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**AGREEMENT**

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English version

**Guidance material for mapping between Dublin Core and ISO in the  
Geographic Information Domain**

This CEN Workshop Agreement has been drafted and approved by a Workshop of representatives of interested parties, the constitution of which is indicated in the foreword of this Workshop Agreement.

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## Foreword

The production of this CEN Workshop Agreement (CWA) was formally accepted as part of the CEN/ISSS Workshop on Metadata for Multimedia Information - Dublin Core (WS/MMI-DC) in the Workshop's plenary meeting on 2002-03-07.

This CWA was agreed upon by the contributing partners in the CEN/ISSS Workshop on MMI-DC, representing a wide mix of interests, including administrations, libraries, on-line education and geographic information systems. The list of company individuals who have supported the document's contents may be obtained from the CEN/ISSS Secretariat.

The CWA was approved by the Workshop's plenary meeting on 2003-09-08.

The final text of this CWA was submitted to CEN for publication on 2003-09-09.

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## Executive Summary

This deliverable is a part of the CEN/ISSS Workshop on Metadata for Multimedia Information - Dublin Core (WS/MMI-DC) Work Item 7 – “Define and agree a CWA on mappings between Dublin Core and the forthcoming IS 19115 standard for geographic information metadata”. The main objective of this Work Item is to define a mapping between the Dublin core metadata specifications and DIS 19115 to improve the discovery of geographical information in cross-domain searches. This work has to include guidance material for mapping and a draft spatial application profile.

The results of this Work Item are important in order to facilitate wider exploitation of the Dublin Core technique in conjunction with geographic information. This is particularly timely at present as a new standard on geographic metadata is expected to be ratified by ISO in January 2003 (ISO 19115). The Dublin Core Metadata Element Set itself has been published in 2003 as IS 15836.

This document provides guidance material for those people who could be interested in transforming metadata from one standard to the other. It presents a short review of the state of the art in the development of metadata crosswalks among geographic metadata standards. It also includes references to most of the European projects related with geographic information data and Dublin Core.

The guidance information is structured into five major areas:

1. Review of the state of the art.
2. Methodology for constructing metadata crosswalks.
3. The ISO 19115 – Dublin Core crosswalk.
4. Guides for automatic translation from one standard to the other.
5. Mapping metadata from ISO to DC and vice versa

A major conclusion in this report is that Dublin Core is a good tool for describing geographic data. As a result of this work, a method for going from Dublin Core to ISO 19115, and from ISO 19115 to Dublin Core automatically, has been created.

Annex A presents the methodology used for creating the contents of the section “Definitions and Abbreviations”. In Annex B, controlled lists involved in the mapping process are given. It presents the lists of controlled terms that are used in both standards (ISO and Dublin Core), and the correspondences between them. Annex C presents the XML-RDF style sheet that gives the possibility for creating tools that can change metadata from one standard to the other automatically. Annex D presents some example of their use.

# 1 Introduction

## 1.1 Context

This deliverable is a part of the CEN/ISSS Workshop on Metadata for Multimedia Information - Dublin Core (WS/MMI-DC) Work Item 7 – “Define and agree a CWA on mappings between Dublin Core and the forthcoming ISO 19115 standard for geographic information metadata”. The main objective of this Work Item is to define a mapping between the Dublin core metadata specifications and DIS 19115 to improve the discovery of geographical information in cross-domain searches. This work has to include guidance material for mapping and a draft spatial application profile.

The results of this Work Item are important in order to facilitate wider exploitation of the Dublin Core technique in conjunction with geographic information. This is particularly timely at present as a new standard on geographic metadata was ratified by ISO in 2003 (IS 19115).

The work of the Project Team responsible of this Work Item is concerned to improve the discovery of geographical information when dealing with cross-domain searching. The work contains three elements:

- A mapping between Dublin Core and the future ISO standard DIS 19115, “Geographic Information – Metadata”;
- Guidance material for use of this mapping;
- Development of a “spatial” application profile.

It is important to identify and ensure wide involvement of the stakeholders in this domain. The Project Team shall liaise with the wider GI and DC communities to build on what may already be out there and shall do a quick survey to identify such interests

The Workshop will work to build wide involvement across Europe to establish agreement on this CWA. The Project Team is to work with other members of the Workshop to establish agreement at the Workshop on each CWA.

## 1.2 Scope

The current document is the deliverable for point 2 above, providing guidance to organisations and communities wishing to consider the use of the Dublin Core in their metadata activities inside the geographic information domain. The information it contains tries to be useful for adopting Dublin Core in this domain and for being it compatible with ISO standard IS 19115, “Geographic Information – Metadata”.

This document is the result of co-operation between the members of the CEN/ISSS MMI-DC workshop in the period between September 2002 and September 2003.

## 1.3 Audience

The Guidance material contained in this CWA is aimed at three main categories of people:

- 1) strategic decision makers
- 2) metadata providers
- 3) technical implementers

Vendors of systems and software will not be addressed directly but it is conceivable that they will also benefit from the material.

## 1.4 General context/Background/Environment

The Dublin Core has become an important part of the emerging infrastructure of the Internet. Many communities are eager to adopt a common core of semantics for resource description, and the Dublin Core has attracted broad ranging international and interdisciplinary support for this purpose.<sup>1</sup>

The MMI-DC Workshop offers the opportunity to assist a co-ordinated approach towards metadata within the European Union, by establishing, at a cross-sector level and in support of existing and future European (IST and other) projects, an open forum in which metadata standards related issues get addressed.

The Workshop's current work programme consists of the following work items:

- Work Item 1 - Revision/update to guidance – CWA13988
- Work Item 2 - Maintenance of the DC Metadata Observatory
- Work Item 3 – Maintenance of a European Dublin Core metadata “Web ring”
- Work Item 4 – Define and agree a CWA for a Dublin Core eGovernment Application profile
- Work Item 5 – Guidelines on Dublin Core Application profiles (the profiles themselves are agreed as one or more CWAs)
- Work Item 6 – Define and agree a CWA for a model for management of information resources in eGovernment
- Work Item 7 – Define and agree a CWA on mappings between Dublin Core and the forthcoming IS 19115 standard for geographic information metadata (note: geographic information represents a large percentage of governmental information)
- Work Item 8 – Liaison with IST projects and with other developments

Existing CEN Workshop Agreements the responsibility of this Workshop:

<b>CWA 13989</b>	Description of structure and maintenance of the web based Observatory of European work on metadata
<b>CWA 13988</b>	Guidance information for the use of Dublin Core in Europe
<b>CWA 13874</b>	Dublin Core Metadata Element Set - Reference Description - Version 1.1
<b>CWA 13700</b>	Requirements for Metadata for Multimedia Information
<b>CWA 13699</b>	Model for Metadata for Multimedia Information

Related activities and Liaisons include:

- Dublin Core Metadata Initiative (DCMI) (<http://dublincore.org/>)
- Managing Information for e-Government (MIReG) group of the IDA programme
- DC-Gov Working Group of the DCMI
- CEN/ISSS Workshop on Learning Technologies
- ISO/TC 46; ISO/TC 211; ISO/TC 46/SC 4 (<http://www.niso.org/tc46sc4.html>)
- MPEG 7

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<sup>1</sup> Extracted from the Dublin Core Metadata Initiative website.

## 2 Definitions and abbreviations

Term	Description	Web site
<b>CWA</b>	CEN Workshop Agreement consensus-based specification, drawn up in an open Workshop environment.	<a href="http://www.cenorm.be/iss/CWAs/product.htm">http://www.cenorm.be/iss/CWAs/product.htm</a>
<b>DCMI</b>	Dublin Core Metadata Initiative.	<a href="http://dublincore.org/">http://dublincore.org/</a>
<b>Dublin Core</b>	Metadata element set intended to facilitate discovery of electronic resources.	<a href="http://purl.org/DC/">http://purl.org/DC/</a>
<b>ISO</b>	International Organisation for Standardisation	<a href="http://www.iso.ch/">http://www.iso.ch/</a>
<b>MARC</b>	Machine-Readable Cataloguing standards for the representation and communication of bibliographic and related information in machine-readable form. There are several variations of MARC formats.	<a href="http://lcweb.loc.gov/marc/index.html">http://lcweb.loc.gov/marc/index.html</a>
<b>RDF</b>	Resource Description Framework integrates a variety of web-based metadata activities including sitemaps, content ratings, stream channel definitions, search engine data collection (web crawling), digital library collections, and distributed authoring, using XML as an interchange syntax.	<a href="http://www.w3.org/RDF/">http://www.w3.org/RDF/</a>
<b>XML = Extensible Markup Language</b>	The Extensible Markup Language (XML) is the universal format for structured documents and data on the Web.	<a href="http://www.w3.org/XML/">http://www.w3.org/XML/</a>



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## 3 State of the art in geographic metadata mappings

### 3.1 Introduction

The objective of this section is to revise the state of the art in geographic metadata standards, This revision will include existent mappings as well as works and projects related. The mappings are not only restricted to those having Dublin Core as the source or target standards. On the contrary, it is also interesting to consider other mappings because they present similar conversion problems and the solutions which were applied could be reused for a DC-ISO19115 mapping.

The work to find the results presented in this section was done since November 15, 2002 to December 15, 2002. The methodology used is presented in “Annex A. Methodology for reviewing the state of the art in geographic metadata mappings”. Next subsection the resources that were discovered as a result of this revision.

### 3.2 Works on geographic metadata mapping

#### 3.2.1 DC- ISO19115.3 Mapping

URL: [www.ec-gis.org/madame](http://www.ec-gis.org/madame)

- It is included inside the Metadata FAQ section of the MADAME project). It can also be found at the ETeMII project (<http://www.lmu.jrc.it/etemii/index.html>) document “Towards a European Approach to Metadata for Geographic Information” compiled by M. Craglia
- It offers a table with the correspondence between the Dublin Core sections and the ISO 19115.3 sections.
- It does not offer any automatic or semi-automatic tool for transforming from one to the other.
- It also provides a correspondence between prENV 12657 and ISO TC 211 /CD 19115.3

#### 3.2.2 ISO-FGDC Mapping

- The Canadian Geospatial Data Infrastructure has developed a crosswalk between ISO19115 and FGDC (see “The Access Technical Services Manual Version 1.1” at <http://www.geoconnections.ca/>).
- “Use of XML for Web-Based Query Processing of Geospatial Data”. Master Thesis by Ying Teng available at [http://www.cs.unb.ca/tech-reports/files/TR00\\_135.pdf](http://www.cs.unb.ca/tech-reports/files/TR00_135.pdf).
- The DGIWG Metadata WP (Digital Geographic Information Working Group Metadata Work Program) provides a FGDC-ISO crosswalk available at <http://ogcengine.digest.org/metadata/ISO19115/related.htm>.

#### 3.2.3 FGDC- Dublin Core Mapping

URL: <http://geology.usgs.gov/tools/metadata/tools/doc/dublin.html>

- Mapping provided by FGDC

#### 3.2.4 FGDC-DC-MARC21 Mapping

URL: <http://www.dlib.org/dlib/january00/chandler/01chandler.html>

- This work was presented at “Mapping and Converting Essential Federal Geographic Data Committee (FGDC) Metadata into MARC21 and Dublin Core. Towards an Alternative to the FGDC Clearinghouse”

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D-Lib Magazine, January 2000, Volume 6 Number 1 (also at <http://webdoc.sub.gwdg.de/edoc/aw/d-lib/dlib/january00/chandler/01chandler.html>).

- This work was done inside the project “Cooperative Online Research Catalog (CORC)”. One of the goals of this project was to provide the conversion of Federal Geographic Data Committee metadata into MARC21 and Dublin Core.
- The FGDC-DC mapping does not take into account the fields RELATION, SOURCE, LANGUAGE and CONTRIBUTOR.

### 3.2.5 ISO-CDS Mapping

This mapping has been developed inside the project “ETC/CDS (EIONET): European Topic Centre on Catalogue of Data Sources” (<http://eionet.eu.int/>). The mapping has been built between ISO and GELOS.

### 3.2.6 ISO-UDK Mapping

This mapping has been developed inside the project “UDK (Umwelt Data Katalog)” (<http://www.umweltdatenkatalog.de/>), German Environmental data catalog. They are mapping UDK-metadata standard and ISO.

### 3.2.7 Other mappings

- There are some URLs that have collections of links to several mappings between metadata formats. The most complete ones are <http://www.sinica.edu.tw/~metadata/tool/mapping-foreign.html> and <http://www.ukoln.ac.uk/metadata/interoperability/>. They include links to mappings from MARC 21 to Dublin Core, Dublin Core to USMARC, Dublin Core to EAD/GILS/USMARC, Dublin Core to FINMARC/GILS, Dublin Core to IAFA/ROADS templates, Dublin Core to UNIMARC, FDGC to GCMD DIF, FGDC to USMARC, and others

## 3.3 Interesting Projects

- “DC-ENV”, environment section from Dublin Core (directed by Thom Pick). It is very interesting their work “A Survey on the Usage of Dublin Core in the Environmental Domain” ([http://www.jiscmail.ac.uk/files/DC-ENVIRONMENT/DC\\_environment\\_survey\\_first\\_draft.htm](http://www.jiscmail.ac.uk/files/DC-ENVIRONMENT/DC_environment_survey_first_draft.htm))
- “ETC/CDS (EIONET): European Topic Centre on Catalogue of Data Sources”, European Environment Information and Observation Network (<http://eionet.eu.int/>). This project has produced some result presented before.
- “UDK (Umwelt Data Katalog)” (<http://www.umweltdatenkatalog.de/>), German Environmental data catalog. This project has produced some result presented before.
- Alexandria Digital Library Project (ADEPT, <http://www.alexandria.ucsb.edu/>). As a part of this project, ADEPT, DLESE and NASA are collaborating to produce the ADEPT/DLESE/NASA (ADN) Joint Metadata Framework. The currently in use DLESE metadata framework (version 2.1) is based upon version 1.1 of the IMS metadata standard. Version 1.1 of IMS is based on IEEE-LOM version 3.5. The ADN-JMCM follows IMS v1.2, but is not based upon it. This represents a shift in policy. Crosswalks will be maintained between ADN-JMF and IMS & Dublin Core.
- Inside this project, in <http://www.library.ucsb.edu/people/larsgaard/warwick.html>, it is also possible to find information about the correspondence of Dublin Core fields and the ADEPT fields.
- “GI & GIS : harmonisation and interoperability” (<http://gi-gis.jrc.it/>), a JRC initiative. At a European level, a clear Geographic Information (GI) strategy is missing. GI strategy includes awareness raising, promoting greater usage and capacity building, as well as the creation of a European GI policy and GI infrastructure. Although they are vital components of any modern society, in the European Union, no legal entity exists that has a mandate to maintain a European GI infrastructure and to address GI policy issues. The mission of the GI&GIS project is to fill that void, and to establish the right conditions for the creation of a European Reference Centre for Geographic Information. At the crossroads of GI policy and strategy development, GI interoperability, and the conception of pan-European GI data sets, the G&GIS project is a unique reference, both for the European Commission and the European Union, for issues related to geospatial information. The GI&GIS project aims at helping to pave the way for both the private and public sectors in the EU to overcome the difficulties that hinder the development and application of GI.

The specific objectives of the GI&GIS project are threefold: to work towards a European reference centre for GI; to assist the Services of the Commission to conceive, create and harmonise pan-European spatial databases relevant to support and monitor EU policies; and to develop models and tools that help to understand the spatial component of phenomena in the Union.

- “ETEMII: European Territorial Management Information Infrastructure” (<http://www.lmu.jrc.it/etemii/index.html>). At the ETeMII Conclusions on Metadata issues arising from the second Workshop 13-14th July 2000, the following recommendations can be found:
  - The GI industry should be advised to adopt a documented profile of the current draft for ISO standard IS 19115 for its internal purposes while ensuring that Dublin Core is also supported (CWA 13874) for cross-IT searching. ETeMII should give a strong guideline that should include a "mapping" between DC and the 19115 profile. The profile should support inventory management, data discovery and user application of GI data.
  - ETeMII should include ISO/TC 211 and the Dublin Core community in its dissemination and ensure that issues are reported to them. These will include issues of semantic matches between the two metadata approaches.
  - ETeMII should liaise with the Dublin Core community concerning their development of qualifiers.
- “MADAME: Methods for access to data and metadata in Europe” ([www.ec-gis.org/madame](http://www.ec-gis.org/madame)). This project has produced some results presented before.
- “Diffuse” (<http://www.diffuse.org/diffuse.html>). The objective of the Diffuse project is to provide a single, value-added, entry point to up-to-date reference and guidance information on available and emerging standards and specifications that facilitate the electronic exchange of information. Inside this project there is a section titled “Diffuse Standards and Specifications List” that provides information on standards used for interchange geographical and other spatially organized data (<http://www.diffuse.org/gis.html>).
- “DGIWG Metadata WP: Digital Geographic Information Working Group Metadata Work Program” (<http://ogcengine.digest.org/metadata/>). DGIWG's metadata WP is taking a leading role in developing an implementation model and XML schema of the ISO 19115 metadata standard (officially known as ISO 19139), a U.S. National profile of the ISO standard, and a common NATO, DoD and IC profile of the ISO standard for use in shared data environments.

### 3.4 Other interesting works

- “MIMAS Metadata for the DNER”. This is a project from MIMAS at the University of Manchester. It is a national data centre for higher and further education and the research community in the UK, providing networked access to key data and information resources to support teaching, learning and research across a wide range of disciplines. As a part of this project, a Dublin Core extension has been developed to enable the capture of information which is MIMAS-specific or according to schemes which are not currently endorsed by Dublin Core. As one of the future work-lines of this project, it is presented the metadata extension for including records according to domain-specific standards, such as the Data Documentation Initiative (DDI) Codebook for statistical datasets, a standard geographic scheme, such as ISO DIS 19115 Geographic Information. ([http://www.mimas.ac.uk/metadata/MMD/final\\_rpt.html](http://www.mimas.ac.uk/metadata/MMD/final_rpt.html))
- “SCHEMAS” (<http://www.schemas-forum.org/>). This project has provided a forum for metadata schema designers involved in projects under the IST Programme and national initiatives in Europe. SCHEMAS has informed schema implementers about the status and proper use of new and emerging metadata standards. The project has supported development of good-practice guidelines for the use of standards in local implementations. It has investigated how metadata registries can support these aims. This project does not have its focus on geographic metadata.
- “GDDD” (<http://www.eurogeographics.org/Projects/GDDD/GDDDIndexLevel1.htm>). GDDD is the acronym for the Geographical Data Description Directory. It was created in 1994 to establish a descriptive listing of all the principal geographical databases available from the official National Mapping Agencies (NMAs) of Europe. The GDDD was also a pilot implementation of the European metadata standard CEN ENV 12657 of CEN/TC287. Since 1996 the main part of the information contained in the GDDD has been freely accessible on the Internet. The GDDD is becoming increasingly easy to update through semi-automated procedures making the content increasingly valuable. Data about new products are regularly added and more NMAs are joining those already contributing to the service. Today more than three hundred products are described, from 36 European Mapping Agencies.
- “LaClef” ([http://www.eurogeographics.org/Projects/LaClef/LaClef\\_index.htm](http://www.eurogeographics.org/Projects/LaClef/LaClef_index.htm)). The aim of this project was to explore the issues surrounding the unlocking of publicly held GI data, to provide a tangible

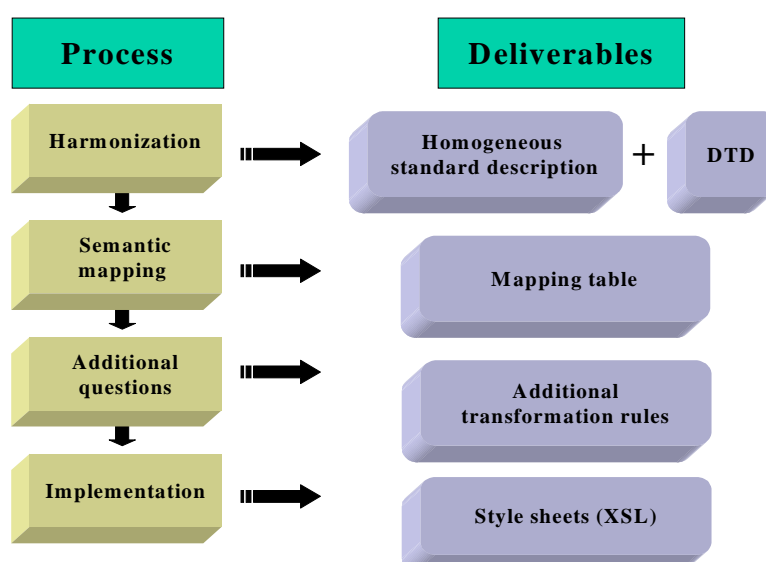
demonstration of how technology can provide users with the data they want and to create a model for other organisations to utilise. LaClef has built on existing European initiatives, including MEGRIN's existing GDDD, to identify how an effective GI meta data and online data supply service can be developed. The project focused on the following subjects: 1) the improvement of the GDDD (Geographical Data Description Directory) meta-information system created by MEGRIN: more and detailed information in an advanced database management system; 2) the identification and online provision of additional services to the user related to geodetic and conversion issues; 3) the investigation of general issues related to GI e-commerce, and more specifically of commercial and legal issues; 4) the creation of a web-interface through which the user can search for geographic information through the meta-information system and geographic interface, allowing the selection and ordering online of the required data sets, with download and payment online.

- "Issues in Crosswalking Content Metadata Standards" by Margaret St. Pierre and William P. LaPlant, Jr. October 15, 1998 (<http://www.niso.org/press/whitepapers/crswalk.html>). This paper presents a process for metadata crosswalk creation. This is a White Paper from NISO. It is the National Information Standards Organization, a non-profit association accredited by the American National Standards Institute (ANSI), identifies, develops, maintains, and publishes technical standards to manage information in our changing and ever-more digital environment. NISO standards apply both traditional and new technologies to the full range of information-related needs, including retrieval, re-purposing, storage, metadata, and preservation.

## 4 Construction of crosswalks between metadata standards

This section presents the steps of the process that has been followed to construct a the crosswalk between ISO and DC standards and that simplifies its implementation by means of the use of formal specifications and automated mechanisms. The process has the following steps:

- Harmonization: This phase aims at obtaining a formal and homogeneous specification of both standards.
- Semantic mapping: In order to determine the semantic correspondence of elements between the standards of metadata a deep knowledge of the origin and destiny metadata standards is required. As result of this phase, a mapping table is created.
- Additional rules for metadata conversion. Apart from the mapping table, it should be necessary to provide additional metadata conversion rules in order to solve problems such as different level of hierarchy, data type conversions, etc. .
- Mapping implementation: The last objective of the process is to obtain a completely automated crosswalk by means of the application of some type of tool. In this way, maintaining only one set of metadata, searches and views can be provided according to the different families from metadata.



The following subsections present further details of each one of these steps.

### 4.1 Harmonization

Many of the metadata standards use similar properties in the definition of their content elements. Some examples of similar properties could be: a unique identifier for each metadata element (for example: tag, label, identifier); a semantic definition for each element; the mandatory, optional or conditional character of each element; the multiplicity or allowed number of occurrences of an element; the hierarchical organization with respect to the rest of elements; or constraints on the value of an element (e.g. free text, numerical range, dates or a predefined code list). Once these properties are fixed, each metadata standard can be described in a similar way. Consequently, similar processes can be applied to related metadata standards, thus simplifying not only standards implementation but also the development of new crosswalks among them.

The generalization and formalization in the specification of metadata standard properties are possible by means of a canonical representation or a specification language. This procedure is analogous to the specification of a programming language syntax using the well-known notation Backus-Naur-Form (BNF [Naur 1963]). In fact, thanks to the circumstance that most standards use XML as exchange and presentation format, they also provide a DTD that formally their syntax.

Nevertheless, a mere syntactic description of a metadata standard is not enough to store all the information necessary to automate the development of crosswalks. For instance, a minimum set of data types must be defined as a basis to obtain from it the derived data types that are required to represent all the elements in

the target standard. And in addition to this, as it happens with BNF, a metadata specification does not contain information about the semantics of elements. For that reason, in this step it is proposed the creation of a table (that could be implemented by means of the use of a Excel sheet) describing the elements of each standard apart from the DTD available for each standard. In this table, each element of metadata will be defined by means of the following fields:

- Nr: Number assigned in its own metadata standard according to its level in the hierarchy.
- Longname: "long" name assigned by the standard to this element. Besides, it is recommended to indent sections and subsections of metadata in order to show the hierarchical structure of the standard.
- Shortname: "short" name of the element. This shortname usually corresponds with the tag used for XML encoding of metadata.
- Car: multiplicity and mandatory constraints that the standard impose on this element.
- Description: semantic definition of the element.
- Datatype: datatype for the values of this element.

## 4.2 Semantic mapping

The most important task in the development of crosswalks is the one in charge of determining the semantic correspondence between the elements of the standards to be mapped [Pierre&LaPlant 1998]. This task implies the specification of a mapping between each element in the origin standard and the element that is semantically equivalent to this one in the target standard. For that purpose, it is very important to count on a clear and precise definition of each-standard elements.

Many metadata standards already provide a semantic mapping with standards of related metadata, frequently this mapping appears in form of a table in an annex of the standard. In the process that appears here, at the end of this phase, a mapping table is produced.

## 4.3 Additional rules for metadata conversion

A crosswalk is a set of transformations that applied to a set of elements in the source metadata standard produce, as a result, an equivalent content in the target standard, which has been properly modified and redistributed to meet the requirements of the analogous elements. Therefore, a completely specified crosswalk must consist of a table of semantic mapping accompanied by a metadata conversion specification. This specification contains the additional transformations required to convert the metadata document whose contents fulfil the source standard into a document whose contents fulfil the target standard. Following subsections present the different metadata conversion problems that may arise and which those additional rules must solve. These rules are usually included as descriptions in an additional column of the mapping table or in an annex document.

### 4.3.1 Content Conversion

Frequently, metadata standards restrict the contents of each element to a particular data type, range of values or controlled vocabulary. In some cases, two analogous in elements in different standards may have different content restrictions. For example, it could happen that a text value must be transformed into a numerical value or a date value. Therefore specific rules are required to establish the correspondence between the initial element whose values may be specified as free text and a target element whose value is constrained to a controlled vocabulary. Moreover, when mapping two elements restricted to different controlled vocabularies, it is necessary to establish the relationship between values on one-to-one basis.

### 4.3.2 Element to element mapping

All metadata standards specify a number of properties associated with the definition of each element. For instance, some standards qualify each element as repeatable or non-repeatable and indicate additionally whether this element is mandatory or optional. Others, such as FGDC, incorporate both features into a single property containing a lower and upper bound number of occurrences. A lower bound of zero indicates an optional element, whereas a lower bound of one indicates that the element must occur at least once and thus

is mandatory. For crosswalk development, these properties must be taken into careful consideration. The trivial case is the mapping between two elements that share identical properties, e.g. a mandatory non-repeatable element which matches with a mandatory non-repeatable element in target standard. The rest of cases can be classified in the following categories:

- One to many. In most cases, a one-to-many map is trivial; an occurrence of the source element maps to a single occurrence in the target element. However, there are cases where the mapping requires more explicit resolution. For example, the source standard may contain a non-repeatable *"keywords"* element and according to its definition the content of this element consists of one or more keyword values separated by commas. Nevertheless, this element should match with a repeatable element in the target standard, that is to say, an occurrence for each keyword value. In this case, the mapping requires specialized knowledge of the composition of the source element, and how it expands into multiple target elements. Another interesting case is the mapping of one source element to two unique target elements. For example, a crosswalk for Dublin Core to FGDC standard should map the Dublin Core *"Rights"* element to the *"Access Constraints"* and *"Use Constraints"* elements in FGDC. In this case, special rules must be provided to extract correctly the content of the source element and map it to the corresponding element in FGDC.
- Many to one. The many-to-one map must specify what to do with the extra elements. If the solution adopted is to map all values of the source element to a single value in the target element, explicit rules are required to specify how concatenate the original values. Alternatively, if the solution is to map a unique value of the source element, with the consequent information loss, a rule must indicate the criteria for this value selection, e.g. the first value or the most recently added.
- Extra elements in source. Another problem arises when a source element does not have any equivalent element in the target standard. Since many metadata standards provide the ability to capture additional information or to define appropriate extensions, a rule must be established to precisely specify how these extra-elements element are handled.
- Unresolved mandatory elements in target. In some cases, mandatory elements in the target standard may have no mapping in the source standard. Because the target requires a value for the mandatory elements, the crosswalk must provide a rule to fill these elements with appropriate values.

