

XML DATA ENCODING SPECIFICATION FOR INFORMATION RESOURCE METADATA VERSION 2

ICTechSpec 500.D.5-V2

An Intelligence Community Technical Specification
Prepared by the
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Table of Contents

Table of Contents	1
List of Figures	2
List of Tables	2
Chapter 1 – Introduction	3
1.1 Purpose	3
1.2 Needs and Requirements	3
1.3 Audience and Applicability	3
1.4 Utility	4
1.5 Version Information	4
1.6 Components of this DES	4
1.7 Normative and Informative Components	5
1.8 Technical Encoding Dependencies	5
1.9 Typographic conventions	5
Chapter 2 – Development Guidance	6
2.1 Mapping of Abstract Data Elements to Physical XML Elements	6
2.2 Additional guidance	11
2.2.1 <i>DescribedItemIRM & MetaCardIRM</i>	11
2.2.2 <i>DocumentID</i>	12
2.2.3 <i>ISM Attribute usage</i>	12
2.2.4 <i>Specification of publishing organization</i>	12
Chapter 3 – XML Schema Guide	15
Chapter 4 – Constraint Rules	16
4.1 Basics	16
4.1.1 <i>Classified or Controlled Constraint Rules</i>	16
4.1.2 <i>Terminology</i>	16
4.1.3 <i>Rule Identifiers</i>	17
4.1.4 <i>Errors and Warnings</i>	17
4.2 Global Constraints	17
4.3 DES Constraints	18
4.4 Value Enumeration Constraints	18
4.5 General Constraints	19
4.6 Information Security Markings (ISM.XML)	21
Appendix A IC CIO Approval Memo	22
Appendix B Acronyms	23
Appendix C Glossary	25
Appendix D Bibliography	26
Appendix E Points of Contact	28
Appendix F Change History	29
Appendix G Configuration Management	30
Appendix H Reading the Schematics	31

H.1	Element Models	31
H.2	Groupings of Elements	32
H.3	Occurrence indicators.....	33
H.4	Order of Elements.....	34
H.5	Attributes	35
Appendix I	Controlled Vocabulary Enumerations	36

List of Figures

Figure 1.	Symbol for an XML Element having Element Content.....	31
Figure 2.	Symbol of an Element with Mixed Content.....	32
Figure 3.	Symbol of an Empty Element	32
Figure 4.	Element Group Symbol	33
Figure 5.	Optional elements, one repeatable, graphical representation	33
Figure 6.	Optional and repeatable element, graphical representation.....	34
Figure 7.	Required and repeatable element, graphical representation.....	34
Figure 8.	Sequence Symbol	34
Figure 9.	Choice Symbol.....	35
Figure 10.	Sequence and Choice Combined	35

List of Tables

Table 1.	DES change summary	4
Table 2.	Mapping of Abstract Data Elements to Physical XML Elements	7

Chapter 1 – Introduction

1.1 Purpose

This *XML Data Encoding Specification for Information Resource Metadata* (IRM.XML) defines detailed specifications for using Extensible Markup Language (XML) to encode information resource metadata in compliance with the *Intelligence Community (IC) Abstract Data Definition*. This Data Encoding Specification (DES) defines the XML elements and attributes, associated structures and relationships, mandatory and cardinality requirements, and permissible values for representing security marking concepts using XML.

This DES uses the Department of Defense Discovery Metadata Specification (DDMS) as a base and builds on that base by specifying additional metadata needed to describe information resources in the IC. In some cases, this DES specifies additional constraints on the data.

1.2 Needs and Requirements

Information sharing within the national intelligence enterprise will increasingly rely on information resource metadata to allow users and systems to find and access a wide-range of information resources throughout the enterprise. Information resource visibility, accessibility, and understandability are all critical to providing these capabilities. A successful information sharing enterprise depends on the ability of users and systems to locate and access information resources through a consistent and flexible search, or discovery capability. An enterprise-wide discovery capability will be greatly enhanced by the consistent “digital” description of all information resources. A common specification for the description of information resources allows for a comprehensive capability that can locate all resources across the enterprise regardless of format, type, location, or classification.

1.3 Audience and Applicability

DESS are intended primarily to be used by those developing tools and services to create, modify, store, exchange, search, display, or further process the type of data being described. The applicability and conditions for when the DES should be used will be found in the Intelligence Community Enterprise Standards Baseline and referenced in IC policy guidance.

1.4 Utility

A DES specifies how to implement the abstract concepts defined in the IC Abstract Data Definition Set (ADD) in a particular physical form (e.g., data or file format). For example:

- DESs for textual markup formats, such as XML and HyperText Markup Language (HTML), define markup elements and attributes, their relationships, cardinalities, processing requirements, and use.
- DESs for display formats, such as text and Adobe Portable Document Format (PDF), define text and typographic conventions, cardinalities, processing requirements, and use.
- DESs for application-specific formats, such as Microsoft Word, define document properties, styles, fields, cardinalities, processing requirements, and use.

1.5 Version Information

This is **Version 2** of this DES. This version number must be specified in any instance document intended to be valid against this version using the attribute **DESVersion**. A separate **DESVersion** attribute should be specified for each DES an instance document is claiming compliance with; each of these attributes should be in the namespace specified by each DES.

The following table lists the major changes made to this DES.

Table 1. DES change summary

Change	Artifacts changed	Compatibility Notes
Added all constructs other than ddms:Resource	All	Prior data will need to have the constructs other than ddms:Resource and will have to map ddms:Resource to irm:ICResourceMetadataPackage

1.6 Components of this DES

This document is the primary documentary component of the DES. This document contains:

- **Chapter 1 – Introduction.** The introduction describes high-level background information for this document. It defines the purpose and scope of this document.

- **Chapter 2 – Development Guidance.** This chapter covers two primary topics:
 - 1) Mappings of the XML element and attributes defined within this DES to appropriate IC.ADD data elements
 - 2) Descriptions of how particular encoding situations should be handled using the features provided by this DES.
- **Chapter 3 – XML Schema Guide.** Highlights the availability of an interactive presentation of the IRM.XML schema as well as an implementation-specific data element dictionary.
- **Chapter 4 – Data Validation Constraint Rules.** The constraint rules in this chapter define data validation constraints for IRM.XML beyond those in the XML Schema.

This DES consists of a number of additional technical components to include: the interactive *XML Schema Guide* referenced in Chapter 3, XML schema files, and Controlled Vocabulary Enumerations (CVE) files.

1.7 Normative and Informative Components

The XML schemas, CVE values from the XML CVE files, and the Chapter 4 constraint rules are normative for this DES. The rest of this document, the descriptive content referenced within the XML Schema Guide, and HTML CVE value files are informative.

