

**SPACEBEL / ESA-ESRIN**

**DRAFT**

**Technical Note on the design of the HMA  
EO Product Catalogue for VITO CVB**



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## EXECUTIVE SUMMARY

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This technical note describes the design of the developments undertaken by the consortium consisting of GIM, ERDAS and VITO for implementing an HMA compatible EO Product Catalogue for the VITO Centrum voor beeldverwerking (CVB) within the frame of the HMA Phase 2 project.

In the past VITO has employed a variety of different metadata models for the different product collections that were developed to cover the needs of particular projects. Specific Catalogue (Service) instances were developed to serve project specific needs. Some of these Catalogues Services were following international standards, like for instance the Catalogue Service developed within the ESA GSE Global Monitoring for Food Security (GMFS) project. Others were developed as a closed application using proprietary interfaces. In the future, VITO would like to harmonise the metadata descriptions and to align with International Standards. Hence the interest in applying the EO Profile of GML as the basis of a common metadata model and using the HMA EO Product Catalogue specifications.

In a preceding document, the mapping of the different metadata formats to the EO Profile of GML was detailed. The outcome of this study is that the EO Profile of GML specification, with a number of minor enhancements is well-suited for describing the VITO EO Products for discovery and evaluation purposes. In addition, if one wants to use the EO Profile of GML as well for the purposes of "Use Metadata", a number of specific additional elements are required to obtain a metadata file that contains sufficient information for the correct interpretation of these products. To satisfy this use case, a derived thematic application schema was developed (with vgt namespace prefix) that encompasses all of these additional elements.

This document details how this metadata can then be served using the EO Products Extension Package for ebRIM Profile of CSW. As there are discussions ongoing within the OGC EO Extension Package of ebRIM Standards Working Group with a view of improving this specification, a number of different implementations options are proposed within this draft document. It is the idea to select during the forthcoming CDR meeting the approach for implementation which will then be further elaborated in the next version of this document.

## SIGNATURES

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## TABLE OF CONTENTS

<b>Executive Summary .....</b>	<b>i</b>
<b>1 Introduction .....</b>	<b>1</b>
1.1 Purpose .....	1
1.2 Scope.....	1
1.3 Structure of the document.....	1
1.4 Applicable documents .....	2
1.5 Reference Documents .....	2
1.6 Acronyms.....	3
<b>2 Enterprise ViewPoint.....</b>	<b>4</b>
<b>3 Information Viewpoint .....</b>	<b>6</b>
3.1 Base information model: EO Profile of GML.....	6
3.2 EbRIM Information model.....	7
3.3 Catalogue Service Capabilities.....	8
<b>4 Services Viewpoint .....</b>	<b>9</b>
<b>5 Engineering ViewPoint.....</b>	<b>11</b>
<b>6 Technology ViewPoint .....</b>	<b>12</b>
<b>ANNEX 1 VGT Schema.....</b>	<b>13</b>
<b>ANNEX 2 Modified EOP base schema taking into account the change requests.....</b>	<b>17</b>
<b>ANNEX 3 VGT4AFRICA ISO19115 To EO Profile of GML XSLT .....</b>	<b>35</b>

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# 1 INTRODUCTION

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## 1.1 PURPOSE

This document is the Technical Note on the design of the HMA EO Product Catalogue for the VITO Centrum voor Beeldverwerking (CVB). It is format deliverable identified in WP3000 of the GIM-VITO-ERDAS proposal submitted for the Heterogeneous Missions Accessibility - Testbed (HMA-T) Phase 2 call in reply to the joint Spacebel/ESA ITT AO/HMA-T-2/780 – HMA Testbed Phase 2 [AD01].

## 1.2 SCOPE

The objectives of the HMA-Testbed project are

1. To permit the evolution and testing of the interoperability standards which have been initially defined within the Heterogeneous Missions Accessibility contract, in parallel with the EO Data Access Integration Layer EO-DAIL implementation and the implementation of the specified interfaces within the partners' ground segments.
2. To permit the conformance testing of the HMA adopted standards and to support industry and institutions in the testing of their own products or developments.
3. To support the take-up of HMA defined standards by European Institutional Users (e.g. INSPIRE Legally Mandated Organisations (LMOs) and geospatial software product developers).

The work performed by our Consortium headed by GIM and further consisting of VITO and ERDAS focuses on the EO Product metadata and HMA Product Catalogs.

- The EO Product Metadata standardised within the GML 3.1.1 Application schema for Earth Observation products specification (OGC06-080) is applied to a set of representative VITO EO Products. This study work will allow testing of this specification on a range of products and may lead to the creation of specific derived GML application schemas (as foreseen by this specification). It will also provide VITO with the required experience to allow future adoption of this specification as common EO Product Metadata format.
- Once this study is completed, one of the VITO systems will be selected for the implementation of an HMA Catalog. This Catalog prototype will be setup using ERDAS EbrIM software, it will be implemented by and hosted at GIM and filled with a representative set of metadata.

The subject technical note describes the design of the developments undertaken by the consortium consisting of GIM, ERDAS and VITO for implementing an HMA compatible EO Product Catalogue for the VITO RO product metadata. It is structured according to the ISO Reference Model of Open Distributed Processing [RD10]. It fulfills the document requirements typically addressed in a Technical Specification and Architectural Design Document as specified in [AD05].

## 1.3 STRUCTURE OF THE DOCUMENT

The structure of this technical note follows the Reference Model of Open Distributed Processing [RD10] which is an international standard for architecting open, distributed processing systems. It has been used as the basis for the OGC Reference Model and within several ESA projects (HMA, ESIT, COPS-B, ...). Within RM-ODP, a system is described in terms of a set of viewpoints. The viewpoints identify the top priorities for architectural specifications and provide a minimal set of requirements to ensure system integrity. They address different aspects of the system and enable the 'separation of concerns'. When RM-ODP is applied in the context of Service Oriented Architectures, the computational viewpoint is often replaced by a "Services Viewpoint" that specifies the service interfaces.

Following RM-ODP, this document is organised in the following chapters:

Chapter 1 is the introductory chapter that you are currently reading and that lists scope and purpose.

Chapter 2 relates to the RM-ODP Enterprise Viewpoint. It is a viewpoint on the system and its environment that focuses on the purpose, scope and policies for the system.

Chapter 3 details the information viewpoint on the system and its environment that focuses on the semantics of the information and information processing performed.

Chapter 4 is the services viewpoint that enables distribution through functional decomposition of the system into Services and describes the service interfaces.

Chapter 5 describes the engineering viewpoint that focuses on the mechanisms and functions required to support distributed interaction between objects in the system.

Chapter 6 finally constitutes the technology viewpoint that focuses on the choice of technology in that system.

## 1.4 APPLICABLE DOCUMENTS

AD01	Invitation to tender AO/HMA-T-2/780- HMA Testbed Phase 2, Hoeilaart, 31 January 2008,
AD02	Statement of Work SPB-HMA-T-SOW-002- Issue 1 - Rev. 0, 31 January 2008
AD03	Appendix 3 To Spacebel AO/HMA-T-2/780: Special Conditions of Tender
AD04	Appendix 2 to Spacebel AO/HMA-T-2/780: Draft Contract
AD05	ECSS Space Engineering Standards – Software ECSS E-40B (with tailoring)
AD06	Management, Administrative and Financial proposal - EO Profile of GML and HMA Product Catalog for VITO CVB, CP08028B/SS/ss/001/v01 (2008-04-11)
AD7	Technical proposal HMA-T Phase 2 EO Profile of GML and HMA Catalog for VITO CVB, CP08028B/SS/ss/002/v01 (2008-04-11)
AD8	GML 3.1.1 Application schema for Earth Observation products, OGC 06-080r4, Version 0.9.3, dated 2008/07/21
AD9	HMA-T-MOM-2003-SPB, HMA-T PDR / Progress Meeting 26 November 2008 Minutes of Meeting
AD10	HMA-T-TN-0002-GIM, Issue 1.1, 2009-02-06, Technical Note on the application of the EO Profile of GML to the VITO EO product collections
AD11	OGC Catalogue Services Specification 2.0 Extension Package for ebRIM Application Profile: Earth Observation Products, Version: 0.2.0, OGC 06-131r5

## 1.5 REFERENCE DOCUMENTS

RD01	OGC Catalogue Services Specification 2.0.2 (Corrigendum 2 Release), OGC 07-006r1
RD02	OGC Catalogue Services - ebRIM profile of CSW (ebRIM) 1.0, OGC 07-110
RD03	OGC 06-131r3 EO Products Extension Package for ebRIM Profile of CSW 2.0 0.1.8
RD04	Vegetation User Guide, <a href="http://www.spot-vegetation.com/vegetationprogramme/Pages/TheVegetationSystem/userguide/userguide.htm">http://www.spot-vegetation.com/vegetationprogramme/Pages/TheVegetationSystem/userguide/userguide.htm</a>
RD05	Vegetation Web Portal: <a href="http://www.vgt.vito.be/">http://www.vgt.vito.be/</a>
RD06	GeoSuccess Web Portal: <a href="http://geofront.vgt.vito.be/">http://geofront.vgt.vito.be/</a>
RD07	GMFS Web Portal <a href="http://www.gmfs.info/">http://www.gmfs.info/</a>
RD08	VGT4Africa Portal: <a href="http://www.vgt4africa.org/">http://www.vgt4africa.org/</a>

RD09	ISO 19115-2 Geographic information - Metadata - Part 2: Extensions for imagery and gridded data, 2008-07-21
RD10	ISO ISO-IEC 10746-1/2/3 Information technology – Open Distributed Processing – Reference model

## 1.6 ACRONYMS

BAE	Burnt Area Estimate
CSW	Catalogue Services for Web
CVB	VITO Centrum voor Beeldverwerking
DMP	Dry Matter Productivity
EO	Earth Observation
ESA	European Space Agency
ESRIN	European Space Research Institute
fAPAR	Fraction of Absorbed Photosynthetically Active Radiation
fCover	Fractional cover
GeoSuccess	Global Earth Observation in Support of Climate Change and Environmental Security Studies
GML	Geographic Mark-up Language
GUI	Graphical User Interface
HDF	Hierarchical Data Format
HMA	Heterogeneous Missions Accessibility
HTTP	Hyper Text Transfer Protocol
ICD	Interface Control Document
ITT	Invitation to Tender
LAI	Leaf Area Index
MIR	Mid-Infrared
MVC	Maximum Value Composite
NDVI	Normalized Difference Vegetation Index
NIR	Near Infra red
NEP	Net Ecosystem Productivity
NPP	Net Primary Productivity
PAR	Photosynthetically Active Radiation
N/A	Not Applicable
OGC	Open Geospatial Consortium
SOW	Statement of Work
SWIR	Short wave Infrared
VGT-P	Vegetation Physical Values
VGT-S1	Vegetation Synthesis over 1 day
VGT-S10	Vegetation Synthesis over 10 days
VGT-D10	Vegetation bidirectional Synthesis over 10 days
VPI	Vegetation Productivity Indicator

## 2 ENTERPRISE VIEWPOINT

The enterprise viewpoint, forms a viewpoint on the system and its environment that focuses on the purpose, scope and policies for the system

The VITO “Centrum Voor Beeldverwerking” deals with a number of different EO product collections. Some of these products are “base” EO Products. Others are synthesis products that are created by combining the information contained within products that are acquired over a certain period. Yet others are derived products that are obtained by calculating derived values using the information contained within the EO Products and possibly auxiliary data. In addition VITO is operating airborne sensors. In the current situation, the metadata for the different EO products is defined on a per project basis and this metadata is made available via project specific discovery mechanisms with different Catalogue systems typically available through different Catalogues discovery systems.

