DATACITE DUBLIN CORE APPLICATION PROFILE DRAFT 1.8

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Description	This document is a proposed Dublin Core Application Profile for the DataCite Metadata Kernel version 3.1. (Later versions will be updated to reflect new DataCite Metadata releases.)

1 Introduction

1.1 The DataCite Consortium

Scholarly research is producing ever increasing amounts of digital research data, and it depends on data to verify research findings, create new research, and share findings. In this context, what has been missing until recently, is a *persistent* approach to access, identification, sharing, and re-use of datasets. To address this need, the DataCite[1] international consortium was founded in late 2009 with these three fundamental goals:

- establish easier access to scientific research data on the Internet,
- increase acceptance of research data as legitimate, citable contributions to the scientific record, and
- support data archiving that will permit results to be verified and re-purposed for future study.

The aim of DataCite is to provide domain agnostic services to benefit scholars in a wide range of disciplines. Key to the DataCite service is the concept of a long term or *persistent* identifier. A persistent identifier is an association between a character string and a resource. Resources can be files, parts of files, persons, organizations, abstractions, etc. DataCite uses *Digital Object Identifiers* (DOIs) at the present time and is considering the use of other identifier schemes in the future. For this reason, the Metadata Schema has been designed with flexibility and extensibility in mind.

1.2 The Metadata Schema

The DataCite Metadata Schema is a list of core metadata properties chosen for the accurate and consistent identification of a resource for citation and retrieval purposes, along with recommended use instructions. The resource that is being identified can be of any kind, but it is typically a dataset. We use the term 'dataset' in its broadest sense. We mean it to include not only numerical data, but any other research data outputs.

In order to support openness and future extensibility of the schema, a collaboration between DataCite and the Dublin Core Metadata Initiative (DCMI) Science and Metadata Community (SAM)[2] is producing a version of the schema in this Dublin Core Application Profile format, provided as a DCMI Community Specification. The aim is to formalise the DataCite metadata schema within the Dublin Core Application Profile framework and to confirm interoperability with Dublin Core as far as possible. The Specification is released[3] on our GitHub and will be maintained with all future versions of the Schema.

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[1] http://www.datacite.org
[2] For more information on DCMI SAM, see http://wiki.dublincore.org/index.php/DCMI_Science_And_Metadata.
[3] The Application Profile will be released on DataCite's Github site: https://github.com/datacite.

1.3 Functional Requirements

The functional requirements of the profile are to:

- Resolve a dataset identifier i.e. a DataCite DOI to a network location
- Discover a dataset and related publications by author, description
- Discover datasets and related publications by search and browse
- Establish links between datasets and their publications by DOI. Publication DOIs may be added in the related resource element for the linking purpose.
- Cite datasets
- Select datasets
- Obtain datasets

1.4 Domain model

An 'Agent' creates a 'Dataset' which has

- Content Properties including title, subject etc.
- Temporal Properties including date:issued etc.
- Geospatial Properties including spatial
- Relational Properties including isPartOf and hasPart etc.
- Technical Properties including size, format,version and rights etc.

1.5 Mandatory, Recommended and Optional Properties Overview

There are three different levels of obligation for the metadata properties:

- **Mandatory (M)** properties *must* be provided,
- **Recommended (R)** properties are optional, but strongly recommended and
- **Optional (O)** properties are optional and provide richer description.

The properties listed in Table 1 have the obligation level Mandatory, and *must be* supplied when submitting DataCite metadata. The properties listed in Table 2 have one of the obligation levels Recommended or Optional, and *may be* supplied when submitting DataCite metadata.

In Tables 1 and 2, the combined Mandatory and Recommended "super set" of properties and sub-properties that enhance the prospect that the resource's metadata will be found, cited and linked is indicated by shading.

Of the Recommended set of properties, the two most important to use are the properties **ResourceType** and **Description,** together with their Recommended sub-properties resourceTypeGeneral="controlled list value" (see Appendix 1) and descriptionType ="Abstract" (see Section 2.3). Appendix 1 includes detailed descriptions of controlled list values, using the same shading to indicate those values that are especially important for information seekers and added-service providers. It cannot be emphasized enough how valuable resourceTypeGeneral and Description are to other scholars in finding the resource and then determining whether or not the resource, once found, is worth investigating further, re-using or validating.

Table 1: DataCite Mandatory Properties

ID	DataCite Property Label in the DC2AP	Obligation
1	Identifier	M
2	Creator	M
3	Title	M
4	Publisher	M
5	PublicationYear	M

Table 2: DataCite Recommended and Optional Properties

ID	DataCite Property Label in the DC2AP	Obligation
6	Subject	R
7	Contributor	R
8	Date	R
9	Language	O
10	ResourceType	R
11	AlternateIdentifier	O
12	RelatedIdentifier	R
13	Size	O

ID	DataCite Property Label in the DC2AP	Obligation
14	Format	O
15	Version	O
16	Rights	O
17	Description	R
18	GeoLocation	R

2.0   DataCite to Dublin Core mapping – Usage Guidelines

Table 3 provides a detailed description of the mandatory properties, together with their sub-properties, which *must* be supplied with any initial metadata submission to the managing agent for DataCite. **If one of the required properties is unavailable**, please use one of the standard (machine-recognizable) codes listed in Appendix 3, Table 11. In Table 4, the Recommended and Optional properties are described in detail. As with Tables 1 and 2, Tables 3 and 4 use shading to identify the combined Mandatory and Recommended "super set" of properties and sub-properties that enhance the prospect that the resource's metadata will be found, cited and linked.

The third column, Occurrence (Occ), indicates cardinality/quantity constraints for the properties as follows:

    0-n = optional and repeatable
    0-1 = optional, but not repeatable
    1-n = required and repeatable
    1 = required, but not repeatable

    Vocabularies/Namespaces used in this DCAP
    References to properties etc. in DC metadata descriptions are made using URIs. In the following tables, qualified names in the form prefix:term are used as abbreviations for the URIs that identify the metadata terms.