1.8 Technical Encoding Dependencies

This DES relies on the XML Data Encoding Specifications for Information Security Marking (ISM.XML) and Need-To- Know (NTK.XML). Value enumerations used for several XML structures are defined in the various CVE's included in this DES.

1.9 Typographic conventions

Certain typography is used throughout the body of this document to convey certain meanings, in particular:

- *Italics* – A title of a referenced work or a specialized or emphasized term.
- Underscore – An abstract data element.
- **Bold** – An XML element or attribute.

Chapter 2 – Development Guidance

This chapter covers two primary topics:

- 1) Mappings of the XML element and attributes defined within this DES to appropriate IC.ADD data elements
- 2) Descriptions of how particular encoding situations should be handled using the features provided by this DES

2.1 Mapping of Abstract Data Elements to Physical XML Elements

The mapping of abstract data elements from the IC.ADD to the corresponding physical XML structures defined by this DES is shown in the following tables, which reflect the groupings in the IC.ADD. These mappings are provided for reference only. The complete set of DES artifacts, both normative and informative, should be consulted.

This mapping and additional mappings in other DESs provide a starting point for the development of automated transformations between formats defined by the DESs. However, it should be noted that when these transformations are used between formats with different levels of detail, there might be some data loss.

Note: DescribedItemIRM nodes pertain to the described resource (e.g. `irm:ICResourceMetadataPackage/irm:DescribedItemIRM/ddms:Resource/ddms:creator` is the creator of the document). The XPath paths listed under **DescribedItemIRM nodes** are relative to `irm:ICResourceMetadataPackage/irm:DescribedItemIRM`.

MetaCardIRM nodes pertain to the metacard, rather than the described resource (e.g. `irm:ICResourceMetadataPackage/irm:MetaCardIRM/irm:CreatorPublishList/ddms:creator` refers to the creator of the metacard, not necessarily the creator of the document). The XPath paths listed under **MetaCardIRM nodes** are relative to `irm:ICResourceMetadataPackage/irm:MetaCardIRM`. See section 2.2.1 for a further discussion of these concepts.

Table 2. Mapping of Abstract Data Elements to Physical XML Elements

Abstract Data Element	Definition	XPath and XML implementation notes
Contributor	An entity responsible for making contributions to the resource. Examples of Contributor include a person, an organization, or a service. Typically, the name of a Contributor should be used to indicate the entity.	DescribedItemIRM nodes ./ddms:Resource/ddms:contributor MetaCardIRM nodes ./irm:CreatorPublishList/ddms:contributor
Coverage	The spatial, temporal [or virtual] topic of the resource, the spatial [or virtual] applicability of the resource, or the jurisdiction under which the resource is relevant. Spatial topic may be a named place or a location specified by its geographic coordinates. Temporal period may be a named period, date, or date range. Virtual topic may be a named place or a location specified using a network or email address. A jurisdiction may be a named administrative entity or a geographic place to which the resource applies. Recommended best practice is to use a controlled vocabulary such as the Thesaurus of Geographic Names (TGN) or the NGA Geographic Names Server (GNS) as sanctioned by the United States Board on Geographic Names. Where appropriate, named places or time periods can be used in preference to numeric identifiers such as sets of coordinates or date ranges.	DescribedItemIRM nodes ./ddms:Resource/ddms:geospatialCoverage ./ddms:Resource/ddms:temporalCoverage ./ddms:Resource/ddms:virtualCoverage MetaCardIRM nodes Not applicable
Creator	An entity primarily responsible for making the resource. Examples of Creator include a person, an organization, or a service. Typically, the name of a creator should be used to indicate the entity.	DescribedItemIRM nodes ./ddms:Resource/ddms:creator MetaCardIRM nodes ./irm:CreatorPublishList/ddms:creator

Abstract Data Element	Definition	XPath and XML implementation notes
Date	A point or period of time associated with an event in the lifecycle of the resource. Date may be used to express temporal information at any level of granularity. Recommended best practice is to use an encoding scheme, such as the W3CDTF profile of ISO 8601. Typically, date will be associated with the creation or availability of the resource.	<p>DescribedItemIRM nodes</p> <p>./ddms:Resource/ddms:dates/@ddms:created ./ddms:Resource/ddms:dates/@ddms:infoCutOff ./ddms:Resource/ddms:dates/@ddms:posted ./ddms:Resource/ddms:dates/@ddms:validTil ./irm:Dates/@irm:dateApproved</p> <p>MetaCardIRM nodes</p> <p>./irm:Dates/@irm:dateApproved ./ddms:dates/@ddms:created ./ddms:dates/@ddms:infoCutOff ./ddms:dates/@ddms:posted ./ddms:dates/@ddms:validTil</p>
Description	An account of the resource. Description may include but is not limited to: an abstract, a table of contents, a graphical representation, or a free-text account of the resource.	<p>DescribedItemIRM nodes</p> <p>./ddms:Resource/ddms:description ./TaskingInfo ./Activity ./NoticeList ./ProductionMetricsList</p> <p>MetaCardIRM nodes</p> <p>./ddms:description ./irm:NoticeList</p>
Format	The file format, physical medium, or dimensions of the resource. Examples of dimensions include size and duration. Recommended best practice is to use a controlled vocabulary such as the list of Internet Media Types (MIME). Format may be used to identify the software, hardware, or other equipment needed to display or operate the resource.	<p>DescribedItemIRM nodes</p> <p>./ddms:Resource/ddms:format ./irm:ApplicationSoftware</p> <p>MetaCardIRM nodes</p> <p>./irm:ApplicationSoftware</p>
Identifier	An unambiguous reference to the resource within a given context. Recommended best practice is to identify the resource by means of a string conforming to a formal identification system. Formal identification systems include but are not limited to the Uniform Resource Identifier (URI) (including the Uniform Resource Locator (URL)), the Digital Object Identifier (DOI), and the International Standard Book Number (ISBN).	<p>DescribedItemIRM nodes</p> <p>./ddms:Resource/ddms:identifier</p> <p>MetaCardIRM nodes</p> <p>./irm:IdentifierList/ddms:identifier</p>