By performing the mapping of the metadata of the different EO product collections onto one common information model based on the EO Profile of GML and by exposing this through common Catalogue interfaces, the intention is to satisfy the following high-level use case.

UC-001	Discovery of all CVB Products from a common HMA Compatible Catalogue Client GUI
Overview	An enduser interested in EO products accesses a Web Portal where he finds an EO Product Catalogue client. He uses the Catalogue client to search for his products of interest and when he finds a product he can evaluate it further by requesting to see more detailed metadata. Note that this Catalogue client can be a Catalogue client integrated in a VITO CVB Web Portal or can for instance be a Catalogue client that forms part of another “HMA compatible Portal”.
Purpose	Offer a machine-2-machine EO product discovery Web Service that allows discovery of all EO products of the CVB. Endusers can search for products and retrieve typical discovery metadata returned in response to a “search-like operation” He can then visualise more detailed metadata for evaluation and use purposes (through a present like operation). By implementing a Web service interface based on Open Standards, the metadata can be made discoverable through a wide range of portals and other catalogue clients implementing the same protocol.
Actors and Interfaces	Enduser is the person who is interested in discovery of the products  The Web portal is the software system that incorporates a catalogue client that can be accessed to discover products. In this project, the Catalogue client will be instantiated by a “Catalogue Service client” that will be configured within the ESA SSE/HMA Portal.  The Catalogue service is the software system that is used by the Catalogue client to return EO product metadata in response to user requests. It is this system that is being prototyped in this project
Initial Status and Preconditions	Enduser has navigated to the Catalogue client integrated within the portal
Evolution	1. Enduser enters search criteria including <ul style="list-style-type: none"> <li>• Product collection (selection from a predefined collection tree)</li> <li>• Geographical Area Of interest (by digitising on map)</li> <li>• Time Period</li> <li>• Cloud, snow cover %</li> </ul>



	<ul style="list-style-type: none"> <li>• ...</li> </ul> <p>And starts the search</p> <ol style="list-style-type: none"> <li>2. Catalogue Clients contacts Catalogue service by issuing the appropriate GetRecords request and receives and parses the response</li> <li>3. Enduser gets presented with a list of products showing typical metadata that is useful to make a first selection within the list of the available products. This consists of (collection) parent identifier, product Identifier, Platform, acquisition time, ...</li> <li>4. Enduser selects one of the available products and specifies to see more detailed metadata</li> <li>5. Catalogue Clients contacts Catalogue service by issuing the appropriate request (GetRecordById or GetRepositoryItem) and receives and parses the response</li> <li>6. Enduser is presented with the full set of metadata that incorporates evaluation metadata and use metadata.</li> </ol>
Final status and post conditions	Enduser has discovered a product and can visualise and/or download the full metadata (including specific use metadata).

The metadata of the following product collections would be stored such a Catalogue Service. It is to be noted that the prime focus of the reference implementation are the VGT4Africa collections. However a limited number of metadata for other product collections will be added.

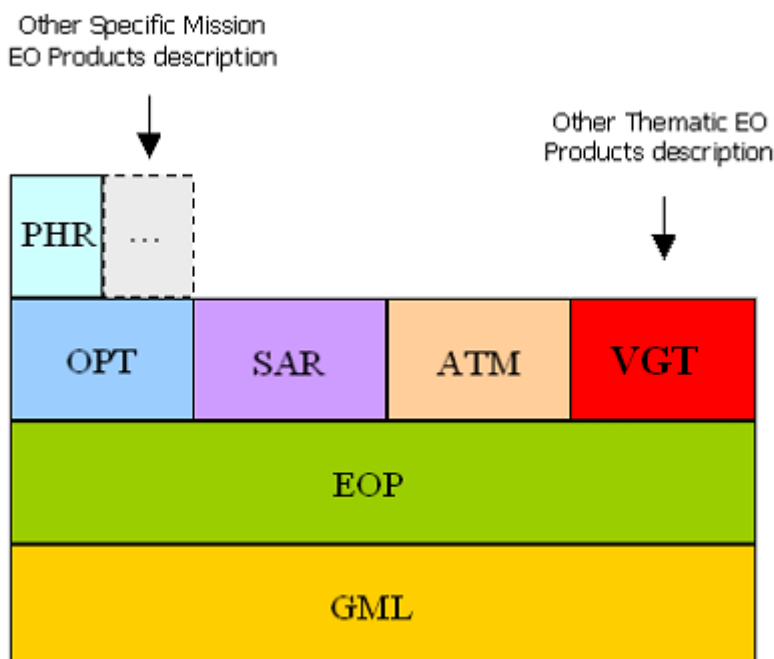
<b>Category</b>	<b>Products</b>	<b>Distribution system</b>
Base products	VGT-P	CTIV Commercial Services
Synthesis products	VGT-S1, VGT S-10, VGT D-10 VGTS-10 NDVI	CTIV Commercial Services VGT4Africa
Derived Products	Dry Matter Productivity (DMP) Small Water Bodies Vegetation Productivity Indicator (VPI) Normalised Difference Water Index (NDWI) Fractional cover LeafArea Index Albedo Phenology Small Water bodies Burnt Area	VGT4Africa VGT4Africa VGT4Africa VGT4Africa VGT4Africa VGT4Africa VGT4Africa VGT4Africa VGT4Africa VGT4Africa

## 3 INFORMATION VIEWPOINT

The information viewpoint focuses on the semantics of the information and information processing performed. Three different information models need to be considered in the context of an ebRIM based Catalogue Service. Firstly there is the basic information model of the resources that are to be harvested. For an OGC Web Services type of catalogue, these resources consist of OGC Web Services Capabilities documents. Similarly one could harvest Web Map Context documents. In the frame of an EO extension package of ebRIM CSW, the resources under consideration however are the EO Product metadata encoded according to the EO Profile of GML. Secondly, there is the presentation of this information when it is returned in response to ebRIM GetRecords requests which typically consists of csw:Record or rim:RegistryObject elements. Thirdly, there is the services metadata.

### 3.1 BASE INFORMATION MODEL: EO PROFILE OF GML

The base information model that is under consideration for an EO Product Catalog, is the basic metadata model and format in which the metadata are expressed. In the frame of the initial Heterogeneous Missions Accessibility project, this metadata was modelled as gml:features and later on refined as gml:observations as documented in the GML 3.1.1 Application schema for Earth Observation products [AD08]. This document describes a hierarchy of schemas with increasing specialisation following which one can describe an earth observation product, a thematic product like optical, radar or atmosphere or even a mission specific product. This set of schemas is extensible so that one can create new derived schemas to encompass metadata elements required for the description of other thematic product groups or missions.



**Figure 1 Schema Hierarchy**

For the VITO EO products, a mapping has been done to compare the metadata that is currently in use for the variety of product collections to a common metadata model. The result of this mapping exercise is documented in the Technical Note on the application of the EO Profile of GML to the VITO EO product collections [AD10]. The conclusion is that the EO Profile of GML can be usefully applied for the description of the products of all VITO CVB Earth Observation Product collections with a number of minor corrections and enhancements to the base schemas. In addition, a derived schema was developed in order to capture some of the specific metadata elements that are required for correct interpretation of the

VITO VGT derived information products. These properties are stored in metadata elements that are defined in a specific metadata schema with vgt as namespace prefix for vegetational derived products. To note is that the additional metadata elements are not needed for pure discovery purposes but are required when using the product to avoid product misinterpretations. However, as VITO would like to have this harmonised metadata accessible from a central Catalogue service from which users can download it, it makes sense to model these properties within an extension of the EO Profile of GML.

Further information on the metadata mapping, the enhancements/corrections to the EO Profile of GML and the vgt gml application schema can be found in [AD10]. The corrected eop schema and the derived vgt schema are included as annex 2 respectively 1 of this document.

### 3.2 EBRIM INFORMATION MODEL

When the metadata is returned in response to Catalogue Service requests, the metadata is typically not encoded in GML. Depending on the type of request, it may be encoded either in the model defined by the schemas of the <http://www.opengis.net/cat/csw/2.0.2> namespace. alternatively as so-called RIM registry objects or finally as EO Profile of GML observations that were described above.

The csw 2.0.2 namespace defines the <csw:Record>, <csw:SummaryRecord> and <csw:BriefRecord> elements which are the basic recordtypes that any Catalogue Service for the Web Implementation (regardless of the specific application profile that the CSW implements) should support. These record types contain respectively full, summary, and brief views on Dublin Core Metadata Initiative metadata terms.

When the outputschema is set to ebRIM, the record representation can be any subtype of a rim:RegistryObject. Also here one has got the notion of abstract property sets—or views—that provide differing levels of detail about a catalogue item: brief, summary, and full. The brief view basically only contains ids and objecttypes. The summary view returns some properties of the product but generally too little to serve as what one would typically present after a search like operation. The Full view returns – like the name implies, the full metadata with all ebRIM associations and classifications.

In the Earth Observation context, the use of brief & summary are generally not useful, as they do not contain sufficient information. The brief view only contains ids and objecttypes. The summary view returns some properties of the EO products that are part of the main registryObject, but the associations and classifications are missing.

The following table summarises for the different Web Service operations that are described in section 4, the different information models that can be returned in response to these operations.

Operation	Output Schema
GetRecords	<a href="http://www.opengis.net/cat/csw/2.0.2">http://www.opengis.net/cat/csw/2.0.2</a> or urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0
GetRecordById	<a href="http://www.opengis.net/cat/csw/2.0.2">http://www.opengis.net/cat/csw/2.0.2</a> or urn:oasis:names:tc:ebxml-regrep:xsd:rim:3.0
GetRepositoryItem	EO Profile of GML

Normally when employing an ebRIM like Catalogue, one only maps the most important metadata elements – the ones that should either be usable as search criteria, the so-called queryables, and/or the “base” returnables, the set of metadata elements that one would like to see in response to a search operation on to the ebRIM model within the so-called slots. Full metadata is only returned when executing the GetRepositoryItem operation which will return the metadata with its full content in the native encoding. Within the HMA project, the choice was however made to map all elements of the EO Profile of GML to ebRIM meaning that all EO Profile of GML elements are defined as slots within the EO extension package of ebRIM CSW [AD11].

