Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

CEN Workshop Agreement
CEN/ISSS Workshop on
Discovery of and Access to eGovernment Resources (CEN/ISSS WS/eGov-Share)

"Sharing eGovernment resources: a practical approach for designers and developers"

Part 1a: Reference Ontology and Metadata Schema

Version 4, 18 November 2008

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

1. Abstract

Public authorities can aggregate information from many of the federated registries in- and outside of their own administration into portals and / or inner-agency information bases. Uniform and standardized mappings for the descriptions of services and other eGovernment resources across Europe is a prerequiste. It enables eGovernment resources to be retrievable across Europe and thus plays an important part in realizing an ecosystem of national and pan-European government services.

2. Scope

Part 1a specifies a reference ontology for eGovernment resources and a metadata schema building on that ontology. It also lists mappings for selected metadata schemata to the reference ontology and the metadata schema.

3. Description of the reference ontology

3.1. Overview

3.1.1. Resources

Resources are the key abstraction behind the Workshop's objectives. Following the Oxford American Dictionary, resources are seen as assets that can be drawn on by a person or organization in order to function effectively.

> **NOTE:** The term "resource" is polyvalent. The [RDF Primer](#) understands it as all "things that can be identified on the Web, even when they cannot be directly retrieved on the Web" This includes many types of entities that are not resources according to our definition of the term.

The Workshop's business plan particularly highlights four concrete types of eGovernment resources:

- Services
- Process descriptions
- Standards and interoperability frameworks
- (Requirements) documents

This particular list is, of course, not comprehensive and can be extended by various other concrete types of eGovernment resources such as geographic data, mandates etc. All of these different types of resources share a certain number of key properties, however.

Very clearly, not all of these properties are applicable for each resource instance and can thus not be mandatory. Many resources such as most "traditional" eGovernment services, for example, will not be electronically addressable and hence not have a URL (though they can very well have URLs pointing to descriptions and / or additional documentation). In other cases, the relevant information may not be readily available and / or be irrelevant for outsiders. In other cases, concrete systems may need richer semantics, in which case the ontology can be locally extended.

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

However, for the exchange of data local data should be mapped on the relevant properties and relationships defined in this ontology whenever possible.

The metadata schema which is to be defined in the following section will specify the minimum set of mandatory classes and properties based on this ontology. Furthermore, the metadata schema can flatten the ontology and treat a number of the relationships as properties.

3.1.2. Other top level classes

Resource is not the only top level class in our ontology. Currently the other top level classes are:

- Administrative Unit
- Agent
- Function
- Subject

3.1.3. The role of vocabularies and taxonomies

Vocabularies and taxonomies are essential semantic assets for a common understanding and interpretation of properties. Their reuse is, however, currently limited as many of the key vocabularies are not yet available in standardized formats such as the RDF-based Simple Knowledge Organisation System (SKOS). Such formats facilitate referencing and hence reusing specific terms in instance data that is mappable on this reference ontology.

Part 2 of this CWA looks in more depth into the role that vocabularies and taxonomies play for semantic interoperability.

3.1.4. Stable Identifiers

All instances of the classes in this ontology must have a unique and stable identifier. This can be realized as a `subjectIdentifier` / PSI in Topic Maps or as a Resource Identifier in RDF.

Classes defined in this ontology can be realized both in the Topic Map format XTM 2.0 and in OWL (RDF/XML syntax).

All URIs are considered to be in the following namespace: "http://psi.egovpt.org/types/".

3.2. Resource

Classname	ID	Subclass of
Resource	resource	

Property name	Short description	ID	Alternate ID	Typical value domains
URI / IRI	Address for electronic access to the resource (e.g. via Web, Email etc.)	link		`xsd:anyURI`
Name	Title(s)/name(s) of the resource, possibly scoped by language	name		

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

Description	Free text description(s) of the resource (scoped by language if necessary)	description	http://purl.org/dc/elements/1.1/description	
Language	Language of the resource	language	http://purl.org/dc/terms/language	language code (RFC 3066)
Status	Categorization of the status according to a suitable taxonomy	status		values such as valid, withdrawn, operational
Creation date	Date of the resource's creation	creation-date		`xsd:date` or `xsd:dateTime`
Update date	Date of last update to the resource	update-date		`xsd:date` or `xsd:dateTime`
Valid from-to date	Timespan for which this resource is valid	valid-from-date		conformant to http://purl.org/dc/terms/PeriodOfTime
Audience	Agents for whom the resource is intended or useful.	audience	http://purl.org/dc/terms/audience	one of citizen, business and administration
Access Rights	Free text description of access rights to the resource	access-rights	http://purl.org/dc/terms/accessRights	`xsd:string`