This Application Profile should be used in conjunction with the DataCite Ontology. Users may obtain additional guidance by referring to the mapping from the DataCite Ontology to RDF.

Vocabulary title	Namespace	Prefix
The Dublin Core Metadata Element Set, v1.1	http://purl.org/dc/elements/1.1/	dc
Dublin Core Metadata Terms	http://purl.org/dc/terms/	dcterms
Friend of a Friend (FOAF)	http://xmlns.com/foaf/0.1/	foaf
DCMI Type	http://purl.org/dc/dcmitype/	dctype
Basic Geo (WGS84 Lat/Long) Vocabulary	http://www.w3.org/2003/01/geo/wgs84_pos#	wgs
Datacite	http://purl.org/spar/datacite/	datacite
Publishing Rules Ontology	http://purl.org/spar/pro:	pro
FRBR-aligned Bibliographic Ontology (FaBiO)	http://purl.org/spar/fabio/	fabio
Collections Ontology	http://purl.org/co/	co
Xml Schema	http://www.w3.org/2001/XMLSchema	xsd
OWL Web Ontology Language	http://www.w3.org/2002/07/owl#	owl
SKOS Simple Knowledge Organization System	http://www.w3.org/2004/02/skos/core#	skos
Scholarly Contributions and Role Ontology	http://purl.org/spar/scoro/	scoro

Table 3: Expanded DataCite Mandatory Properties

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
1	identifier	datacite:hasIdentifier (datacite Class datacite:PrimaryResourceIdentifer	1	The Identifier is a unique string that identifies a resource.	DOI (Digital Object Identifier) registered by a DataCite member. Format should be "10.1234/foo"
1.1	identifierType	datacite:usesIdentifierScheme	1	The type of the Identifier.	*For the DOI identifier the Controlled List Value is* 'DOI'

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
2	creator	dcterms:creator with the range dcterms:Agent and if relevant the choice of foaf:Person, foaf:Organization If the order of creators is required then use datacite:hasCreatorList + co:* (from the Collections Ontology, to ensure the order of creators - see appendix 4 fig. 1)	1-n	The main researchers involved in producing the data, or the authors of the publication, in priority order.	May be a corporate/institutional or personal name. Note: DataCite infrastructure supports up to between 8000-10000 names. For name lists above that size, consider attribution via linking to the related metadata.
2.1	creatorName	foaf:name	1	The name of the creator.	Examples: Smith, John; Miller, Elizabeth The personal name format should be: family, given. Non-roman names may be transliterated according to the ALA-LC schemes[4].
2.2	nameIdentifier	datacite:hasIdentifier	0-1	Uniquely identifies an individual or legal entity, according to various schemes.	The format is dependent upon scheme.
2.2.1	nameIdentifierScheme	datacite:usesIdentifierScheme + skos:prefLabel	1	The name of the name identifier scheme.	If nameIdentifier is used, nameIdentifierScheme is mandatory. Examples: ORCID[5], ISNI[6],

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[4] http://www.loc.gov/catdir/cpso/roman.html
[5] http://orcid.org/
[6] http://www.isni.org/

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
2.2.2	schemeURI	xsi:type="URI"	0-1	The URI of the name identifier scheme.	Examples: http://isni.org/isni/ http://orcid.org
2.3	affiliation	scoro:affiliate	0-n	The organizational or institutional affiliation of the creator.	Free text.
3	title	dcterms:title (for specific title types, see titleType below)	1-n	A name or title by which a resource is known.	Free text.
3.1	titleType	dcterms:alternative for AlternativeTitle fabio:hasSubtitle for Subtitle fabio:hasTranslatedTitle for TranslatedTitle	0-1	The type of Title.	Controlled List Values: AlternativeTitle Subtitle TranslatedTitle
4	publisher	dcterms:publisher + foaf:name	1	The name of the entity that holds, archives, publishes prints, distributes, releases, issues, or produces the resource. This property will be used to formulate the citation, so consider the prominence of the role.	Examples: World Data Center for Climate (WDCC); GeoForschungsZentrum Potsdam (GFZ); Geological Institute, University of Tokyo

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
5	publicationYear	fabio:hasPublicationYear	1	The year when the data was or will be made publicly available.	YYYY If an embargo period has been in effect, use the date when the embargo period ends. In the case of datasets, "publish" is understood to mean making the data available on a specific date to the community of researchers. If there is no standard publication year value, use the date that would be preferred from a citation perspective.

PublicationYear—Additional guidance

PublicationYear: the year when the data was or will be made publicly available. In the case of datasets, "publish" is understood to mean making the data available on a specific date to the community of researchers.

- If that date cannot be determined, use the date of registration.
- If an embargo period has been in effect, use the date when the embargo period ends.
- If there is no standard publication year value, use the date that would be preferred from a citation perspective.

In the case of a digitized version of a physical object

If the DOI is being used to identify a digitized version of an original item, the recommended approach is to supply the PublicationYear for the digital version and not the original object.

The Title field may be used to convey the approximate or known date of the original object. Other metadata properties available for additional date information about the object include: Subject and Description. However, only Title will be part of the citation.

If the DOI is being used to identify the original object and the publication date of this is unknown or not standard then we recommend the following:

- Use the date that would be preferred from a citation perspective.

Guidance for handling missing mandatory property values

If the completion of any of the mandatory properties presents a difficulty, use of standard machine-recognizable codes is strongly advised. A set of the codes is provided in Appendix 3, Table 11. However, we recommend that you consider the resulting effect on the citation created from the metadata provided.