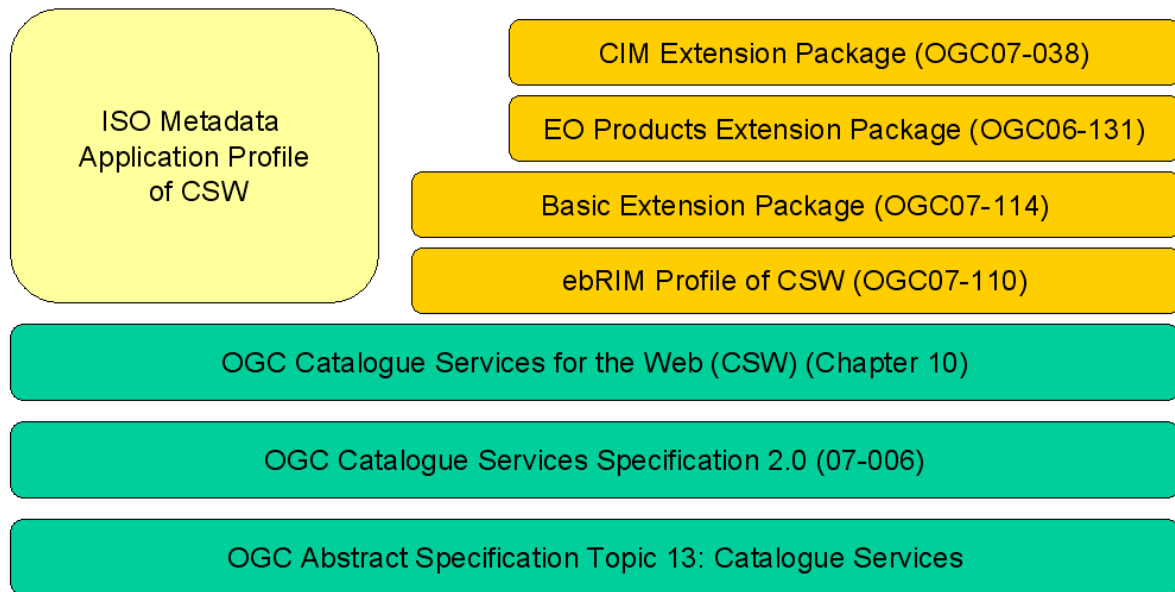
### **3.3 CATALOGUE SERVICE CAPABILITIES**

One additional information model that comes in to play when developing a Catalogue service is the metadata of the service instance itself. In the world of OGC services, this metadata is typically returned to client applications in response to the so-called GetCapabilities operation. The XML document that is returned is a Capabilities XML document. For an EO Extension package ebRIM catalogue it is important to document the collections of the EO Products for which the Catalogue is serving metadata, in the ows:ExtendedCapabilities element.

## 4 SERVICES VIEWPOINT

The chapter summarises the services viewpoint that enables distribution through functional decomposition of the system into Services and describes the service interfaces.

The main Service interface in the reference implementation to be instantiated in the project is a Catalogue Service that implements the EO extension package of ebRIM CSW [AD11]. This extension package is part of a hierarchical group of Catalogue standards that is sketched in the following Figure.



**Figure 2 Overview of OGC Catalogue Specifications**

At OGC, two families of Application Profiles of CSW exist. The ebRIM Profile of CSW (defined by OGC07-110 and 07-114) has been declared to be OGC's recommended application profile for future Catalogue developments. Two extension packages have been created that augment the basic extension package by defining the mapping of specific information models to so called registry packages. On the one hand there is the CIM extension package for storing metadata about geographic datasets (ISO19115) and geographic services (ISO19119). For EO Product metadata the EO extension package of ebRIM CSW has been developed [AD11]. It is this specification that will be implemented by our prototype.

The operations that are currently typically used in the HMA Catalog implementations are the GetRecords and GetRecordById operations typically returning the "Full Elementset". This works for implementations of which the required information model is such that it fits perfectly on the EO Profile of GML with no extensions required. In this case, and due to the full mapping of the EO Profile of GML on the ebRIM slots, the GetRecords Operation will full elementSet will return all metadata elements.

Now, the fact that we have extended our information model to cope with additional elements that could be required by users of VITO's derived EO Products, poses however a problem when considering the approach that is currently followed. If we would follow this approach, we would need to extend the currently existing EO extension package (or create a VGT extension package on top of the EO extension package) to map all of the new metadata elements to new ebRIM slots. All of this effort in documentation (new OGC profile), implementation and maintenance of software and documents would be required to just be able to return the metadata elements within the full elementset in reply to a GetRecords (or GetRecordById) request. The mapping of these elements onto slots and the definition of a new extension package does not seem to be an efficient approach if one just wants to return a couple of additional metadata elements which one would not need to be able to query upon. Also this approach implies that the information contained within the EO Profile of GML gets completely duplicated in the EO extension package which puts the further existence of the EO Profile of GML into question and creates problems of

maintainability of both standards. These issues were also raised by CNES as per the issue 168 in the EOxbRIMSWG Issue tracker list.

An alternative approach is to use the GetRepositoryItem operation for returning the full metadata in response to a “present like operation to be able to represent the full metadata.

We would prefer the second approach with implementing GetRecords (with a full resultset) for the search-like operation and GetRepositoryItem for a present like operation. This is however a suboptimal approach as there is a lot information that needs to be transferred twice, once when doing the search with GetRecords with the full elementset and secondly when performing a present with the Full EO Profile of GML with extensions being returned. This last issue could be alleviated if one would revert to a “light” extension package in which one would only map the queryables and the “core” returnables on ebRIM slots. The “core” returnables would be the items that one would typically represent as output to searchlike operations that give an overview of al the records that match the search criteria. All other metadata would then be retrieveable via the GetRepositoryItem request.

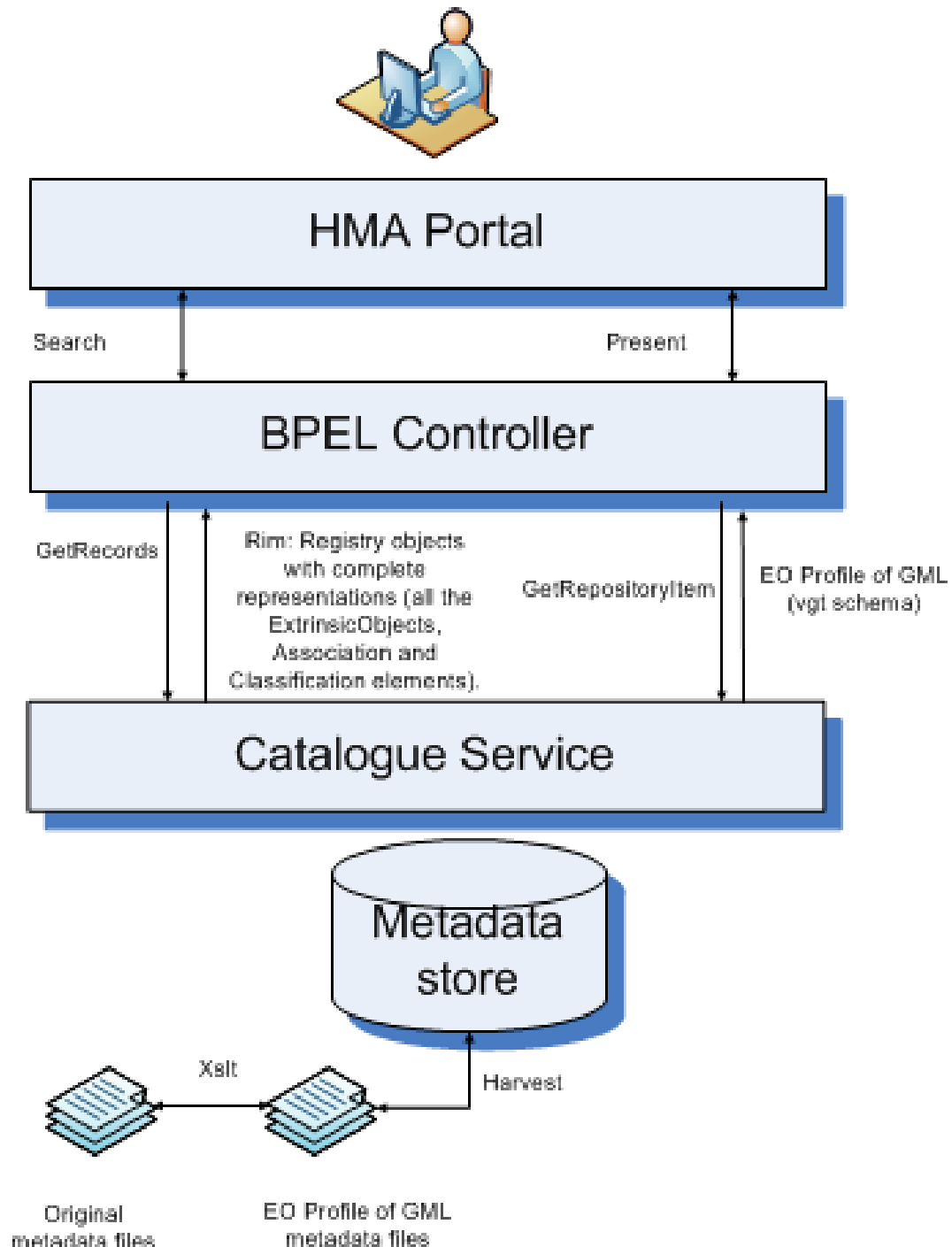
The decision on which approach to be followed out of the following options, will be taken during next CDR meeting, after which this document will be updated to reflect the choices.

- Extending EO Extension Package (implementation only - not necessarily the creation of a new extension package specification document) and continue working with GetRecords operation with full elementset
- Approach whereby the additional metadata elements would only be returned in response to a GetRepositoryItem call, keeping the GetRecords with the full elaborate elementset
- Approach whereby we implement a “light” extension package

## 5 ENGINEERING VIEWPOINT

This chapter describes the engineering viewpoint that focuses on the mechanisms and functions required to support distributed interaction between objects in the system. It specifies the mapping of the service specifications and information models to the chosen service and information infrastructure.

The overall architecture diagram is sketched in the following Figure. The engineering Viewpoint will be further elaborated once the design choice has been validated during the CDR meeting.



## 6 TECHNOLOGY VIEWPOINT

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Chapter 6 finally constitutes the technology viewpoint that focuses on the choice of technology in that system.