### 4.3.3 Hierarchy

Most metadata standards organize their metadata hierarchically (by means of sections and subsections). The crosswalk must consider the possible differences between the hierarchies of the source and target standards. In the process presented, the mapping table itself shows the elements organized hierarchically in every standard, although it excludes the infinite mapping of those sections, which are recursively defined (e.g. *Citation* section of FGDC) and make the depth of the hierarchy unlimited.



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## 5 ISO-DC Mapping

### 5.1 ISO-DC Mapping Table & Additional transformation rules

After the study of the existent mappings and the study of the documents available for each standard, a first version of the mapping table has been generated, where each element of Dublin Core has been matched with an element of ISO according to two main criteria:

- Match DC elements with ISO elements that belong to the “*ISO Core Metadata for Geographic Datasets*”. This core schema comprises the basic minimum number of metadata elements that describe consistently a dataset.
- Match DC elements with other no core ISO metadata elements if there is no mapping with core metadata or the meaning of DC element is even closer to other ISO metadata elements.

For the definition of elements in each standard, the following documents have been used:

- “DCMI Metadata Terms”, available at <http://dublincore.org/documents/dcmi-terms/>, dated 3/3/2003. This document defines the current list of metadata elements, element refinements, encoding schemes and vocabulary terms.
- The final draft international standard ISO/FDIS 19115 available with restricted access at [http://www.isotc211.org/protdoc/FDIS/ISO\\_FDIS\\_19115\\_\(E\).pdf](http://www.isotc211.org/protdoc/FDIS/ISO_FDIS_19115_(E).pdf) and released in January 2003. The annex B of this document offers a data dictionary with the detailed description of each element. References of last versions of ISO 19115 are referenced at <http://www.isotc211.org/pow.htm>.

Each row in the mapping table includes the following columns:

- For the DC element
  - “Nr”. Number of the element.
  - “Element”. Name of the element.
  - “Refinement”. The refinements of this Dublin Core element if they are mapped to a particular ISO element. A <none> value indicates that the refinement is not used. And an <otherwise> value indicates the rest of possible refinements or none refinement.
  - “definition”. Definition of the element.
  - “obligation/condition”. Field describing the mandatory(M), optional (O), or conditional (C) character of an element.
  - “maximum occurrence” . Maximum number of occurrences for this element.
  - “Data type”. The data type used for this element.
  - “domain description”. Description of the domain of values. For instance: Name of the standard or code list recommended for this DC element.
- For the ISO element
  - “Core”. Y/N field indicating whether the ISO element belongs to the “*ISO Core Metadata for Geographic Datasets*”.
  - “Element”. Long name of ISO element, including path of parent entities if any. The ISO core metadata elements for geographic metadata are included although they have no mapping with Dublin Core elements.
  - “Shortname” Short name of ISO element, including path of parent entities if any. This path is used, for instance, to encode metadata in XML format with shortnames.
  - “Definition”: Definition of the element as provided by ISO DIS 19115.
  - “obligation/condition”. Field describing the mandatory(M), optional (O), or Conditional (C) character of an element. This character is obtained as a result of examining the character of the intermediate entities between the MD\_Metadata class and the element considered.



- "maximum occurrence". Maximum number of occurrences for this element. This maximum occurrence is obtained as a result of examining the occurrence of the intermediate entities between the MD\_Metadata class and the element considered.
- "data type". Element data type.
- "domain". Description of the domain of values.
- Columns regarding the problems encountered in the mapping proposed
  - "remark about mapping": General comment
  - "list code conversion" problem. Yes/No field describing if there is a content conversion when source and target standards recommend a code list as domain.
  - "1-N problem". Yes/No field describing if a repeatable source element must correspond to a non-repeatable element in target standard.
  - "section to one element problem". Yes/No field describing if there is a problem because one source element must correspond to a composite element or a section in the target standard.
  - "mandatory/optional conversion". Yes/No field describing if there is a problem because a source element is optional but the related target element is mandatory.

The crosswalk between ISO and DC will be implemented by means of two XSL stylesheets (one for ISO->DC and one for DC->ISO). And the guidelines of these stylesheets will detail the special rules applied for the data conversion problems encountered in previous mapping.

## 5.2 Summary of the DC elements

DUBLIN-CORE							
Nr	Element	refinement	Definition	obligation/ condition	maximum occurrence	data type	domain (encoding scheme)
1	TITLE	<none>	A name given to the resource. Typically, a Title will be a name by which the resource is formally known.	O	N	CharacterString	Free text
1	TITLE	alternative	Any form of the title used as a substitute or alternative to the formal title of the resource. This qualifier can include Title abbreviations as well as translations.	O	N	CharacterString	Free text
2	CREATOR		An entity primarily responsible for making the content of the resource. Examples of a Creator include a person, an organisation, or a service. Typically, the name of a Creator should be used to indicate the entity.	O	N	CharacterString	Free text
3	SUBJECT		The topic of the content of the resource. Typically, a Subject will be expressed as keywords, key phrases or classification codes that describe a topic of the resource.	O	N	CharacterString	LCSH (Library of Congress Subject Headings) MESH (Medical Subject Headings, <a href="http://www.nlm.nih.gov/mesh/meshhome.html">http://www.nlm.nih.gov/mesh/meshhome.html</a> ) DDC (Dewey Decimal Classification, <a href="http://www.oclc.org/dewey/index.htm">http://www.oclc.org/dewey/index.htm</a> ) LCC (Library of Congress Classification, <a href="http://lcweb.loc.gov/catdi">http://lcweb.loc.gov/catdi</a> )
4	DESCRIPTION	<none>, tableOfContents, abstract	An account of the content of the resource. Description may include but is not limited to: an abstract, table of contents, reference to a graphical representation of content or a free-text account of the content.	O	N	CharacterString	Free text
5	PUBLISHER		An entity responsible for making the resource available. Examples of a Publisher include a person, an organisation, or a service. Typically, the name of a Publisher should be used to indicate the entity.	O	N	CharacterString	Free text

6	CONTRIBUTOR		An entity responsible for making contributions to the content of the resource. Examples of a Contributor include a person, an organisation, or a service. Typically, the name of a Contributor should be used to indicate the entity.	O	N	CharacterString	Free text
7	DATE	created, issued, modified, <otherwise>	A date associated with an event in the life cycle of the resource. Typically, Date will be associated with the creation or availability of the resource.	O	N	CharacterString	Period (DCMI Period. A specification of the limits of a time interval. <a href="http://dublincore.org/documents/dcmi-period/">http://dublincore.org/documents/dcmi-period/</a> ) W3CDTF (W3C Encoding rules for dates and times - a profile based on ISO 8601, <a href="http://www.w3.org/TR/NOTE-datetime">http://www.w3.org/TR/NOTE-datetime</a> )
8	TYPE		The nature or genre of the content of the resource. 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.	O	N	CharacterString	DCMIType (DCMI Type Vocabulary. A list of types used to categorize the nature or genre of the content of the resource. <a href="http://dublincore.org/documents/dcmi-type-vocabulary/">http://dublincore.org/documents/dcmi-type-vocabulary/</a> )
9	FORMAT	<none>	The physical or digital manifestation of the resource. 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. Examples of dimensions include size and duration.	O	N	CharacterString	IMT (The Internet media type of the resource, <a href="http://www.isi.edu/in-notes/iana/assignments/media-types/media-types">http://www.isi.edu/in-notes/iana/assignments/media-types/media-types</a> )
9	FORMAT	medium	The material or physical carrier of the resource.	O	N	CharacterString	See format codes sheet
9	FORMAT	extent	The size or duration of the resource.	O	N	CharacterString	Free text

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10	IDENTIFIER		An unambiguous reference to the resource within a given context.	O	N	CharacterString	URI (A URI Uniform Resource Identifier, Internet RFC 2396. <a href="http://www.ietf.org/rfc/rfc2396.txt">http://www.ietf.org/rfc/rfc2396.txt</a> )
10	IDENTIFIER	bibliographicCitation	A bibliographic reference for the resource. Recommended practice is to include sufficient bibliographic detail to identify the resource as unambiguously as possible, whether or not the citation is in a standard form.	"	"	"	Example formal identification systems include the International Standard Book Number (ISBN). Example formal identification systems include the Digital Object Identifier (DOI).
11	SOURCE		A Reference to a resource from which the present resource is derived. The present resource may be derived from the Source resource in whole or in part.	O	N	CharacterString	Recommended best practice is to reference the resource by means of a string or number conforming to a formal identification system.
12	LANGUAGE		A language of the intellectual content of the resource.	O	N	CharacterString	ISO639-2 (ISO 639-2: Codes for the representation of names of languages, <a href="http://lcweb.loc.gov/standards/iso639-2/langhome.html">http://lcweb.loc.gov/standards/iso639-2/langhome.html</a> ) RFC1766 (Internet RFC 1766 'Tags for the identification of Language' specifies a two letter code taken from ISO 639, followed op
13	RELATION	isVersionOf, replaces, isPartOf, references, isFormatOf, <otherwise>	A reference to a related resource.	O	N	CharacterString	Recommended best practice is to reference the resource by means of a string or number conforming to a formal identification system.

14	COVERAGE	spatial (geographic coordinates)	The extent or scope of the content of the resource. Coverage will typically include spatial location (geographic coordinates).	O	N	CharacterString	Point (The DCMI Point identifies a point in space using its geographic coordinates, <a href="http://dublincore.org/documents/dcmi-point/">http://dublincore.org/documents/dcmi-point/</a> ) Box (The DCMI Box identifies a region of space using its geographic limits, <a href="http://dublincore.org/documents/dcmi-box/">http://dublincore.org/documents/dcmi-box/</a> )
14	COVERAGE	spatial (place name)	The extent or scope of the content of the resource. Coverage will typically include spatial location (place name) or jurisdiction (such as a named administrative entity).	O	N	CharacterString	TGN (The Getty Thesaurus of Geographic Names, <a href="http://www.getty.edu/research/tools/vocabulary/tgn/index.html">http://www.getty.edu/research/tools/vocabulary/tgn/index.html</a> )
14	COVERAGE	temporal (date, or date range)	The extent or scope of the content of the resource. Coverage will typically include temporal period (date, or date range).	O	N	CharacterString	Period (DCMI Period. A specification of the limits of a time interval. <a href="http://dublincore.org/documents/dcmi-period/">http://dublincore.org/documents/dcmi-period/</a> ) W3CDTF (W3C Encoding rules for dates and times - a profile based on ISO 8601, <a href="http://www.w3.org/TR/NOTE-datetime">http://www.w3.org/TR/NOTE-datetime</a> )
14	COVERAGE	temporal (period label)	The extent or scope of the content of the resource. Coverage will typically include temporal period (period label) .	O	N	CharacterString	Recommended best practice is to select a value from a controlled vocabulary and that, where appropriate, named time periods be used in preference to date ranges.

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15	RIGHTS	<none>	Information about rights held in and over the resource. Typically, a Rights element will contain a rights management statement for the resource, or reference a service providing such information. Rights information often encompasses Intellectual Property	O	N	CharacterString	Free text
15	RIGHTS	accessRights	Information about who can access the resource or an indication of its security status. Access Rights may include information regarding access or restrictions based on privacy, security or other regulations.	O	N	CharacterString	Free text
16	AUDIENCE	<none>,educationLevel	A class of entity for whom the resource is intended or useful. A class of entity may be determined by the creator or the publisher or by a third party.	O	N	CharacterString	Free text
16	AUDIENCE	mediator	A class of entity that mediates access to the resource and for whom the resource is intended or useful. The audiences for a resource are of two basic classes: (1) an ultimate beneficiary of the resource, and (2) frequently, an entity that mediates access	O	N	CharacterString	Free text

## 5.3 Summary of the ISO DIS 19115 elements involved in the mapping

ISO 19115							
	Core Element (longname)	shortname (including path of parent entities when possible)	Definition	obligation/ condition	maximum occurrence	data type	domain
Y	MD_Metadata.identificationInfo > MD_DataIdentification.citation >CI_Citation.title	Metadata/dataIdInfo/idCitation/resTitle	name by which the cited resource is known	M	N	CharacterString	Free text
N	MD_Metadata.identificationInfo > MD_DataIdentification.citation >CI_Citation.alternateTitle						
Y	MD_Metadata.identificationInfo > MD_DataIdentification.pointOfContact >CI_ResponsibleParty (when role="originator")	Metadata/dataIdInfo/idPoC	identification of, and means of communication with, person(s) and organizations(s) associated with the resource(s)	O	N	CI_ResponsibleP arty	
N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.citedResponsibleParty > CI_ResponsibleParty (when role="originator")	Metadata/dataIdInfo/ idCitation/citRespParty	name and position information for an individual or organization that is responsible for the resource	O	N	CI_ResponsibleP arty	
Y	MD_Metadata.identificationInfo > MD_DataIdentification.topicCategory	Metadata/dataIdInfo/tpCat	main theme(s) of the dataset	M	N	MD_TopicCatego ryCode <<CodeList>>	see subject codes sheet
N	MD_Metadata.identificationInfo > MD_DataIdentification.descriptiveKeywords > MD_Keywords (when type="theme")	Metadata/dataIdInfo/descKeys	provides category keywords, their type, and reference source commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject	O	N	MD_Keywords	
Y	MD_Metadata.identificationInfo > MD_DataIdentification.abstract	Metadata/dataIdInfo/idAbs	brief narrative summary of the content of the resource(s)	M	N	CharacterString	Free text
Y	MD_Metadata.identificationInfo > MD_DataIdentification.pointOfContact >CI_ResponsibleParty (when role="publisher")	Metadata/dataIdInfo/idPoC	identification of, and means of communication with, person(s) and organizations(s) associated with the resource(s)	O	N	CI_ResponsibleP arty	
Y	MD_Metadata.contact > CI_ResponsibleParty (when role="publisher")	Metadata/mdContact	party responsible for the metadata information	M	N	CI_ResponsibleP arty	
N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.citedResponsibleParty > CI_ResponsibleParty (when role="publisher")	Metadata/dataIdInfo/idCitation/citRespParty	name and position information for an individual or organization that is responsible for the resource	O	N	CI_ResponsibleP arty	

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N	MD_Metadata.identificationInfo > MD_DataIdentification.credit	Metadata/dataIdInfo/idCredit	recognition of those who contributed to the resource(s)	O	N	CharacterString	Free text
Y	MD_Metadata.identificationInfo > MD_DataIdentification.citation >CI_Citation.date > CI_Date (when dateType="publication")	Metadata/dataIdInfo/idCitation/citRespParty/resRefDate	reference date for the cited resource	M	N	CI_Date	one of the attributes of this class is of type Date. This class gives values for year, month and day. Character encoding of a date is a string which shall follow the format for date specified by ISO 8601. This class is documented in full in ISO/TS 19103.
Y	MD_Metadata.dateStamp > Date	Metadata/mdDateSt	date that the metadata was created	M	1	Date	This class gives values for year, month and day. Character encoding of a date is a string which shall follow the format for date specified by ISO 8601. This class is documented in full in ISO/TS 19103.
Y	MD_Metadata.identificationInfo>MD_DataIdentification.spatialRepresentationType > MD_SpatialRepresentationTypeCode	Metadata/dataIdInfo/spatRpType	method used to spatially represent geographic information	O	N	MD_SpatialRepresentationTypeCode <<CodeList>>	see type codes sheet
N	MD_Metadata.identificationInfo > MD_DataIdentification.citation >CI_Citation.presentationForm > CI_PresentationFormCode	Metadata/dataIdInfo/idCitation/presFormCd	mode in which the resource is represented	O	N	CI_PresentationFormCode <<CodeList>>	see type codes sheet
N	MD_Metadata.hierarchyLevel > MD_ScopeCode	Metadata/mdHrLv	scope to which the metadata applies (see annex H for more information about metadata hierarchy levels)	C/ hierarchyLevel is not equal to "dataset"?	N	MD_ScopeCode <<CodeList>>	see type codes sheet
Y	MD_Metadata.distributionInfo > MD_Distribution.distributionFormat > MD_Format	Metadata/distInfo/distFormat	provides information about the format used by the distributor	O	N	MD_Format	
N	MD_Metadata.identificationInfo > MD_DataIdentification.resourceFormat > MD_Format	Metadata/dataIdInfo/dsFormat	provides a description of the format of the resource(s)	O	N	MD_Format	



N	MD_Metadata.distributionInfo>MD_Distribution.transferOptions>MD_DigitalTransferOptions.offline > MD_Medium	Metadata/distInfo/distTranOps/offLineMedia	information about offline media on which the resource can be obtained	O	N	MD_Medium	
N	MD_Metadata.distributionInfo>MD_Distribution.transferOptions>MD_DigitalTransferOptions.transferSize	Metadata/distInfo/distTranOps/transSize	estimated size of a unit in the specified transfer format, expressed in megabytes. The transfer size is > 0.0	O	N	Real	
Y	MD_Metadata > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource.linkage > URL	Metadata/distInfo/distTranOps/onLineSrc	on-line information that can be used to contact the individual or organization. location (address) for on-line access using a Uniform Resource Locator address or similar addressing scheme such as <a href="http://www.statkart.no/isotc211">http://www.statkart.no/isotc211</a>	O	N	URL	(IETF RFC1738 IETF RFC 2056)
N	MD_Metadata.datasetURI	Metadata/dataSetURI	Uniformed Resource Identifier (URI) of the dataset to which the metadata applies.	O	1	CharacterString	Free text
N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.isbn	Metadata/dataIdInfo/idCitation/isbn	international Standard Book Number	O	N	CharacterString	Free text
N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.issn	Metadata/dataIdInfo/idCitation/issn	international Standard Serial Number	O	N	CharacterString	Free text
N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.identifier > MD_Identifier	Metadata/dataIdInfo/idCitation/citId	value uniquely identifying an object within a namespace	O	N	MD_Identifier	
Y	MD_Metadata.dataQualityInfo > DQ_DataQuality.lineage > LI_Lineage.source > LI_Source.description	Metadata/dqInfo/dataLineage/dataSource/srcDesc	information about the source data used in creating the data specified by the scope. detailed description of the level of the source data	O	N	CharacterString	Free text
Y	MD_Metadata.identificationInfo > MD_DataIdentification.language	Metadata/dataIdInfo/dataLang	language(s) used within the dataset	M	N	CharacterString	ISO 639-2, other parts may be used
N	MD_Metadata.identificationInfo > MD_DataIdentification.aggregationInfo > MD_AggregateInfo	Metadata/dataIdInfo/aggrInfo	aggregate dataset information	O	N	MD_AggregateInformation	
N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.series > CI_Series.name	Metadata/dataIdInfo/idCitation/datasetSeries/seriesName	name of the series, or aggregate dataset, of which the dataset is a part	O	N	CharacterString	Free text

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Y	MD_Metadata.identificationInfo > MD_DataIdentification.extent >EX_Extent.geographicElement >EX_GeographicBoundingBox	Metadata/dataIdInfo/dataExt/geoEle/GeoBndBox (westBL,eastBL,southBL,northBL)	minimum bounding rectangle within which data is available	C / hierarchyLevel equals "dataset" and geographic Description not documented?	N	EX_GeographicBoundingBox	
Y	MD_Metadata.identificationInfo > MD_DataIdentification.extent >EX_Extent.geographicElement > EX_GeographicDescription	Metadata/dataIdInfo/dataExt/geoEle/GeoDesc	description of the geographic area using identifiers	C / hierarchyLevel equals "dataset" and geographic Description not documented?	N	EX_GeographicDescription	
N	MD_Metadata.identificationInfo > MD_DataIdentification.descriptiveKeywords > MD_Keywords (when type="place")	Metadata/dataIdInfo/descKeys	provides category keywords, their type, and reference source commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject	O	N	MD_Keywords	
Y	MD_Metadata.identificationInfo > MD_DataIdentification.extent > EX_Extent.temporalElement > EX_TemporalExtent.extent > TM_Primitive	Metadata/dataIdInfo/dataExt/tempEle/exTemp	date and time for the content of the dataset	O	N	TM_Primitive	An abstract class representing a non-decomposed element of geometry or topology. This class is fully documented in ISO 19108.
N	MD_Metadata.identificationInfo > MD_DataIdentification.descriptiveKeywords > MD_Keywords (when type="temporal")	Metadata/dataIdInfo/descKeys	provides category keywords, their type, and reference source commonly used word(s) or formalised word(s) or phrase(s) used to describe the subject	O	N	MD_Keywords	

N	MD_Metadata.identificationInfo > MD_DataIdentification.resourceConstraints > MD_LegalConstraints	Metadata/dataIdInfo/resConst (useConsts, othConsts)	provides information about constraints which apply to the resource(s):  - use constraints: constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource	O	N	MD_Constraints	MD_Constraints.useConstraints is of type MD_RestrictionCode (<<CodeList>>). See rights code sheet
N	MD_Metadata.identificationInfo > MD_DataIdentification.resourceConstraints > MD_LegalConstraints.accessConstraints > MD_RestrictionCode	Metadata/dataIdInfo/resConst/accessConst	access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource	O	N	MD_RestrictionCode (<<CodeList>>)	See rights code sheet
N	MD_Metadata.identificationInfo > MD_DataIdentification.purpose	Metadata/dataIdInfo/idPurp	summary of the intentions with which the resource(s) was developed	O	N	CharacterString	Free text
N	MD_Metadata.distributionInformation > MD_Distribution.distributor > MD_Distributor.distributorContact > CI_ResponsibleParty (when role=distributor)	Metadata/distInfo/distributor/distorCont	party from whom the resource may be obtained. This list need not be exhaustive	O	N	CI_ResponsibleParty	
Y	MD_Metadata.identificationInfo > MD_DataIdentification.characterSet		full name of the character coding standard used for the dataset	C / ISO/IEC 10646-1 not used and not defined by encoding?	1	MD_CharacterSetCode	
Y	MD_Metadata.identificationInfo > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance		factor which provides a general understanding of the density of spatial data in the dataset	O	N	MD_Resolution	
Y	MD_Metadata.referenceSystemInfo > MD_ReferenceSystem		information about the reference system	O	N	MD_ReferenceSystem	
Y	MD_Metadata.fileIdentifier		unique identifier for this metadata file	O	1	CharacterString	Free text
Y	MD_Metadata.metadataStandardName		name of the metadata standard (including profile name) used	O	1	CharacterString	Free text
Y	MD_Metadata.metadataStandardVersion		version (profile) of the metadata standard used	O	1	CharacterString	Free text
Y	MD_Metadata.language		language used for documenting metadata	C / not defined by encoding?	1	CharacterString	ISO 639-2, other parts may be used

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Y	MD_Metadata.characterSet		full name of the character coding standard used for the metadata set	C / ISO/IEC 10646-1 not used and not defined by encoding?	1	MD_CharacterSetCode	
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## 5.4 Mapping proposed

DUBLIN-CORE			ISO 19115		MAPPING COMMENTS					
Nr	Element	refinement	Core	Element (longname)	shortname (including path of parent entities when possible)	remark about mapping	"list code conversion" problem	"1-N" problem	"section to one element" problem	"mandator y/optional conversion" problem
1	TITLE	<none>	Y	MD_Metadata.identificationInfo > MD_DataIdentification.citation >CI_Citation.title	Metadata/dataIdInfo/idCitation/re sTitle		No	No.Although occurrence of title in CI_Citation could seem to be 1, there is a 1..* relationship between MD_Metadata and MD_Identification. Therefore maximum occurrence is N.	No	yes
1	TITLE	alternative	N	MD_Metadata.identificationInfo > MD_DataIdentification.citation >CI_Citation.alternateTitle		Second or later occurrences of DC:TITLE are also matched with ISO alternative element.	no	no	no	no
2	CREATOR		Y	MD_Metadata.identificationInfo > MD_DataIdentification.pointOfCo ntact >CI_ResponsibleParty (when role="originator")	Metadata/dataIdInfo/idPoC	unique similar element in core metadata	no	no	yes	no
2	CREATOR		N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.citedResponsiblePart y > CI_ResponsibleParty (when role="originator")	Metadata/dataIdInfo/idCitation/cit RespParty		no	No	yes	No
3	SUBJECT		Y	MD_Metadata.identificationInfo > MD_DataIdentification.topicCatego ry	Metadata/dataIdInfo/tpCat	unique similar element in core metadata	yes	no	no	no
3	SUBJECT		N	MD_Metadata.identificationInfo > MD_DataIdentification.descriptive Keywords > MD_Keywords (when type="theme")	Metadata/dataIdInfo/descKeys		no	No	yes	no
4	DESCRIPTION	<none>, tableOfContents, abstract	Y	MD_Metadata.identificationInfo > MD_DataIdentification.abstract	Metadata/dataIdInfo/idAbs		no	No. Although occurrence of abstract in MD_Identification could seem to be 1, there is a 1..* relationship between MD_Metadata and MD_Identification. Therefore maximum occurrence is N.	no	yes

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5	PUBLISHER		Y	MD_Metadata.identificationInfo > MD_DataIdentification.pointOfContact > CI_ResponsibleParty (when role="publisher")	Metadata/dataIdInfo/idPoC			no	no	yes	no
5	PUBLISHER		Y	MD_Metadata.contact > CI_ResponsibleParty (when role="publisher")	Metadata/mdContact		This mapping is not very intuitive, but this element is mandatory in ISO core and DC publisher element is the element with more similar meaning. FGDC proposes a similar mapping between metadata point of contact (equivalent element to ISO in FGDC Standard)	no	no	yes	yes
5	PUBLISHER		N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.citedResponsibleParty > CI_ResponsibleParty (when role="publisher")	Metadata/dataIdInfo/idCitation/citRespParty			no	no	yes	no
6	CONTRIBUTOR		N/A	MD_Metadata.identificationInfo > MD_DataIdentification.credit	Metadata/dataIdInfo/idCredit			no	no	no	no
7	DATE	created, issued, modified, <otherwise>	Y	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.date > CI_Date (when dateType="publication")	Metadata/dataIdInfo/idCitation/citRespParty/resRefDate			no	no	yes	yes
7	DATE	created, issued, modified, <otherwise>	Y	MD_Metadata.dateStamp > Date	Metadata/mdDateSt		Although the element DC:DATE may not correspond with the date of metadata creation, this element is mandatory in ISO and DC:DATE is the only available date.	no	yes	no	yes