Relationships:

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2
is-about	The resource is about a given subject	is-about	resource	is-about/resource	subject
is-provided-by	Creator of the resource (human or institutional agent(s))	is-provided-by	resource	is-provided-by/resource	institution
is-governed-by	a resource is governed by a given regulation (playing the role of a mandate)	is-governed-by	resource	is-governed-by/resource	regulation
is-related-to	another resource that this resource is related to	is-related-to	resource	is-related-to/resource	resource
is-part-of	This resource is a part of a resource bundle	is-part-of	resource	is-part-of/resource	resource-bundle
is-relevant-for	Resource is relevant a given administrative unit or area	is-relevant-for	resource	is-relevant-for/resource	administrative-unit

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

3.3. Resource: Service

NOTE: Related to the Dublin Core service concept http://purl.org/dc/dcmitype/Service

Classname	ID	Subclass of
Service	service	resource

A capability (in the sense of the SOA reference model) offered by a public authority or on behalf of a public authority for citizens, other public authorities, or other types of organizations such as businesses or NGOs. This can be an electronic service or a "traditional" office service.

Properties (in addition to the generic ones):

Property name	Short description	ID	Alternate ID	Typical value domains
Operating Hours	Time span in which this service is operational (e.g. opening hours)	operating-hours		list of `xsd:time` value pairs (i.e. from-to pairs, e.g. morning and afternoon opening hours)
Interface Definition	URI of a machine-processable interface specification for the service (e.g. expressed in WSDL, IDL, or WADL)	interface-definition		`xsd:anyURI`

Relationships (in addition to the generic ones):

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2	Role type 2
supports	Supports or implements a given process	supports	service	supports/service	process	supports/process

3.4. Resource: Process

Classname	ID	Subclass of
Process	process	resource

Formalized description of a process, preferably in BPMN, normally chaining a number of services. A process normally either produces a new resource (e.g. a document) or changes an internal state (e.g. approval of an application).

Property (in addition to the generic ones):

Property name	Short description	ID	Alternate ID	Typical value domains
Process description	Pointer to a formal description of the process, best in a standardized notation such as BPMN	process		`anyURI`

Relationships (in addition to the generic ones):

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2	Role type 2
is-intended-for	Function that this process is intended to support	is-intended-for	process	is-intended-for/process	function	is-intended-for/function

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

3.5. Resource: Standard

Classname	ID	Subclass of
Standard	standard	resource

Alternative ID: http://purl.org/dc/terms/Standard

A Standard is for the purposes of the ontology a formal or informal specification (a "basis for comparison; a reference point against which other things can be evaluated" in DC terminology) that is referenced in an eGovernment mandate or implemented in an eGovernment service. Standards are further subdivided into technical, semantic and process standards.

Properties (in addition to the generic ones):

Property name	Short description	ID	Alternate ID	Typical value domains
Formal identification	Formal identification of a standard	formal-identification		
Version	Version of the standard	version		

Relationships (in addition to the generic ones):

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2	Role type 2
is-superseded-by	Standard is superseded by another standard	is-superseded-by	standard	is-superseded-by/superseded-standard	standard	is-superseded-by/superseding-standard
is-approved-by	Standard is approved, recommended or mandated by a mandate	is-approved-by	standard	is-approved-by/standard	regulation	is-approved-by/mandate
is-under-observation-by	Standard is under observation by a mandate	is-observation-by	standard	is-observation-by/standard	regulation	is-observation-by/mandate
is-discouraged-by	Standard is under discouraged by a mandate	is-discouraged-by	standard	is-discouraged-by/standard	regulation	is-discouraged-by/mandate

NOTE: The criteria for the evaluation of standards that were developped in the CEN/ISSS eGovernment Focus Group are *not* part of this generic ontology

3.6. Resource: Document

A textual document that can be in electronic or paper form. Requirements document are a specific type of document

Classname	ID	Subclass of
Document	document	resource

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

Property name	Short description	ID	Alternate ID	Typical value domains
Category	Type of document (e.g. requirements document, tutorial etc.)	category		

3.7. Resource: Information system

An information system is "a system of persons, data records and activities that process the data and information in an organization, and it includes the organization's manual and automated processes" (Wikipedia s.v. "Information system", consulted on 2008-10-07)

NOTE: Information systems are often based on computer programs in the sense of http://purl.org/dc/dcmitype/Software, but are not necessarily themselves computer programs

Classname	ID	Subclass of
Information system	information-system	resource

Relationships (in addition to the generic ones):

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2	Role type 2
supports	Supports or implements by a given service	supports	information-system	supports/information-system	service	supports/service
implements	Implements by given standard	implements	information-system	implements/information-system	standard	implements/standard

3.8. Resource: Resource Bundle

For practical purposes resources are often bundled into larger units – archives or libraries for, e.g., process descriptions and circumstances (*Lebenslagen*) for services.

