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NEXT-GENERATION NETWORKS, INTERNET OF  
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Cloud Computing

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**Big data – Requirements and conceptual model  
of metadata for data catalogue**

Recommendation ITU-T Y.3603

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# Recommendation ITU-T Y.3603

## Big data – Requirements and conceptual model of metadata for data catalogue

### Summary

Recommendation ITU-T Y.3603 describes the general concept of metadata and its utilization in a big data ecosystem. Also, this Recommendation provides requirements and a conceptual model of metadata for data catalogue as well as the extensible markup language (XML) schema of metadata as an example. This metadata supports finding data easier, and is used for exchange, preservation, integration and provenance of data in a big data ecosystem.

### History

Edition	Recommendation	Approval	Study Group	Unique ID*
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### Keywords

Big data, big data catalogue, conceptual model, metadata for big data, metadata requirements.

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\* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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# Recommendation ITU-T Y.3603

## Big data – Requirements and conceptual model of metadata for data catalogue

### 1 Scope

This Recommendation introduces the metadata concept as well as its usages in a big data lifecycle. This Recommendation provides requirements and a conceptual model of metadata for a data catalogue to support the big data ecosystem defined in [ITU-T Y.3600]. The extensible markup language (XML) profiles based on the conceptual model described by the unified modelling language (UML) and examples of metadata are provided in the appendices.

### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T Y.3600] Recommendation ITU-T Y.3600 (2015), *Big data – Cloud computing based requirements and capabilities*.
- [ITU-T Y.3601] Recommendation ITU-T Y.3601 (2018), *Big data – Framework and requirements for data exchange*.
- [ITU-T Y.3602] Recommendation ITU-T Y.3602 (2018), *Big data – Functional requirements for data provenance*.
- [ITU-T Z.109] Recommendation ITU-T Z.109 (2016), *Specification and Description Language – Unified modeling language profile for SDL-2010*.

### 3 Definitions

#### 3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

**3.1.1 data catalogue** [ITU-T Y.3601]: A listing of all metadata which a data broker makes available.

**3.1.2 metadata** [b-ITU-T H.752]: Structured, encoded data that describe characteristics of information-bearing entities to aid in the identification, discovery, assessment and management of the described entities.

#### 3.2 Terms defined in this Recommendation

None.

### 4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

- API        Application Programming Interface  
BDC        Big Data Service Customer

BDSP	Big Data Service Provider
DCAT	Data Catalogue Vocabulary
DP	Data Provider
JSON	JavaScript Object Notation
RDF	Resource Description Framework
Turtle	Terse Resource Description Framework Triple Language
UML	Unified Modelling Language
URI	Uniform Resource Identifier
XML	extensible Markup Language

## 5 Conventions

The keywords "**is required to**" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

The keywords "**is recommended**" indicate a requirement which is recommended but which is not absolutely required. Thus this requirement need not be present to claim conformance.

The keywords "**can optionally**" indicate an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

In the body of this document and its annexes, the words shall, shall not, should, and may sometimes appear, in which case they are to be interpreted, respectively, as is required to, is prohibited from, is recommended, and can optionally. The appearance of such phrases or keywords in an appendix or in material explicitly marked as informative are to be interpreted as having no normative intent.

The unified modelling language (UML) schema used in this Recommendation follows [ITU-T Z.109].

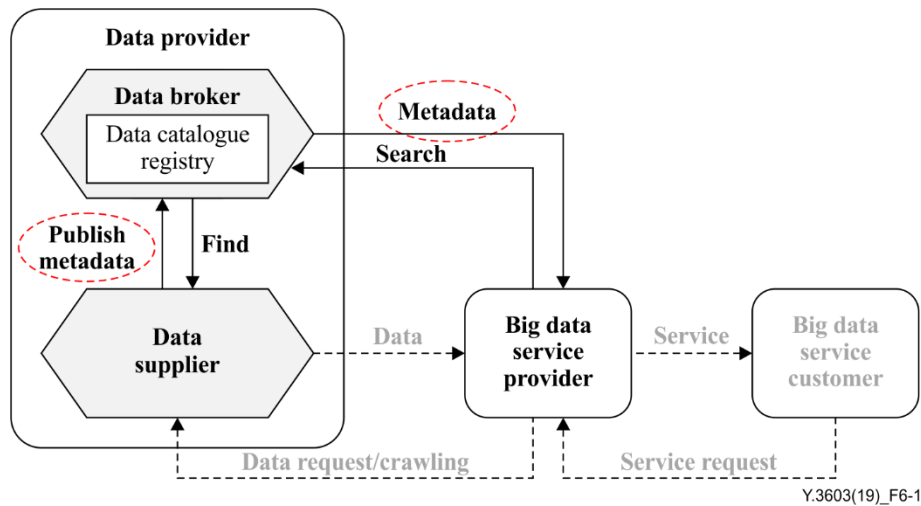
## 6 Overview of metadata

### 6.1 Introduction to metadata in the big data ecosystem

Metadata is structured, encoded data that describe characteristics of a dataset to aid in the identification, discovery, assessment and management of the dataset. Metadata summarizes overall information about data, making finding and working with particular data easier. Typically, the metadata structure is highly dependent on data format or application. Therefore, a metadata for big data is needed to provide an overarching model to cover the characteristics of big data.

Figure 6-1 illustrates metadata in the big data ecosystem defined in [ITU-T Y.3600]. Metadata is used for data publication and search among roles and sub-roles of the big data ecosystem.





**Figure 6-1 – Metadata in the big data ecosystem**

Regarding the data provider (DP), DP:data broker provides a meta-information registry (e.g., data catalogue registry) to DP:data suppliers for publishing their data sources, and DP:data suppliers are creating and publishing metadata information to DP:data broker. A big data service provider (BDSP) searches information through metadata stored in the DP:data broker's data catalogue registry.

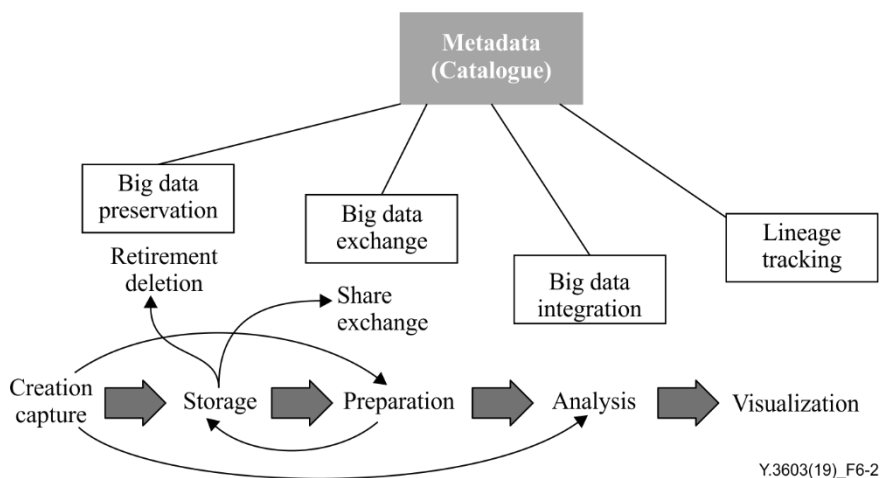
According to [ITU-T Y.3600], metadata provides:

- critical information for identification, access right of data;
- information about creation, control, and update on data for the management purpose;
- additional information about data integration capabilities.

## 6.2 Introduction to big data lifecycle

Metadata is used for various purposes, such as preserving data, data distribution, data integration and data history management by continuously recoding and updating. Figure 6-2 shows the usages of metadata according to big data lifecycle.

NOTE – An example of big data lifecycle has a main cycle with creation/capture, storage, preparation, analysis, visualization, and also has branch cycles with retirement/deletion and share/exchange.



**Figure 6-2 – Usage of metadata in big data lifecycle**

[ITU-T Y.3601] defines the functional requirements for big data exchange. In that Recommendation, DP:data broker provides a common data catalogue schema to exchange big data which covers various

type of data sources. DP:data broker provides meta-information (data catalogue for dataset) registry to data source. A data source publishes metadata to an online registry for data sharing. This metadata includes:

- data type, format, size and its update frequency;
- category (area of data source);
- metadata and its access information (e.g., uniform resource identifier (URI));
- delivery mechanism, and electronic access methods to data (e.g., application programming interface (API)).

And, this metadata can optionally include:

- data rights (e.g. general agreement, copyrights, patents, licenses policies and pricing policies) (e.g. the applied functions with parameter);
- usage of data;
- quality of data (e.g., sales ranking, and data supplier's credit);
- related keywords; and
- sample data.

DP:data broker also supports data classification with commonly used data vocabulary and taxonomy, and it is recommended to support multiple data classifications by usage area.