8	TYPE		Y	MD_Metadata.identificationInfo > MD_DataIdentification.spatialRepresentationType > MD_SpatialRepresentationTypeCode	Metadata/dataIdInfo/spatRpType	unique similar element in core metadata	yes	no	no. This class only contains an attribute	no
8	TYPE		N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.presentationForm > CI_PresentationFormCode	Metadata/dataIdInfo/idCitation/pr esFormCd	without direct equivalence: approximately	yes	no	no. This class only contains an attribute	no
8	TYPE		N	MD_Metadata.hierarchyLevel > MD_ScopeCode	Metadata/mdHrLv	The mapping between standards is only supposed to be done for datasets and therefore hierarchyLevel will be always 'dataset'?	yes	no	no. This class only contains an attribute	yes but look at mapping remark
9	FORMAT	<none>	Y	MD_Metadata.distributionInfo > MD_Distribution.distributionFormat > MD_Format	Metadata/distInfo/distFormat	Although this element is a core metadata element, the comprehensive metadata profile (annex E.1 from FDIS standard document) removes the aggregate relationship between MD_Distribution and MD_Format. the use DC:Format element has another refinement "extent" but it	no if we do not constrain the use of media type for DC	no	yes	no
9	FORMAT	<none>	N	MD_Metadata.identificationInfo > MD_DataIdentification.resourceFormat > MD_Format	Metadata/dataIdInfo/dsFormat	DC:Format element has another refinement "extent" but it has no match within ISO MD_Format class.	no if we do not constrain the use of media type for DC	no	yes	no
9	FORMAT	medium	N	MD_Metadata.distributionInfo > MD_Distribution.transferOptions > MD_DigitalTransferOptions.offLine > MD_Medium	Metadata/distInfo/distTranOps/offLineMed	The extent value should be associated with the medium	no	no	yes	no
9	FORMAT	extent	N	MD_Metadata.distributionInfo > MD_Distribution.transferOptions > MD_DigitalTransferOptions.transferSize	Metadata/distInfo/distTranOps/tran sSize	The extent value should be associated with the medium	no	no	yes	no
10	IDENTIFIER		Y	MD_Metadata > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource.linkage > URL	Metadata/distInfo/distTranOps/onLineSrc	The mapping is very complex. Linkage attribute belongs to CI_Online and there are mandatory attributes in path entities.	no	no	no	no
10	IDENTIFIER		Y	MD_Metadata.datasetURI	Metadata/dataSetURI		no	yes	no	no

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10	IDENTIFIER	bibliographicCitation	N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.isbn	Metadata/dataIdInfo/idCitation/isbn		no	no	no	no	
10	IDENTIFIER	bibliographicCitation	N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.issn	Metadata/dataIdInfo/idCitation/issn		no	no	no	no	
10	IDENTIFIER	bibliographicCitation	N	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.identifier > MD_Identifier	Metadata/dataIdInfo/idCitation/citId		no	no	yes	no	
11	SOURCE		Y	MD_Metadata.dataQualityInfo > DQ_DataQuality.lineage > LI_Lineage.source > LI_Source.description	Metadata/dqInfo/dataLineage/dataSource/srcDesc		no	no	no	no	
12	LANGUAGE		Y	MD_Metadata.identificationInfo > MD_DataIdentification.language	Metadata/dataIdInfo/dataLang	The shortname and type of this element was different when the mapping was established: datLangCode of type LanguageCode	no	no	no	yes	
13	RELATION	isVersionOf, replaces, isPartOf, references, isFormatOf, <otherwise>	N/A	MD_Metadata.identificationInfo > MD_DataIdentification.aggregationInfo > MD_AggregationInfo	Metadata/dataIdInfo/aggrInfo		no	no	yes	no	
13	RELATION	isPartOf	N/A	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.series > CI_Series.name	Metadata/dataIdInfo/idCitation/datasetSeries/seriesName		no		No. Although occurrence of CI_Series in CI_Citation could seem to be 1, there is a 1..* relationship between MD_Metadata and MD_Identification. Therefore maximum occurrence is N.	no	no
14	COVERAGE	spatial (geographic coordinates)	Y	MD_Metadata.identificationInfo > MD_DataIdentification.extent > EX_Extent.geographicElement > EX_GeographicBoundingBox	Metadata/dataIdInfo/dataExt/geoEle/GeoBndBox (westBL,eastBL,southBL,northBL)		no	no	yes	yes	
14	COVERAGE	spatial (place name)	Y	MD_Metadata.identificationInfo > MD_DataIdentification.extent > EX_Extent.geographicElement > EX_GeographicDescription	Metadata/dataIdInfo/dataExt/geoEle/GeoDesc		no	no	yes	yes	
14	COVERAGE	spatial (place name)	N	MD_Metadata.identificationInfo > MD_DataIdentification.descriptiveKeywords > MD_Keywords (when type="place")	Metadata/dataIdInfo/descKeys		no	no	yes	no	



14	COVERAGE	temporal (date, or date range)	Y	MD_Metadata.identificationInfo > MD_DataIdentification.extent > EX_Extent.temporalElement > EX_TemporalExtent.extent > TM_Primitive	Metadata/dataIdInfo/dataExt/tempEle/exTemp	The core element "additional extent information" covers temporal and vertical extent. However, here only the matching with temporal extent is appropriate.	no	No. Although occurrence of extent in EX_Temporal could seem to be 1, there is a 0..* relationship between MD_DataIdentification and EX_Extent. Therefore maximum occurrence is N.	yes	no. Although extent in EX_Temporal is mandatory, there is a 0..* relationship between MD_DataIdentification and EX_Extent. As a result, this attribute can be considered optional.
14	COVERAGE	temporal (period label)	N	MD_Metadata.identificationInfo > MD_DataIdentification.descriptiveKeywords > MD_Keywords (when type="temporal")	Metadata/dataIdInfo/descKeys		no	no	yes	no
15	RIGHTS	<none>	N/A	MD_Metadata.identificationInfo > MD_DataIdentification.resourceConstraints > MD_LegalConstraints	Metadata/dataIdInfo/resConst (useConsts, othConsts)		yes	no	yes	no
15	RIGHTS	accessRights	N/A	MD_Metadata.identificationInfo > MD_DataIdentification.resourceConstraints > MD_LegalConstraints.accessConstraints > MD_RestrictionCode	Metadata/dataIdInfo/resConst/accessConst		yes	no	no	no
16	AUDIENCE	<none>, educationLevel	N/A	MD_Metadata.identificationInfo > MD_DataIdentification.purpose	Metadata/dataIdInfo/idPurp	Although it is not an exact matching, ISO purpose element includes DC:AUDIENCE. DC:AUDIENCE has another refinement called educationLevel ( general statement describing the education or training context. Alternatively, a more specific statement of the loc	no	No. Although occurrence of purpose in MD_DataIdentification could seem to be 1, there is a 0..* relationship between MD_Metadata and MD_DataIdentification. Therefore maximum occurrence is N.	no	no
16	AUDIENCE	mediator	N/A	MD_Metadata.distributionInformation > MD_Distribution.distributor > MD_Distributor.distributorContact > CI_ResponsibleParty (when role=distributor)	Metadata/distInfo/distributor/distorCont		no	no	yes	no
N/A			Y	MD_Metadata.identificationInfo > MD_DataIdentification.characterSet						

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N/A		Y	MD_Metadata.identificationInfo > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance						
N/A		Y	MD_Metadata.referenceSystemInfo > MD_ReferenceSystem						
N/A		Y	MD_Metadata.fileIdentifier						
N/A		Y	MD_Metadata.metadataStandardName						
N/A		Y	MD_Metadata.metadataStandardVersion						
N/A		Y	MD_Metadata.language						
N/A		Y	MD_Metadata.characterSet						

## 5.5 DC gaps to ISO DIS 19115 Core metadata profile

### 5.5.1 DC - ISO DIS 19115 Core mapping

DC element	ISO-CORE element
1 TITLE	Dataset title (M) (MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.title)
2 CREATOR	Dataset responsible party (O) (MD_Metadata.identificationInfo > MD_DataIdentification.pointOfContact > CI_ResponsibleParty) (when role="originator")
3 SUBJECT	Dataset topic category (M) (MD_Metadata.identificationInfo > MD_DataIdentification.topicCategory)
4 DESCRIPTION	Abstract describing the dataset (M) (MD_Metadata.identificationInfo > MD_DataIdentification.abstract)
5 PUBLISHER	Dataset responsible party (O) (MD_Metadata.identificationInfo > MD_DataIdentification.pointOfContact > CI_ResponsibleParty) (when role="publisher")
5 PUBLISHER	Metadata point of contact (M) (MD_Metadata.contact > CI_ResponsibleParty)
6 CONTRIBUTOR	<b>N/A</b>
7 DATE	Dataset reference date (M) (MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.date > CI_Date)
7 DATE	Metadata date stamp (M) (MD_Metadata.dateStamp > Date)
8 TYPE	Spatial representation type (O) (MD_Metadata.identificationInfo > MD_DataIdentification.spatialRepresentationType > MD_SpatialRepresentationTypeCode)
9 FORMAT	Distribution format (O) (MD_Metadata.distributionInfo > MD_Distribution.distributionFormat > MD_Format)
10 IDENTIFIER	On-line resource (O) (MD_Metadata > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource.linkage > URL)
11 SOURCE	Lineage (O) (MD_Metadata.dataQualityInfo > DQ_DataQuality.lineage > LI_Lineage.source > LI_Source.description)
12 LANGUAGE	Dataset language (M) (MD_Metadata.identificationInfo > MD_DataIdentification.language)
13 RELATION	<b>N/A</b>
14 COVERAGE:SPATIAL	Geographic location of the dataset (by four coordinates or by geographic identifier) (C) (MD_Metadata.identificationInfo > MD_DataIdentification.extent > EX_Extent.geographicElement > EX_GeographicBoundingBox)
14 COVERAGE:TEMPORAL	Additional extent information for the dataset (vertical and temporal) (O) (MD_Metadata.identificationInfo > MD_DataIdentification.extent > EX_Extent.temporalElement > EX_TemporalExtent.extent > TM_Primitive)

15	RIGHTS	N/A
16	AUDIENCE	N/A
N/A		Dataset character set (C) (MD_Metadata.identificationInfo > MD_DataIdentification.characterSet)
N/A		Spatial resolution of the dataset (O) (MD_Metadata.identificationInfo > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance)
N/A		Reference system (O) (MD_Metadata.referenceSystemInfo > MD_ReferenceSystem)
N/A		Metadata file identifier (O) (MD_Metadata.fileIdentifier)
N/A		Metadata standard name (O) (MD_Metadata.metadataStandardName)
N/A		Metadata standard version (O) (MD_Metadata.metadataStandardVersion)
N/A		Metadata language (C) (MD_Metadata.language)
N/A		Metadata character set (C) (MD_Metadata.characterSet)

### 5.5.2 Summary of the DC - ISO DIS 19115 Core mapping gaps

DC element	ISO-CORE element
6 CONTRIBUTOR	N/A
13 RELATION	N/A
15 RIGHTS	N/A
16 AUDIENCE	N/A
N/A	Dataset character set (C) (MD_Metadata.identificationInfo > MD_DataIdentification.characterSet)
N/A	Spatial resolution of the dataset (O) (MD_Metadata.identificationInfo > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance)
N/A	Reference system (O) (MD_Metadata.referenceSystemInfo > MD_ReferenceSystem)
N/A	Metadata file identifier (O) (MD_Metadata.fileIdentifier)
N/A	Metadata standard name (O) (MD_Metadata.metadataStandardName)
N/A	Metadata standard version (O) (MD_Metadata.metadataStandardVersion)
N/A	Metadata language (C) (MD_Metadata.language)
N/A	Metadata character set (C) (MD_Metadata.characterSet)

## 5.5.3 Comments about the gaps

### 5.5.3.1 DC elements with no ISO Core correspondence

There are four elements from Dublin Core that have no correspondence with any element of the Core version of the ISO DIS 19115. These four elements are "CONTRIBUTOR", "RELATION", "RIGHTS" and "AUDIENCE". Nevertheless, all of them have a correspondence with one or more elements of the full ISO standard (see tables below).

6	CONTRIBUTOR		MD_Metadata.identificationInfo > MD_DataIdentification.credit
13	RELATION	isVersionOf, replaces, isPartOf, references, isFormatOf, <otherwise>	MD_Metadata.identificationInfo > MD_DataIdentification.aggregationInfo > MD_AggregateInfo
13	RELATION	isPartOf	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.series > CI_Series.name
15	RIGHTS	<none>	MD_Metadata.identificationInfo > MD_DataIdentification.resourceConstraints > MD_LegalConstraints
15	RIGHTS	accessRights	MD_Metadata.identificationInfo > MD_DataIdentification.resourceConstraints > MD_LegalConstraints.accessConstraints > MD_RestrictionCode
16	AUDIENCE	<none>,educationLevel	MD_Metadata.identificationInfo > MD_DataIdentification.purpose
16	AUDIENCE	mediator	MD_Metadata.distributionInformation > MD_Distribution.distributor > MD_Distributor.distributorContact > CI_ResponsibleParty (when role=distributor)

MD_Metadata.identificationInfo > MD_DataIdentification.credit	recognition of those who contributed to the resource(s)
MD_Metadata.identificationInfo > MD_DataIdentification.aggregationInfo > MD_AggregateInfo	aggregate dataset information
MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.series > CI_Series.name	name of the series, or aggregate dataset, of which the dataset is a part
MD_Metadata.identificationInfo > MD_DataIdentification.resourceConstraints > MD_LegalConstraints	>Constraints describe constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations or warnings on using the resource
MD_Metadata.identificationInfo > MD_DataIdentification.resourceConstraints > MD_LegalConstraints.accessConstraints > MD_RestrictionCode	>Constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the resource
MD_Metadata.identificationInfo > MD_DataIdentification.purpose	Summary of the intentions with which the resource(s) was developed
MD_Metadata.distributionInformation > MD_Distribution.distributor > MD_Distributor.distributorContact > CI_ResponsibleParty (when role=distributor)	Party from whom the resource may be obtained. This list need not be exhaustive

This Core restriction could justify the expansion of the ISO Core Metadata for Geographic Data Sets in order to fulfil the mapping to Dublin Core. The aim of Dublin Core is to compile the minimum elements that describe a resource and thus ISO Core should include at least these DC elements to be really "Core".

## 5.5.3.2 ISO Core elements with no DC correspondence

There are some elements from the Core version of the ISO DIS 19115 that have no direct correspondence with elements from Dublin Core. Following table presents these elements and offers a solution for their mapping (if it exists).

ISO-CORE element	Comment
Dataset character set (C) (MD_Metadata.identificationInfo > MD_DataIdentification.characterSet)	This is the full name of the character coding standard used for the dataset. The mapping between DC and ISO can be implemented as a refinement of the "FORMAT" Dublin Core element (see the URI " <a href="http://www.isotc211.org/19115/MD_Metadata.identificationInformation.characterSet">http://www.isotc211.org/19115/MD_Metadata.identificationInformation.characterSet</a> " in the draft of the spatial application profile).
Spatial resolution of the dataset (O) (MD_Metadata.identificationInfo > MD_DataIdentification.spatialResolution > MD_Resolution.equivalentScale or MD_Resolution.distance)	This is the factor which provides a general understanding of the density of spatial data in the dataset. The mapping between DC and ISO cannot be implemented because this is a specific geographic feature of the resource. The draft spatial application profile proposes its use as main element (see the URI: <a href="http://www.isotc211.org/19115/MD_Metadata.identificationInformation.spatialResolution">http://www.isotc211.org/19115/MD_Metadata.identificationInformation.spatialResolution</a> ).
Reference system (O) (MD_Metadata.referenceSystemInfo > MD_ReferenceSystem)	This term provides information about the reference system. The mapping between DC and ISO cannot be implemented directly because this is a specific geographic feature of the resource. The draft spatial application profile proposes its use as main element (see the URI: <a href="http://www.isotc211.org/19115/MD_Metadata.referenceSystemInfo">http://www.isotc211.org/19115/MD_Metadata.referenceSystemInfo</a> ).
Metadata file identifier (O) (MD_Metadata.fileIdentifier)	This element represents the unique identifier for this metadata file. A possible mapping of this ISO element could be its definition as a refinement of the "IDENTIFIER" Dublin Core element. However, it may result complex to generate a unique identifier for metadata descriptions, particularly if data and metadata are delivered separately.
Metadata standard name (O) (MD_Metadata.metadataStandardName)	This term stores the name of the metadata standard (including profile name). There is not a mapping between ISO and DC. However, the standard name could be autogenerated for a mapping DC->ISO. The objective is precisely to obtain metadata compliant with ISO 19115, i.e. metadata using ISO 19115 as standard name. On the other hand, regarding DC metadata descriptions, the encoding itself should reference the document defining the Dublin Core elements.
Metadata standard version (O) (MD_Metadata.metadataStandardVersion)	This term stores the version (profile) of the metadata standard used. There is not a mapping between ISO and DC. However, the standard name could be autogenerated for a mapping DC->ISO. The objective is precisely to obtain metadata compliant with ISO 19115 and a specific version. On the other hand, regarding DC metadata descriptions, the encoding itself should reference the document and version that defines the Dublin Core elements.
Metadata language (C) (MD_Metadata.language)	This term keeps the language used for documenting metadata. The mapping between DC and ISO can be implemented as a refinement of the "LANGUAGE" Dublin Core element (see the URI " <a href="http://www.isotc211.org/19115/MD_Metadata.language">http://www.isotc211.org/19115/MD_Metadata.language</a> " in the draft of the spatial application profile).
Metadata character set (C) (MD_Metadata.characterSet)	This element represents the full name of the character coding standard used for the metadata set. The mapping between DC and ISO can be implemented as a refinement of the "FORMAT" Dublin Core element (see the URI " <a href="http://www.isotc211.org/19115/MD_Metadata.characterSet">http://www.isotc211.org/19115/MD_Metadata.characterSet</a> " in the draft of the spatial application profile).

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## 6 Mapping metadata from ISO to DC and vice versa

This section presents some guides to facilitate the automatic translation of metadata from one standard to the other. To do this, the style sheet presented in “Annex C. Style sheet for mapping between ISO-XML and DC-RDF” has been built. “Annex D. XML file examples” presents some example of their use.

### 6.1 Automated implementation of crosswalks: the use of stylesheets

Taking into account that most metadata standards use XML as exchange and presentation format, it has been considered that the most suitable technology to carry out the implementation of crosswalks is by means of XSL (eXtensible Stylesheet Language [XSL 2003]), whose purpose is precisely the manipulation and transformation of XML. XSL is a language for expressing style sheets that integrates two related languages: a transformation language (XSL Transformations or XSLT); and a formatting language (XSL Formatting Objects) of XML documents, which is comparable to the language CSS (Cascading Style Sheets) for HTML pages. The transformation language (XSLT) provides elements that define rules to transform an XML-document into another XML-document. This second document can use the same set of elements that the original document (it is associated to the same DTD or XMLSchema) or can use a completely different set of elements.

Therefore, the method to make transformations will consist of constructing the style sheet that applied to the original XML-document (in agreement the corresponding standard of metadata) generates as a result an XML-document whose elements fulfil the target standard, and that contains the same information represented in the input document. Next it is detailed the general methodology that has been followed during the construction of style sheets that implement the crosswalks between the different metadata standards. The followed methodology is based on the successive transformation of each section applying the mapping tables that have been defined previously. In particular, the following steps are followed to complete the style sheet:

- Establish the document type declaration that will appear in the output document, and that will include the route (URL) of the DTD corresponding to the target standard.
- Next, for each section to match in the target standard:
- A template will be created (based on the mapping table) whose pattern is the element (name of section or subsection) in the source standard that generates the corresponding elements in the target. In this template the necessary transformation rules will be applied in order to fulfil the specification with respect to the properties and content in the target standard.
  - Once the first version of the style sheet has been built, it is applied to a XML document that conforms the source standard, and contains values for all the elements belonging to the section previously matched. The style sheet processor (e.g. Java XML parser provided by Oracle at <http://technet.oracle.com/>) generates as a result a new document. Although this document will not probably validate the DTD corresponding to the target standard (it only contains the sections mapped until this moment), it must be verified that the transformations have been made correctly. By means of a XML edition tool it is possible to visualize the XML document as a tree of nodes, which correspond to the sections, subsections or *PCDATA* tags. Therefore, this tree of nodes is used to check: the absence of a mandatory element; the order of generated elements; and the content constraints. In case of detecting some error, the template must be revised.
  - Additionally, it should be verified that there is not information loss in case the inverse style sheet were applied to the target document. Usually, a crosswalk and the inverse crosswalk are developed in parallel. If there exists some difference between the initial document and this new generated document, the mapping table should be verify the cause of the problem. It may be due to a problem of extra-elements in source standard that has not been resolved by any rule. But if this circumstance does not take place, the XSL template should be checked again.

- Once it has been proved that the transformation of the last section has been done correctly, the process must be started again for the next section in the source standard until the crosswalk is completely implemented.

## 6.2 Description of formats used to encode metadata

The objective of this section is to describe the format used to encode metadata in both standards. The implementation of the mapping is based on two XSL stylesheets, the format used in input metadata files must be based on XML.

### 6.2.1 About Dublin Core

The document “DCMI Metadata Terms”, available at <http://dublincore.org/documents/dcmi-terms/>, defines the current list of metadata elements, element refinements, encoding schemes and vocabulary terms. According to the inclusion or exclusion of some of these metadata terms, Dublin Core metadata are classified into two categories: Simple Dublin Core metadata and Qualified Dublin Core metadata. By Simple Dublin Core Metadata it is meant metadata records which contain uniquely elements that belong to the Dublin Core metadata element set, and which do not use element qualifiers (i.e. element refinements or encoding schemes). And by Qualified Dublin Core metadata it is meant the rest of metadata records that may use qualifiers.

The aforementioned document is an abstract specification of metadata content but when metadata is exchanged, it is usually encoded either as HTML <meta> tags (suitable for embedding in the <head>...</head> section of the page) or as RDF/XML (Resource Description Framework [RDF 1999] using XML). However, the crosswalks are implemented by means of XSL documents and they enforce the use of XML as input. Therefore, the first encoding format (HTML <meta> tags) do not result appropriate and the only possibility is to use RDF to encode Dublin Core. RDF is a W3C recommendation for modelling and exchanging metadata, which is expressed in XML format. The major advantage of RDF is its flexibility. RDF is not really a metadata standard defining a series of elements. On the contrary, it can be considered as a meta-model that contains other metadata schemas or combinations of them. RDF uniquely defines a simple model for describing the interrelationships among resources in terms of named properties and values. But for the declaration and interpretation of those properties, a complementary technology of RDF is needed. This complementary technology is RDFS, which stands for RDF Schema although it has been recently renamed as RDF Vocabulary Description Language [RDFS 2002]. RDFS provides a rich set of constructs to define and constrain the interpretation of vocabularies used in a certain information community.

In order to establish the syntax of XML documents, there are two mechanisms: a DTD (Document Type Definition) or an XML-Schema (an enhanced version of a DTD). Regarding Simple DC metadata, the document “Expressing Simple Dublin Core in RDF/XML” (a DCMI recommendation available at <http://dublincore.org/documents/2002/07/31/dcmes-xml/>), includes a DTD (also available at <http://dublincore.org/documents/2002/07/31/dcmes-xml/dcmes-xml-dtd.dtd>) that defines the syntax for expressing simple Dublin Core metadata, i.e. without qualifiers, in RDF/XML. There is also an XML Schema, available at <http://dublincore.org/schemas/xmls/simpledc20021212.xsd>, for expressing simple Dublin Core metadata. And as concerns Qualified Dublin Core, DCMI published a document entitled “Expressing Qualified Dublin Core in RDF/XML” (proposed recommendation, <http://dublincore.org/documents/2002/04/14/dcq-rdf-xml/>). Nevertheless, this document does not include any kind of DTD or XML Schema. XML schemas for Qualified Dublin Core are currently under development and are expected to become available in early 2003. At the moment of implementing the stylesheet, January-February 2003, they are still not available.

Finally, as there is not an XML-Schema (or DTD) for qualified Dublin Core, it has been decided to accept Simple Dublin Core metadata as input of crosswalks using the aforementioned DTD. The only modification proposed for the syntax described in this DTD is the inclusion of two refinements for the *COVERAGE* element of Dublin Core: *spatial* and *temporal*. In the geographic information context, to define appropriately a dataset, it is necessary to define its spatial and temporal coverage. Hence, this DTD has been modified to include these refinements and their respective encoding schemes: the *DCMI Box Encoding Scheme* (<http://dublincore.org/documents/dcmi-box/>) for the spatial refinement, and the *DCMI Period Encoding Scheme* (<http://dublincore.org/documents/dcmi-period/>). This DTD can be found at appendix 0.



## 6.2.2 About ISO

ISO19115 geographic metadata standard is a specific standard to describe geographic datasets. It is assumed that the ISO metadata files used by the stylesheet are compliant with the final draft international standard ISO/FDIS 19115 (available at [http://www.isotc211.org/protdoc/FDIS/ISO\\_FDIS\\_19115\\_\(E\).pdf](http://www.isotc211.org/protdoc/FDIS/ISO_FDIS_19115_(E).pdf) ) released in January 2003.

In this standard, it is accepted that the more appropriate format to encode metadata is XML. ISO TC/211 released in June 2002 a "New Work Item proposal: Geographic information - Metadata - Implementation specifications" (ISO TC211 document Nr 1309 available at <http://www.isotc211.org/protdoc/211n1309/211n1309.pdf>) that proposes an XML Schema to establish the syntax of this XML. This item proposal to develop the implementation model and XML Schema of the ISO 19115 standard is officially known as ISO 19139. And the "Digital Geographic Information Working Group Metadata Work Program" (<http://ogcengine.digest.org/metadata/>) is taking a leading role in the development of this item. Particularly, the XML-Schema that has been used for ISO standard can be downloaded from DGIWG's metadata WP site at following URL: [http://ogcengine.digest.org/metadata/protected/iso19115/impl/schema\\_files/iso19115.zip](http://ogcengine.digest.org/metadata/protected/iso19115/impl/schema_files/iso19115.zip) (with restricted access) .

## 6.3 General assumptions, decisions and observations

The stylesheets implemented will make the following assumptions on the input metadata files in order to generate valid output metadata files:

- On ISO->DC stylesheet: The input metadata files in ISO 19115 standard must be correct. That is to say, they must comply with ISO19115 standard. For instance, an attribute whose value is restricted to a code list, can not contain values not included in this list.
- On DC -> ISO stylesheet: The input files in RDF contain only one <RDF:description> tags with the description of a resource. If there is more than one <RDF:description> tag, only the first occurrence will be taken into account to generate an ISO metadata file.

Decisions taken:

- On DC->ISO stylesheet:
  - The DC->ISO stylesheet will generate a metadata file containing a unique *MD\_IdentificationInformation* instance. *MD\_Metadata*, the root class (or entity) in ISO standards maintains a 1-N relationship with *MD\_IdentificationInformation* class. However, it is not possible to differentiate which DC elements must be mapped to a specific *MD\_IdentificationInformation* instance.
  - The DC->ISO stylesheet will always generate a valid ISO metadata. That is to say, although the DC metadata input did not include the enough elements to generate the mandatory elements (*title*, *description*, *publisher*, *language* and *date*) for the output, the stylesheet would generate the ISO mandatory elements containing default values.
- On ISO->DC stylesheet:
  - The encoding schemes established by Dublin Core are recommended but not restrictive. If there is not a direct correspondence between codes in ISO and Dublin Core, ISO codes will be transferred without modification.

Observations about generated metadata files:

- The consecutive application of ISO->DC and DC->ISO to an ISO metadata file may not generate again the original file. The application of ISO->DC implies the loss of those ISO elements that have no correspondence with Dublin Core metadata elements. Therefore, although it is applied the inverse stylesheet, DC->ISO, these elements cannot be recovered. ISO metadata standard defines more than 300 elements that must be translated into the 16 simple elements of Dublin Core.
- Similarly, the consecutive application of DC->ISO and ISO->DC to a DC metadata file may not generate again the original file. This time, there is no loss of information between DC and ISO. However, since a DC element may correspond to more than one element in ISO, those elements are generated in ISO containing the same value. Then, if the inverse stylesheet is applied, those elements will generate

repeatedly the same Dublin Core element with the same value. In order to avoid this problem the stylesheets should verify repetition of element contents.

## 6.4 Element-to-element conversion details

This section presents the specific problems about element-to-element mapping and content conversion for each Dublin Core element as well as the decisions taken to solve these problems.

There exists a subsection for each Dublin Core element. And these subsection include, in turn, another two subsections: one for DC->ISO conversion details; and another for ISO->DC conversion details.