Abstract Data Element	Definition	XPath and XML implementation notes
Language	A language of the resource. Recommended best practice is to use a controlled vocabulary such as RFC 3066, <i>Tags for the Identification of Languages</i> , which specifies use of ISO 639-2, <i>Codes for the Representation of Names of Languages</i> , three character language code, with an optional appended ISO 3166-1, <i>Codes for the representation of names of countries and their subdivisions</i> , two character country code. For example: "eng-US" or "eng-UK."	DescribedItemIRM nodes ./ddms:Resource/ddms:language MetaCardIRM nodes Not applicable
Publisher	An entity responsible for making the resource available. Examples of a Publisher include a person, an organization, or a service. Typically, the name of a Publisher should be used to indicate the entity.	DescribedItemIRM nodes ./ddms:Resource/ddms:publisher ./irm:PublishingAgency MetaCardIRM nodes ./irm:CreatorPublishList/ddms:publisher ./irm:PublishingAgency
Relation	A related resource. Recommended best practice is to identify the referenced resource by means of a label or number conforming to a formal identification system.	DescribedItemIRM nodes ./ddms:Resource/ddms:relatedResources MetaCardIRM nodes Not Applicable
Rights	Information about rights held in and over the resource. Typically, rights will contain a rights management statement for the resource, or reference a service providing such information. Rights information often encompasses Intellectual Property Rights (IPR), Copyright, and various Property Rights. If the rights element is absent, no assumptions may be made about any rights held in or over the resource.	DescribedItemIRM nodes ./ddms:Resource/ddms:rights MetaCardIRM nodes Not Applicable

Abstract Data Element	Definition	XPath and XML implementation notes
Resource Security Mark	<p>The overall security classification and security handling instructions carried by the resource.</p> <p>Resource Security Mark applies to the resource-level classification, SCI controls, dissemination controls, non-IC markings, and other security provisions prescribed by Executive Order 13526, as amended, the Information Security Oversight Office (ISOO) Directive 1 of the National Archives and Records Administration, and the Intelligence Community marking standard maintained by the Controlled Access Program Coordination Office (CAPCO). These values are prominently presented, in the case of intelligence publications, at the top and bottom of every page and in other specified locations. See the <i>Intelligence Community Standard for Information Security Marking Metadata</i> for refinements of this conceptual element.</p>	<p>irm:ICResourceMetadataPackage/@ism:*/ntk:Access</p> <p>DescribedItemIRM nodes Not applicable</p> <p>MetaCardIRM nodes ./irm:NoticeList</p>
Source	<p>The resource from which the described resource is derived.</p> <p>The described resource may be derived from the related resource in whole or in part. Recommended best practice is to identify the related resource by means of a string conforming to a formal identification system.</p>	<p>DescribedItemIRM nodes ./ddms:Resource/ddms:source</p> <p>MetaCardIRM nodes Not applicable</p>
Subject	<p>A topic of the resource.</p> <p>Typically, the topic will be represented using keywords, key phrases, or classification codes. Recommended best practice is to use a controlled vocabulary. To describe the spatial, temporal or virtual topic of the resource, use the Coverage element.</p>	<p>DescribedItemIRM nodes ./ddms:Resource/ddms:subjectCoverage ./ddms:Resource/ddms:subjectCoverage/ddms:Subject/ddms:keyword ./irm:ProductionMetricsList/irm:ProductionMetric</p> <p>MetaCardIRM nodes Not applicable</p>
Title	<p>A name given to the resource.</p> <p>Typically, a Title will be a name by which the resource is formally known.</p>	<p>DescribedItemIRM nodes ./ddms:Resource/ddms:title ./ddms:Resource /ddms:subtitle</p> <p>MetaCardIRM nodes Not applicable</p>

Abstract Data Element	Definition	XPath and XML implementation notes
Type	The nature or genre of the content of the resource. The Type includes terms describing general categories, functions, genres, or aggregation levels for content. Examples of Types include publication forms (e.g., reports or articles) and intelligence disciplines (e.g., SIGINT, MASINT, HUMINT). Recommended best practice is to use a controlled vocabulary. To describe the file format, physical medium, or dimensions of the resource, use the Format element.	DescribedItemIRM nodes ./ddms:Resource/ddms:type ./IntelType ./ProductLine MetaCardIRM nodes Not applicable
Records Management Information (Provisional)	Required information primarily supporting federal record keeping requirements.	DescribedItemIRM nodes irm:VitalRecordIndicator irm:RecordKeeper MetaCardIRM nodes irm:VitalRecordIndicator irm:RecordKeeper

2.2 Additional guidance

This section provides additional guidance for encoding data in specific situations. The content of this section will evolve over time as additional situations are identified. Implementers of this DES are encouraged to contact the maintainers of this DES for further guidance when necessary.

2.2.1 DescribedItemIRM & MetaCardIRM

MetaCardIRM and **DescribedItemIRM** are two major components of a single IRM document and are not intended to be used as stand-alone documents. Each of them describes part of the IRM as a whole. From a Library Card analogy, the **ICResourceMetadataPackage** is the entirety of the "Library Card", the **DescribedItemIRM** contains information about the "book" while the **MetaCardIRM** contains information about the "Library Card"

There may be instances in which the author of the book documented in **DescribedItemIRM** and the author of the Library Card documented in **MetaCardIRM** are the same. In those cases the metadata may seem redundant. In the case where they are different, it becomes clear that an organization may create a

book documented in **DescribedItemIRM** while an entirely different agency may create the Library Card documented in **MetaCardIRM**.

MetaCardIRM has an **IdentifierList** easily confused with the **DescribedItemIRM/ddms:Resource /ddms:identifier**. These are similar constructs but for different purposes. Using the Library Card analogy again **ddms:identifier** inside **DescribedItemIRM** identifies the "book" maybe an International Standard Book Number (ISBN) number while the **IdentifierList** inside the **MetaCardIRM** identifies the "Library Card" with a unique identifier for the card. Since the **ICResourceMetadataPackage** may be in and of itself a classified document it needs its own identification for tracking, revision-recall, and auditing purposes.

2.2.2 DocumentID

For the purposes of the IC there needs to be a single document identifier that all documents will have. This document ID is denoted using the DDMS constructs by having a qualifier of "IC-ID" placed on a **ddms:identifier** element.

2.2.3 ISM Attribute usage

Both IRM and DDMS have adopted the recommended usage of the ISM resource attribute group being used on the root node of their schemas. Because of this decision, both the ISM attributes on the root node of IRM and those on the **ddms:resource** represent the classification attributes for all of their child elements that do not have **ism:excludeFromRollup='true'**. The only element in IRM that has the **excludeFromRollup='true'** is the Security element in DDMS. This is because the security element represents the classification information about the described item and not the classification of any content in the IRM.

2.2.4 Specification of publishing organization

The elements **ddms:publisher** and **irm:PublishingAgency** are used to identify the entity(ies) primarily responsible for releasing the information to the enterprise. The entity(ies) of interest in this context are foremost the organization responsible for the actual distribution of the data. The organizations and/or individuals responsible for creating the information are captured within the **ddms:creator** and **ddms:contributor** structures. The publishing organization's approved identifier value is captured in an element called **irm:PublishingAgency**. Further decomposition of the **irm:PublishingAgency** is captured in the **irm:SubAgency** element. Depending on

the enterprise requirement being addressed, a complete understanding of the Publisher requires evaluating the **irm:PublishingAgency/@irm:acronym** and **irm:SubAgency** value as well as the values found in the **ddms:affiliation** of the **ddms:publisher**, **ddms:creator** and **ddms:contributor** elements.