[ITU-T Y.3602] defines the functional requirements for big data provenance. Provenance is information about the origin and creation process of data, including the metadata recording process of workflow, annotations and notes about processes. When data are imported from an outside data source and stored, the BDSP generates metadata based on the importing context, including:

- responsible party information;
- time stamp;
- size, etc.

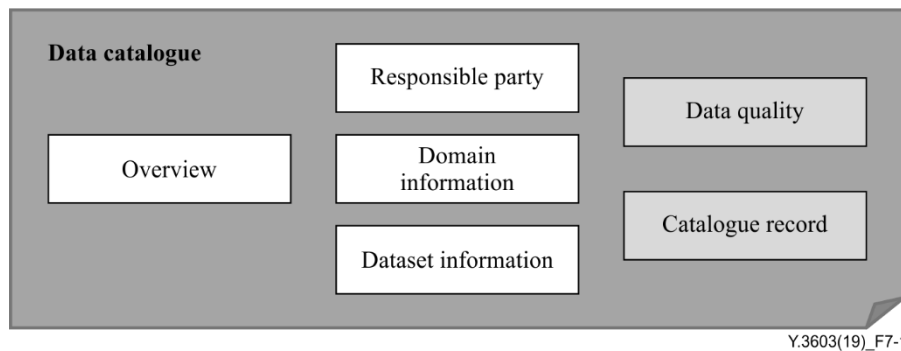
The metadata can be used for recording provenance information according to [ITU-T Y.3602].

For storage efficiency and performance, the BDSP provides data preservation capabilities by monitoring information (e.g., time stamp) included in metadata. In addition, the BDSP uses metadata to retrieve the data for data preparation (e.g. data integration).

## **7 Requirements of metadata for data catalogue**

### **7.1 Metadata for data catalogue**

A data catalogue describes the requirements for searching a dataset. It helps the users of the data to evaluate the dataset to determine its suitability of usage of the data. This clause provides six elements and contents of a data catalogue for big data. Figure 7-1 shows the elements of metadata for a data catalogue.



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**Figure 7-1 – Elements of metadata for a data catalogue**

A data catalogue **is required to** include the following elements:

- overview (see clause 7.2.1);
- responsible party (see clause 7.2.2);
- dataset information (see clause 7.2.3);
- domain information (see clause 7.2.4).

A data catalogue **is recommended to** include the following elements:

- data quality (see clause 7.2.5);
- catalogue record (see clause 7.2.6).

## **7.2 Requirements of metadata elements**

### **7.2.1 Overview element**

The overview element provides overall information of the data catalogue and is required to include:

- information about the creation of the data catalogue;  
NOTE 1 – This may include the title, the language used in the text, and the version of data catalogue specification.
- an informal description of the data catalogue.  
NOTE 2 – An informal description is intended to give a short introduction to data catalogue and allow a human reader for better understanding.

### **7.2.2 Responsible party element**

The responsible party element provides authoritative reference information and is required to include:

- information to identify and communicate with person(s) and organizations associated with the data catalogue.  
NOTE 1 – This may include the role or function performed by the organization, the organization name, individual name and position name.

Responsible party element is recommended to include following:

- contact information.  
NOTE 2 – This may include the phone number, address, online resource such as URI and time period when individuals may contact the publisher of data catalogue.

### **7.2.3 Dataset information element**

A data catalogue element contains one or more datasets. The dataset information of metadata represents the actual dataset as published by the DP:data provider, and is required to include:

- the title of the dataset;

- an informal description of the dataset.

NOTE 1 – An informal description is intended to give a short introduction to the dataset and allow a human reader a better understanding.

The dataset information element is recommended to include:

- dataset distribution information;

NOTE 2 – A dataset may have multiple distribution information.

NOTE 3 – This information may include the distribute format of dataset, type of dataset (structured, semi-structured, unstructured), access information including data API, user's guide or its URI, size of dataset, sample data for user's preview and data rights.

- keywords representing dataset;
- contact point information.

NOTE 4 – Contact point information is represented with the same contents of the responsible party described in clause 7.2.2, but its target is DP:data provider.

Dataset information may also include the following information optionally:

- the frequency at which the dataset is updated;
- temporal coverage of dataset which is described by period of time.

#### **7.2.4 Domain information element**

The domain information element provides the application area of dataset and is required to include:

- source domain of the dataset for classification.

The domain information element is recommended to include:

- usage domain of the dataset.

#### **7.2.5 Data quality element**

In a big data ecosystem, there are various types and formats of data, each having different quality requirements. Therefore, different quality evaluation methods are applied to different datasets. The data quality element is required to include:

- quality requirement on the dataset;
- unit of measure for data quality;
- quality evaluation result.

#### **7.2.6 Catalogue record element**

The catalogue record element provides date information for registration and modification for instances of the data catalogue. The catalogue record element is required to include:

- the most recent modified date of data catalogue.

The catalogue record element of data catalogue is recommended to include:

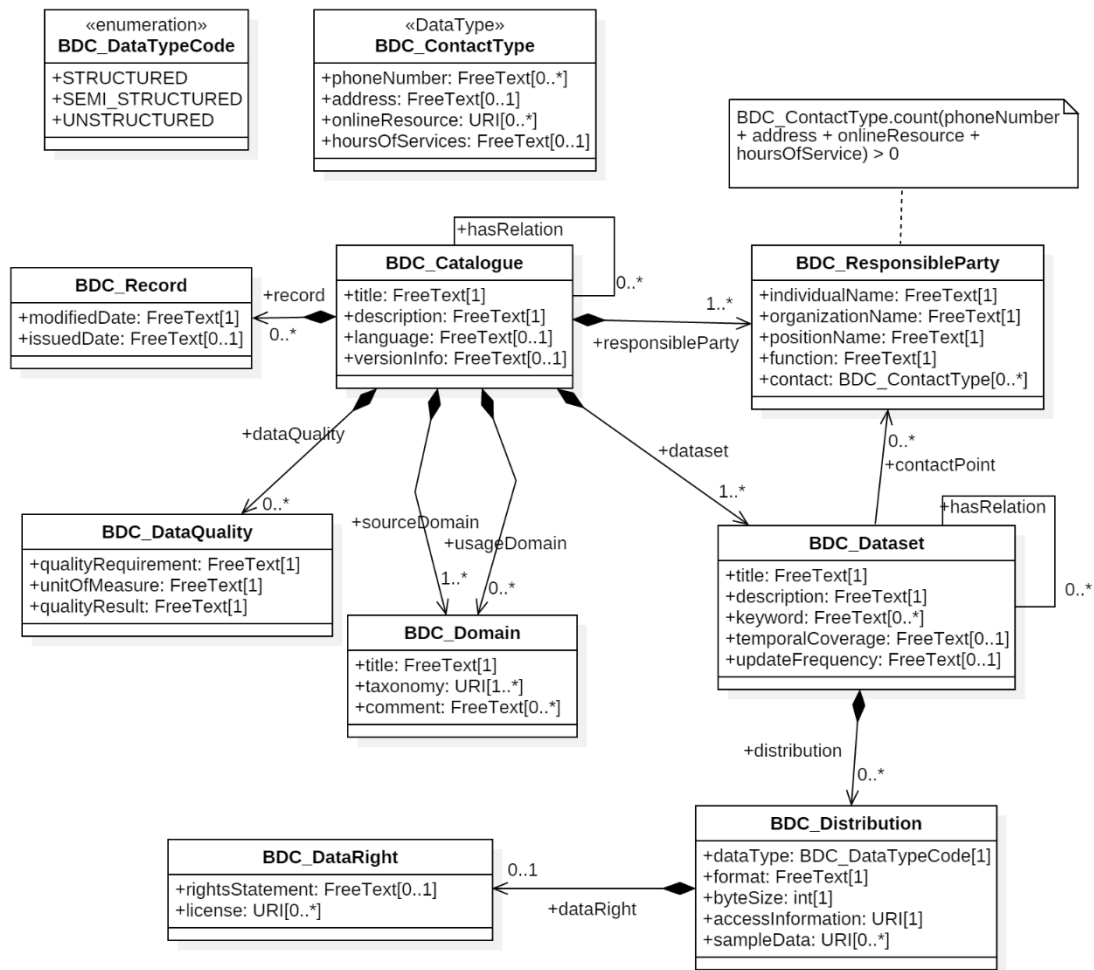
- the issued date of listing the dataset in the catalogue.

NOTE – The issued date of listing a dataset in a data catalogue is different than the publication date of the dataset.

## **8 Conceptual model for data catalogue**

### **8.1 Overall class diagram**

This clause provides a UML model based on clause 7, which describes the requirements of metadata for a data catalogue. Figure 8-1 shows the overall class diagram of the data catalogue using UML to provide the design of a concept for a data catalogue.



BDC – Big data service customer

**Figure 8-1 – Overall class diagram of data catalogue using UML**

## 8.2 Classes and data type

The following descriptors are used to explain the data dictionaries in the clauses that follow.