Table 4: Expanded DataCite Recommended and Optional Properties

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
6	subject	dc:subject *for literals* dcterms:subject *for non-literals*	0-n	Subject, keyword, classification code, or key phrase describing the resource.	Free text or URI
6.1	subjectScheme	dcterms:subject xsi:type="DCTERMS: " If the value is not available as a DCTERM then use skos:inScheme (an individual of skos:ConceptScheme) with skos:prefLabel	0-1	The name of the subject scheme or classification code or authority if one is used.	Free text. If the scheme value is used with dcterms: then it must be one of the Vocabulary Encoding Schemes listed at http://www.dublincore.org/documents/dcmi-terms/#H4. e.g. xsi:type="DCTERMS:MESH"

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
6.2	schemeURI	dcterms:subject xsi:type="URI"	0-1	The URI of the subject identifier scheme.	Examples: dcterms:subject xsi:type="http://id.loc.gov/authorities/subjects" dcterms:subject xsi:type="http://dewey.info"
7	contributor	dcterms:contributor with foaf:Person or foaf:Organization (depending on contributorType)	0-n	The institution or person responsible for collecting, managing, distributing, or otherwise contributing to the development of the resource.	Note: DataCite infrastructure supports up to between 8000-10000 names. For name lists above that size, consider attribution via linking to the related metadata.

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
7.1	contributorType	dcterms:contributor with pro:withRole ContactPerson = scoro:contact-person DataCollector = scoro:data-creator DataCurator = scoro:data-curator DataManager =scoro:data-manager Distributor = pro:distributor Editor = pro:editor Funder = scoro:funder HostingInstitution = scoro:host-institution Producer = pro:producer ProjectLeader = scoro:project-leader ProjectManager = scoro:project-manager ProjectMember = scoro:project-member RegistrationAgency = scoro:registrat RegistrationAuthority = scoro:registration-authority RelatedPerson = foaf:Person Researcher = scoro:researcher ResearchGroup=frapo:ResearchGroup RightsHolder = scoro:rights-holder Sponsor = scoro:sponsor Supervisor = scoro:supervisor WorkPackageLeader = scoro:workpackage-leader Other = foaf:Person or foaf:Organization (see appendix 4 fig. 2)	1	The type of contributor of the resource.	If Contributor is used, then contributorType is mandatory. *Controlled List Values:* ContactPerson DataCollector DataCurator DataManager Distributor Editor Funder HostingInstitution Producer ProjectLeader ProjectManager ProjectMember RegistrationAgency RegistrationAuthority RelatedPerson Researcher ResearchGroup RightsHolder Sponsor Supervisor WorkPackageLeader Other See appendix for definitions.

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
7.2	contributorName	See 2.1	1	The name of the contributor.	If Contributor is used, then contributorName is mandatory. Examples: Patel, Emily; Doe, John The personal name format may be: family, given. Non-roman names should be transliterated according to the ALA-LC schemes[7].
7.3	nameIdentifier	See 2.2	0-1	Uniquely identifies an individual or legal entity, according to various schemes.	The format is dependent upon scheme.
7.3.1	nameIdentifierScheme	See 2.2.1	1	The name of the name identifier scheme.	If nameIdentifier is used, nameIdentifierScheme is mandatory. Examples:ORCID[8], ISNI[9], FundRef[10]
7.3.2	schemeURI	See 2.2.2	0-1	The URI of the name identifier scheme.	Examples: http://www.isni.org http://orcid.org http://www.crossref.org/fundref/
7.4	affiliation	See 2.3	0-n	The organizational or institutional affiliation of the contributor.	Free text.

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[7] http://www.loc.gov/catdir/cpso/roman.html
[8] http://orcid.org/
[9] http://www.isni.org/
[10] http://www.crossref.org/fundref/

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
8	date	dcterms:date or other (see dateType)	0-n	Different dates relevant to the work.	YYYY,YYYY-MM-DD, YYYY-MM-DDThh:mm:ssTZD or any other format or level of granularity described in W3CDTF.[11] Use RKMS-ISO8601[12] standard for depicting date ranges. Example: 2004-03-02/2005-06-02
8.1	dateType	dcterms:dateAccepted dcterms:available dcterms:dateCopyrighted dcterms:coverage dcterms:created dcterms:issued dcterms:dateSubmitted dcterms:modified dcterms:valid	1	The type of date.	If Date is used, dateType is mandatory. *Controlled List Values:* Accepted Available Copyrighted Collected Created Issued Submitted Updated Valid See appendix for definitions and recommendations.
9	language	dcterms:language	0-1	The primary language of the resource.	Allowed values are taken from IETF BCP 47, ISO 639-1 language codes. Examples: en, de, fr

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[11] http://www.w3.org/TR/NOTE-datetime
[12] The standard is documented here: http://www.ukoln.ac.uk/metadata/dcmi/collection-RKMS-ISO8601/

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
10	resourceType	dc:type	0-1	A description of the resource.	The format is open, but the preferred format is a single term of some detail so that a pair can be formed with the sub-property. Text formats can be free-text OR terms from the CASRAI Publications resource type list.[13] *** Examples: Dataset/Census Data, where 'Dataset' is resourceTypeGeneral value and 'Census Data' is ResourceType value. Text/Conference Abstract, where 'Text' is ResourceTypeGeneral value and 'Conference Abstract' is resourceType value aligned with CASRAI Publications term.

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[13] http://dictionary.casrai.org/research-personnel-profile/contributions/outputs/publications

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
10.1	resourceTypeGeneral	dcterms:type + DCMI Type Vocabulary were applicable, otherwise use datacite:hasGeneralResourceType	1	The general type of a resource.	If ResourceType is used, resourceTypeGeneral is mandatory. *Controlled List Values:* Audiovisual Collection Dataset Event Image InteractiveResource Model PhysicalObject Service Software Sound Text[14] Workflow Other See appendix for definitions and examples.