The **ddms:publisher** structure provides the ability to identify multiple levels of organizational structure and multiple organizations or individuals responsible for creating the information. The most basic ability to identify is captured with the required element **irm:PublishingAgency** using the attribute **acronym**. The controlled vocabulary enumeration (CVE) for **irm:acronym** includes values representing the organizations officially designated as part of the IC as defined in the DNI's *Overview of the United States Intelligence Community for the 111th Congress* of 2009, plus the DNI, plus additional entries intended to recognize non-IC publishers whose information is commonly used in support of the intelligence mission. One of these values must be selected.

In many cases, the AgencyAcronym CVE only includes the highest level of the organization structure (e.g., DNI), service or agency (e.g., US Army, DHS, DoS), or non-IC designation (e.g., OtherDoD, Foreign). In order to identify a Publisher at a level below what the AgencyAcronym CVE allows, use the **irm:SubAgency** element of the **irm:PublishingAgency**.

For consistency, populate **irm:SubAgency** with an approved organization acronym designator for the sub-organization. For multiple levels of sub-organization, list the acronyms in descending order delimited with the "/" character.

In cases where non-IC information (e.g., OtherDoD, OtherUSG, SLT, Foreign) is shared with the intelligence enterprise, the **irm:PublishingAgency/irm:acronym** should reflect the organization, which last prepared the information for consumption (e.g., converted the content into PUBS.XML, applied enhanced information resource metadata tagging, translated, or packaged the information into an official IC product) and shared the product with the enterprise. As that organization is affecting the record status of the product, it must take responsibility for addressing any questions about the information.

If a non-IC producer is providing information that is already compliant with IC enterprise data encoding standards, then the **irm:PublishingAgency/irm:acronym** should reflect the appropriate non-IC organization designator and the non-IC organizations office in the **irm:SubAgency** element. Examples of this scenario might exist in a USG department where there are sub-organizations designated in the IC and sub-organizations not in the IC; DoD where some sub-organizations support DIA, some support a service, and some are not in the IC; State, Local, Tribal organizations with information that flows into the intelligence enterprise via DHS, NCTC, or other means;

or with our foreign partners. In the case of foreign partners designations in the **irm:SubAgency**, precede the office acronym with the country code tri-graph in order to ensure uniqueness.

Examples

For NCTC:

```
<irm:PublishingAgency irm:acronym="DNI">  
<irm:SubAgency>NCTC</irm:SubAgency></irm:PublishingAgency>
```

For the XYZ component of NCTC:

```
<irm:PublishingAgency irm:acronym="DNI">  
<irm:SubAgency>NCTC/XYZ</irm:SubAgency></irm:PublishingAgency>
```

For the XYZ component of CIA:

```
<irm:PublishingAgencyirm:acronym="CIA">  
<irm:SubAgency>XYZ</irm:SubAgency></irm:PublishingAgency>
```

For the United State Postal Service:

```
<irm:PublishingAgency irm:acronym="OtherUSG">  
<irm:SubAgency>USPS</irm:SubAgency></irm:PublishingAgency>
```

For the JIOC at PACOM:

```
<irm:PublishingAgency irm:acronym="DIA">  
<irm:SubAgency>PACOM/JIOC</irm:SubAgency></irm:PublishingAgency>
```

For the J4 at PACOM:

```
<irm:PublishingAgency irm:acronym="OtherDoD">  
<irm:SubAgency>PACOM/J4</irm:SubAgency></irm:PublishingAgency>
```


Chapter 3 – XML Schema Guide

The detailed description and reference documentation for the IRM.XML schema can be found in a separate document entitled *IRM.XML Schema Guide*. This guide serves as an interactive presentation of the IRM.XML schema as well as a data element dictionary.

The guide was generated with a commercially available product named *XML Spy®*, produced by Altova. The physical XML structures illustrated in the guide are described in **Appendix H**.

The guide provides an interactive index to:

- Global Elements and Attributes
- Local Elements and Attributes
- Simple and Complex Types
- Groups and Attribute Groups
- Referenced Schemas

Where applicable, the guide provides:

- Diagram
- Namespace
- Type
- Children
- Used by
- Properties
- Patterns
- Enumerations
- Attributes
- Annotations
- Source Code

The guide is published in a folder consisting of a master HTML file with supporting graphics.

Chapter 4 – Constraint Rules

Constraint rules explicitly define the validation constraints for IRM.XML. They provide additional restrictions (i.e., constraints) on how the data should be structured and encoded, especially for criteria that exceed the constraints implemented in the XML Schema. These rules are written in plain English phrases; however, knowledge of the IRM.XML schemas is required to understand the rules. These constraint rules will eventually be offered in a more declarative form, such as Schematron. Complex constraint rules may be followed by text labeled **Human Readable**. This text is intended to inform the intent of the more formal language above it. Implementers are intended to implement the formal language, and should there be a perception of conflict, bring it to the attention of the appropriate configuration control body to be resolved.

4.1 Basics

The IRM.XML schema defines the data elements, attributes, cardinalities and parent-child relationships for which XML instances must comply. Validation of these syntax aspects is an important first step in the validation process. An additional level of validation is needed to ensure that the content complies with the constraints as specified in applicable IC policy guidance and codified in these constraint rules. Traditional schema languages are generally unable to effectively represent these additional constraints.

4.1.1 Classified or Controlled Constraint Rules

Additional rules that are either classified or have handling controls can be found in separate annexes closely associated with the DES artifacts wherever they are located.

4.1.2 Terminology

For the purposes of this document, the following statements apply:

- The term “is specified” indicates that an attribute is applied to an element and the attribute has a non-null value.
- The term “must be specified” indicates that an attribute must be applied to an element and the attribute must have a non-null value.

- The term “is not specified” indicates that an attribute is not applied to an element, or an attribute is applied to an element and the attribute has a null value.
- The term “must not be specified” indicates that an attribute must not be applied to an element.

4.1.3 Rule Identifiers

Each constraint rule has an assigned rule ID, indicated in brackets preceding the constraint rule description. The rule IDs from 00001 to 10000 are unclassified and 10001 to 20000 are “for official use only” (FOUO). IDs from 20001 to 30000 are reserved for “Secret” rules and 30001 and above for more classified rules.

As the constraint rules are managed over time, ID’s from deleted rules will not be reused.

