AIMS

LODE-BD Recommendations 1.0
Report on how to produce Linked Open Data (LOD)-enabled bibliographical data

Prepared by:

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Abstract

The LODE-BD Recommendations address the questions of how to encode existing bibliographic data hosted by various open repositories for the purpose of exchange across data providers and how to produce Linked Open Data (LOD)-enabled bibliographic data. The initial goal is to present a tool that will assist the data providers in selecting appropriate encoding strategies according to their needs in order to facilitate metadata exchange through the VOA3R (Virtual Open Access in Agriculture and Aquaculture Repository) platform. The core component of the LODE-BD report contains a set of recommended decision-making trees for common properties used in describing a bibliographic resource instance (article, monograph, thesis, conference paper, research report, etc. – in print or electronic format). Each decision tree is delivered with various acting points and the matching encoding suggestions, usually with multiple options. In spite that the recommendations are geared to the agriculture and aquaculture sectors through the VOA3R project, the report is destined to become useful for any type of bibliographical data describing bibliographic resources in any subject domain.

Status of the Document

This is a draft document and may be updated or replaced by a new version at any time. The report will be published in May 2011 and subsequently revised according to suggestions starting from the end of the year. The recommendations will be published and maintained by the Agricultural Information Management Standards (AIMS) of the Food and Agriculture Organization (FAO) of the United Nations.

Comments on this document may be sent to Imma Subirats <Imma.Subirats@fao.org>, please include the text "LODE-BD comment" in the subject line.

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1. About the Report

The report, entitled *LODE-BD Recommendations*, addresses the questions of how to encode existing bibliographic data hosted by various open repositories and communities for the purpose of exchange across data providers and how to produce Linked Open Data (LOD)-enabled bibliographic data. The initial goal of the LODE-BD Recommendations is to present a tool that will assist data providers in selecting appropriate encoding strategies according to their needs in order to facilitate metadata exchange of the agriculture and aquaculture sectors through the VOA3R[1] platform. The report is destined to become useful for any type of bibliographical data describing a bibliographic resource (article, monograph, thesis, conference paper, research report, etc. – in print or electronic format) in any subject domain.

1.1 Background

The idea of assisting information professionals to decide what metadata terms to use when encoding existing bibliographic data for the purpose of exchange and sharing across data providers was born under the umbrella of VOA3R. VOA3R has the goal to develop a platform for exchanging bibliographic data to improve the dissemination of research results in agriculture and aquaculture via open access. In order to reach this goal, VOA3R data providers need to deal with the initial issues such as what data needs to be exchanged and how. Some simple example questions could be: "Will be the physical holding of a resource important enough to be shared among the VOA3R participants?" "What metadata term should be used for encoding the title(s), identifier(s), or location of a resource?" Furthermore, as data providers continue to gravitate towards the direction of Linked Open Data, they will likely have additional questions. For example, controlled vocabularies such as AGROVOC and LCSH, both having been used in their databases for a long time, are now available as Linked Data. So, what kind of data value for 'subject' property should be exchanged: the original string (literal) or the URI of a concept (non-literal)? And what metadata term should be used for a non-literal value, dc:subject, or dcterms:subject?

The LODE-BD report thus is prepared with dual objectives: the first is to meet the needs of a platform for exchanging bibliographic data via open access, without the requirements of considering Linked Data. The second is to provide recommendations for advancing such exchange to the Linked Open Data-enabled level. The report introduces a set of recommended decision-making trees for common properties that are used in describing a bibliographic resource. It is the long-term plan of the authors that, after receiving feedback from the participating data providers in VOA3R and external advisors, the recommendations will be revised to incorporate various situations and needs as well as the emerging technologies in the Linked Data movement.

1.2 Key Principles

Recognizing the facts that bibliographic data providers usually have different bibliographic data structures and may be situated at different stages in considering Linked Data, LODE-BD provides multiple sets of action points and the matching encoding suggestions for each of the properties.

There are five key principles of the LODE-BD Recommendations:

1. Facilitating the decision-making process regarding data encoding for the purpose of exchange and reuse;
2. Encouraging the use of authority data, controlled vocabularies, and syntax encoding standards whenever possible in order to enhance the quality of the interoperability and effectiveness of information exchange;

[1] VOA3R http://voa3r.eu/

3. Promoting the use of well-established metadata standards as well as the emerging LOD-enabled vocabularies proposed in the Linked Open Data Community;
4. Encouraging the use of resource URIs as data values in metadata when they are available;
5. Providing a tool that is open for suggestions of new properties and metadata terms according to the needs of the LOD community as well as the needs of data providers.

1.3 Disclaimer

These recommendations do not intend to include cataloguing description rules or how to publish linked data. The current recommendations are only applicable for bibliographic data of bibliographic resources, although in the future the recommendations can be extended to accommodate other kinds of information resources.

2. Scope and Methodologies

2.1 Scope

Best practices of metadata can be gathered from different perspectives based on the emphasized processes. Metadata-related standards have been created by different communities for specifics purposes - to guide the design, creation, and implementation of data structure, data values, data content, and data exchange in an efficient and consistent manner. Using a simple illustration, metadata standards can be categorized into these groups in accordance with their primary purposes and functions.

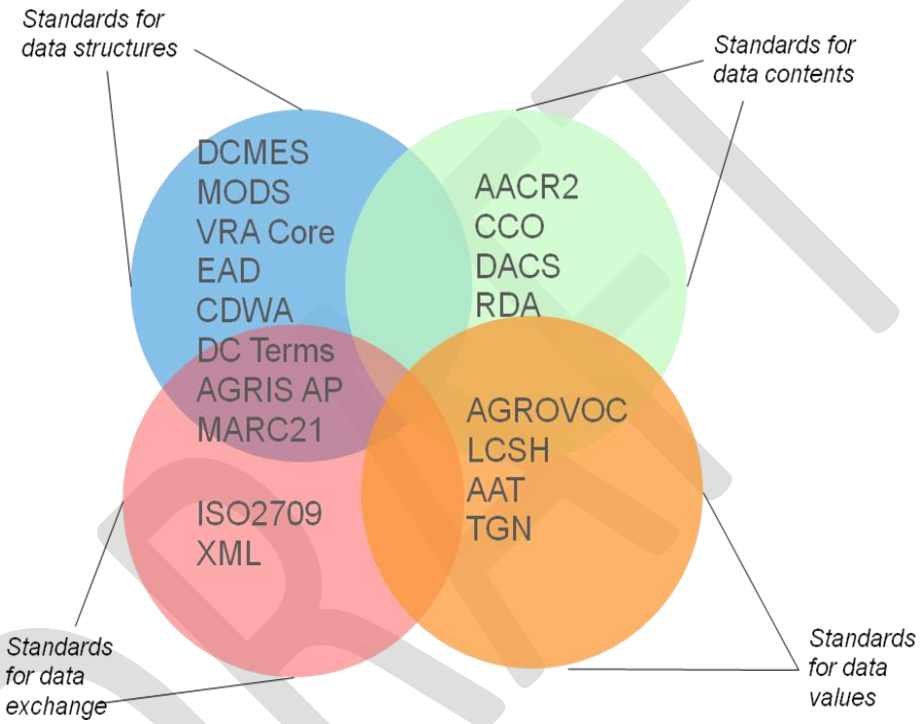


Figure 1. An illustration of different types of metadata standards according to their primary purposes and functions

The LODE-BD recommendations only focus on the implementation of standards for data structures (e.g., on which namespace and what properties would best fit for an encoding decision), combined with limited consideration for data contents (e.g., on what metadata properties are mandatory and which value space should consider using controlled vocabulary).

2.2 The Concept Model

The LODE-BD Recommendations has taken both bottom-up and top-down approaches. The selection of the properties to include in this report is from bottom-up. The properties are supported by the literary warrant and user warrant as evidenced by the data models in operation. The top-down approach is to use a conceptual model for sharing the common understanding of the important entities and relationships for bibliographic data. The conceptual model is built on a FRBR-based model previously developed by the AIMS of the FAO, with enormous extension and reconsideration for this project.

In the following illustrations, the Bibliographic Resource (in short as '*Resource*') entity is the center. Major relations can be identified between a *resource* instance and the *agent(s)* that are responsible for the creation of the content and the dissemination of the resource, as well as the *thema(s)* (subjects or topics) that the

resource's content is about. The general model presented on the left (*Figure 2*) provides a high level of abstraction. The model presented on the right (*Figure 3*) gives examples of possible relationship types between and among the entities.

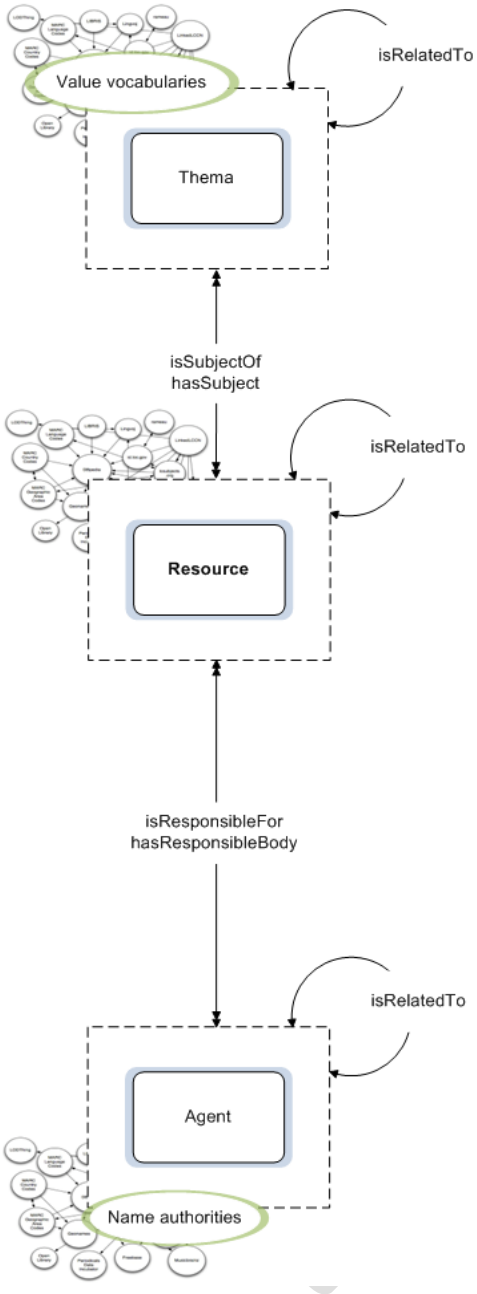


Figure 2. A general concept model

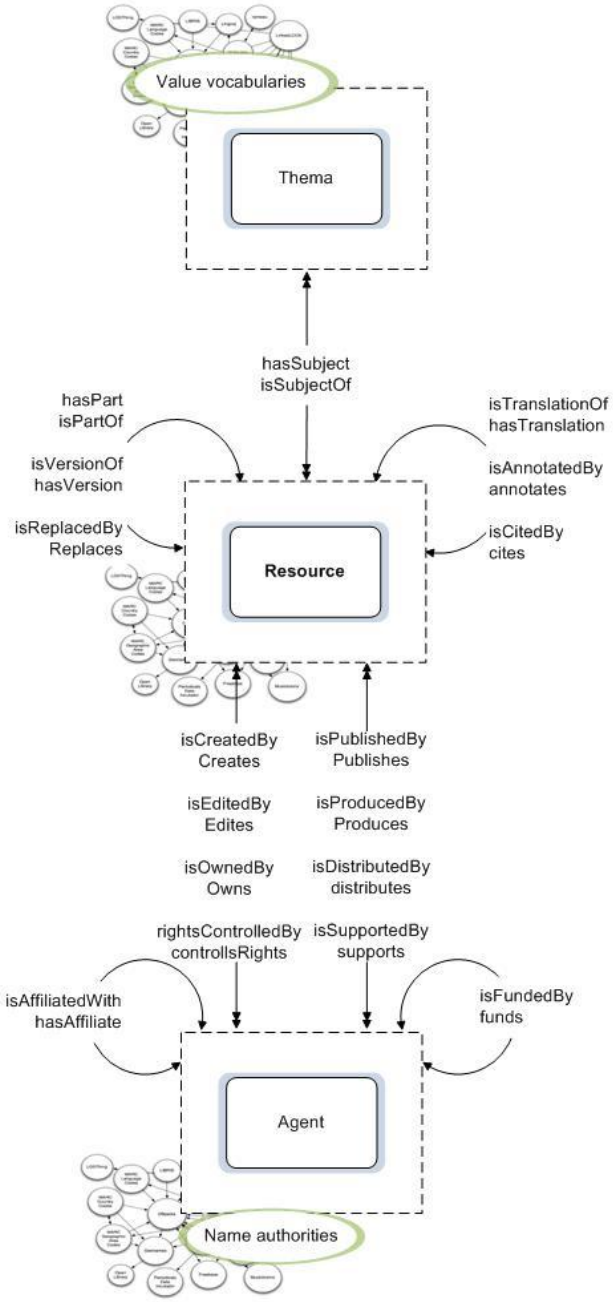


Figure 3. The implication of the general concept model in the VOA3R case.

The general model conveys the following meanings (entity names are presented in italics):

1) The *Resource* entity is the centre of every description. It is the starting point of any description of a resource instance. This position is set up according to the main purpose of this report. If the purpose were for building an authority file or a value vocabulary, the model would have had different emphasis.
2) Relationships are established between the *Resource* entity and two other major entitles: *Agent* and *Thema*. *Agents* are responsible bodies for the creation of the content and the dissemination of the

resource. *Themas* are usually characterized as subjects, topics, concepts, and categories that the resource's content is about. The model does not exemplify the types of sub-entities, e.g., the sub-entities of *Resource* would be various resource types;

3) Relationships between instances of each entity also exist. For example, a resource may be related to another resource. An agent may be related to another agent. Such relationships are demonstrated in Figure 3.
4) The responsible bodies, regardless of their roles in relation to a resource, should be managed through name authority files. Concepts, topics, and geographic places as the themas of a resource should be controlled with value vocabularies. Although not emphasized in the model for the authority control of the titles of bibliographic resource given the context of this report, it is also a logical step that resource uniform titles also be controlled.
5) More and more name authority files, controlled vocabularies, and resource data sets are becoming available as Linked Data. The model intentionally sets a LOD cloud background to each entity, to remind the reality.

The LODE-BD concept model holds the key for sharing the common understanding of the important entities and relationships for bibliographic data. It can be implemented to different data models and be realized with different implementation approaches. It can also be used to mark the responsibilities of internal, external, and collaborative responsibilities, the focuses of each stage of a LOD-enabled project, and the gaps between the goal and reality.

2.3 Groups of Common Properties

Common properties for describing bibliographic resources are identified and grounded in nine groups. They form the backbone of the LODE-BD Recommendations. About two dozen properties used for describing a bibliographic resource as well as an additional two sets of properties for describing relations between bibliographic resources or between agents are included. The inclusion of these properties and the grouping of them are based on the analysis of the data dictionaries and sample records provided by the data providers participating in the VOA3R project, with a supporting conceptual model.

In the following list of the groups, some selected properties are emphasized in italic format. In the report the word 'resource' is used to represent 'bibliographic resource', a primary resource type to be described.

1. **Title Information**
   Title is one of the most important and relevant access points for any resource. The information is usually supplied through a number of properties including *title, alternative title*-(handling subtitle(s), parallel title(s), translated title(s), transliterated title(s)), and *title supplement*.

2. **Responsible Body**
   This group contains the properties associated with any agent who is responsible of the creation and publication of the content of the resource, for example, the *creator*, *contributor*, and *publisher* or *issuer*.

3. **Physical Characteristics**
   Properties that describe the appearance and the characteristics of the physical form of a resource are placed into this group. They are: *date*, *identifier*, *language*, *format,* and *edition/version.*

4. **Location (physical location)**
   It is considered important for a resource to be located and obtained in the information exchange. As this information has been supplied by all participating data providers, properties that record the *location* and *availability* information are taken account in this unique group.

5. **Subject**
   In contrast to the physical characteristics, the Subject group embraces the properties that describe or otherwise help the identification of what the resource is about or denotes, in the form of *subject term*, *classification/category*, freely assigned *keyword* and *geographic term*.

6. **Description of content**

Two major types of descriptions that focus on the content of the resource rather than the physical object are considered in this group: a) any representative *description* of the content, usually in the form of *abstract*, *summary, note,* and *table of contents* and b) *type* or *genre* of the resource.

7. **Intellectual property**
   Any property that deals with an aspect of intellectual property rights relating to access and use of a resource is included in this group, with special regard to *rights*, *terms of use* and *access condition*.

8. **Usage**
   Properties that are related to the use of a resource, rather than the characteristics of the resource itself, are considered to belong to this group. Typical properties are: *audience*, *literary indication,* and *education Level*.