[14]Combine "Text" with free-text or terms from the CASRAI Publications resource type list found here: http://dictionary.casrai.org/research-personnel-profile/contributions/outputs/publications

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
11	alternateIdentifier	datacite:hasIdentifier (dataCite Class datacite:AlternateResourceIdentifier)	0-n	An identifier or identifiers other than the primary Identifier applied to the resource being registered. This may be any alphanumeric string which is unique within its domain of issue. May be used for local identifiers. AlternateIdentifier should be used for another identifier of the same instance (same location, same file).	Free text. *** Example: E-GEOD-34814
11.1	alternateIdentifierType	datacite:usesIdentifierScheme	1	The type of the AlternateIdentifier.	Free text. *** If AlternateIdentifier is used, alternateIdentifierType is mandatory. For the above example, the alternateIdentifierType would be "A local accession number"
12	relatedIdentifier	dc:relation	0-n	Identifiers of related resources. These must be globally unique identifiers.	Free text. *** Use this property to indicate subsets of properties, as appropriate.

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
12.1	relatedIdentifierType	datacite:usesIdentifierScheme	1	The type of the RelatedIdentifier	If RelatedIdentifier is used, relatedIdentifierType is mandatory. *Controlled List Values:* ARK arXiv bibcode DOI EAN13 EISSN Handle ISBN ISSN ISTC LISSN LSID PMID PURL UPC URL URN See appendix for full names and examples.

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
12.2	relationType	dcterms:isReferencedBy/ dcterms:references frbr:supplementOf / frbr:Supplement frbr:successor / frbr:successorOf cito:citesAsMetadataDocument / cito:isCitedAsMetadataDocument frbr:revisionOf / frbr:revision dcterms:isPartOf / dcterms:hasPart dcterms:isReferencedBy/ dcterms:references cito:isDocumentedBy / cito:documents cito:isCompiledby / cito:compiles dcterms:isFormatOf / dcterms:hasFormat owl:sameAs cito:isReviewedBy / cito:reviews dcterms:source / cito:isCitedAsDataSourceBy	1	Description of the relationship of the resource being registered (A) and the related resource (B).	If RelatedIdentifier is used, relationType is mandatory. *Controlled List Values:* IsCitedBy Cites IsSupplementTo IsSupplementedBy IsContinuedBy Continues HasMetadata IsMetadataFor IsNewVersionOf IsPreviousVersionOf IsPartOf HasPart IsReferencedBy References IsDocumentedBy Documents IsCompiledBy Compiles IsVariantFormOf IsOriginalFormOf IsIdenticalTo IsReviewedBy Reviews IsDerivedFrom IsSourceOf See appendix for definitions, examples and usage notes.

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
12.3	relatedMetadataScheme	dcterms:relation + datacite:usesMetadataScheme	0-1	The name of the scheme.	Use only with this relation pair: (HasMetadata/ IsMetadataFor)
12.4	schemeURI	dcterms:relation + datacite:usesMetadataScheme xsi:type="URI"	0-1	The URI of the relatedMetadataScheme.	Use only with this relation pair: (HasMetadata/ IsMetadataFor)
12.5	schemeType	dcterms:relation + dcterms:format (class dcterms:MediaTypeorExtent)	0-1	The type of the relatedMetadataScheme, linked with the schemeURI.	Use only with this relation pair: (HasMetadata/ IsMetadataFor) Examples: XSD, DDT, Turtle
13	size	dcterms:extent and optionally dcterms:description	0-n	Unstructured size information about the resource.	Free text. *** Examples: "15 pages", "6 MB"
14	format	dcterms:format and optionally dcterms:description	0-n	Technical format of the resource.	Free text. *** Use file extension or MIME type where possible, e.g., PDF, XML, MPG or application/pdf, text/xml, video/mpeg.

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
15	version	prism:versionIdentifier	0-1	The version number of the resource.	Suggested practice: track major_version.minor_version. Register a new identifier for a major version change. Individual stewards need to determine which are major vs. minor versions[15]. May be used in conjunction with properties 11 and 12 (AlternateIdentifier and RelatedIdentifier) to indicate various information updates. May be used in conjunction with property 17 (Description) to indicate the nature and file/record range of version.

[15] Based on the work of the Earth Science Information Partners (ESIP). For more guidance, see:
http://wiki.esipfed.org/index.php/Interagency_Data_Stewardship/Citations/provider_guidelines#Note_on_Versioning_and_Locators

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
16	rights	dc:rights or dcterms:rights	0-n	Any rights information for this resource.	Free text. *** Provide a rights management statement for the resource or reference a service providing such information. Include embargo information if applicable. Use the complete title of a license and include version information if applicable. Example: Creative Commons Attribution 3.0 Germany License
16.1	rightsURI	dcterms:license xsi:type="URI"	0-1	The URI of the license.	Example: http://creativecommons.org/licenses/by/3.0/de/deed.en
17	description	dcterms:description	0-n	All additional information that does not fit in any of the other categories. May be used for technical information.	The format is open *** It is a best practice to supply a description.

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
17.1	descriptionType	Use dc terms or properties where possible dcterms:abstract dcterms:tableOfContents If not available then use datacite:hasDescriptionType with DataCite controlled vocabulary values - Methods - SeriesInformation - Other	1	The type of the Description.	If Description is used, descriptionType is mandatory. *Controlled List Values:* Abstract Methods SeriesInformation TableOfContents Other See appendix for definitions.
18	geoLocation	dcterms:spatial	0-n	Spatial region or named place where the data was gathered or about which the data is focused.	Repeat this property to indicate several different locations.
18.1	geoLocationPoint	dcterms:spatial xsi:type="DCTERMS:Point"	0-1	A point location in space	A point contains a single latitude-longitude pair, separated by whitespace. Detailed usage instructions[21] Example: <geoLocationPoint> 31.233 -67.302 </geoLocationPoint>

ID	DataCite-Property Label in this DCAP	Dublin Core or other schema property	Occ	Definition	Allowed values, examples, other constraints
18.2	geoLocationBox	dcterms:spatial xsi:type="DCTERMS:Box"	0-1	The spatial limits of a place.	A box contains two white space separated latitude-longitude pairs, with each pair separated by whitespace. The first pair is the lower corner (normally south west), the second is the upper corner (normally north east). Detailed usage instructions[16] Example: <geoLocationBox> 41.090 -71.032 42.893 -68.211 </geoLocationBox>
18.3	geoLocationPlace	dcterms:coverage	0-1	Description of a geographic location	Free text. Use to describe a geographic location.