### 6.4.1 Title

#### 6.4.1.1 DC-ISO

##### "mandatory/optional conversion" problem

The *title* attribute is mandatory within ISO *CI\_Citation* entity. Therefore, if there is no value for DC:TITLE, ISO value will be filled with **"Default Title"**.

##### "1-N" problem

There may be more than one occurrence for *DC:TITLE* element but the *CI\_Citation* section only has one *title* attribute and the output generated by the crosswalk only contains an *MD\_IdentificationInformation* instance. Therefore, the first occurrence of *DC:TITLE* will be mapped to the *title* attribute, but the rest occurrences of *DC:TITLE* will be mapped with the attribute *alternateTitle*, which is repeatable in *CI\_Citation* entity.

#### 6.4.1.2 ISO-DC

For every occurrence of attributes *title* and *alternateTitle* in *CI\_Citation* entity, a *DC:TITLE* occurrence will be generated.

### 6.4.2 Creator

#### 6.4.2.1 DC-ISO

##### "section to one element" problem

There are two possible mappings of DC:CREATOR: *MD\_Metadata.identificationInfo.pointOfContact* and *MD\_Metadata.identificationInfo.citation.citedResponsibleParty*. In both cases, the single value of *DC:CREATOR* must be mapped to the section (or entity) *CI\_ResponsibleParty*.

For every DC:CREATOR, the two possible mappings in ISO will be generated in the following way: the attribute *CI\_ResponsibleParty.role* will contain the value *"originator"*, and the *DC:CREATOR* value will be used to fill in the attribute *organisationName*.

#### 6.4.2.2 ISO-DC

##### "section to one element" problem

Each instance of *CI\_ResponsibleParty* entity (with *role="originator"*) in *MD\_Metadata.identificationInfo.pointOfContact* and *MD\_Metadata.identificationInfo.citation.citedResponsibleParty* must be mapped to a single value of *DC:CREATOR*. If the *CI\_ResponsibleParty* has been correctly completed, *organisationName* or *individualName* or *positionName* must contain a non-null value. Hence, the crosswalk will use the value of these attributes to create a *DC:CREATOR* element. That is to say, the crosswalk will try firstly the mapping

with *organisationName*, the mapping with *individualName* as a second option, and *positionName* as last option.

## 6.4.3 Subject

### 6.4.3.1 DC-ISO

"list code conversion" problem, "mandatory/optional conversion" problem

One possible mapping of *DC:SUBJECT* field is to ISO *MD\_Metadata.identificationInfo.topicCategory* attribute. On one hand, the value of this ISO attribute is constrained to the *MD\_TopicCategoryCode* code list. Therefore, the crosswalk will only generate a *topicCategory* attribute if the value (ignoring upper and lower cases) of *DC:SUBJECT* matches with a value in the aforementioned code list. On the other hand, it must be mentioned that *topicCategory* is mandatory in ISO if the *MD\_Metadata.hierarchyLevel* attribute is equals to "Dataset". If no *MD\_TopicCategoryCode* value is found in *DC:SUBJECT*, it is assumed that the *hierarchyLevel* will not be "Dataset".

"section to one element" problem

A second possible mapping of *DC:SUBJECT* is *MD\_Metadata.identificationInfo.descriptiveKeywords*. This mapping is less problematic because this ISO attribute is optional and does not constraint its values to a code list. The only problem is that a single value (*DC:SUBJECT*) must be mapped to a section (*MD\_Keywords* class). The occurrences that have not been mapped to a *topicCategory* attribute will be mapped in the following way: the *DC:SUBJECT* value will be used for *MD\_Keywords.keyword* attribute, and the *MD\_keywords.type* attribute will contain the "theme" value.

### 6.4.3.2 ISO-DC

Every occurrence of *MD\_Metadata.identificationInfo.topicCategory* attribute will generate a *DC:SUBJECT* element. And regarding *MD\_Metadata.identificationInfo.descriptiveKeywords* attribute, if the subattribute *type* is equals to "theme", a *DC:SUBJECT* element will be generated for each occurrence of subattribute *keyword*.

## 6.4.4 Description

### 6.4.4.1 DC-ISO

"mandatory/optional conversion" problem

The ISO *MD\_Metadata.identificationInfo.abstract* attribute is mandatory. Therefore, the crosswalk will introduce a default value ("Default abstract") to generate a valid ISO output.

"1-N" problem,

As the crosswalk only generates *MD\_IdentificationInformation* instance for the output ISO metadata record, all possible instances of *DC:DESCRIPTION* must be mapped to a unique abstract attribute. To solve this problem, the crosswalk will concatenate the input *DC:DESCRIPTION* elements with carry returns.

### 6.4.4.2 ISO-DC

For every occurrence of *MD\_Metadata.identificationInfo.abstract* attribute, the crosswalk will generate a new *DC:DESCRIPTION* element.

## 6.4.5 Publisher

### 6.4.5.1 DC-ISO

#### “section to one element” problem

There are three possible mappings of *DC:PUBLISHER* element: *MD\_Metadata.identificationInfo.citation.citedResponsibleParty*, *MD\_Metadata.identificationInfo.pointOfContact* and *MD\_Metadata.contact*. The problem here is that the crosswalk must map a single value with an ISO section (or class). In every mapping, the *CI\_ResponsibleParty.role* attribute will be filled with “*publisher*” value and the *CI\_ResponsibleParty.organisationName* will be filled with *DC:PUBLISHER* value.

#### “1-N” problem

The ISO *MD\_Metadata.contact* attribute is mandatory in ISO. Therefore, if there is no *DC:PUBLISHER* value, the crosswalk will generate automatically a *MD\_Metadata.contact* attribute containing the value “*Default organisation*” for the *organisationName*.

### 6.4.5.2 ISO-DC

The mapping is equivalent to the mapping of *DC:CREATOR* element. The unique difference is that this time the crosswalk must check that the value of *CI\_ResponsibleParty.role* attribute must be equals to “*publisher*”.

## 6.4.6 Contributor

The *DC:CONTRIBUTOR* element is mapped to ISO *MD\_Metadata.identificationInfo.credit* attribute. Both elements are optional, repeatable and are filled with *CharacterString* values. There are no special conversion problems to mention.

## 6.4.7 Date

### 6.4.7.1 DC-ISO

#### “section to one element” problem

One mapping of *DC:DATE* is the *MD\_Metadata.identificationInfo.citation.date* attribute. The problem here is that the crosswalk must map a single value to a section, the *CI\_Date* class. The crosswalk will fill the *CI\_Date.dateType* with the “*publication*” and will use the *DC:DATE* value to fill the *CI\_Date.date* value. If the crosswalk allowed element refinements, the *dateType* could be filled with a more appropriate value (see *dateType\_codes* sheet of mapping table).

#### “1-N” problem

Another mapping for *DC:DATE* is the *MD\_Metadata.dateStamp* attribute. *DC:DATE* is a repeatable element but the ISO attribute may occur only once. Therefore, the crosswalk will only map the first occurrence of *DC:DATE* to generate the *MD\_Metadata.dateStamp* attribute.

#### “mandatory/optional conversion” problem

An additional problem for the two previous mappings is that the ISO corresponding elements are mandatory. Therefore, in case there is not *DC:DATE* elements, the crosswalk will fill the ISO attributes with a default value (“*0/00/0000*”) in order to generate a valid ISO output.

## 6.4.7.2 ISO-DC

Every occurrence of *MD\_Metadata.identificationInfo.citation.date* or *MD\_Metadata.dateStamp* will imply the generation of a *DC:DATE* element.

### “section to one element” problem

The *MD\_Metadata.identificationInfo.citation.date* attribute of type *CI\_Date* class must be mapped to a single value in Dublin Core. The crosswalk will only consider the attribute *CI\_Date.date* attribute to generate the value of *DC:DATE*. If element refinements were allowed, the crosswalk would generate more appropriate element refinements (“created”, “issued”, ...) according to the *dateType* attribute of *CI\_Date* class.

## 6.4.8 Type

### 6.4.8.1 DC-ISO

#### “list code conversion” problem

The *DC:TYPE* element is mapped to a series of ISO elements, which are constrained to specific code lists. These elements and code lists are: *MD\_Metadata.identificationInfo.spatialRepresentationType* using *MD\_SpatialRepresentationTypeCode* code list; *MD\_Metadata.identificationInfo.citation.presentationForm* using *CI\_PresentationFormCode* code list; and *MD\_Metadata.hierarchyLevel* using *MD\_ScopeCode*. And on the other hand, DCMI recommends the use of *DCMI Type Vocabulary* for *DC:TYPE* element although it is not a restriction. Given this context, the crosswalk will process the *DC:TYPE* in the following way:

- If *DC:TYPE* contains a value belonging to *MD\_SpatialRepresentationTypeCode*, *CI\_PresentationFormCode* or *MD\_ScopeCode*, the corresponding value will be generated.
- Additionally, if *DC:TYPE* contains a value from the recommended *DCMI Type Vocabulary*, a *MD\_Metadata.hierarchyLevel* attribute will be generated with an equivalent value in *MD\_ScopeCode* list. The values of *MD\_ScopeCode* list are quite close to those of *DCMI Type Vocabulary*. See correspondence of values in “*type\_codes*” sheet of mapping table.

### 6.4.8.2 ISO-DC

#### “list code conversion” problem

The translation in this direction is not so problematic because the *DCMI Type Vocabulary* is only a recommendation for the *DC:TYPE* element. Therefore the crosswalk will generate *DC:TYPE* elements with the following rules:

- For every *MD\_Metadata.identificationInfo.spatialRepresentationType* or *MD\_Metadata.identificationInfo.citation.presentationForm*, a *DC:TYPE* element will be generated without code conversion.
- And in the case of *MD\_Metadata.hierarchyLevel* attribute:
  - If the value coincides with one of *DCMI Type Vocabulary*, a *DC:TYPE* element will be generated without code conversion. For instance:

```
< MD_ScopeCode>dataset</ MD_ScopeCode>
would generate
```

```
<dc:type>Dataset</dc:type>
```

- In other cases, two *DC:TYPE* elements will be generated: one without code conversion and another with the closest sense in *DCMI Type Vocabulary*. For instance:

```
< MD_ScopeCode> attribute </ MD_ScopeCode>
would generate
```

```
<dc:type>attribute</dc:type>
<dc:type>Dataset</dc:type>
```

## 6.4.9 Format

### 6.4.9.1 DC-ISO

“section to one element” problem

There two possible mappings in ISO for the DC:FORMAT element: *MD\_Metadata.distributionInfo.distributionFormat* and *MD\_Metadata.identificationInfo.resourceFormat*. The problem with both mappings is that a single value must be mapped to a value of *MD\_Format* class. Besides, this class has two mandatory attributes: *name* and *version*. By convention, the crosswalk assumes that *DC:FORMAT* contains a value with the form “*name // version*”. And if no “//” is found, the *MD\_Format.version* attribute will be filled with the default value “*unknown*”

### 6.4.9.2 ISO-DC

“section to one element” problem

For every *MD\_Metadata.distributionInfo.distributionFormat* or *MD\_Metadata.identificationInfo.resourceFormat* attribute, the crosswalk will generate a *DC:FORMAT* element that will concatenate the values for *MD\_Format.name* and *MD\_Format.version* with “//”.

## 6.4.10 Identifier

### 6.4.10.1 DC-ISO

The *DC:IDENTIFIER* has 5 possible mapping according to the value format:

- If the value corresponds with an URL (http, ftp, file ...), the crosswalk will generate an *MD\_Metadata.distributionInfo.trasferOptions.onLine.linkage* attribute.
- The first of them will be also the element *MD\_Metadata.dataSetURI*.
- If the value corresponds with an ISBN (i.e. starts with ISBN), the crosswalk will generate and *MD\_Metadata.identificationInfo.citation.ISBN* attribute.
- If the value corresponds with an ISSN (i.e. starts with ISSN), the crosswalk will generate and *MD\_Metadata.identificationInfo.citation.ISSN* attribute.
- Otherwise, an *MD\_Metadata.identificationInfo.citation.identifier* attribute will be generated. This attribute is of type *MD\_Identifier* and the crosswalk will only fill the *MD\_Identifier.code* with the content of *DC:IDENTIFIER*.

### 6.4.10.2 ISO-DC

For every occurrence of *MD\_Metadata.distributionInfo.trasferOptions.onLine.linkage*, *MD\_Metadata.identificationInfo.citation.ISBN*, *MD\_Metadata.identificationInfo.citation.ISSN*, *MD\_Metadata.identificationInfo.citation.identifier* and *MD\_Metadata.dataSetURI*, the crosswalk will generate a *DC:IDENTIFIER* element.

The crosswalk will also verify that *MD\_Metadata.identificationInfo.citation.ISBN* and *MD\_Metadata.identificationInfo.citation.ISSN* values contain the *ISBN* and *ISSN* words. If not, the *ISBN* and *ISSN* will be added as prefix for the *DC:IDENTIFIER* value.

## 6.4.11 Source

### 6.4.11.1 DC-ISO

#### “section to one element” problem

The *DC:SOURCE* element is mapped to the *MD\_Metadata.dataQualityInfo.lineage.source.description* attribute. The problem is that the *MD\_Metadata.dataQualityInfo* of type *DQ\_QualityInfo* has a mandatory subattribute named *scope* that must be filled with a value belonging to the *MD\_ScopeCode* code list. The crosswalk will automatically generate the value “dataset” to fill this *scope* attribute.

### 6.4.11.2 ISO-DC

No relevant conversion problems were found.

## 6.4.12 Language

### 6.4.12.1 DC-ISO

#### “list code conversion” problem, “section to one element” problem

The *DC:LANGUAGE* element is mapped to the ISO *MD\_Metadata.identificationInfo.language* attribute of type *MD\_Language*. This class contains three attributes that may indicate the language: *isoCode* (two or three letters code), *isoName* (language name) and *otherLang*. Given this context, the crosswalk will proceed as follows:

- If *DC:LANGUAGE* value length is equals to three, this value will be used for *isoCode* attribute.
- Otherwise, the *DC:LANGUAGE* value will be used to fill the *otherLang* attribute

#### “mandatory/optional conversion” problem

The *MD\_Metadata.identificationInfo.language* attribute is mandatory in ISO. Therefore, if there is no value for *DC:LANGUAGE*, the crosswalk will automatically generate an ISO attribute with the English language as default value.

### 6.4.12.2 ISO-DC

#### “section to one element” problem

For every occurrence of *MD\_Metadata.identificationInfo.language*, the crosswalk will generate a *DC:LANGUAGE* element. Only the non-null value among *isoCode*, *isoName* and *otherLang* attributes will be used to fill the content of *DC:LANGUAGE* element.

## 6.4.13 Relation

### 6.4.13.1 DC-ISO

#### “1-N” problem

One possible mapping of *DC:RELATION* is to ISO *MD\_Metadata.identificationInfo.citation.series.name* attribute. The problem here is that the DC element is repeatable but the *CI\_Citation.series* attribute may occur only once and the crosswalk only generates an instance of *MD\_IdentificationInformation*. Therefore, the crosswalk will only map the first occurrence of *DC:IDENTIFIER*. As a remark for future versions of this crosswalk, if qualifiers were used, the crosswalk should generate an *isPartOf* refinement.

### “section to one element” problem

A second possible mapping of *DC:RELATION* is the *MD\_Metadata.identificationInfo.aggregationInfo* attribute of type *MD\_AggregateInformation*. This class has two attributes that will be filled by the crosswalk as follows:

- The *associationType* attribute will be filled with the default value “*references*”. If qualifiers were considered, the crosswalk could generate this attribute according to the refinement (see *relation\_codes* sheet of mapping table).
- The *aggregateDataSetIdentifier* value of type *MD\_Identifier* is used to identify the related dataset. The value of *DC:RELATION* will be used to fill the *aggregateDataSetIdentifier.code* sub-attribute.

### 6.4.13.2 ISO-DC

Every occurrence of *MD\_Metadata.identificationInfo.citation.series.name* or *MD\_Metadata.identificationInfo.aggregateInfo* will generate a new *DC:RELATION* element.

### “section to one element” problem

The attribute *MD\_Metadata.identificationInfo.aggregationInfo* of type *MD\_AggregateInformation* must be transformed into a single value. If qualifiers were used, the crosswalk could generate an appropriate refinement according to the association type. But, as qualifiers are not handled, only the *aggregateDataSetIdentifier.code* value is used to fill the content of *DC:RELATION*.

## 6.4.14 Coverage

### 6.4.14.1 DC-ISO

The *DC:COVERAGE* element is the only element in Dublin Core, for which two encoding schemes have been considered: *DCMI Box Encoding Scheme* the spatial coverage, and the *DCMI Period Encoding Scheme* for the temporal coverage. According to these encoding schemes, the ISO attributes will be generated as follows

- For DCMI Box Encoding Scheme (Box entity in XML)
  - If there is a value for the attribute *name*, an *MD\_Metadata.identificationInfo.descriptiveKeywords* of type *MD\_Keywords* will be generated. The *MD\_Keywords.type* attribute will be filled with “*place*”. In addition to this, if the *name* attribute contain several place names separated by commas, a new *MD\_Keywords.keyword* will be generated.
  - Subentities *northlimit*, *westlimit*, *eastlimit* and *southlimit* will be used to generate an *MD\_Metadata.identificationInfo.extent.geographicElement* of type *Ex\_GeographicBoundingBox*
- For DCMI Period Encoding Scheme (Period entity in XML)
  - If there is a value for the attribute *name*, an *MD\_Metadata.identificationInfo.descriptiveKeywords* of type *MD\_Keywords* will be generated. The *MD\_Keywords.type* attribute will be filled with “*temporal*”. In addition to this, if the *name* attribute contain several place names separated by commas, a new *MD\_Keywords.keyword* attribute will be generated.
  - Subentities *start* and *end* will be used to generate an *MD\_Metadata.identificationInfo.extent.temporalElement.extent* of type *TM\_Primitive*.

### 6.4.14.2 ISO-DC

#### “1-N” problem, “section to one element” problem

Given a series of ISO attributes, the crosswalk must generate *DC:COVERAGE* elements with *DCMI Box Encoding Scheme* and *DCMI Period Encoding Scheme* as follows

- Regarding the DCMI Box Encoding Scheme, *MD\_Metadata.identificationInfo.descriptiveKeywords* (with *type*="place") and *MD\_Metadata.identificationInfo.extent.geographicElement* must be merged. The problem here is that both ISO attributes may have more than one instance and it is difficult to decide the correspondence. The final decision here will be to generate a *DC:COVERAGE* with Box Encoding



Scheme for each `MD_Metadata.identificationInfo.extent.geographicElement` and the name attribute of Box entity will contain all `MD_Keywords.keyword` values separated by commas.

- Regarding the DCMI Box Encoding Scheme, `MD_Metadata.identificationInfo.descriptiveKeywords` (with `type="temporal"`) and `MD_Metadata.identificationInfo.extent.temporalElement.extent` must be merged. The problem here is that both ISO attributes may have more than one instance and it is difficult to decide the correspondence. The final decision here will be to generate a DC:COVERAGE with Period Encoding Scheme for each `MD_Metadata.identificationInfo.extent.temporalElement.extent` and the name attribute of Period entity will contain all `MD_Keywords.keyword` values separated by commas.

## 6.4.15 Rights

### 6.4.15.1 DC-ISO

"list code conversion" problem, "section to one element" problem

The `DC:RIGHTS` element is mapped to the `MD_Metadata.identificationInfo.resourceConstraints` attribute of type `MD_LegalConstraints`. The conversion problem here is to map a single value to a class which contains attributes with restricted values. The crosswalk will generate an `MD_Metadata.identificationInfo.resourceConstraints` attribute as follows:

- If `DC:RIGHTS` contains a value belonging to `MD_RestrictionCode` code list, the `MD_LegalConstraints.useConstraints` attribute will be filled with this value.
- Otherwise, `MD_LegalConstraints.useConstraints` will be filled with the value "otherRestrictions" and the `MD_LegalConstraints.otherConstraints` will contain the `DC:RIGHTS` value.

As a last remark for future versions of crosswalk, if qualifiers (`accessRights`) were used for Dublin Core metadata, the crosswalk could discriminate more appropriately which DC value correspond with `MD_LegalConstraints.useConstraints` or `MD_LegalConstraints.accessConstraints`, not considered for the moment.

### 6.4.15.2 ISO-DC

"section to one element" problem

Every occurrence of `MD_Metadata.identificationInfo.resourceConstraints` must be mapped to a single `DC:RIGHTS` element as follows

- If `MD_LegalConstraints.useConstraints` (and `MD_LegalConstraints.accessConstraints`) value is distinct to "otherRestrictions", a new `DC:RIGHTS` element will be generated.
- If `MD_LegalConstraints.useConstraints` value is equals to "otherRestrictions", a new `DC:RIGHTS` element will be generated with the content of `MD_LegalConstraints.otherConstraints`.

## 6.4.16 Audience

Since the DTD for expressing the Dublin Core metadata syntax only includes Simple Dublin Core metadata, this element is not managed by the crosswalks.

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## Annex A. Methodology for reviewing the state of the art in geographic metadata mappings

The work to find the results presented in the section "State of the art in geographic metadata mappings" was done since November 15, 2002 to December 15, 2002. To prepare this revision, the following databases were searched:

- Most popular Web Search engines: <http://www.google.com>, <http://www.altavista.com>, <http://www.yahoo.com>.
- <http://www.scirus.com>. Scirus is a comprehensive science-specific search engine available on the Internet. It enables scientists, students and anyone searching for scientific information to chart and pinpoint data, locate university sites and find reports and articles quickly and easily. It was launched by Elsevier Science, one of the most important international publishers of scientific information. A most general search provided by this company is <http://www.sciencedirect.com>.
- <http://www.acm.org>. ACM Digital Library. A half century of pioneering concepts and fundamental research have been digitized and indexed in a variety of ways in this special collection of works published by ACM since its inception. The ACM Digital Library includes bibliographic information, abstracts, reviews, and full texts.
- <http://citeseer.nj.nec.com/cs>. ResearchIndex is a scientific literature digital library that aims to improve the dissemination and feedback of scientific literature, and to provide improvements in functionality, usability, availability, cost, comprehensiveness, efficiency, and timeliness.
- <http://www.computer.org/>. The IEEE Computer Society Digital Library provides online access to 20 society magazines and transactions and over 900 selected conference proceedings.
- <http://www.sti.nasa.gov/RECONselect.html>. The CASI TRS database contains bibliographic citations and abstracts for publicly available aerospace documents, journal articles, and conference proceedings. It is part of the NASA Technical Report Server (NTRS), which primarily provides recent full-text reports produced by the NASA centres. The database is a selected portion of publicly available materials from the NASA Scientific and Technical Information (STI) Database. The CASI TRS database contains over 2.2 million records.
- <http://iinwww.ira.uka.de/bibliography/index.html>. This is a collection of bibliographies of scientific literature in computer science from various sources, covering most aspects of computer science. The bibliographies are updated monthly from their original locations such that you'll always find the most recent versions here.
- <http://www3.interscience.wiley.com>. Search engine over the John Wiley & Sons, Inc. publications.
- <http://www.ec-gis.org>. Portal of the GI&GIS project. The mission of this project is to fill that void, and to establish the right conditions for the creation of a European Reference Centre for Geographic Information. At the crossroads of GI policy and strategy development, GI interoperability, and the conception of pan-European GI data sets, the GI&GIS project is a unique reference, both for the European Commission and the European Union, for issues related to geospatial information. The GI&GIS project aims at helping to pave the way for both the private and public sectors in the EU to overcome the difficulties that hinder the development and application of GI.
- <http://www.cordis.net>. This World Wide Web site contains the "Community Research and Development Information Service - CORDIS". The site includes information, and the software and media on which it is operated or contained, (individually and collectively the "Information") which is made available by the European Commission (the "Commission") as an activity of its "Innovation-SMEs" programme. Our goal is to keep this information timely and accurate.

## Annex B. Controlled lists involved in the mapping process

This annex presents the lists of controlled terms that are used in both standards (ISO and Dublin Core), and the correspondences between them.

### Annex B.1. Type codes

DC and ISO controlled-lists for DC:TYPE element.

Name	domain code	definition
CI_PresentationFormCode	PresFormCd	mode in which the data is represented
documentDigital	001	digital representation of a primarily textual item (can contain illustrations also)
documentHardcopy	002	representation of a primarily textual item (can contain illustrations also) on paper, photographic material, or other media
imageDigital	003	likeness of natural or man-made features, objects, and activities acquired through the sensing of visual or any other segment of the electromagnetic spectrum by sensors, such as thermal infrared, and high resolution radar and stored in digital format
imageHardcopy	004	likeness of natural or man-made features, objects, and activities acquired through the sensing of visual or any other segment of the electromagnetic spectrum by sensors, such as thermal infrared, and high resolution radar and reproduced on paper, photographic material, or other media for use directly by the human user
mapDigital	005	map represented in raster or vector form
mapHardcopy	006	map printed on paper, photographic material, or other media for use directly by the human user
modelDigital	007	multi-dimensional digital representation of a feature, process, etc.
modelHardcopy	008	3-dimensional, physical model
profileDigital	009	vertical cross-section in digital form
profileHardcopy	010	vertical cross-section printed on paper, etc.
tableDigital	011	digital representation of facts or figures systematically displayed, especially in columns
tableHardcopy	012	representation of facts or figures systematically displayed, especially in columns, printed on paper, photographic material, or other media
videoDigital	013	digital video recording
videoHardcopy	014	video recording on film

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Name	domain code	definition
MD_SpatialRepresentationTypeCode	SpatRepTypCd	method used to represent geographic information in the dataset
vector	001	vector data is used to represent geographic data
grid	002	grid data is used to represent geographic data
textTable	003	textual or tabular data is used to represent geographic data
tin	004	triangulated irregular network
stereoModel	005	three-dimensional view formed by the intersecting homologous rays of an overlapping pair of images
video	006	scene from a video recording

Name	domain code	definition	Equivalent term from DCMI Type Vocabulary
MD_ScopeCode	ScopeCd	class of information to which the referencing entity applies	
attribute	001	information applies to the attribute class	Dataset
attributeType	002	information applies to the characteristic of a feature	Dataset
collectionHardware	003	information applies to the collection hardware class	Dataset
collectionSession	004	information applies to the collection session	Event
dataset	005	information applies to the dataset	Dataset
series	006	information applies to the series	Collection
nonGeographicDataset	007	information applies to non-geographic data	Dataset
dimensionGroup	008	information applies to a dimension group	Dataset
feature	009	information applies to a feature	Dataset
featureType	010	information applies to a feature type	Dataset
propertyType	011	information applies to a property type	Dataset
fieldSession	012	information applies to a field session	Event
software	013	information applies to a computer program or routine	Software
service	014	information applies to a capability which a service provider entity makes available to a service user entity through a set of interfaces that define a behaviour, such as a use case	Service
model	015	information applies to a copy or imitation of an existing or hypothetical object	Dataset
tile	016	information applies to a tile, a spatial subset of geographic data	Dataset

Name	domain code	definition	Equivalent Term from MD_ScopeCode
DCMI Type Vocabulary		<a href="http://dublincore.org/documents/dcmi-type-vocabulary/">http://dublincore.org/documents/dcmi-type-vocabulary/</a> The DCMI Type Vocabulary provides a general, cross-domain list of approved terms that may be used as values for the Type element to identify the genre of a resource.	
Collection	Collection	A collection is an aggregation of items. The term collection means that the resource is described as a group; its parts may be separately described and navigated.	series
Dataset	Dataset	A dataset is information encoded in a defined structure (for example, lists, tables, and databases), intended to be useful for direct machine processing.	dataset
Event	Event	An event is a non-persistent, time-based occurrence. Metadata for an event provides descriptive information that is the basis for discovery of the purpose, location, duration, responsible agents, and links to related events and resources. The resource of type event may not be retrievable if the described instantiation has expired or is yet to occur. Examples - exhibition, web-cast, conference, workshop, open-day, performance, battle, trial, wedding, tea-party, conflagration.	
Image	Image	An image is a primarily symbolic visual representation other than text. For example - images and photographs of physical objects, paintings, prints, drawings, other images and graphics, animations and moving pictures, film, diagrams, maps, musical notation. Note that image may include both electronic and physical representations.	dataset
Interactive Resource	Interactive Resource	An interactive resource is a resource which requires interaction from the user to be understood, executed, or experienced. For example - forms on web pages, applets, multimedia learning objects, chat services, virtual reality.	
Service	Service	A service is a system that provides one or more functions of value to the end-user. Examples include: a photocopying service, a banking service, an authentication service, interlibrary loans, a Z39.50 or Web server.	service
Software	Software	Software is a computer program in source or compiled form which may be available for installation non-transiently on another machine. For software which exists only to create an interactive environment, use interactive instead.	software
Sound	Sound	A sound is a resource whose content is primarily intended to be rendered as audio. For example - a music playback file format, an audio compact disc, and recorded speech or sounds.	
Text	Text	A text is a resource whose content is primarily words for reading. For example - books, letters, dissertations, poems, newspapers, articles, archives of mailing lists. Note that facsimiles or images of texts are still of the genre text.	