The following technical components will be employed in the prototype

- HMA Portal available at <http://Services.eoportal.org>
- Custom developed XSLT stylesheet, WSDL and XSD to be developed by GIM
- Custom workflow (depending on design choice) to be developed by GIM nv
- ERDAS Catalog service developed by ERDAS
- ERDAS catalogue harvesters with ERDAS/GIM
- PostGresQL/PostGIS database with the following version: PostgreSQL 8.3.3 - POSTGIS="1.3.3" GEOS="2.2.3-CAPI-1.1.1" PROJ="Rel. 4.5.0, 22 Oct 2006" USE\_STATS
- XSLT for converting the VGT4africa ISO19115 metadata to EO Profile of GML (see Annex 3)



## ANNEX 1 VGT SCHEMA

```

<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XMLSpy v2008 rel. 2 sp2 (http://www.altova.com) by Steven Smolders(GIM nv) 09/02/09-->
<xs:schema xmlns:vgt="http://www.vito.be/vgt" xmlns:eop="http://earth.esa.int/eop"
xmlns:gml="http://www.opengis.net/gml" xmlns:gmd="http://www.isotc211.org/2005/gmd"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xs="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://www.vito.be/vgt" elementFormDefault="qualified"
attributeFormDefault="unqualified" version="0.0.0">
  <xs:import namespace="http://www.opengis.net/gml"
schemaLocation="../../gml/3.1.1/base/gmlSubset.xsd"/>
  <xs:import namespace="http://earth.esa.int/eop" schemaLocation="./eop.xsd"/>
  <!-- <xs:import namespace="http://www.isotc211.org/2005/gmd"
schemaLocation="http://www.isotc211.org/2005/gmd/gmd.xsd"/> -->
  <!-- ===== -->
  <!-- This schema defines the extensions to the HMA eop and opt schemas as required for VITO's
vgt centrum Voor Beeldverwerking products) -->
  <!-- VGT EarthObservation : -->
  <!--           + Extends eop:AbstractObservation -->
  <!-- ===== -->
  <xs:element name="EarthObservation" type="vgt:EarthObservationType"
substitutionGroup="eop:EarthObservation">
    <xs:annotation>
      <xs:documentation>Namespace for VITO vgt
EarthObservationProduct.</xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:complexType name="EarthObservationType">
    <xs:complexContent>
      <xs:extension base="eop:EarthObservationType">
        <xs:sequence/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <!-- ===== -->
  <!-- EarthObservationMetadata :
-->
  <!--           + this feature extends eop:EarthObservationMetadata -->
  <!--           The following elements are added
-->
  <!--           + GeometricCorrectionInformation for CTIV P, S1, S10 and D10
Products -->
  <!--           + RadiometricCorrectionInformation for CTIV P, S1, S10 and D10 Products
-->
  <!--           + Synthesis Information for CTIV S1, S10 and D10 Products
-->
  <!--           + Derived product Information for VGT4Africa Products
-->
  <!-- ===== -->
  <xs:element name="EarthObservationMetaData" type="vgt:EarthObservationMetaDataType"
substitutionGroup="eop:EarthObservationMetaData"/>
  <xs:complexType name="EarthObservationMetaDataType" mixed="true">

```

```

        <xs:complexContent mixed="true">
          <xs:extension base="eop:EarthObservationMetaDataType">
            <xs:sequence>
              <xs:element ref="vgt:GeometricCorrectionInformation"
minOccurs="0"/>
              <xs:element ref="vgt:RadiometricCorrectionInformation"
minOccurs="0"/>
              <xs:element ref="vgt:SynthesisInformation" minOccurs="0"/>
              <xs:element ref="vgt:DerivedProductInformation"
minOccurs="0"/>
            </xs:sequence>
          </xs:extension>
        </xs:complexContent>
      </xs:complexType>
      <!-- ===== -->
      <!-- Geometric Correction -->
      <!-- ===== -->
      <xs:element name="GeometricCorrectionInformation"
type="vgt:GeometricCorrectionInformationType"/>
      <xs:complexType name="GeometricCorrectionInformationType">
        <xs:annotation>
          <xs:documentation>
            The information related to the geometric correction that was performed
          </xs:documentation>
        </xs:annotation>
        <xs:sequence>
          <xs:element name="demRef" type="xs:string"/>
          <xs:element name="demDate" type="xs:date"/>
          <xs:element name="geometricalCharacteristicsRef" type="xs:string"/>
          <xs:element name="geometricCorrectionBandRef"
type="vgt:GeometricCorrectionBandRefType"/>
          <xs:element name="ControlPointAvailability" type="xs:boolean"/>
          <xs:element name="geomCorrQualityFlag" type="vgt:GeomCorrQualityFlag"
minOccurs="0"/>
        </xs:sequence>
      </xs:complexType>
      <xs:simpleType name="GeometricCorrectionBandRefType">
        <xs:restriction base="xs:string">
          <xs:enumeration value="B2"/>
          <xs:enumeration value="B3"/>
        </xs:restriction>
      </xs:simpleType>
      <xs:simpleType name="GeomCorrQualityFlag">
        <xs:restriction base="xs:string">
          <xs:enumeration value="Good"/>
          <xs:enumeration value="Bad"/>
        </xs:restriction>
      </xs:simpleType>
      <!-- ===== -->
      <!-- Radiometric Correction -->
      <!-- ===== -->
      <xs:element name="RadiometricCorrectionInformation"
type="vgt:RadiometricCorrectionInformationType"/>
      <xs:complexType name="RadiometricCorrectionInformationType">
        <xs:annotation>
          <xs:documentation>
            The information related to the geometric correction that was performed
          </xs:documentation>
        </xs:annotation>

```

```

        <xs:sequence>
            <xs:element name="equalisationCharacteristicsRef" type="xs:string"/>
            <xs:element name="calibrationCharacteristicsRef" type="xs:string"/>
        </xs:sequence>
    </xs:complexType>
    <!-- ===== ->
    <!-- Synthesis Information ->
    <!-- ===== ->
    <xs:element name="SynthesisInformation" type="vgt:SynthesisInformationType"/>
    <xs:complexType name="SynthesisInformationType">
        <xs:annotation>
            <xs:documentation>
                The information is related to the production of the synthesis
            </xs:documentation>
        </xs:annotation>
        <xs:sequence>
            <xs:element name="synthesisNominalDate" type="xs:date"/>
            <xs:element name="synthesisAlgorithm" type="xs:string"/>
        </xs:sequence>
    </xs:complexType>
    <!-- ===== ->
    <!-- Derived Product Information ->
    <!-- ===== ->
    <xs:element name="DerivedProductInformation" type="vgt:DerivedProductInformationType"/>
    <xs:complexType name="DerivedProductInformationType">
        <xs:annotation>
            <xs:documentation>
                The information is related to content of the derived Product. It defines the dimensional content of
                the product and the flag values.
            </xs:documentation>
        </xs:annotation>
        <xs:sequence>
            <xs:element name="derivedProductProcessingInformation" type="xs:string"
minOccurs="0"/>
            <xs:element name="minValueSignificantDigital" type="xs:decimal"
minOccurs="0"/>
            <xs:element name="maxValueSignificantDigital" type="xs:decimal"
minOccurs="0"/>
            <xs:element name="scaleFactor" type="xs:decimal" minOccurs="0"/>
            <xs:element name="offset" type="xs:decimal" minOccurs="0"/>
            <xs:element name="minValueDisplayDigital" type="xs:decimal" minOccurs="0"/>
            <xs:element name="maxValueDisplayDigital" type="xs:decimal" minOccurs="0"/>
            <xs:element name="minValuePhysical" type="xs:decimal" minOccurs="0"/>
            <xs:element name="maxValuePhysical" type="xs:decimal" minOccurs="0"/>
            <xs:element name="units" type="xs:string" minOccurs="0"/>
            <!-- should refer to gml:unitdefinition ->
            <xs:element name="flagInformation" type="vgt:FlagInformationType"
minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="FlagInformationType">
        <xs:annotation>
            <xs:documentation>
                The information related to the Flag values present in the derived product
            </xs:documentation>
        </xs:annotation>
        <xs:sequence>
            <xs:element name="flagCode" type="xs:string"/>
            <xs:element name="flagDescription" type="xs:string" minOccurs="0"/>

```

```
        <xs:element name="flagValue" type="xs:decimal"/>
    </xs:sequence>
</xs:complexType>
</xs:schema>
```

## ANNEX 2 MODIFIED EOP BASE SCHEMA TAKING INTO ACCOUNT THE CHANGE REQUESTS

?xml version="1.0" encoding="utf-8"?>

<!-- Version 1.2.1-GIM 06-02-2009 takes into account issues 170, 171 and 172 raised in the EOxebRIM SWG -->

<xs:schema xmlns:gml="http://www.opengis.net/gml" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:eop="http://earth.esa.int/eop" xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://earth.esa.int/eop" elementFormDefault="qualified" attributeFormDefault="unqualified" version="1.2.1">

<xs:import namespace="http://www.opengis.net/gml" schemaLocation="../../gml/3.1.1/base/gmlSubset.xsd"/>

<xs:import namespace="http://www.w3.org/1999/xlink" schemaLocation="../../xlink/1.0.0/xlinks.xsd"/>

<xs:element name="EarthObservation" type="eop:EarthObservationType" substitutionGroup="gml:Observation">

<xs:annotation>

<xs:documentation>eop root element for generic Earth Observation Product description</xs:documentation>

</xs:annotation>

</xs:element>

<xs:complexType name="EarthObservationType" mixed="false">

<xs:annotation>

<xs:documentation>Earth Observation Product description</xs:documentation>

</xs:annotation>

<xs:complexContent mixed="false">

<xs:extension base="gml:ObservationType">

<xs:attribute name="version" type="xs:string" use="required" fixed="1.2.1">

<xs:annotation>

validate the instance</xs:documentation>

</xs:annotation>

</xs:attribute>

</xs:extension>

</xs:complexContent>

</xs:complexType>

<xs:complexType name="EarthObservationPropertyType">

<xs:sequence>

<xs:element ref="eop:EarthObservation" minOccurs="0"/>

</xs:sequence>

<xs:attributeGroup ref="gml:AssociationAttributeGroup"/>

</xs:complexType>

<xs:element name="EarthObservationEquipment" type="eop:EarthObservationEquipmentType" substitutionGroup="gml:\_Feature"/>