[16] Use WGS 84 (World Geodetic System) coordinates. Use only decimal numbers for coordinates. Longitudes are -180 to 180 (0 is Greenwich, negative numbers are west, positive numbers are east), Latitudes are -90 to 90 (0 is the equator; negative numbers are south, positive numbers north).

Appendices

Appendix 1: Controlled List Vocabulary Definitions

In Appendix 1, as in Sections 2.1 and 2.3 above, controlled list values that enhance the prospect that the resource's metadata will be found, cited and linked are indicated by shading.

contributorType Vocabulary

Table 5: Description of contributorType

Option	Description	Usage Notes
ContactPerson	Person with knowledge of how to access, troubleshoot, or otherwise field issues related to the resource	May also be "Point of Contact" in organization that controls access to the resource, if that organization is different from Publisher, Distributor, Data Manager
DataCollector	Person/institution responsible for finding, gathering/collecting data under the guidelines of the author(s) or Principal Investigator (PI)	May also use when crediting survey conductors, interviewers, event or condition observers, person responsible for monitoring key instrument data.
DataCurator	Person tasked with reviewing, enhancing, cleaning, or standardizing metadata and the associated data submitted for storage, use, and maintenance within a data center or repository	While the "DataManager" is concerned with digital maintenance, the DataCurator's role encompasses quality assurance focused on content and metadata. This includes checking whether the submitted dataset is complete, with all files and components as described by submitter, whether the metadata is standardized to appropriate systems and schema, whether specialized metadata is needed to add value and ensure access across disciplines, and determining how the metadata might map to search engines, database products, and automated feeds.

Option	Description	Usage Notes
DataManager	Person (or organization with a staff of data managers, such as a data centre) responsible for maintaining the finished resource.	The work done by this person or organization ensures that the resource is periodically "refreshed" in terms of software/hardware support, is kept available or is protected from unauthorized access, is stored in accordance with industry standards, and is handled in accordance with the records management requirements applicable to it.
Distributor	Institution tasked with responsibility to generate/disseminate copies of the resource in either electronic or print form.	Works stored in more than one archive/repository may credit each as a distributor.
Editor	A person who oversees the details related to the publication format of the resource.	Note: if the Editor is to be credited in place of multiple creators, the Editor's name may be supplied as Creator, with "(Ed.)" appended to the name.
Funder	Institution that provided financial support for the development of the resource.	Recommended for discovery. Includes organizations that provide funding via regular budget allocations, through grants or awards
HostingInstitution	Typically, the organization allowing the resource to be available on the internet through the provision of its hardware/software/operating support.	May also be used for an organization that stores the data offline. Often a data centre (if that data centre is not the "publisher" of the resource.)
Producer	Typically a person or organization responsible for the artistry and form of a media product.	In the data industry, this may be a company "producing" DVDs that package data for future dissemination by a distributor.
ProjectLeader	Person officially designated as head of project team or sub-project team instrumental in the work necessary to development of the resource.	The Project Leader is not "removed" from the work that resulted in the resource; he or she remains intimately involved throughout the life of the particular project team.
ProjectManager	Person officially designated as manager of a project. Project may consist of one or many project teams and sub-teams.	The manager of a project normally has more administrative responsibility than actual work involvement.
ProjectMember	Person on the membership list of a designated project/project team.	This vocabulary may or may not indicate the quality, quantity, or substance of the person's involvement.
RegistrationAgency	Institution/organization officially appointed by a	DataCite is a Registration Agency for the International DOI

Option	Description	Usage Notes
	Registration Authority to handle specific tasks within a defined area of responsibility.	Foundation (IDF). One of DataCite's tasks is to assign DOI prefixes to the allocating agents who then assign the full, specific character string to data clients, provide metadata back to the DataCite registry, etc.
RegistrationAuthority	A standards-setting body from which Registration Agencies obtain official recognition and guidance.	The IDF serves as the Registration Authority for the International Standards Organization (ISO) in the area/domain of Digital Object Identifiers.
RelatedPerson	A person without a specifically defined role in the development of the resource, but who is someone the author wishes to recognize.	This person could be an author's intellectual mentor, a person providing intellectual leadership in the discipline or subject domain, etc.
Researcher	A person involved in analyzing data or the results of an experiment or formal study. May indicate an intern or assistant to one of the authors who helped with research but who was not so "key" as to be listed as an author.	Should be a person, not an institution. Note that a person involved in the gathering of data would fall under the contributorType "DataCollector." The researcher may find additional data online and correlate it to the data collected for the experiment or study, for example.
ResearchGroup	Typically refers to a group of individuals with a lab, department, or division; the group has a particular, defined focus of activity.	May operate at a narrower level of scope; may or may not hold less administrative responsibility than a project team.
RightsHolder	Person or institution owning or managing property rights, including intellectual property rights over the resource.	
Sponsor	Person or organization that issued a contract or under the auspices of which a work has been written, printed, published, developed, etc.	Includes organizations that provide in-kind support, through donation, provision of people or a facility or instrumentation necessary for the development of the resource, etc.
Supervisor	Designated administrator over one or more groups/teams working to produce a resource or over one or more steps of a development process.	
WorkPackageLeader	A Work Package is a recognized data product, not all of which is included in publication. The package, instead, may include notes, discarded documents, etc. The Work	

Option	Description	Usage Notes
	Package Leader is responsible for ensuring the comprehensive contents, versioning, and availability of the Work Package during the development of the resource.	
Other	Any person or institution making a significant contribution to the development and/or maintenance of the resource, but whose contribution does not "fit" other controlled vocabulary for contributorType.	Could be a photographer, artist, or writer whose contribution helped to publicize the resource (as opposed to creating it), a reviewer of the resource, someone providing administrative services to the author (such as depositing updates into an online repository, analysing usage, etc.), or one of many other roles.