4.1.4 Errors and Warnings

The severity of a constraint rule violation is categorized as either an “Error” or a “Warning.” An “Error” is naturally more severe and is indicative of a clear violation of an IRM.XML constraint rule, which would be likely to have a significant impact on the quality of a document. A “Warning” is less severe although noteworthy, and may not necessarily have any impact on the quality of a document. The severity of a constraint rule violation is indicated in brackets preceding each constraint rule description

Each system responsible for processing a document (e.g., create, modify, transform, or exchange) must make a mission-appropriate decision about using a document with errors or warnings based on mission needs.

4.2 Global Constraints

[IRM-ID-00002][Error] For every optional attribute that is used in a document, a non-null value must be present.

Human Readable: In other words, the attribute “is specified” as defined in **Section 4.1.2.**

4.3 DES Constraints

The DES version is specified through attributes on the root element. The Schema constrains the values of these attributes. The DES version enables systems processing an instance document to be certain which set of schema, CVE's and business rules are intended by the author to be used for any particular instance document.

4.4 Value Enumeration Constraints

[IRM-ID-00001][Error] If element **ddms:countryCode** has attribute **ddms:qualifier** specified as "urn:us:gov:ic:cenum:irm:coverage:fips:digraph:v1" then the value of attribute **ddms:value** must be in CEnumIRMCoverageFIPSDigraph.xml.

Human Readable: FIPS CountryCodes must be in the FIPS CVE

[IRM-ID-00002][Error] If element **ddms:countryCode** has attribute **ddms:qualifier** specified as "urn:us:gov:ic:cenum:irm:coverage:iso3166:digraph:v1" then the value of attribute **ddms:value** must be in CEnumIRMCoverageISO3166Digraph.xml.

Human Readable: ISO digraph CountryCodes must be in the ISO digraph CVE

[IRM-ID-00003][Error] If element **ddms:countryCode** has attribute **ddms:qualifier** specified as "urn:us:gov:ic:cenum:irm:coverage:iso3166:trigraph:v1" then the value of attribute **ddms:value** must be in CEnumIRMCoverageISO3166Trigraph.xml.

Human Readable: ISO trigraph CountryCodes must be in the ISO trigraph CVE

[IRM-ID-00004][Error] If element **ddms:countryCode** has attribute **ddms:qualifier** specified as "urn:us:gov:ic:cenum:irm:coverage:iso3166:numeric:v1" then the value of attribute **ddms:value** must be in CEnumIRMCoverageISO3166Numeric.xml.

Human Readable: ISO numeric CountryCodes must be in the ISO numeric CVE

[IRM-ID-00005][Error] If element **ddms:language** has the attribute **ddms:qualifier** value of "urn:us:gov:ic:cenum:irm:iso639:digraph:v1" then the value of attribute **ddms:value** must be in CEnumIRMISO639Digraph.xml and no country code portion may be specified in the **Language** element value.

Human Readable: ISO 639 digraph language codes must be in the ISO 639 digraph CVE

[IRM-ID-00006][Error] If element **ddms:language** has the attribute **ddms:qualifier** value of "urn:us:gov:ic:cenum:irm:iso639-2:trigraph:v1" then the value of attribute **ddms:value** must be in CEnumIRMISO639-2Trigraph.xml and no country code portion may be specified in the **ddms:value** value.

Human Readable: ISO 639-2 trigraph language codes must be in the ISO 639-2 trigraph CVE

[IRM-ID-00007][Error] If element **ddms:language** has the attribute **ddms:qualifier** value of “urn:us:gov:ic:cenum:irm:iso639-3:trigraph:v1” then the value of attribute **ddms:value** must be in CVEnumIRMISO639-3Trigraph.xml and no country code portion may be specified in the **ddms:value** value.

Human Readable: ISO 639-3 digraph language codes must be in the ISO 639-3 digraph CVE

[IRM-ID-00008][Error] If element **ddms:language** has the attribute **ddms:qualifier** value of “RFC1766” then the language code portion of the **ddms:value** attribute value must be in CVEnumIRMISO639Digraph.xml and the country code portion, if present, must be in CVEnumIRMCoverageISO3166Digraph.xml.

Human Readable: RFC1766 language codes must comply with the RFC by using parts from ISO 639 Digraph and ISO 3166 Digraph

[IRM-ID-00009][Error] If element **ddms:language** has the attribute **ddms:qualifier** value of “RFC3066” then the language code portion of the **ddms:value** attribute value must be in CVEnumIRMISO639Digraph.xml or CVEnumIRMISO639-2Trigraph.xml and the country code portion, if present, must be in CVEnumIRMCoverageISO3166Digraph.xml.

Human Readable: RFC3066 language codes must comply with the RFC by using parts from ISO 639 Digraph or ISO 639-2 Trigraph and ISO 3166 Digraph

[IRM-ID-00010][Error] If element **ddms:language** has the attribute **ddms:qualifier** value of “RFC4646” then the language code portion of the **ddms:value** attribute value must be in CVEnumISO639Digraph.xml or CVEnumISO639-2Trigraph.xml and the country code portion, if present, must be in CVEnumIRMCoverageISO3166Digraph.xml.

Human Readable: RFC4646 language codes must comply with the RFC by using parts from ISO 639 Digraph or ISO 639-2 Trigraph and ISO 3166 Digraph

4.5 General Constraints

[IRM-ID-00011][Error] If an element **irm:MetaCardIRM/irm:IdentifierList/ddms:identifier** does not exist with the attribute **ddms:qualifier** value of “IC-ID”.

Human Readable: Every metacard must have an ID identified as an IC-ID

[IRM-ID-00012][Error] If more than 1 element **irm:MetaCardIRM/irm:IdentifierList/ddms:identifier** exists with the attribute **ddms:qualifier** value of “IC-ID”.

Human Readable: Every metacard must have only 1 ID identified as an IC-ID

[IRM-ID-00013][Error] If an element **irm:DescribedItemIRM/ddms:Resource/ddms:identifier** does not exist with the attribute **ddms:qualifier** value of "IC-ID".

Human Readable: Every DescribedItemIRM must have an ID identified as an IC-ID

[IRM-ID-00014][Error] If more than 1 element **irm:DescribedItemIRM/ddms:Resource/ddms:identifier** exists with the attribute **ddms:qualifier** value of "IC-ID".

Human Readable: Every DescribedItemIRM must have only 1 ID identified as an IC-ID

[IRM-ID-00015][Error] If element **ddms:dates** exists without one of the attributes **ddms:created** or **ddms:posted**

Human Readable: Every date must have 1 of created or posted.

[IRM-ID-00016][Error] The permissible values for the year range are 1901 through the current year for attributes **irm:dateApproved**, **ddms:infoCutOff**, **ddms:posted**, and **ddms:created**

Human Readable: Dates must be after 1901 and in the past for **irm:dateApproved**, **ddms:infoCutOff**, **ddms:posted**, and **ddms:created**.

