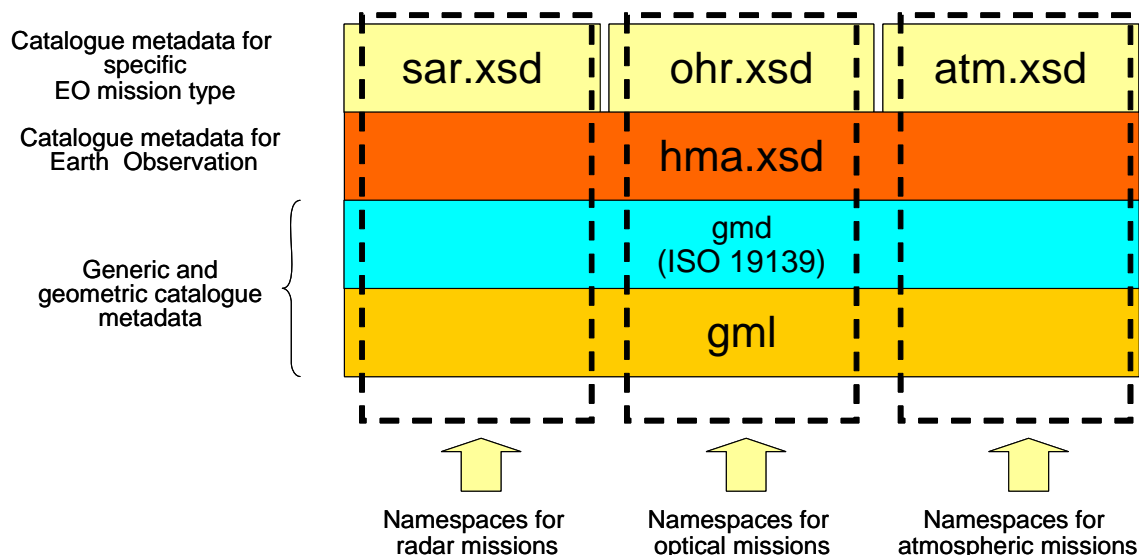
Figure 3: EO Dataset layered structure

The element that describes the EO metadata is the "EarthObservationProduct" element which is defined in the SAR (Synthetic Aperture Radar), OHR (Optical High Resolution), ATM (Atmospheric) specific schemas as an extension of a common EarthObservationProduct element defined in the HMA schema. This model also called the "HMA information model" further in this document is refined in chapter 9 according to the different presentations.
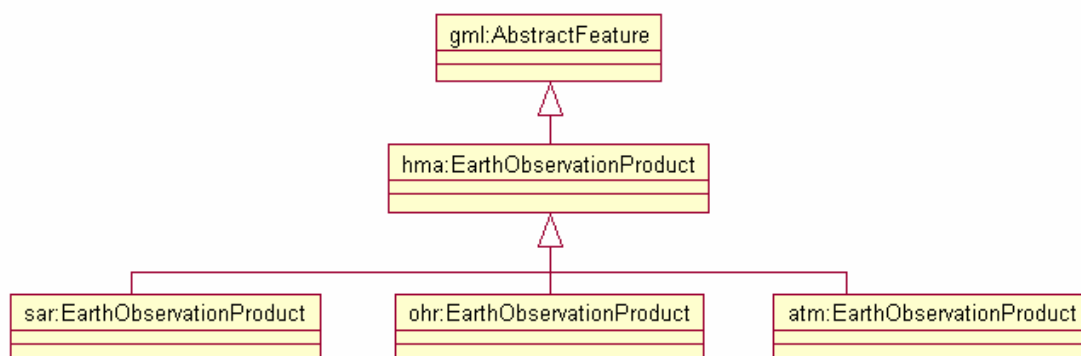
Figure 4: HMA Information Model

7.2   *Mappings to the common XML Record format*

As catalogues compliant with this profile may also support csw:IsoRecord as output schema, the tables in the following subsections, describe the mapping from [NR0] to both the HMA information model and the ISO information model. In the following subsections, the "EarthObservationProduct" root element has been removed in the mapping to the HMA information model.

7.2.1   OGC core queryable properties

The OGC core queryables supported by the EO catalogue shall be returned in the "supported-corequeryables" section of the <ServiceProperties> part in the capabilities document.

The core queryables mapping to the EO Products information model is defined in the following table.

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Table 1 - OGC core queryable properties

Name source [NR0]	Definition source [NR0]	Data type source [NR0]	Property Mapping to ISO Information Model[2] source [OR1]	Property Mapping to the HMA Information Model
Subject [a]	The topic of the content of the resource[b]	CharacterString	MD_Metadata.identificationInfo.AbstractMD_Identification.descriptiveKeywords.MD_Keywords.keyword	Not supported at "product level", the topic applies equally to all products in a collection and therefore provides no additional filtering of results.
Title [a]	A name given to the resource	CharacterString	MD_Metadata.identificationInfo.AbstractMD_Identification.citation.CI_Citation.title	Not supported at "product level", each product has an identifier, but no naming applied to products at this level.
Abstract [a]	A summary of the content of the resource	CharacterString	MD_Metadata.identificationInfo.AbstractMD_Identification.abstract	Not supported at "product level", the topic applies equally to all products in a collection and therefore provides no additional filtering ofresults
Format [a]	The physical or digital manifestation of the resource [f]	Codelist: "application/xml", "text/html", "text/plain"	MD_Metadata.distributionInfo.MD_Distribution.distributionFormat.MD_Format.name	Not supported at "product level", the EO product may be delivered in a number of manifestations, part of the order options

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[2] If the value resides in a child element of a base datatype, e.g. 'gco:CharacterString', 'gco:Integer' or 'gco:Decimal', the element is often omitted for clarity

Name source [NR0]	Definition source [NR0]	Data type source [NR0]	**Property Mapping to ISO Information Model**[2] source [OR1]	**Property Mapping to the HMA Information Model**
Identifier [a]	An unambiguous reference to the resource within a given context	Identifier	MD_Metadata.identificationInfo.AbstractMD_Identification.citation.CI_Citation.identifier. MD_Identifier.code	hma:identifier
Modified [c]	Date on which the resource was last changed	Date-8601, example: 1963-06-19	MD_Metadata.identificationInfo.AbstractMD_Identification.citation.CI_Citation.date.CI_Date.date.Date[dateType=='revision']	hma:archiveIn/ hma:ArchivingInformation/ hma:archivingDate or hma:end.
AnyText	This queryable represents the catalogue entry as a whole. Query-Sample: …AnyText like '%satellite image%'…	CharacterString	Whole resource text.	Not supported at "product level", the text applies equally to all products in a collection and therefore provides no additional filtering of results.
Type [a]	The nature or genre of the content of the resource. Type can include general categories, genres or aggregation levels of content. [g]	Codelist: Dataset, DatasetCollection, Service	MD_Metadata.hierarchyLevel.MD_ScopeCode@codeListValue. If MD_Metadata .hierarchyLevel is missing, 'Type' will be considered as "Dataset" (default).	Always "Dataset" (default).

Name source [NR0]	Definition source [NR0]	Data type source [NR0]	Property Mapping to ISO Information Model[2] source [OR1]	Property Mapping to the HMA Information Model
BoundingBox [d]	A bounding box for identifying a geographic area of interest	BoundingBox, see Table 2	BoundingBox. The only **mandatory** Coordinate Reference System here is WGS84 (EPSG::4326).	gml:extentOf: the BoundingBox is compared with the extent of the products.
CRS	Coordinate Reference System (Authority and ID) for spatial extent of the **resource-content**	Identifier		Not supported at "product level", the CRS applies equally to all products in a collection and therefore provides no additional filtering of results.
Association	Complete statement of a one-to-one relationship	Association		Because of the imprecise specification of this queryable property, it will not be supported in this version. Same justification as in [OR1].

a   Dublin Core Metadata Element Set, version 1.1:ISO Standard 15836-2003 (February 2003)

b   Typically, a Subject will be expressed as keywords, key phrases or classification codes that describe a topic of the resource. Recommended best practice is to select a value from a controlled vocabulary or formal classification scheme.

c   DCMI metadata term <http://dublincore.org/documents/dcmi-terms/>.

d   Same semantics as EX_GeographicBoundingBoxclass in ISO 19115.

f   Dublin Core Metadata Element Set, version 1.1:ISO Standard 15836-2003: Typically, Format may include the media-type or dimensions of the resource. Format may be used to determine the software, hardware or other equipment needed to display or operate the resource.

g   Dublin Core Metadata Element Set, version 1.1:ISO Standard 15836-2003: Type includes terms describing general categories, functions, genres, or aggregation levels for content. To describe the physical or digital manifestation of the resource, use the FORMAT element.

Table 2 - Composition of compound element "BoundingBox"

Name source [NR0]	Definition source [NR0]	Data type source [NR0]	Property Mapping to ISO Information Model source [OR1]	Property Mapping to HMA Information Model
WestBoundLongitude	Western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	numeric	MD_Metadata.identificationInfo._MD_DataIdentification.extent.EX_Extent.geographicElement.EX_GeographicBoundingBox.westBoundLongitude	gml:extentOf
SouthBoundLatitude	Southern-most coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)	numeric	MD_Metadata.identificationInfo._MD_DataIdentification.extent.EX_Extent.geographicElement.EX_GeographicBoundingBox.southBoundLatitude	gml:extentOf
EastBoundLongitude	Eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	numeric	MD_Metadata.identificationInfo._MD_DataIdentification.extent.EX_Extent.geographicElement.EX_GeographicBoundingBox.eastBoundLongitude	gml:extentOf

| NorthBoundLatitude | Northern-most, coordinate of the limit of the dataset extent, expressed in latitude in decimal degrees (positive north) | numeric | MD_Metadata.identificationInfo._MD_DataIdentification.extent.EX_Extent.geographicElement.EX_GeographicBoundingBox.northBoundLatitude | gml:extentOf |

7.2.2 OGC core returnable properties

The following table lists the mapping between core returnable properties and properties defined by this profile and in the ISO Application Profile [OR1].