- Name/Role name: title of class (gray colored row in table), association (noted as role) and attribute;
- Description: short description about 'Name/Role name';
- M/R/O: the mandatory/recommended/optional (M/R/O) necessity of each class, association and attribute;
- Cardinality: the maximum number of instances that the metadata entity or metadata element may have. Single occurrences are shown by "1"; repeating occurrences are represented by "N".
- Domain: the values allowed, or the use of free text placed on the contents of the field. "Free text" indicates that no restrictions are placed on the contents of the field. Integer-based codes shall be used to represent values for domains containing codelists.
- Domain code: designated code used in place of the concept.

### 8.2.1 Class: BDC\_Catalogue

Table 8-1 shows the data dictionary of *BDC\_Catalogue* which describes the overview element information in clause 7.2.1.

**Table 8-1 – Catalogue overview**

	<b>Name/Role name</b>	<b>Description</b>	<b>M/R/O</b>	<b>Cardinality</b>	<b>Domain</b>
1	BDC_Catalogue	root entity which defines metadata about dataset resource	M	1	Line 2 to 12
2	role: responsibleParty	responsible party information for the data catalogue	M	N	BDC_ResponsibleParty
3	role: dataset	dataset information for the data catalogue	M	N	BDC_Dataset
4	role: sourceDomain	source domain information for the data catalogue	M	N	BDC_Domain
5	role: usageDomain	usage domain information for the data catalogue	R	N	BDC_Domain
6	role: dataQuality	data quality information for the data catalogue	R	N	BDC_DataQuality
7	role: record	record information for the data catalogue	R	N	BDC_Record
8	role: hasRelation	related data catalogue of the data catalogue	O	N	BDC_Dataset
9	title	title of data catalogue	M	1	free text
10	description	a short introduction to data catalogue	M	1	free text
11	language	language used within the data catalogue	R	1	free text (e.g., RFC 5646 [b-RFC5646])
12	versionInfo	version of data catalogue specification	R	1	free text (major.minor.patch)

### 8.2.2 Class: BDC\_ResponsibleParty

Table 8-2 shows the data dictionary of *BDC\_ResponsibleParty* and its data type class *BDC\_ContactType* which describes the responsible party in clause 7.2.2.

**Table 8-2 – Responsible party information**

	<b>Name/Role name</b>	<b>Description</b>	<b>M/R/O</b>	<b>Cardinality</b>	<b>Domain</b>
13	BDC_ResponsibleParty	name and position information for an individual or organization that is responsible for the data catalogue or dataset	M	N	Line 14 to 18
14	individualName	name of the responsible person: surname, given name, title	M	1	free text
15	organisationName	name of the responsible organization	M	1	free text
16	positionName	role or position of the responsible person	M	1	free text

**Table 8-2 – Responsible party information**

	Name/Role name	Description	M/R/O	Cardinality	Domain
17	function	function performed by the responsible party	M	1	free text
18	contact	information required to enable contact with the responsible person and/or organization	R	N	BDC_ContactType
19	BDC_ContactType	information required to enable contact with the responsible person and/or organization	R	N	Line 20 to 23
20	phoneNumber	telephone numbers at which the organization or individual may be contacted	R	N	free text
21	address	physical and email address at which the organization or individual may be contacted	R	1	free text
22	onlineResource	on-line information that can be used to contact the individual or organization	R	N	URI
23	hoursOfServices	time period (including time zone) when individuals can contact the organization or individual	R	1	free text

### 8.2.3 Class: BDC\_Dataset

Table 8-3 shows the data dictionary of *BDC\_Dataset* and its sub-classes (*BDC\_Distribution*, *BDC\_DataRight*) which describes dataset information in clause 7.2.3

**Table 8-3 – Dataset information**

	Name/Role name	Description	M/R/O	Cardinality	Domain
24	BDC_Dataset	a collection of data which is available for access and/or download	M	N	Line 25 to 32
25	role: contactPoint	contact point information for the dataset	R	N	BDC_ResponsibleParty
26	role: distribution	information about the distributor of and options for obtaining the dataset	R	N	BDC_Distribution
27	role: hasRelation	related dataset of the dataset	O	N	BDC_Dataset
28	title	title of the dataset	M	1	free text
29	description	short introduction to the dataset	M	1	free text

**Table 8-3 – Dataset information**

	Name/Role name	Description	M/R/O	Cardinality	Domain
30	keyword	commonly used word(s) used to describe the dataset	R	N	free text
31	temporalCoverage	time period (including time zone) when the dataset was captured	O	1	free text
32	updateFrequency	rate of occurrence of dataset update	O	1	free text
33	BDC_Distribution	information about the distributor of and options for obtaining the dataset	R	N	Line 34 to39
34	role: dataRight	information about limitation placed upon the use of the dataset	R	1	BDC_DataRight
35	dataType	type of information of the dataset	M	1	BDC_DataTypeCode
36	format	format of information of the dataset including a version	M	1	free text
37	byteSize	information about the size of the dataset in bytes	M	1	int
38	accessInformation	access information to the dataset	M	1	free text
39	sampleData	location information about a sample data including URI	R	N	URI
40	BDC_DataRight	information about limitation placed upon the use of the dataset	R	1	Line 41 to 42
41	rightStatement	information to the usage permissions being agreed to	R	1	free text
42	license	links to the license document under which the catalog is made available and not the datasets	R	N	URI

**8.2.4 Class: BDC\_Domain**

Table 8-4 shows the data dictionary of *BDC\_Domain* which describes domain information in clause 7.2.4.

**Table 8-4 – Domain information**

	Name/Role name	Description	M/R/O	Cardinality	Domain
43	BDC_Domain	source and/or usage information for data catalogue	M	1	Line 44 to 46
44	title	a member item of taxonomy which used for identifying the domain of source and/or usage	M	1	free text



**Table 8-4 – Domain information**

	Name/Role name	Description	M/R/O	Cardinality	Domain
45	taxonomy	taxonomy information including classification system and authority	M	N	URI
46	comment	any additional information for the domain	O	N	free text

**8.2.5 Class: BDC\_DataQuality**

Table 8-5 shows the data dictionary of *BDC\_DataQuality* which describes data quality in clause 7.2.5.

**Table 8-5 – Data quality information**

	Name/Role name	Description	M/R/O	Cardinality	Domain
47	BDC_DataQuality	data quality information for the data catalogue	R	N	Line 48 to 50
48	qualityRequirement	requirement statement for evaluating quality of the dataset	M	1	free text
49	unitOfMeausre	standard unit or system of units by means of which a quantity is accounted for and expressed.	M	1	free text
50	qualityResult	the result of quality evaluation described by the unit of measure	M	1	free text

**8.2.6 Class: BDC\_Record**

Table 8-6 shows the data dictionary of *BDC\_Record* which describes catalogue record in clause 7.2.6.

**Table 8-6 – Catalogue record information**

	Name/Role name	Description	M/R/O	Cardinality	Domain
51	BDC_Record	record information for the data catalogue	R	N	Line 52 to 53
52	modifiedDate	the most resent modified date of data catalogue	M	N	free text (e.g., ISO 8601 [b-ISO8601])
53	issuedDate	the issued date of listing the dataset in the catalogue	R	1	free text (e.g., ISO 8601 [b-ISO8601])

**8.2.6 Data type: BDC\_DataTypeCode**

Table 8-7 shows the data dictionary of *BDC\_DataTypeCode* describing the enumerated data type for data distribution.

**Table 8-7 – Data type information**

<b>Name</b>	<b>Domain code</b>	<b>Description</b>
STRUCTURED	001	data that is organized in a format easily used by formatted repository
SEMI_STRUCTURED	002	data that is neither raw data, nor typed data in a conventional database system (e.g., XML, JavaScript Object Notation (JSON))
UNSTRUCTURED	003	data that either does not have a pre-defined data model or is not organized in a pre-defined manner

# Appendix I

## Examples of metadata profile for data catalogue

(This appendix does not form an integral part of this Recommendation.)

This appendix uses the W3C data catalog vocabulary (DCAT) in the XML profile and terse resource description framework triple language (Turtle) profile (see [b-W3C DCAT]). The namespace for DCAT is `http://www.w3.org/ns/dcat#`, but DCAT makes extensive use of terms from other vocabularies. The extended prefix and its namespace for this appendix are "bdc" and "`http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#`".