## Annex B.2. Right Codes

ISO controlled-list for ISO equivalent term to DC:RIGHTS.

Name	domain code	definition
MD_RestrictionCode	RestrictCd	limitation(s) placed upon the access or use of the data
copyright	001	exclusive right to the publication, production, or sale of the rights to a literary, dramatic, musical, or artistic work, or to the use of a commercial print or label, granted by law for a specified period of time to an author, composer, artist, distributor
patent	002	government has granted exclusive right to make, sell, use or license an invention or discovery
patentPending	003	produced or sold information awaiting a patent
trademark	004	a name, symbol, or other device identifying a product, officially registered and legally restricted to the use of the owner or manufacturer
license	005	formal permission to do something
intellectualPropertyRights	006	rights to financial benefit from and control of distribution of non-tangible property that is a result of creativity
restricted	007	withheld from general circulation or disclosure
otherRestrictions	008	limitation not listed

## Annex B.3. Subject Codes

ISO controlled-list for ISO equivalent term to DC:SUBJECT element.

Name	domain code	definition
MD_TopicCategoryCode	TopicCatCd	high-level geographic data thematic classification to assist in the grouping and search of available geographic data sets. Can be used to group keywords as well. Listed examples are not exhaustive. NOTE It is understood there are overlaps between general categories and the user is encouraged to select the one most appropriate.
farming	001	rearing of animals and/or cultivation of plants. Examples: agriculture, irrigation, aquaculture, plantations, herding, pests and diseases affecting crops and livestock
biota	002	flora and/or fauna in natural environment. Examples: wildlife, vegetation, biological sciences, ecology, wilderness, sealife, wetlands, habitat
boundaries	003	legal land descriptions. Examples: political and administrative boundaries
climatologyMeteorologyAtmosphere	004	processes and phenomena of the atmosphere. Examples: cloud cover, weather, climate, atmospheric conditions, climate change, precipitation
economy	005	economic activities, conditions and employment. Examples: production, labour, revenue, commerce, industry, tourism and ecotourism, forestry, fisheries, commercial or subsistence hunting, exploration and exploitation of resources such as minerals, oil and gas
elevation	006	height above or below sea level. Examples: altitude, bathymetry, digital elevation models, slope, derived products
environment	007	environmental resources, protection and conservation. Examples: environmental pollution, waste storage and treatment, environmental impact assessment, monitoring environmental risk, nature reserves, landscape
geoscientificInformation	008	information pertaining to earth sciences Examples: geophysical features and processes, geology, minerals, sciences dealing with the composition, structure and origin of the earth's rocks, risks of earthquakes, volcanic activity, landslides, gravity information, soils, permafrost, hydrogeology, erosion
health	009	health, health services, human ecology, and safety. Examples: disease and illness, factors affecting health, hygiene, substance abuse, mental and physical health, health services
imageryBaseMapsEarthC	010	base maps. Examples: land cover, topographic maps, imagery, unclassified images, annotations
intelligenceMilitary	011	military bases, structures, activities. Examples: barracks, training grounds, military transportation, information collection

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inlandWaters	012	inland water features, drainage systems and their characteristics. Examples: rivers and glaciers, salt lakes, water utilization plans, dams, floods, water quality, hydrographic charts, currents,
Location	013	positional information and services. Examples: addresses, geodetic networks, control points, postal zones and services, place names
Oceans	014	features and characteristics of salt water bodies (excluding inland waters). Examples: tides, tidal waves, coastal information, reefs
planningCadastre	015	information used for appropriate actions for future use of the land. Examples: land use maps, zoning maps, cadastral surveys, land ownership
Society	016	characteristics of society and cultures. Examples: settlements, anthropology, archaeology, education, traditional beliefs, manners and customs, demographic data, recreational areas and activities, social impact assessments, crime and justice, census information
Structure	017	man-made construction. Examples: buildings, museums, churches, factories, housing, monuments, shops, towers
transportation	018	means and aids for conveying persons and/or goods. Examples: roads, airports/airstrips, shipping routes, tunnels, nautical charts, vehicle or vessel location, aeronautical charts, railways
utilitiesCommunication	019	energy, water and waste systems and communications infrastructure and services. Examples: hydroelectricity, geothermal, solar and nuclear sources of energy, water purification and distribution, sewage collection and disposal, electricity and gas distribution, data communication, telecommunication, radio, communication networks



## Annex B.4. Format Codes

Internet Media Types recommended for DC:FORMAT element.

The format-codes list recommend by Dublin Core is the "media-types" list presented at <http://www.isi.edu/in-notes/iana/assignments/media-types/media-types>. It is also available at <http://www.isi.edu/in-notes/iana/assignments/media-types/> where the "media-types" directory contains a subdirectory for each content type and each of those directories contains a file for each content subtype. ISO does not establish a controlled list for format codes.

## Annex B.5. Date type Codes

DC refinements for DC:DATE and ISO controlled-list to specify date type.

Name	domain code	definition	Corresponding date refinement
<b>CI_DateTypeCode</b>	<b>DateTypCd</b>	<b>identification of when a given event occurred</b>	
creation	001	date identifies when the resource was brought into existence	created
publication	002	date identifies when the resource was issued	issued
revision	003	date identifies when the resource was examined or re-examined and improved or amended	modified

Label	Name	definition	Corresponding CI_DateTypeCode
<b>DCMI refinements for DATE</b>			
created	created	Date of creation of the resource.	creation
valid	valid	Date (often a range) of validity of a resource.	
available	available	Date (often a range) that the resource will become or did become available.	
issued	issued	Date of formal issuance (e.g., publication) of the resource.	publication
modified	modified	Date on which the resource was changed.	revision
Date Accepted	dateAccepted	Date of acceptance of the resource (e.g. of thesis by university department, of article by journal, etc.).	
Date Copyrighted	dateCopyrighted	Date of a statement of copyright.	
Date Submitted	dateSubmitted	Date of submission of the resource (e.g. thesis, articles, etc.).	
		none refinement or matching by default	created

## Annex B.6. Relation Codes

DC refinements for DC:RELATION and ISO controlled-list to specify association type.

Name	domain code	definition	Corresponding date refinement
<b>DS_AssociationTypeCode</b>	<b>AscTypeCd</b>	<b>justification for the correlation of two datasets</b>	
crossReference	001	reference from one dataset to another	References
largerWorkCitation	002	reference to a master dataset of which this one is a part	Is Part Of
partOfSeamlessDatabase	003	part of same structured set of data held in a computer	Is Part Of
source	004	mapping and charting information from which the dataset content originates	Is Version Of
stereoMate	005	part of a set of imagery that when used together, provides three-dimensional images	Is Part Of

label	name	definition	Corresponding DS_AssociationTypeCode
<b>DCMI refinements for RELATION</b>			
Is Version Of	isVersionOf	The described resource is a version, edition, or adaptation of the referenced resource. Changes in version imply substantive changes in content rather than differences in format.	source
Has Version	hasVersion	The described resource has a version, edition, or adaptation, namely, the referenced resource.	
Is Replaced By	isReplacedBy	The described resource is supplanted, displaced, or superseded by the referenced resource.	
Replaces	replaces	The described resource supplants, displaces, or supersedes the referenced resource.	source
Is Required By	isRequiredBy	The described resource is required by the referenced resource, either physically or logically.	
Requires	requires	The described resource requires the referenced resource to support its function, delivery, or coherence of content.	
Is Part Of	isPartOf	The described resource is a physical or logical part of the referenced resource.	largerWorkCitation
Has Part	hasPart	The described resource includes the referenced resource either physically or logically.	
Is Referenced By	isReferencedBy	The described resource is referenced, cited, or otherwise pointed to by the referenced resource.	
References	references	The described resource references, cites, or otherwise points to the referenced resource.	crossReference
Is Format Of	isFormatOf	The described resource is the same intellectual content of the referenced resource, but presented in another format.	source
Has Format	hasFormat	The described resource pre-existed the referenced resource, which is essentially the same intellectual content presented in another format.	
Conforms To	conformsTo	A reference to an established standard to which the resource conforms.	
		none refinement or matching by default	crossReference

## Annex C. Style sheet for mapping between ISO-XML and DC-RDF

This annex presents the XML-RDF style sheet that gives the possibility for creating tools that can change metadata from one standard to the other automatically. It also presents some aspects related with the rules that the style sheets implement.

### Annex C.1. DTD for expressing Dublin Core metadata

This annex presents the DTD used for expressing Dublin Core metadata. This DTD, which will be referred in this document as "DCMES.dtd", is the simple DC-DTD with two encoding schemes for the levels "box" and "period" that are used for representing information about the coverage.

```
<?xml encoding="UTF-8"?>
<!--DTD 2001-11-28 for
Expressing Simple Dublin Core in RDF/XML
http://dublincore.org/documents/2001/11/28/dcmes-xml/
Public ID: "-//DUBLIN CORE//DCMES DTD 2001 11 28//EN"
Based on
Dublin Core Metadata Element Set, Version 1.1: Reference Description
http://dublincore.org/documents/1999/07/02/dces/
This DTD is for information only and NON-NORMATIVE.-->

<!-- The namespaces for RDF and DCMES 1.1 respectively -->
<!ENTITY rdfns 'http://www.w3.org/1999/02/22-rdf-syntax-ns#' >
<!ENTITY rdfsns 'http://www.w3.org/2000/01/rdf-schema#' >
<!ENTITY dcns 'http://purl.org/dc/elements/1.1/' >
<!ENTITY dctermsns 'http://purl.org/dc/terms' >

<!-- Declare convenience entities for XML namespace declarations -->
<!ENTITY % rdfnsdecl 'xmlns:rdf CDATA #FIXED "&rdfns;"' >
<!ENTITY % rdfsnsdecl 'xmlns:rdfs CDATA #FIXED "&rdfsns;"' >
<!ENTITY % dcnsdecl 'xmlns:dc CDATA #FIXED "&dcns;"' >
<!ENTITY % dctermsnsdecl 'xmlns:dcterms CDATA #FIXED "&dctermsns;"' >

<!-- The wrapper element -->
<!ELEMENT rdf:RDF (rdf:Description)* >
<!ATTLIST rdf:RDF %rdfnsdecl; %rdfsnsdecl; %dcnsdecl; %dctermsnsdecl; >

<!ENTITY % dcmes "dc:title | dc:creator | dc:subject | dc:description |
dc:publisher | dc:contributor | dc:date | dc:type | dc:format |
dc:identifier | dc:source | dc:language | dc:relation | dc:coverage |
dc:rights" >

<!-- The resource description container element -->
<!ELEMENT rdf:Description (%dcmes;)* >
<!ATTLIST rdf:Description rdf:about CDATA #IMPLIED>

<!-- The elements from DCMES 1.1 -->
<!-- The name given to the resource. -->
<!ELEMENT dc:title (#PCDATA)>
<!ATTLIST dc:title xml:lang CDATA #IMPLIED>
<!ATTLIST dc:title rdf:resource CDATA #IMPLIED>

<!-- An entity primarily responsible for making the content of the
resource. -->
<!ELEMENT dc:creator (#PCDATA)>
<!ATTLIST dc:creator xml:lang CDATA #IMPLIED>
<!ATTLIST dc:creator rdf:resource CDATA #IMPLIED>

<!-- The topic of the content of the resource. -->
<!ELEMENT dc:subject (#PCDATA)>
<!ATTLIST dc:subject xml:lang CDATA #IMPLIED>
<!ATTLIST dc:subject rdf:resource CDATA #IMPLIED>
```

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```
<!-- An account of the content of the resource. -->
<!ELEMENT dc:description (#PCDATA)>
<!ATTLIST dc:description xml:lang CDATA #IMPLIED>
<!ATTLIST dc:description rdf:resource CDATA #IMPLIED>

<!-- The entity responsible for making the resource available. -->
<!ELEMENT dc:publisher (#PCDATA)>
<!ATTLIST dc:publisher xml:lang CDATA #IMPLIED>
<!ATTLIST dc:publisher rdf:resource CDATA #IMPLIED>

<!-- An entity responsible for making contributions to the content of
the resource. -->
<!ELEMENT dc:contributor (#PCDATA)>
<!ATTLIST dc:contributor xml:lang CDATA #IMPLIED>
<!ATTLIST dc:contributor rdf:resource CDATA #IMPLIED>

<!-- A date associated with an event in the life cycle of the resource. -->
<!ELEMENT dc:date (#PCDATA)>
<!ATTLIST dc:date xml:lang CDATA #IMPLIED>
<!ATTLIST dc:date rdf:resource CDATA #IMPLIED>

<!-- The nature or genre of the content of the resource. -->
<!ELEMENT dc:type (#PCDATA)>
<!ATTLIST dc:type xml:lang CDATA #IMPLIED>
<!ATTLIST dc:type rdf:resource CDATA #IMPLIED>

<!-- The physical or digital manifestation of the resource. -->
<!ELEMENT dc:format (#PCDATA)>
<!ATTLIST dc:format xml:lang CDATA #IMPLIED>
<!ATTLIST dc:format rdf:resource CDATA #IMPLIED>

<!-- An unambiguous reference to the resource within a given context. -->
<!ELEMENT dc:identifier (#PCDATA)>
<!ATTLIST dc:identifier xml:lang CDATA #IMPLIED>
<!ATTLIST dc:identifier rdf:resource CDATA #IMPLIED>

<!-- A Reference to a resource from which the present resource is derived. -->
<!ELEMENT dc:source (#PCDATA)>
<!ATTLIST dc:source xml:lang CDATA #IMPLIED>
<!ATTLIST dc:source rdf:resource CDATA #IMPLIED>

<!-- A language of the intellectual content of the resource. -->
<!ELEMENT dc:language (#PCDATA)>
<!ATTLIST dc:language xml:lang CDATA #IMPLIED>
<!ATTLIST dc:language rdf:resource CDATA #IMPLIED>

<!-- A reference to a related resource. -->
<!ELEMENT dc:relation (#PCDATA)>
<!ATTLIST dc:relation xml:lang CDATA #IMPLIED>
<!ATTLIST dc:relation rdf:resource CDATA #IMPLIED>

<!-- The extent or scope of the content of the resource. -->
<!ELEMENT dc:coverage (dcterms:Box?, dcterms:Period?)>
<!ATTLIST dc:coverage xml:lang CDATA #IMPLIED>
<!ATTLIST dc:coverage rdf:resource CDATA #IMPLIED>

<!ELEMENT dcterms:Box (Box)>
<!ELEMENT   Box (northlimit?,eastlimit?,southlimit?,westlimit?,uplimit?,downlimit?)>
<!ATTLIST   Box projection CDATA "geographic, height relative to mean-sea-level" name
CDATA #IMPLIED >
<!ELEMENT   northlimit (#PCDATA)>
<!ATTLIST   northlimit units CDATA "signed decimal degrees">
<!ELEMENT   eastlimit (#PCDATA)>
<!ATTLIST   eastlimit units CDATA "signed decimal degrees">
<!ELEMENT   southlimit (#PCDATA)>
<!ATTLIST   southlimit units CDATA "signed decimal degrees">
<!ELEMENT   westlimit (#PCDATA)>
<!ATTLIST   westlimit units CDATA "signed decimal degrees">
<!ELEMENT   uplimit (#PCDATA)>
<!ATTLIST   uplimit zunits CDATA "m">
<!ELEMENT   downlimit (#PCDATA)>
<!ATTLIST   downlimit zunits CDATA "m">
```

```
<!ELEMENT dcterms:Period (Period)>
<!ELEMENT   Period      (start?,end?)>
<!ATTLIST   Period name          CDATA #IMPLIED >
<!ELEMENT   start      (#PCDATA)>
<!ATTLIST   start  scheme      CDATA "W3C-DTF">
<!ELEMENT   end        (#PCDATA)>
<!ATTLIST   end    scheme      CDATA "W3C-DTF">

<!-- Information about rights held in and over the resource. -->
<!ELEMENT dc:rights (#PCDATA)>
<!ATTLIST dc:rights xml:lang CDATA #IMPLIED>
<!ATTLIST dc:rights rdf:resource CDATA #IMPLIED>
```

## Annex C.2. ISO-DC stylesheet

```

<?xml version="1.0" encoding="ISO-8859-1"?>
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
                xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
                xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
                xmlns:dc="http://purl.org/dc/elements/1.1"
                xmlns:dcterms="http://purl.org/dc/terms"
                xmlns:iso19115="http://www.isotc211.org/iso19115/"
                xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

  <xsl:output method="xml" indent="yes" encoding="ISO-8859-1"/>

  <xsl:output doctype-system="DCMES.dtd"/>
  <!-- this line will change if the location of the DTD changes. -->

  <!-- Stylesheet that translates a correct ISO data into a correct DC data -->
  <!-- Author: IAAA -->

  <xsl:template match="/">
    <xsl:apply-templates select="iso19115:MD_Metadata"/>
  </xsl:template>

  <xsl:template match="iso19115:MD_Metadata">

    <xsl:variable name="xsltstr-lower"
      select="'a;b;c;d;e;f;g;h;i;j;k;l;m;n;o;p;q;r;s;t;u;v;w;x;y;z'"/>
    <xsl:variable name="xsltstr-upper"
      select="'A;B;C;D;E;F;G;H;I;J;K;L;M;N;O;P;Q;R;S;T;U;V;W;X;Y;Z'"/>

    <xsl:element name="rdf:RDF">
      <xsl:element name="rdf:Description">

        <!-- Element title conversion: -->
        <!-- It's supposed to be more than one occurrence in ISO (and that -->
        <!-- means more than citation element). For each occurrence of -->
        <!-- citation.title a new element dc:title will be generated -->

        <!-- ISO CORE and ISO COMPREHENSIVE-->
        <xsl:for-each select="./iso19115:_MD_Identification/citation/title">
          <xsl:element name="dc:title">
            <xsl:value-of select="normalize-space(.)"/>
          </xsl:element>
        </xsl:for-each>

        <!-- Also a new element dc:title is generated for each -->
        <!-- citation.alternateTitle element -->

        <xsl:for-each select="./iso19115:_MD_Identification/citation/alternateTitle">
          <xsl:element name="dc:title">
            <xsl:value-of select="normalize-space(.)"/>
          </xsl:element>
        </xsl:for-each>

        <!-- creator element conversion: -->
        <!-- It's assumed that at least, one of organisationName, individualName -->
        <!-- or positionName exists. No comprobations are made. -->
        <!-- ISO COMPREHENSIVE -->
        <xsl:for-each
      select="./iso19115:_MD_Identification/citation/citedResponsibleParty">
          <xsl:if test="normalize-space(./role/CI_RoleCode_CodeList)='originator'">
            <xsl:element name="dc:creator">
              <xsl:choose>
                <xsl:when test="./organisationName">
                  <xsl:value-of select="./organisationName"/>
                </xsl:when>
                <xsl:when test="./individualName">
                  <xsl:value-of select="./individualName"/>
                </xsl:when>
                <xsl:when test="./positionName">
                  <xsl:value-of select="./positionName"/>
                </xsl:when>
                <xsl:otherwise>

```

```

        <!-- Nothing. This should be never happen. -->
    </xsl:otherwise>
</xsl:choose>
</xsl:element>
</xsl:if>
</xsl:for-each>

<!-- ISO CORE -->
<xsl:for-each select="./iso19115:_MD_Identification/pointOfContact">
  <xsl:if test="normalize-space(./role/CI_RoleCode_CodeList)='originator'">
    <xsl:element name="dc:creator">
      <xsl:choose>
        <xsl:when test="./organisationName">
          <xsl:value-of select="./organisationName"/>
        </xsl:when>
        <xsl:when test="./individualName">
          <xsl:value-of select="./individualName"/>
        </xsl:when>
        <xsl:when test="./positionName">
          <xsl:value-of select="./positionName"/>
        </xsl:when>
        <xsl:otherwise>
          <!-- Nothing. This should be never happen. -->
        </xsl:otherwise>
      </xsl:choose>
    </xsl:element>
  </xsl:if>
</xsl:for-each>

<!-- Element subject conversion -->
<!-- The data is supposed to be correct and for this reason the -->
<!-- verification of the correction of the value is not made. -->
<!-- ISO COMPREHENSIVE -->

<xsl:for-each select="./iso19115:_MD_Identification/descriptiveKeywords">
  <xsl:if test="normalize-space(./type/MD_KeywordTypeCode_CodeList)='theme'">
    <xsl:element name="dc:subject">
      <xsl:value-of select="./keyword"/>
    </xsl:element>
  </xsl:if>
</xsl:for-each>

<!-- ISO CORE -->
<xsl:for-each select="./iso19115:_MD_Identification/topicCategory">
  <xsl:element name="dc:subject">
    <xsl:value-of select="normalize-space(./MD_TopicCategoryCode_CodeList)"/>
  </xsl:element>
</xsl:for-each>

<!-- description element conversion -->
<!-- For each occurrence of abstract a new dc:description will be -->
<!-- generated -->
<!-- ISO CORE E ISO COMPREHENSIVE-->
<xsl:for-each select="./iso19115:_MD_Identification/abstract">
  <xsl:element name="dc:description">
    <xsl:value-of select="."/>
  </xsl:element>
</xsl:for-each>

<!-- publisher element conversion: -->
<!-- It's assumed that at least, one of organisationName, individualName -->
<!-- or positionName exists. No comprobations are made. -->

<!-- ISO COMPREHENSIVE -->
<xsl:for-each
select="./iso19115:_MD_Identification/citation/citedResponsibleParty">
  <xsl:if test="normalize-space(./role/CI_RoleCode_CodeList)='publisher'">
    <xsl:element name="dc:publisher">
      <xsl:choose>
        <xsl:when test="./organisationName">
          <xsl:value-of select="./organisationName"/>
        </xsl:when>
        <xsl:when test="./individualName">
          <xsl:value-of select="./individualName"/>

```

```

        </xsl:when>
        <xsl:when test="./positionName">
            <xsl:value-of select="./positionName"/>
        </xsl:when>
        <xsl:otherwise>
            <!-- Nothing. This should be never happen. -->
        </xsl:otherwise>
    </xsl:choose>
</xsl:element>
</xsl:if>
</xsl:for-each>

<xsl:for-each select="./iso19115:_MD_Identification/citation/pointOfContact">
    <xsl:if test="normalize-space(./role/CI_RoleCode_CodeList)='publisher'">
        <xsl:element name="dc:publisher">
            <xsl:choose>
                <xsl:when test="./organisationName">
                    <xsl:value-of select="./organisationName"/>
                </xsl:when>
                <xsl:when test="./individualName">
                    <xsl:value-of select="./individualName"/>
                </xsl:when>
                <xsl:when test="./positionName">
                    <xsl:value-of select="./positionName"/>
                </xsl:when>
                <xsl:otherwise>
                    <!-- Nothing. This should be never happen. -->
                </xsl:otherwise>
            </xsl:choose>
        </xsl:element>
    </xsl:if>
</xsl:for-each>

<!-- ISO CORE -->
<xsl:for-each select="./contact">
    <xsl:if test="normalize-space(./role/CI_RoleCode_CodeList)='publisher'">
        <xsl:element name="dc:publisher">
            <xsl:choose>
                <xsl:when test="./organisationName">
                    <xsl:value-of select="./organisationName"/>
                </xsl:when>
                <xsl:when test="./individualName">
                    <xsl:value-of select="./individualName"/>
                </xsl:when>
                <xsl:when test="./positionName">
                    <xsl:value-of select="./positionName"/>
                </xsl:when>
                <xsl:otherwise>
                    <!-- Nothing. This should be never happen. -->
                </xsl:otherwise>
            </xsl:choose>
        </xsl:element>
    </xsl:if>
</xsl:for-each>

<!-- contributor element conversion -->
<!-- ISO COMPREHENSIVE -->
    <xsl:for-each select="./iso19115:_MD_Identification/credit">
        <xsl:element name="dc:contributor">
            <xsl:value-of select="."/>
        </xsl:element>
    </xsl:for-each>

<!-- ISO CORE N/A ;;;GAP!!! -->

<!-- date element conversion: In ISO the publication date is compulsory -->
<!-- and it can appear N times -->
<!-- ISO CORE E ISO COMPREHENSIVE-->
    <xsl:for-each select="./iso19115:_MD_Identification/citation/date">
        <xsl:if test="normalize-
space(./dateType/CI_DateTypeCode_CodeList)='publication'">
            <xsl:element name="dc:date">
                <xsl:value-of select="./date"/>
            </xsl:element>
        </xsl:if>
    </xsl:for-each>

```



```

    </xsl:if>
  </xsl:for-each>

  <!-- Another publication date will be generated with the value of      -->
  <!-- dateStamp.                                                       -->

  <xsl:if test="./dateStamp">
    <xsl:element name="dc:date">
      <xsl:value-of select="./dateStamp"/>
    </xsl:element>
  </xsl:if>

  <!-- element type conversion(1)                                       -->
  <!-- ISO COMPREHENSIVE -->
  <xsl:for-each select="./hierarchyLevel">
    <xsl:variable name="hierarchyLevelVar">
      <!-- it's translated to lower case -->
      <xsl:value-of select="translate(normalize-
space(./MD_ScopeCode_CodeList),$xsltsl-str-upper, $xsltsl-str-lower)"/>
    </xsl:variable>

    <xsl:choose>
      <xsl:when test="$hierarchyLevelVar='attribute'">
        <xsl:element name="dc:type">
          <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
        </xsl:element>
        <xsl:element name="dc:type">
          <xsl:text>Dataset</xsl:text>
        </xsl:element>
      </xsl:when>

      <xsl:when test="$hierarchyLevelVar='attributetype'">
        <xsl:element name="dc:type">
          <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
        </xsl:element>
        <xsl:element name="dc:type">
          <xsl:text>Dataset</xsl:text>
        </xsl:element>
      </xsl:when>

      <xsl:when test="$hierarchyLevelVar='collectionhardware'">
        <xsl:element name="dc:type">
          <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
        </xsl:element>
        <xsl:element name="dc:type">
          <xsl:text>Dataset</xsl:text>
        </xsl:element>
      </xsl:when>

      <xsl:when test="$hierarchyLevelVar='collectionssession'">
        <xsl:element name="dc:type">
          <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
        </xsl:element>
        <xsl:element name="dc:type">
          <xsl:text>Event</xsl:text>
        </xsl:element>
      </xsl:when>

      <xsl:when test="$hierarchyLevelVar='dataset'">
        <!-- If upper and lower cases are the same, only one dataset must -->
        <!-- be generated -->
        <xsl:element name="dc:type">
          <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
        </xsl:element>
        <!--xsl:element name="dc:type">
        <xsl:text>Dataset</xsl:text>
        </xsl:element-->
      </xsl:when>