<xs:complexType name="EarthObservationEquipmentType" mixed="false">

<xs:complexContent mixed="false">

<xs:extension base="gml:AbstractFeatureType">

<xs:sequence>

<xs:element name="platform" type="eop:PlatformPropertyType" minOccurs="0"/>

```

minOccurs="0"/>
<xs:element name="instrument" type="eop:InstrumentPropertyType"
minOccurs="0"/>
<xs:element name="sensor" type="eop:SensorPropertyType" minOccurs="0"/>
minOccurs="0"/>
<xs:element name="acquisitionParameters" type="eop:AcquisitionPropertyType"
</xs:sequence>
</xs:extension>
</xs:complexContent>
</xs:complexType>
<xs:complexType name="EarthObservationEquipmentPropertyType">
<xs:sequence>
<xs:element ref="eop:EarthObservationEquipment"/>
</xs:sequence>
</xs:complexType>
<xs:attribute name="type" type="xs:QName"/>
<xs:element name="ArchivingInformation" type="eop:ArchivingInformationType"/>
<xs:complexType name="ArchivingInformationArrayPropertyType">
<xs:sequence>
<xs:element ref="eop:ArchivingInformation" maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="ArchivingInformationType">
<xs:sequence>
<xs:element name="archivingCenter" type="gml:CodeListType">
<xs:annotation>
<xs:documentation>Archiving centre code. Possible values are mission specific
and should be retrieved using codespace.
PHR : value is a valid station code
eop/EOLI : N/A</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="archivingDate" type="xs:dateTime">
<xs:annotation>
<xs:documentation>Archiving date time</xs:documentation>
</xs:annotation>
</xs:element>
<xs:element name="archivingIdentifier" type="eop:CodeWithAuthorityType" minOccurs="0">
<xs:annotation>
<xs:documentation>Local archiving id as created by the mission ground
segment that may required to allow subsequent order processing</xs:documentation>
</xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:element name="DownlinkInformation" type="eop:DownlinkInformationType"/>
<xs:complexType name="DownlinkInformationArrayPropertyType">

```

---

```

    <xs:sequence>
      <xs:element ref="eop:DownlinkInformation" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="DownlinkInformationType">
    <xs:sequence>
      <xs:element name="acquisitionStation" type="gml:CodeListType">
        <xs:annotation>
          <xs:documentation>Acquisition / receiving station code. Possible values are
mission specific and should be retrieved using codespace.</xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element name="acquisitionDate" type="xs:dateTime" minOccurs="0">
        <xs:annotation>
          <xs:documentation>Acquisition date time</xs:documentation>
        </xs:annotation>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
  <xs:element name="EarthObservationMetaData" type="eop:EarthObservationMetaDataType"
substitutionGroup="gml:_MetaData"/>
  <xs:complexType name="EarthObservationMetaDataType" mixed="true">
    <xs:complexContent mixed="true">
      <xs:extension base="gml:AbstractMetaDataType">
        <xs:sequence>
          <xs:element ref="eop:identifier"/>
          <xs:element ref="eop:doi" minOccurs="0"/>
          <xs:element ref="eop:parentIdentifier" minOccurs="0"/>
          <xs:element ref="eop:acquisitionType"/>
          <xs:element ref="eop:acquisitionSubType" minOccurs="0"/>
          <xs:element ref="eop:productType" minOccurs="0"/>
          <xs:element ref="eop:status"/>
          <xs:element name="downlinkedTo"
type="eop:DownlinkInformationArrayPropertyType" minOccurs="0"/>
          <xs:element name="archivedIn"
type="eop:ArchivingInformationArrayPropertyType" minOccurs="0"/>
          <xs:element ref="eop:imageQualityDegradation" minOccurs="0"/>
          <xs:element ref="eop:imageQualityDegradationQuotationMode"
minOccurs="0"/>
          <xs:element ref="eop:histograms" minOccurs="0"/>
          <xs:element ref="eop:composedOf" minOccurs="0" maxOccurs="unbounded"/>
          <xs:element ref="eop:subsetOf" minOccurs="0" maxOccurs="unbounded"/>
          <xs:element ref="eop:linkedWith" minOccurs="0" maxOccurs="unbounded"/>
          <xs:element name="processing" type="eop:ProcessingInformationPropertyType"
minOccurs="0"/>
          <xs:element name="vendorSpecific"
type="eop:SpecificInformationArrayPropertyType" minOccurs="0"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

```

---

```

        </xs:extension>
    </xs:complexContent>
</xs:complexType>
<xs:element name="Acquisition" type="eop:AcquisitionType"/>
<xs:complexType name="AcquisitionPropertyType">
    <xs:sequence>
        <xs:element ref="eop:Acquisition"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="AcquisitionType">
    <xs:sequence>
        <xs:element name="orbitNumber" type="xs:int" minOccurs="0">
            <xs:annotation>
                <xs:documentation>EOLI : orbit (F B b s)</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="lastOrbitNumber" type="xs:int" minOccurs="0">
            <xs:annotation>
                <xs:documentation>EOLI : lastOrbit (F)</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="orbitDirection" minOccurs="0">
            <xs:annotation>
                <xs:documentation>EOLI : orbitDir (F B b s)</xs:documentation>
            </xs:annotation>
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:enumeration value="ASCENDING"/>
                <xs:enumeration value="DESCENDING"/>
            </xs:restriction>
        </xs:simpleType>
        </xs:element>
        <xs:element name="wrsLongitudeGrid" minOccurs="0">
            <xs:annotation>
                <xs:documentation>Neutral wrsLongitudeGrid to replace track in track/frame, K
in K/J, etc. The optional attribute "eop:codeSpace" is used to point the reference grid.</xs:documentation>
            </xs:annotation>
        <xs:complexType>
            <xs:simpleContent>
                <xs:extension base="xs:anySimpleType">
                    <xs:attribute name="codeSpace" type="xs:anyURI"/>
                </xs:extension>
            </xs:simpleContent>
        </xs:complexType>
        </xs:element>
        <xs:element name="wrsLatitudeGrid" minOccurs="0">

```



---

```

        <xs:annotation>
            <xs:documentation>Neutral wrsLatitudeGrid to replace frame in track/frame, J
in K/J, etc. The optional attribute "codeSpace" is used to point the reference grid.</xs:documentation>
        </xs:annotation>
    </xs:complexType>
    <xs:simpleContent>
        <xs:extension base="xs:anySimpleType">
            <xs:attribute name="codeSpace" type="xs:anyURI"/>
        </xs:extension>
    </xs:simpleContent>
</xs:complexType>
</xs:element>
<xs:element name="ascendingNodeDate" type="xs:dateTime" minOccurs="0">
    <xs:annotation>
        <xs:documentation>UTC date and time at ascending node of
orbit</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="ascendingNodeLongitude" type="gml:MeasureType" minOccurs="0">
    <xs:annotation>
        <xs:documentation>Longitude at ascending node of orbit. should be expressed
in degrees</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="startTimeFromAscendingNode" type="gml:MeasureType" minOccurs="0">
    <xs:annotation>
        <xs:documentation>Start time of acquisition in milliseconds from Ascending
node date</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="completionTimeFromAscendingNode" type="gml:MeasureType" minOccurs="0">
    <xs:annotation>
        <xs:documentation>Completion time of acquisition in milliseconds from
Ascending node date</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="orbitDuration" type="gml:MeasureType" minOccurs="0">
    <xs:annotation>
        <xs:documentation>Actual orbit duration in milliseconds</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="acrossTrackIncidenceAngle" type="gml:AngleType" minOccurs="0">
    <xs:annotation>
        <xs:documentation>Across Track Incidence angle given in
degrees.</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="alongTrackIncidenceAngle" type="gml:AngleType" minOccurs="0">

```

---

```

        <xs:annotation>
            <xs:documentation>Along Track Incidence angle given in
degrees.</xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element name="incidenceAngle" type="gml:AngleType" minOccurs="0">
        <xs:annotation>
            <xs:documentation>Global Incidence angle given in
degrees.</xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element name="pitch" type="gml:AngleType" minOccurs="0">
        <xs:annotation>
            <xs:documentation>Pitch angle given in degrees.</xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element name="roll" type="gml:AngleType" minOccurs="0">
        <xs:annotation>
            <xs:documentation>Roll angle given in degrees.</xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element name="yaw" type="gml:AngleType" minOccurs="0">
        <xs:annotation>
            <xs:documentation>Yaw angle given in degrees.</xs:documentation>
        </xs:annotation>
    </xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="PlatformPropertyType">
    <xs:sequence>
        <xs:element ref="eop:Platform"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="InstrumentPropertyType">
    <xs:sequence>
        <xs:element ref="eop:Instrument"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="SensorPropertyType">
    <xs:sequence>
        <xs:element ref="eop:Sensor"/>
    </xs:sequence>
</xs:complexType>
<xs:element name="Platform" type="eop:PlatformType"/>
<xs:complexType name="PlatformType">
    <xs:sequence>

```

---

```

    <xs:element name="shortName" type="xs:string">
      <xs:annotation>
        <xs:documentation>Platform short name (eg. PHR) </xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="serialIdentifier" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>Platform serial identifier (eg. for PHR :
1A)</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="orbitType" minOccurs="0">
      <xs:annotation>
        <xs:documentation>High level characterisation of main mission types
(GEO/LEO)</xs:documentation>
      </xs:annotation>
      <xs:simpleType>
        <xs:restriction base="xs:string">
          <xs:enumeration value="GEO"/>
          <xs:enumeration value="LEO"/>
        </xs:restriction>
      </xs:simpleType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:element name="Instrument" type="eop:InstrumentType"/>
<xs:complexType name="InstrumentType">
  <xs:sequence>
    <xs:element name="shortName" type="xs:string">
      <xs:annotation>
        <xs:documentation>Instrument short name
EOLI : instShNm</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:element name="Sensor" type="eop:SensorType"/>
<xs:complexType name="SensorType">
  <xs:sequence>
    <xs:element name="sensorType" type="eop:SensorTypePropertyType" minOccurs="0"/>
    <xs:element name="operationalMode" type="gml:CodeListType" minOccurs="0">
      <xs:annotation>
        <xs:documentation>Sensor mode. Possible values are mission specific and
should
be retrieved using codespace. (eg. PHR : PA, XS or PX).</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>

```

---

```

    </xs:element>
    <xs:element name="resolution" type="gml:MeasureType" minOccurs="0">
      <xs:annotation>
        <xs:documentation>Image resolution</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="swathIdentifier" type="gml:CodeListType" minOccurs="0">
      <xs:annotation>
        <xs:documentation>Swath identifier (e.g. Envisat ASAR has 7 distinct swaths
(11,12,13...17) that correspond to precise incidence angles for the sensor). Value list can be retrieved with
codeSpace.</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="SensorTypePropertyType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="ALTIMETRIC"/>
    <xs:enumeration value="ATMOSPHERIC"/>
    <xs:enumeration value="OPTICAL"/>
    <xs:enumeration value="RADAR"/>
  </xs:restriction>
</xs:simpleType>
<xs:element name="EarthObservationResult" type="eop:EarthObservationResultType" substitutionGroup="gml:_Feature">
  <xs:annotation>
    <xs:documentation>Defines the observation result, i.e. the Earth Observation
Product</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:complexType name="EarthObservationResultType" mixed="false">
  <xs:complexContent mixed="false">
    <xs:extension base="gml:AbstractFeatureType">
      <xs:sequence>
        <xs:element name="browse" type="eop:BrowseInformationArrayPropertyType"
minOccurs="0"/>
        <xs:element name="product" type="eop:ProductInformationArrayPropertyType"
minOccurs="0"/>
        <xs:element name="mask" type="eop:MaskInformationArrayPropertyType"
minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
<xs:complexType name="EarthObservationResultPropertyType">
  <xs:sequence>
    <xs:element ref="eop:EarthObservationResult"/>
  </xs:sequence>
</xs:complexType>

```

```

<xs:element name="Footprint" type="eop:FootprintType" substitutionGroup="gml:_Feature">
  <xs:annotation>
    <xs:documentation>Defines the acquisition footprint, i.e. the region observed by the
Instrument</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:complexType name="FootprintType" mixed="false">
  <xs:complexContent mixed="false">
    <xs:extension base="gml:AbstractFeatureType">
      <xs:sequence>
        <xs:element ref="gml:multiExtentOf">
          <xs:annotation>
            <xs:documentation>Acquisition footprint coordinates,
described by a closed polygon (last point=first point), using CRS:WGS84, Latitude,Longitude pairs (per-WGS84 definition of point
ordering, not necessarily per all WFS implementations). Expected structure is gml:Polygon/gml:exterior/gml:LinearRing/gml:posList.