Table 3 - Mapping to core returnable properties

Dublin Core metadata element name source [NR0]	Term used in ISO Application Profile source [OR1]	Property Mapping to ISO Information Model source [OR1]	Property Mapping to HMA Information Model
dc:creator	Creator	MD_Metadata.identificationInfoAbstractMD_Identification.citation.CI_Citation.citedResponsibleParty.organisationName[role.CI_RoleCode@codeListValue='publisher']	Not supported at product level
dc:publisher	Publisher	MD_Metadata.identificationInfoAbstractMD_Identification.citation.CI_Citation.citedResponsibleParty.organisationName[role.CI_RoleCode@codeListValue='publisher']	Not supported at product level
dc:contributor	Contributor	MD_Metadata.identificationInfoAbstractMD_Identification.citation.CI_Citation.citedResponsibleParty.organisationName[role.CI_RoleCode@codeListValue='author']	Not supported at product level
dc:language	Language	MD_Metadata.identificationInfo.MD_DataIdentification.language[1..*]	Not supported at product level

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Dublin Core metadata element name	Term used in ISO Application Profile	Property Mapping to ISO Information Model	Property Mapping to HMA Information Model
source [NR0]	source [OR1]	source [OR1]	
dc:rights	Rights	MD_Metadata.identificationInfo.AbstractMD_Identification.resourceConstraints.MD_LegalConstraints	Not supported at product level
dc:title	Title	MD_Metadata.identificationInfo.AbstractMD_Identification.citation.CI_Citation.title	Not supported at product level
dc:subject	Subject	MD_Metadata.identificationInfo.AbstractMD_Identification.descriptiveKeywords.MD_Keywords.keyword	Not supported at product level
dct:abstract	Abstract	MD_Metadata.identificationInfo.AbstractMD_Identification.abstract	Not supported at product level
dc:date	Modified	MD_Metadata.identificationInfo.AbstractMD_Identification.citation.CI_Citation.date.CI_Date.date.Date[dateType=='revision']	hma:archivingDate or hma:end
dc:type	Type	MD_Metadata.hierarchyLevel.MD_ScopeCode@codeListValue. If MD_Metadata .hierarchyLevel is missing, 'Type' will be considered as "Dataset" (default).	"Dataset" (default)
dc:format	Format	MD_Metadata.distributionInfo.MD_Distribution.distributionFormat.MD_Format.name	Not supported. Issue 2: FS6 Why "dc:format" is not supported as returnable properties. Couldn't it be used to describe the format of the product, e.g. GOETIFF or HDF…Same reason as in Core Queryable table ?
dc:identifier	Identifier	MD_Metadata.identificationInfo.AbstractMD_Identification.citation.CI_Citation.identifier. MD_Identifier.code	See mapping in Table 1
dc:source	Source	Not supported	Not supported Issue 3: FS7 Can't we find a use for the "dc:source" field? E.g. for Level 1b product this could point to the Level 0 product used to create it.

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Dublin Core metadata element name	**Term used in ISO Application Profile**	**Property Mapping to ISO Information Model**	**Property Mapping to HMA Information Model**
source [NR0]	source [OR1]	source [OR1]	
dc:relation	Relation, Source, Target	A reference to a related resource. In case of a tightly-coupled service this may include a reference (the identifier of a given tightly coupled dataset.	Not supported
dct:spatial	Envelope, CRS	See Table 4	See Table 4

Table 4 - Mapping dct:spatial

Dublin Core metadata element name source [NR0]	Term used in ISO application profile source [OR1]	Property Mapping to ISO Information Model	Property Mapping to HMA Information Model
BoundingBBox[3]			Bounding box is too imprecise to describe an EO product (in a way that would further support scene selection or allow accurate overlay on a map), a polygon is typically required and so this element in not supported at product level.
	WestBoundLongitude	see Table 2	see Table 2
	SouthBoundLatitude	see Table 2	see Table 2
	EastBoundLongitude	see Table 2	see Table 2
	NorthBoundLatitude	see Table 2	see Table 2
CRS	CRS		CRS of the spatial extent or scope of the **content of the resource**. This Identifier is an URN of the CRS: "<Authority>::<ID>". Example of such an URN is: "urn:opengis:crs:EPSG::4326". gml:boundedBy.gml:Envelope attribute srsName Issue 4: Mapping of CRS to GML to be confirmed by GML experts.

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[3] in WGS84

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7.2.3 OGC ISO AP queryable properties

The support for ISO AP queryables as defined in [OR1] is optional for EO catalogues.

The ISO AP queryables supported by the EO catalogue shall be returned in the "supported-isoqueryables" section of the <ServiceProperties> part in the capabilities document.

7.2.4 Additional queryable properties for EO Products

In addition to the core queryables, this profile defines the following queryable properties[4], which an implementation of this profile must minimally support.[5] The catalogue should deliver these queryable properties in its capabilities document. The following should be noted: If a catalogue entry holds a null-value for queryable *X*, this entry does *not* fulfill any query constraint on that queryable except "is Null".

If search properties are applied on an information resource which does not support this search property, the catalogue throws an exception (see section 8.2.3).

Additional Search properties or "queryables" will be defined for the different schema layers (see Figure 3) defined by this profile.

7.2.4.1 Additional HMA queryable properties

The following table contains the additional search properties which are common to all HMA EO Product resources.

In Table 5, if deemed useful because of name mismatch, the Tag name used in the JM HMAandISOmetadata_DRAFT20060524.xls file is indicated in italics below the queryable property name.

Table 5 - Additional HMA queryable properties

Name	Definition	Data type	Property Mapping to HMA Information Model
CollectionId	Id of the collection	CharacterString	Maps to the "fileIdentifier" at the collections metadata level.
Circle	Area of interest defined as a point and a radius	TBD	gml:extentOf (optional depending on the capabilities of the database used by the provider)
Polygon	Area of interest defined as a polygon	TBD	gml:extentOf (optional depending on the capabilities of the database used by the provider)
BeginAcquisition *startDate*	Acquisition begin dateTime.	Acquisition begin dateTime in ISO 8601 format(CCYY-MM-DDThh:mm)	hma:begin
EndAcquisition *completionDate*	Acquisition end dateTime.	Acquisition end dateTime in ISO 8601 format(CCYY-MM-DDThh:mm)	hma:end

---

[4] All queryables must be handled in a case-sensitive manner.

[5] For a catalogue instance it may also be possible to define further additional queryable properties.

Name	Definition	Data type	Property Mapping to HMA Information Model
PlatformName *PlatformShortName*	Platform short name (ex. PHR)	CharacterString	hma:acquiredBy/ hma:PlatformAndSensor/ hma:platformName
PlatformSerialIdentifier	E.g for PHR: 1A	CharacterString	hma:acquiredBy/ hma:PlatformAndSensor/ hma:platformSerialIdentifier
SensorName *SensorId* *InstrumentShortName*	Instrument / Sensor name	CharacterString	hma:acquiredBy/ hma:PlatformAndSensor/ hma:sensorName
SensorType	Sensor type	Codelist: OPTICAL RADAR ALTIMETRIC ATMOSPHERIC	hma:acquiredBy/ hma:PlatformAndSensor/ hma:sensorType
SensorMode *SensorOperationalMode*	Sensor mode. Possible values are mission specific and should be retrieved using codespace. (ex. PHR : PA, XS or PX).	CharacterString	hma:acquiredBy/ hma:PlatformAndSensor/ hma:sensorMode
OrbitDirection	Acquisition orbit direction	Codelist: ASCENDING or DESCENDING	hma:acquisitionParameters/ hma.Acquisition/ hma:orbitDirection
AcquisitionType	Specificies if product is a nominal acquisition, special calibration product..	Codelist: NOMINAL, CALIBRATION, OTHER	hma:acquisitionType
AcquisitionSubType	The mission specific type definition should refer to mission/ground segment dedicated codeSpace.	CharacterString	hma:acquisitionSubType
ProductType	Describes product type in case that mixed types are available within a single collection.	CharacterString	hma:productType
(Not found in hma 0.6 *CompositeType*	Composite type of product.	Codelist: DAILY, WEEKLY, MONTHLY, YEARLY, UNKNOWN	TBD
Status	Refers to product status e.g: ACQUIRED	Enum TBD	hma:status
QualityQuotation	Must be expressed in percent.	Float e.g 70.9	hma:qualityQuotation

Issue 5: Queryables ending with "Type". Shouldn't this reserved for XML Type names and not for identifiers ?

7.2.4.2 Additional ATM queryable properties

The following table contains the additional search properties which are specific for Atmospheric EO Product resources.

Table 6 - Additional ATM queryable properties

Name	Definition	Data type	Property Mapping to ATM Information Model
DatalayerSpecies	Species contained in datalayer	CharacterString e.g. O3, NO2	atm:datalayers/ atm:datalayer/ atm:species
DatalayerHighestLocation	Top height of datalayer (in meters)	Integer, e.g. 30000	atm:datalayer.atm/ highestLocation
DatalayerLowestLocation	Bottom height of datalayer (in meters)	Integer, e.g. 27000	atm:datalayer.atm/ lowestLocation

7.2.4.3 Additional OHR queryable properties

The following table contains the additional search properties which are specific for Optical High Resolution EO Product resources.

Table 7 - Additional OHR queryable properties

Name	Definition	Data type	Property Mapping to OHR Information Model
CloudCoverPercentage	Cloud cover percentage.	gml:MeasureType	ohr:cloudCoverPercentage
SnowCoverPercentage	Snow cover percentage.	gml:MeasureType	ohr:snowCoverPercentage

7.2.4.4 Additional SAR queryable properties

The following table contains the additional search properties which are specific for Radar EO Product resources.

Table 8 - Additional Radar queryable properties

Name	Definition	Data type	Property Mapping to SAR Information Model
PolarisationMode	TBD	Codelist: S for single, D for dual, T for twin, Q for quad, U for Undefined	sar:polarisationMode
PolarisationChannels	Polarisation channel transmit/receive	Codelist: HORIZONTAL, VERTICAL	sar:polarisationChannels
MinimumIncidenceAngle	Minimum incidence angle	Float Range TBD	sar:minimumIncidenceAngle

Name	Definition	Data type	Property Mapping to SAR Information Model
MaximumIncidenceAngle	Maximum incidence angle	Float Range TBD	sar:maximumIncidenceAngle

7.3 Supported data bindings

The only data binding required to be supported is XML. Any information object that is to be managed by a catalogue service complying with this profile must apply this presentation form. The encoding of any information object in this profile is based on schemas provided in chapter 9.

7.4 Result sets

This section defines XML Schema presentations for valid result sets of the application profile. A representation of catalogue entries in a result set may substitute for the element **csw:AbstractRecord** defined in the record.xsd schema of the CSW 2.0.0 (with Corrigendum) base specification.

Table 9: - Overview schema / resultset relationships

Schema\resultset	Missions	BRIEF	SUMMARY	FULL
EarthObservationProduct	ALL	Not Supported	Supported	Supported
EarthObservationProduct	ATM	Not Supported	Supported	Supported
EarthObservationProduct	OHR	Not Supported	Supported	Supported
EarthObservationProduct	SAR	Not Supported	Supported	Supported

The relationship between representations and schemas is further discussed in chapter 9.

7.4.1 SUMMARY Resultset

A response to a valid catalogue service request with ElementSetName=SUMMARY. This element set corresponds to the 'summary' element set in the general catalogue model. The corresponding XML schema is defined in chapter 9.

7.4.2 FULL Resultset

A response to a valid catalogue service request with ElementSetName=FULL. The corresponding XML schema is defined in chapter 9.

7.5 Service information model

This section describes the content model and syntax for service metadata of a catalogue service compliant with the profile. This model is described according to [NR2]. A compliant catalogue service shall describe its capabilities document according to the terms defined by OGC 05-008c1 [NR2].

As the CSW server implements the filter predicate language as defined in [NR1], it must include a Filter_Capabilities section in the service metadata to describe which elements of the predicate language are supported [OGC 04-021r3] (see 8.3).

The schema for the Capabilities file for this EO Application Profile is identical to the one proposed for the ISO AP (after integration of the comments received during the RFC period). This schema allows to include information about supported queryables and output schemas as in the example in section 10.1.

Because every CSW server must implement the filter predicate language as defined in [OGC 04-095], the server must include a Filter_Capabilities section in the service metadata to describe which elements of the predicate language are supported [OGC 04-021r3].