9. **Relation**
   This group has a different perspective for describing the resources from other groups that focus on describing the resource itself. Here various relations between two resources or between two agents are the focus of description. Due to the significant number of such properties, no specific properties are listed under the Relation group in the following table. Details of the properties designed for describing the relations are introduced in the sections 9.1 and 9.2 of the recommendations.

Table 1 enumerates the common properties of each group, comprising the following components:

A. Groups of properties (refer to the explanations in the section above.)
B. Properties included in each group Two special styles are used to signify the importance of the properties: two plus signs "++" (also in red colour) for the mandatory property; one plus sign "+" (also in blue colour) for the highly recommended property in the context of bibliographic information exchange. The rest are recommended or optional.
C. Requirements of properties in the context of non-analytical and analytical bibliographic records, specified with (M)andatory, (H)ighly-(R)ecommended, (R)ecommended, and (O)ptional marked for either process.
D. Recommendation on the control of values, indicating (n)ot controlled or should be controlled by using a name authority and a controlled vocabulary or by following a syntax encoding.
E. Attributes associated with individual properties, with special regard to the language and scheme attributes. A scheme can be either a value encoding scheme or a syntax encoding scheme.

Table 1. Groups of Common Properties

A	B	C		D	E
Group	**Property**	**Requirement | M | HR | R | O |**		**Value Control**	**Important Attributes**
		Non Analytical	**Analytical**		
1. Title Information	**title++**	M	M	n	language
	alternative title	O	O	n	
	title supplement	O	O	n	
2. Responsible Body	creator+	HR	HR	n or Name authority (personal, corporate body, conference)	scheme
	contributor	O	O	n or Name authority	
	publisher/issuer+	HR	R	n or Name authority	
3. Physical Characteristics	**date++**	M	M	Syntax encoding rule	scheme
	identifier+	HR	HR	Syntax encoding rule	scheme
	language++	M	M	Controlled list	scheme
	format/medium+	HR	HR	Controlled list	scheme
	edition /version	R	R	n	
	source+	HR	R	n	
4. Location	**location++**	M	M	n or Rule [Holding unit names may be managed through a controlled list]	

	availability	O	O	n	
5. Subject	subject term+	HR	HR	Controlled vocabulary	language scheme
	classification	O	O	Controlled vocabulary, Classification system	scheme
	[freely assigned] keyword	R	R	n	language
	geographic term	O	O	Controlled vocabulary	language scheme
6. Description of content	description/abstract (or note/ summary/ table of contents)	R	R	n	language
	type/form/genre	R	R	Controlled vocabulary	language scheme
7. Intellectual property	rights+ term of use access condition	R	R	n [Rights holders may be managed through name authorities]	
8. Usage	audience	O	O	Controlled list	scheme
	literary indication	O	O	Controlled list	scheme
	education level	O	O	Controlled list	scheme
9. Relation	[relation between resources]+	O	HR	Controlled resource IDs	
	[relation between agents]	O	O	n or Name authority	

2.4 Metadata Standards Used in the LODE-BD Recommendations

A selected number of widely-used metadata standards and the emerging LOD-enabled vocabularies are used as the base for the metadata terms recommended in LODE. The descriptions of these specifications are based on the information available on their Websites.

dc

Dublin Core Metadata Element Set (DCMES or DC)
Dublin Core Metadata Initiative (DCMI)
http://dublincore.org/documents/dces/
= ISO 15836
The *Dublin Core Metadata Element Set* is a vocabulary of fifteen properties for use in resource description. The fifteen Dublin Core elements in this standard are part of a larger set of metadata vocabularies and technical specifications maintained by the Dublin Core Metadata Initiative (DCMI).

dcterms

DCMI Metadata Terms
Dublin Core Metadata Initiative (DCMI)
http://dublincore.org/documents/dcmi-terms/
The *DCMI Metadata Terms* is an authoritative specification of all metadata terms maintained by DCMI. As a full set of DCMI vocabularies it also includes sets of resource classes (including the DCMI Type Vocabulary), vocabulary encoding schemes, and syntax encoding schemes.

bibo

Bibliographic Ontology
Bibliographic Ontology Specification Group
http://bibliontology.com/
The *Bibliographic Ontology* is designed for use in describing bibliographic things on the semantic Web in RDF. One of the usages of the ontology is to describe any kind of document in RDF, in addition to other usages such as being a citation ontology or as a document classification ontology.

agls

AGLS Metadata Standard
Australian Government Locator Service
http://www.agls.gov.au/schemas/rdfs/2008/01/15/aglsterms.rdf
= Australian Standard AS 5044-2010.
The *AGLS Metadata Standard* is developed to promote consistency of discovery of government resources. It provides a set of metadata properties and associated usage guidelines to improve the visibility, manageability and interoperability of online information and services.

ags

*AgMES (*Agricultural Metadata Element set)
FAO
http://purl.org/agmes/1.1/
AgMES is an application profile of the *Dublin Core Metadata Element Set* in the domain of agriculture with respect to description, resource discovery, interoperability and data exchange for different types of information resources.

eprint

Eprints Terms
UKOLN, JIST
The *Eprints Terms* include eprints-specific metadata properties and encoding schemes that have been created as part of the Dublin Core-based *Scholarly Works Application Profile*.

marcrel

MARC List for Relators
Library of Congress
LOD version: http://id.loc.gov/vocabulary/relators/fnd.html
Homepage: http://www.loc.gov/marc/relators/relators.html
Relator terms and their associated codes are originally designed for use with the MARC records, for designating the relationship between a name and a bibliographic resource.

2.5 Explanation of Terminology

Certain terminology has been applied throughout the report. Short explanations are provided below. Please refer to Appendix A for detailed explanations of each term.

"Resource"

The term "*Resource*" is used in the conceptual model to denote a general entity, the *Bibliographic Resource*. An instance of the bibliographic resource can be an article, monograph, thesis, conference paper, research report, etc., regardless if it is in print or electronic format. The range of the '*Resource*' is consistent with what the Dublin Core referred to as 'resource description'. However, it is narrower than rdf:Resource where *Resource* is an entity of anything in the universe, or is a name of the class of everything.

In the flowcharts provided by the LODE-BD Recommendations, the 'resource' at the beginning oval box is an instance of the bibliographic resource.

"Metadata Terms" and "Properties"

"[metadata] elements", "[metadata] fields", and "attributes [of an entity]" have been widely used by the professionals who are involved in creating, designing, and implementing metadata standards. The term "properties" of resources are used in place of "elements" in the LOD report.

This document considers the process of metadata description as the description of "*properties"* of a resource. For example, 'rights' is considered as a property of a resource, hence, there is a:

Property: rights

Because there are various levels of granularity and multiple corresponding ways this property can be described, LODE-BD uses "*metadata term*" for a specific element provided by a metadata element set. For example, property 'rights' can be described by metadata terms from different namespaces:

Metadata term: dc:rights
Metadata term: dcterms:rights
Metadata term: ags:rightsStatement

"String" and "URI" as values

In this document, the words 'string' and 'URI' are used for the most commonly seen values in bibliographic data. They correspond to the terminology of RDF in the form of 'literal' (typically a string of characters) and 'non-literal'.

For example, "rice" is a concept included in the *AGROVOC Thesaurus*, with a preferred label (in English), "Rice." When the thesaurus is published as Linked Data, the concept is considered as a resource and is given a unique URI, http://aims.fao.org/aos/agrovoc/c_6599. This means that a URI reference is used to identify this concept as a resource.

In this situation for the *property:* subject, the *metadata terms* for encoding this property include dc:subject and dcterms:subject. Based on the definition of these metadata terms, the following examples are provided:

dc:subject Rice
dcterms:subject http://aims.fao.org/aos/agrovoc/c_6599

"URI" as a value recommend in this document represents "http URI" only.

2.6 Crosswalk of Metadata Terms

All metadata terms used in the LODE-BD Recommendations are presented in the following crosswalk table. Usually metadata terms from the DCMES (dc:) and DCMI Metadata Terms (dcterms:namespaces) are the fundamentals, while metadata terms from other namespaces are supplemented when additional needs are to be satisfied. The constraints of the metadata terms (e.g., range, domain, and relation with another property) defined by these specifications are inherited when a recommendation is made in a decision tree.

Table 2. Crosswalk of metadata terms used in the LODE-BD Recommendations

LODE-BD Group	Metadata Terms		
	General		Narrower
	dc:-based	dcterms:-based	
1. Title Information	dc:title	dcterms:title	dcterms:alternative
			ags:titleSupplement
2. Responsible Body	dc:creator	dcterms:creator	ags:creatorPersonal
			ags:creatorCorporate
			ags:creatorConference
	dc:contributor	dcterms:contributor	bibo:editor
	dc:publisher	dcterms:publisher	bibo: issuer
			bibo:producer
			bibo:distributor
			bibo:owner

3. Physical Characteristics	dc:date	dcterms:date	dcterms:created	
			dcterms:dateAccepted	
			dcterms:dateCopyrighted	
			dcterms:dateSubmitted	
			dcterms:modified	
			dcterms:valid	
			dcterms:available	
			dcterms:issued	
	dc:identifier	dcterms:identifier	bibo:asin	
			bibo:coden	
			bibo:doi	
			bibo:eanucc13	
			bibo:eissn	
			bibo:gtin14	
			bibo:handle	
			bibo:isbn	
			bibo:issn	
			bibo:lccn	
			bibo:oclcnum	
			bibo:pmid	
			bibo:sici	
			bibo:upc	
			bibo:uri	
	dc:language	dcterms:language		
	dc:format	dcterms:format	dcterms:medium	
	bibo:edition			
	bibo:status			
	dc:source	dcterms:source	bibo:pages	bibo:pageStart
				bibo:pageEnd
			bibo:section	
			bibo:volume	
			bibo:issue	
			bibo:chapter	

4. Location	agls:availability	ags:availabilityLocation	bibo:locator
		ags:availabilityNumber	

5. Subject	dc:subject	dcterms:subject	ags:subjectThesaurus
			ags:subjectClassification
	dc:coverage	dcterms:coverage	dcterms:spatial
			dcterms:temporal

6. Description of content	dc:description	dcterms:description	dcterms:abstract
			dcterms:tableOfContent
	dc:type	dcterms:type	

7. Intellectual property	dc:rights	dcterms:rights	dcterms:rightsHolder
			dcterms:accessRights
			dcterms:license
			ags:rightsStatement
			ags:termsOfUse
8. Usage		dcterms:audience	dcterms:educationLevel
			dcterms:mediator
		dcterms:instructionalMethod	
9. Relation [between resources]	dc:relation	dcterms:relation	dcterms:isVersionOf
			dcterms:hasVersion
			dcterms:isReplacedBy
			dcterms:replaces
			dcterms:isRequiredBy
			dcterms:requires
			dcterms:isPartOf
			dcterms:hasPart
			dcterms:isReferencedBy
			dcterms:references
			ags:relationTranslationOf
			ags:relationHasTranslation
			bibo:annotates
			bibo:citedBy
			bibo:cites
[between agents]	eprint:affiliatedInstitution		
	eprint:grantNumber		
	marcrel:FND		

2.7 The Flowcharts

The LODE-BD report uses flowcharts to present the properties included in the nine groups. The flowcharts are a kind of diagrammatic representation that uses standardized symbols to portray steps and processes involved in decision making, with orders connected by flow lines with arrows. The basic shapes used in the figures follow the flowchart conventions:

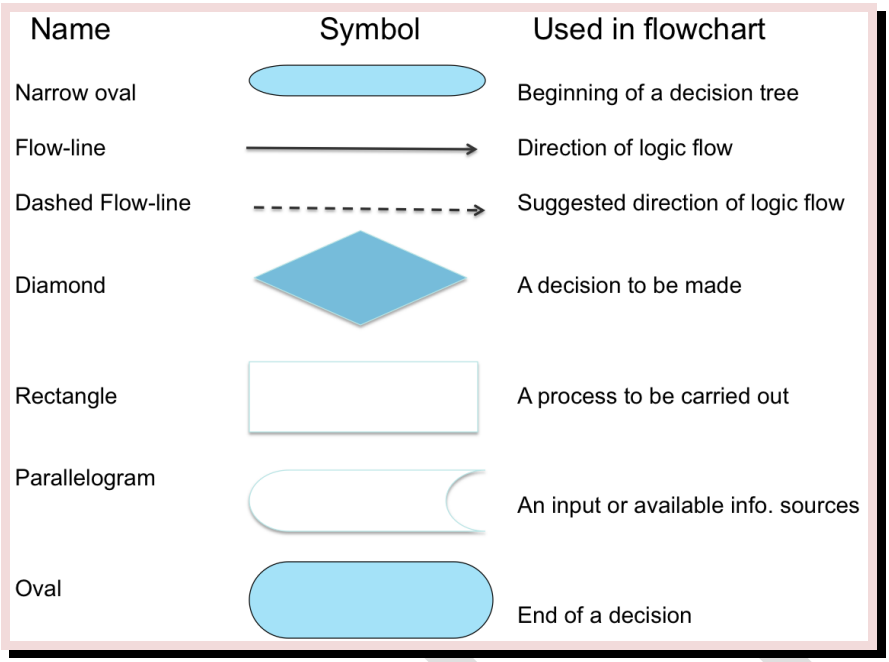


Figure 4. Flowchart symbols and meanings

Starting from the property that describes a resource instance, a flowchart presents decision points and gives a step-by-step solution to a given problem of metadata encoding. These flowcharts are designed to facilitate the selection of the appropriate strategies adjustable to data providers according to their situations, while all work towards the goal of data exchange and reuse. At the end of each flowchart there are alternative sets of metadata terms for selection.

Each chart is followed by the text-based explanations corresponding to the flowchart, with notes, steps in tables, and examples whenever necessary.

3. The Recommendations

The decision trees are presented according to the property groups:

1. Title
[2. Responsible Body]
   2.1. Responsible Body. Creator
   2.2. Responsible Body. Contributor
   2.3. Responsible Body. Publisher
[3. Physical Characteristics]
   3.1. Physical Characteristics. Date
   3.2. Physical Characteristics. Identifier
   3.3. Physical Characteristics. Language
   3.4. Physical Characteristics. Format
   3.5. Physical Characteristics. Edition/Version
   3.6. Physical Characteristics. Source
4. Location
5. Subject
[6. Descriptions of Content]
   6.1. Description of Content. Description/Abstract
   6.2. Description of Content. Type/Form/Genre
7. Intellectual property
8. Usage
[9. Relation]
   9.1. Relation Between Resources
   9.2. Relation Between Agents