      <xsl:when test="$hierarchyLevelVar='series'">
        <xsl:element name="dc:type">
          <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
        </xsl:element>
        <xsl:element name="dc:type">

```

```

    <xsl:text>Collection</xsl:text>
  </xsl:element>
</xsl:when>

<xsl:when test="$hierarchyLevelVar='nongeographicdataset'">
  <xsl:element name="dc:type">
    <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
  </xsl:element>
  <xsl:element name="dc:type">
    <xsl:text>Dataset</xsl:text>
  </xsl:element>
</xsl:when>

<xsl:when test="$hierarchyLevelVar='dimensiongroup'">
  <xsl:element name="dc:type">
    <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
  </xsl:element>
  <xsl:element name="dc:type">
    <xsl:text>Dataset</xsl:text>
  </xsl:element>
</xsl:when>

<xsl:when test="$hierarchyLevelVar='feature'">
  <xsl:element name="dc:type">
    <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
  </xsl:element>
  <xsl:element name="dc:type">
    <xsl:text>Dataset</xsl:text>
  </xsl:element>
</xsl:when>

  <xsl:when test="$hierarchyLevelVar='featuretype'">
    <xsl:element name="dc:type">
      <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
    </xsl:element>
    <xsl:element name="dc:type">
      <xsl:text>Dataset</xsl:text>
    </xsl:element>
  </xsl:when>

  <xsl:when test="$hierarchyLevelVar='propertytype'">
    <xsl:element name="dc:type">
      <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
    </xsl:element>
    <xsl:element name="dc:type">
      <xsl:text>Dataset</xsl:text>
    </xsl:element>
  </xsl:when>

  <xsl:when test="$hierarchyLevelVar='fieldsession'">
    <xsl:element name="dc:type">
      <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
    </xsl:element>
    <xsl:element name="dc:type">
      <xsl:text>Event</xsl:text>
    </xsl:element>
  </xsl:when>

  <xsl:when test="$hierarchyLevelVar='software'">
    <xsl:element name="dc:type">
      <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
    </xsl:element>
    <xsl:element name="dc:type">
      <xsl:text>Software</xsl:text>
    </xsl:element>
  </xsl:when>

  <xsl:when test="$hierarchyLevelVar='service'">
    <xsl:element name="dc:type">
      <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
    </xsl:element>
    <xsl:element name="dc:type">
      <xsl:text>Service</xsl:text>
    </xsl:element>
  </xsl:when>

```

```

</xsl:when>

  <xsl:when test="$hierarchyLevelVar='model'">
    <xsl:element name="dc:type">
      <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
    </xsl:element>
    <xsl:element name="dc:type">
      <xsl:text>Dataset</xsl:text>
    </xsl:element>
  </xsl:when>

  <xsl:when test="$hierarchyLevelVar='tile'">
    <xsl:element name="dc:type">
      <xsl:value-of select="normalize-space(./MD_ScopeCode_CodeList)"/>
    </xsl:element>
    <xsl:element name="dc:type">
      <xsl:text>Dataset</xsl:text>
    </xsl:element>
  </xsl:when>

  <xsl:otherwise>
    <!-- Nothing. This should be never happen. -->
  </xsl:otherwise>
</xsl:choose>
</xsl:for-each>

<!-- element type conversion(2) -->
<!-- ISO CORE -->
  <xsl:for-each select="./iso19115:_MD_Identification/spatialRepresentationType">
    <xsl:element name="dc:type">
      <xsl:value-of select="normalize-
space(./MD_SpatialRepresentationTypeCode_CodeList)"/>
    </xsl:element>
  </xsl:for-each>

  <xsl:for-each select="./iso19115:_MD_Identification/citation/presentationForm">
    <xsl:element name="dc:type">
      <xsl:value-of select="normalize-space(./CI_PresentationFormCode_CodeList)"/>
    </xsl:element>
  </xsl:for-each>

<!-- Format element conversion -->
<!-- ISO COMPREHENSIVE E ISO CORE -->
  <xsl:for-each select="./distributionInfo/distributionFormat">
    <xsl:element name="dc:format">
      <xsl:value-of select="./name"/>
      <xsl:text>//</xsl:text>
      <xsl:value-of select="./version"/>
    </xsl:element>
  </xsl:for-each>

  <xsl:for-each select="./iso19115:_MD_Identification/resourceFormat">
    <xsl:element name="dc:format">
      <xsl:value-of select="./name"/>
      <xsl:text>//</xsl:text>
      <xsl:value-of select="./version"/>
    </xsl:element>
  </xsl:for-each>

<!-- identifier element conversion: -->
<!-- For this element there are five possible ways. -->

  <xsl:for-each select="./distributionInfo/transferOptions/onLine">
    <xsl:element name="dc:identifier">
      <xsl:if test="./linkage">
        <xsl:value-of select="./linkage"/>
      </xsl:if>
    </xsl:element>
  </xsl:for-each>

  <xsl:for-each select="./iso19115:_MD_Identification/citation/identifier">
    <xsl:element name="dc:identifier">
      <xsl:value-of select="./code"/>
    </xsl:element>
  </xsl:for-each>

```

```

</xsl:for-each>

<xsl:for-each select="./iso19115:_MD_Identification/citation/ISBN">
  <xsl:variable name="isbnVar">
    <!-- it's translated to lower case -->
    <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper, $xsltsl-
str-lower)"/>
  </xsl:variable>
  <xsl:element name="dc:identifier">
    <xsl:choose>
      <xsl:when test="contains($isbnVar, 'isbn')">
        <xsl:value-of select="."/>
      </xsl:when>
      <xsl:otherwise>
        <xsl:text>ISBN </xsl:text><xsl:value-of select="."/>
      </xsl:otherwise>
    </xsl:choose>
  </xsl:element>
</xsl:for-each>

<xsl:for-each select="./iso19115:_MD_Identification/citation/ISSN">
  <xsl:variable name="issnVar">
    <!-- it's translated to lower case -->
    <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper, $xsltsl-
str-lower)"/>
  </xsl:variable>
  <xsl:element name="dc:identifier">
    <xsl:choose>
      <xsl:when test="contains($issnVar, 'ISSN')">
        <xsl:value-of select="."/>
      </xsl:when>
      <xsl:otherwise>
        <xsl:text>ISSN </xsl:text><xsl:value-of select="."/>
      </xsl:otherwise>
    </xsl:choose>
  </xsl:element>
</xsl:for-each>

<xsl:if test="./dataSetURI">
  <xsl:element name="dc:identifier">
    <xsl:value-of select="./dataSetURI"/>
  </xsl:element>
</xsl:if>

<!-- source element conversion: -->
<!-- ISO COMPREHENSIVE -->

<xsl:for-each select="./dataQualityInfo/lineage/source/description">
  <xsl:element name="dc:source">
    <xsl:value-of select="."/>
  </xsl:element>
</xsl:for-each>

<!-- ISO CORE N/A ;;;GAP!!! -->

<!-- language element conversion. -->
<!-- ISO COMPREHENSIVE E ISO CORE -->
<xsl:for-each select="./iso19115:_MD_Identification/language">
  <xsl:if test="./isoCode">
    <xsl:element name="dc:language">
      <xsl:value-of select="./isoCode"/>
    </xsl:element>
  </xsl:if>
  <xsl:if test="./isoName">
    <xsl:element name="dc:language">
      <xsl:value-of select="./isoName"/>
    </xsl:element>
  </xsl:if>
  <xsl:if test="./otherLang">
    <xsl:element name="dc:language">
      <xsl:value-of select="./otherLang"/>
    </xsl:element>
  </xsl:if>
</xsl:for-each>

```

```

<!-- relation element conversion: -->
<!-- ISO COMPREHENSIVE -->
  <xsl:for-each select="./iso19115:_MD_Identification/citation/series/name">
    <xsl:element name="dc:relation">
      <xsl:value-of select="."/>
    </xsl:element>
  </xsl:for-each>
  <xsl:for-each
select="./iso19115:_MD_Identification/aggregationInfo/aggregateDataSetIdentifier/code">
    <xsl:element name="dc:relation">
      <xsl:value-of select="."/>
    </xsl:element>
  </xsl:for-each>

<!-- ISO CORE N/A ;;;GAP!!! -->

<!-- coverage element conversion: -->
<!-- It's composed by several elements. -->
<!-- PlaceName: keywords that have type = "place". -->
<!-- Coordenates: iso19115:EX_GeographicBoundingBox. -->
<!-- PeriodName: keywords that have type = "period". -->
<!-- Period of time: temporalElement. -->
<!-- If in the data ISO there is no information, the element won't be -->
<!-- generated, but, if at least one of the four elements exists, the -->
<!-- element will be generated. -->

  <xsl:choose>
    <xsl:when
test="count(./iso19115:_MD_Identification/descriptiveKeywords/type[MD_KeywordTypeCode_Cod
eList='place']) > 0
      or
./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/northBoundLatitude
      or
count(./iso19115:_MD_Identification/descriptiveKeywords/type[MD_KeywordTypeCode_CodeList=
'temporal']) > 0
      or ./iso19115:_MD_Identification/extent/temporalElement/extent/beginEnd">
      <xsl:element name="dc:coverage">

        <!-- element dcterms:Box -->
        <xsl:choose>
          <xsl:when
test="count(./iso19115:_MD_Identification/descriptiveKeywords/type[MD_KeywordTypeCode_Cod
eList='place']) > 0
            or
./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/northBoundLatitude
">
            <xsl:element name="dcterms:Box">
              <xsl:element name="Box">

                <!-- ISO COMPREHENSIVE -->

                <!-- If there are two or more keywords of type place, there
are concatenated with a comma-->
                <xsl:if
test="./iso19115:_MD_Identification/descriptiveKeywords/type[MD_KeywordTypeCode_CodeList=
'place']">
                  <xsl:attribute name="name">
                    <xsl:for-each
select="./iso19115:_MD_Identification/descriptiveKeywords/type[MD_KeywordTypeCode_CodeLis
t='place']">
                      <xsl:value-of select="../../keyword"/>
                      <xsl:if test="position()=last()">
                        <xsl:text disable-output-escaping = "yes">&#44;</xsl:text>
                      </xsl:if>
                    </xsl:for-each>
                  </xsl:attribute>
                </xsl:if>

                <!-- ISO CORE N/A ;;;GAP!!! -->

                <!-- ISO COMPREHENSIVE and ISO CORE -->

```

## CWA 14856:2003 (E)

```

        <xsl:if
test="./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/northBoundLa
titude">
            <xsl:element name="northlimit">
                <xsl:value-of
select="./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/northBound
Latitude"/>
            </xsl:element>
        </xsl:if>

        <xsl:if
test="./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/eastBoundLon
gitude">
            <xsl:element name="eastlimit">
                <xsl:value-of
select="./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/eastBoundL
ongitude"/>
            </xsl:element>
        </xsl:if>

        <xsl:if
test="./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/southBoundLa
titude">
            <xsl:element name="southlimit">
                <xsl:value-of
select="./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/southBound
Latitude"/>
            </xsl:element>
        </xsl:if>

        <xsl:if
test="./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/westBoundLon
gitude">
            <xsl:element name="westlimit">
                <xsl:value-of
select="./iso19115:_MD_Identification/extent/iso19115:EX_GeographicBoundingBox/westBoundL
ongitude"/>
            </xsl:element>
        </xsl:if>

    </xsl:element>
</xsl:element>

</xsl:when>
<xsl:otherwise>
</xsl:otherwise>
</xsl:choose>

<!-- element dcterms:Period -->
<xsl:choose>
    <xsl:when
test="count(./iso19115:_MD_Identification/descriptiveKeywords/type[MD_KeywordTypeCode_Cod
eList='temporal']) > 0
    or ./iso19115:_MD_Identification/extent/temporalElement/extent/beginEnd">
        <xsl:element name="dcterms:Period">
            <xsl:element name="Period">

                <!-- ISO COMPREHENSIVE -->
                <xsl:if
test="./iso19115:_MD_Identification/descriptiveKeywords/type[MD_KeywordTypeCode_CodeList=
'temporal']">
                    <xsl:attribute name="name">
                        <xsl:for-each
select="./iso19115:_MD_Identification/descriptiveKeywords/type[MD_KeywordTypeCode_CodeLis
t='temporal']">
                            <xsl:value-of select="./../keyword"/>
                            <xsl:if test="position()=last()">
                                <xsl:text disable-output-escaping = "yes">&#44;</xsl:text>
                            </xsl:if>
                        </xsl:for-each>
                    </xsl:attribute>
                </xsl:if>
                <!-- ISO CORE N/A ;;;GAP!!! -->

```

```

        <!-- ISO COMPREHENSIVE and ISO CORE -->
        <xsl:if
test="./iso19115:_MD_Identification/extent/temporalElement/extent/beginEnd">
            <xsl:element name="start">
                <xsl:value-of
select="./iso19115:_MD_Identification/extent/temporalElement/extent/beginEnd/begin"/>
            </xsl:element>
            <xsl:element name="end">
                <xsl:value-of
select="./iso19115:_MD_Identification/extent/temporalElement/extent/beginEnd/end"/>
            </xsl:element>
        </xsl:if>

        </xsl:element>
    </xsl:element>
</xsl:when>
    <xsl:otherwise>
    </xsl:otherwise>
</xsl:choose>

</xsl:element>
</xsl:when>

    <xsl:otherwise>
    <!-- There is no information for coverage element -->
    </xsl:otherwise>
</xsl:choose>

<!-- rights element conversion. -->
<!-- ISO COMPREHENSIVE -->

    <xsl:if test="./iso19115:_MD_Identification/resourceConstraints/accessConstraints">
    <xsl:for-each
select="./iso19115:_MD_Identification/resourceConstraints/accessConstraints">
        <xsl:variable name="rightsVar">
            <!-- it's translated to lower case -->
            <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper,
$xsltsl-str-lower)"/>
        </xsl:variable>
        <xsl:element name="dc:rights">
            <xsl:choose>
                <xsl:when test="$rightsVar='copyright'">
                    <xsl:text>copyright</xsl:text>
                </xsl:when>
                <xsl:when test="$rightsVar='patent'">
                    <xsl:text>patent</xsl:text>
                </xsl:when>
                <xsl:when test="$rightsVar='patentpending'">
                    <xsl:text>patentPending</xsl:text>
                </xsl:when>
                <xsl:when test="$rightsVar='trademark'">
                    <xsl:text>trademark</xsl:text>
                </xsl:when>
                <xsl:when test="$rightsVar='license'">
                    <xsl:text>license</xsl:text>
                </xsl:when>
                <xsl:when test="$rightsVar='intellectualpropertyrights'">
                    <xsl:text>intellectualPropertyRights</xsl:text>
                </xsl:when>
                <xsl:when test="$rightsVar='restricted'">
                    <xsl:text>restricted</xsl:text>
                </xsl:when>
                <xsl:when test="$rightsVar='otherrestrictions'">
                    <xsl:text>otherRestrictions</xsl:text>
                </xsl:when>
                <xsl:otherwise>
                    <!-- If the value is not in this list the data in ISO is not
correct. However, the value is translated to DC.-->
                    <xsl:value-of select="normalize-space(.)"/>
                </xsl:otherwise>
            </xsl:choose>
        </xsl:element>
    </xsl:for-each>

```

## CWA 14856:2003 (E)

```
</xsl:if>

  <xsl:if test="./iso19115:_MD_Identification/resourceConstraints/useConstraints">
    <!-- There is, at least, one-->
    <xsl:for-each
select="./iso19115:_MD_Identification/resourceConstraints/useConstraints">
      <xsl:variable name="rightsVar2">
        <!-- it's translated to lower case -->
        <xsl:value-of select="translate(normalize-space(.),$xsl:tsl-str-upper,
$xsl:tsl-str-lower)"/>
      </xsl:variable>
      <xsl:element name="dc:rights">
        <xsl:choose>
          <xsl:when test="$rightsVar2='copyright'">
            <xsl:text>copyright</xsl:text>
          </xsl:when>
          <xsl:when test="$rightsVar2='patent'">
            <xsl:text>patent</xsl:text>
          </xsl:when>
          <xsl:when test="$rightsVar2='patentpending'">
            <xsl:text>patentPending</xsl:text>
          </xsl:when>
          <xsl:when test="$rightsVar2='trademark'">
            <xsl:text>trademark</xsl:text>
          </xsl:when>
          <xsl:when test="$rightsVar2='license'">
            <xsl:text>license</xsl:text>
          </xsl:when>
          <xsl:when test="$rightsVar2='intellectualpropertyrights'">
            <xsl:text>intellectualPropertyRights</xsl:text>
          </xsl:when>
          <xsl:when test="$rightsVar2='restricted'">
            <xsl:text>restricted</xsl:text>
          </xsl:when>
          <xsl:when test="$rightsVar2='otherrestrictions'">
            <xsl:text>otherRestrictions</xsl:text>
          </xsl:when>
          <xsl:otherwise>
            <!-- If the value is not in this list the data in ISO is not
            correct. However, the value is translated to DC.-->
            <xsl:value-of select="normalize-space(.)"/>
          </xsl:otherwise>
        </xsl:choose>
      </xsl:element>
    </xsl:for-each>
  </xsl:if>

  <xsl:for-each
select="./iso19115:_MD_Identification/resourceConstraints/otherConstraints">
    <xsl:element name="dc:rights">
      <xsl:value-of select="normalize-space(.)"/>
    </xsl:element>
  </xsl:for-each>

  <!-- ISO CORE N/A ;;;GAP!!! -->

  </xsl:element>
</xsl:element>
</xsl:template>
</xsl:stylesheet>
```



## Annex C.3. DC-ISO stylesheet

```

<?xml version="1.0" encoding="ISO-8859-1"?>
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
                xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-
ns#"
                xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
                xmlns:dc="http://purl.org/dc/elements/1.1"
                xmlns:dcterms="http://purl.org/dc/terms"
                xmlns:iso19115="http://www.isotc211.org/iso19115/"
                xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance">

  <xsl:param name="_date">0000-00-00</xsl:param>

  <xsl:output indent="yes" encoding="ISO-8859-1"/>

  <!-- Stylesheet that translates a correct DC RDF/XML data into a correct -->
  <!-- ISO data -->

  <!-- Author: IAAA -->

  <xsl:template match="/">
    <xsl:apply-templates select="rdf:RDF"/>
  </xsl:template>

  <xsl:template match="rdf:RDF">

    <xsl:variable name="xsltsl-str-lower"
select="'a;b;c;d;e;f;g;h;i;j;k;l;m;n;o;p;q;r;s;t;u;v;w;x;y;z'"/>
    <xsl:variable name="xsltsl-str-upper"
select="'A;B;C;D;E;F;G;H;I;J;K;L;M;N;O;P;Q;R;S;T;U;V;W;X;Y;Z'"/>

    <!-- A file in ISO represents a resource. If there is more than one -->
    <!-- rdf:Description, only the first will be taken into account to -->
    <!-- generate an ISO metadata file. -->

    <xsl:if test="rdf:Description">
      <xsl:element name="iso19115:MD_Metadata">

        <xsl:element name="iso19115:MD_Identification">
          <xsl:attribute name="xsi:type">iso19115:MD_DataIdentificationType</xsl:attribute>
          <xsl:element name="citation">

            <!-- Element Title conversion: -->
            <!-- There is no title in DC: default value "default Title" -->
            <!-- There is only one title in DC: perfect. It goes to citation.title -->
            <!-- There is more than one titles in DC: the first goes to citation.title-->
            <!-- the others to citation.alternateTitle, repeteable element -->

            <xsl:choose>
              <xsl:when test="./rdf:Description/dc:title">
                <xsl:element name="title">
                  <xsl:value-of select="./rdf:Description/dc:title"/>
                </xsl:element>
              </xsl:when>
              <xsl:otherwise>
                <!-- No hay title en DC. ¿Que pongo? -->
                <xsl:text>Default Title</xsl:text>
              </xsl:otherwise>
            </xsl:choose>

            <!-- Element Date conversion: -->
            <!-- There is no date in DC: If we can obtain the date of the application-->
            <!-- that uses this stylesheet, this date is used. If not, the default -->
            <!-- value 0000-00-00 is used. -->
            <!-- There are one or more date in DC: the element citation.date is -->
            <!-- repeteable, so, a new date of publication is generated for every -->
            <!-- dc:date. -->

            <xsl:choose>
              <xsl:when test="./rdf:Description/dc:date">
                <xsl:for-each select="./rdf:Description/dc:date">

```

```

        <xsl:element name="date">
          <xsl:element name="dateType">
            <xsl:element name="CI_DateTypeCode_CodeList">
              <xsl:text>publication</xsl:text>
            </xsl:element>
          </xsl:element>
          <xsl:element name="date">
            <xsl:value-of select="."/>
          </xsl:element>
        </xsl:element>
      </xsl:for-each>
    </xsl:when>
    <xsl:otherwise>
      <xsl:element name="date">
        <xsl:element name="dateType">
          <xsl:element name="CI_DateTypeCode_CodeList">
            <xsl:text>publication</xsl:text>
          </xsl:element>
        </xsl:element>
        <xsl:element name="date">
          <!-- If there is no date, the parameter passed from the
              application is taken. If there is no parameter, the default
              value 0000-00-00 is considered-->
          <xsl:value-of select="$_date"/>
        </xsl:element>
      </xsl:element>
    </xsl:otherwise>
  </xsl:choose>

<!-- Element identifier conversion (1) -->
<!-- If there are dc:identifiers that not correspond neither file, http -->
<!-- ftp, ISSN nor ISBN, a element citation.identifier is generated -->

  <xsl:for-each select="./rdf:Description/dc:identifier">
    <xsl:choose>
      <xsl:when test="contains(normalize-space(.), 'file')
                    or contains(normalize-space(.), 'http')
                    or contains(normalize-space(.), 'ftp')
                    or contains(normalize-space(.), 'www')
                    or contains(normalize-space(.), 'ISSN')
                    or contains(normalize-space(.), 'ISBN')">
      </xsl:when>
      <xsl:otherwise>
        <xsl:element name="identifier">
          <xsl:element name="code">
            <xsl:value-of select="normalize-space(.)"/>
          </xsl:element>
        </xsl:otherwise>
      </xsl:choose>
    </xsl:for-each>

<!-- Element creator conversion: -->
<!-- If there is no creator in DC: nothing happen. In both standards is -->
<!-- optional. -->
<!-- If it appers once or more: a new citedResponsibleParty with role -->
<!-- originator is created for each apparition. -->
<!-- the text of the enter is written in organisationName. -->

  <xsl:for-each select="./rdf:Description/dc:creator">
    <xsl:element name="citedResponsibleParty">
      <xsl:element name="role">
        <xsl:element name="CI_RoleCode_CodeList">
          <xsl:text>originator</xsl:text>
        </xsl:element>
      </xsl:element>
      <xsl:element name="organisationName">
        <xsl:value-of select="."/>
      </xsl:element>
    </xsl:element>
  </xsl:for-each>

<!-- Element publisher conversion: -->
<!-- If there is no publisher in DC: nothing happen. In both standards -->

```

```

<!-- is optional. -->
<!-- If it appers once or more:  a new citedResponsibleParty with role -->
<!-- publisher is created for each apparition. -->
<!-- the text of the enter is written in organisationName. -->

    <xsl:for-each select="./rdf:Description/dc:publisher">
      <xsl:element name="citedResponsibleParty">
        <xsl:element name="role">
          <xsl:element name="CI_RoleCode_CodeList">
            <xsl:text>publisher</xsl:text>
          </xsl:element>
        </xsl:element>
        <xsl:element name="organisationName">
          <xsl:value-of select="."/>
        </xsl:element>
      </xsl:element>
    </xsl:for-each>

<!-- type element conversion(1): -->
<!-- If the value is equal to one code of -->
<!-- CI_PresentationFormCode_CodeList, a presentationForm value is -->
<!-- generated. -->

    <xsl:for-each select="./rdf:Description/dc:type">
      <xsl:variable name="typeVar">
        <!-- it's traslated to lower case -->
        <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper,
$xsltsl-str-lower)"/>
      </xsl:variable>
      <xsl:choose>
        <xsl:when test="$typeVar='documentdigital' or
          $typeVar='documenthardcopy' or
          $typeVar='imagedigital' or
          $typeVar='imagehardcopy' or
          $typeVar='mapdigital' or
          $typeVar='maphardcopy' or
          $typeVar='modeldigital' or
          $typeVar='modelhardcopy' or
          $typeVar='profiledigital' or
          $typeVar='profilehardcopy' or
          $typeVar='tabledigital' or
          $typeVar='tablehardcopy' or
          $typeVar='videodigital' or
          $typeVar='videohardcopy'">
          <xsl:element name="presentationForm">
            <xsl:element name="CI_PresentationFormCode_CodeList">
              <xsl:value-of select="normalize-space(.)"/>
            </xsl:element>
          </xsl:element>
        </xsl:when>
        <xsl:otherwise>
        </xsl:otherwise>
      </xsl:choose>
    </xsl:for-each>

<!-- relation element conversion(1): -->
<!-- If there is no dc:relation in DC, nothing happens because it's -->
<!-- optional. -->
<!-- If it appears in DC, only the first ocurrence is mapped in -->
<!-- series.name. The rest occurrences are lost. -->

    <xsl:if test="./rdf:Description/dc:relation">
      <xsl:element name="series">
        <xsl:element name="name">
          <xsl:value-of select="./rdf:Description/dc:relation"/>
        </xsl:element>
      </xsl:element>
    </xsl:if>

<!-- If there are more than one title, all except the first go to -->
<!-- alternateTitle. -->

    <xsl:for-each select="./rdf:Description/dc:title">
      <xsl:choose>

```

```

        <xsl:when test="position()=1">
            <!-- The first dc:title go to citation.title -->
        </xsl:when>
        <xsl:otherwise>
            <xsl:element name="alternateTitle">
                <xsl:value-of select="."/>
            </xsl:element>
        </xsl:otherwise>
    </xsl:choose>
</xsl:for-each>

<!-- Element identifier conversion (2) -->
<!-- If there are dc:identifiers that contains the word ISSN or ISBN a -->
<!-- element citation.issn or citation.isbn is generated -->

    <xsl:for-each select="./rdf:Description/dc:identifier">
        <xsl:if test="contains(normalize-space(.), 'ISBN')">
            <xsl:element name="ISBN">
                <xsl:value-of select="."/>
            </xsl:element>
        </xsl:if>
    </xsl:for-each>

    <xsl:for-each select="./rdf:Description/dc:identifier">
        <xsl:if test="contains(normalize-space(.), 'ISSN')">
            <xsl:element name="ISSN">
                <xsl:value-of select="."/>
            </xsl:element>
        </xsl:if>
    </xsl:for-each>

</xsl:element> <!-- De citation -->

<!-- description element conversion: -->
<!-- An only abstract will be generated, so, if there are more than one -->
<!-- occurrences of dc:description, they will be concatenated with carry -->
<!-- returns. -->

<xsl:choose>
    <xsl:when test="./rdf:Description/dc:description">
        <xsl:element name="abstract">
            <xsl:variable name="abstractElement"/>
            <xsl:for-each select="./rdf:Description/dc:description">
                <xsl:value-of select="concat($abstractElement, normalize-space())"/>
                <xsl:if test="position() != last()">
                    <xsl:value-of select="concat($abstractElement, '&#xA;')"/>
                </xsl:if>
            </xsl:for-each>
            <xsl:value-of select="$abstractElement"/>
        </xsl:element>
    </xsl:when>
    <xsl:otherwise>
        <xsl:element name="abstract">
            <!-- This element is compulsory, so, if there is no dc:description
            in DC, a default value is generated. -->
            <xsl:text>Default abstract</xsl:text>
        </xsl:element>
    </xsl:otherwise>
</xsl:choose>

<!-- Element creator conversion(2): -->
<!-- If there is no creator in DC: nothing happen. In both standards is -->
<!-- optional. -->
<!-- If it appers once or more: a new pointOfContact is created -->
<!-- for each apparition. -->
<!-- the text of the enter is written in organisationName. -->