The document element **must** be valid against the following element declaration:

http://schemas.opengeospatial.net/csw-iso/1.0.0/isoap-capabilities.xsd#Capabilities

One additional service metadata element is introduced in this profile (Table 17)[6] which is also used in the ISO AP [OR1] .

Table 10 – Additional service metadata elements

Qualified name	Content
ServiceProperties	A list of general service properties (see below).

Each service property is a list of values specified as follows:
```
<isoap:ServiceProperties>

      <isoap:property name="http://www.opengis.net/cat/eoap/properties/my-
property-name">

            <isoap:value>my-value-1</isoap:value>

            <isoap:value>my-value-2</isoap:value>

      </isoap:property>

</isoap:ServiceProperties>
```

Table 11 lists the general CSW-ISO service properties from [OR1] supported by this EO Application Profile. The asterisk (*) denotes the prefix "http://www.opengis.net/cat/isoap/properties/", which is omitted for convenience.

Table 11 – Supported ISO AP service property names

Qualified Name	Content
*/supported-isoqueryables	A list of the supported additional queryables defined in the ISO AP profile (e.g. parentIdentifier). See section 7.2.3.
*/additional-queryables	A list of additional queryables defined e.g. by a specific community, not defined in this profile or the base specification.

A standard set of service features and properties are used to convey service capabilities that are specific to CSW-EO catalogues. The additional property names defined in this profile are listed in the table below. If the property name is missing, then the list of associated values is assumed to be empty. An unimplemented feature shall not be listed in the capabilities

---

[6] The concept here has been taken over from the OGC™ Catalogue Services — ebRIM (ISO/TS 15000-3) profile of CSW

document. Mandatory outputschemas, typenames and queryables do not need to be included in the corresponding property sections (TBC). However, optional outputschemas, typenames and queryables which are supported by the catalogue instance shall be included in the corresponding sections to allow a catalogue client to discover that they are supported.

Table 12 – EO AP service property names

Qualified Name	Content
*/supported-outputschemas	Output schemas supported by this catalogue.
*/supported-typenames	Typenames supported by this catalogue.
*/supported-corequeryables	Optional OGC core queryables supported by this catalogue (See section 7.2.1).
*/supported-hmaqueryables	Optional HMA queryables supported by this catalogue (See section 7.2.4.1).
*/supported-atmqueryables	Optional ATM queryables supported by this catalogue (See section 7.2.4.2).
*/supported-ohrqueryables	Optional OHR queryables supported by this catalogue (See section 7.2.4.3).
*/supported-sarqueryables	Optional SAR queryables supported by this catalogue (See section 7.2.4.4).
*/supported-collections	List of collection identifiers valid for this catalogue instance.

7.6 *Compatibility with catalogs based on other CSW 2.0 profiles*

The EO Application Profile may optionally support ISO19115/ISO19119 Application Profile as output schema (see Table 16).

In addition, the catalogue should indicate in its capabilities file which ISO AP queryables it supports. The support for these queryables is optional in this profile as indicated in section 7.2.3.

Issue : [FS11] Since most of the ISO profile queryables are not supported, see table 1, what will be the benefit of supporting the ISO Application Profile?

7.7 *Native language support*

Not Supported

8   External interfaces

This view describes the externally visible behaviour of the system, including the interfaces provided by its components and the supported protocol bindings. It defines the request and response message structures as part of the operation signatures, primarily the differences to that of the OGC CS 2.0.0 (with Corrigendum) base specification. It also documents supported query facilities and some implementation guidance.

8.1   *Imported protocol binding (Relationship to the common model)*

This profile inherits the HTTP/SOAP protocol binding from the CSW OGC CS 2.0.0 (with Corrigendum) specification.

Table 13 shows how the operations of this EO Application Profile are mapped to the operations specified by the CSW 2.0.0 (with Corrigendum) specification. This is not a full mapping in that not all of the CSW(T) ISO operations have a corresponding CSW operation.

Table 13 - Mapping CSW EO App. Profile operations to CSW operations

CSW operation	EO App. Profile operation
OGC_Service.GetCapabilities	OGC_Service.GetCapabilities
CSW-Discovery.GetRecords	CSW-Discovery.GetRecords
CSW-Discovery.DescribeRecord	CSW-Discovery.DescribeRecord
CSW-Discovery.GetDomain	Not Supported
CSW-Discovery.GetRecordById	CSW-Discovery.GetRecordById
CSW-Publication.Transaction	Not Supported
CSW-Publication.Harvest	Not Supported

All operations must support the embedding of requests and responses in SOAP messages. Only SOAP messaging (via HTTP/POST) with document/literal style shall be used. Messages shall conform to SOAP 1.2 (http://www.w3.org/TR/SOAP/). The message payload shall be in the body of the SOAP envelope.

Table 14 summarises the CSW operations and their encoding methods that are applied in this profile.

Table 14 - Operation request encoding

CSW operation	Request encoding
GetCapabilities	XML/SOAP mandatory, others optional
DescribeRecord	XML/SOAP mandatory, others optional
GetRecords	XML/SOAP mandatory, others optional
GetRecordById	XML/SOAP mandatory, others optional

8.2   *Interface specifications*

This chapter describes syntax and semantics restrictions and variations of the interface operations in comparison to those of the imported CSW 2.0.0 (with Corrigendum) HTTP protocol binding[7]. It gives formal, language-independent interface specifications (W3C WSDL) that admit multiple programming language bindings and shows error conditions that can occur.

8.2.1   OGC_Service Interface

8.2.1.1 GetCapabilities Operation

The GetCapabilities operation allows clients to retrieve service metadata from a server. The response to a GetCapabilities request should be an XML document containing service metadata about the server (see [NR2] and [NR0]).

The *sections* parameter may be used to request a subset of the complete capabilities document; the value is a comma-separated list of section names. The allowed set of section names recognized by this profile are listed in Table 9. If this parameter is absent, the complete description must be returned; unrecognized section names are ignored.

Table 9 — Permissible section names

Section name	Content
ServiceIdentification	General information about the service (type, version, etc.).
ServiceProvider	Information about the organization providing the service.
OperationsMetadata	Summarizes the operational characteristics of the service.
Filter_Capabilities	Describes supported OGC filter operators (see section 8.3)
ServiceProperties	Information about general service properties (see section 7.5)

8.2.1.1.1   Request

8.2.1.1.1.1   XML encoding

---

[7] Further details can be found in the OGC Catalog Services Specification [OGC 04-021r3].and the OGC Web Services Common Specification [OGC 05-008]

```
            ..omp.o...ype
  <!-- ============================================================ -->
  <element name="GetCapabilities" type="ows:GetCapabilitiesType"/>
  <!-- ============================================================ -->
  <complexType name="GetCapabilitiesType">
    <annotation>
      <documentation>XML encoded GetCapabilities operation request. This operation allows clients to retrieve service metadata about a specific service i
  cluded, since the element name specifies the specific operation. This base type shall be extended by each specific OWS to include the additional required
  ocumentation>
    </annotation>
    <sequence>
      <element name="AcceptVersions" type="ows:AcceptVersionsType" minOccurs="0">
        <annotation>
          <documentation>When omitted, server shall return latest supported version. </documentation>
        </annotation>
      </element>
      <element name="Sections" type="ows:SectionsType" minOccurs="0">
        <annotation>
          <documentation>When omitted or not supported by server, server shall return complete service metadata (Capabilities) document. </documenta
        </annotation>
      </element>
      <element name="AcceptFormats" type="ows:AcceptFormatsType" minOccurs="0">
        <annotation>
          <documentation>When omitted or not supported by server, server shall return service metadata document using the MIME type "text/xml". </doc
        </annotation>
      </element>
    </sequence>
    <attribute name="updateSequence" type="ows:UpdateSequenceType" use="optional">
      <annotation>
        <documentation>When omitted or not supported by server, server shall return latest complete service metadata document. </documentation>
      </annotation>
    </attribute>
  </complexType>
```

See also section 7.5 for the content of the response document.

8.2.1.1.1.2   Parameter descriptions

Table 15 - Parameters in GetCapabilities operation request

Name source [OR1]	Definition source [OR1]	Data type and value source [OR1]	Multiplicity and use source [OR1]	EO App. Profile
SERVICE	Service type identifier	Character String type, not empty Value is OWS type abbreviation (e.g., "CSW", "WFS")	One (mandatory)	Fixed value: "CSW"
REQUEST	Operation name	Character String type, not empty Value is operation name (e.g. "GetCapabilities")	One (mandatory) Fixed value: "GetCapabilities"	Not supported as only needed for KVP.
ACCEPTVER SIONS	Prioritised sequence of one or more specification versions accepted by client, with preferred versions listed first	Sequence of Character String type, not empty Value is list of x.y.z "version" values	Zero or one (optional) When omitted, return latest supported version (see Version negotiation subclause)	Zero or one (optional) When omitted, return latest supported version (see Version negotiation subclause)
SECTIONS	Unordered list of zero or more names of requested sections in complete service metadata document [a]	Sequence of Character String type, not empty Value is list of section names Allowed section names are specified by each Implementation Specification	Zero or one (optional)	Zero or one (optional) When omitted or not supported by server, return complete service metadata document.

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UPDATESEQUENCE	Service metadata document version, value is "increased" whenever any change is made in complete service metadata document	Character String type, not empty Values are selected by each server, and are always opaque to clients	Zero or one (optional)	Zero or one (optional) When omitted or not supported by server, return latest service metadata document
ACCEPTFORMATS	Prioritised sequence of zero or more response formats desired by client, with preferred formats listed first	Sequence of Character String type, not empty Value is list of format identifiers Identifiers are MIME types of formats useful for service metadata documents	Zero or one (optional)	Zero or one (optional) When omitted or not supported by server, return service metadata document using MIME type "application/ xml"

Issue 7: [JM11]GetCapabilities operation to be clarified for this profile: e.g. what should be the returned sections ?

The WSDL portType component of the OGC_Service interface is shown in Listing 1; this is a fragment of the complete WSDL 2.0 definition for the CSW Catalogue capability class (Annex C).

Listing 1 - OGC_Service: WSDL interface definition

```
<wsdl:portType name="OWS-Common">
   <wsdl:operation name="OWS-Common.getCapabilities">
      <wsdl:input message="ows:GetCapabilitiesRequest"/>
      <wsdl:output message="ows:GetCapabilitiesResponse"/>
      <wsdl:fault name="ExceptionReport"
message="ows:ExceptionReport"/>
   </wsdl:operation>
</wsdl:portType>
```

8.2.1.1.2 Response

Example Capabilities section:

<isoap:ServiceProperties>

<isoap:property name="http://www.opengis.net/cat/eoap/properties/supported-outputschemas">

        <isoap:value>HmaRecord</isoap:value>
        <isoap:value>OhrRecord</isoap:value>
     </isoap:property>

```
<isoap:property name="http://www.opengis.net/cat/eoap/properties/supported-typenames">
                <isoap:value>dataset</isoap:value>
                <isoap:value>ohr-dataset</isoap:value>
                <isoap:value>phr-dataset</isoap:value>
        </isoap:property>

<isoap:property name="http://www.opengis.net/cat/eoap/properties/supported-
corequeryables">
                <isoap:value>Identifier</isoap:value>
                <isoap:value>Modified</isoap:value>
                <isoap:value>Type</isoap:value>
        </isoap:property>
        <isoap:property
name="http://www.opengis.net/cat/eoap/properties/supported-hmaqueryables">
                <isoap:value>CollectionId</isoap:value>
        </isoap:property>
<isoap:property name="http://www.opengis.net/cat/eoap/properties/supported-
ohrqueryables">
                <isoap:value>CloudCoverPercentage</isoap:value>
        </isoap:property>
<isoap:property name="http://www.opengis.net/cat/isoap/properties/additional-queryables">
                <isoap:value>phr-specific</isoap:value>

        </isoap:ServiceProperties>
```

8.2.2   CSW Discovery Interface

8.2.2.1 GetRecords Operation

8.2.2.1.1   Request

8.2.2.1.1.1   XML encoding

The following XML-Schema fragment defines the XML encoding of the GetRecords operation request.