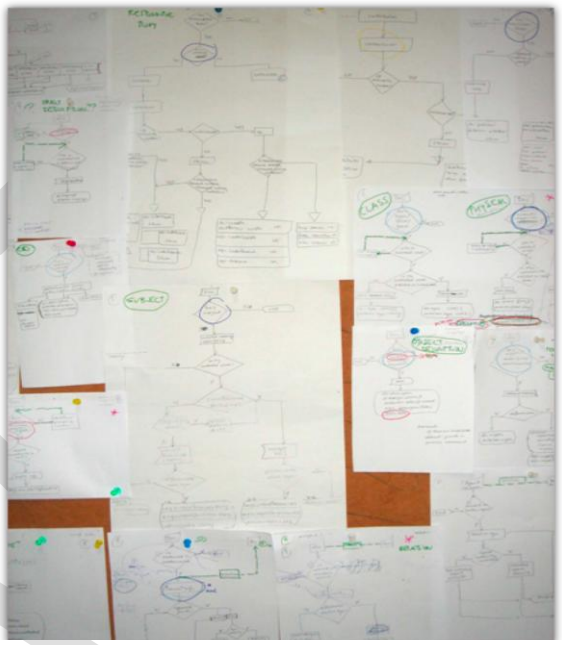


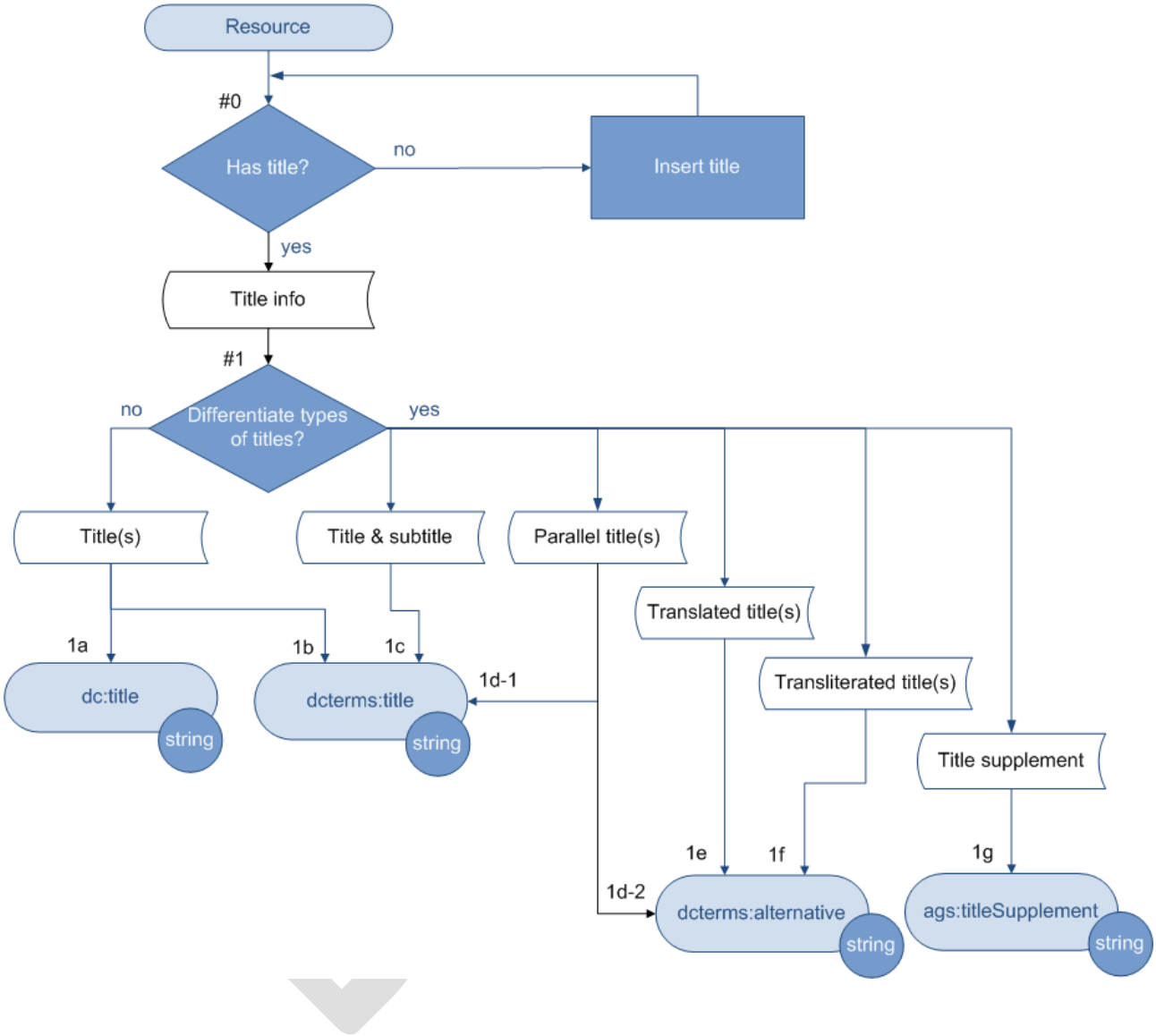
Figure 5. Brainstorming the decision-making trees

Decisions related to various situations are numbered in the flowcharts and tables for every property in the next part of the report. For each decision, find your situation according to the question and select an action.

1. Title

Relation with a resource being described: Resource has title.

Title is considered as essential in the description of resources, therefore the flowchart below foresees **title** as a mandatory metadata property.



Note

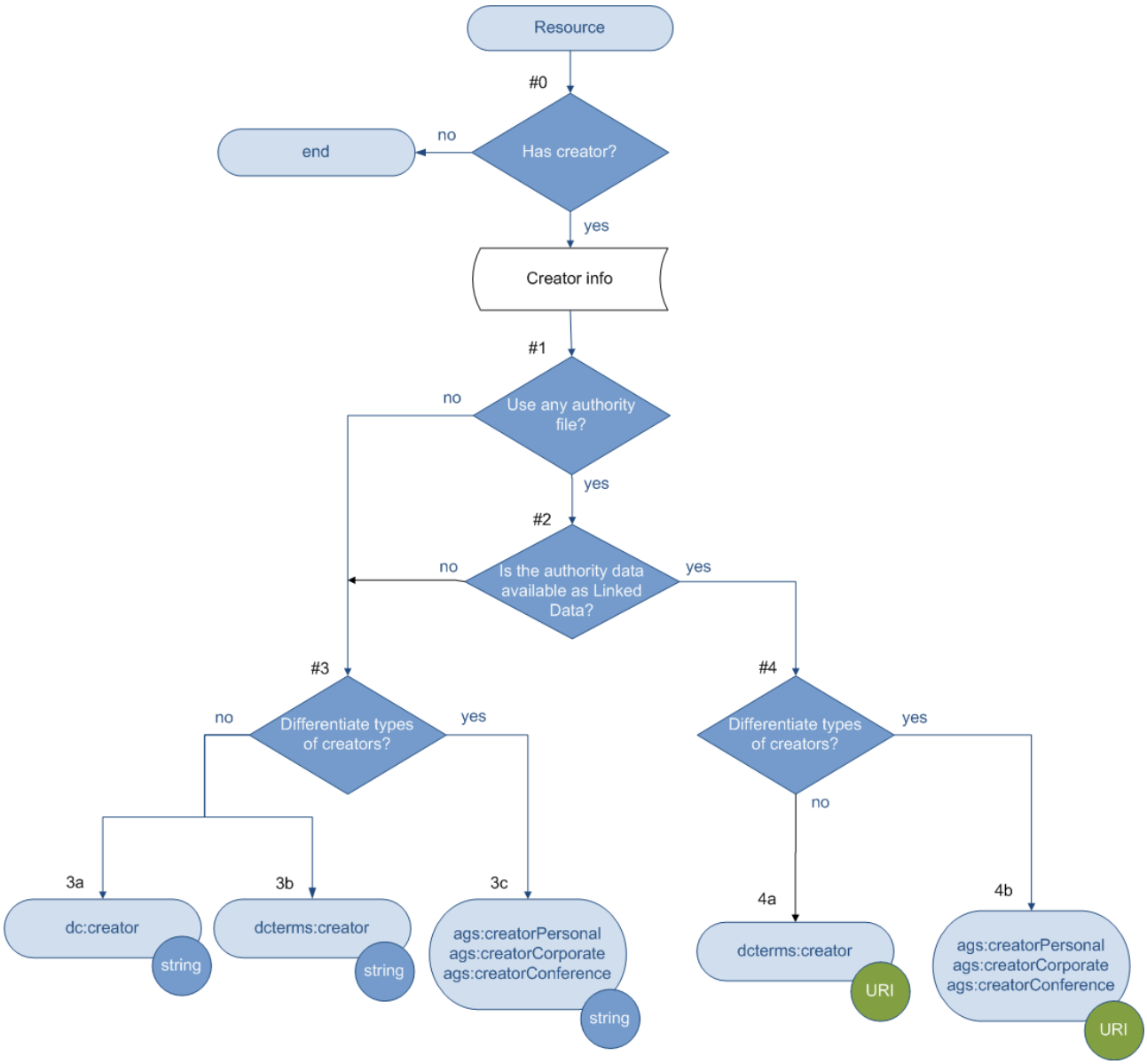
- Values for this property are always text strings.
- Although not emphasized in this report for the authority control of the titles of bibliographic resource given the context of this report, it is a logical step that resource titles, especially uniform titles, also be controlled.

Decision	Question	Answer		Action	Value Type	Examples	
						Metadata Term	Value
#0	Has title?	No		Insert title and go back to #0			
		Yes		Continue to #1			
#1	Differentiate types of titles?	No		1a	String	dc:title	Solar radiation energy and its utilization by Lucerne (Medicagosativa L.) On the state of man [world agricultural situation]
				1b	String	dcterms:title	
		Yes	title(s) and subtitle(s)	1c	String	dc:title	FAO yearbook of forest products, 1996-2000
			parallel title(s)	1d-1	String	dcterms:title	Annuaire des produits forestiers de la FAO, 1996-2000
				1d-2	String	dcterms:alternative	
			translated title(s)	1e	String	dcterms:alternative	Anuario de productos forestales de la FAO, 1996-2000 Working together for an International Alliance Against Hunger
			transliterated title(s)	1f	String	dcterms:alternative	Posly dobroj voli Prodovol'stvennoj i Sel'skokhozyajstvennoj Organizatsii Ob'edinennykh Natsij
			title supplement	1g	String	ags:titleSupplement	Report of a WHO Expert Consultation in collaboration with The Institute for Hygiene and Food Safety of the Federal Dairy Research Center, The Food and Agriculture Organization of the United Nations, Kiel, Germany, 21-23 March 2000

[2. Responsible Body]

2.1 Creator

Relation with a resource being described: Resource has creator.



Note

- It is always recommended that an authority file be used for the responsible body that has created the resource.
- In the examples below, the names of corporate body and conference are in English. Both the strings and the URIs are from the FAO Authority Description Concept Scheme.

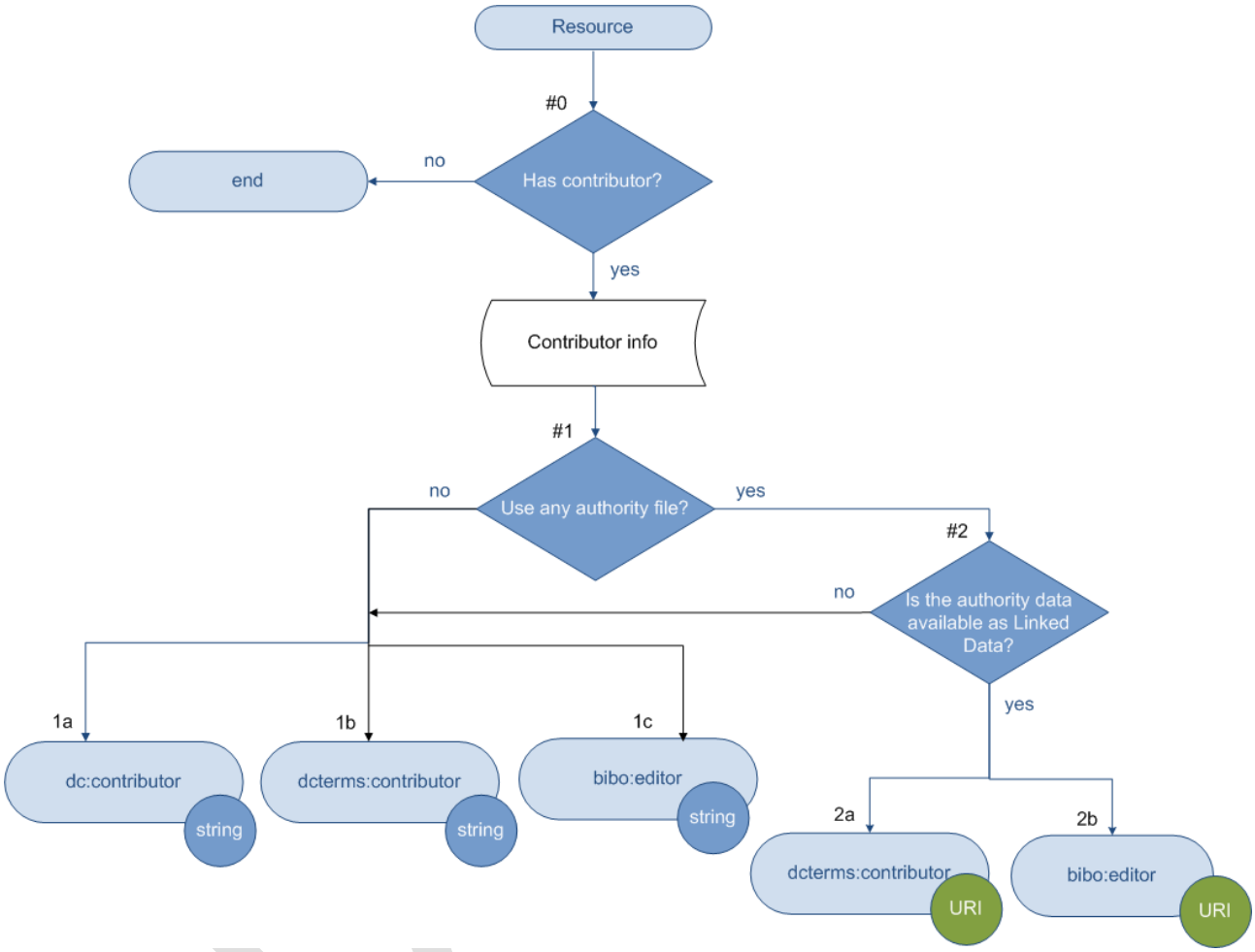
Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has creator?	No	End			
		Yes	Continue to #1			
#1	Use any authority file?	No	Go to #3 [Unauthorized form for any responsible body]			
		Yes	Go to #2			
#2	Is the authority data available as Linked Data?	No	Go to #3 [Authorized form from an authority file]			
		Yes	Go to #4			
#3	Differentiate types of creators?	No	3a	String	dc:creator	[Unauthorized form]: Tim Berners-Lee Tim B-L Timothy John Berners-Lee FAO of the UN FAO Council (78th Session) Nov. 24, 1980, Rome, Italy [Authorized form]: Berners-Lee, Tim FAO Council (Sess. 78 : 24 Nov 1980 : Rome, Italy) Food and Agriculture Organization of the United Nations
			3b	String	dcterms:creator	
		Yes	3c	String	ags:creatorPersonal	[Unauthorized form] Tim Berners-Lee [Authorized form]: Berners-Lee, Tim
					ags:creatorCorporate	[Unauthorized form]: FAO of the UN [Authorized form]: Food and Agriculture Organization of the United Nations
					ags:creatorConference	[Unauthorized form]: FAO Council (78th Session) Nov. 24, 1980, Rome, Italy [Authorized form]: FAO Council (Sess. 78 : 24 Nov 1980 : Rome, Italy)

#4	Differentiate types of creators?	No	4a	URI	dcterms:creator	http://aims.fao.org/aos/corporate/c_1297 [1] http://aims.fao.org/aos/conference/c_1842[2] http://viaf.org/viaf/85312226/#Berners-Lee,_Tim [3] http://www.w3.org/People/Berners-Lee/card [4]
		Yes	4b	URI	ags:creatorPersonal	http://viaf.org/viaf/85312226/#Berners-Lee,_Tim [3] http://www.w3.org/People/Berners-Lee/card [4]
					ags:creatorCorporate	http://aims.fao.org/aos/corporate/c_1297 [1]
					ags:creatorConference	http://aims.fao.org/aos/conference/c_1842 [2]

[1] A corporate body's URI, from the FAO Authority Description Concept Scheme
[2] A conference' URI, from the FAO Authority Description Concept Scheme
[3] Tim Berners-Lee's URI, from the FIAF (Virtual International Authority File)
[4] Tim Berners-Lee's URI: http://www.w3.org/People/Berners-Lee/card#i (Source of note: http://www.linkedin.com/in/timbl)

2.2 Contributor

Relation with a resource being described: Resource has contributor.



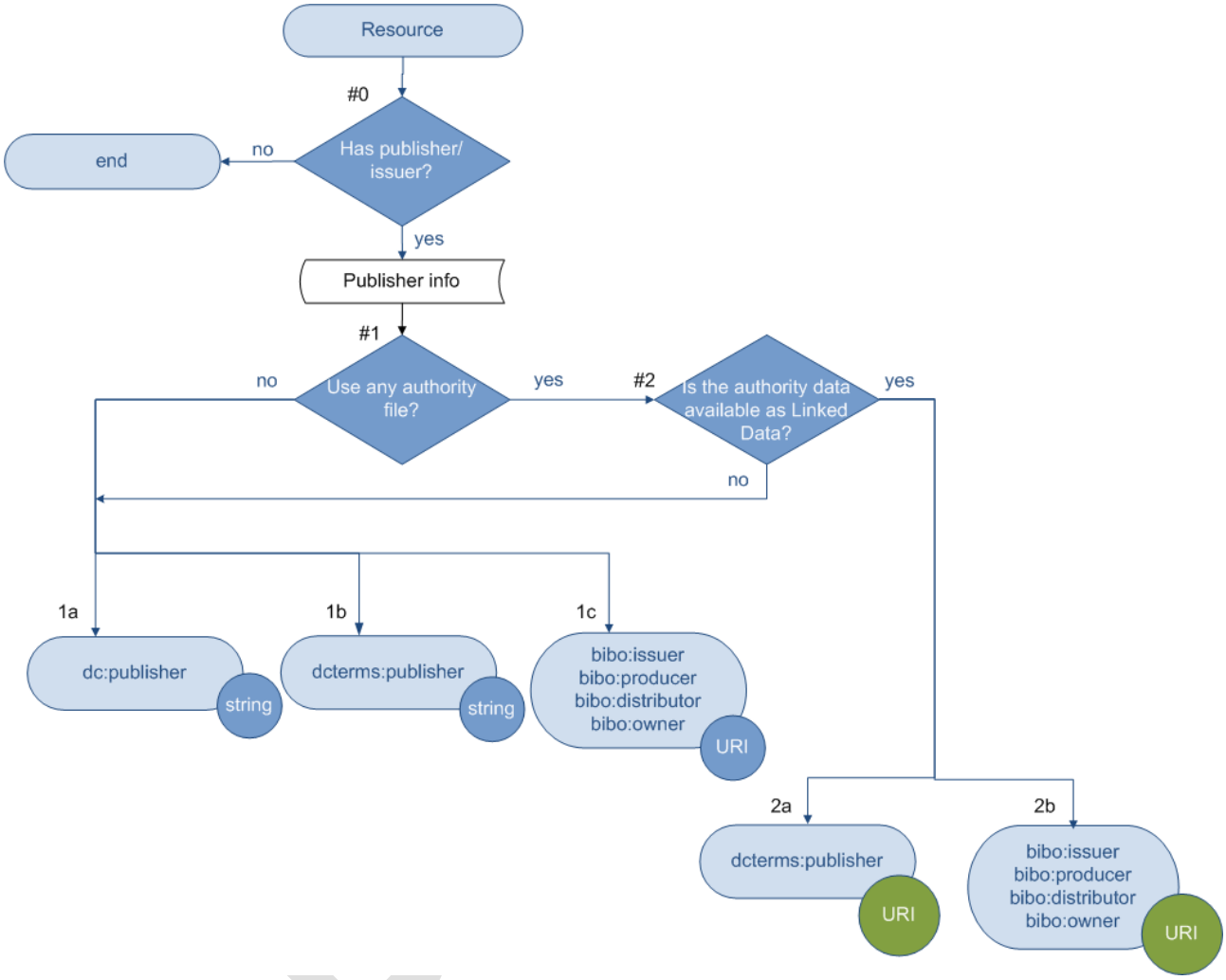
Note

- It is always recommended that an authority file be used for a responsible body that has contributed to the resource.