### I.1 RDF profile

This clause provides the XML schema with resource description framework (RDF) format corresponding to the UML model in clause 8.

```
<?xml version="1.0"?>
<rdf:RDF xmlns="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#"
  xml:base="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue"
  xmlns:schema="http://schema.org/"
  xmlns:bdc="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:terms="http://purl.org/dc/terms/"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  xmlns:dcat="http://www.w3.org/ns/dcat#"
  xmlns:dc="http://purl.org/dc/elements/1.1/">
  <owl:Ontology rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue">
    <owl:imports rdf:resource="http://www.w3.org/ns/dcat#"/>
    <owl:imports rdf:resource="https://www.w3.org/2002/07/owl#"/>
  </owl:Ontology>

  <!--
  ////////////////////////////////////////////////////////////////////
  //
  // Annotation properties
  //
  ////////////////////////////////////////////////////////////////////
  -->
  <!-- http://www.w3.org/2002/07/owl#versionInfo -->

  <rdf:Description rdf:about="http://www.w3.org/2002/07/owl#versionInfo">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  </rdf:Description>

  <!-- http://www.w3.org/ns/dcat#byteSize -->

  <owl:AnnotationProperty rdf:about="http://www.w3.org/ns/dcat#byteSize">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution"/>
  </owl:AnnotationProperty>

  <!--
  ////////////////////////////////////////////////////////////////////
  //
  // Object Properties
```

```

//
////////////////////////////////////
-->

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#hasRelation -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#hasRelation">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#contact -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#contact">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ResponsibleParty"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ContactType"/>
  <rdfs:comment>information required to enable contact with the responsible person and/or
organization</rdfs:comment>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#contactPoint -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#contactPoint">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ResponsibleParty"/>
  <rdfs:comment>data quality information for the data catalogue</rdfs:comment>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#dataQuality -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#dataQuality">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataQuality"/>
  <rdfs:comment>Information about limitation placed upon the use of the dataset</rdfs:comment>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#dataRight -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#dataRight">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataRight"/>
  <rdfs:comment>Information about limitation placed upon the use of the dataset</rdfs:comment>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#dataType -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#dataType">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataTypeCode"/>
  <rdfs:comment>the type information of the dataset</rdfs:comment>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#dataset -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#dataset">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <rdfs:comment>dataset information for the data catalogue</rdfs:comment>

```

```

</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#distribution -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#distribution">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution"/>
  <rdfs:comment>information about the distributor of and options for obtaining the dataset</rdfs:comment>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#record -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#record">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Record"/>
  <rdfs:comment>record information for the data catalogue</rdfs:comment>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#responsibleParty -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#responsibleParty">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ResponsibleParty"/>
  <rdfs:comment>responsible party information for the data catalogue</rdfs:comment>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#sourceDomain -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#sourceDomain">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Domain"/>
  <rdfs:comment>source domain information for the data catalogue</rdfs:comment>
</owl:ObjectProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#usageDomain -->

<owl:ObjectProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#usageDomain">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:range rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Domain"/>
  <rdfs:comment>usage domain information for the data catalogue</rdfs:comment>
</owl:ObjectProperty>

<!--
//
// Data properties
//
//
-->

<!-- http://purl.org/dc/elements/1.1/description -->

<owl:DatatypeProperty rdf:about="http://purl.org/dc/elements/1.1/description">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>

<!-- http://purl.org/dc/elements/1.1/format -->

```

```

<owl:DatatypeProperty rdf:about="http://purl.org/dc/elements/1.1/format">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>

<!-- http://purl.org/dc/elements/1.1/keyword -->

<owl:DatatypeProperty rdf:about="http://purl.org/dc/elements/1.1/keyword">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:comment>commonly used word(s) used to describe the dataset</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://purl.org/dc/elements/1.1/language -->

<owl:DatatypeProperty rdf:about="http://purl.org/dc/elements/1.1/language">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:range rdf:resource="http://purl.org/dc/terms/RFC5646"/>
</owl:DatatypeProperty>

<!-- http://purl.org/dc/elements/1.1/temporalCoverage -->

<owl:DatatypeProperty rdf:about="http://purl.org/dc/elements/1.1/temporalCoverage">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:comment>time period (including time zone) when the dataset was captured</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://purl.org/dc/elements/1.1/title -->

<owl:DatatypeProperty rdf:about="http://purl.org/dc/elements/1.1/title">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue"/>
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Domain"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>

<!-- http://purl.org/dc/elements/1.1/updateFrequency -->

<owl:DatatypeProperty rdf:about="http://purl.org/dc/elements/1.1/updateFrequency">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:comment>rate of occurrence of dataset update</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#accessInformation -->

<owl:DatatypeProperty
  namespace/itut/Y.3603/bigdatacatalogue#accessInformation"
  rdf:about="http://www.itu.int/xml-
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:comment>access information to dataset</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#address -->

<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#address">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ContactType"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>

```

```
<rdfs:comment>physical and email address at which the organization or individual may be contacted</rdfs:comment>
</owl:DatatypeProperty>
```

```
<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#hoursOfServices -->
```

```
<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#hoursOfServices">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ContactType"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:comment>time period (including time zone) when individuals can contact the organization or individual</rdfs:comment>
</owl:DatatypeProperty>
```

```
<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#individualName -->
```

```
<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#individualName">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ResponsibleParty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:comment>name of the responsible person- surname, given name, title</rdfs:comment>
</owl:DatatypeProperty>
```

```
<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#issuedDate -->
```

```
<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#issuedDate">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Record"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#date"/>
  <rdfs:comment>the issued date of listing the dataset in the catalogue</rdfs:comment>
</owl:DatatypeProperty>
```

```
<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#license -->
```

```
<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#license">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataRight"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#anyURI"/>
  <rdfs:comment>This links to the license document under which the catalog is made available and not the datasets</rdfs:comment>
</owl:DatatypeProperty>
```

```
<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#modifiedDate -->
```

```
<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#modifiedDate">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Record"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#date"/>
  <rdfs:comment>the most recent modified date of data catalogue</rdfs:comment>
</owl:DatatypeProperty>
```

```
<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#onlineResource -->
```

```
<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#onlineResource">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ContactType"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#anyURI"/>
  <rdfs:comment>online information that can be used to contact the individual or organization</rdfs:comment>
</owl:DatatypeProperty>
```

```
<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#organizationName -->
```

```

    <owl:DatatypeProperty                                rdf:about="http://www.itu.int/xml-
namespace/itu/Y.3603/bigdatacatalogue#organizationName">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#ResponsibleParty"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdfs:comment>name of the responsible organization</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#phoneNumber -->

<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#phoneNumber">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#ContactType"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdfs:comment>telephone numbers at which the organization or individual may be contacted</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#positionName -->

<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#positionName">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#ResponsibleParty"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdfs:comment>role or position of the responsible person</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#qualityRequirement -->

    <owl:DatatypeProperty                                rdf:about="http://www.itu.int/xml-
namespace/itu/Y.3603/bigdatacatalogue#qualityRequirement">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#DataQuality"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdfs:comment>requirement statement for evaluating quality of dataset</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#qualityResult -->

<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#qualityResult">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#DataQuality"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdfs:comment>the result of quality evaluation described by the unit of measure</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#rightStatement -->

    <owl:DatatypeProperty                                rdf:about="http://www.itu.int/xml-
namespace/itu/Y.3603/bigdatacatalogue#rightStatement">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#DataRight"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdfs:comment>information to the usage permissions being agreed to</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#function -->

<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#function">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#ResponsibleParty"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdfs:comment>function performed by the responsible party</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#sampleData -->

    <owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itu/Y.3603/bigdatacatalogue#sampleData">

```



```

    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#anyURI"/>
    <rdfs:comment>location information about a sample data including URI</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#taxonomy -->

<owl:DatatypeProperty rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#taxonomy">
  <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Domain"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#anyURI"/>
  <rdfs:comment>taxonomy information including classification system and authority</rdfs:comment>
</owl:DatatypeProperty>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#unitOfMeasure -->

  <owl:DatatypeProperty                                rdf:about="http://www.itu.int/xml-
namespace/itut/Y.3603/bigdatacatalogue#unitOfMeasure">
    <rdfs:domain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataQuality"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdfs:comment>standard unit or system of units by means of which a quantity is accounted for and
expressed.</rdfs:comment>
  </owl:DatatypeProperty>

<!--
//////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
//
// Classes
//
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
-->

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
  <rdfs:comment>Root entity which defines metadata about dataset resource</rdfs:comment>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ContactType -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ContactType">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
  <rdfs:comment>information required to enable contact with the responsible person and/or
organization</rdfs:comment>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataQuality -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataQuality">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
  <rdfs:comment>data quality information for the data catalogue</rdfs:comment>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataRight -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataRight">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
  <rdfs:comment>information about limitation placed upon the use of the dataset</rdfs:comment>
</owl:Class>

```

```

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataTypeCode -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataTypeCode">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
  <rdfs:comment>dataset information for the data catalogue</rdfs:comment>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
  <rdfs:comment>information about the distributor of and options for obtaining the dataset</rdfs:comment>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Domain -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Domain">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
  <rdfs:comment>source and/ or usage information for data catalogue</rdfs:comment>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Record -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Record">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
  <rdfs:comment>record information for the data catalogue</rdfs:comment>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ResponsibleParty -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ResponsibleParty">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
  <rdfs:comment>responsible party information for the data catalogue</rdfs:comment>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#SemiStructured -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#SemiStructured">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Structured -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Structured">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
</owl:Class>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Unstructured -->

<owl:Class rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Unstructured">
  <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
</owl:Class>

<!--