[IRM-ID-00017][Error] The permissible values for the year range are 1901 through 9999 for element **ddms:validTil**.

Human Readable: **ddms:validTil** must be after 1901.

[IRM-ID-00018][Error] The permissible values for the decimal seconds are .0 through .999 for attributes **irm:dateApproved**, **ddms:start**, **ddms:end**, **ddms:infoCutOff**, **ddms:posted**, **ddms:validTil** and **ddms:created**.

[IRM-ID-00019][Warning] **irm:dateApproved** must not be later than **ddms:created**, and **ddms:posted**.

[IRM-ID-00020][Error] **ddms:infoCutOff** must not be later than **ddms:posted**, and **ddms:created**.

[IRM-ID-00021][Warning] **ddms:validTil** must not be earlier than **irm:dateApproved**, **ddms:infoCutOff**, **ddms:posted**, and **ddms:created**.

[IRM-ID-00022][Error] For any element **TimePeriod** **start** must not be later than **end**.

[IRM-ID-00023][Error] The permissible values for the year range are 0001 through 9999 for elements **ddms:start** and **ddms:end**.

Human Readable: **ddms:start** and **ddms:end** must be positive integers less than 10,000.

[IRM-ID-00024][Warning] For elements **irm:dateApproved**, **ddms:start**, **ddms:end**, **ddms:infoCutOff**, **ddms:posted**, **ddms:validTil** and **ddms:created.**, if the time designator (T) is specified, it is recommended that time zone be specified.

4.6 Information Security Markings (ISM.XML)

Most constraint rules specific to the application of information security markings are documented in the *XML Data Encoding Specification for Information Security Marking Metadata* and related documents. The rules in this section are additional constraints on the specific implementation of ISM in IRM.XML

[IRM-ID-00025][Error] The attribute **ism:excludeFromRollup** must not be specified for any element in the namespace <http://metadata.dod.mil/mdr/ns/DDMS/3.0/> except **security**.

[IRM-ID-00026][Error] The root element must have the attribute **ism:compliesWith** in the namespace **urn:us:gov:ic:ism** containing the value of "ICD-710".

Human Readable: All IRM.XML documents must comply with the applicable ICD-710 rules encoded in ISM.

Appendix A IC CIO Approval Memo

An Office of the Intelligence Community Chief Information Officer (OCIO) Approval Memo should accompany this enterprise technical data specification bearing the signature of the Intelligence Community Chief Information Officer (IC CIO) or an IC CIO-designated official(s). If an OCIO Approval Memo is not accompanying this specification's version release package, then refer back to the authoritative web location(s) for this specification to see if a more complete package or a specification update is available.

Specification artifacts display a date representing the last time a version's artifacts as a whole were modified. This date most often represents the conclusion of the IC Element collaboration and coordination process. Once the IC Element coordination process is complete, the specification goes through an internal OCIO staffing and coordination process leading to signature of the OCIO Approval Memo. The signature date of the OCIO Approval Memo will be later than the last modified date shown on the specification artifacts by an indeterminable time period.

Upon signature of the OCIO Approval Memo, IC Elements may begin to use this specification version in order to address mission and business objectives. However, it is critical for IC Elements, prior to disseminating information encoded with this new specification version, to ensure that key enterprise services and consumers are prepared to accept this information. IC Elements should work with enterprise service providers and consumers to orchestrate an orderly implementation transition to this specification version in concert with mandatory and retirement usage decisions captured in the IC Enterprise Standards Baseline as defined in Intelligence Community Standard (ICS) 500-20.

Appendix B Acronyms

ADD - Abstract Data Definition

CAPCO – Controlled Access Program Coordination Office

CVE – Controlled Vocabulary Enumeration

DCMI – Dublin Core Metadata Initiative

DC MES – Dublin Core Metadata Element Set

DES – Data Encoding Specification

DOI – Digital Object Identifier

FOUO - For Official Use Only

GNS – Geographic Names Server

HTML – HyperText Markup Language

IC CIO – Intelligence Community Chief Information Officer

ICD – Intelligence Community Directive

ICS – Intelligence Community Standard

IRM.XML - XML Data Encoding Specification for Information Resource Metadata

ISBN – International Standard Book Number

ISO – International Organization for Standardization

ISOO – Information Security Oversight Office

KA – Knowledge Assertion

KOS – Knowledge Organization System

MIME – Internet Media Types

NARA – National Archives and Records Administration

NGA – National Geospatial Intelligence Agency

NTK - Need To Know

OCIO - Office of the Intelligence Community Chief Information Officer

ODNI – Office of the Director of National Intelligence

TGN – Thesaurus of Geographic Names

URI – Uniform Resource Identifier

URL – Uniform Resource Locator

W3CDTF – World Wide Web Consortium Date Time Format

XML – Extensible Markup Language

Appendix C Glossary

No pertinent glossary items requiring further definition.

Appendix D Bibliography

This appendix lists all the sources referenced in this DES and lists other sources that may have been used in other DES. This appendix is a shared resource across multiple documents so in any given DES there are likely sources that are not referenced in that particular DES.

(CAPCO Implementation Guide)

Intelligence Community Classification and Control Markings Implementation Manual. Unclassified FOUO version. Volume 3, Edition 1 (Version 3.1). 7 May 2010. Director of National Intelligence (DNI), Special Security Center (SSC), Controlled Access Program Coordination Office (CAPCO).

https://www.intelink.gov/sites/ssc/divisions/capco/CAPCO%20Resources/CAPCO_Implementation%20Manual_FOUO_v3%2010%20May%202010%20.pdf

(CAPCO Register)

Authorized Classification and Control Markings Register. Unclassified FOUO version. Volume 3, Edition 1 (Version 3.1). 7 May 2010. Director of National Intelligence (DNI), Special Security Center (SSC), Controlled Access Program Coordination Office (CAPCO).

[https://www.intelink.gov/sites/ssc/divisions/capco/CAPCO%20Resources/CAPCO_Register_FOUO_v3%2010%20May%202010%20\(2\).pdf](https://www.intelink.gov/sites/ssc/divisions/capco/CAPCO%20Resources/CAPCO_Register_FOUO_v3%2010%20May%202010%20(2).pdf)

(DC MES)

Dublin Core Metadata Element Set. Version 1.1. 02 June 2003. Dublin Core Metadata Initiative. <http://dublincore.org/documents/dces/>.

(E.O. 12958, as amended)

Executive Order 12958 – Classified National Security Information, as Amended. Federal Register, Vol. 68, No. 60. 25 March 2003. The White House.

<http://www.archives.gov/isoo/policy-documents/eo-12958-amendment.html>.

(E.O. 12829, as amended)

Executive Order 12829 – National Industrial Security Program, as Amended. Federal Register, Vol. 58, No. 240. 16 December 1993. The White House.