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has contributor?	No	End			
		Yes	Continue to #1			
#1	Use any authority file?	No	1a	String	dc:contributor	[Unauthorized form]: Tim Berners-Lee Tim B-L FAO of the UN FAO Council (78th Session) Nov. 24, 1980, Rome, Italy [Authorized form]: Berners-Lee, Tim Food and Agriculture Organization of the United Nations
			1b	String	dcterms:contributor	
			1c	String	bibo:editor	
		Yes	Go to #2			
#2	Is the authority data available as Linked Data?	No	Go to #1 Opt. *No* [Use authorized form from an authority file]			
		Yes				[URI of a responsible body]
			2a	URI	dcterms:contributor	
			2b	URI	bibo:editor	

2.3 Publisher

Relation with a resource being described: Resource has publisher.



Note

- It is always recommended that an authority file be used for a responsible body that is responsible for publishing or producing the resource.

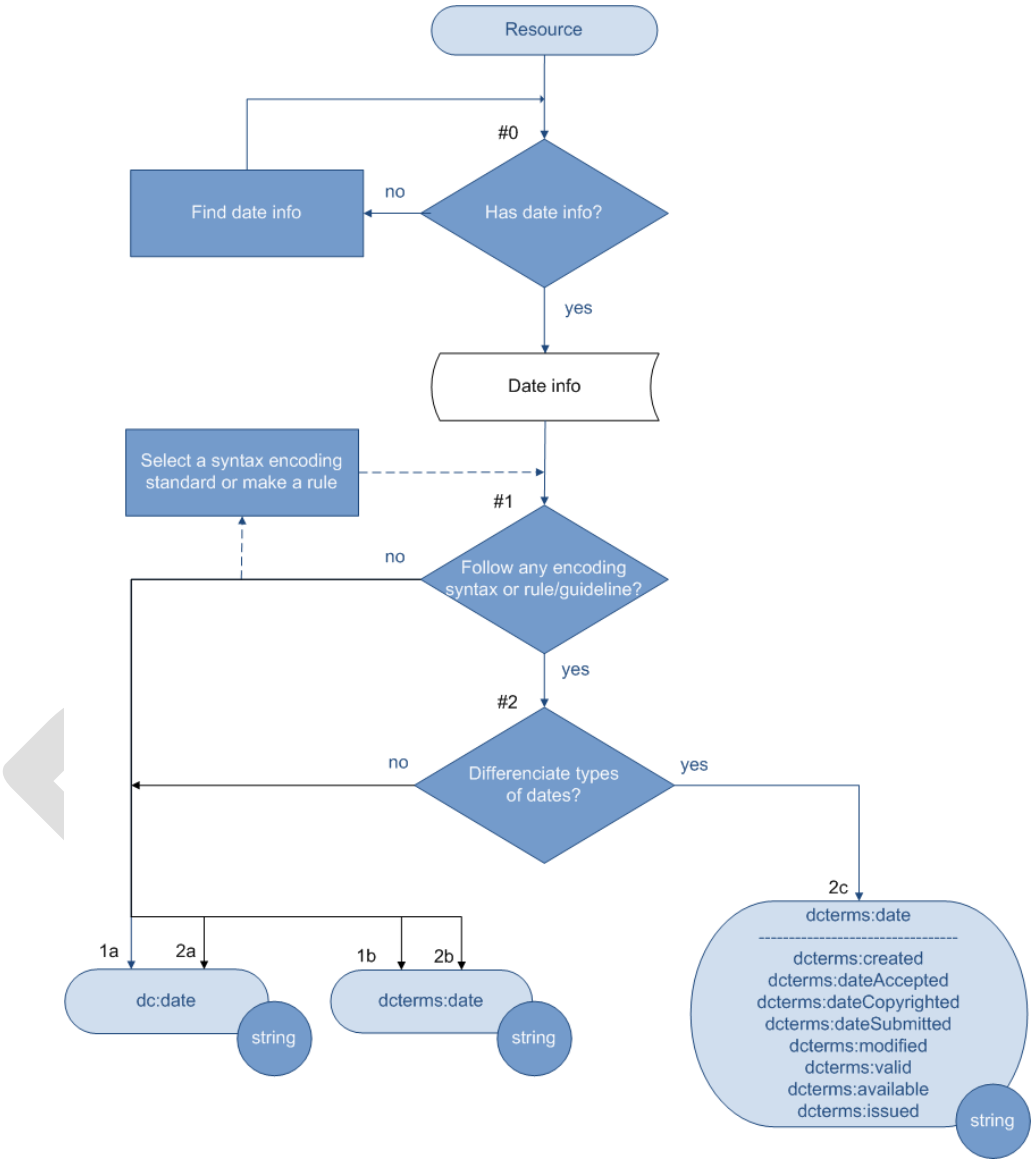
Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has publisher/issuer?	No	End			
		Yes	Continue to #1			
#1	Use any authority file?	No	1a	String	dc:publisher	[Un-authorized form] : FAORome (Italy) FAO F.A.O. FAO of the UN FAO, Rome Food and Agriculture Organization F.A.O. of the U.N. [Authorized form] : Food and Agriculture Organization of the United Nations
			1b	String	dcterms: publisher	
			1c	String	bibo: issuer	
					bibo:producer	
					bibo:distributor	
					bibo:owner	
		Yes	Go to #2			
#2	Is the authority data available as Linked Data?	No	Go to #1 Opt. *No.* [Use authorized form from an authority file]			
		Yes	2a	URI	dcterms: publisher	[URI of a responsible body]
			2b	URI	bibo: issuer	[URI of a responsible body]
					bibo:producer	
					bibo:distributor	
					bibo:owner	

[3. Physical Characteristics]

3.1 Date

Relation with a resource being described: Resource has date.

Date is considered essential information in the description of resources, therefore the flowchart below foresees **date** as a mandatory property.



Note

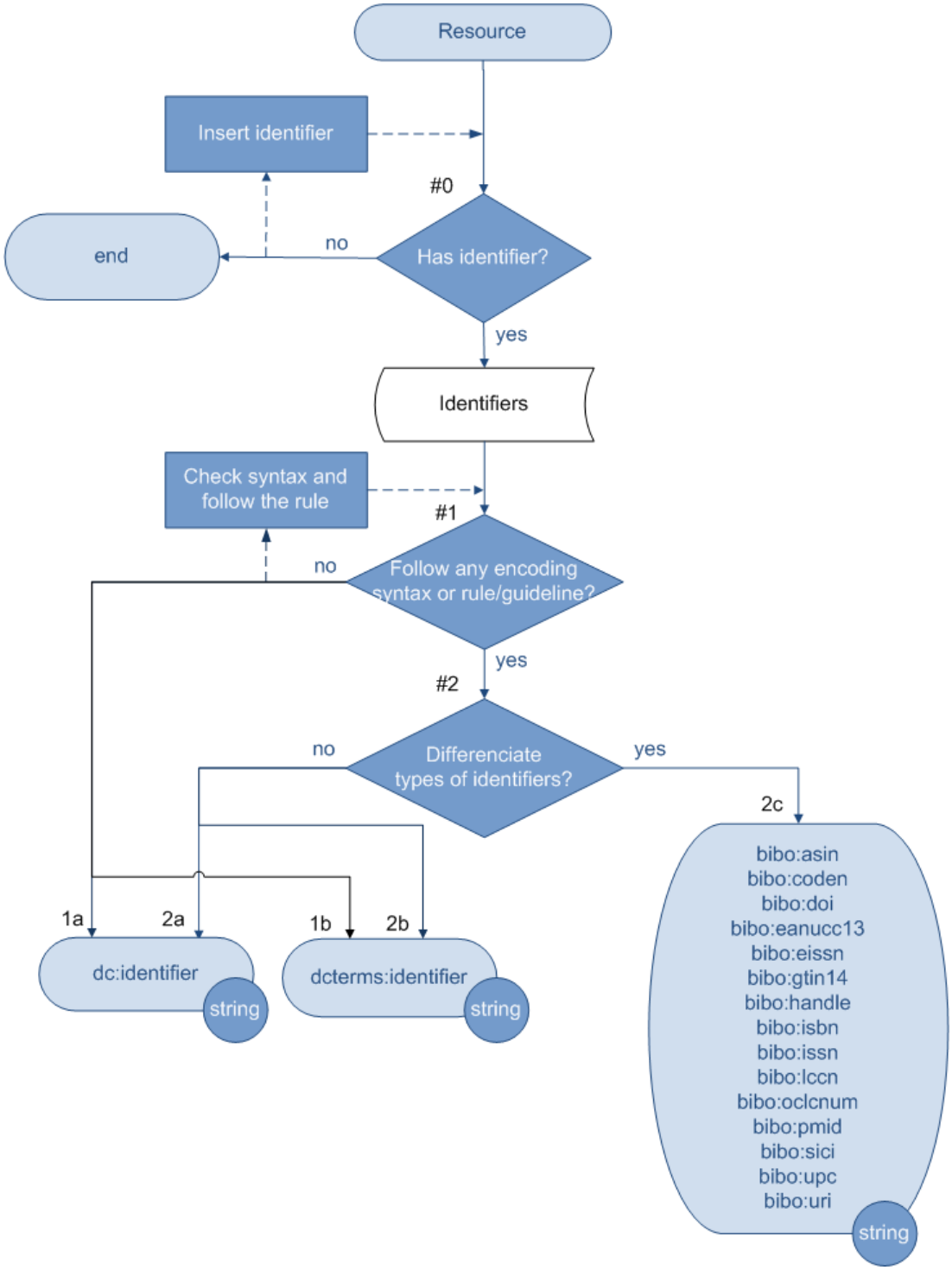
- Recommended best practice is to follow an encoding syntax, such as that defined by the W3CDTF profile of ISO 8601 [W3CDTF].

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has date?	No	Find date info and go back to #0			
		Yes	Continue to #1			
#1	Follow any encoding syntax or rule/guideline?	Yes	Continue to #2			
		No	1a	String	dc:date	[198?] [1996] [1997?] 1968-2006 7 Jul 1989 7 July 1989 7-July-1989 Jul 1989 1989 Jul Jan-Feb 1997 1-5 Feb 1997 Spr 1997 20 Mar - 15 Apr 1995
			1b	String	dcterms:date	[see all examples above]
#2	Differentiate type of dates?	No	2a	String	dc:date	1997 1997-07 1997-07-16 1997-07-16T19:20+01:00 1997-07-16T19:20:30+01:00 1997-07-16T19:20:30.45+01:00 [1]
			2b	String	dcterms:date	
		Yes	2c	String	dcterms:date	
					dcterms:created	
					dcterms:dateAccepted	
					dcterms:dateCopyrighted	
					dcterms:dateSubmitted	
					dcterms:modified	
					dcterms:valid	
					dcterms:available	
					dcterms:issued	

[1] ISO 8601.

3.2 Identifier

Relation with a resource being described: Resource has identifier.



Note

- It is always recommended that a resource has an identifier or identifiers.
- *Established codes for identifiers (universal or local) should be used for any kind of identifiers. It is always recommended to check the syntax, follow or create a rule/guideline when handling identifiers.

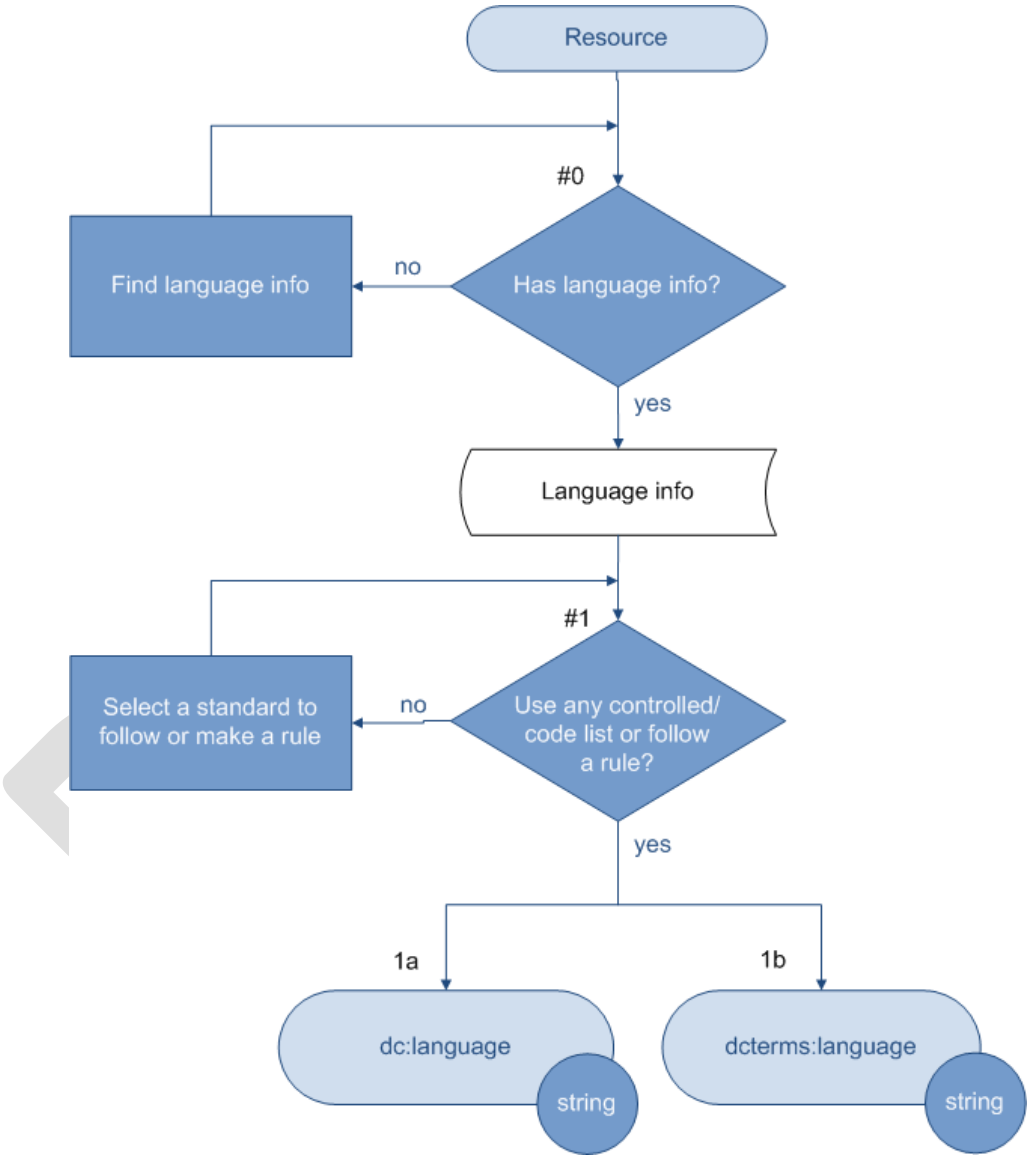
Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has identifier?	No	End but recommended to insert an identifier			
		Yes	Continue to #1			
#1	Follow any encoding syntax, or follow any rule or guideline?	No*	1a	String	dc:identifier	http://www.ukoln.ac.uk/ [1]
						urn:ietf:rfc:1766 [1]
			1b	String	dcterms:identifier	http://www.ukoln.ac.uk/ [1]
						urn:ietf:rfc:1766 [1]
		Yes	Continue to #2			
#2	Differentiate types of identifiers?	No	2a	String	dc:identifier	http://www.ukoln.ac.uk/ [1]
						urn:ietf:rfc:1766 [1]
			2b	String	dcterms:identifier	http://www.ukoln.ac.uk/ [1]
						urn:ietf:rfc:1766 [1]
		Yes	2c	String	bibo:asin	020530902X [2]
					bibo:coden	66HYAL [3]
					bibo:doi	doi:10.1109/ISSTA.2002.1048560 [4]
					bibo:eanucc13	0123456789012 [5]
					bibo:eissn	0378-5955 [6]
					bibo:gtin14	00012345600012 [7]
					bibo:handle	http://hdl.handle.net/10760/6634 [8]
					bibo:isbn	9-788175-257665 [9]
						9788175257665
					bibo:issn	0317-8471 [10]
					bibo:lccn	79051955 [11]
					bibo:oclcnum	ocm00012345 [12]
						ocn123456789
					bibo:pmid	20346624 [13]
					bibo:sici	0095-4403(199502/03)21:3 <12:WATIIB>2.0.TX;2-J [14]
					bibo:upc	5778400002 [15]
					bibo:uri	http://example.org/absolute/URI/with/absolute/path/to/resource.txt [16]
						ftp://example.org/resource.txt

[1] From http://dublincore.org/documents/2001/04/12/usageguide/simple-html.shtml
[2] From http://en.wikipedia.org/wiki/Amazon_Standard_Identification_Number
[3] From http://en.wikipedia.org/wiki/CODEN
[4] From http://www.doi.org/
[5] From http://www.gtin.info/
[6] From http://en.wikipedia.org/wiki/EISSN
[7] From http://www.gtin.info/
[8] From http://eprints.rclis.org/
[9] From http://en.wikipedia.org/wiki/International_Standard_Book_Number
[10] From http://en.wikipedia.org/wiki/International_Standard_Serial_Number
[11] From http://catalog.loc.gov/
[12] From http://www.oclc.org/batchprocessing/controlnumber.htm
[13] From http://www.ncbi.nlm.nih.gov/pubmed/
[14] From http://en.wikipedia.org/wiki/Serial_Item_and_Contribution_Identifier
[15] From http://en.wikipedia.org/wiki/Universal_Product_Code
[16] From http://en.wikipedia.org/wiki/Uniform_Resource_Identifier

3.3 Language

Relation with a resource being described: Resource has language information.