```

```

////////////////////////////////////
//
// Individuals
//
////////////////////////////////////
-->

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#SemiStructured -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-
namespace/itut/Y.3603/bigdatacatalogue#SemiStructured">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataTypeCode"/>
  <rdfs:comment>data that is neither raw data, nor typed data in a conventional database system (e.g. XML,
JSON)</rdfs:comment>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Structured -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Structured">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataTypeCode"/>
  <rdfs:comment>data that is organized in a format easily used by formatted repository</rdfs:comment>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Unstructured -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Unstructured">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataTypeCode"/>
  <rdfs:comment>data that either does not have a pre-defined data model or is not organized in a pre-defined
manner</rdfs:comment>
</owl:NamedIndividual>

</rdf:RDF>

```

## I.2 Turtle profile

This clause provides the Turtle format schema corresponding to the UML model in Appendix I.

```

# baseURI: http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue
# imports: http://purl.org/dc/elements/1.1/
# imports: http://purl.org/dc/terms/
# imports: http://www.w3.org/ns/dcat#
# imports: https://www.w3.org/2002/07/owl#
# prefix: bdc

@prefix bdc: <http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix dcat: <http://www.w3.org/ns/dcat#> .

dc:description
  rdfs:domain bdc:Catalogue ;
  rdfs:domain bdc:Dataset ;
  rdfs:range xsd:string ;
.
dc:format
  rdfs:domain bdc:Distribution ;
  rdfs:range xsd:string ;

```

```

.
bcd:hasRelation
  rdf:type rdf:Property ;
  rdfs:domain bcd:Catalogue ;
  rdfs:domain bcd:Dataset ;
  rdfs:range bcd:Catalogue ;
  rdfs:range bcd:Dataset ;
.
dc:keyword
  rdf:type rdf:Property ;
  rdfs:comment "commonly used word(s) used to describe the dataset" ;
  rdfs:domain bcd:Dataset ;
  rdfs:range xsd:string ;
.
dc:language
  rdfs:domain bcd:Catalogue ;
  rdfs:range <http://purl.org/dc/terms/RFC5646> ;
.
dc:temporalCoverage
  rdf:type rdf:Property ;
  rdfs:comment "time period (including time zone) when the dataset was captured" ;
  rdfs:domain bcd:Dataset ;
  rdfs:range xsd:string ;
.
dc:title
  rdfs:domain bcd:Catalogue ;
  rdfs:domain bcd:Dataset ;
  rdfs:domain bcd:Domain ;
  rdfs:range xsd:string ;
.
dc:updateFrequency
  rdf:type rdf:Property ;
  rdfs:comment "rate of occurrence of dataset update" ;
  rdfs:domain bcd:Dataset ;
  rdfs:range xsd:string ;
.
<http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue>
  rdf:type owl:Ontology ;
  owl:imports <http://purl.org/dc/elements/1.1/> ;
  owl:imports <http://purl.org/dc/terms/> ;
  owl:imports <http://www.w3.org/ns/dcat#> ;
  owl:imports <https://www.w3.org/2002/07/owl#> ;
.
bcd:Catalogue
  rdf:type rdfs:Class ;
  rdfs:comment "Root entity which defines metadata about dataset resource" ;
  rdfs:subClassOf owl:Thing ;
.
bcd:ContactType
  rdf:type rdfs:Class ;
  rdfs:comment "information required to enable contact with the responsible person and/or organization" ;
  rdfs:subClassOf owl:Thing ;
.
bcd:DataQuality
  rdf:type rdfs:Class ;
  rdfs:comment "data quality information for the data catalogue" ;
  rdfs:subClassOf owl:Thing ;
.
bcd:DataRight
  rdf:type rdfs:Class ;

```

```

rdfs:comment "information about limitation placed upon the use of the dataset" ;
rdfs:subClassOf owl:Thing ;
.
bdc:DataTypeCode
rdf:type rdfs:Class ;
rdfs:subClassOf owl:Thing ;
.
bdc:Dataset
rdf:type rdfs:Class ;
rdfs:comment "dataset information for the data catalogue" ;
rdfs:subClassOf owl:Thing ;
.
bdc:Distribution
rdf:type rdfs:Class ;
rdfs:comment "information about the distributor of and options for obtaining the dataset" ;
rdfs:subClassOf owl:Thing ;
.
bdc:Domain
rdf:type rdfs:Class ;
rdfs:comment "source and/ or usage information for data catalogue" ;
rdfs:subClassOf owl:Thing ;
.
bdc:Record
rdf:type rdfs:Class ;
rdfs:comment "record information for the data catalogue" ;
rdfs:subClassOf owl:Thing ;
.
bdc:ResponsibleParty
rdf:type rdfs:Class ;
rdfs:comment "responsible party information for the data catalogue" ;
rdfs:subClassOf owl:Thing ;
.
bdc:SemiStructured
rdf:type bdc:DataTypeCode ;
rdfs:comment "data that is neither raw data, nor typed data in a conventional database system (e.g. XML, JSON)" ;
rdfs:subClassOf owl:Thing ;
.
bdc:Structured
rdf:type bdc:DataTypeCode ;
rdfs:comment "data that is organized in a format easily used by formatted repository" ;
rdfs:subClassOf owl:Thing ;
.
bdc:Unstructured
rdf:type bdc:DataTypeCode ;
rdfs:comment "data that either does not have a pre-defined data model or is not organized in a pre-defined manner" ;
rdfs:subClassOf owl:Thing ;
.
bdc:accessInformation
rdf:type owl:DatatypeProperty ;
rdfs:comment "access information to dataset" ;
rdfs:domain bdc:Distribution ;
rdfs:range xsd:string ;
.
bdc:address
rdf:type rdf:Property ;
rdfs:comment "physical and email address at which the organization or individual may be contacted" ;
rdfs:domain bdc:ContactType ;
rdfs:range xsd:string ;
.
bdc:contact

```

```

rdf:type rdf:Property ;
rdfs:comment "information required to enable contact with the responsible person and/or organization" ;
rdfs:domain bdc:ResponsibleParty ;
rdfs:range bdc:ContactType ;
.
bdc:contactPoint
rdf:type rdf:Property ;
rdfs:comment "contact point information for the dataset" ;
rdfs:domain bdc:Dataset ;
rdfs:range bdc:ResponsibleParty ;
.
bdc:dataQuality
rdf:type rdf:Property ;
rdfs:comment "data quality information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc>DataQuality ;
.
bdc:dataRight
rdf:type rdf:Property ;
rdfs:comment "Information about limitation placed upon the use of the dataset" ;
rdfs:domain bdc:Distribution ;
rdfs:range bdc>DataRight ;
.
bdc:dataType
rdf:type rdf:Property ;
rdfs:comment "the type information of the dataset" ;
rdfs:domain bdc:Distribution ;
rdfs:range bdc:DataTypeCode ;
.
bdc:dataset
rdf:type rdf:Property ;
rdfs:comment "dataset information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc:Dataset ;
.
bdc:distribution
rdf:type rdf:Property ;
rdfs:comment "information about the distributor of and options for obtaining the dataset" ;
rdfs:domain bdc:Dataset ;
rdfs:range bdc:Distribution ;
.
bdc:hoursOfServices
rdf:type rdf:Property ;
rdfs:comment "time period (including time zone) when individuals can contact the organization or individual" ;
rdfs:domain bdc:ContactType ;
rdfs:range xsd:string ;
.
bdc:individualName
rdf:type rdf:Property ;
rdfs:comment "name of the responsible person- surname, given name, title" ;
rdfs:domain bdc:ResponsibleParty ;
rdfs:range xsd:string ;
.
bdc:issuedDate
rdf:type rdf:Property ;
rdfs:comment "the issued date of listing the dataset in the catalogue" ;
rdfs:domain bdc:Record ;
rdfs:range xsd:date ;
.
bdc:license