Source is the schemas delivered with [OR1].

```xml
<xsd:element name="GetRecords" type="csw:GetRecordsType" id="GetRecords"/>
<xsd:complexType name="GetRecordsType" id="GetRecordsType">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
    The principal means of searching the catalogue. The matching
    catalogue entries may be included with the response. The client
    may assign a requestId (absolute URI). A distributed search is
    performed if the DistributedSearch element is present and the
    catalogue is a member of a federation. Profiles may allow
    alternative query expressions.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="csw:RequestBaseType">
      <xsd:sequence>
        <xsd:element name="DistributedSearch" type="csw:DistributedSearchType" minOccurs="0"/>
        <xsd:element name="ResponseHandler" type="xsd:anyURI" minOccurs="0" maxOccurs="unbounded"/>
        <xsd:choice>
          <xsd:element ref="csw:AbstractQuery"/>
          <xsd:any namespace="##other" processContents="strict"/>
        </xsd:choice>
      </xsd:sequence>
      <xsd:attribute name="requestId" type="xsd:anyURI" use="optional"/>
      <xsd:attribute name="resultType" type="csw:ResultType" use="optional" default="hits"/>
      <xsd:attributeGroup ref="csw:BasicRetrievalOptions"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:complexType name="RequestBaseType" abstract="true" id="RequestBaseType">
  <xsd:annotation>
    <xsd:documentation>
    Base type for all request messages except GetCapabilities. The
    attributes identify the relevant service type and version.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:attribute name="service" type="ows:ServiceType" use="optional" default="http://www.opengis.net/cat/csw"/>
  <xsd:attribute name="version" type="ows:VersionType" use="optional" default="2.0.1"/>
</xsd:complexType>
```

```xml
<xsd:element name="Query" type="csw:QueryType" substitutionGroup="csw:AbstractQuery" id="Query"/>
<xsd:complexType name="QueryType" id="QueryType">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
Specifies a query to execute against instances of one or
more object types. A set of ElementName elements may be included
to specify an adhoc view of the csw:Record instances in the result
set. Otherwise, use ElementSetName to specify a predefined view.
The Constraint element contains a query filter expressed in a
supported query language. A sorting criterion that specifies a
property to sort by may be included.

typeNames - a list of object types to query.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="csw:AbstractQueryType">
      <xsd:sequence>
        <xsd:choice>
          <xsd:element ref="csw:ElementSetName"/>
          <xsd:element name="ElementName" type="xsd:anyURI" maxOccurs="unbounded"/>
        </xsd:choice>
        <xsd:element ref="csw:Constraint" minOccurs="0"/>
        <xsd:element ref="ogc:SortBy" minOccurs="0"/>
      </xsd:sequence>
      <xsd:attribute name="typeNames" type="csw:TypeNameListType" use="required"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

<xsd:element name="ElementSetName" type="csw:ElementSetNameType" default="summary" id="ElementSetName"/>
<xsd:complexType name="ElementSetNameType" id="ElementSetNameType">
  <xsd:simpleContent>
    <xsd:extension base="csw:ElementSetType">
      <xsd:attribute name="typeNames" type="csw:TypeNameListType" use="optional"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

8.2.2.1.1.2   Parameter descriptions

Table 16 specifies the attributes of the **GetRecords** element part of the CSW-Discovery.getRecords operation message. The column **EO App. Profile** shows syntax and/or semantics restrictions or variations in comparison to those of the base specification. It has also been modified to be consistent with the schema definition provided in in section **8.2.2.1.1.1** above. The encoding in the table is directly suitable for the SOAP/HTTP binding.

Table 16 - Parameters in GetRecords operation request

Attributes	Datatype & Value (base specification)	Optionality (base specification)	ISO App. Profile	EO App. Profile[8]
SERVICE	Character String. Fixed value of "CSW"	Mandatory	Mandatory CSW for HTTP Get http://www.opengis.net/cat/csw for XML encoding.	Optional. If present, should be the default value: http://www.opengis.net/cat/csw *To be consistent with XML encoding above.*
VERSION	Character String. Fixed value of "2.0.1"	Mandatory	Mandatory	Mandatory Fixed value of "1.0.0"
REQUESTID	CharacterString	Optional	Optional	Not supported Issue 8: GetRecords.REQUESTID not supported. What should it mean ? Ignored ? Must not be specified ?

.

Attributes	Datatype & Value (base specification)	Optionality (base specification)	ISO App. Profile	EO App. Profile[8]
RESULTTYPE	CodeList. One of "hits", "results" or "validate".	Optional. Default value is "hits".	Optional. Default value is "hits". Indicate whether the catalogue returns the full result set (if ELEMENTSETNAME or ELEMENTNAME are missing) or just the number of hits the query found. If the value is "hits", ELEMENTSETNAME or ELEMENTNAME are ignored.	Same as ISO App. Profile except: "validate" is not supported. (i.e. a non-compliance)

Attributes	Datatype & Value (base specification)	Optionality (base specification)	ISO App. Profile	EO App. Profile[8]
OUTPUTFORMAT	Character String Value is Mime type The only value that must be supported is "application/xml". Other suppored values may include "text/html" and "text/plain".	Optional. Default value is "application/xml".	Only "application/xml" supported.	Only "application/xml" is required to be supported.
OUTPUTSCHEMA	Defined in a profile. Must support "csw:Record".	Optional Default value is "csw:Record"	Optional Must support "csw:Record" and "csw:IsoRecord". Default value is "csw:Record".	Optional Default value is "csw:HmaRecord" It <u>may</u> support additionally "AtmRecord,"OhrRecord","SarRecord", "IsoRecord" or "CswRecord"[9]. Schemas supported can be discovered via the capabilities file. Issue 9: [FS15]Non compliance with base spec. if this profile does not support as OUTPUTSCHEMA "csw:Record" for the GetRecords operation.

---

[9] CswRecord will only be supported by a façade which is able to combine metadata from the dataset collection catalogue with the products catalogue. See implementation guidance.

Attributes	Datatype & Value (base specification)	Optionality (base specification)	ISO App. Profile	EO App. Profile[8]
STARTPOSITION	PositiveInteger	Optional The default value is 1.	Optional The default value is 1.	Optional The default value is 1.
MAXRECORDS	PositiveInteger	Optional The default values is 10.	Optional The default value is 10.	Optional The default value is 10.
TYPENAMES Attribute of GetRecord.Query element	List of Character String, comma separated Unordered List of object types implicated in the query	Mandatory	Mandatory: One or more of: "service", "dataset", "datasetcollection", "application"	Mandatory: One or more of "dataset", "ohr-dataset", "sar-dataset", "atm-dataset".
ELEMENTSETNAME or ELEMENTNAME Subelement of GetRecords.Query	Character String List of Character String	Optional Default action is to present all metadata elements.	Optional Default action is to present metadata elements of the "summary" set . Valid values are: "brief", "summary", "full".	Choice is limited to ELEMENTSETNAME. Default action is to present metadata elements metadata of the "summary" set. Valid values are: "full", "summary".
CONSTRAINTLANGUAGE Subelement of GetRecords.Query	CodeList One of "CQL_TEXT" or "FILTER"	Mandatory	Must be specified with QUERYCONSTRAINT parameter.	Fixed value: "FILTER".

Attributes	Datatype & Value (base specification)	Optionality (base specification)	ISO App. Profile	EO App. Profile[8]
CONSTRAINT_LANGUA GE_VERSION	String May be used to specify a version number indicating which version of a specification the constraint conforms to. For example, if "FILTER" is being used, this parameter could be set to "1.1.0" indicating that the filter conforms to version 1.1.0 of the Filter Encoding Implementation Specification [OGC 02-059].	Mandatory	Mandatory	Fixed value: "1.1.0".

Attributes	Datatype & Value (base specification)	Optionality (base specification)	ISO App. Profile	EO App. Profile[8]
CONSTRAINT Subelement of GetRecords.Query	String The predicate expression specified in the language indicated by the CONSTRAINTLANGUAGE parameter.	Optional Default action is to execute an unconstrained query.	Optional Default action is to execute an unconstrained query.	Mandatory

Attributes	Datatype & Value (base specification)	Optionality (base specification)	ISO App. Profile	EO App. Profile[8]
SORTBY Subelement of GetRecords.Query	List of Character String, comma separated Ordered list of names of metadata elements to use for sorting the response Format of each list item is *metadata_elemen_ name:A* indicating an ascending sort or *metadata_ element_name:D* indicating descending sort[10]. *metadata_elemen_ name:* use only the plain name (not case sensitive) without any prefixes etc, because these are uniquely defined. Example: Denominator instead of SpatialResolution.Denominator	Optional Default action is to present the records in the order in which they are retrieved.	Optional Default action is to present the records in the order in which they are retrieved.	Not supported. Issue 10: [FS16]Why SORTBY attribute in getRecord is not "Optional" rather than "Not Supported"?
DISTRIBUTEDSEARCH	Boolean	Optional Default value is FALSE.	Optional Default value is FALSE.	Fixed value: FALSE. See note hereafter.

---

[10] It is not reasonable to request all records from an EO Products catalogue.

Attributes	Datatype & Value (base specification)	Optionality (base specification)	ISO App. Profile	EO App. Profile[8]
HOPCOUNT	Integer	May be specified only if DISTRIBUTEDSEAR CH is specified. If not specified, the default value is 2.	May be specified only if DISTRIBUTEDSEARCH is specified. If not specified, the default is 2.	Not supported.
RESPONSEHANDLER	URL	Zero or one (Optional) If not included, process request synchronously	Not supported: only synchronous requests supported	Not supported.

Additional note for "DISTRIBUTEDSEARCH"
For the EO Application Profile, the distributed search is not handled at the catalogue protocol level. The distribution can be handled at the client side e.g. by a workflow client. The distributed access can also be handled in the catalogue kernel and hidden for the client.

Issue 11: the search response should include the collection ID to which each search result belongs. In EOLI-XML, this was not needed as a client could only query for one collection at a time and thus know to which collection a product belonged. With Filter language encoding, the filter can search inside multiple collections at a time and the client may not be able to find out to which collection belongs each record. The ISO "ParentIdentifier" could be used to include the Collection ID of the product.

Issue 12: We suppose a single catalogue may store heterogeneous collections, i.e. optical or radar collections, and thus return information according to different schemas: ohr.xsd, sar.xsd etc. This means that DescribeRecord should have a collection ID as parameter ? Alternatively, the various schemas should be merged into a single one or a main one which contains an ohr part, sar part, atm part etc.

8.2.2.1.2   Response

8.2.2.1.2.1   XML encoding

The following XML-Schema fragment defines the XML format response to a **GetRecords** operation:

Source is the schemas delivered with [OR1]. Some definitions are discussed below.