Language is considered essential information in the description of resources, therefore the flowchart below foresees **language** as a mandatory property.



Note

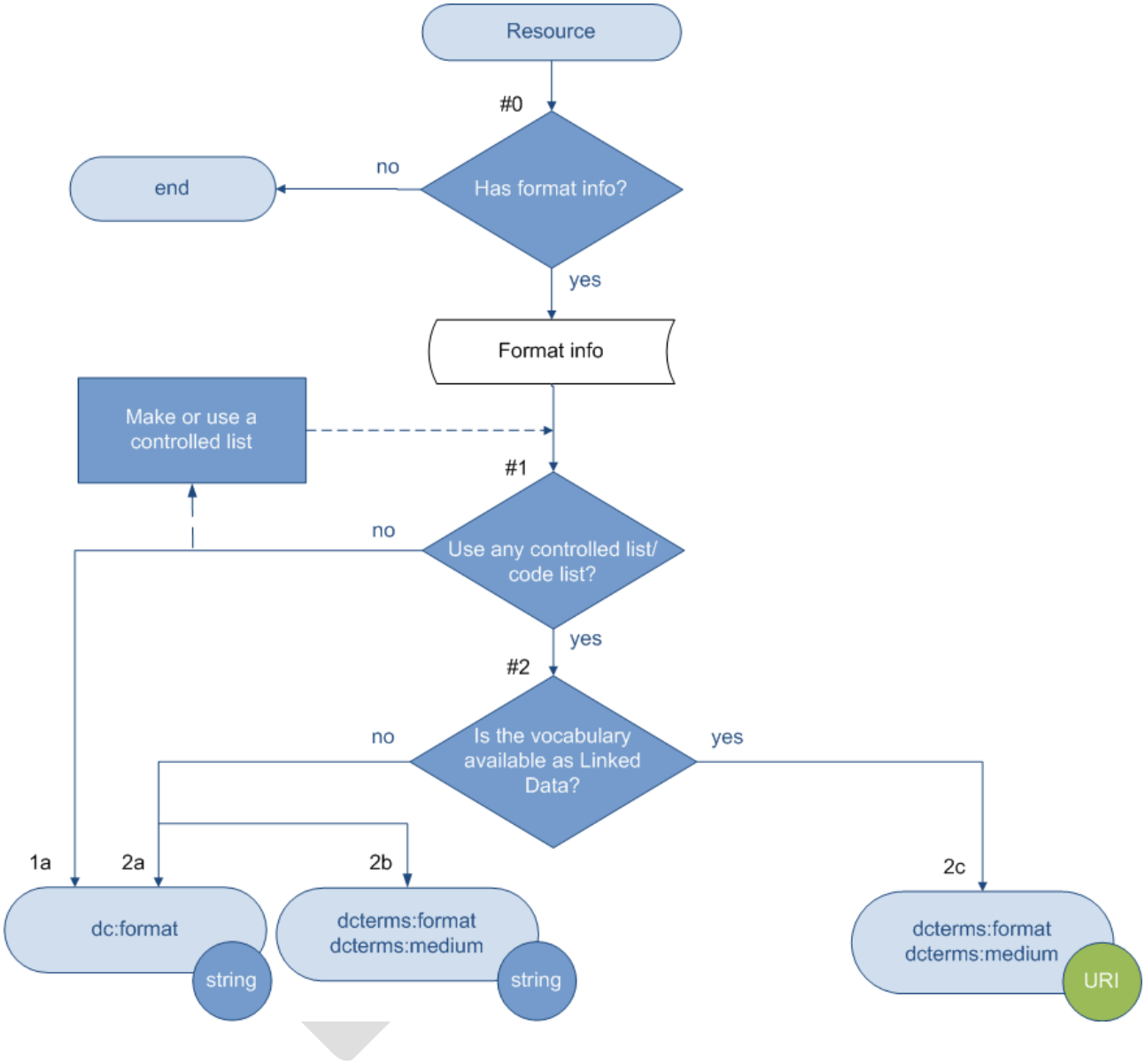
- Recommended best practice is to use an encoding scheme, such as the three-letter code (ISO639-2) or the two letter code (ISO639-1).

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has language info?	No	Find language info and go back to #0			
		Yes	Continue to #1			
#1	Use any controlled list /code list or follow a rule?	No	Go back to #1			
		Yes	1a	String	dc:language	cat [1]
						ca [2]
			1b	String	dcterms:language	cat [1]
						ca [2]

[1] From ISO639-2
[2] From ISO639-1

3.4 Format

Relation with a resource being described: Resource has format.



Note

- *It is always recommended that a controlled vocabulary be created for your collection when describing 'format', such as the list of Internet Media Types [MIME].
- dcterms:medium has the definition of material or physical carrier of the resource such as a book or CD. Therefore the Internet Media Types [MIME] should not be used for these values. [1]

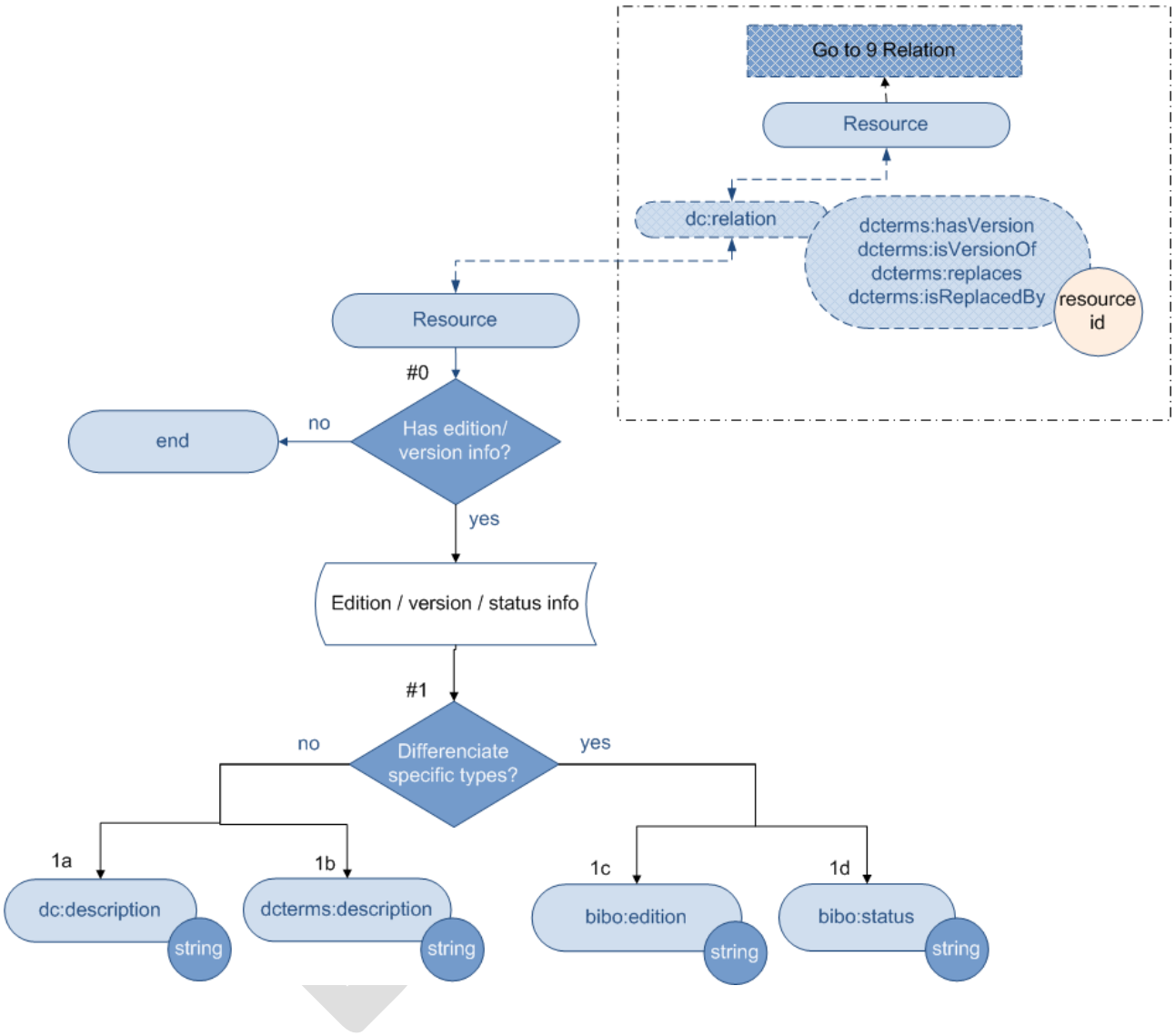
Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has format info?	No	End			
		Yes	Continue to #1			
#1	Use any controlled list or code list?	No*	1a	String	dc:format	html
		Yes	Continue to #2			
#2	Is the controlled vocabulary available as Linked Data?	No	2a	String	dc:format	text/html
			2b	String	dcterms:format	text/html
					dcterms:medium	CD Book
		Yes	2c	URI	dcterms:format	[URI of a term]
					dcterms:medium	[URI of a term]

[1] according to: http://web.resource.org/rss/1.0/modules/dcterms/#extent

3.5 Edition/Version

Decisions related to various situations are numbered in the table and flowchart below. For each decision, find your situation according to the question and select an action.

Relation with a resource being described: Resource has edition/version/status.



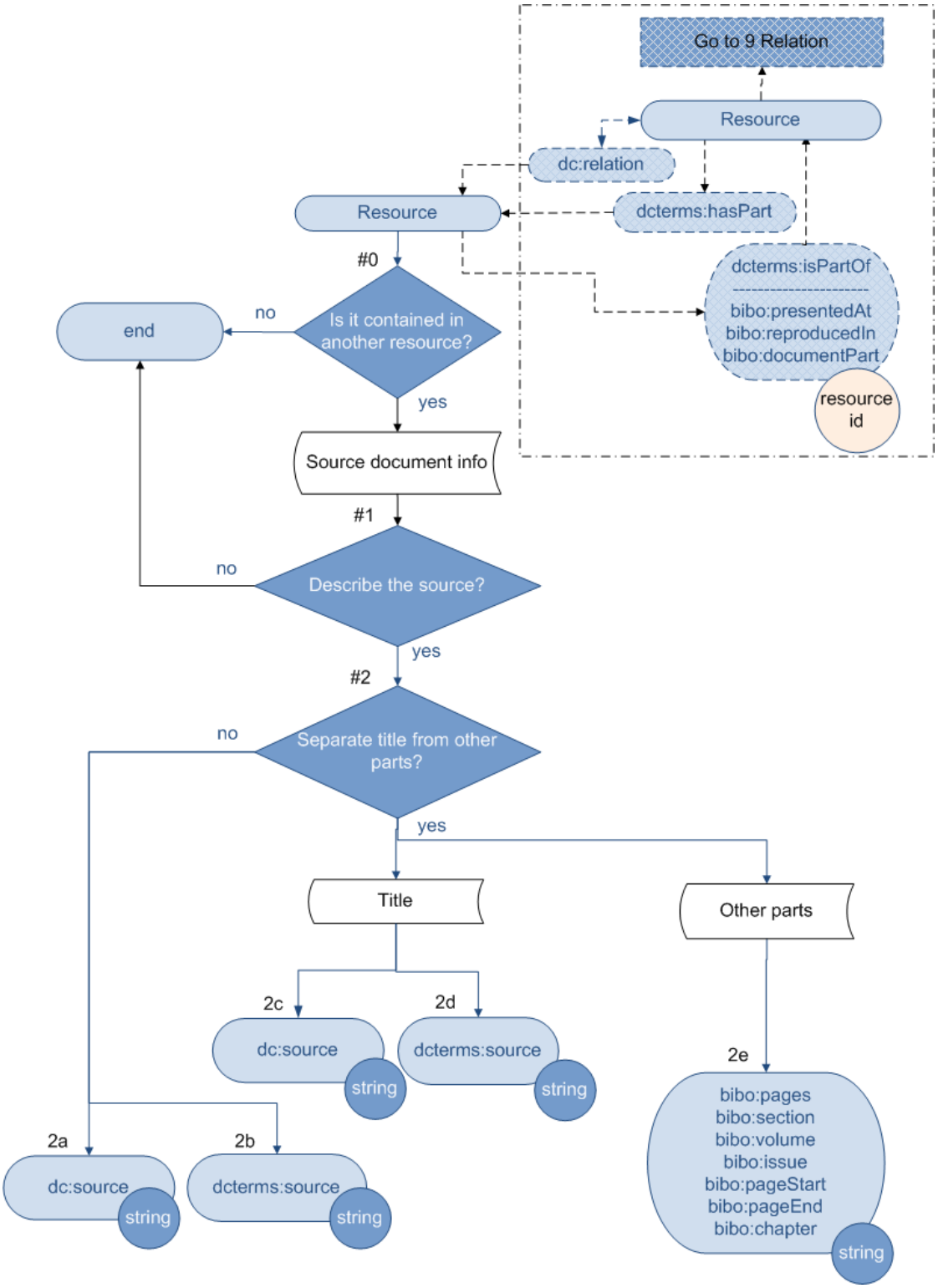
Notes

- When edition or version of a resource is to be described, the relation between a resource and its related version(s) should also be described. In this graph, a dash-lined box signifies such relation(s) and points to Section 9, “Relation”, in this report.
- The main body of the graph is only focused on the description of edition or version as a part of the physical characteristics of a resource. For describing relations between different versions of resources, go to Section 9.1 Relations between resources.

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has edition version info	No	End			
		Yes	Continue to #1			
#1	Differentiate specific types?	No	1a	String	dc:description	2nd ed.
			1b	String	dcterms:description	2nd ed.
		Yes	1c	String	bibo:edition	2nd ed.
			1d	String	bibo:status	Final.

3.6 Source

Relation with a resource being described: Resource has source.