`dateType`

NOTE: To indicate a date range, follow the RKMS-ISO8601 standard for depicting date ranges.

For example: <dcterms:dateCreated>2012-03-01/2012-03-05</dcterms:dateCreated>

Table 6: Description of dateType

Option	Description	Usage Notes
Accepted	The date that the publisher accepted the resource into their system.	To indicate the start of an embargo period, use Submitted or Accepted, as appropriate.
Available	The date the resource is made publicly available. May be a range.	To indicate the end of an embargo period, use Available.
Copyrighted	The specific, documented date at which the resource receives a copyrighted status, if applicable.	
Collected	The date or date range in which the resource content was collected.	To indicate precise or particular timeframes in which research was conducted.
Created	The date the resource itself was put together; this could be a date range or a single date for a final component, e.g., the finalised file with all of the data.	Recommended for discovery.

Issued	The date that the resource is published or distributed e.g. to a data center	
Submitted	The date the creator submits the resource to the publisher. This could be different from Accepted if the publisher then applies a selection process.	Recommended for discovery. To indicate the start of an embargo period, use Submitted or Accepted, as appropriate.
Updated	The date of the last update to the resource, when the resource is being added to. May be a range.	
Valid	The date or date range during which the dataset or resource is accurate.	

resourceTypeGeneral Vocabulary

Table 7: Description of resourceTypeGeneral

Option	Description[17]	Examples and Usage Notes	Suggested Dublin Core Mapping
Audiovisual	A series of visual representations imparting an impression of motion when shown in succession. May or may not include sound.	May be used for films, video, etc, Ex: http://data.datacite.org/10.7916/D8610XCB	MovingImage
Collection	An aggregation of	A collection of samples, or various files	Collection

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[17]Where there is direct correspondence with the Dublin Core Metadata, DataCite definitions have borrowed liberally from the DCMI definitions. See: http://dublincore.org/documents/dcmi-terms/index.shtml

Option	Description[17]	Examples and Usage Notes	Suggested Dublin Core Mapping
	resources of various types. If a collection exists of a single type, use the single type to describe it.	making up a report. Ex: http://data.datacite.org/10.5284/1001038	
Dataset	Data encoded in a defined structure.	Data file or files, Ex: http://data.datacite.org/10.4231/D39Z90B9T	Dataset
Event	A non-persistent, time-based occurrence.	Descriptive information and/or content that is the basis for discovery of the purpose, location, duration, and responsible agents associated with an event such as a webcast or convention. Ex: http://data.datacite.org/10.7269/P3RN35SZ	Event
Image	A visual representation other than text.	Digitized or born digital images, drawings or photographs. Ex: http://data.datacite.org/10.6083/M4QN65C5	Image, StillImage
InteractiveResource	A resource requiring interaction from the user to be understood, executed, or experienced	Training modules, files that require use of a viewer (e.g., Flash), or query/response portals. Ex: http://data.datacite.org/10.7269/P3TB14TR	InteractiveResource
Model	An abstract, conceptual, graphical, mathematical or visualization model that represents empirical objects, phenomena, or physical processes.	Modelled descriptions of, for example, different aspects of languages or a molecular biology reaction chain. Ex: http://data.datacite.org/10.5285/4D866CD2-C907-4CE2-B070-084CA9779DC2	N/A
PhysicalObject	An inanimate, three-dimensional object or substance.	Artifacts, specimens. Ex: http://data.datacite.org/10.7299/X78052RB	PhysicalObject

Option	Description[17]	Examples and Usage Notes	Suggested Dublin Core Mapping
Service	A system that provides one or more functions of value to the end-user.	Data management service, authentication service, or photocopying service.	Service
Software	A computer program in source code (text) or compiled form.	Software supporting research. Ex: http://data.datacite.org/10.7916/D8S75DPD	Software
Sound	A resource primarily intended to be heard.	Audio recording. Ex: http://data.datacite.org/10.7282/T3J67F05	Sound
Text	A resource consisting primarily of words for reading.	Grey literature, lab notes, accompanying materials. Ex: http://data.datacite.org/10.5682/9786065914018	Text
Workflow	A structured series of steps which can be executed to produce a final outcome, allowing users a means to specify and enact their work in a more reproducible manner.	Computational workflows involving sequential operations made on data by wrapped software and may be specified in a format belonging to a workflow management system, such as Taverna (http://www.taverna.org.uk/). More.[18]	N/A
Other	If selected, supply a value for ResourceType.		

`relatedIdentifierType Vocabulary`

Table 8: Description of relatedIdentifierType

Option	Full Name
ARK	Archival Resource Key; URL designed to support long-term access to information objects. In general, ARK syntax is of the form (brackets indicate [optional] elements: [**http://**NMA/]**ark:**/NAAN/Name[Qualifier]
arXiv	arXiv identifier; arXiv.org is a repository of preprints of scientific papers in the fields of mathematics, physics, astronomy, computer science, quantitative biology, statistics, and quantitative finance.
bibcode	Astrophysics Data System bibliographic codes; a standardized 19 character identifier according to the syntax yyyyjjjjjvvvvmppppa. See http://info-uri.info/registry/OAIHandler?verb=GetRecord&metadataPrefix=reg&identifier=info:bibcode/
DOI	Digital Object Identifier; a character string used to uniquely identify an object. A DOI name is divided into two parts, a prefix and a suffix, separated by a slash.
EAN13	European Article Number, now renamed International Article Number, but retaining the original acronym, is a 13-digit barcoding standard which is a superset of the original 12-digit Universal Product Code (UPC) system.
EISSN	Electronic International Standard Serial Number; ISSN used to identify periodicals in electronic form (eISSN or e-ISSN).
Handle	A handle is an abstract reference to a resource.
ISBN	International Standard Book Number; a unique numeric book identifier. There are 2 formats: a 10-digit ISBN format and a 13-digit ISBN.
ISSN	International Standard Serial Number; a unique 8-digit number used to identify a print or electronic periodical publication.
ISTC	International Standard Text Code; a unique "number" assigned to a textual work. An ISTC consists of 16 numbers and/or letters.
LISSN	The linking ISSN or ISSN-L enables collocation or linking among different media versions of a continuing resource.
LSID	Life Science Identifiers; a unique identifier for data in the Life Science domain. Format: urn:lsid:authority:namespace:identifier:revision
PMID	PubMed identifier; a unique number assigned to each PubMed record.
PURL	Persistent Uniform Resource Locator. A PURL has three parts: (1) a *protocol*, (2) a *resolver address*, and (3) a *name.*