    <xsl:for-each select="./rdf:Description/dc:creator">
        <xsl:element name="pointOfContact">
            <xsl:element name="role">
                <xsl:element name="CI_RoleCode_CodeList">
                    <xsl:text>originator</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:element>
    </xsl:for-each>

```

```

        <xsl:element name="organisationName">
          <xsl:value-of select="."/>
        </xsl:element>
      </xsl:element>
    </xsl:for-each>

    <!-- Element publisher conversion: -->
    <!-- If there is no publisher in DC: nothing happen. In both standards -->
    <!-- is optional. -->
    <!-- If it appers once or more: a new pointOfContact with role publisher-->
    <!-- is created for each apparition. -->
    <!-- the text of the enter is written in organisationName. -->

    <xsl:for-each select="./rdf:Description/dc:publisher">
      <xsl:element name="pointOfContact">
        <xsl:element name="role">
          <xsl:element name="CI_RoleCode_CodeList">
            <xsl:text>publisher</xsl:text>
          </xsl:element>
        </xsl:element>
        <xsl:element name="organisationName">
          <xsl:value-of select="."/>
        </xsl:element>
      </xsl:element>
    </xsl:for-each>

    <!-- rights element conversion: -->
    <!-- If there is no rights in DC, nothing happens because in ISO is -->
    <!-- optional. -->
    <!-- If there are rights, they will be mapped with useConstraints if the -->
    <!-- value is included in the restricted list. If not, useConstraints -->
    <!-- will be documented with otherConstraints, and the value will be -->
    <!-- mapped with otherRestrictions. -->

    <xsl:if test="./rdf:Description/dc:rights">

      <xsl:element name="resourceConstraints">
        <xsl:attribute
name="xsi:type">iso19115:MD_LegalConstraintsType</xsl:attribute>

        <xsl:variable name="rightsISO"/>
        <xsl:for-each select="./rdf:Description/dc:rights">
          <xsl:variable name="rightsVar">
            <!-- it's traslated to lower case -->
            <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper,
$xsltsl-str-lower)"/>
          </xsl:variable>

          <xsl:choose>
            <xsl:when test="$rightsVar='copyright'">
              <xsl:element name="useConstraints">
                <xsl:element name="MD_RestrictionCode_CodeList">
                  <xsl:value-of select="normalize-space(.)"/>
                </xsl:element>
              </xsl:element>
            </xsl:when>
            <xsl:when test="$rightsVar='patent'">
              <xsl:element name="useConstraints">
                <xsl:element name="MD_RestrictionCode_CodeList">
                  <xsl:value-of select="normalize-space(.)"/>
                </xsl:element>
              </xsl:element>
            </xsl:when>
            <xsl:when test="$rightsVar='patentpending'">
              <xsl:element name="useConstraints">
                <xsl:element name="MD_RestrictionCode_CodeList">
                  <xsl:value-of select="normalize-space(.)"/>
                </xsl:element>
              </xsl:element>
            </xsl:when>
            <xsl:when test="$rightsVar='trademark'">
              <xsl:element name="useConstraints">
                <xsl:element name="MD_RestrictionCode_CodeList">
                  <xsl:value-of select="normalize-space(.)"/>
                </xsl:element>
              </xsl:element>
            </xsl:when>
          </xsl:choose>
        </xsl:for-each>
      </xsl:element>
    </xsl:if>

```

```

        </xsl:element>
      </xsl:element>
    </xsl:when>
    <xsl:when test="$rightsVar='license'">
      <xsl:element name="useConstraints">
        <xsl:element name="MD_RestrictionCode_CodeList">
          <xsl:value-of select="normalize-space(.)"/>
        </xsl:element>
      </xsl:element>
    </xsl:when>
    <xsl:when test="$rightsVar='intellectualpropertyrights'">
      <xsl:element name="useConstraints">
        <xsl:element name="MD_RestrictionCode_CodeList">
          <xsl:value-of select="normalize-space(.)"/>
        </xsl:element>
      </xsl:element>
    </xsl:when>
    <xsl:when test="$rightsVar='restricted'">
      <xsl:element name="useConstraints">
        <xsl:element name="MD_RestrictionCode_CodeList">
          <xsl:value-of select="normalize-space(.)"/>
        </xsl:element>
      </xsl:element>
    </xsl:when>
    <xsl:when test="$rightsVar='otherrestrictions'">
      <xsl:element name="useConstraints">
        <xsl:element name="MD_RestrictionCode_CodeList">
          <xsl:value-of select="normalize-space(.)"/>
        </xsl:element>
      </xsl:element>
    </xsl:when>
    <xsl:otherwise>
      <xsl:element name="useConstraints">
        <xsl:element name="MD_RestrictionCode_CodeList">
          <xsl:text>otherRestrictions</xsl:text>
        </xsl:element>
      </xsl:element>
    </xsl:otherwise>
  </xsl:choose>
</xsl:for-each>

<xsl:for-each select="./rdf:Description/dc:rights">
  <xsl:variable name="rightsVar">
    <!-- it's traslated to lower case -->
    <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper,
    $xsltsl-str-lower)"/>
  </xsl:variable>
  <xsl:choose>
    <xsl:when test="$rightsVar='copyright'">
    </xsl:when>
    <xsl:when test="$rightsVar='patent'">
    </xsl:when>
    <xsl:when test="$rightsVar='patentpending'">
    </xsl:when>
    <xsl:when test="$rightsVar='trademark'">
    </xsl:when>
    <xsl:when test="$rightsVar='license'">
    </xsl:when>
    <xsl:when test="$rightsVar='intellectualpropertyrights'">
    </xsl:when>
    <xsl:when test="$rightsVar='restricted'">
    </xsl:when>
    <xsl:when test="$rightsVar='otherrestrictions'">
    </xsl:when>
    <xsl:otherwise>
      <xsl:element name="otherConstraints">
        <xsl:value-of select="normalize-space(.)"/>
      </xsl:element>
    </xsl:otherwise>
  </xsl:choose>
</xsl:for-each>

</xsl:element>
</xsl:if>

```

```

<!-- format element conversion (1): -->
<!-- If in DC doesn't appear, nothing happens because is optional. -->
<!-- If it appears N times, a new distributorFormat will be generated -->
<!-- for each dc:format. -->

<xsl:for-each select="./rdf:Description/dc:format">
  <xsl:element name="resourceFormat">
    <xsl:choose>
      <xsl:when test="contains(normalize-space(.), '//')">
        <xsl:element name="name">
          <xsl:value-of select="substring-before(normalize-space(.), '//')"/>
        </xsl:element>
        <xsl:element name="version">
          <xsl:value-of select="substring-after(normalize-space(.), '//')"/>
        </xsl:element>
      </xsl:when>
      <xsl:otherwise>
        <xsl:element name="name">
          <xsl:value-of select="normalize-space(.)"/>
        </xsl:element>
        <xsl:element name="version">
          <xsl:text>Unknown</xsl:text>
        </xsl:element>
      </xsl:otherwise>
    </xsl:choose>
  </xsl:element>
</xsl:for-each>

<!-- Element subject conversion: -->
<!-- If there is no dc:subject in DC nothing happens because in both -->
<!-- standars are optative. -->
<!-- If there are some occurrences, only the values that have not been -->
<!-- mapped as topicCategory will be mapped here, as a keyword. -->
<!-- In this case, also the element type is completed with the "theme" -->
<!-- value. -->

<xsl:for-each select="./rdf:Description/dc:subject">
  <xsl:variable name="enter">
    <!-- it's translated to lower case -->
    <xsl:value-of select="translate(normalize-space(.), $xsltsl-str-upper,
    $xsltsl-str-lower)"/>
  </xsl:variable>
  <xsl:choose>
    <xsl:when test="$enter='farming' or $enter=' farming' or $enter='farming ' or
    $enter=' farming '>
    </xsl:when>
    <xsl:when test="$enter='biota' or $enter=' biota' or $enter='biota ' or
    $enter=' biota '>
    </xsl:when>
    <xsl:when test="$enter='boundaries' or $enter=' boundaries' or
    $enter='boundaries ' or $enter=' boundaries '>
    </xsl:when>
    <xsl:when test="$enter='climatologymeteorologyatmosphere' or $enter='
    climatologymeteorologyatmosphere' or $enter='climatologymeteorologyatmosphere ' or
    $enter=' climatologymeteorologyatmosphere '>
    </xsl:when>
    <xsl:when test="$enter='economy' or $enter=' economy' or $enter='economy ' or
    $enter=' economy '>
    </xsl:when>
    <xsl:when test="$enter='elevation' or $enter=' elevation' or
    $enter='elevation ' or $enter=' elevation '>
    </xsl:when>
    <xsl:when test="$enter='environment' or $enter=' environment' or
    $enter='environment ' or $enter=' environment '>
    </xsl:when>
    <xsl:when test="$enter='geoscientificinformation' or $enter='
    geoscientificinformation' or $enter='geoscientificinformation ' or $enter='
    geoscientificinformation '>
    </xsl:when>
    <xsl:when test="$enter='health' or $enter=' health' or $enter='health ' or
    $enter=' health '>
    </xsl:when>
  </xsl:choose>

```

## CWA 14856:2003 (E)

```

        <xsl:when test="$sender='imagerybasemapsearchc' or $sender='
imagerybasemapsearchc' or $sender='imagerybasemapsearchc ' or $sender='
imagerybasemapsearchc '">
        </xsl:when>
        <xsl:when test="$sender='intelligencemilitary' or $sender='
intelligencemilitary' or $sender='intelligencemilitary ' or $sender=' intelligencemilitary
'">
        </xsl:when>
        <xsl:when test="$sender='inlandwaters' or $sender=' inlandwaters' or
$sender='inlandwaters ' or $sender=' inlandwaters '">
        </xsl:when>
        <xsl:when test="$sender='location' or $sender=' location' or $sender='location '
or $sender=' location '">
        </xsl:when>
        <xsl:when test="$sender='oceans' or $sender=' oceans' or $sender='oceans ' or
$sender=' oceans '">
        </xsl:when>
        <xsl:when test="$sender='planningcadastre' or $sender=' planningcadastre' or
$sender='planningcadastre ' or $sender=' planningcadastre '">
        </xsl:when>
        <xsl:when test="$sender='society' or $sender=' society' or $sender='society ' or
$sender=' society '">
        </xsl:when>
        <xsl:when test="$sender='structure' or $sender=' structure' or
$sender='structure ' or $sender=' structure '">
        </xsl:when>
        <xsl:when test="$sender='transportation' or $sender=' transportation' or
$sender='transportation ' or $sender=' transportation '">
        </xsl:when>
        <xsl:when test="$sender='utilitiescommunication' or $sender='
utilitiescommunication' or $sender='utilitiescommunication ' or $sender='
utilitiescommunication '">
        </xsl:when>
        <xsl:otherwise>
        <xsl:element name="descriptiveKeywords">
        <xsl:element name="keyword">
        <xsl:value-of select="."/>
        </xsl:element>
        <xsl:element name="type">
        <xsl:element name="MD_KeywordTypeCode_CodeList">
        <xsl:text>theme</xsl:text>
        </xsl:element>
        </xsl:element>
        </xsl:element>
        </xsl:otherwise>
        </xsl:choose>
    </xsl:for-each>

    <!-- coverage:placename element conversion: -->
    <!-- For separating the different names, a template is used. This -->
    <!-- template separated the string by the commas. -->

    <xsl:for-each select="./rdf:Description/dc:coverage/dcterms:Box/Box/@name">
    <xsl:call-template name="separatePlaceCoverage">
    <xsl:with-param name="cad">
    <xsl:value-of select="normalize-space(.)" />
    </xsl:with-param>
    </xsl:call-template>
    </xsl:for-each>

    <!-- coverage:periodName element conversion: -->
    <!-- Like the previous one. -->
    <xsl:for-each select="./rdf:Description/dc:coverage/dcterms:Period/Period/@name">
    <xsl:call-template name="separateTemporalCoverage">
    <xsl:with-param name="cad">
    <xsl:value-of select="normalize-space(.)" />
    </xsl:with-param>
    </xsl:call-template>
    </xsl:for-each>

    <!-- relation element conversion(2): -->
    <!-- If there is no dc:relation in DC, nothing happens because it's -->
    <!-- optional. -->
    <!-- If it appears in DC, an aggregationInfo will be generated for each -->
```



```

<!-- dc:relation element. -->
<xsl:if test="./rdf:Description/dc:relation">
  <xsl:for-each select="./rdf:Description/dc:relation">
    <xsl:element name="aggregationInfo">
      <xsl:element name="aggregateDataSetIdentifier">
        <xsl:element name="code">
          <xsl:value-of select="normalize-space(.)"/>
        </xsl:element>
      </xsl:element>
      <xsl:element name="associationType">
        <xsl:element name="DS_AssociationTypeCode_CodeList">
          <xsl:text>crossReference</xsl:text>
        </xsl:element>
      </xsl:element>
    </xsl:for-each>
  </xsl:if>

<!-- contributor element conversion: -->
<!-- If there is no dc:contributor in DC, it doesn't matter because in -->
<!-- both languages is optional. -->
<!-- If it appears more than once, a new labor credit will be generated -->
<!-- for each dc:contributor. -->
<xsl:for-each select="./rdf:Description/dc:contributor">
  <xsl:element name="credit">
    <xsl:value-of select="."/>
  </xsl:element>
</xsl:for-each>

<!-- type element conversion(2): -->
<!-- If there is no type in DC, nothing happens because it's not -->
<!-- compulsory in IsoCore. -->
<!-- If it appears more than one, a new spatialRepresentationType will -->
<!-- be generated for each dc:type. -->

<xsl:for-each select="./rdf:Description/dc:type">
  <xsl:variable name="typeVar2">
    <!-- it's translated to lower case -->
    <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper,
$xsltsl-str-lower)"/>
  </xsl:variable>
  <xsl:if test="$typeVar2='vector' or
$typeVar2='grid' or
$typeVar2='texttable' or
$typeVar2='tin' or
$typeVar2='stereomodel' or
$typeVar2='video'">
    <xsl:element name="spatialRepresentationType">
      <xsl:element name="MD_SpatialRepresentationTypeCode_CodeList">
        <xsl:value-of select="normalize-space(.)"/>
      </xsl:element>
    </xsl:element>
  </xsl:if>
</xsl:for-each>

<!-- element subject conversion(2): -->
<!-- This element is compulsory only if hierarchyLevel=Dataset. -->
<!-- Hence, if no dc:subject appears in DC, it's assumed that -->
<!-- hierarchyLevel!=dataset. -->
<!-- As ISO-CORE: -->

<xsl:choose>
  <xsl:when test="./rdf:Description/dc:subject">
    <xsl:for-each select="./rdf:Description/dc:subject">
      <xsl:variable name="enter">
        <!-- it's traslated to lower case -->
        <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper,
$xsltsl-str-lower)"/>
      </xsl:variable>

      <xsl:choose>
        <xsl:when test="$enter='farming' or $enter=' farming' or $enter='farming
' or $enter=' farming '">

```

```

        <xsl:element name="topicCategory">
          <xsl:element name="MD_TopicCategoryCode_CodeList">
            <xsl:text>farming</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:when>
      <xsl:when test="$sender='biota' or $sender=' biota' or $sender='biota ' or
$sender=' biota ' ">
        <xsl:element name="topicCategory">
          <xsl:element name="MD_TopicCategoryCode_CodeList">
            <xsl:text>biota</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:when>
      <xsl:when test="$sender='boundaries' or $sender=' boundaries' or
$sender='boundaries ' or $sender=' boundaries ' ">
        <xsl:element name="topicCategory">
          <xsl:element name="MD_TopicCategoryCode_CodeList">
            <xsl:text>boundaries</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:when>
      <xsl:when test="$sender='climatologymeteorologyatmosphere' or $sender='
climatologymeteorologyatmosphere' or $sender='climatologymeteorologyatmosphere ' or
$sender=' climatologymeteorologyatmosphere ' ">
        <xsl:element name="topicCategory">
          <xsl:element name="MD_TopicCategoryCode_CodeList">
            <xsl:text>climatologyMeteorologyAtmosphere</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:when>
      <xsl:when test="$sender='economy' or $sender=' economy' or $sender='economy
' or $sender=' economy ' ">
        <xsl:element name="topicCategory">
          <xsl:element name="MD_TopicCategoryCode_CodeList">
            <xsl:text>economy</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:when>
      <xsl:when test="$sender='elevation' or $sender=' elevation' or
$sender='elevation ' or $sender=' elevation ' ">
        <xsl:element name="topicCategory">
          <xsl:element name="MD_TopicCategoryCode_CodeList">
            <xsl:text>elevation</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:when>
      <xsl:when test="$sender='environment' or $sender=' environment' or
$sender='environment ' or $sender=' environment ' ">
        <xsl:element name="topicCategory">
          <xsl:element name="MD_TopicCategoryCode_CodeList">
            <xsl:text>environment</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:when>
      <xsl:when test="$sender='geoscientificinformation' or $sender='
geoscientificinformation' or $sender='geoscientificinformation ' or $sender='
geoscientificinformation ' ">
        <xsl:element name="topicCategory">
          <xsl:element name="MD_TopicCategoryCode_CodeList">
            <xsl:text>geoscientificInformation</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:when>
      <xsl:when test="$sender='health' or $sender=' health' or $sender='health '
or $sender=' health ' ">
        <xsl:element name="topicCategory">
          <xsl:element name="MD_TopicCategoryCode_CodeList">
            <xsl:text>health</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:when>

```

```

        <xsl:when test="$sender='imagerybasemapsearchc' or $sender='
imagerybasemapsearchc ' or $sender='imagerybasemapsearchc ' or $sender='
imagerybasemapsearchc '">
            <xsl:element name="topicCategory">
                <xsl:element name="MD_TopicCategoryCode_CodeList">
                    <xsl:text>imageryBaseMapsEarthC</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:when>
        <xsl:when test="$sender='intelligencemilitary' or $sender='
intelligencemilitary' or $sender='intelligencemilitary ' or $sender=' intelligencemilitary
'">
            <xsl:element name="topicCategory">
                <xsl:element name="MD_TopicCategoryCode_CodeList">
                    <xsl:text>intelligenceMilitary</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:when>
        <xsl:when test="$sender='inlandwaters' or $sender=' inlandwaters' or
$sender='inlandwaters ' or $sender=' inlandwaters '">
            <xsl:element name="topicCategory">
                <xsl:element name="MD_TopicCategoryCode_CodeList">
                    <xsl:text>inlandWaters</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:when>
        <xsl:when test="$sender='location' or $sender=' location' or
$sender='location ' or $sender=' location '">
            <xsl:element name="topicCategory">
                <xsl:element name="MD_TopicCategoryCode_CodeList">
                    <xsl:text>location</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:when>
        <xsl:when test="$sender='oceans' or $sender=' oceans' or $sender='oceans '
or $sender=' oceans '">
            <xsl:element name="topicCategory">
                <xsl:element name="MD_TopicCategoryCode_CodeList">
                    <xsl:text>oceans</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:when>
        <xsl:when test="$sender='planningcadastre' or $sender=' planningcadastre'
or $sender='planningcadastre ' or $sender=' planningcadastre '">
            <xsl:element name="topicCategory">
                <xsl:element name="MD_TopicCategoryCode_CodeList">
                    <xsl:text>planningCadastre</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:when>
        <xsl:when test="$sender='society' or $sender=' society' or $sender='society
' or $sender=' society '">
            <xsl:element name="topicCategory">
                <xsl:element name="MD_TopicCategoryCode_CodeList">
                    <xsl:text>society</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:when>
        <xsl:when test="$sender='structure' or $sender=' structure' or
$sender='structure ' or $sender=' structure '">
            <xsl:element name="topicCategory">
                <xsl:element name="MD_TopicCategoryCode_CodeList">
                    <xsl:text>structure</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:when>
        <xsl:when test="$sender='transportation' or $sender=' transportation' or
$sender='transportation ' or $sender=' transportation '">
            <xsl:element name="topicCategory">
                <xsl:element name="MD_TopicCategoryCode_CodeList">
                    <xsl:text>transportation</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:when>

```

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```
<xsl:when test="$enter='utilitiescommunication' or $enter='
utilitiescommunication' or $enter='utilitiescommunication ' or $enter='
utilitiescommunication '">
  <xsl:element name="topicCategory">
    <xsl:element name="MD_TopicCategoryCode_CodeList">
      <xsl:text>utilitiesCommunication</xsl:text>
    </xsl:element>
  </xsl:element>
</xsl:when>
<xsl:otherwise>
  <!-- this field is compulsory only if the resource has a
  hierarchyLevel equals to Dataset. Hence, if the element
  doesn't appear in the list, it's not translated to DC -->
  </xsl:otherwise>
</xsl:choose>
</xsl:for-each>
</xsl:when>
<xsl:otherwise>
  <!-- nothing is written. In ISO it's understood by default that
  it's a dataset. -->
  </xsl:otherwise>
</xsl:choose>

<!-- coverage:periodTime element conversion. -->

<xsl:for-each select="./rdf:Description/dc:coverage">

  <xsl:if test="./dcterms:Box/Box/northlimit or
./rdf:Description/dc:coverage/dcterms:Period/Period/start">
    <xsl:element name="extent">
      <xsl:if test="./dcterms:Period/Period/start">
        <xsl:element name="temporalElement">
          <xsl:element name="extent">
            <xsl:element name="beginEnd">
              <xsl:element name="begin">
                <xsl:value-of select="./dcterms:Period/Period/start"/>
              </xsl:element>
              <xsl:element name="end">
                <xsl:value-of select="./dcterms:Period/Period/end"/>
              </xsl:element>
            </xsl:element>
          </xsl:element>
        </xsl:element>
      </xsl:if>
    </xsl:if>

  <!-- coverage:coordinates element conversion. -->
  <xsl:if test="./dcterms:Box/Box/northlimit">
    <xsl:element name="iso19115:EX_GeographicBoundingBox">
      <xsl:element name="westBoundLongitude">
        <xsl:value-of select="./dcterms:Box/Box/westlimit"/>
      </xsl:element>
      <xsl:element name="eastBoundLongitude">
        <xsl:value-of select="./dcterms:Box/Box/eastlimit"/>
      </xsl:element>
      <xsl:element name="southBoundLatitude">
        <xsl:value-of select="./dcterms:Box/Box/southlimit"/>
      </xsl:element>
      <xsl:element name="northBoundLatitude">
        <xsl:value-of select="./dcterms:Box/Box/northlimit"/>
      </xsl:element>
    </xsl:element>
  </xsl:if>

  </xsl:element>
</xsl:if>
</xsl:for-each>

<!-- language element conversion. -->
<xsl:choose>
  <xsl:when test="./rdf:Description/dc:language">
    <xsl:for-each select="./rdf:Description/dc:language">
      <xsl:element name="language">
        <!-- Here begin a big dissertation about the correct position
        of the value: isoCode, isoName or otherLang. -->
      </xsl:element>
    </xsl:for-each>
  </xsl:when>
</xsl:choose>
```

```

    <xsl:variable name="lang">
      <xsl:value-of select="."/>
    </xsl:variable>
    <xsl:choose>
      <xsl:when test="string-length($lang) = 3">
        <!-- If the text has three letters, it's supposed to be an
        isoCode. -->
        <xsl:element name="isoCode">
          <xsl:value-of select="$lang"/>
        </xsl:element>
      </xsl:when>
      <xsl:otherwise>
        <!-- If not, it's putted in otherLang. -->
        <xsl:element name="otherLang">
          <xsl:value-of select="$lang"/>
        </xsl:element>
      </xsl:otherwise>
    </xsl:choose>
  </xsl:element>
</xsl:for-each>
</xsl:when>
<xsl:otherwise>
  <xsl:element name="language">
    <xsl:element name="isoCode">
      <xsl:text>eng</xsl:text>
    </xsl:element>
  </xsl:element>
</xsl:otherwise>
</xsl:choose>
</xsl:element> <!-- iso19115:_MD_Identification -->

<!-- source element conversion: -->
<!-- If there is no source in DC, nothing happens because it's optional -->
<!-- If it appears, a new dataQualityInfo.lineage.source is generated by -->
<!-- each occurrence. dataQualityInfo has, also, a compulsory attribute -->
<!-- that is, scope. This attribute will be automatically generated with-->
<!-- the value 'dataset'. -->

<xsl:if test="./rdf:Description/dc:source">
  <xsl:element name="dataQualityInfo">
    <xsl:element name="scope">
      <xsl:element name="level">
        <xsl:element name="MD_ScopeCode_CodeList">
          <xsl:text>dataset</xsl:text>
        </xsl:element>
      </xsl:element>
    </xsl:element>
    <xsl:element name="lineage">
      <xsl:for-each select="./rdf:Description/dc:source">
        <xsl:element name="source">
          <xsl:element name="description">
            <xsl:value-of select="."/>
          </xsl:element>
        </xsl:element>
      </xsl:for-each>
    </xsl:element>
  </xsl:element>
</xsl:if>

<!-- format element conversion (2): -->
<!-- If in DC doesn't appear, nothing happens because is optional. -->
<!-- If it appears N times, a new distributionInfo will be generated -->
<!-- for each dc:format. -->

<!-- Element identifier conversion (3) -->
<!-- If there are dc:identifiers that correspond with a file a element -->
<!-- a MD_DigitalTransferOptions is also generated -->

<xsl:if test="./rdf:Description/dc:format">
  <!-- DistributionInfo must appear only once -->
  <xsl:element name="distributionInfo">

    <xsl:for-each select="./rdf:Description/dc:format">

```

```

<xsl:variable name="pos">
  <xsl:value-of select="position()"/>
</xsl:variable>

<xsl:element name="distributionFormat">
  <xsl:choose>
    <xsl:when test="contains(normalize-space(.), '//')">
      <xsl:element name="name">
        <xsl:value-of select="substring-before(normalize-space(.), '//')"/>
      </xsl:element>
      <xsl:element name="version">
        <xsl:value-of select="substring-after(normalize-space(.), '//')"/>
      </xsl:element>
    </xsl:when>
    <xsl:otherwise>
      <xsl:element name="name">
        <xsl:value-of select="normalize-space(.)"/>
      </xsl:element>
      <xsl:element name="version">
        <xsl:text>Unknown</xsl:text>
      </xsl:element>
    </xsl:otherwise>
  </xsl:choose>
</xsl:element>

</xsl:for-each>
<xsl:for-each select="./rdf:Description/dc:identifier">
  <xsl:variable name="identifierVar">
    <!-- it's translated to lower case -->
    <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper,
    $xsltsl-str-lower)"/>
  </xsl:variable>
  <xsl:if test="contains($identifierVar, 'file')
    or contains($identifierVar, 'http')
    or contains($identifierVar, 'ftp')
    or contains($identifierVar, 'www')">
    <xsl:element name="transferOptions">
      <xsl:element name="onLine">
        <xsl:element name="linkage">
          <xsl:value-of select="."/>
        </xsl:element>
      </xsl:element>
    </xsl:element>
  </xsl:if>
</xsl:for-each>

</xsl:element>
</xsl:if>

<!-- type element conversion(3) (iso-comprehensive): -->
<!-- If there is no type in DC, nothing happens, it's optional. -->
<!-- If it appears more than one, a new hierarchyLevel will -->
<!-- be generated for each dc:type. -->
<!-- Also the values of DCMI Type Vocabulary are mapped into -->
<!-- hierarchyLevel. -->

<xsl:for-each select="./rdf:Description/dc:type">
  <xsl:variable name="typeVar3">
    <!-- it's translated to lower case -->
    <xsl:value-of select="translate(normalize-space(.),$xsltsl-str-upper, $xsltsl-
str-lower)"/>
  </xsl:variable>
  <xsl:choose>
    <xsl:when test="$typeVar3='attribute' or
      $typeVar3='attributetype' or
      $typeVar3='collectionhardware' or
      $typeVar3='collectionsession' or
      $typeVar3='dataset' or
      $typeVar3='series' or
      $typeVar3='nongeographicdataset' or
      $typeVar3='dimensiongroup' or
      $typeVar3='feature' or
      $typeVar3='featuretype' or
      $typeVar3='propertytype' or