```

```

rdf:type rdf:Property ;
rdfs:comment "This links to the license document under which the catalog is made available and not the datasets" ;
rdfs:domain bdc:DataRight ;
rdfs:range xsd:anyURI ;
.
bdc:modifiedDate
rdf:type rdf:Property ;
rdfs:comment "the most recent modified date of data catalogue" ;
rdfs:domain bdc:Record ;
rdfs:range xsd:date ;
.
bdc:onlineResource
rdf:type rdf:Property ;
rdfs:comment "online information that can be used to contact the individual or organization" ;
rdfs:domain bdc:ContactType ;
rdfs:range xsd:anyURI ;
.
bdc:organizationName
rdf:type rdf:Property ;
rdfs:comment "name of the responsible organization" ;
rdfs:domain bdc:ResponsibleParty ;
rdfs:range xsd:string ;
.
bdc:phoneNumber
rdf:type rdf:Property ;
rdfs:comment "telephone numbers at which the organization or individual may be contacted" ;
rdfs:domain bdc:ContactType ;
rdfs:range xsd:string ;
.
bdc:positionName
rdf:type rdf:Property ;
rdfs:comment "role or position of the responsible person" ;
rdfs:domain bdc:ResponsibleParty ;
rdfs:range xsd:string ;
.
bdc:qualityRequirement
rdf:type rdf:Property ;
rdfs:comment "requirement statement for evaluating quality of dataset" ;
rdfs:domain bdc:DataQuality ;
rdfs:range xsd:string ;
.
bdc:qualityResult
rdf:type rdf:Property ;
rdfs:comment "the result of quality evaluation described by the unit of measure" ;
rdfs:domain bdc:DataQuality ;
rdfs:range xsd:string ;
.
bdc:record
rdf:type rdf:Property ;
rdfs:comment "record information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc:Record ;
.
bdc:responsibleParty
rdf:type rdf:Property ;
rdfs:comment "responsible party information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc:ResponsibleParty ;
.
bdc:rightStatement

```

```

rdf:type rdf:Property ;
rdfs:comment "information to the usage permissions being agreed to" ;
rdfs:domain bdc:DataRight ;
rdfs:range xsd:string ;
.
bdc:function
rdf:type rdf:Property ;
rdfs:comment "function performed by the responsible party" ;
rdfs:domain bdc:ResponsibleParty ;
rdfs:range xsd:string ;
.
bdc:sampleData
rdf:type owl:DatatypeProperty ;
rdfs:comment "location information about a sample data including URI" ;
rdfs:domain bdc:Distribution ;
rdfs:range xsd:anyURI ;
.
bdc:sourceDomain
rdf:type rdf:Property ;
rdfs:comment "source domain information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc:Domain ;
.
bdc:taxonomy
rdf:type rdf:Property ;
rdfs:comment "taxonomy information including classification system and authority" ;
rdfs:domain bdc:Domain ;
rdfs:range xsd:anyURI ;
.
bdc:unitOfMeasure
rdf:type rdf:Property ;
rdfs:comment "standard unit or system of units by means of which a quantity is accounted for and expressed." ;
rdfs:domain bdc:DataQuality ;
rdfs:range xsd:string ;
.
bdc:usageDomain
rdf:type rdf:Property ;
rdfs:comment "usage domain information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc:Domain ;
.
owl:versionInfo
rdfs:domain bdc:Catalogue ;
.
dcat:byteSize
rdfs:domain bdc:Distribution ;
.

```



## Appendix II

### Examples of metadata instance

(This appendix does not form an integral part of this Recommendation.)

For the better understanding of the conceptual model, this appendix provides the examples of a metadata instance about health care data [b-NHIS]. The UML object diagram, RDF instance and Turtle instances follow the UML and XML models in clause 8 and Appendix I, and these examples provide information on a dataset about 'Health Insurance'.

#### II.1 UML object diagram

An object diagram represents an instance of a class diagram. Figure II.1 is an object diagram derived from class diagram presented by Figure 8-1.

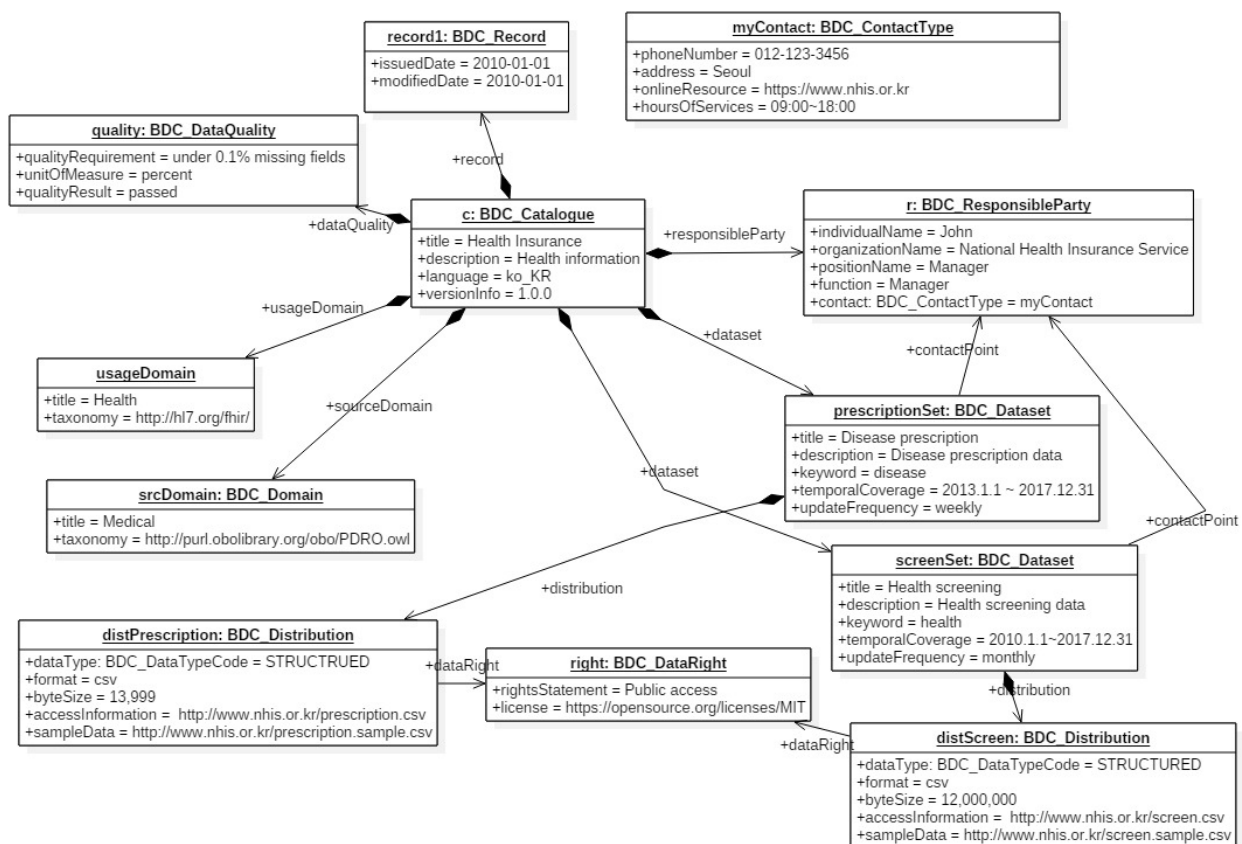


Figure II.1 – UML object diagram of metadata

#### II.2 RDF instance

This clause provides an example of metadata instance based on the RDF schema which described in Appendix I.1.

```
<?xml version="1.0"?>
<rdf:RDF xmlns="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#"
  xml:base="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue"
  xmlns:schema="http://schema.org/"
  xmlns:bdc="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#"
  xmlns:owl="http://www.w3.org/2002/07/owl#">
```

```

xmlns:xsd="http://www.w3.org/2001/XMLSchema#"
xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
xmlns:dct="http://purl.org/dc/terms/"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:dcat="http://www.w3.org/ns/dcat#"
xmlns:dc="http://purl.org/dc/elements/1.1/">

<owl:Ontology rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue">
  <owl:imports rdf:resource="http://www.w3.org/ns/dcat#" />
  <owl:imports rdf:resource="https://www.w3.org/2002/07/owl#" />
</owl:Ontology>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#healthCatalogue -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#healthCatalogue">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Catalogue" />
  <dataQuality rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#quality" />
  <dataset rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#prescriptionSet" />
  <dataset rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#screenSet" />
  <record rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#record1" />
  <responsibleParty rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#rParty" />
  <sourceDomain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#srcDomain" />
  <usageDomain rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#useDomain" />
  <dc:description>Health data of prescription & screening</dc:description>
  <dc:language rdf:datatype="http://purl.org/dc/terms/RFC5646">ko_KR</dc:language>
  <dc:title>Health Data</dc:title>
  <owl:versionInfo>1.0.0</owl:versionInfo>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ko_KR -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ko_KR">
  <rdf:type rdf:resource="http://purl.org/dc/terms/LinguisticSystem" />
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#myContact -->
<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#myContact">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ContactType" />
  <address>Seoul Korea</address>
  <hoursOfServices>09:00~18:00</hoursOfServices>
  <onlineResource
rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">https://www.nhis.or.kr</onlineResource>
  <phoneNumber>012-123-3456</phoneNumber>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#prescriptionDist -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#prescriptionDist">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution" />
  <dataRight rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#right" />
  <dataType rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Structured" />
  <dc:format>csv</dc:format>
  <accessInformation
rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://www.nhis.or.kr/prescription.csv</accessInformation>
  <sampleData
rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://www.nhis.or.kr/prescription.sample.csv</sampleData>
  <dcat:byteSize rdf:datatype="http://www.w3.org/2001/XMLSchema#unsignedLong">3999200</dcat:byteSize>