Option	Full Name
UPC	Universal Product Code is a barcode symbology used for tracking trade items in stores. Its most common form, the UPC-A, consists of 12 numerical digits.
URL	Uniform Resource Locator, also known as web address, is a specific character string that constitutes a reference to a resource. The syntax is: scheme://domain:port/path?query_string#fragment_id
URN	Uniform Resource Name; is a unique and persistent identifier of an electronic document. The syntax is: urn:< NID>:<NSS> The leading **urn:** sequence is case-insensitive, **<NID>** is the namespace identifier, **<NSS>** is the namespace-specific string.

relationType Vocabulary

Description of the relationship of the resource being registered (A) and the related resource (B).

Table 9: Description of relationType

Option	Definition	Usage Notes
IsCitedBy	indicates that B includes A in a citation	Recommended for discovery.
Cites	indicates that A includes B in a citation	Recommended for discovery.
IsSupplementTo	indicates that A is a supplement to B	Recommended for discovery.
IsSupplementedBy	indicates that B is a supplement to A	Recommended for discovery.
IsContinuedBy	indicates A is continued by the work B	
Continues	indicates A is a continuation of the work B	
HasMetadata	indicates resource A has additional	

Option	Definition	Usage Notes
	metadata B	
IsMetadataFor	indicates additional metadata A for a resource B	
IsNewVersionOf	indicates A is a new edition of B, where the new edition has been modified or updated	Use for a version making previous version(s) obsolete.
IsPreviousVersionOf	indicates A is a previous edition of B	
IsPartOf	indicates A is a portion of B; may be used for elements of a series	Recommended for discovery.
HasPart	indicates A includes the part B	Recommended for discovery.
IsReferencedBy	indicates A is used as a source of information by B	
References	indicates B is used as a source of information for A	
IsDocumentedBy	indicates B is documentation about/ explaining A	
Documents	indicates A is documentation about/B	
IsCompiledBy	indicates B is used to compile or create A	
Compiles	indicates B is the result of a compile or creation event using A	
IsVariantFormOf	indicates A is a variant or different form of B, e.g. calculated or calibrated form or different packaging	Use for a different form of one thing.
IsOriginalFormOf	indicates A is the original form of B	
IsIdenticalTo	indicates that A is identical to B, for use when there is a need to register two separate instances of the same resource	IsIdenticalTo should be used for a resource that is the same as the registered resource but is saved on another location, maybe another institution.
IsReviewedBy	indicates that A is reviewed by B	
Reviews	indicates that A is a review of B	

Option	Definition	Usage Notes
IsDerivedFrom	indicates B is a source upon which A is based	IsDerivedFrom should be used for a resource that is a derivative of an original resource. For example, where the dataset is derived from a larger dataset and data values have been manipulated from their original state.
IsSourceOf	indicates A is a source upon which B is based	IsSourceOf is the original resource from which a derivative resource was created. For example, where the original dataset without value manipulation is the source of the derived dataset.

descriptionType Vocabulary

Table 10: Description of descriptionType

Option	Definition	Usage Notes
Abstract	A brief description of the resource and the context in which the resource was created.	Recommended for discovery. Use " " to indicate a line break for improved rendering of multiple paragraphs, but otherwise no html markup. Example: http://data.datacite.org/10.1594/PANGAEA.771774
Methods	The methodology employed for the study or research.	Recommended for discovery. For example, see section "Sampling, Processing and Quality Control Methods" in the following dataset record: https://knb.ecoinformatics.org/#view/doi:10.5063/F1DZ067F
SeriesInformation	Information about a repeating series, such as volume, issue, number.	For use with grey literature. If providing an ISSN, use property 12 (RelatedIdentifier), relatedIdentifierType=ISSN. For dataset series, use property 12 (RelatedIdentifier) and describe the relationships with isPartOf or HasPart. Example: http://data.datacite.org/10.4229/23RDEUPVSEC2008-5CO.8.3
TableOfContents	A listing of the Table of Contents.	Use " " to indicate a line break for improved rendering of multiple paragraphs, but otherwise

		no html markup. Example: http://data.datacite.org/10.5678/LCRS/FOR816.CIT.1031
Other	Other description information that does not fit into an existing category.	Use for any other description type.