```
<xsd:element name="GetRecordsResponse" type="csw:GetRecordsResponseType" id="GetRecordsResponse"/>
<xsd:complexType name="GetRecordsResponseType">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
    The response message for a GetRecords request. Some or all of the
    matching records may be included as children of the SearchResults
    element. The RequestId is only included if the client specified it.
    </xsd:documentation>
  </xsd:annotation>
  <xsd:sequence>
    <xsd:element name="RequestId" type="xsd:anyURI" minOccurs="0"/>
    <xsd:element name="SearchStatus" type="csw:RequestStatusType"/>
    <xsd:element name="SearchResults" type="csw:SearchResultsType"/>
  </xsd:sequence>
  <xsd:attribute name="version" type="xsd:string" use="optional"/>
</xsd:complexType>
```

```
<xsd:complexType name="RequestStatusType" id="RequestStatusType">
  <xsd:annotation>
    <xsd:documentation>
    This element provides information about the status of the
    search request.

    status   - status of the search
    timestamp - the date and time when the result set was modified
        (ISO 8601 format: YYYY-MM-DDThh:mm:ss[+|-]hh:mm).
    </xsd:documentation>
  </xsd:annotation>
  <xsd:attribute name="status" type="csw:StatusType" use="required"/>
  <xsd:attribute name="timestamp" type="xsd:dateTime" use="optional"/>
</xsd:complexType>
```

```
<xsd:simpleType name="StatusType" id="StatusType">
 <xsd:restriction base="xsd:string">
   <xsd:enumeration value="complete">
     <xsd:annotation>
       <xsd:documentation>
   The request was successfully completed and valid results
   are available.
     </xsd:documentation>
     </xsd:annotation>
   </xsd:enumeration>
   <xsd:enumeration value="subset">
     <xsd:annotation>
       <xsd:documentation>
   Partial, valid results are available.
     </xsd:documentation>
     </xsd:annotation>
   </xsd:enumeration>
   <xsd:enumeration value="interim">
     <xsd:annotation>
       <xsd:documentation>
   Partial results available, not necessarily valid.
     </xsd:documentation>
     </xsd:annotation>
   </xsd:enumeration>
   <xsd:enumeration value="none">
     <xsd:annotation>
       <xsd:documentation>No results are available</xsd:documentation>
     </xsd:annotation>
   </xsd:enumeration>
   <xsd:enumeration value="processing">
     <xsd:annotation>
       <xsd:documentation>
   Request is still being processed. Its status will be set
   to complete when request is done.
     </xsd:documentation>
     </xsd:annotation>
   </xsd:enumeration>
 </xsd:restriction>
</xsd:simpleType>
```

This operation must respond with an XML document including the results. If the **resultType** parameter is set to "results", the catalogue service must include any matching records within the <SearchResults> element, up to the maximum number of records specified in the request. The <**SearchResults**> element is a generic XML container. This generic container is defined in the CSW 2.0.0 (with Corrigendum) specification. The content of the <**SearchResults**> element is the set of records returned by the **GetRecords** operation. The following XML schema fragment defines the **SearchResultsType**:

```
<xsd:complexType name="SearchResultsType" id="SearchResultsType">
    <xsd:sequence>
       <xsd:choice>
          <xsd:element ref="csw:AbstractRecord" minOccurs="0"
maxOccurs="unbounded"/>
          <xsd:any namespace="##other" processContents="strict"
minOccurs="0" maxOccurs="unbounded"/>
       </xsd:choice>
    </xsd:sequence>
    <xsd:attribute name="resultSetId" type="xsd:anyURI"
use="optional"/>
    <xsd:attribute name="elementSet" type="csw:ElementSetType"
use="optional"/>
    <xsd:attribute name="recordSchema" type="xsd:anyURI"
use="optional"/>
```

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```
    <xsd:attribute name="numberOfRecordsMatched"
type="xsd:nonNegativeInteger" use="required"/>
    <xsd:attribute name="numberOfRecordsReturned"
type="xsd:nonNegativeInteger" use="required"/>
    <xsd:attribute name="nextRecord" type="xsd:nonNegativeInteger"
use="optional"/>
    <xsd:attribute name="expires" type="xsd:dateTime"
use="optional"/>
</xsd:complexType>
```

Catalogue services implementing this Application Profile MUST NOT substitute <csw:AbstractRecord> but rather <xs:any> with XML documents that comply with one of the schemas defined in chapter 9.

On top of that, the following limitations apply:

o The parameter "`resultSetId`" is optional,

o The Parameter "`expires`" is not supported in the response because of the stateless character of the profile. The result sets expires immediately.

o The value "`StatusType.processing`" should never be used by the status attribute.

o The optional parameter "timestamp" is already optional in the ISO Application Profile and does not seem useful in this profile.

If the **resultType** parameter is set to "hits", the catalogue service shall return a <**GetRecordsResponse**> element containing an empty <SearchResults> element that indicates the estimated size of the result set. Optional attributes may or may not be set accordingly.

8.2.2.2 GetRecordById Operation

The mandatory **GetRecordById** request retrieves the default representation of catalogue records using their fileidentifier. The **GetRecordById** operation is an implementation of the **Present** operation from the general model. Normally this operation presumes that a previous query has been performed in order to obtain the identifiers that may be used with this operation.

8.2.2.2.1   Request

8.2.2.2.1.1   XML encoding

```
<xsd:element name="GetRecordById" type="csw:GetRecordByIdType" id="GetRecordById"/>
<xsd:complexType name="GetRecordByIdType" id="GetRecordByIdType">
  <xsd:annotation>
    <xsd:documentation xml:lang="en">
    Convenience operation to retrieve default record representations
    by identifier.
    Id - object identifier (a URI) that provides a reference to a
        catalogue item (or a result set if the catalogue supports
        persistent result sets).
    ElementSetName - one of "summary", or "full"
    </xsd:documentation>
  </xsd:annotation>
  <xsd:complexContent>
    <xsd:extension base="csw:RequestBaseType">
      <xsd:sequence>
        <xsd:element name="Id" type="xsd:anyURI" maxOccurs="unbounded"/>
        <xsd:element ref="csw:ElementSetName" minOccurs="0"/>
      </xsd:sequence>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

8.2.2.2.1.2   Parameter descriptions

Table 17 specifies the parameters of the **GetRecordById** operation request (XML). The column **EO App. Profile** shows syntax and/or semantics restrictions or variations in comparison to those of the base spec.

Note that the GetRecordById operation does not allow to include the OUTPUTRECORD keyword. By default, the catalogue should return the most specialised record type. For example, an OHR type catalogue should return the OhrRecord and not the HmaRecord (TBC).   If the client needs a different record type, then it should use the GetRecord operation with OUTPUTRECORD keyword and the ID specified in the Filter expression.

Table 17 - Parameters in GetRecordById operation request

Keyword	Datatype & Value	Optionality (ISO AP)	EO App. Profile[11]
REQUEST	Character String. Fixed value of "GetRecordById". (The value is case insensitive.)	Mandatory for KVP Optional for SOAP	Not supported as KVP specific. (same applies for ISO AP)
SERVICE	Character String. Fixed value of "CSW"	Mandatory. Is optional in ISO AP XML schemas.	Not supported as KVP specific.
VERSION	Character String. Fixed value of "2.0.1". Refers to version of "SERVICE" specified above.	Mandatory. Is optional in ISO AP XML schemas.	Not supported. Default value of "1.0.0"

Keyword	Datatype & Value	Optionality (ISO AP)	EO App. Profile[11]
ELEMENTSETNAME	CodeList with allowed values: "brief", "summary" or "full"	Zero or one (Optional) Default value is "summary".	Zero or one (Optional) Valid values are: "full", "summary" Default value is: "summary"
ID	Comma separated list of anyURI	One (Mandatory)	Map to hma:identifier or to gml:id attribute of hma:EarthObservationProduct

Issue 13: How can the DAIL know to which catalogue to route the request? In the GetRecords interface we have the collectionId implicit in the query, here we have no query parameter. Collection Id to be included in the ID to have a unique ID ?

8.2.2.2.2   Response

The following XML-Schema fragment defines the **GetRecordByIdResponseType** as part of this XML schema. This is simply the list of requested record:

Listing 2 - GetRecordByIdResponseType definition

```
   <xsd:complexType name="GetRecordByIdResponseType"
id="GetRecordByIdResponseType">
     <xsd:sequence>
       <xsd:choice>
          <xsd:element ref="csw:AbstractRecord" minOccurs="0"/>
          <xsd:any namespace="##other" processContents="strict"
minOccurs="0"/>
       </xsd:choice>
     </xsd:sequence>
   </xsd:complexType>
```

Catalogues implementing this application profile should return the record in one of the <u>schemas</u> defined in chapter 9. In the <xsd:choice> section the option <xsd:any> element MUST be used for substitution.

8.2.2.3 DescribeRecord Operation

The DescribeRecord operation allows a client to discover elements of the information model supported by the target catalogue service. For the response, it should return hma.xsd and the specific schema supported by the catalogue (hma, ohr, atm or sar).

Issue 14: FS1 proposes an updated introduction removing cost notion and satellite words…

Question: this is to be checked with the ISO Profile which returns the "identification.xsd" schema.

8.2.2.3.1   Request

Table 18 specifies the parameters for the **DescribeRecord** operation request. The column **EO App. Profile** shows syntax and/or semantics restrictions or variations in comparison to that of the base spec. The encoding in the table is directly suitable for the HTTP GET binding.

The XML encoding of the frame of a valid response is specified in the HTTP binding of the CSW 2.0.0 (with Corrigendum) specification. Please refer to this section to determine the according XML schema.

Table 18 - Parameters in DescribeRecord operation request

Keyword	Datatype & Value	Optionality (ISO AP)	EO App. Profile[12]
REQUEST	Character String. Fixed value of "DescribeRecord". The value is case insensitive.	Mandatory for KVP. Not used for SOAP.	Not supported as only needed for KVP.
SERVICE	Character String. Fixed value of "CSW"	Mandatory for KVP. Optional in XML schemas.	Not supported.
VERSION	Character String. Fixed value of "2.0.0"	Mandatory. Optional in XML schemas.	Not supported.
NAMESPACE	List of Character String, comma separated. Used to specify a namespace and its prefix. Format must be [<prefix>:]<url>. If the prefix is not specified then this is the default namespace.	One (Mandatory)[13]. Include declarations for each namespace used in a TypeName	Assumed to be "any": the purpose is to return the schema associated to the catalogue.
TYPENAME	List of Character String, comma separated One or more qualified type names to be described	Zero or one (Optional) Default action is to describe all types known to server	Optional. "dataset", "ohr-dataset", "sar-dataset", "atm-dataset". Default is "dataset".

One of the reasons to have different "typenames" is to allow to get the different schemas hma.xsd, ohr.xsd, atm.xsd or sar.xsd. In reality very few client are expected to use this

---

[13] The NAMESPACE parameter contains the same information as the xmlns attributes which may be used to define and bind namespaces in XML encoding.

operation. Another advantage of having multiple "typenames" is to allow verification or queryables w.r.t. type names to avoid searching for "ohr" queryables on an "atm" catalogue.

OUTPUTFORMAT	Character String A MIME type indicating the format that the output document should have	Optional. Default value is "application/xml".	Not supported. Default is "application/ xml".
SCHEMALANGUAGE	Character String	Zero or one (Optional) Default value is "XMLSCHEMA"	Not supported. Default is "XMLSCHEMA "

8.2.2.3.2   Response

The <**DescribeRecordResponse**> element (see CSW 2.0.0 (with Corrigendum)) is the container for the <**SchemaComponent**> element, which contains the description in the requested schema language:

```
   <xsd:element name="DescribeRecordResponse"
type="csw:DescribeRecordResponseType" id="DescribeRecordResponse"/>
   <xsd:complexType name="DescribeRecordResponseType"
id="DescribeRecordResponseType">
     <xsd:sequence>
       <xsd:element name="SchemaComponent"
type="csw:SchemaComponentType" minOccurs="0" maxOccurs="unbounded"/>
     </xsd:sequence>
   </xsd:complexType>
   <xsd:complexType name="SchemaComponentType"
id="SchemaComponentType" mixed="true">
     <xsd:sequence>
       <xsd:any namespace="##any" processContents="lax"/>
     </xsd:sequence>
     <xsd:attribute name="targetNamespace" type="xsd:anyURI"
use="required"/>
     <xsd:attribute name="parentSchema" type="xsd:anyURI"
use="optional"/>
     <xsd:attribute name="schemaLanguage" type="xsd:anyURI"
use="required"/>
   </xsd:complexType>
```

Issue 15: In the case of the ISO Application Profile, this will return the data identification definition ('identification.xsd'). In EO Application Profile, the value of "any" would be, according to the supported missions, one of the following schemas: hma.xsd, atm.xsd, ohr.xsd or sar.xsd. Can we assume that one catalogue implements only one specific schema (atm, sar…).

8.2.3   Error handling

In the event that the submitted request is invalid, an exception report message is generated and returned to the client. This report complies with the definition of exception reports that are specified by OGC Common specification (see CSW EO Application Profile05-008c1).

Table 19 shows an excerpt from that document that lists valid exception codes and meanings that are supported by this profile[14].

Table 19 - Exception codes and meanings (from OGC Common)

exceptionCode value	Meaning of code	"locator" value
OperationNotSupported	Request is for an operation that is not supported by this server	Name of operation not supported
MissingParameterValue	Operation request does not include a parameter value, and this server did not declare a default value for that parameter	Name of missing parameter
InvalidParameterValue	Operation request contains an invalid parameter value a	Name of parameter with invalid value
NoApplicableCode	No other exceptionCode specified by this service and server applies to this exception	None, omit "locator" parameter
a When an invalid parameter value is received, it seems desirable to place the invalid value(s) in ExceptionText string(s) associated with the InvalidParameterValue value.		

The XML encoding of an exception has to comply with owsExceptionReport.xsd that is attached to the further mention OGC Common specification. See this document for details. .

8.3   Query facilities

OGC Filter Encoding is an XML based encoding of the OGC_Common Query Language. This query language (Version 1.1.0) must be supported by all catalogue instances of this profile in order to support search interoperability. The capabilities document of the catalogue instance shall describe the supported query language (plus version).

The supported subset of the Filter Encoding shall be returned in the <ogc:Filter_Capabilities> section of the capabilities document. See example in section 10.1.

Note: The following conditions must be met by the supported query language.

	Filter	*EO Application Profile*
Logical ops	And	Mandatory
	Or	Optional
	Not	Optional
Comparison ops	PropertyIsEqualTo	Mandatory
	PropertyIsNotEqualTo	Optional
	PropertyIsLessThan	Mandatory
	PropertyIsGreaterThan	Mandatory

---

[14] In future versions of this profile there will be defined additional standard allowed values for the exceptionCode parameter

	PropertyIsLessThanOrEqualTo	Optional
	PropertyIsGreaterThanOrEqualTo	Optional
	PropertyIsLike	Optional
	PropertyIsNull	Optional
	PropertyIsBetween	Mandatory
Expressions	property name	tbd
	literal	tbd
Spatial ops	Intersects	Mandatory
	Disjoint	Optional
	BBOX	Optional

If the value of a search parameter in a metadata entry is a missing value, then the metadata set entry does not fulfill this search condition.

8.4   *Implementation guidance*

The following section gives developers help when setting up a catalogue service instance that complies with the defined application profile. Any information provided here is non-normative or is an detailing of former descriptions.

8.4.1   ISO Application Profile Interface implementation

The proposed EO Application profile for datasets can be used together with the ISO Application Profile for dataset collections to implement an ISO Application Profile CSW catalogue using service orchestration as depicted in the UML sequence diagram below. "f1" and "f2" indicate filter language expressions in this picture.
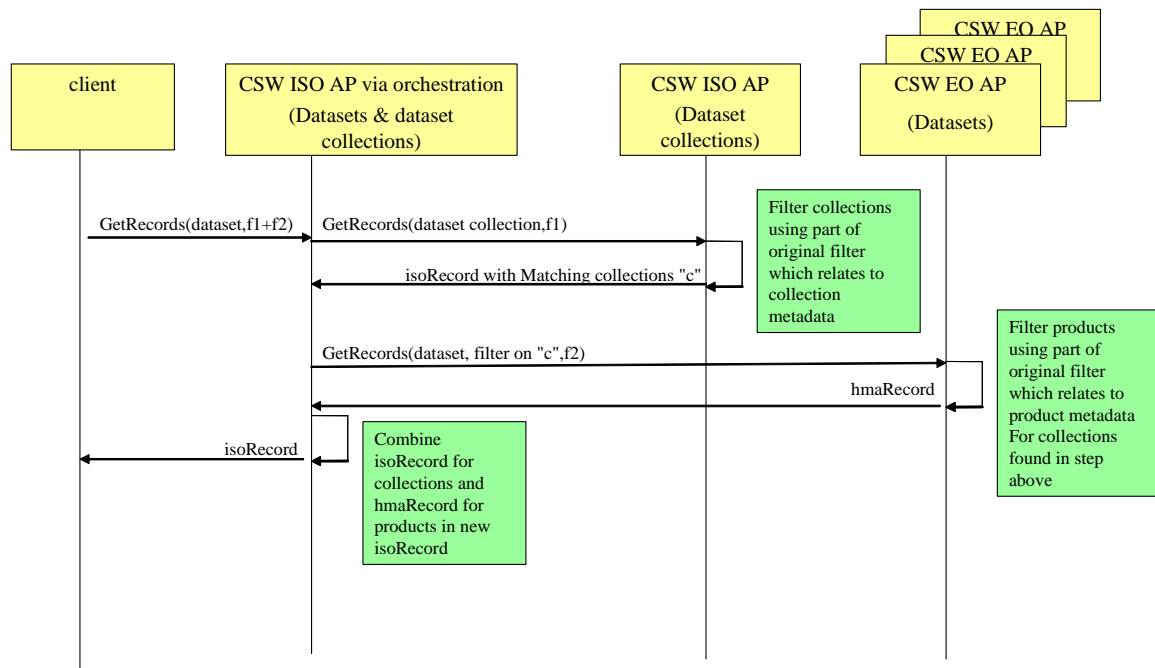
Figure 5: Implementing an ISO AP CSW interface based on EO AP CSW

8.4.2　Distributed search implementation

Although this application profile does not support DISTRIBUTEDSEARCH keyword in the GetRecords request, distributed searches can be implemented via a Web service orchestration engine, e.g. using OASIS BPEL as depicted below.
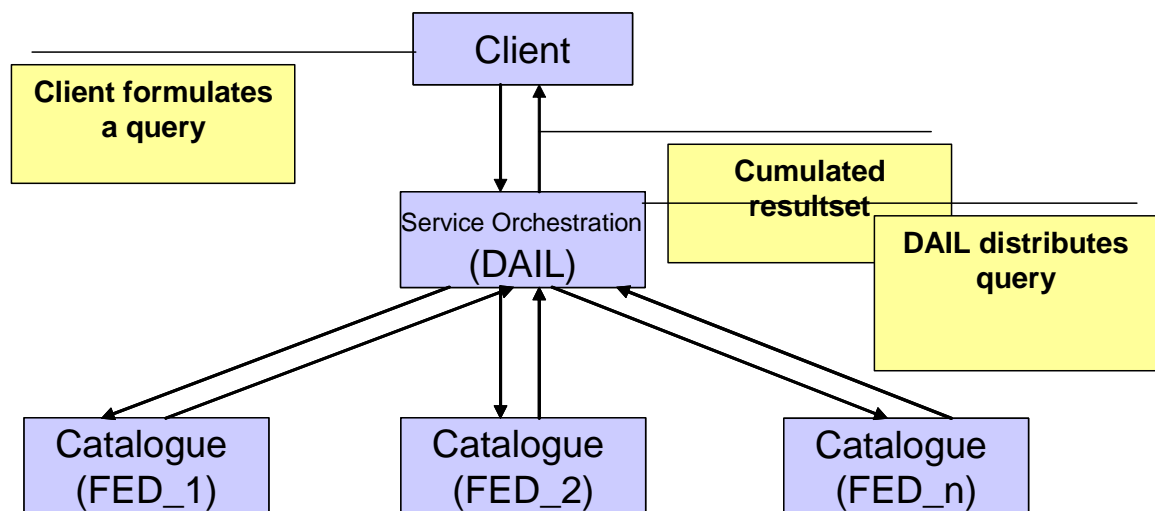

Figure 6: Implementing distributed search with the EO AP CSW

8.4.3　Semantic issues

o　In case of using the appropriate metadata version the contents of 'metadataStandardName' and 'metadataStandardVersion' in a metadata set shall comply with one of the following conventions:

o　The definition of the resource type in a metadata set should be done in the attribute *codeListValue* of the child element *MD_ScopeCode* of the element *hierarchyLevel*. Example:

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```
<hierarchyLevel>
<MD_ScopeCode
codeList="http://someurl.com/codeList.xml#MD_ScopeCode"

codeListValue="dataset"/>

</hierarchyLevel>
```

Valid values for *hierarchyLevel are*[15]:

- application
- dataset
- datasetcollection
- service

o The following values should be used for the parameter *outputSchema* of a discovery operation:

- csw:HmaRecord, csw:AtmRecord, csw:OhrRecord, csw:SarRecord
- csw:IsoRecord

Issue 16: What should be returned by the Catalogue when in a request, the parameter "outputschema" is defined as "csw:HmaRecord" ? Should it return a HMA record or if it is a more specialised catalogue, the most complete record e.g. a csw:SarRecord ?

typenames: outputschema:	Record (base spec)	Dataset=hma	ohr	atm	sar
CswRecord	X	X	X	X	X
HmaRecord	exception	X	X	X	X
OhrRecord	exception	exception	X	exception	exception
AtmRecord	exception	Exception	exception	X	exception
SarRecord	exception	exception	exception	exception	X

8.4.4   Metadata set examples

An example for a metadata record describing a dataset that complies with the given schemas is attached in chapter 9 of this document.