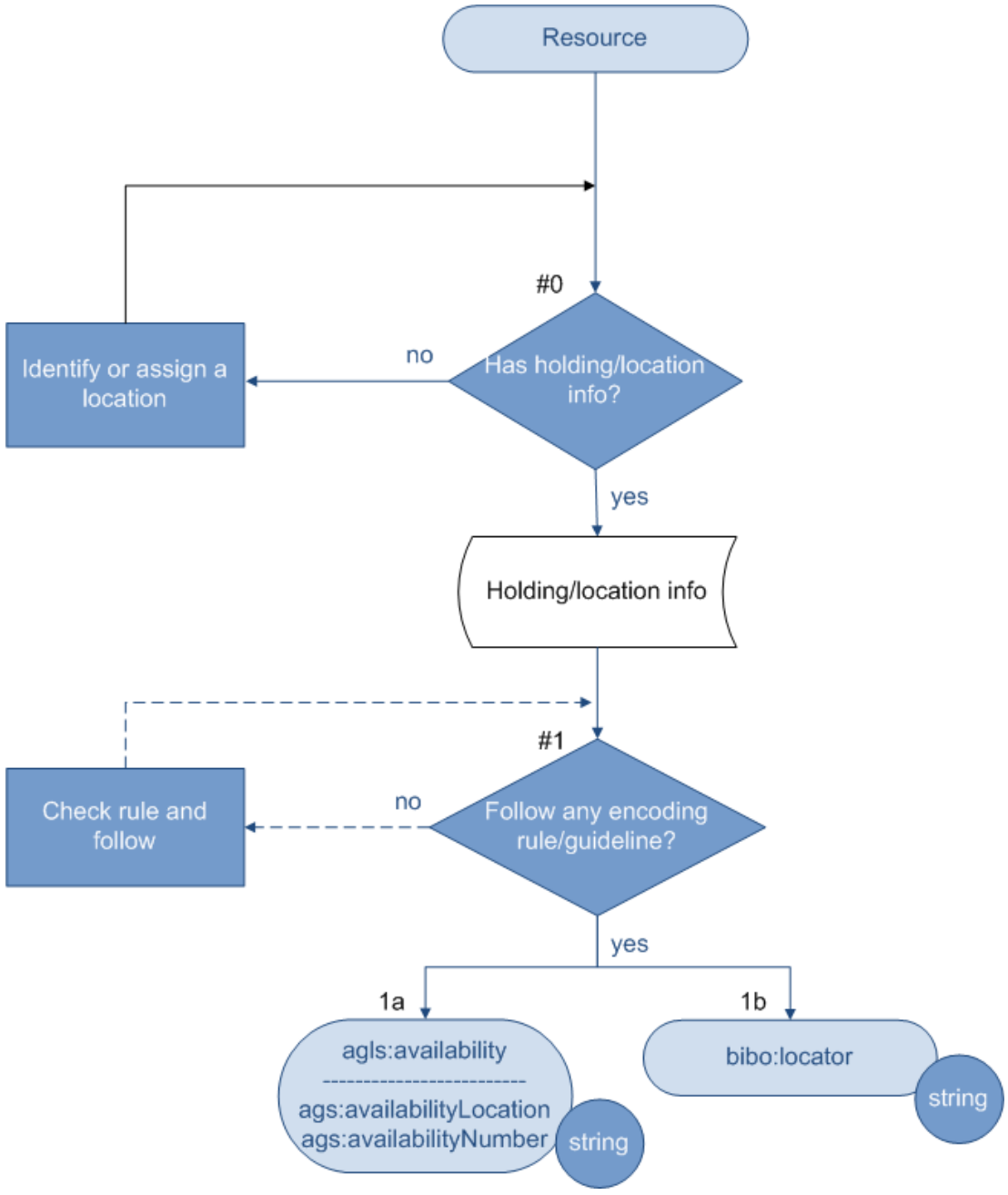
Notes

- When a resource to be described is contained in another resource, the relations between the resources may be described according to the convention of a data provider. In this graph, a dash-lined box signifies such relation(s) and points to Section 9, “Relation”.
- The main body of the graph is only focused on the description of the source of a resource. For describing relations between the resources involved, go to Section 9.1 Relations between resources.
- * It is recommended that if the resource titles are controlled through an authority file, use the controlled title or identifier.

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Is it contained in another source?	No	End			
		Yes	Continue to #1			
#1	Describe the source	No	End			
		Yes	Continue to #2			
#2	Separate title from other parts?	No	2a	String	dc:source	Proceedings of the National Academy of Sciences of the United States of America, v. 95(10) p. 5632-5636
						http://www.pnas.org/content/by/year/2010
			2b	String	dcterms:source	Proceedings of the National Academy of Sciences of the United States of America, v. 95(10) p. 5632-5636
						http://www.pnas.org/content/by/year/2010
		Yes	2c	String (Title)*	dc:source	Proceedings of the National Academy of Sciences of the United States of America
			2d	String (Title)	dcterms:source	Proceedings of the National Academy of Sciences of the United States of America
			2e	String (Other parts)	bibo:pages	542
					bibo:section	2
					bibo:volume	95
					bibo:issue	10
					bibo:pageStart	5632
					bibo:pageEnd	5636
					bibo:chapter	II

4. Location

Relation with a resource being described: Resource has holding or location information.
Location is considered essential information in the description of resources, therefore the flowchart below foresees **location** as a mandatory property.



Note

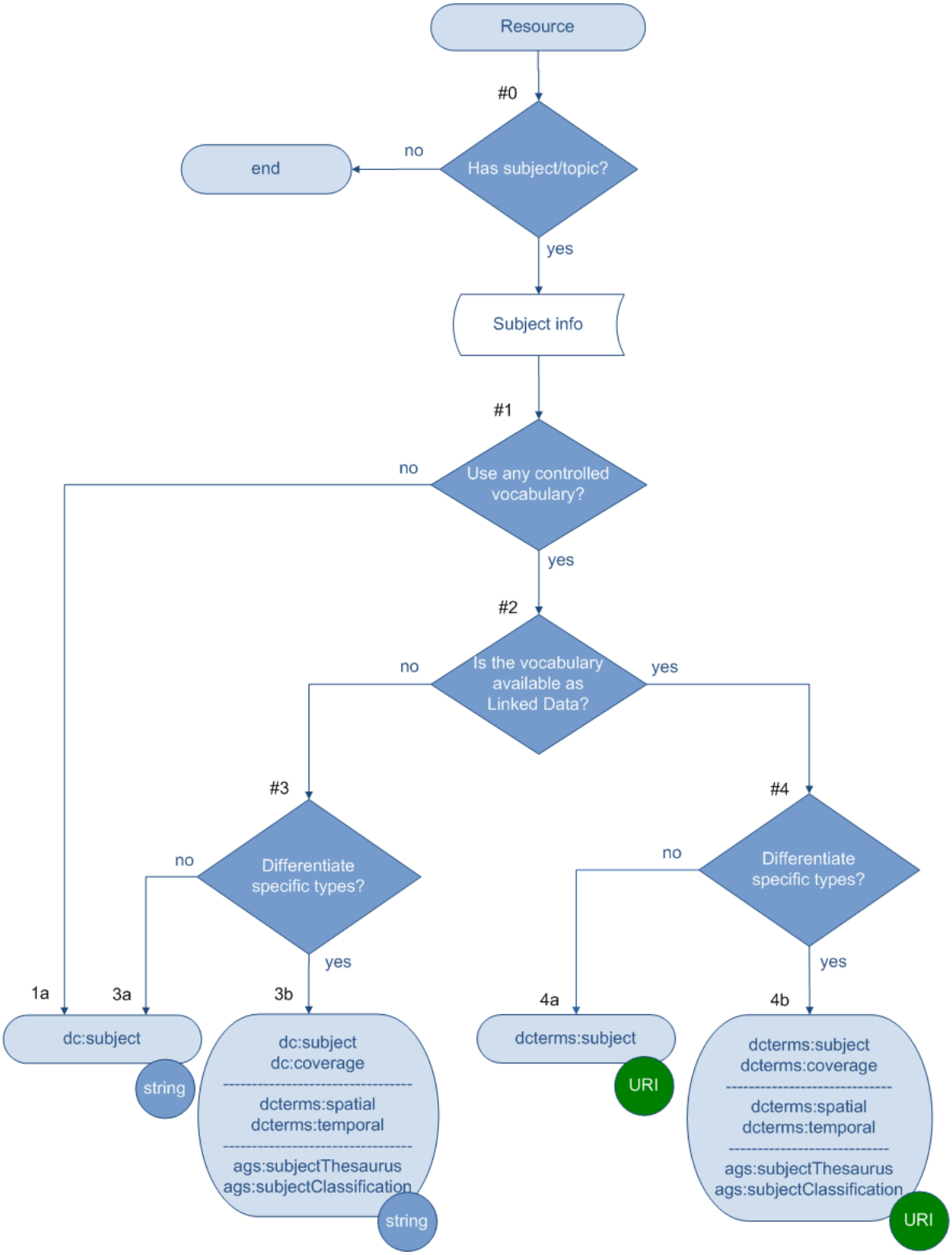
- A location (physical location) is always required.
- *It is always recommended that location information is provided consistently by following an encoding rule or guideline.

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has holding/location info?	No	Identify or assign a location and Go back to #0			
		Yes	Continue to #1			
#1	Follow any encoding rule or guideline?	No*	Go back to #1			
		Yes	1a	String	agls:availability	http://www.example.org/services/id5678/ Contact the Publications Section on 1300 999 999[1]
					ags:availabilityLocation	University of Vienna, Peter Jordanstr. 52, A-1190 Vienna, Austria
					ags:availabilityNumber	Boku 2456.23
			1b	String	bibo:locator	Box 12, Folder 3

[1] From http://www.agls.gov.au/

5. Subject

Relation with a resource being described: Resource has subject/topic.



Note

- Examples in the following table are in English. Values (strings or URIs) in the examples are from the *AGROVOC Thesaurus* and the *Library of Congress Subject Headings*. Classification values (strings or URIs) in the examples are from the *Dewey Decimal Classification* system.
- Usually a value encoding scheme's title (e.g., AGROVOC or LCSH) should be indicated along with the value. This report does not provide the syntax (e.g., rdf, xml, html) of expressing this related information. Consult references if needed.
- * If you plan to publish your controlled vocabulary as linked data, you may follow AGROVOC's practice.

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has subject/topics?	No	End			
		Yes	Continue to #1			
#1	Use any controlled vocabulary?	No	1a	String	dc:subject	paddy
						Pacific Islands & Oceania
						19th century
		Yes	Continue to #2			
#2	Is the vocabulary available as linked data (i.e., each concept has a http URI)?	No*	Continue to #3			
		Yes	Continue to #4			
#3	Differentiate types of subjects?	No	3a	String	dc:subject	Rice
						Pacific Islands
						Nineteenth century
		Yes	3b	String	dc:subject	Rice
					dc:coverage	Pacific Islands
					dcterms:spatial	Pacific Islands
					dcterms:temporal	Nineteenth century
					ags:subjectThesaurus	Rice
					ags:subjectClassification	586 [1]
#4	Differentiate types of subjects?	No	4a	URI	dcterms:subject	http://aims.fao.org/aos/agrovoc/c_6599 [2]
						http://aims.fao.org/aos/agrovoc/c_5487 [3]
		Yes	4b	URI	dcterms:subject	http://aims.fao.org/aos/agrovoc/c_6599 [2]
					dcterms:coverage	http://aims.fao.org/aos/agrovoc/c_5487 [3]
					dcterms:spatial	http://aims.fao.org/aos/agrovoc/c_5487 [3]
					dcterms:temporal	http://id.loc.gov/authorities/sh85091984 [4]
					ags:subjectThesaurus	http://aims.fao.org/aos/agrovoc/c_6599 [2]
					ags:subjectClassification	http://dewey.info/class/586/ [5]

[1] From the Dewey Decimal Classification: "586 Seedless plants" (English version).
[2] http://aims.fao.org/aos/agrovoc/c_6599 is the URI of a concept in AGROVOC. Its preferred English label is "Rice".

[3] http://aims.fao.org/aos/agrovoc/c_5487 is the URI of a concept in AGROVOC. Its preferred English label is “Pacific Islands ”.
[4] http://id.loc.gov/authorities/sh85091984 is the URI of a concept in LCSH. Its preferred English label is “Nineteenth century”.
[5] The URI of the Dewey Decimal Classification: “586”. Its English caption is “Seedless plants”.

Additional comments

1. It is always recommended to index the concept/topic/subject/category of a resource.
Examples of values:

- concepts represented by terms from a controlled vocabulary (e.g., Agrovoc, LCSH, ASFA Thesaurus.);
- keywords;
- classes or categories represented by codes or terms from a classification system.

2. If your database contains separate fields for values from a thesaurus and a classification, or wants to differentiate general subjects from geographic names, you may encode with appropriate metadata terms. See Decision #3.

3. More and more controlled vocabularies are published as Linked Data where concepts are represented by non-literal values (i.e., an identifier and/or a concept-URI). For example, each AGROVOC concept and label has its unique http URI.

Use these http URIs instead of the literal forms (i.e., the labels) as values when considering moving towards publishing your data as linked data.
Examples of values:

- an AGROVOC concept URI;
- a URI from any controlled vocabulary, e.g., LCSH;
- a URI of an **agent** when the agent is the subject/focus of a resource (e.g., URI of a conference, defined in a foaf file or defined in the FAO OA).

4. If you have created your own controlled vocabulary and would like to publish it as a LD value vocabulary, you may follow the AGROVOC practices.

5. If in the metadata records you have used strings from a controlled vocabulary (e,g., a subject heading from LCSH or a descriptor from AGROVOC), and now want to release your metadata as a LD set, you may convert the strings into corresponding URIs provided by this vocabulary. Please follow the instructions in Decision #4.

6. Usually a value encoding scheme’s title (e.g., ‘AGROVOC’ or ‘LCSH’) should be indicated along with the value. This document does not provide the syntax (e.g., rdf, xml, html) of expressing this related information. Consult references if needed, including:

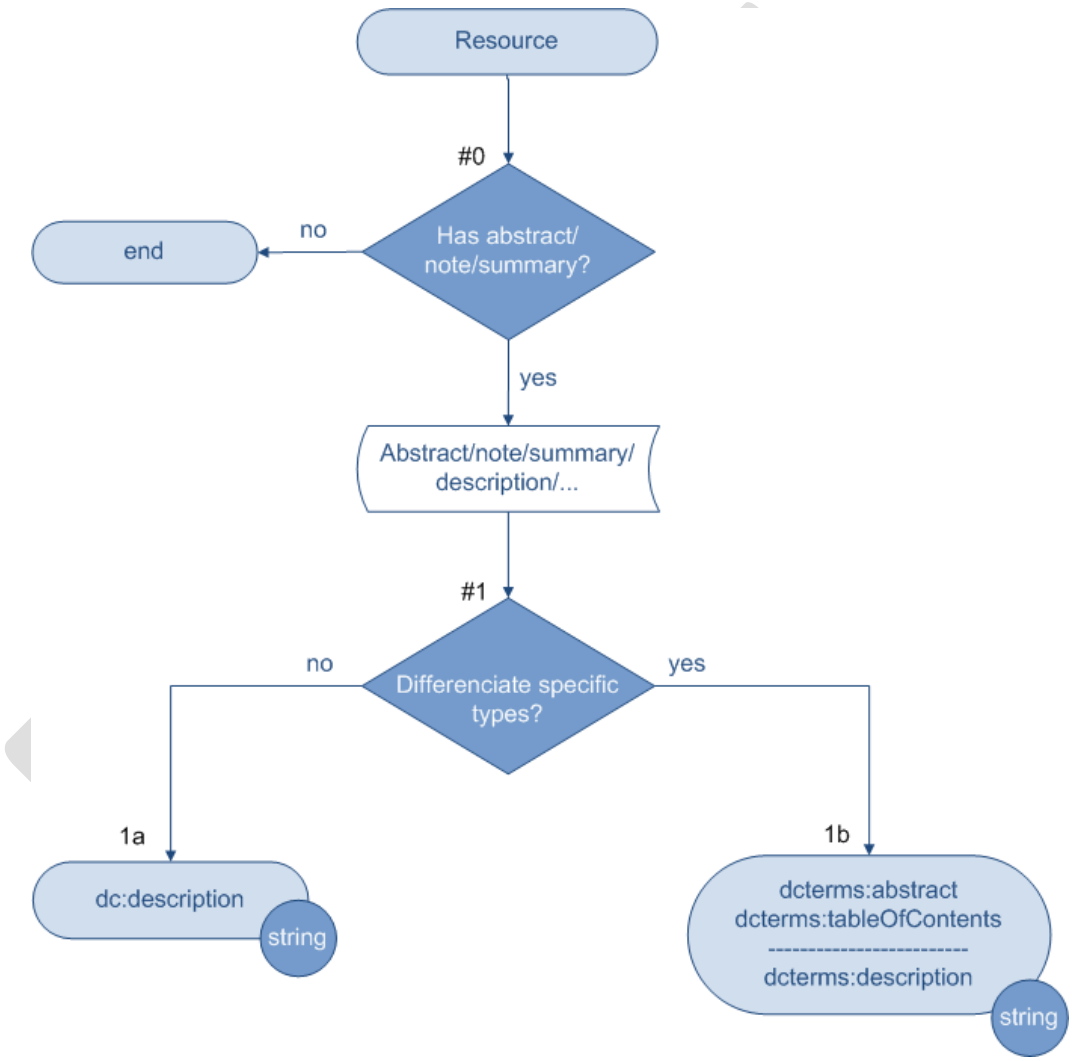
- "Expressing Dublin Core Description Sets using XML (DC-DS-XML)"
  URL: http://www.dublincore.org/documents/dc-ds-xml/

- "Expressing Dublin Core metadata using the Resource Description Framework (RDF)"
  http://www.dublincore.org/documents/dc-rdf/

[6. Description of Content]

6.1 Description/Abstract

Relation with a resource being described: Resource has description/abstract.