```

eop/EOLI : polygon/coordinates (F B b s)

```

          </xs:documentation>
        </xs:annotation>
      </xs:element>
      <xs:element ref="gml:centerOf" minOccurs="0">
        <xs:annotation>
          <xs:documentation>Acquisition center coordinates.

```

Expected structure is gml:Point/gml:pos.

```

eop/EOLI : scCenter/coordinates (F B b s)</xs:documentation>
          </xs:annotation>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
<xs:complexType name="BrowseInformationArrayPropertyType">
  <xs:sequence>
    <xs:element ref="eop:BrowseInformation" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:element name="BrowseInformation" type="eop:BrowseInformationType"/>
<xs:complexType name="BrowseInformationType">
  <xs:sequence>
    <xs:element name="type">
      <xs:annotation>
        <xs:documentation>Browse type. Possible values are : THUMBNAIL,
QUICKLOOK and ALBUM. </xs:documentation>
      </xs:annotation>
    <xs:simpleType>
      <xs:restriction base="xs:string">

```

---

```

        <xs:enumeration value="THUMBNAIL"/>
        <xs:enumeration value="QUICKLOOK"/>
        <xs:enumeration value="ALBUM"/>
    </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="subType" type="gml:CodeListType" minOccurs="0">
    <xs:annotation>
        <xs:documentation>Value is mission specific. Value list can be retrieved with
codeSpace. Not used by PHR. For MODIS : OPTICAL, THERMAL</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="referenceSystemIdentifier" type="eop:CodeWithAuthorityType">
    <xs:annotation>
        <xs:documentation>Indicates if browse is geo-referenced, and thus can be
assumed to be displayed directly on a map (in which case should point to a code space for the CRS), when not supplied it is assumed
that the browse is provided in "raw" satellite frame of reference</xs:documentation>
    </xs:annotation>
</xs:element>
<xs:element name="fileName" type="xs:string">
    <xs:annotation>
        <xs:documentation>Path to the browse image (could be any kind of URL :
direct link to the image or WMS/WCS interface), it is assumed that if a client is prepared to "manage" a browse delivered by e.g.
WMS they would parse the URL to identify that it contains the OGC standard SERVICE=WMS</xs:documentation>
    </xs:annotation>
</xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="ProductInformationArrayPropertyType">
    <xs:sequence>
        <xs:element ref="eop:ProductInformation" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:element name="ProductInformation" type="eop:ProductInformationType"/>
<xs:complexType name="ProductInformationType">
    <xs:sequence>
        <xs:element name="referenceSystemIdentifier" type="eop:CodeWithAuthorityType" minOccurs="0">
            <xs:annotation>
                <xs:documentation>Indicates if product is geo-referenced, (in which case should
point to a code space for the CRS), when not supplied it is assumed that the browse is provided in "raw" satellite frame of
reference</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="fileName" type="xs:string">
            <xs:annotation>
                <xs:documentation>Path to the actual product data if available online (could be
any kind of URL :

```

direct link to the image or WMS/WCS interface), it is assumed that if a client is prepared to "manage" a product delivered by e.g. WCS they would parse the URL to identify that it contains the OGC standard SERVICE=WCS</xs:documentation>

```

    </xs:annotation>
  </xs:element>
  <xs:element name="version" type="xs:string" minOccurs="0">
    <xs:annotation>
      <xs:documentation>Product version</xs:documentation>
    </xs:annotation>
  </xs:element>
  <xs:element name="size" type="gml:MeasureListType" minOccurs="0">
    <xs:annotation>
      <xs:documentation>Product size (bytes) allowing the user to realise how long a
download is likely to take</xs:documentation>
    </xs:annotation>
  </xs:element>
</xs:sequence>
</xs:complexType>
<xs:complexType name="ProcessingInformationPropertyType">
  <xs:sequence>
    <xs:element ref="eop:ProcessingInformation" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:element name="ProcessingInformation" type="eop:ProcessingInformationType"/>
<xs:complexType name="ProcessingInformationType">
  <xs:sequence>
    <xs:element name="processingCenter" type="gml:CodeListType" minOccurs="0">
      <xs:annotation>
        <xs:documentation>Processing centre code. Possible values are mission specific
and should be retrieved using codespace.</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="processingDate" type="xs:dateTime" minOccurs="0">
      <xs:annotation>
        <xs:documentation>Processing date time</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="compositeType" minOccurs="0" type="xs:duration"/>
    <xs:element name="method" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>Method used to compute datalayer. (e.g. Kalman filtering,
ROSE)</xs:documentation>
      </xs:annotation>
    </xs:element>
    <xs:element name="methodVersion" type="xs:string" minOccurs="0">
      <xs:annotation>
        <xs:documentation>Method version (e.g. 1.0)</xs:documentation>
      </xs:annotation>
    </xs:element>
  </xs:sequence>

```

---

```

        </xs:element>
        <xs:element name="processorName" type="xs:string" minOccurs="0">
            <xs:annotation>
                <xs:documentation>Processor software name (e.g.
FastROSE)</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="processorVersion" type="xs:string" minOccurs="0">
            <xs:annotation>
                <xs:documentation>Processor software version (e.g. 1.0)</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="processingLevel" minOccurs="0">
            <xs:annotation>
                <xs:documentation>Processing level applied to the product</xs:documentation>
            </xs:annotation>
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:enumeration value="1A"/>
                    <xs:enumeration value="1B"/>
                    <xs:enumeration value="2"/>
                    <xs:enumeration value="3"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="nativeProductFormat" type="xs:string" minOccurs="0">
            <xs:annotation>
                <xs:documentation>Native product format</xs:documentation>
            </xs:annotation>
        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:element name="histograms" type="eop:HistogramArrayPropertyType"/>
<xs:element name="Histogram" type="eop:HistogramType" substitutionGroup="gml:_Object"/>
<xs:complexType name="HistogramArrayPropertyType">
    <xs:sequence>
        <xs:element ref="eop:Histogram" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="HistogramType">
    <xs:sequence>
        <xs:element name="bandId" type="xs:string" minOccurs="0"/>
        <xs:element name="min" type="xs:int"/>
        <xs:element name="max" type="xs:int"/>
        <xs:element name="mean" type="xs:double" minOccurs="0"/>
        <xs:element name="stdDeviation" type="xs:double" minOccurs="0"/>
    </xs:sequence>

```



```

        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="MaskInformationArrayPropertyType">
        <xs:sequence>
            <xs:element ref="eop:MaskInformation" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:element name="MaskInformation" type="eop:MaskInformationType"/>
    <xs:complexType name="MaskInformationType">
        <xs:sequence>
            <xs:element name="type">
                <xs:annotation>
                    <xs:documentation>Mask type. Possible values are : SNOW, CLOUD and
QUALITY</xs:documentation>
                </xs:annotation>
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:enumeration value="SNOW"/>
                    <xs:enumeration value="CLOUD"/>
                    <xs:enumeration value="QUALITY"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="format">
            <xs:annotation>
                <xs:documentation>Mask format. Possible values are : RASTER or
VECTOR</xs:documentation>
            </xs:annotation>
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:enumeration value="RASTER"/>
                <xs:enumeration value="VECTOR"/>
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
    <xs:element name="referenceSystemIdentifier" type="eop:CodeWithAuthorityType" minOccurs="0">
        <xs:annotation>
            <xs:documentation>Indicates if mask is geo-referenced, and thus can be
assumed to be displayed directly on a map (in which case should point to a code space for the CRS), when not supplied it is assumed
that the mask is provided in "raw" satellite frame of reference</xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element name="fileName" type="xs:string">
        <xs:annotation>
            <xs:documentation>Path to the mask (could be any kind of URL :
direct link to the image or WMS/WCS interface in case of RASTER mask; direct link to the file or WFS interface in case of VECTOR
file), it is assumed that if a client is prepared to "manage" a mask delivered by e.g. WMS they would parse the URL to identify that it
contains the OGC standard SERVICE=WMS</xs:documentation>
        </xs:annotation>
    </xs:element>

```

```

        </xs:annotation>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
  <xs:element name="Mask" type="eop:MaskType" substitutionGroup="gml:_Feature">
    <xs:annotation>

```

<xs:documentation>Mask defined as a feature collection (in the GML 3.2 sense : a feature collection is a feature having a property derived by extension from gml:AbstractFeatureMemberType). Mandates the following optional gml properties inherited from gml:\_Feature :

- gml:id attribute
- gml:name
- gml:boundedBy

Note : the upcoming gml:identifier will replace eop:identifier in GML 3.2</xs:documentation>

```

    </xs:annotation>
  </xs:element>
  <xs:complexType name="MaskType" mixed="false">
    <xs:complexContent mixed="false">
      <xs:extension base="gml:AbstractFeatureType">
        <xs:sequence>
          <xs:element ref="eop:maskMembers"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:element name="maskMembers" type="eop:MaskMembersPropertyType"/>
  <xs:complexType name="MaskMembersPropertyType">
    <xs:sequence>
      <xs:element ref="eop:MaskFeature" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:element name="MaskFeature" type="eop:MaskFeatureType" substitutionGroup="gml:_Feature">
    <xs:annotation>

```

<xs:documentation>Mask member : . Mandates the following optional gml properties inherited from gml:\_Feature :

- gml:id attribute
- gml:name
- gml:boundedBy

Note : the upcoming gml:identifier will replace eop:identifier in GML 3.2</xs:documentation>

```

    </xs:annotation>
  </xs:element>
  <xs:complexType name="MaskFeatureType" mixed="false">
    <xs:complexContent mixed="false">
      <xs:extension base="gml:AbstractFeatureType">
        <xs:sequence>
          <xs:element name="maskType" type="eop:CodeWithAuthorityType">