<http://www.archives.gov/isoo/policy-documents/eo-12829.html>

(E.O. 13526)

Executive Order 13526 – Classified National Security Information 29 December 2009. The White House. <http://www.archives.gov/isoo/pdf/cnsi-eo.pdf>.

(ICD 206)

Sourcing Requirements for Disseminated Intelligence Products. Intelligence Community Directive Number 206. 17 October 2007. Office of the Director of National Intelligence. http://www.dni.gov/electronic_reading_room/ICD_206.pdf.

(ICD 500)

Director of National Intelligence Chief Information Officer. Intelligence Community Directive Number 500. 7 August 2008. Office of the Director of National Intelligence. http://www.dni.gov/electronic_reading_room/ICD_500.pdf.

(ICD 710)

Classification and Control Markings System. Intelligence Community Directive Number 710. 11 September 2009. Office of the Director of National Intelligence. http://www.dni.gov/electronic_reading_room/ICD_710.pdf

(ISO 639-2)

Codes for the representation of names of languages – Part 2: Alpha-3 code. ISO 639-2:1998. International Organization for Standardization (ISO). http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=4767.

(ISO 3166-1)

Codes for the representation of names of countries and their subdivisions – Part 1: Country codes. ISO 3166-1:2006. International Organization for Standardization (ISO). http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=39719.

(ISO 8601)

Data elements and interchange formats – Information interchange – Representation of dates and times. ISO 8601:2004. International Organization for Standardization (ISO). http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=40874.

(ISO 15836)

Information and documentation – The Dublin Core metadata element set. ISO 15836:2009. International Organization for Standardization (ISO). http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=52142.

(ISOO Directive 1)

Classified National Security Information (Directive No. 1); Final Rule. 32 CFR Parts 2001 and 2004. Federal Register, Vol. 68, No. 183. 22 September 2003. Information Security Oversight Office (ISOO), National Archives and Records Administration (NARA). <http://www.archives.gov/isoo/policy-documents/eo-12958-implementing-directive.pdf>.

(RFC 3066)

Tags for the Identification of Languages. January 2001. H. Alvestrand. Cisco Systems. <http://www.rfc-editor.org/rfc/rfc3066.txt>.

Appendix E Points of Contact

This technical specification is managed by the Office of the Intelligence Community Chief Information Officer (IC CIO). As of this writing, the IC CIO/IC Enterprise Architecture (ICEA) Directorate facilitates the IC data collaboration and coordination forums responsible for the selection or development of common IC technical data specifications. Direct all inquiries about this IC technical specification to IC CIO/ICEA, the IC's data collaboration and coordination forum, or IC element representatives involved in those forums.

Appendix F Change History

Version	Identifier	Date	Purpose
1	IRM V1.0	July 2009	Initial Release
1	ICTechSpec 500.D.5-V2	7 September 2010	Routine revision to technical specification. For details of changes, see section 1.5

Appendix G Configuration Management

The selection or development of technical data specifications of common interest to the IC are collaborated and coordinated currently within governance forums managed by the IC CIO. Change requests for this technical data specification should be directed to the office identified in **Appendix E – Points of Contact**.

Appendix H Reading the Schematics

The physical XML structures documented in this guide are illustrated with schematics created with the commercially available product named *XML Spy®*, produced by Altova. The symbology used by *XML Spy®* is described in this appendix.

H.1 Element Models

In *XML Spy*, XML elements are represented by rectangles like that shown for an element named **PublicationMetadata** in **Figure 1**. XML elements may have one of three types of content model:

- Element content: A model in which the content consists entirely of child elements; in other words, there is no *direct* data content (although the child elements may have data content).
- Mixed content: A model in which the content consists of text, possibly intermixed with child elements; child elements in mixed content are said to float in the text in that their use is not constrained to a hierarchy.
- Empty: A model in which the element has no content; the element's function is performed by its attribute(s), if any, or the element is simply a placeholder for data that will be generated when the element is rendered for presentation.



Figure 1. Symbol for an XML Element having Element Content

An element whose model is element content is illustrated by the preceding figure. The "+" symbol in the small box at the right edge denotes that **PublicationMetadata** has content.

In the *XML Spy* graphical user interface (GUI), a schematic may be expanded and contracted to expose more or less of the model. In the GUI, clicking with the mouse on the "+" symbol causes the content of the element (in this case **PublicationMetadata**) to be revealed and the "+" is replaced by a "-" symbol. The purpose for pointing this out is that, in the remainder of this appendix, some of the illustrations show the "-" rather than the "+".

An element whose model is *mixed content* is represented by the symbol shown in Figure 2. As above, the "+" signifies that the element has content, and the lines in the

upper left corner denote that text is allowed. Mixed content is the normal model for elements like paragraphs, list items, titles, *et al.*, in which the text “contains” semantic objects like footnote references, superscripts and subscripts, italicized and bolded passages, quoted strings, words or phrases that have been tagged for indexing or searching, *etc.* These types of semantic objects that appear in the running text are represented in XML as elements.



Figure 2. Symbol of an Element with Mixed Content

An *empty* element is illustrated by **Figure 3**. Note that the element symbol lacks a “+” symbol, meaning that content is not allowed. Empty elements do not have textual content. They are used for one or more of three possible purposes:

- They are pointers to text or non-text objects that are located in external files. In this capacity, they can be used as placeholders for illustrations. They mark the position where a graphic is to be placed and, using attributes, identify the file that contains the graphic image.
- They are placeholders for application-generated content that will be created as part of the rendering process. Examples include tables of contents, indexes, glossaries, and bibliographies. Empty elements are used to specify the positioning of such constructs.
- They mark locations that are acted upon by formatting engines. A common example is to use an empty element called **br** or **break** to tell a formatter to insert a newline sequence at the point where the empty element is encountered.



Figure 3. Symbol of an Empty Element

H.2 Groupings of Elements

XML Spy represents an XML schema element group that has been used in a content model with a rounded box. In **Figure 4**, **ComplexContentGroup** is the name of an element group.



Figure 4. Element Group Symbol

Note the use of the “+” symbol. In the GUI, clicking on this symbol reveals the composition of the element group. This is illustrated later on in this appendix.

H.3 Occurrence indicators

Some elements must be used, they are designated as required. Other elements are designated as optional. Both required and optional elements may be repeatable. These in combination make four classes of occurrence indicators: a required element that can be used once and only once, a required element that may repeat, an optional and repeatable element, and an optional element that may not repeat.

Figure 5 illustrates several elements the use of which is optional. The dotted border of the element symbols for **UUID**, **DocumentID**, and **InternalID** denote optionality. This means that the producer may use these elements to tag document identifiers, but their use is not required. The XML document will be deemed *syntactically* correct with or without them.