```

```

</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#prescriptionSet -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#prescriptionSet">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
  <contactPoint rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#rParty"/>
  <dc:description>Disease prescription data</dc:description>
  <dc:keyword>prescription</dc:keyword>
  <dc:temporalCoverage>2013.1.1 ~ 2017.12.31</dc:temporalCoverage>
  <dc:updateFrequency>weekly</dc:updateFrequency>
  <dc:title>Disease prescription</dc:title>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#quality -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#quality">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataQuality"/>
  <qualityRequirements>under 1% missing fields</qualityRequirements>
  <qualityResult>passed (99.3%)</qualityResult>
  <unitOfMeasure>percent</unitOfMeasure>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#rParty -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#rParty">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#ResponsibleParty"/>
  <contact rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#myContact"/>
  <function>Management</function>
  <individualName>John</individualName>
  <organizationName>National Health Insurance Service</organizationName>
  <positionName>Manager</positionName>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#record1 -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#record1">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Record"/>
  <issuedDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2018-03-01</issuedDate>
  <modifiedDate rdf:datatype="http://www.w3.org/2001/XMLSchema#date">2018-04-15</modifiedDate>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#right -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#right">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#DataRight"/>
  <license
rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://purl.obolibrary.org/obo/PDRO.owl</license>
  <rightsStatement>Public access</rightsStatement>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#screenDist -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#screenDist">
  <rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Distribution"/>
  <dataRight rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#right"/>
  <dataType rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Structured"/>
  <dc:format>json</dc:format>
  <accessInformation
rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://www.nhis.or.kr/screen.csv</accessInformation>

```

```

<sampleData
rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://www.nhis.or.kr/screen.sample.csv</sampleData
>
<dcat:byteSize rdf:datatype="http://www.w3.org/2001/XMLSchema#unsignedLong">12000000</dcat:byteSize>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#screenSet -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#screenSet">
<rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Dataset"/>
<contactPoint rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#rParty"/>
<distribution rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#screenDist"/>
<dc:description>Health screening data</dc:description>
<dc:keyword>health</dc:keyword>
<dc:temporalCoverage>2010.1.1~2017.12.31</dc:temporalCoverage>
<dc:updateFrequency>monthly</dc:updateFrequency>
<dc:title>Health screening</dc:title>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#srcDomain -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#srcDomain">
<rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Domain"/>
<comment>Precription ontology</comment>
<taxonomy
rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://purl.obolibrary.org/obo/PDRO.owl</taxonomy>
<dc:title>Medical</dc:title>
</owl:NamedIndividual>

<!-- http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#useDomain -->

<owl:NamedIndividual rdf:about="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#useDomain">
<rdf:type rdf:resource="http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#Domain"/>
<comment>HL7&apos;s health data exchange</comment>
<taxonomy rdf:datatype="http://www.w3.org/2001/XMLSchema#anyURI">http://hl7.org/fhir/</taxonomy>
<dc:title>Health</dc:title>
</owl:NamedIndividual>

</rdf:RDF>

```

## II.3 Turtle instance

This clause provides an example of a metadata instance based on the Turtle format schema which was described in Appendix I.2.

```

# baseURI: http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue
# imports: http://purl.org/dc/elements/1.1/
# imports: http://purl.org/dc/terms/
# imports: http://www.w3.org/ns/dcat#
# imports: https://www.w3.org/2002/07/owl#
# prefix: bdc

@prefix bdc: <http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue#> .
@prefix dc: <http://purl.org/dc/elements/1.1/> .
@prefix dcat: <http://www.w3.org/ns/dcat#> .
@prefix dct: <http://purl.org/dc/terms/> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

```

```

dc:description
  rdfs:domain bdc:Catalogue ;
  rdfs:domain bdc:Dataset ;
  rdfs:range xsd:string ;
.
dc:format
  rdfs:domain bdc:Distribution ;
  rdfs:range xsd:string ;
.
dc:hasRelation
  rdf:type rdf:Property ;
  rdfs:domain bdc:Dataset ;
  rdfs:range bdc:Dataset ;
.
dc:hasRelation
  rdf:type rdf:Property ;
  rdfs:domain bdc:Catalogue ;
  rdfs:range bdc:Catalogue ;
.
dc:keyword
  rdf:type rdf:Property ;
  rdfs:comment "commonly used word(s) used to describe the dataset" ;
  rdfs:domain bdc:Dataset ;
  rdfs:range xsd:string ;
.
dc:language
  rdfs:domain bdc:Catalogue ;
  rdfs:range dct:RFC5646 ;
.
dc:temporalCoverage
  rdf:type rdf:Property ;
  rdfs:comment "time period (including time zone) when the dataset was captured" ;
  rdfs:domain bdc:Dataset ;
  rdfs:range xsd:string ;
.
dc:title
  rdfs:domain bdc:Catalogue ;
  rdfs:domain bdc:Dataset ;
  rdfs:domain bdc:Domain ;
  rdfs:range xsd:string ;
.
dc:updateFrequency
  rdf:type rdf:Property ;
  rdfs:comment "rate of occurrence of dataset update" ;
  rdfs:domain bdc:Dataset ;
  rdfs:range xsd:string ;
.
<http://www.itu.int/xml-namespace/itut/Y.3603/bigdatacatalogue>
  rdf:type owl:Ontology ;
  owl:imports dc ;
  owl:imports <https://www.w3.org/2002/07/owl#> ;
.
bdc:Catalogue
  rdf:type rdfs:Class ;
  rdfs:comment "Root entity which defines metadata about dataset resource" ;
  rdfs:subClassOf owl:Thing ;
.
bdc:ContactType
  rdf:type rdfs:Class ;

```

```

rdfs:comment "information required to enable contact with the responsible person and/or organization" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:DataQuality
rdf:type rdfs:Class ;
rdfs:comment "data quality information for the data catalogue" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:DataRight
rdf:type rdfs:Class ;
rdfs:comment "information about limitation placed upon the use of the dataset" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:DataTypeCode
rdf:type rdfs:Class ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:Dataset
rdf:type rdfs:Class ;
rdfs:comment "dataset information for the data catalogue" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:Distribution
rdf:type rdfs:Class ;
rdfs:comment "information about the distributor of and options for obtaining the dataset" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:Domain
rdf:type rdfs:Class ;
rdfs:comment "source and/ or usage information for data catalogue" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:Record
rdf:type rdfs:Class ;
rdfs:comment "record information for the data catalogue" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:ResponsibleParty
rdf:type rdfs:Class ;
rdfs:comment "responsible party information for the data catalogue" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:SemiStructured
rdf:type bdc:DataTypeCode ;
rdfs:comment "data that is neither raw data, nor typed data in a conventional database system (e.g. XML, JSON)" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:Structured
rdf:type bdc:DataTypeCode ;
rdfs:comment "data that is organized in a format easily used by formatted repository" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:Unstructured
rdf:type bdc:DataTypeCode ;
rdfs:comment "data that either does not have a pre-defined data model or is not organized in a pre-defined manner" ;
rdfs:subClassOf owl:Thing ;
.
.
bdc:accessInformation
rdf:type owl:DatatypeProperty ;
rdfs:comment "access information to dataset" ;

```

```

rdfs:domain bdc:Distribution ;
rdfs:range xsd:anyURI ;
.
bdc:address
rdf:type rdf:Property ;
rdfs:comment "physical and email address at which the organization or individual may be contacted" ;
rdfs:domain bdc:ContactType ;
rdfs:range xsd:string ;
.
bdc:comment
rdf:type rdf:Property ;
rdfs:comment "an additional information for domain" ;
rdfs:domain bdc:Domain ;
rdfs:range xsd:string ;
.
bdc:contact
rdf:type rdf:Property ;
rdfs:comment "information required to enable contact with the responsible person and/or organization" ;
rdfs:domain bdc:ResponsibleParty ;
rdfs:range bdc:ContactType ;
.
bdc:contactPoint
rdf:type rdf:Property ;
rdfs:comment "contact point information for the dataset" ;
rdfs:domain bdc:Dataset ;
rdfs:range bdc:ResponsibleParty ;
.
bdc:dataQuality
rdf:type rdf:Property ;
rdfs:comment "data quality information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc:DataQuality ;
.
bdc:dataRight
rdf:type rdf:Property ;
rdfs:comment "Information about limitation placed upon the use of the dataset" ;
rdfs:domain bdc:Distribution ;
rdfs:range bdc:DataRight ;
.
bdc:dataType
rdf:type rdf:Property ;
rdfs:comment "the type information of the dataset" ;
rdfs:domain bdc:Distribution ;
rdfs:range bdc:DataTypeCode ;
.
bdc:dataset
rdf:type rdf:Property ;
rdfs:comment "dataset information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc:Dataset ;
.
bdc:distribution
rdf:type rdf:Property ;
rdfs:comment "information about the distributor of and options for obtaining the dataset" ;
rdfs:domain bdc:Dataset ;
rdfs:range bdc:Distribution ;
.
bdc:function
rdf:type rdf:Property ;
rdfs:comment "function performed by the responsible party" ;