```

---

```

        <xs:annotation>
            <xs:documentation>Mask type. Value list can be retrieved
with codeSpace</xs:documentation>
        </xs:annotation>
    </xs:element>
    <xs:element ref="gml:extentOf">
        <xs:annotation>
            <xs:documentation>Mask member extent. Expected
structure is gml:Polygon/gml:exterior/gml:LinearRing/gml:posList with 0 to n gml:Polygon/gml:interior/gml:LinearRing/gml:posList
elements representing the holes.</xs:documentation>
        </xs:annotation>
    </xs:element>
</xs:sequence>
</xs:extension>
</xs:complexContent>
</xs:complexType>
<xs:element name="SpecificInformation" type="eop:SpecificInformationType"/>
<xs:complexType name="SpecificInformationArrayPropertyType">
    <xs:sequence>
        <xs:element ref="eop:SpecificInformation" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="SpecificInformationType">
    <xs:sequence>
        <xs:element name="localAttribute" type="xs:string">
            <xs:annotation>
                <xs:documentation>Container for ad-hoc metadata that does not merit a
mission specific schema or extension, the localAttribute describes the name of the attribute</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="localValue" type="xs:string">
            <xs:annotation>
                <xs:documentation>Container for ad-hoc metadata that does not merit a
mission specific schema or extension, the localAttribute describes the value of the attribute</xs:documentation>
            </xs:annotation>
        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:element name="identifier">
    <xs:annotation>
        <xs:documentation>Identifier for metadata item, includes ground segment codespace to guarantee
uniqueness within eop :
urn:eop:GS:CollectionId:ProductId</xs:documentation>
    </xs:annotation>
    <xs:simpleType>
        <xs:restriction base="xs:string"/>
    </xs:simpleType>
</xs:element>

```

---

```

<xs:element name="doi">
  <xs:annotation>
    <xs:documentation>Digital Object Identifier identifying the product</xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:string"/>
  </xs:simpleType>
</xs:element>
<xs:element name="parentIdentifier">
  <xs:annotation>
    <xs:documentation>Collection identifier</xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:string"/>
  </xs:simpleType>
</xs:element>
<xs:element name="status">
  <xs:annotation>
    <xs:documentation>Refers to product status. PHR : always "ACQUIRED"</xs:documentation>
  </xs:annotation>
  <xs:simpleType>
    <xs:restriction base="xs:string">
      <xs:enumeration value="ACQUIRED"/>
      <xs:enumeration value="ARCHIVED"/>
      <xs:enumeration value="CANCELLED"/>
      <xs:enumeration value="FAILED"/>
      <xs:enumeration value="PLANNED"/>
      <xs:enumeration value="POTENTIAL"/>
      <xs:enumeration value="REJECTED"/>
    </xs:restriction>
  </xs:simpleType>
</xs:element>
<xs:element name="statusDetail" type="xs:string">
  <xs:annotation>
    <xs:documentation>This field refers to the eop:status value. It should be used to motivate the reason
of a failure deletion or rejection</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="acquisitionType">
  <xs:annotation>
    <xs:documentation>Used to distinguish at a high level the appropriateness of the acquisition for
"general" use, whether the product is a nominal acquisition, special calibration product or other. Values:
- NOMINAL
- CALIBRATION
- OTHER

```

More specific information (i.e. platform and sensor specific values) are expressed within the imageSubType tag.</xs:documentation>

```

</xs:annotation>
<xs:simpleType>
  <xs:restriction base="xs:string">
    <xs:enumeration value="NOMINAL"/>
    <xs:enumeration value="CALIBRATION"/>
    <xs:enumeration value="OTHER"/>
  </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="acquisitionSubType" type="gml:CodeListType">
  <xs:annotation>
    <xs:documentation>The mission specific type definition should refer to mission/ground segment
dedicated codeSpace.</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="productType" type="xs:string">
  <xs:annotation>
    <xs:documentation>Describes product type in case that mixed types are available within a single
collection. This is ground segment specific definition</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="imageQualityDegradation" type="gml:MeasureType">
  <xs:annotation>
    <xs:documentation>Must be expressed in percents. EOLI N/A (attTypes/attName
?)</xs:documentation>
  </xs:annotation>
</xs:element>
<xs:element name="imageQualityDegradationQuotationMode">
  <xs:annotation>
    <xs:documentation>Indicator to know how the quality quotation has been
calculated.</xs:documentation>
  </xs:annotation>
<xs:simpleType>
  <xs:restriction base="xs:string">
    <xs:pattern value="AUTOMATIC"/>
    <xs:pattern value="MANUAL"/>
  </xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element name="composedOf" type="eop:EarthObservationPropertyType"/>
<xs:element name="subsetOf" type="eop:EarthObservationPropertyType"/>
<xs:element name="linkedWith" type="eop:EarthObservationPropertyType"/>
<xs:complexType name="CodeWithAuthorityType">
  <xs:annotation>
    <xs:documentation>From GML 3.2 draft</xs:documentation>
  </xs:annotation>

```

```
<xs:simpleContent>
  <xs:extension base="xs:string">
    <xs:attribute name="codeSpace" type="xs:anyURI" use="required"/>
  </xs:extension>
</xs:simpleContent>
</xs:complexType>
</xs:schema>
```

---

## ANNEX 3 VGT4AFRICA ISO19115 To EO PROFILE OF GML XSLT

---

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

```
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform" xmlns:gmd="http://www.isotc211.org/2005/gmd"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:fn="http://www.w3.org/2005/xpath-functions"
xmlns:date="http://exslt.org/dates-and-times" xmlns:gco="http://www.isotc211.org/2005/gco"
xmlns:gmx="http://www.isotc211.org/2005/gmx" xmlns:gml="http://www.opengis.net/gml">
```

```
  <xsl:output method="xml" version="1.0" encoding="UTF-8" indent="yes"/>
```

```
  <xsl:template match="/">
```

```
    <xsl:call-template name="test">
```

```
      <!-- ALBQ -->
```

```
      <!--
```

```
      <xsl:with-param name="prefixId">vito:vgt4A:albq</xsl:with-param>
```

```
      -->
```

```
      <!-- ALBE -->
```

```
      <!--
```

```
      <xsl:with-param name="prefixId">vito:vgt4A:albe</xsl:with-param>
```

```
      -->
```

```
      <!-- BBDHRN -->
```

```
      <!--
```

```
      <xsl:with-param name="prefixId">vito:vgt4A:bbdhrn</xsl:with-param>
```

```
      -->
```

```
      <!-- BBDHRT -->
```

```
      <!--
```

```
      <xsl:with-param name="prefixId">vito:vgt4A:bbdhrt</xsl:with-param>
```

```
      -->
```

```
      <!-- BBDHRV -->
```

```
      <!--
```

```
      <xsl:with-param name="prefixId">vito:vgt4A:bbdhrv</xsl:with-param>
```

```
      -->
```

```
      <!-- BIOQ -->
```

```
      <!--
```

```
      <xsl:with-param name="prefixId">vito:vgt4A:bioq</xsl:with-param>
```

```
      -->
```

```
      <!-- DMP -->
```

```
      <!--
```

```
      <xsl:with-param name="prefixId">vito:vgt4A:dmp</xsl:with-param>
```

---

```

->

<!-- FCOVER -->
<!--
<xsl:with-param name="prefixId">vito:vgt4A:fcover</xsl:with-param>
->

<!-- LAI -->
<!--
<xsl:with-param name="prefixId">vito:vgt4A:lai</xsl:with-param>
->

<!-- NDWI -->
<!--
<xsl:with-param name="prefixId">vito:vgt4A:ndwi</xsl:with-param>
->

<!-- PHENOKS -->
<!--
<xsl:with-param name="prefixId">vito:vgt4A:phenoks</xsl:with-param>
->

<!-- PHENOMAX -->
<!--
<xsl:with-param name="prefixId">vito:vgt4A:phenomax</xsl:with-param>
->

<!-- SWB -->
<!--
<xsl:with-param name="prefixId">vito:vgt4A:swb</xsl:with-param>
->

<!-- VPI -->
<xsl:with-param name="prefixId">vito:vgt4A:vpi</xsl:with-param>

<!-- DMP, VPI -->
<xsl:with-param name="dataSetPath"
select="/gmd:MD_Metadata/gmd:describes/gmx:MX_DataSet"></xsl:with-param>

<xsl:with-param name="EPSG"
select="/gmd:MD_Metadata/gmd:describes/gmx:MX_DataSet/gmx:datasetCatalogue/gmx:CT_CrsCatalogue/gmx:crs/gml:GeodeticC
RS/gml:identifier/text()"/>

PHENOMAX, SWB -->

<!-- ALBQ, ALBE, BBDHRN, BBDHRT, BBDHRV, BIOQ, FCOVER, LAI, NDWI, PHENOKS,
PHENOMAX, SWB -->

<!-- Only use first composedOf - not error file-->
<!--

```



---

```

        <xsl:with-param name="dataSetPath"
select="/gmd:MD_Metadata/gmd:series/gmx:MX_Aggregate/gmd:composedOf[1]/gmx:MX_DataSet"/>

        <xsl:with-param name="EPSG"
select="/gmd:MD_Metadata/gmd:series/gmx:MX_Aggregate/gmx:aggregateCatalogue/gmx:CT_CrsCatalogue/gmx:crs/gml:Geodetic
CRS/gml:identifier/text()"/>

        ->
        </xsl:call-template>
    </xsl:template>
    <xsl:template name="test">
        <xsl:param name="prefixId"/>
        <xsl:param name="dataSetPath"/>
        <xsl:param name="EPSG"/>
        <xsl:processing-instruction name="xml-stylesheet">type="text/xsl"
href="schematron_result_for_cvb.xsl"</xsl:processing-instruction>
        <vgt:EarthObservation version="1.2.1" xmlns:gml="http://www.opengis.net/gml"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:vgt="http://www.vito.be/vgt" xmlns:eop="http://earth.esa.int/eop" xsi:schemaLocation="http://www.vito.be/vgt xsd-v1.2.1-
GIM/eop/1.2.1/vgt.xsd http://earth.esa.int/eop xsd-v1.2.1-GIM/eop/1.2.1/eop.xsd">
            <gml:metaDataProperty>
                <xsl:variable name="id">
                    <xsl:value-of
select="/gmd:MD_Metadata/gmd:fileIdentifier/gco:CharacterString"/>
                </xsl:variable>
                <vgt:EarthObservationMetaData>
                    <eop:identifier>
                        <xsl:value-of select="$prefixId"/>
                        <xsl:text></xsl:text>
                        <!-- strip extension from filename -->
                        <xsl:value-of select="substring-before($id, '.')"/>
                    </eop:identifier>
                    <eop:parentIdentifier>
                        <xsl:value-of select="$prefixId"/>
                    </eop:parentIdentifier>
                    <eop:acquisitionType>NOMINAL</eop:acquisitionType>
                    <eop:status>
                        <xsl:text>ARCHIVED</xsl:text>
                    </eop:status>
                    <eop:downloadedTo>
                        <eop:DownlinkInformation>
                            <eop:acquisitionStation
codeSpace="urn:eop:PHR:stationCode">
                                <xsl:text>KIRUNA</xsl:text>
                            </eop:acquisitionStation>
                        </eop:DownlinkInformation>
                    </eop:downloadedTo>
                    <eop:archivedIn>
                        <eop:ArchivingInformation>
                            <eop:archivingCenter
codeSpace="urn:eop:PHR:stationCode">