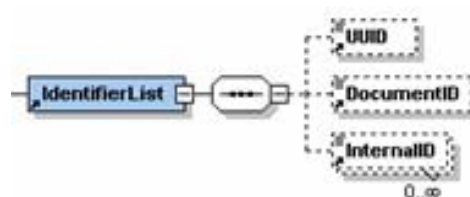


Figure 5. Optional elements, one repeatable, graphical representation

It is important to emphasize, in conjunction with **Figure 5**, that syntactic correctness and semantic completeness are distinct requirements. While an automated XML processing software application will accept element **IdentifierList** with or without the child elements, a production organization will need to apply local business rules to require at least one of the child elements to be present. This is done in order to allow the model to be used throughout the life cycle of the data. For example, the model can be used both at the time of authoring when the values for the child elements may not be known and later on when the values are required during the exchange with a partner.

The next two figures illustrate the symbols for repeatable elements. In **Figure 6**, element **InternalID** may be used zero or more times, as indicated by the “0..∞” string

beneath the symbol. Note also that a repeatable element is denoted by a stack of element symbols.

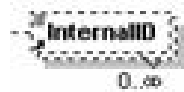


Figure 6. Optional and repeatable element, graphical representation

By contrast, in **Figure 7**, the element named **Section** must be used at least once, and may be used multiple times in succession. The fact that the section element symbol has solid borders means that its use is required. The “1..∞” beneath the symbol means it can be used one or more times.



Figure 7. Required and repeatable element, graphical representation

An element symbol that has solid borders and neither “0..∞” nor “1..∞” beneath must be used one and only one time. In **Figure 5**, the element named **IdentifierList** must be used once and only once.

H.4 Order of Elements

In many cases, XML schemas require that elements be used in a prescribed sequence. As shown in **Figure 8** this constraint is denoted by an ellipsis in a rounded box in the schematics:

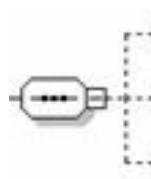


Figure 8. Sequence Symbol

The connecting lines leading from the right edge lead to three elements, which, if used, must be used in top-to-bottom order. **Figure 5** shows this symbol in a larger context. It says that the subelements of **IdentifierList** are all optional but, if used, must be in the order shown.

Figure 9 shows the symbol that signifies that a choice must be made between the child components. The symbol is a three-pole switch inside of a rounded box. The switch signifies that an author can choose either of the branches leading from the right edge. Because the borders of the box are dashed, the choice itself is optional. The "0..∞" symbol beneath the box means that the choice can be made multiple times.



Figure 9. Choice Symbol

Figure 10 shows the use of this symbol in context:

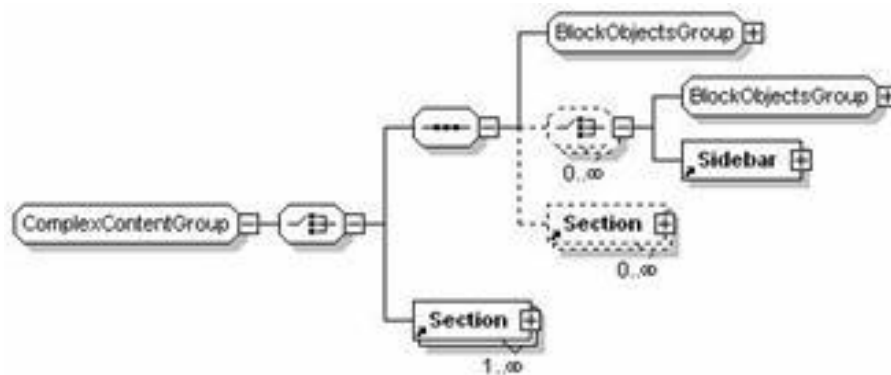


Figure 10. Sequence and Choice Combined

This schematic says that the grouping named **ComplexContentGroup** consists of a required choice between the top branch on the one hand and the bottom branch on the other. The top branch is a sequence of one element from the **BlockObjectsGroup**, optionally followed by a *repeatable* choice between **BlockObjectsGroup** elements and a **Sidebar** element, optionally followed by zero or more **Section** elements. The bottom branch leads to one or more **Section** elements.

H.5 Attributes

Elements may have properties. For example, the element **List** has the property called **listStyle**. In XML, such properties of an element are called *attributes* of the element. In the schematic diagrams used in this document, the attributes are displayed separately from the elements.

Appendix I Controlled Vocabulary Enumerations

The Controlled Vocabulary Enumerations (CVEs) used in this DES are as follows:

CVE File name	Definition	Attribute and Rules Cross reference
CVEnumIRMCoverageFIPSDigraph	All currently valid FIPS digraphs.	CountryCode PUBS-ID-00066 PUBS-ID-00011
CVEnumIRMCoverageISO3166Digraph	All currently valid ISO-3166 digraphs.	CountryCode PUBS-ID-00067 PUBS-ID-00059 PUBS-ID-00060 PUBS-ID-00061
CVEnumIRMCoverageISO3166Numeric	All currently valid ISO-3166 numeric values	CountryCode PUBS-ID-00069
CVEnumIRMCoverageISO3166Trigraph	WWW and All currently valid ISO-3166 trigraphs	CountryCode PUBS-ID-00068
CVEnumIRMCoverageISO4217Numeric	All currently valid ISO-4217 Numeric codes.	@unitOfMeasure PUBS-ID-00064
CVEnumIRMCoverageISO4217Trigraph	All currently valid ISO-4217 Trigraphs.	@unitOfMeasure PUBS-ID-00063
CVEnumIRMCoverageISO639Digraph	All currently valid ISO-639-1 Digraphs.	Language PUBS-ID-00056 PUBS-ID-00059 PUBS-ID-00061
CVEnumIRMCoverageISO639-2Trigraph	All currently valid ISO-639-2 Trigraphs.	Language PUBS-ID-00057 PUBS-ID-00060
CVEnumIRMCoverageISO639-3Trigraph	All currently valid ISO-639-3 Trigraphs.	Language PUBS-ID-00058
CVEnumIRMAgencyAcronym	All currently valid Agency Acronyms for use with publisher.	AgencyAcronym PUBS-ID-00076
CVEnumMimeType	All currently valid MIME Types.	@MIMETYPE PUBS-ID-00074 PUBS-ID-00075
CVEnumIRMIntelSubDisciplineTechniques	All currently valid Intel sub Discipline technique codes.	IntelSubdisciplineTechnique SchemaEnumeration
CVEnumIRMIntelSubDisciplines	All currently valid Intel sub Discipline codes.	IntelSubdiscipline SchemaEnumeration
CVEnumIRMIntelDisciplines	All currently valid Intel Discipline codes.	IntelDiscipline SchemaEnumeration