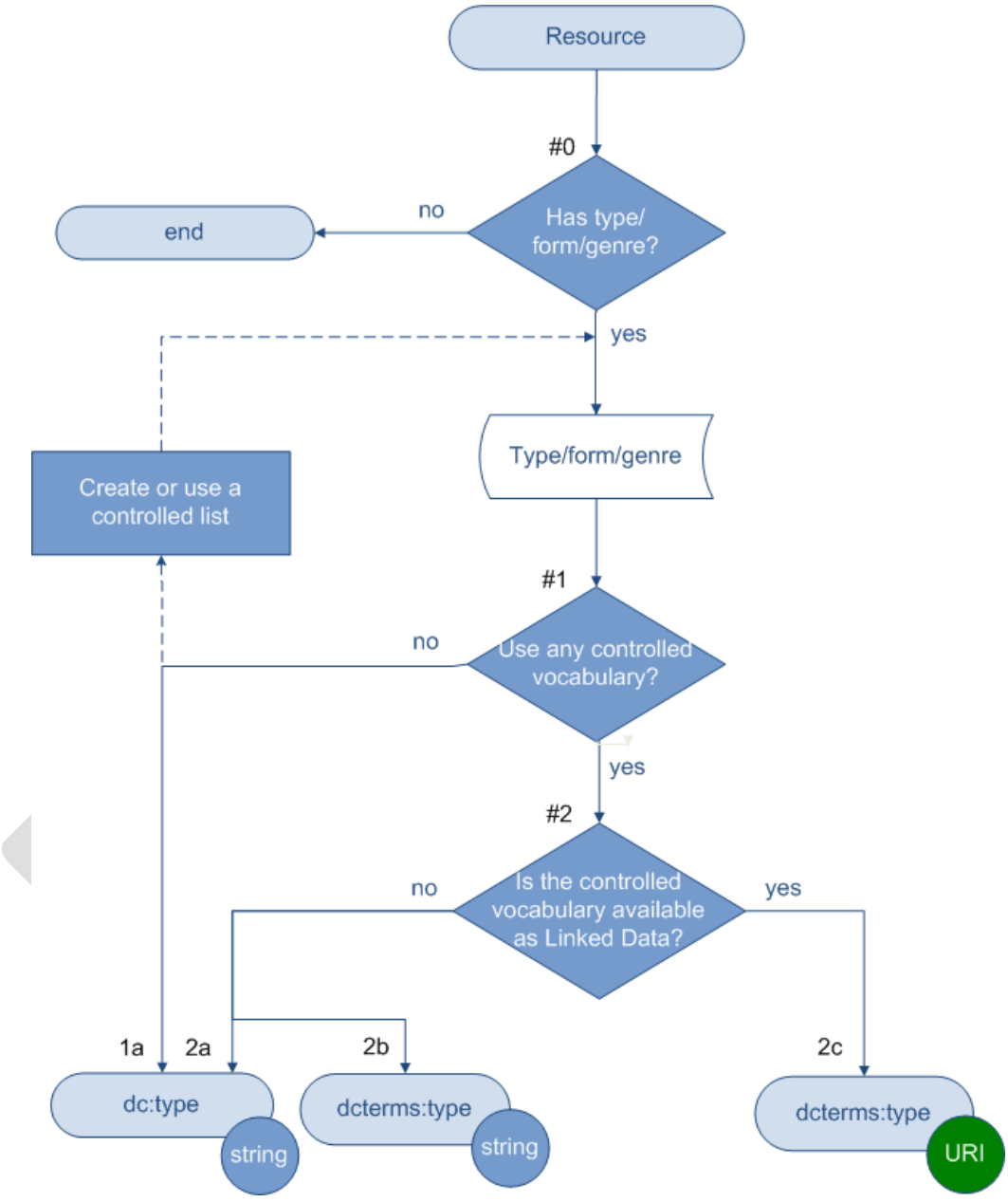
Note

- In describing the content, different words might have been used, such as ‘abstract’ vs. ‘note’, or ‘description’ vs. ‘summary’. A table of contents may also be presented in a description.
- When a translated description is to be included, repeat the actions.

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has abstract/note/summary?	No	End			
		Yes	Continue to #1			
#1	Differentiate types of content descriptions?	No	1a	String	dc:description	One of the least understood aspects of population biology is …
		Yes	1b	String	dcterms:abstract	One of the least understood aspects of population biology is …
					dcterms:table-of-contents	Introduction -- Formal theory -- Coevolution --
					dcterms:description	Contains a series of articles which are intended to …

6.2 Type/Form/Genre

Relation with a resource being described: Resource has type/form/genre.



Note

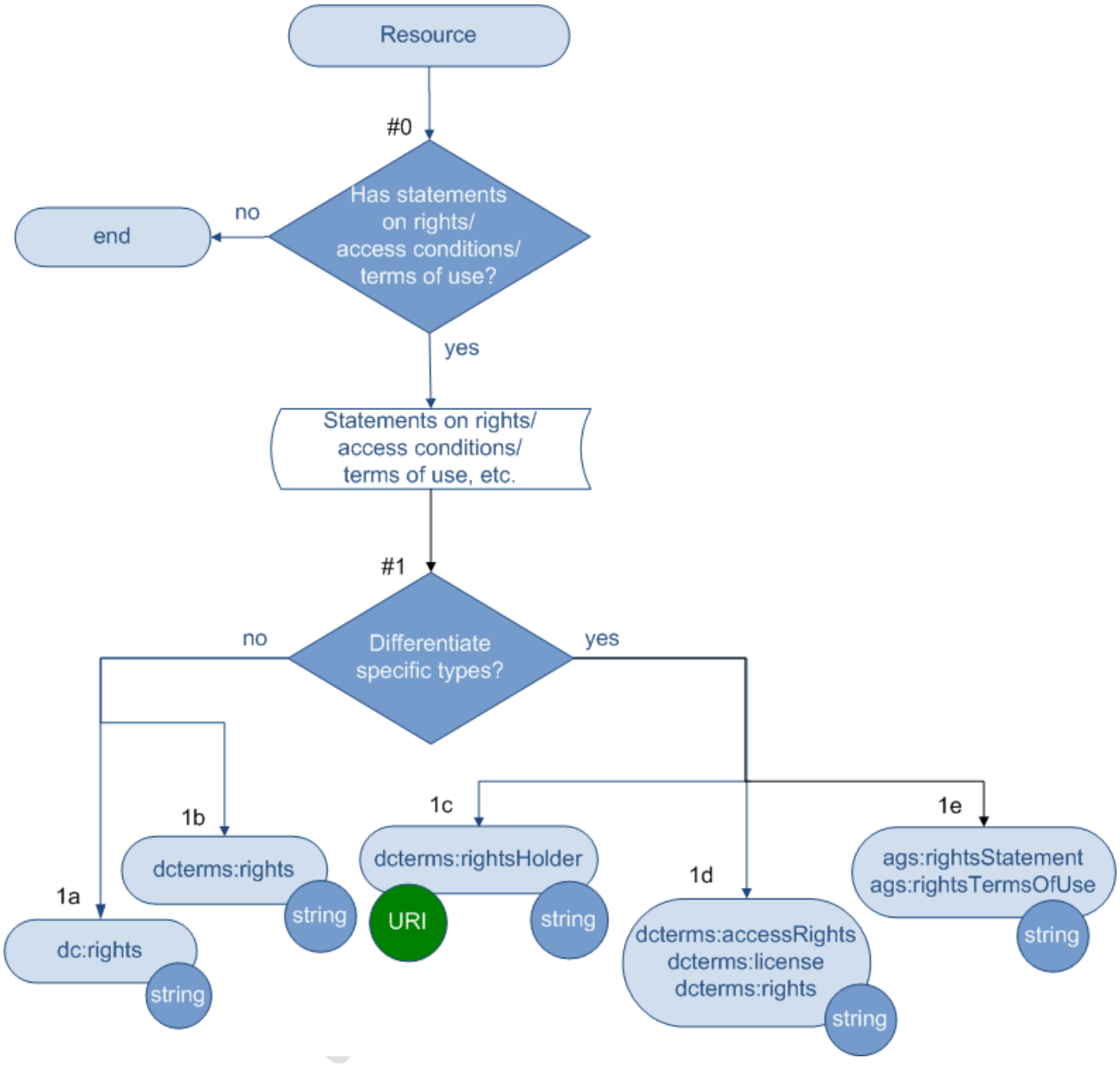
- Values (strings or URIs) in the examples are from *DCMI Type Vocabulary* and DC Terms http://www.dublincore.org/documents/dcmi-terms/ namespace.
- * It is always recommended that a controlled vocabulary be used or created for your collection when describing a resource type. An example of such a controlled vocabulary is the “Eprint Type” list used by the Organic-Eprints.

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has type/form/genre?	No	End			
		Yes	Continue to #1			
#1	Use any controlled vocabulary ?	No*	1a	String	dc:type	Lecture; Poster, …
		Yes	Continue to #2			
#2	Is the controlled vocabulary available as linked data?	No	2a	String	dc:type	Interactive Resource
			2b	String	dcterms:type	Interactive Resource
		Yes	2c	URI	dcterms:type	http://purl.org/dc/dcmitype/InteractiveResource [1]

[1] http://purl.org/dc/dcmitype/InteractiveResource is the URI of the concept “Interactive Resource”, from *DCMI Type Vocabulary*.

7. Intellectual property. Rights

Relation with a resource being described: Resource has intellectual property rights statement.



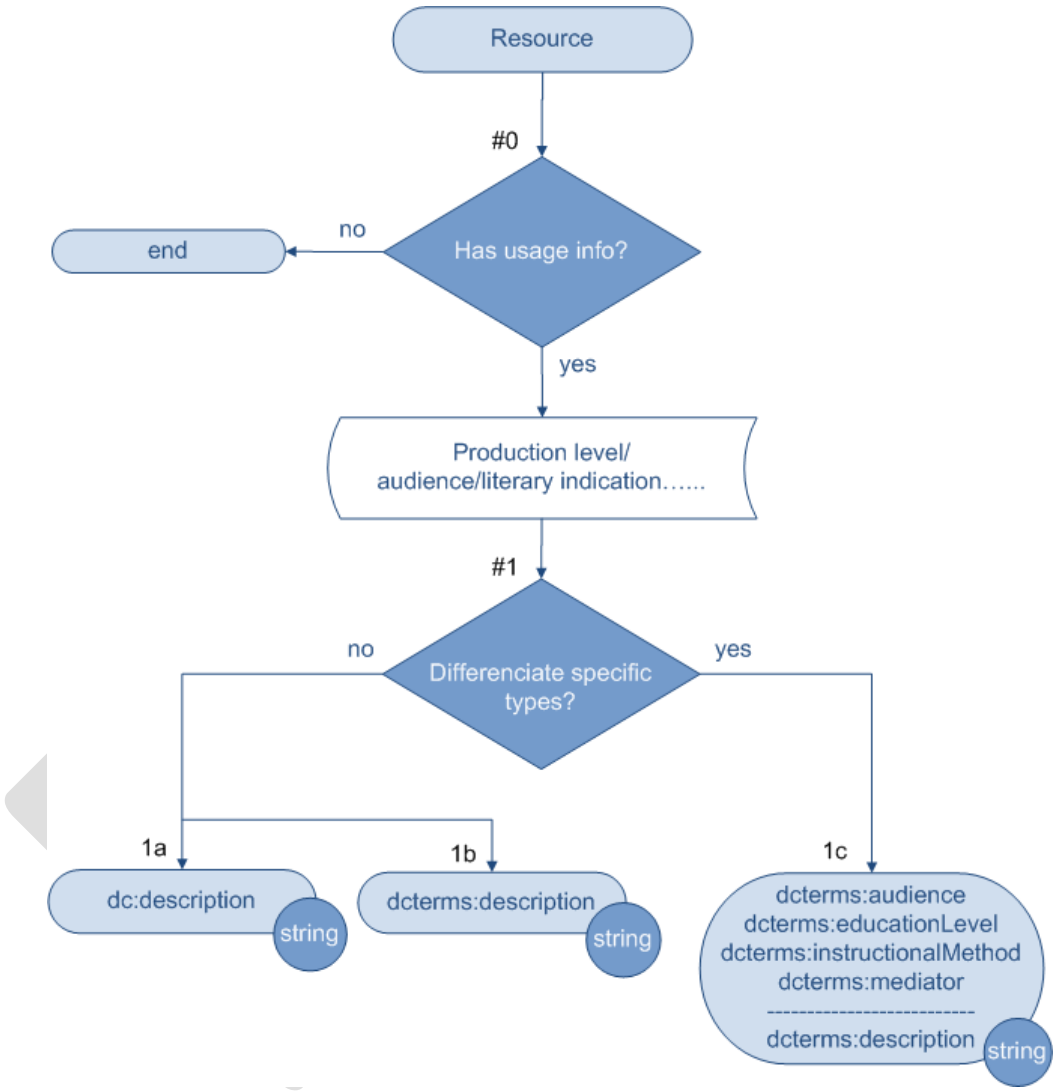
Note

- The property may be named as: rights or rights statement. More detailed types of statements may include access rights, terms of use, access condition/access rights, license.
- Examples of the values (strings or URIs) are from: http://dublincore.org/usage/meetings/2004/03/dc-rights-proposal.html

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Use any controlled vocabulary ?	No	End			
		Yes	Continue to #1			
#1	Differentiate specific types or parts in the rights statement?	No	1a	string	dc:rights	Copyright 1996-2007 XYZ Productions. All rights reserved.
						http://www.fao.org/corp/copyright/en/
			1b	string	dcterms:rights	Copyright 1996-2007 XYZ Productions. All rights reserved.
						http://www.fao.org/corp/copyright/en/
		Yes	1c	string or URI	dcterms:rightsHolder	XYZ Productions
						http://www.fao.org/
			1d	string	dcterms:accessRights	http://www.fao.org/corp/copyright/en/
						Available to subscribers only.
					dcterms:license	http://creativecommons.org/licenses/by/3.0/
						Licensed for use under Creative Commons Attribution 3.0
						http://www.fao.org/teca/content/disclaimer-1
					dcterms:rights	[any other type of statements]
			1e	string	ags:rightsStatement	Copyright 1996-2007 XYZ Productions. All rights reserved.
						http://www.fao.org/corp/copyright/en/
					ags:termsOfUse	Access limited to members.

8. Usage

Relation with a resource being described: Resource has usage information.



Note

- In presenting the usage-related information, different words might be used in your situation, for example, “Production Level”, “Audience”, “Literary Indication”, etc.
- Values for this property that are text strings are considered in this document. It is also possible that the values are controlled by a vocabulary or dataset which is available as Linked Data. For such a situation, consult “6.2. Type/Genre” for options.