```

---

```

        <xsl:text>VITO:CVB</xsl:text>
    </eop:archivingCenter>
    <eop:archivingDate>
        <xsl:variable name="archivingDate">
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:dateStamp/gco:Date"/>
        </xsl:variable>
        <xsl:value-of select="$archivingDate"/>
        <!-- add 'T00:00:00.0' to archiving date if the
archiving date doesn't contain a time yet -->
        <xsl:if test="contains($archivingDate,'T')=false">
            <xsl:text>T00:00:00.0</xsl:text>
        </xsl:if>
    </eop:archivingDate>
</eop:ArchivingInformation>
</eop:archivedIn>
<eop:processing>
    <eop:ProcessingInformation>
        <eop:processingCenter>
            <xsl:text>VITO:CVB</xsl:text>
        </eop:processingCenter>
        <eop:method>
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:resourceMaintenance[2]
/gmd:MD_MaintenanceInformation/gmd:updateScope/gmd:MD_ScopeCode/text()"/>
        </eop:method>
        <eop:processorName>
            <xsl:variable name="processorName">
                <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:resourceMaintenance[2]
/gmd:MD_MaintenanceInformation/gmd:maintenanceNote[1]/gco:CharacterString"/>
            </xsl:variable>
            <!-- exclude 'program = ' -->
            <xsl:value-of select="substring-
after($processorName,'program = ')/>
        </eop:processorName>
        <eop:processorVersion>
            <xsl:variable name="processorVersion">
                <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:resourceMaintenance[2]
/gmd:MD_MaintenanceInformation/gmd:maintenanceNote[2]/gco:CharacterString"/>
            </xsl:variable>
            <!-- exclude 'program version = ' -->
            <xsl:value-of select="substring-
after($processorVersion,'program version = ')/>
        </eop:processorVersion>
    </eop:ProcessingInformation>
</eop:processing>
<vgt:DerivedProductInformation>

```

---

```

        <vgt:derivedProductProcessingInformation>
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:supplementalInformation
/gco:CharacterString"/>
        </vgt:derivedProductProcessingInformation>
        <vgt:minValueSignificantDigital>
            <xsl:value-of select="
$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension/gmd:MD_Band/gmd:m
inValue/gco:Real[../gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString='Significant']"/>
        </vgt:minValueSignificantDigital>
        <vgt:maxValueSignificantDigital>
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension/gmd:MD_Band
/gmd:maxValue/gco:Real[../gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString='Significant']"/>
        </vgt:maxValueSignificantDigital>
        <vgt:scaleFactor>
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension/gmd:MD_Band
/gmd:scaleFactor/gco:Real[../gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString='Significant']"/>
        </vgt:scaleFactor>
        <vgt:offset>
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension/gmd:MD_Band
/gmd:offset/gco:Real[../gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString='Significant']"/>
        </vgt:offset>
        <vgt:minValueDisplayDigital>
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension/gmd:MD_Band
/gmd:minValue/gco:Real[../gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString='Display']"/>
        </vgt:minValueDisplayDigital>
        <vgt:maxValueDisplayDigital>
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension/gmd:MD_Band
/gmd:maxValue/gco:Real[../gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString='Display']"/>
        </vgt:maxValueDisplayDigital>
        <vgt:minValuePhysical>
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension/gmd:MD_Band
/gmd:minValue/gco:Real[../gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString='Physical']"/>
        </vgt:minValuePhysical>
        <vgt:maxValuePhysical>
            <xsl:value-of
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension/gmd:MD_Band
/gmd:maxValue/gco:Real[../gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString='Physical']"/>
        </vgt:maxValuePhysical>
        <!-- loop all dimensions that are not 'Physical', 'Significant' or 'Display' --
    >
        <xsl:for-each
select="$DataSetPath/gmd:has/gmd:MD_Metadata/gmd:contentInfo/gmd:MD_CoverageDescription/gmd:dimension[gmd:MD_Band
/gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString != 'Physical' and
gmd:MD_Band/gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString != 'Significant' and
gmd:MD_Band/gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString != 'Display']"/>
            <vgt:flagInformation>
                <vgt:flagCode>

```

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```

                                <xsl:value-of
select="gmd:MD_Band/gmd:descriptor/gco:CharacterString"/>
                                </vgt:flagCode>
                                <vgt:flagDescription>
                                <xsl:value-of
select="gmd:MD_Band/gmd:sequenceIdentifier/gco:MemberName/gco:aName/gco:CharacterString"/>
                                </vgt:flagDescription>
                                <vgt:flagValue>
                                <xsl:value-of
select="gmd:MD_Band/gmd:maxValue/gco:Real"/>
                                </vgt:flagValue>
                                </vgt:flagInformation>
                                </xsl:for-each>
                                </vgt:DerivedProductInformation>
                                </vgt:EarthObservationMetaData>
                                </gml:metaDataProperty>
                                <gml:validTime>
                                <gml:TimePeriod>
                                <gml:beginPosition>
                                <xsl:value-of
select="$dataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/g
md:temporalElement/gmd:EX_TemporalExtent/gmd:extent/gml:TimePeriod/gml:beginPosition"/>
                                </gml:beginPosition>
                                <gml:endPosition>
                                <xsl:value-of
select="$dataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/g
md:temporalElement/gmd:EX_TemporalExtent/gmd:extent/gml:TimePeriod/gml:endPosition"/>
                                </gml:endPosition>
                                </gml:TimePeriod>
                                </gml:validTime>
                                <gml:using>
                                <eop:EarthObservationEquipment>
                                <eop:platform>
                                <eop:Platform>
                                <eop:shortName>
                                <xsl:text>SPOT</xsl:text>
                                </eop:shortName>
                                <eop:serialIdentifier>
                                <xsl:text>5</xsl:text>
                                </eop:serialIdentifier>
                                </eop:Platform>
                                </eop:platform>
                                <eop:instrument>
                                <eop:Instrument>
                                <eop:shortName>
                                <xsl:text>VGT2</xsl:text>
                                </eop:shortName>
                                </eop:Instrument>

```

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```

        </eop:instrument>
        <eop:sensor>
            <eop:Sensor>
                <eop:sensorType>OPTICAL</eop:sensorType>
                <eop:resolution uom="deg">
                    <xsl:value-of
select="$dataSetPath/gmd:has/gmd:MD_Metadata/gmd:spatialRepresentationInfo/gmd:MD_Georectified/gmd:axisDimensionProperties[1]/gmd:MD_Dimension/gmd:resolution/gco:Angle/text()"/>
                </eop:resolution>
            </eop:Sensor>
        </eop:sensor>
    </eop:EarthObservationEquipment>
</gml:using>
<gml:target>
    <eop:Footprint>
        <xsl:variable name="north">
            <xsl:value-of
select="$dataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:northBoundLatitude/gco:Decimal"/>
        </xsl:variable>
        <xsl:variable name="north-stripped">
            <xsl:value-of select="number($north)"/>
        </xsl:variable>
        <xsl:variable name="south">
            <xsl:value-of
select="$dataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:southBoundLatitude/gco:Decimal"/>
        </xsl:variable>
        <xsl:variable name="south-stripped">
            <xsl:value-of select="number($south)"/>
        </xsl:variable>
        <xsl:variable name="west">
            <xsl:value-of
select="$dataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:westBoundLongitude/gco:Decimal"/>
        </xsl:variable>
        <xsl:variable name="west-stripped">
            <xsl:value-of select="number($west)"/>
        </xsl:variable>
        <xsl:variable name="east">
            <xsl:value-of
select="$dataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:geographicElement/gmd:EX_GeographicBoundingBox/gmd:eastBoundLongitude/gco:Decimal"/>
        </xsl:variable>
        <xsl:variable name="east-stripped">
            <xsl:value-of select="number($east)"/>
        </xsl:variable>
    </gml:multiExtentOf>
    <gml:MultiSurface srsName="EPSG:4326">

```

---

```

        <gml:surfaceMembers>
            <gml:Polygon srsName="EPSG:4326">
                <gml:exterior>
                    <gml:LinearRing>
                        <gml:posList>

<xml:value-of select="$north-stripped"/>

<xml:text> </xml:text>

<xml:value-of select="$west-stripped"/>

<xml:text> </xml:text>

<xml:value-of select="$north-stripped"/>

<xml:text> </xml:text>

<xml:value-of select="$east-stripped"/>

<xml:text> </xml:text>

<xml:value-of select="$south-stripped"/>

<xml:text> </xml:text>

<xml:value-of select="$east-stripped"/>

<xml:text> </xml:text>

<xml:value-of select="$south-stripped"/>

<xml:text> </xml:text>

<xml:value-of select="$west-stripped"/>

<xml:text> </xml:text>

<xml:value-of select="$north-stripped"/>

<xml:text> </xml:text>

<xml:value-of select="$west-stripped"/>

                        </gml:posList>
                    </gml:LinearRing>
                </gml:exterior>
            </gml:Polygon>
        </gml:surfaceMembers>
    </gml:MultiSurface>
</gml:multiExtentOf>
</eop:Footprint>
</gml:target>
<gml:resultOf>

```

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```

    <eop:EarthObservationResult>
      <eop:browse>
        <eop:BrowseInformation>
          <eop:type>QUICKLOOK</eop:type>
          <eop:referenceSystemIdentifier codeSpace="EPSG">
            <xsl:value-of select="$EPSG"/>
          </eop:referenceSystemIdentifier>
          <eop:fileName>
            <xsl:value-of
select="$dataSetPath/gmd:has/gmd:MD_Metadata/gmd:identificationInfo/gmd:MD_DataIdentification/gmd:graphicOverview/gmd:
MD_BrowseGraphic/gmd:fileName/gco:CharacterString"/>
          </eop:fileName>
        </eop:BrowseInformation>
      </eop:browse>
      <eop:product>
        <eop:ProductInformation>
          <eop:referenceSystemIdentifier codeSpace="EPSG">
            <xsl:value-of select="$EPSG"/>
          </eop:referenceSystemIdentifier>
          <eop:fileName>
            <xsl:value-of
select="$dataSetPath/gmd:has/gmd:MD_Metadata/gmd:fileIdentifier/gco:CharacterString"/>
          </eop:fileName>
        </eop:ProductInformation>
      </eop:product>
    </eop:EarthObservationResult>
  </gml:resultOf>
</vgt:EarthObservation>
</xsl:template>
</xsl:stylesheet>

```