---

[15] case-sensitive

Annex C
(normative)

WSDL Specification CSW 2.0 EO Application Profile

to be completed

9   HMA XML Schemas

9.1   Impact of Full versus Summary presentation on schema design

At the moment, it is foreseen to define 4 common schemas: HMA, ATM, OHR, SAR that define metadata associated to different catalogues. It is also decided to support only two presentations: "full" and "summary".

The theory is that "summary" results are to allow:

1. smaller message sizes

2. "faster" retrieval of product metadata at the server side, allowing the provider to tune the performance of his database to provide key metadata quickly

Looking to some existing catalogue interface definitions, two different approaches are discussed on the following sections.

9.1.1   Single schema shared by different presentations

The same schema is used for the different presentations, schema uses the optional feature to specify information not needed in all presentations and the comments indicate the mandatory attributes, elements corresponding to the different presentations.
+ Single schema definition, leave some freedom to the catalogue implementor
- Cannot use tools to validate the retrieved records structure according to the presentation.

The ESA EOLI-XML ICD uses this mechanism to distinguish between the summary, brief and full presentations..

9.1.2   Multiple schemas according to the different presentations

Example: ISO19115/ISO19119 AP for CSW 2.0 R3

Same element (MD_Metadata defined in different namespaces
http://schemas.opengis.net/iso19115brief , http://schemas.opengis.net/iso19115full,
http://schemas.opengis.net/iso19115summary
+ Can use tools to validate the retrieved records structure according to the presentation.
- The number of schemas increases, see discussion below.

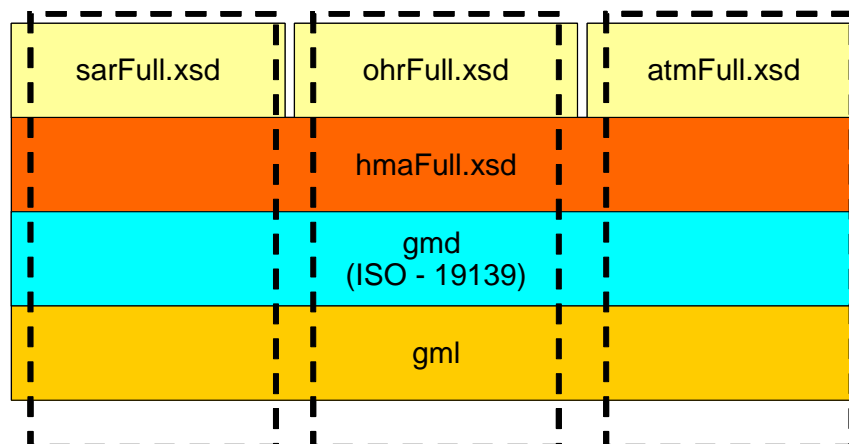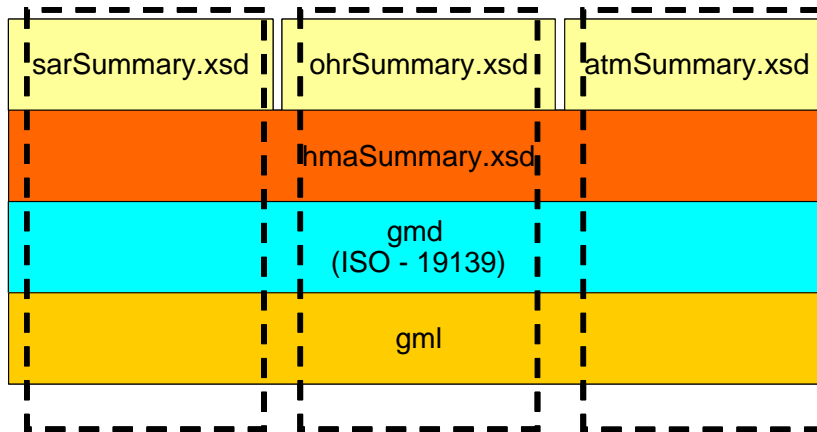If we apply that second approach, Figure 3 in section 7.1 would be split into

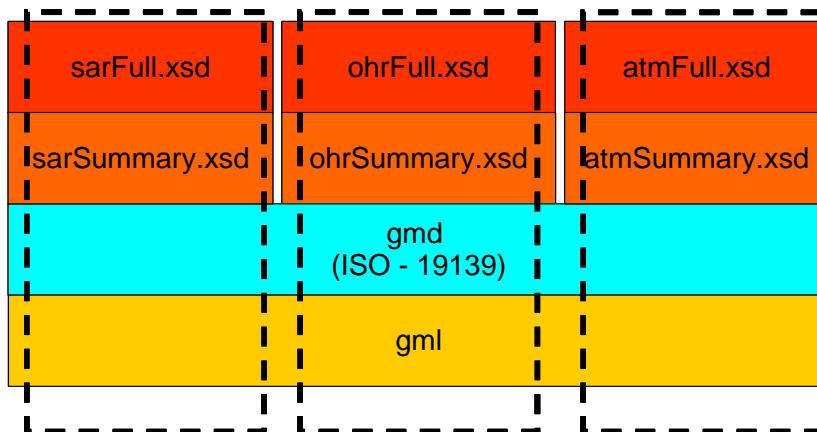**Figure 7: EO Dataset Full Layered Structure**

And

Figure 8: EO Dataset Summary Layered Structure

In more details that would mean that ohrFull:EarthObservationProduct would be defined as an extension of hmaFull:EarthObservationProduct.

We could also imagine that the information of the full presentation as its name seems to indicate it, also include all information of the summary information. This would be represented as:

Figure 9: EO Dataset Layered Structure By Missions

If we combine the three pictures taking into account only the HMA and its extension to OHR, we get something which has no direct implementation because multi-inheritance is not supported in XML schema extension: the ohrFull EarthObservationProduct element can not be defined as an extension of both hmaFull EarthObservationProduct element and ohrSummary EarthObservationProduct element.
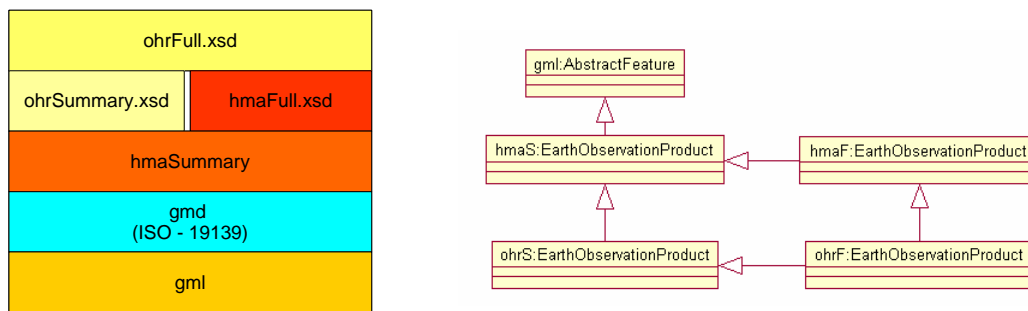
Figure 10: EO Dataset Multiple-Inheritance Structure

We have to select one of the extension type : extension of presentation or extension of the HMA schema.

Looking at the current OHR schema currently defined, it seems that not alot of information is added on top of the HMA schema. So we could conclude, may be prematurally, that the delta information which is added on top of HMA does not need to be split between full and summary presentations.
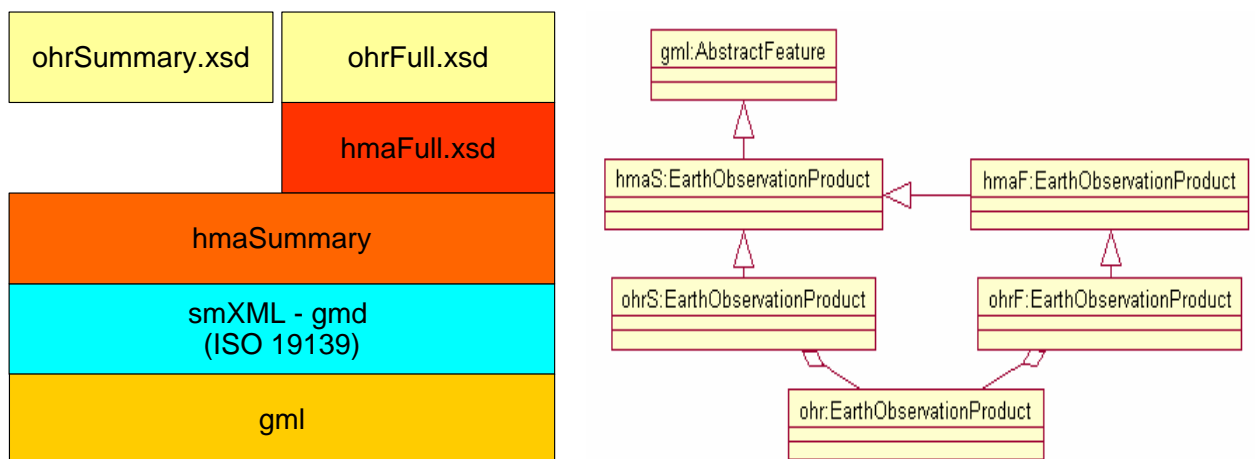

Figure 11: EO Dataset Single-Inheritance Structure

9.1.3   Schemas organisation conclusion

The proposed solution is to not use different schemas for the "full" and the "summary" presentations but have the additional "full" parameters as optional elements in the same schema.

9.2   Impact of record types returned on schema design

Two approaches are possible as explained below.

Issue 17: impact of record types returned on schema design (see section 9.2.x)

9.2.1   Option 1 : specialisation schemas import hma.xsd

An optical catalogue may return a different record type than an atmospheric catalogue. They would return a record according to ohr.xsd or atm.xsd respectively. This poses problems when a single catalogue contains heterogeneous collections, e.g. some optical, some atmospheric. In this approach, the 3 schemas ohr, atm and sar import the hma schema and use inheritance. The OUTPUTRECORD requested by the client in this case is "HmaRecord", "OhrRecord", "AtmRecord" or "SarRecord". Additional record types can be added without impact on the hma.xsd file. Developers can code client supporting for instance only optical catalogues and changes to the atmospheric or radar schemas have no impact on the catalogue client. This is the approach taken in the current document.

9.2.2   Option 2 : hma.xsd imports all specialisation schemas

As an alternative, the record structure may always be the same, consisting of a fixed part containing the "hma" fields. In addition, it then would contain either the ohr fields, the sar.xsd or the atm fields. In this solution, a single hma schema would be the umbrella schema above the 4 other schemas, hma.xsd, ohr.xsd, atm.xsd, sar.xsd. This would mean that hma.xsd imports the 3 other schemas ohr, atm and sar. The OUTPUTRECORD requested by the client in this case is always "HmaRecord". The content will be different according to the type of the collection. Adding an additional record type means that an additional "import" clause is to be added in hma.xsd. Clients requesting the schema will have to be able to consume all schemas as they are all linked together via "import" clauses.