Appendix 3: Additional information

Table 11: Standard values for unknown information

Code	Definition
(:unac)	temporarily inaccessible
(:unal)	unallowed, suppressed intentionally
(:unap)	not applicable, makes no sense
(:unas)	value unassigned (e.g., Untitled)
(:unav)	value unavailable, possibly unknown
(:unkn)	known to be unknown (e.g., Anonymous, Inconnue)
(:none)	never had a value, never will
(:null)	explicitly and meaningfully empty
(:tba)	to be assigned or announced later
(:etal)	too numerous to list (et alia)

Appendix 4: Figures

These figures depict some of the rdf as described in the 2nd column in table 3. Ellipses are resources, rectangles are literals and arrows are properties. The type of resources is enclosed in [square brackets]. Prefixes are as described above, the default namespace is http://purl.org/spar/datacite/, equivalent to the prefix datacite:. Types or properties with a star* yet have to be included in the Datacite ontology.
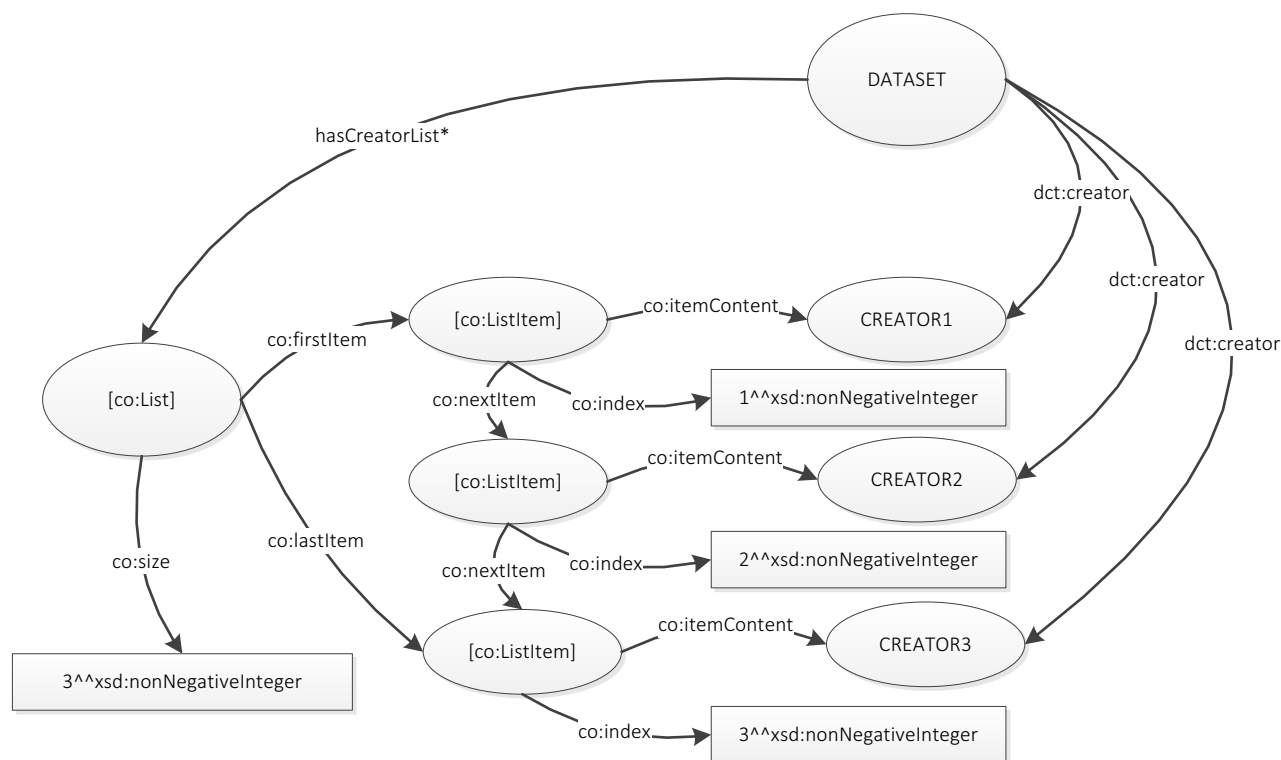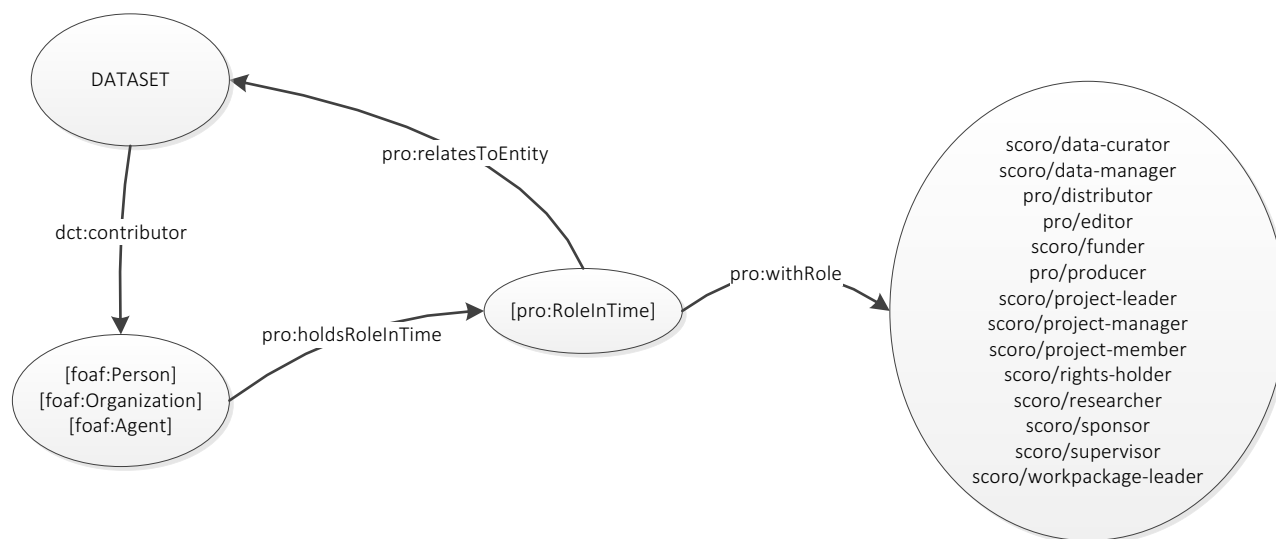

Fig 1. Setting the order of creators. Example with 3 creators.

Fig 2. Contributor types.