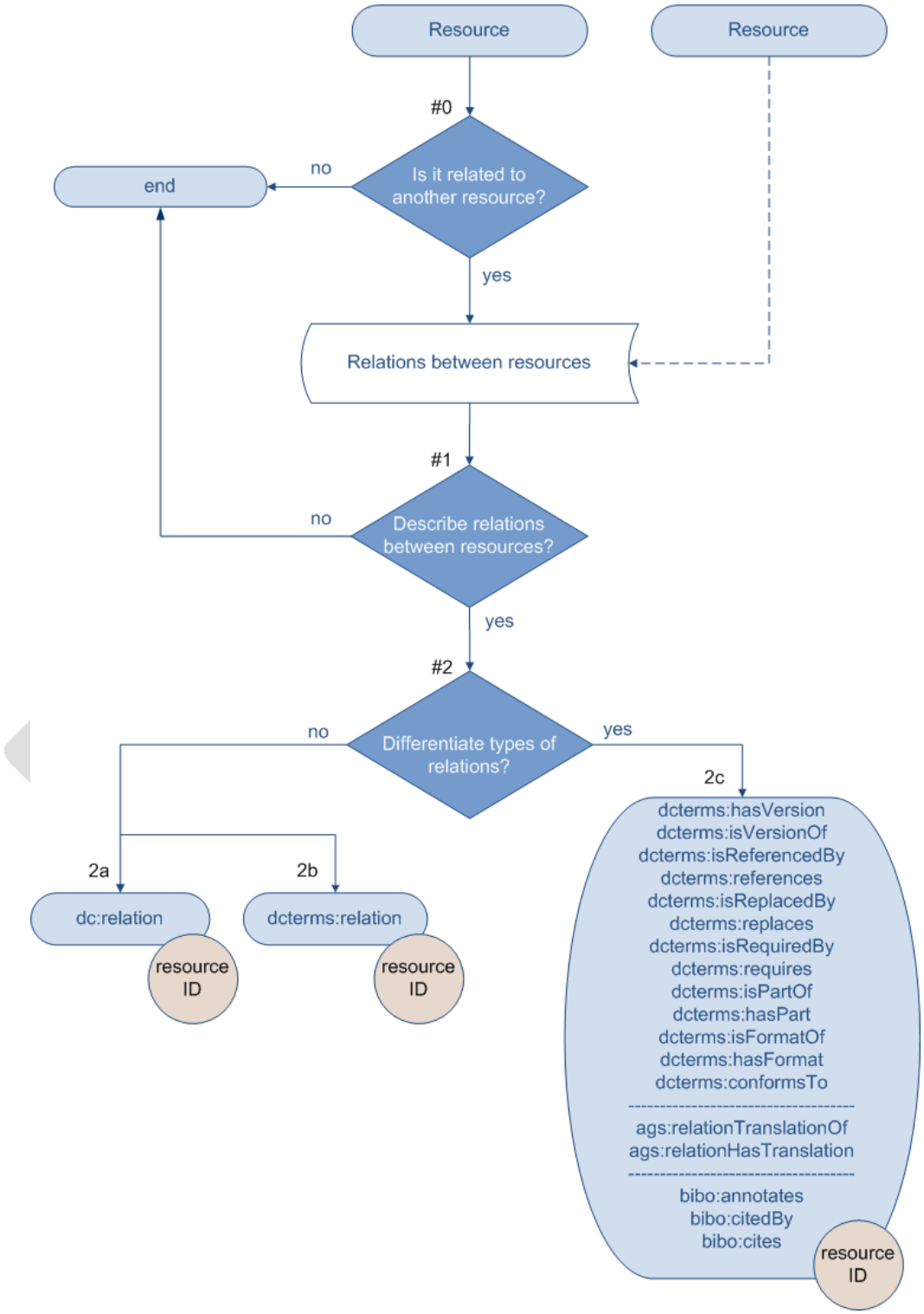
Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Has usage info?	No	End			
		Yes	Continue to #1			
#1	Differentiate specific types of usage data? (e.g., Production level/Audience/Literary indication, etc.)	No	1a	String	dc:description	audience: Public[1]
			1b	String	dcterms:description	audience: Public[1]
		Yes	1c	String	dcterms:audience	Public [1]
					dcterms:educationLevel	UK Educational Level 1 [2]
					dcterms:instructionalMethod	Direct Teaching [3]
					dcterms:mediator	Reading specialist [4]
					dcterms:description	[any other usage data]

[1] Example taken from ProdINRA sample record.
[2] Example taken from *UK Educational Levels (UKEL)* list: http://www.ukoln.ac.uk/metadata/education/ukel/
[3] Example taken from ADPRIMA *Instructional Methods Information* list of Instructional Methods:http://www.adprima.com/teachmeth.htm
[4] Example taken from Diane Hillmann (2005) *Using Dublin Core*. http://dublincore.org/documents/usageguide/

[9. Relation]

9.1 Relation between resources

Relation being described: The resource is related to another resource.



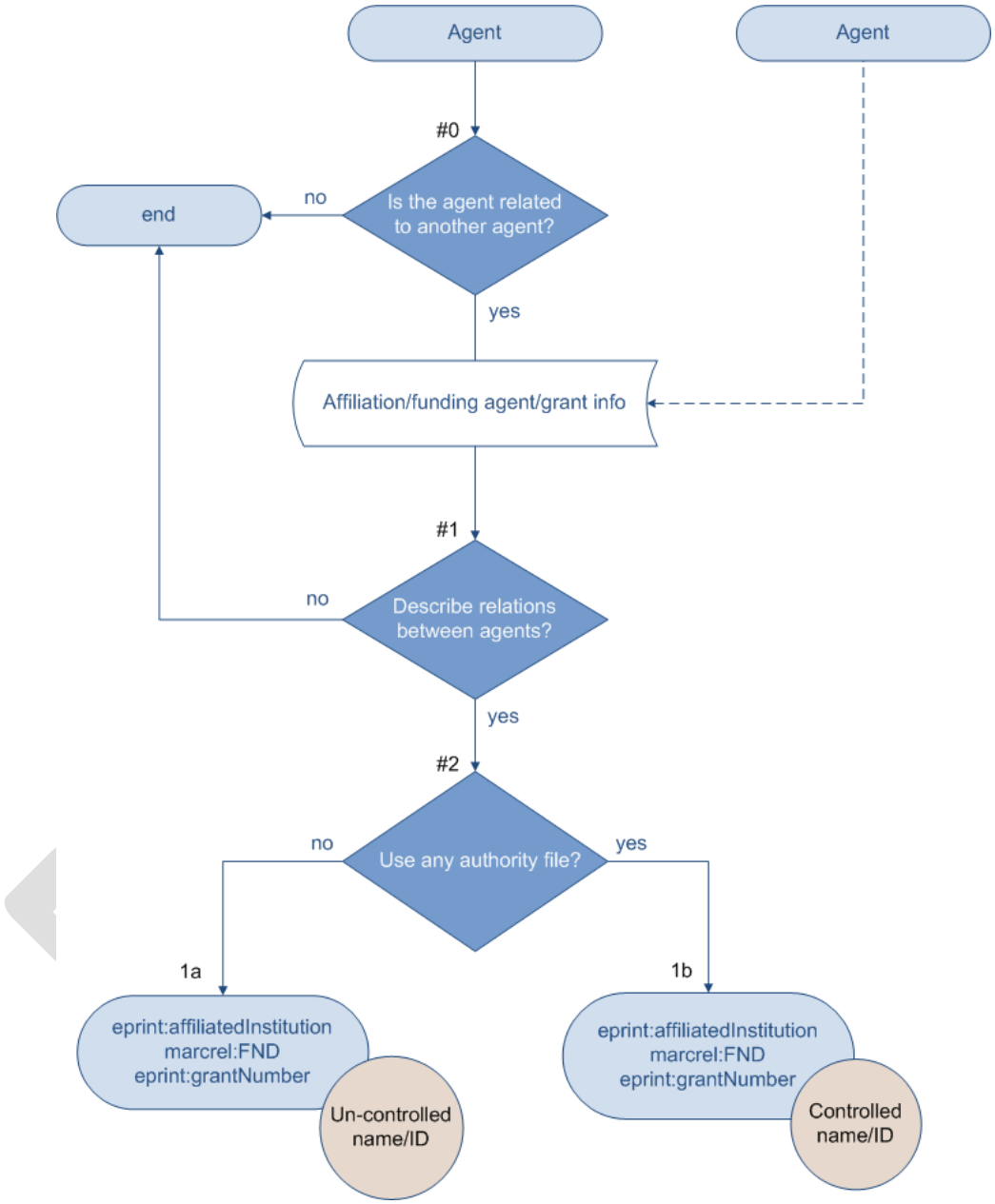
Note

- When a resource is related to another resource, a decision should be made regarding whether the relations between the two resources need to be described.
- In describing the relations, a great number of relation types can be used. The available metadata terms listed below do not form an exhaustive list. Other types may exist.
- The involved resources should always be represented by their identifiers. Values for this property are always the identifiers.

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Is it related to another resource?	No	End			
		Yes	Continue to #1			
#1	Describe relations between resources?	No	End			
		Yes	Continue to #2			
#2	Differentiate types of relation?	No	2a	ID	dc:relation	12345
			2b	ID	dcterms:relation	12345
		Yes	2c	ID	dcterms:isVersionOf dcterms:hasVersion dcterms:isReplacedBy dcterms:replaces dcterms:isRequiredBy dcterms:requires dcterms:isPartOf dcterms:hasPart dcterms:isReferencedBy dcterms:references ags:relationTranslationOf bibo:annotates bibo:citedBy bibo:cites	12345

9.2 Relation between agents

Relation being described: The agent is related to another agent, specifically affiliation and funding.



Note

- When an agent is related to another agent, a decision needs to be made regarding whether the relations between the two agents should be described.
- There could be various types of relations between agents. The available metadata terms listed below focus on the affiliation and funding information and do not form an exhaustive list. Consult *MARC List for Relators (marcrel)* http://id.loc.gov/vocabulary/relators.html for more types of relators.
- It is highly recommended that agents always be represented by their identifiers or controlled names.

Decision	Question	Answer	Action	Value Type	Examples	
					Metadata Term	Value
#0	Is the agent related to another agent?	No	End			
		Yes	Continue to #1			
#1	Describe relations between agents?	No	End			
		Yes	Continue to #2			
#2	Do you use any authority file for the names of the agents?	No	1a	Un-controlled name/ID	eprint:affiliatedInstitution	Univ Bristol
					marcrel:FND [1]	The Mellon Foundation
					eprint:grantNumber	A456X
		Yes	1b	Controlled name/ID	eprint:affiliatedInstitution	University of Bristol
					eprint:grantNumber	A456X
					marcrel:FND [1]	The Andrew W. Mellon Foundation

[1] marcrel:FND represent “Funder” and has an URI: http://id.loc.gov/vocabulary/relators/fnd.html.
-- From the *MARC List for Relators:* http://id.loc.gov/vocabulary/relators/fnd.html

Appendixes

Appendix A. Explanation of Terminology

"Metadata Terms" and "Properties"

"[metadata] elements", "[metadata] fields", and "attributes [of an entity]" have been widely used by the professionals who are involved in creating, designing, and implementing metadata standards. In a number of metadata structure standards it is the term "elements" that have dominated in the specifications. Some standards (e.g., those used by library, museum, and archives communities) prepared their data structure standards (e.g., MODS, CDWA, VRA Core, EAD) using XML schema as the primary medium. These specifications modelled the structure with "elements", related "attributes", and controlled "attribute values" throughout the element sets. Nevertheless, as represented by DCTERMS, the RDF terminology instead of the XML terminology is now gaining momentum. The term "properties" of resources are used in place of "elements" in the LOD report.

This document considers the process of metadata description as the description of properties of a resource. For example, 'rights' is considered as a property of a resource.

Property: rights

Because there are various levels of granularity and multiple corresponding ways this property can be described, LODE-BD uses "*metadata term*" for a specific element provided by a metadata element set. For example, property 'rights' can be described by metadata terms from different namespaces:

Metadata term: dc:rights
Metadata term: dcterms:rights
Metadata term: ags:rightsStatement

"String" and "URI" as values

In this document, the words 'string' and 'URI' are used for the most commonly seen values in bibliographic data. They correspond to the terminology of RDF in the form of 'literal' (typically a string of characters) and 'non-literal'.

> "literal
> The most primitive value type represented in RDF, typically a string of characters. The content of a literal is not interpreted by RDF itself and may contain additional XML markup. Literals are distinguished from Resources in that the RDF model does not permit literals to be the subject of a statement[2]."
>
> "A plain literal is a string combined with an optional language tag. This may be used for plain text in a natural language. As recommended in the RDF formal semantics [RDF-SEMANTICS], these plain literals are self-denoting[3]."
>
> "A *literal* is an entity which uses a Unicode string as a lexical form, together with an optional language tag or datatype, to denote a *resource*[4]."

[2] Resource Description Framework (RDF) Model and Syntax Specification (1999-02-22). Glossary for this source http://www.w3.org/2003/glossary/keyword/All/literal.html?keywords=literal Last accessed February 2011
[3] Resource Description Framework (RDF): Concepts and Abstract Syntax. http://www.w3.org/TR/rdf-concepts/#section-Literals Last accessed February 2011
[4] DCMI Abstract Model. http://www.dublincore.org/documents/abstract-model/ Last accessed February 2011

> "non-literal value
> A *value* which is a physical, digital or conceptual entity[5]."

For example, "rice" is a concept included in the *AGROVOC Thesaurus*, with a preferred label (in English), "Rice." When the thesaurus is published as Linked Data, the concept is considered as a resource and is given a unique URI, http://aims.fao.org/aos/agrovoc/c_6599. This means that a URI reference is used to identify this concept as a resource.

In this situation for the *property:* subject, the *metadata terms* for encoding this property include dc:subject and dcterms:subject. Because dcterms:subject "is intended to be used with non-literal values as defined in the DCMI Abstract Model (http://dublincore.org/documents/abstract-model/)",[6] the value to be used associated with this metadata term should be the URI http://aims.fao.org/aos/agrovoc/c_6599 which represents the concept as a resource instead of "Rice" or other language labels which represent the concept.

Based on the definition of these metadata terms, the following examples are provided:

dc:subject	Rice
dcterms:subject	http://aims.fao.org/aos/agrovoc/c_6599

"URI" as a value recommend in this document represents "http URI" only.

"Resource"

The term "*Resource*" is used in the conceptual model to denote a general entity, the *Bibliographic Resource*. An instance of the bibliographic resource can be an article, monograph, thesis, conference paper, research report, etc., regardless if it is in print or electronic format. The range of the '*Resource*' is consistent with what the Dublin Core referred to as 'resource description'. However, it is narrower than rdf:Resource where *Resource* is an entity of anything in the universe, or is a name of the class of everything.

> "resource
> An abstract object that represents either a physical object such as a person or a book or a conceptual object such as a color or the class of things that have colors. Web pages are usually considered to be physical objects, but the distinction between physical and conceptual or abstract objects is not important to RDF. A resource can also be a component of a larger object; for example, a resource can represent a specific person's left hand or a specific paragraph out of a document."[7]

In the flowcharts provided by the LODE-BD Recommendations, the 'resource' at the beginning oval box is an instance of the bibliographic resource.

[5] Ibid.
[6] DC Terms. http://dublincore.org/documents/dcmi-terms/#terms-subject Last accessed February 2011
[7] From Resource Description Framework (RDF) Model and Syntax Specification (1999-2-22). Glossary for this source http://www.w3.org/2003/glossary/keyword/All/resource.html?keywords=resource Last accessed February 2011

Appendix B. References[8]

How to publish and consume Linked Data

Linked Data: Evolving the Web into a Global Data Space (1st edition), Tom Heath and Christian Bizer (2011)**.** Synthesis Lectures on the Semantic Web: Theory and Technology, 1:1, 1-136. Morgan & Claypool.
URL: http://linkeddatabook.com

> "*This book gives an overview of the principles of Linked Data as well as the Web of Data that has emerged through the application of these principles. The book discusses patterns for publishing Linked Data, describes deployed Linked Data applications and examines their architecture.*"

Linked Data Patterns, Leigh Dodds and Ian Davis.
URL: http://patterns.dataincubator.org/book/

> "*A pattern catalogue for modelling, publishing, and consuming Linked Data.*"

Linked Data Tutorial NG - Publishing and Consuming Linked Data with RDFa, Michael Hausenblas and Richard Cyganiak.
URL: http://ld2sd.deri.org/lod-ng-tutorial/

> "*This note describes, step-by-step, how to create and consume linked data with RDFa.*"

Linked Data star scheme by example
URL: http://lab.linkeddata.deri.ie/2010/star-scheme-by-example/

> "*Tim Berners-Lee suggested a 5-star deployment scheme for Linked Open Data and Ed Summers provided a nice rendering of it.*"

Linked Data - Design Issues, Tim Berners-Lee (2006).
URL: http://www.w3.org/DesignIssues/LinkedData.html

> One of the first discussions of the topic, mentioning the "*four rules of Linked Data*".

Cool URIs for the Semantic Web. Leo Sauermann and Richard Cyganiak (2008)**.** W3C Interest Group Note.
URL: http://www.w3.org/TR/cooluris/

Where to find Linked Data sets

Linked Open Data Cloud - Datasets in the Linking Open Data Cloud diagram.
URL: http://ckan.net/group/lodcloud

The Linking Open Data cloud diagram.
URL: http://richard.cyganiak.de/2007/10/lod/

[8] Section prepared by Hannes Ebner < http://electricbum.wordpress.com/ >

Syntax guidelines

DC-TEXT [DCMI Recommendation]. "Expressing Dublin Core metadata using the DC-Text format"
URL: http://www.dublincore.org/documents/dc-text/

> Its primary use is in presenting metadata constructs for human consumption.

DC-HTML [DCMI Recommendation]. "Expressing Dublin Core metadata using HTML/XHTML meta and link elements"

URL: http://www.dublincore.org/documents/dc-html/

> It describes how a Dublin Core metadata description set can be encoded using the HTML/XHTML <meta> and <link> elements. This specification is also an HTML "meta data profile" as defined by the HTML specification.

DC-DS-XML [DCMI Recommendation]. "Expressing Dublin Core Description Sets using XML (DC-DS-XML)"
URL: http://www.dublincore.org/documents/dc-ds-xml/

> It specifies an XML format for representing a Dublin Core metadata description set.

DC-RDF [DCMI Recommendation]. "Expressing Dublin Core metadata using the Resource Description Framework (RDF)"
http://www.dublincore.org/documents/dc-rdf/

> It describes how constructs of the DCMI Abstract Model may be expressed in RDF graphs.