9.3   *EO Application Profile schemas*

The different schemas describing the EO products associated to the different missions such as optical, radar and atmospheric missions can be found in the "GML Application schema for EO products" [NR5].

10   Examples

10.1   *GetCapabilities Response*

To be completed.

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
==========================================================================
* Topic:           Capabilities document for an CSW 2.0.1 AP ISO 1.0.0
Catalog                               *
* Last update:  17.05.2006
*
* Author:           Uwe Voges (con terra GmbH)
*
==========================================================================
-->
<isoap:Capabilities xmlns:isoap="http://www.opengis.net/cat/isoap"
xmlns:csw="http://www.opengis.net/cat/csw"
xmlns:ows="http://www.opengis.net/ows"
xmlns:ogc="http://www.opengis.net/ogc"
xmlns:xlink="http://www.w3.org/1999/xlink" version="1.0.0"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengis.net/ogc
      http://schemas.opengis.net/ows/1.0.0/owsCommon.xsd
      http://www.opengis.net/ogc
      http://schemas.opengis.net/filter/1.1.0/filterCapabilities.xsd
      http://www.opengis.net/csw
```

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```
        http://schemas.opengis.net/csw/2.0.1/CSW-discovery.xsd
        http://www.opengis.net/cat/isoap
        ../isoap/1.0.0/isoap-capabilities.xsd
        http://www.w3.org/1999/xlink
        http://schemas.opengis.net/gml/3.1.1/xlink/xlinks.xsd">
        <ows:ServiceIdentification>
                <ows:Title>con terra GmbH test catalogue Server</ows:Title>
                <ows:Abstract> Web based Catalogue Service (CS-W 2.0.1/AP ISO)
for service, datasets and applications</ows:Abstract>
                <ows:Keywords>
                        <ows:Keyword>CS-W</ows:Keyword>
                        <ows:Keyword>ISO19119</ows:Keyword>
                        <ows:Keyword>ISO19115</ows:Keyword>
                        <ows:Keyword>con terra</ows:Keyword>
                        <ows:Keyword>Catalog Service</ows:Keyword>
                        <ows:Keyword>metadata</ows:Keyword>
                        <ows:Type
codeSpace="http://www.conterra.de">theme</ows:Type>
                </ows:Keywords>
                <ows:ServiceType>urn:ogc:service:catalogue:csw-
ebrim</ows:ServiceType>
                <ows:ServiceTypeVersion>0.10.2</ows:ServiceTypeVersion>
                <ows:Fees>NONE</ows:Fees>
                <ows:AccessConstraints>Basic authentication (RFC 2617) is
required for all transaction requests</ows:AccessConstraints>
        </ows:ServiceIdentification>
        <ows:ServiceProvider>
                <ows:ProviderName>con terra GmbH</ows:ProviderName>
                <ows:ProviderSite xlink:href="http://www.conterra.de"/>
                <ows:ServiceContact>
                        <ows:IndividualName>Uwe Voges</ows:IndividualName>
                        <ows:PositionName>systems architect</ows:PositionName>
                        <ows:ContactInfo>
                                <ows:Phone>
                                        <ows:Voice>+49-251-7474-402</ows:Voice>
                                        <ows:Facsimile>+49-251-7474-
100</ows:Facsimile>
                                </ows:Phone>
                                <ows:Address>
                                        <ows:DeliveryPoint>Marting-Luther-King-Weg
24</ows:DeliveryPoint>
                                        <ows:City>München</ows:City>

        <ows:AdministrativeArea>NRW</ows:AdministrativeArea>
                                        <ows:PostalCode>48165</ows:PostalCode>
                                        <ows:Country>Germany</ows:Country>

        <ows:ElectronicMailAddress>voges@conterra.de</ows:ElectronicMailAddres
s>
                                </ows:Address>
                                <ows:OnlineResource
xlink:href="mailto:voges@conterra.de"/>
                        </ows:ContactInfo>
                </ows:ServiceContact>
        </ows:ServiceProvider>
        <ows:OperationsMetadata>
                <ows:Operation name="GetCapabilities">
                        <ows:DCP>
                                <ows:HTTP>
                                        <ows:Get
xlink:href="http://www.conterra.de/catalog?GibMirCapabiltities"/>
                                        <ows:Post
xlink:href="http://www.conterra.de/catalog"/>
                                </ows:HTTP>
                        </ows:DCP>
                </ows:Operation>
                <ows:Operation name="DescribeRecord">
```

```
                        <ows:DCP>
                                <ows:HTTP>
                                        <ows:Post
xlink:href="http://linux2:7070/axis/services/CSW20_Discovery_SOAP_Port"/>
                                </ows:HTTP>
                        </ows:DCP>
                        <ows:Parameter name="typeName">
                                <ows:Value>csw:Record</ows:Value>
                        </ows:Parameter>
                        <ows:Parameter name="outputFormat">
                                <ows:Value>text/xml</ows:Value>
                        </ows:Parameter>
                        <ows:Parameter name="schemaLanguage">
                                <ows:Value>XMLSCHEMA</ows:Value>
                        </ows:Parameter>
                </ows:Operation>
                <ows:Operation name="GetRecords">
                        <ows:DCP>
                                <ows:HTTP>
                                        <ows:Post
xlink:href="http://linux2:7070/axis/services/CSW20_Discovery_SOAP_Port"/>
                                </ows:HTTP>
                        </ows:DCP>
                </ows:Operation>
                <ows:Operation name="GetRecordById">
                        <ows:DCP>
                                <ows:HTTP>
                                        <ows:Post
xlink:href="http://linux2:7070/axis/services/CSW20_Discovery_SOAP_Port"/>
                                </ows:HTTP>
                        </ows:DCP>
                        <ows:Parameter name="ElementSetName">
                                <ows:Value>brief</ows:Value>
                                <ows:Value>summary</ows:Value>
                                <ows:Value>full</ows:Value>
                        </ows:Parameter>
                </ows:Operation>
        </ows:OperationsMetadata>
        <ogc:Filter_Capabilities xmlns:gml="http://www.opengis.net/gml">
                <ogc:Spatial_Capabilities>
                        <ogc:GeometryOperands>

<ogc:GeometryOperand>gml:Envelope</ogc:GeometryOperand>

<ogc:GeometryOperand>gml:Point</ogc:GeometryOperand>

<ogc:GeometryOperand>gml:LineString</ogc:GeometryOperand>

<ogc:GeometryOperand>gml:Polygon</ogc:GeometryOperand>
                        </ogc:GeometryOperands>
                        <ogc:SpatialOperators>
                                <ogc:SpatialOperator name="BBOX"/>
                                <ogc:SpatialOperator name="Equals"/>
                                <ogc:SpatialOperator name="Disjoint"/>
                                <ogc:SpatialOperator name="Intersects"/>
                                <ogc:SpatialOperator name="Touches"/>
                                <ogc:SpatialOperator name="Crosses"/>
                                <ogc:SpatialOperator name="Within"/>
                                <ogc:SpatialOperator name="Contains"/>
                                <ogc:SpatialOperator name="Overlaps"/>
                                <ogc:SpatialOperator name="Beyond"/>
                        </ogc:SpatialOperators>
                </ogc:Spatial_Capabilities>
                <ogc:Scalar_Capabilities>
                        <ogc:LogicalOperators/>
                        <ogc:ComparisonOperators>
```

```
        <ogc:ComparisonOperator>LessThan</ogc:ComparisonOperator>

        <ogc:ComparisonOperator>GreaterThan</ogc:ComparisonOperator>

        <ogc:ComparisonOperator>LessThanEqualTo</ogc:ComparisonOperator>

        <ogc:ComparisonOperator>GreaterThanEqualTo</ogc:ComparisonOperator>

        <ogc:ComparisonOperator>EqualTo</ogc:ComparisonOperator>

        <ogc:ComparisonOperator>NotEqualTo</ogc:ComparisonOperator>

        <ogc:ComparisonOperator>Like</ogc:ComparisonOperator>

        <ogc:ComparisonOperator>Between</ogc:ComparisonOperator>

        <ogc:ComparisonOperator>NullCheck</ogc:ComparisonOperator>
                    </ogc:ComparisonOperators>
                    <ogc:ArithmeticOperators>
                            <ogc:SimpleArithmetic/>
                    </ogc:ArithmeticOperators>
            </ogc:Scalar_Capabilities>
            <ogc:Id_Capabilities>
                    <ogc:EID/>
            </ogc:Id_Capabilities>
        </ogc:Filter_Capabilities>
        <isoap:ServiceFeatures>
            <isoap:feature
name="http://www.opengis.net/cat/isoap/features/distributed-search">
                    <isoap:property
name="http://www.opengis.net/cat/isoap/properties/federated-catalogues">

        <isoap:value>http://arcims.hamm.de/csw/CSWStartup</isoap:value>
                    </isoap:property>
            </isoap:feature>
        </isoap:ServiceFeatures>
        <isoap:ServiceProperties>
            <isoap:property
name="http://www.opengis.net/cat/isoap/properties/supported-isoqueryables">
                    <isoap:value>FileIdentifier</isoap:value>
                    <isoap:value>Language</isoap:value>
                    <isoap:value>AlternateTitle</isoap:value>
                    <isoap:value>CreationDate</isoap:value>
                    <isoap:value>OrganisationName</isoap:value>
                    <isoap:value>HierarchyLevelName</isoap:value>
                    <isoap:value>ParentIdentifier</isoap:value>
                    <isoap:value>KeywordType</isoap:value>
                    <isoap:value>TopicCategory</isoap:value>
                    <isoap:value>DatasetLanguage</isoap:value>
                    <isoap:value>GeographicDescriptionCode</isoap:value>
                    <isoap:value>SpatialResolution</isoap:value>
                    <isoap:value>TempExtent_begin</isoap:value>
                    <isoap:value>TempExtent_end</isoap:value>
                    <isoap:value>ServiceType</isoap:value>
                    <isoap:value>ServiceTypeVersion</isoap:value>
                    <isoap:value>OperatesOn</isoap:value>
                    <isoap:value>Operation</isoap:value>
                    <isoap:value>DCP</isoap:value>
                    <isoap:value>CouplingType</isoap:value>
            </isoap:property>
            <isoap:property
name="http://www.opengis.net/cat/isoap/properties/additional-queryables">
                    <isoap:value>Fees</isoap:value>
            </isoap:property>
            <isoap:property
name="http://www.opengis.net/cat/isoap/properties/query-languages">
```

```
                        <isoap:value>http://www.opengis.net/ogc</isoap:value>

       <isoap:value>http://www.opengis.net/cat/csw</isoap:value>
              </isoap:property>
       </isoap:ServiceProperties>
       <isoap:WSDL-services xlink:type="simple" xlink:href="http://www.sdi-
suite.de/csw/services/CSW20_Discovery_SOAP_Port?wsdl" xlink:title="Available
service endpoints (WSDL 2.0)" xlink:role="http://www.w3.org/2005/08/wsdl"/>
</isoap:Capabilities>
```

11 Remaining Issues

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