```

```

        $typeVar3='fieldsession' or
        $typeVar3='software' or
        $typeVar3='service' or
        $typeVar3='model' or
        $typeVar3='tile'">
    <xsl:element name="hierarchyLevel">
        <xsl:element name="MD_ScopeCode_CodeList">
            <xsl:value-of select="normalize-space(.)"/>
        </xsl:element>
    </xsl:element>
</xsl:when>
<xsl:when test="$typeVar3='collection'">
    <xsl:element name="hierarchyLevel">
        <xsl:element name="MD_ScopeCode_CodeList">
            <xsl:text>series</xsl:text>
        </xsl:element>
    </xsl:element>
</xsl:when>
<xsl:when test="$typeVar3='dataset'">
    <xsl:element name="hierarchyLevel">
        <xsl:element name="MD_ScopeCode_CodeList">
            <xsl:text>dataset</xsl:text>
        </xsl:element>
    </xsl:element>
</xsl:when>
<!--xsl:when test="$typeVar3='event'">
    <xsl:element name="hierarchyLevel">
        <xsl:element name="MD_ScopeCode_CodeList">
            <xsl:text>collectionSession</xsl:text>
        </xsl:element>
    </xsl:element>
</xsl:when-->
<xsl:when test="$typeVar3='image'">
    <xsl:element name="hierarchyLevel">
        <xsl:element name="MD_ScopeCode_CodeList">
            <xsl:text>dataset</xsl:text>
        </xsl:element>
    </xsl:element>
</xsl:when>
<xsl:when test="$typeVar3='service'">
    <xsl:element name="hierarchyLevel">
        <xsl:element name="MD_ScopeCode_CodeList">
            <xsl:text>service</xsl:text>
        </xsl:element>
    </xsl:element>
</xsl:when>
<xsl:when test="$typeVar3='software'">
    <xsl:element name="hierarchyLevel">
        <xsl:element name="MD_ScopeCode_CodeList">
            <xsl:text>sotfware</xsl:text>
        </xsl:element>
    </xsl:element>
</xsl:when>
<xsl:otherwise>
    <!-- If the value doesn't correspond with one of the values of
         the list, it doesn't matter. hierarchyLevel is not compulsory -->
    </xsl:otherwise>
</xsl:choose>
</xsl:for-each>

<!-- Element publisher conversion: -->
<!-- If there is no publisher in DC: the element contact in ISO is -->
<!-- compulsory. A default value is needed. -->
<!-- If it appers once or more: a new contact with role -->
<!-- publisher is created for each apparition. -->
<!-- the text of the enter is written in organisationName. -->

<xsl:choose>
    <xsl:when test="./rdf:Description/dc:publisher">
        <xsl:for-each select="./rdf:Description/dc:publisher">
            <xsl:element name="contact">
                <xsl:element name="role">
                    <xsl:element name="CI_RoleCode_CodeList">
                        <xsl:text>publisher</xsl:text>
                    </xsl:element>
                </xsl:element>
            </xsl:element>
        </xsl:for-each>
    </xsl:when>
    <xsl:otherwise>
        <xsl:element name="contact">
            <xsl:element name="role">
                <xsl:element name="CI_RoleCode_CodeList">
                    <xsl:text>publisher</xsl:text>
                </xsl:element>
            </xsl:element>
        </xsl:element>
    </xsl:otherwise>
</xsl:choose>

```

```

        </xsl:element>
    </xsl:element>
    <xsl:element name="organisationName">
        <xsl:value-of select="./rdf:Description/dc:publisher"/>
    </xsl:element>
</xsl:element>
</xsl:for-each>
</xsl:when>
<xsl:otherwise>
    <xsl:element name="contact">
        <xsl:element name="role">
            <xsl:element name="CI_RoleCode_CodeList">
                <xsl:text>publisher</xsl:text>
            </xsl:element>
        </xsl:element>
        <xsl:element name="organisationName">
            <xsl:text>Default organisation</xsl:text>
        </xsl:element>
    </xsl:element>
</xsl:otherwise>
</xsl:choose>

<!-- Here, a final compulsory date is generated. The publication date -->
<!-- is used for that. -->

<xsl:element name="dateStamp">
    <xsl:choose>
        <xsl:when test="./rdf:Description/dc:date">
            <xsl:value-of select="./rdf:Description/dc:date"/>
        </xsl:when>
        <xsl:otherwise>
            <!-- If there is no date in the DC date, the same that with the
            publication date is done. -->
            <xsl:value-of select="$_date"/>
        </xsl:otherwise>
    </xsl:choose>
</xsl:element>

<!-- dataSetURI element. The first URI is used. -->

    <xsl:if test="count(./rdf:Description/dc:identifier[contains(.,'file') or
contains(., 'www') or contains(., 'http') or contains(., 'ftp')]) > 0">
        <xsl:element name="dataSetURI">
            <xsl:value-of select="./rdf:Description/dc:identifier[contains(.,'file') or
contains(., 'www') or contains(., 'http') or contains(., 'ftp')[1]"/>
        </xsl:element>
    </xsl:if>

</xsl:element> <!-- iso19115:MD_Metadata -->

</xsl:if> <!-- of: <xsl:if test="rdf:Description"-->
</xsl:template>

<xsl:template name="separatePlaceCoverage">
    <xsl:param name="cad"/>
    <xsl:choose>
        <xsl:when test="contains($cad, ',')">
            <xsl:element name="descriptiveKeywords">
                <xsl:element name="keyword">
                    <xsl:value-of select="substring-before($cad, ',')"/>
                </xsl:element>
                <xsl:element name="type">
                    <xsl:element name="MD_KeywordTypeCode_CodeList">
                        <xsl:text>place</xsl:text>
                    </xsl:element>
                </xsl:element>
            </xsl:element>

            <xsl:call-template name="separatePlaceCoverage">
                <xsl:with-param name="cad">
                    <xsl:value-of select="substring-after($cad, ',')"/>
                </xsl:with-param>
            </xsl:call-template>
        </xsl:when>

```



```

<xsl:otherwise>
  <xsl:element name="descriptiveKeywords">
    <xsl:element name="keyword">
      <xsl:value-of select="$cad"/>
    </xsl:element>
    <xsl:element name="type">
      <xsl:element name="MD_KeywordTypeCode_CodeList">
        <xsl:text>place</xsl:text>
      </xsl:element>
    </xsl:element>
  </xsl:element>
</xsl:otherwise>

</xsl:choose>
</xsl:template>

<xsl:template name="separateTemporalCoverage">
  <xsl:param name="cad"/>
  <xsl:choose>
    <xsl:when test="contains($cad, ',')">
      <xsl:element name="descriptiveKeywords">
        <xsl:element name="keyword">
          <xsl:value-of select="substring-before($cad, ',')"/>
        </xsl:element>
        <xsl:element name="type">
          <xsl:element name="MD_KeywordTypeCode_CodeList">
            <xsl:text>temporal</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:element>

      <xsl:call-template name="separateTemporalCoverage">
        <xsl:with-param name="cad">
          <xsl:value-of select="substring-after($cad, ',')" />
        </xsl:with-param>
      </xsl:call-template>
    </xsl:when>

    <xsl:otherwise>
      <xsl:element name="descriptiveKeywords">
        <xsl:element name="keyword">
          <xsl:value-of select="$cad"/>
        </xsl:element>
        <xsl:element name="type">
          <xsl:element name="MD_KeywordTypeCode_CodeList">
            <xsl:text>temporal</xsl:text>
          </xsl:element>
        </xsl:element>
      </xsl:element>
    </xsl:otherwise>

  </xsl:choose>
</xsl:template>

</xsl:stylesheet>

```

## Annex D. XML file examples

Annex D.1. presents ISO-XML metadata file that has been used as example of applying the stylesheets.

Annex D.2. presents the DC metadata file that is generated when de ISO-DC stylesheet is applied to the metadata file from Annex D.1.

Annex D.3. presents the ISO metadata file that is generated when de IDC-SO stylesheet is applied to the metadata file from Annex D.2.

two examples of XML files according with the ISO 19115 DTD and with the DC DTD –RDF.

### Annex D.1. ISO metadata file

```
<!-- edited with XMLSPY v5 rel. 3 U (http://www.xmlspy.com) by padme(444490) (starwars) -->
<iso19115:MD_Metadata uuid="US:NIMA:VPF:VMAP0" id="GM0001"
xmlns:iso19115="http://www.isotc211.org/iso19115/" xmlns:gml="http://www.opengis.net/gml"
xmlns:iso19103="http://www.isotc211.org/iso19103/"
xmlns:iso19109="http://www.isotc211.org/iso19109/"
xmlns:iso4217="http://www.isotc211.org/iso4217/" xmlns:iso639-
2="http://www.isotc211.org/iso639-2/" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.isotc211.org/iso19115/iso19115.xsd">
  <iso19115:_MD_Identification xsi:type="iso19115:MD_DataIdentificationType">
    <citation>
      <title>VMAPLV0</title>
      <date>
        <dateType>
          <CI_DateTypeCode_CodeList>publication</CI_DateTypeCode_CodeList>
        </dateType>
        <date>2000-09-03</date>
      </date>
      <presentationForm>
        <CI_PresentationFormCode_CodeList>mapDigital</CI_PresentationFormCode_CodeList>
      </presentationForm>
    </citation>
    <abstract>Vector Map: a general purpose database design to support GIS
applications</abstract>
    <status>
      <MD_ProgressCode_CodeList>completed</MD_ProgressCode_CodeList>
    </status>
    <pointOfContact>
      <contactInfo>
        <address>
          <deliveryPoint>4600 Sangamore Rd</deliveryPoint>
          <city>Bethesda</city>
          <administrativeArea>MD</administrativeArea>
          <postalCode>20816-5003</postalCode>
          <country>United States</country>
          <electronicMailAddress>ogcefeedback@nima.mil</electronicMailAddress>
        </address>
        <onlineResource>
          <function>
            <CI_OnLineFunctionCode_CodeList>download</CI_OnLineFunctionCode_CodeList>
          </function>
        </onlineResource>
      </contactInfo>
      <role>
        <CI_RoleCode_CodeList>originator</CI_RoleCode_CodeList>
      </role>
      <organisationName>National Imagery and Mapping Agency</organisationName>
      <positionName> Director, NIMA, ATTN:COD, MS P-37</positionName>
    </pointOfContact>
  </iso19115:_MD_Identification>
</iso19115:MD_Metadata>
```

```

<resourceFormat>
  <name>VPP</name>
  <version>9606</version>
  <specification>MIL-STD-2407</specification>
</resourceFormat>
<resourceFormat>
  <name>VMap 0</name>
  <version>Ammendment 1</version>
  <specification>MIL-V-89039</specification>
</resourceFormat>
<spatialRepresentationType>
  <MD_SpatialRepresentationTypeCode_CodeList>vector</MD_SpatialRepresentationTypeCode_C
odeList>
</spatialRepresentationType>
<spatialResolution>
  <equivalentScale>
    <denominator>1000000</denominator>
  </equivalentScale>
</spatialResolution>
<characterSet>
  <MD_CharacterSetCode_CodeList>ucs2</MD_CharacterSetCode_CodeList>
</characterSet>
<topicCategory>
  <MD_TopicCategoryCode_CodeList>boundaries</MD_TopicCategoryCode_CodeList>
</topicCategory>
<topicCategory>
  <MD_TopicCategoryCode_CodeList>elevation</MD_TopicCategoryCode_CodeList>
</topicCategory>
<topicCategory>
  <MD_TopicCategoryCode_CodeList>inlandWaters</MD_TopicCategoryCode_CodeList>
</topicCategory>
<topicCategory>
  <MD_TopicCategoryCode_CodeList>oceans</MD_TopicCategoryCode_CodeList>
</topicCategory>
<topicCategory>
  <MD_TopicCategoryCode_CodeList>society</MD_TopicCategoryCode_CodeList>
</topicCategory>
<topicCategory>
  <MD_TopicCategoryCode_CodeList>structure</MD_TopicCategoryCode_CodeList>
</topicCategory>
<topicCategory>
  <MD_TopicCategoryCode_CodeList>transportation</MD_TopicCategoryCode_CodeList>
</topicCategory>
<topicCategory>
  <MD_TopicCategoryCode_CodeList>utilitiesCommunication</MD_TopicCategoryCode_CodeList>
</topicCategory>
<extent>
  <iso19115:EX_GeographicBoundingBox>
    <extentTypeCode>true</extentTypeCode>
    <westBoundLongitude>-180.00</westBoundLongitude>
    <eastBoundLongitude>180.00</eastBoundLongitude>
    <southBoundLatitude>-90.00</southBoundLatitude>
    <northBoundLatitude>90.00</northBoundLatitude>
  </iso19115:EX_GeographicBoundingBox>
</extent>
<extent>
  <iso19115:EX_BoundingPolygon>
    <extentTypeCode>true</extentTypeCode>
    <polygon>
      <polyline>
        <gml:outerBoundaryIs>
          <gml:LinearRing>
            <gml:coordinates>-180.000000,90.000000 -180.000000,-90.000000
180.000000,-90.000000
180.000000,90.000000 -180.000000,90.000000</gml:coordinates>
          </gml:LinearRing>
        </gml:outerBoundaryIs>
      </polyline>
    </polygon>
  </iso19115:EX_BoundingPolygon>
  <description>Worldwide</description>
</extent>

```

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```
<language>
  <isoCode>eng</isoCode>
</language>
</iso19115:MD_Identification>
<metadataConstraints xsi:type="iso19115:MD_SecurityConstraintsType">
  <classification>
    <MD_ClassificationCode_CodeList>unclassified</MD_ClassificationCode_CodeList>
  </classification>
  <handlingDescription>RELEASABILITY - unrestricted</handlingDescription>
</metadataConstraints>
<dataQualityInfo>
  <scope>
    <level>
      <MD_ScopeCode_CodeList>dataset</MD_ScopeCode_CodeList>
    </level>
  </scope>
  <lineage>
    <source>
      <sourceExtent>
        <temporalElement>
          <extent>
            <beginEnd>
              <begin>1992-04-01T00:00:00-00:00</begin>
              <end>2000-02-23T00:00:00-00:00</end>
            </beginEnd>
          </extent>
        </temporalElement>
      </sourceExtent>
    </source>
    <statement>HISTORICAL BACKGROUND - While the fifth edition of NOAMER has
evolved from previous digital
version, the majority of the feature content is based on the National Imagery and Mapping
Agency's (NIMA) hardcopy Operational
Navigational Chart (ONC) series. The initial digital version of VMap0 was the Digital
Chart of the World and was NIMA's first Vector
Product Format (VPF) product. The DCW was released in 1992. With the on-going development
of the VPF Military Standard and the
advent of the VMap0 product specification, a new version of the database was needed. VMap
0 library, NOAMER, Edition 4 was
released in 1997.</statement>
  </lineage>
</dataQualityInfo>
<referenceSystemInfo>
  <referenceSystemIdentifier>
    <code>WGS 84</code>
    <codeSpace>World Geodetic System</codeSpace>
  </referenceSystemIdentifier>
</referenceSystemInfo>
<distributionInfo>
  <distributor>
    <distributorContact>
      <contactInfo>
        <address>
          <deliveryPoint>4600 Sangamore Rd</deliveryPoint>
          <city>Bethesda</city>
          <administrativeArea>MD</administrativeArea>
          <postalCode>20816-5003</postalCode>
          <country>United States</country>
          <electronicMailAddress>ogcefeedback@nima.mil</electronicMailAddress>
        </address>
      </contactInfo>
    <role>
      <CI_RoleCode_CodeList>distributor</CI_RoleCode_CodeList>
    </role>
    <organisationName>National Imagery and Mapping Agency</organisationName>
    <positionName> Director, NIMA, ATTN:COD, MS P-37</positionName>
  </distributorContact>
  <distributorFormat>
    <name>gzip</name>
    <version>1.2.4</version>
    <specification>GNU RFC 1952</specification>
  </distributorFormat>
  <distributorTransferOptions>
    <onLine>
```

```

    <function>
<CI_OnLineFunctionCode_CodeList>download</CI_OnLineFunctionCode_CodeList>
    </function>

<linkage>http://geoengine.nima.mil/ftplib/archive/vpf_data/v0noa.tar.gz</linkage>
    </onLine>
    <onLine>
        <function>

<CI_OnLineFunctionCode_CodeList>download</CI_OnLineFunctionCode_CodeList>
    </function>

<linkage>http://geoengine.nima.mil/ftplib/archive/vpf_data/v0eur.tar.gz</linkage>
    </onLine>
    <onLine>
        <function>

<CI_OnLineFunctionCode_CodeList>download</CI_OnLineFunctionCode_CodeList>
    </function>

<linkage>http://geoengine.nima.mil/ftplib/archive/vpf_data/v0sas.tar.gz</linkage>
    </onLine>
    <onLine>
        <function>

<CI_OnLineFunctionCode_CodeList>download</CI_OnLineFunctionCode_CodeList>
    </function>

<linkage>http://geoengine.nima.mil/ftplib/archive/vpf_data/v0soa.tar.gz</linkage>
    </onLine>
    </distributorTransferOptions>
</distributor>
<distributor>
    <distributorContact>
        <contactInfo>
            <address>
                <deliveryPoint>8000 Jefferson Davis Hwy</deliveryPoint>
                <city>Richmond</city>
                <administrativeArea>VA</administrativeArea>
                <postalCode>23297</postalCode>
                <country>United States</country>
            </address>
            <onlineResource>
                <function>

<CI_OnLineFunctionCode_CodeList>order</CI_OnLineFunctionCode_CodeList>
    </function>
    <linkage>http://www.dscr.dla.mil/pc9</linkage>
    </onlineResource>
</contactInfo>
<role>
    <CI_RoleCode_CodeList>distributor</CI_RoleCode_CodeList>
</role>
    <organisationName>Defense Supply Center Richmond (DLA)</organisationName>
</distributorContact>
<distributorFormat>
    <name>VPF</name>
    <version>9606</version>
    <specification>MIL-STD-2407</specification>
</distributorFormat>
<distributorTransferOptions>
    <offLine>
        <name>
            <MD_MediumNameCode_CodeList>cdRom</MD_MediumNameCode_CodeList>
        </name>
        <volumes>4</volumes>
        <mediumFormat>
            <MD_MediumFormatCode_CodeList>iso9660</MD_MediumFormatCode_CodeList>
        </mediumFormat>
    </offLine>
</distributorTransferOptions>
</distributor>
</distributionInfo>

```

## CWA 14856:2003 (E)

```
<hierarchyLevel>
  <MD_ScopeCode_CodeList>dataset</MD_ScopeCode_CodeList>
</hierarchyLevel>
<contact>
  <contactInfo>
    <address>
      <deliveryPoint>4600 Sangamore Rd</deliveryPoint>
      <city>Bethesda</city>
      <administrativeArea>MD</administrativeArea>
      <postalCode>20816-5003</postalCode>
      <country>United States</country>
      <electronicMailAddress>ogcefeedback@nima.mil</electronicMailAddress>
    </address>
    <onlineResource>
      <function>

<CI_OnLineFunctionCode_CodeList>download</CI_OnLineFunctionCode_CodeList>
      </function>
      <linkage>http://geoengine.nima.mil</linkage>
    </onlineResource>
    </contactInfo>
    <role>
      <CI_RoleCode_CodeList>publisher</CI_RoleCode_CodeList>
    </role>
  </contact>
  <dateStamp>2002-06-30</dateStamp>
  <metadataStandardName>ISO 19115 Geographic Information -
Metadata</metadataStandardName>
  <metadataStandardVersion>FDIS</metadataStandardVersion>
  <dataSet>http://geoengine.nima.mil/ftpdir/pioneer/v0*</dataSet>
</iso19115:MD_Metadata>
```

## Annex D.2. Generated DC metadata file

```

<?xml version = '1.0' encoding = 'ISO-8859-1'?>
<!DOCTYPE rdf:RDF SYSTEM "DCMES.dtd">
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#">
  <rdf:Description>
    <dc:title xmlns:dc="http://purl.org/dc/elements/1.1">VMAPLV0</dc:title>
    <dc:creator xmlns:dc="http://purl.org/dc/elements/1.1">National Imagery and Mapping
Agency</dc:creator>
    <dc:subject xmlns:dc="http://purl.org/dc/elements/1.1">boundaries</dc:subject>
    <dc:subject xmlns:dc="http://purl.org/dc/elements/1.1">elevation</dc:subject>
    <dc:subject xmlns:dc="http://purl.org/dc/elements/1.1">inlandWaters</dc:subject>
    <dc:subject xmlns:dc="http://purl.org/dc/elements/1.1">oceans</dc:subject>
    <dc:subject xmlns:dc="http://purl.org/dc/elements/1.1">society</dc:subject>
    <dc:subject xmlns:dc="http://purl.org/dc/elements/1.1">structure</dc:subject>
    <dc:subject xmlns:dc="http://purl.org/dc/elements/1.1">transportation</dc:subject>
    <dc:subject
xmlns:dc="http://purl.org/dc/elements/1.1">utilitiesCommunication</dc:subject>
    <dc:description xmlns:dc="http://purl.org/dc/elements/1.1">Vector Map: a general
purpose database design to support GIS applications</dc:description>
    <dc:publisher xmlns:dc="http://purl.org/dc/elements/1.1"/>
    <dc:date xmlns:dc="http://purl.org/dc/elements/1.1">2000-09-03</dc:date>
    <dc:date xmlns:dc="http://purl.org/dc/elements/1.1">2002-06-30</dc:date>
    <dc:type xmlns:dc="http://purl.org/dc/elements/1.1">dataset</dc:type>
    <dc:type xmlns:dc="http://purl.org/dc/elements/1.1">vector</dc:type>
    <dc:type xmlns:dc="http://purl.org/dc/elements/1.1">mapDigital</dc:type>
    <dc:format xmlns:dc="http://purl.org/dc/elements/1.1">VPF//9606</dc:format>
    <dc:format xmlns:dc="http://purl.org/dc/elements/1.1">VMap 0//Ammendment
1</dc:format>
    <dc:language xmlns:dc="http://purl.org/dc/elements/1.1">eng</dc:language>
    <dc:coverage xmlns:dc="http://purl.org/dc/elements/1.1">
      <dcterms:Box xmlns:dcterms="http://purl.org/dc/terms">
        <Box>
          <northlimit>90.00</northlimit>
          <eastlimit>180.00</eastlimit>
          <southlimit>-90.00</southlimit>
          <westlimit>-180.00</westlimit>
        </Box>
      </dcterms:Box>
    </dc:coverage>
  </rdf:Description>
</rdf:RDF>

```

## Annex D.3. Generated ISO metadata file

```

<?xml version="1.0" encoding="ISO-8859-1"?>
<!-- edited with XMLSPY v5 rel. 3 U (http://www.xmlspy.com) by padme(444490) (starwars) -
->
<iso19115:MD_Metadata xmlns:iso19115="http://www.isotc211.org/iso19115/"
xmlns:gml="http://www.opengis.net/gml" xmlns:iso19103="http://www.isotc211.org/iso19103/"
xmlns:iso19109="http://www.isotc211.org/iso19109/"
xmlns:iso4217="http://www.isotc211.org/iso4217/" xmlns:iso639-
2="http://www.isotc211.org/iso639-2/" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.isotc211.org/iso19115/iso19115.xsd">
  <iso19115:_MD_Identification xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:type="iso19115:MD_DataIdentificationType">
    <citation>
      <title>VMAPLV0</title>
      <date>
        <dateType>
          <CI_DateTypeCode_CodeList>publication</CI_DateTypeCode_CodeList>
        </dateType>
        <date>2000-09-03</date>
      </date>
      <date>
        <dateType>
          <CI_DateTypeCode_CodeList>publication</CI_DateTypeCode_CodeList>
        </dateType>
        <date>2002-06-30</date>
      </date>
      <citedResponsibleParty>
        <role>
          <CI_RoleCode_CodeList>originator</CI_RoleCode_CodeList>
        </role>
        <organisationName>National Imagery and Mapping Agency</organisationName>
      </citedResponsibleParty>
      <citedResponsibleParty>
        <role>
          <CI_RoleCode_CodeList>publisher</CI_RoleCode_CodeList>
        </role>
        <organisationName/>
      </citedResponsibleParty>
      <presentationForm>

<CI_PresentationFormCode_CodeList>mapDigital</CI_PresentationFormCode_CodeList>
    </presentationForm>
    </citation>
    <abstract>Vector Map: a general purpose database design to support GIS
applications</abstract>
    <pointOfContact>
      <role>
        <CI_RoleCode_CodeList>originator</CI_RoleCode_CodeList>
      </role>
      <organisationName>National Imagery and Mapping Agency</organisationName>
    </pointOfContact>
    <pointOfContact>
      <role>
        <CI_RoleCode_CodeList>publisher</CI_RoleCode_CodeList>
      </role>
      <organisationName/>
    </pointOfContact>
    <resourceFormat>
      <name>VPF</name>
      <version>9606</version>
    </resourceFormat>
    <resourceFormat>
      <name>VMap 0</name>
      <version>Ammendment 1</version>
    </resourceFormat>
    <spatialRepresentationType>

<MD_SpatialRepresentationTypeCode_CodeList>vector</MD_SpatialRepresentationTypeCode_CodeL
ist>
    </spatialRepresentationType>
    <topicCategory>

```



```

    <MD_TopicCategoryCode_CodeList>boundaries</MD_TopicCategoryCode_CodeList>
  </topicCategory>
</topicCategory>
  <MD_TopicCategoryCode_CodeList>elevation</MD_TopicCategoryCode_CodeList>
</topicCategory>
</topicCategory>
  <MD_TopicCategoryCode_CodeList>inlandWaters</MD_TopicCategoryCode_CodeList>
</topicCategory>
</topicCategory>
  <MD_TopicCategoryCode_CodeList>oceans</MD_TopicCategoryCode_CodeList>
</topicCategory>
</topicCategory>
  <MD_TopicCategoryCode_CodeList>society</MD_TopicCategoryCode_CodeList>
</topicCategory>
</topicCategory>
  <MD_TopicCategoryCode_CodeList>structure</MD_TopicCategoryCode_CodeList>
</topicCategory>
</topicCategory>
  <MD_TopicCategoryCode_CodeList>transportation</MD_TopicCategoryCode_CodeList>
</topicCategory>
</topicCategory>
<MD_TopicCategoryCode_CodeList>utilitiesCommunication</MD_TopicCategoryCode_CodeList>
</topicCategory>
<extent>
  <iso19115:EX_GeographicBoundingBox>
    <westBoundLongitude>-180.00</westBoundLongitude>
    <eastBoundLongitude>180.00</eastBoundLongitude>
    <southBoundLatitude>-90.00</southBoundLatitude>
    <northBoundLatitude>90.00</northBoundLatitude>
  </iso19115:EX_GeographicBoundingBox>
</extent>
<language>
  <isoCode>eng</isoCode>
</language>
</iso19115:_MD_Identification>
<distributionInfo>
  <distributionFormat>
    <name>VPF</name>
    <version>9606</version>
  </distributionFormat>
  <distributionFormat>
    <name>VMap 0</name>
    <version>Ammendment 1</version>
  </distributionFormat>
</distributionInfo>
<hierarchyLevel>
  <MD_ScopeCode_CodeList>dataset</MD_ScopeCode_CodeList>
</hierarchyLevel>
<contact>
  <role>
    <CI_RoleCode_CodeList>publisher</CI_RoleCode_CodeList>
  </role>
  <organisationName/>
</contact>
<dateStamp>2000-09-03</dateStamp>
<dataSet/>
</iso19115:MD_Metadata>

```

## Annex E. Bibliography

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