```

```

rdfs:domain bdc:ResponsibleParty ;
rdfs:range xsd:string ;
.
bdc:healthCatalogue
rdf:type bdc:Catalogue ;
dc:description "Health data of prescription & screening" ;
dc:language "ko_KR"^^dct:RFC5646 ;
dc:title "Health Data" ;
bdc:dataQuality bdc:quality ;
bdc:dataset bdc:prescriptionSet ;
bdc:dataset bdc:screenSet ;
bdc:record bdc:record1 ;
bdc:responsibleParty bdc:rParty ;
bdc:sourceDomain bdc:srcDomain ;
bdc:usageDomain bdc:useDomain ;
owl:versionInfo "1.0.0" ;
.
bdc:hoursOfServices
rdf:type rdf:Property ;
rdfs:comment "time period (including time zone) when individuals can contact the organization or individual" ;
rdfs:domain bdc:ContactType ;
rdfs:range xsd:string ;
.
bdc:individualName
rdf:type rdf:Property ;
rdfs:comment "name of the responsible person- surname, given name, title" ;
rdfs:domain bdc:ResponsibleParty ;
rdfs:range xsd:string ;
.
bdc:issuedDate
rdf:type rdf:Property ;
rdfs:comment "the issued date of listing the dataset in the catalogue" ;
rdfs:domain bdc:Record ;
rdfs:range xsd:date ;
.
bdc:ko_KR
rdf:type dct:LinguisticSystem ;
.
bdc:license
rdf:type rdf:Property ;
rdfs:comment "This links to the license document under which the catalog is made available and not the datasets" ;
rdfs:domain bdc:DataRight ;
rdfs:range xsd:anyURI ;
.
bdc:modifiedDate
rdf:type rdf:Property ;
rdfs:comment "the most recent modified date of data catalogue" ;
rdfs:domain bdc:Record ;
rdfs:range xsd:date ;
.
bdc:myContact
rdf:type bdc:ContactType ;
bdc:address "Seoul Korea" ;
bdc:hoursOfServices "09:00~18:00" ;
bdc:onlineResource "https://www.nhis.or.kr"^^xsd:anyURI ;
bdc:phoneNumber "012-123-3456" ;
.
bdc:onlineResource
rdf:type rdf:Property ;
rdfs:comment "online information that can be used to contact the individual or organization" ;

```



```

rdfs:domain bdc:ContactType ;
rdfs:range xsd:anyURI ;
.
bdc:organizationName
rdf:type rdf:Property ;
rdfs:comment "name of the responsible organization" ;
rdfs:domain bdc:ResponsibleParty ;
rdfs:range xsd:string ;
.
bdc:phoneNumber
rdf:type rdf:Property ;
rdfs:comment "telephone numbers at which the organization or individual may be contacted" ;
rdfs:domain bdc:ContactType ;
rdfs:range xsd:string ;
.
bdc:positionName
rdf:type rdf:Property ;
rdfs:comment "role or position of the responsible person" ;
rdfs:domain bdc:ResponsibleParty ;
rdfs:range xsd:string ;
.
bdc:prescriptionDist
rdf:type bdc:Distribution ;
dc:format "csv" ;
bdc:accessInformation "http://www.nhis.or.kr/prescription.csv^^xsd:anyURI" ;
bdc:dataRight bdc:right ;
bdc:dataType bdc:Structured ;
bdc:sampleData "http://www.nhis.or.kr/prescription.sample.csv^^xsd:anyURI" ;
dcat:byteSize "3999200^^xsd:unsignedLong" ;
.
bdc:prescriptionSet
rdf:type bdc:Dataset ;
dc:description "Disease prescription data" ;
dc:keyword "prescription" ;
dc:temporalCoverage "2013.1.1 ~ 2017.12.31" ;
dc:title "Disease prescription" ;
dc:updateFrequency "weekly" ;
bdc:contactPoint bdc:rParty ;
.
bdc:quality
rdf:type bdc:DataQuality ;
bdc:qualityRequirements "under 1% missing fields" ;
bdc:qualityResult "passed (99.3%)" ;
bdc:unitOfMeasure "percent" ;
.
bdc:qualityRequirements
rdf:type rdf:Property ;
rdfs:comment "requirement statement for evaluating quality of dataset" ;
rdfs:domain bdc:DataQuality ;
rdfs:range xsd:string ;
.
bdc:qualityResult
rdf:type rdf:Property ;
rdfs:comment "the result of quality evaluation described by the unit of measure" ;
rdfs:domain bdc:DataQuality ;
rdfs:range xsd:string ;
.
bdc:rParty
rdf:type bdc:ResponsibleParty ;
bdc:contact bdc:myContact ;

```

```

    bdc:function "Management" ;
    bdc:individualName "John" ;
    bdc:organizationName "National Health Insurance Service" ;
    bdc:positionName "Manager" ;
.
bdc:record
    rdf:type rdf:Property ;
    rdfs:comment "record information for the data catalogue" ;
    rdfs:domain bdc:Catalogue ;
    rdfs:range bdc:Record ;
.
bdc:record1
    rdf:type bdc:Record ;
    bdc:issuedDate "2018-03-01"^^xsd:date ;
    bdc:modifiedDate "2018-04-15"^^xsd:date ;
.
bdc:responsibleParty
    rdf:type rdf:Property ;
    rdfs:comment "responsible party information for the data catalogue" ;
    rdfs:domain bdc:Catalogue ;
    rdfs:range bdc:ResponsibleParty ;
.
bdc:right
    rdf:type bdc:DataRight ;
    bdc:license "http://purl.obolibrary.org/obo/PDRO.owl"^^xsd:anyURI ;
    bdc:rightsStatement "Public access" ;
.
bdc:rightsStatement
    rdf:type rdf:Property ;
    rdfs:comment "information to the usage permissions being agreed to" ;
    rdfs:domain bdc:DataRight ;
    rdfs:range xsd:string ;
.
bdc:sampleData
    rdf:type owl:DatatypeProperty ;
    rdfs:comment "location information about a sample data including URI" ;
    rdfs:domain bdc:Distribution ;
    rdfs:range xsd:anyURI ;
.
bdc:screenDist
    rdf:type bdc:Distribution ;
    dc:format "json" ;
    bdc:accessInformation "http://www.nhis.or.kr/screen.csv"^^xsd:anyURI ;
    bdc:dataRight bdc:right ;
    bdc:dataType bdc:Structured ;
    bdc:sampleData "http://www.nhis.or.kr/screen.sample.csv"^^xsd:anyURI ;
    dcat:byteSize "12000000"^^xsd:unsignedLong ;
.
bdc:screenSet
    rdf:type bdc:Dataset ;
    dc:description "Health screening data" ;
    dc:keyword "health" ;
    dc:temporalCoverage "2010.1.1~2017.12.31" ;
    dc:title "Health screening" ;
    dc:updateFrequency "monthly" ;
    bdc:contactPoint bdc:rParty ;
    bdc:distribution bdc:screenDist ;
.
bdc:sourceDomain
    rdf:type rdf:Property ;

```

```

rdfs:comment "source domain information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc:Domain ;
.
bdc:srcDomain
rdf:type bdc:Domain ;
dc:title "Medical" ;
bdc:comment "Prescription ontology" ;
bdc:taxonomy "http://purl.obolibrary.org/obo/PDRO.owl"^^xsd:anyURI ;
.
bdc:taxonomy
rdf:type rdf:Property ;
rdfs:comment "taxonomy information including classification system and authority" ;
rdfs:domain bdc:Domain ;
rdfs:range xsd:anyURI ;
.
bdc:unitOfMeasure
rdf:type rdf:Property ;
rdfs:comment "standard unit or system of units by means of which a quantity is accounted for and expressed." ;
rdfs:domain bdc:DataQuality ;
rdfs:range xsd:string ;
.
bdc:usageDomain
rdf:type rdf:Property ;
rdfs:comment "usage domain information for the data catalogue" ;
rdfs:domain bdc:Catalogue ;
rdfs:range bdc:Domain ;
.
bdc:useDomain
rdf:type bdc:Domain ;
dc:title "Health" ;
bdc:comment "HL7's health data exchange" ;
bdc:taxonomy "http://hl7.org/fhir/"^^xsd:anyURI ;
.
owl:versionInfo
rdfs:domain bdc:Catalogue ;
rdfs:range xsd:string ;
.
dcat:byteSize
rdfs:domain bdc:Distribution ;
rdfs:range xsd:unsignedLong ;
.

```

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