Classname	ID	Subclass of
Resource bundle	resource-bundle	resource

Alternate ID: http://purl.org/dc/dcmitype/Collection

Properties:

Same as for resources (resource bundles are really composite resources)

Relationships:

Same as for resources

3.9. Resource: Regulation

"A rule or directive made and maintained by an authority" (Oxford American Dictionaries). Regulations in this sense can be, amongst others, laws, directives and European regulations

Classname	ID	Subclass of
Regulation	regulation	resource

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

NOTE: A regulation often has the role of a mandate ("an official order or commission to do something", OAD) in associations

3.10. Agent

Abstract class for active movents in the eGovernment domain

Classname	ID	Subclass of
Agent	agent	

Alternative ID: http://purl.org/dc/terms/Agent

Property name	Short description	ID	Alternate ID	Typical value domains
Name	Name of the person	name		
Addresses	Physical address(es) of the institution	address		free text (applications may choose a more detailed structure)
Contact details	Other types of contact details for the institution (email, phone, fax, etc.)	contact-details		free text (applications may choose a more detailed structure)
URI/IRI	URI(s)/IRI(s) related to the institution (webpage, central email address etc.)	link		`xsd:anyURI`
Description	Free text description(s) of the institution (scoped by language if applicable)	description	http://purl.org/dc/elements/1.1/description	
Operating Hours	Time span in which this institution is accessible for customers (physically, via phone, or other means of personal contact)	operating-hours		list of `xsd:time` value pairs (i.e. from-to pairs, e.g. morning and afternoon opening hours)

3.11. Agent: Institution

A permanent organizational unit active in the eGovernment domain

Classname	ID	Subclass of
Institution	institution	agent

Property in addition to those of class Agent:

Property name	Short description	ID	Alternate ID	Typical value domains
Category	Category of the institution according to a taxonomy	category		cf. below

Very important types of eGovernment institutions are public authorities.

Possible taxonomies for the categorization of institutions are:

- for European Union matters: Eurovoc, Field 10

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

- for international organizations: Eurovoc, Field 76

- for local authorities: **to be determined**. National catalogues include the IPSV and the LGCL, both for the UK

- for economics: Eurovoc, Field 16

Relationship:

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2	Role type 2
is-part-of	Institution is part of another institution (e.g. a department)	is-part-of	institution	is-part-of/part	institution	is-part-of/whole
is-acting-on-behalf	Institution is acting on behalf of another institution	is-acting-on-behalf-of	institution	is-acting-on-behalf-of/acting-institution	institution	is-acting-on-behalf-of/represented-institution
is-related-to	Institution is related to another institution other than by being part of it or by acting on its behalf	is-related-to	institution	is-related-to/institution	institution	is-related-to/institution
is-located-in	Institution is situated in and has authority for an administrative unit	is-located-in	institution	is-located-in/institution	administrative-unit	is-located-in/administrative-unit

3.12. Agent: Person

Class that represents people (= foaf:Person)

Classname	ID	Subclass of
Person	person	agent

Properties in addition to those of class Agent:

Property name	Short description	ID	Alternate ID	Typical value domains
Title	Title(s) of the person	title	http://xmlns.com/foaf/0.1/title	
Gender	Gender of the person	gender	http://xmlns.com/foaf/0.1/gender	choice of male, female or other

Relationships:

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2	Role type 2
is-working-for	Person is working for an institution	is-working-for	person	is-working-for/person	institution	is-working-for/institution
is-responsible-for	Person is responsible for the maintenance, the operation of a resource or access to the resource	is-responsible-for	person	is-responsible-for/person	resource	is-responsible-for/resource

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

3.13. Administrative Unit

Politically defined administrative unit such as a town, a region, a country or the European Union

Classname	ID	Subclass of
Administrative unit	administrative-unit	

Property:

Property name	Short description	ID	Alternate ID	Typical value domains
Name	Official name(s) of the administrative unit, possibly scoped by language	official-name		cf. below
Category	Category of the administrative unit according to a suitable taxonomy	category		cf. below

Following the lead of CWA 15526:2006 *European Network for Administrative Nomenclature* administrative units are named and categorized using the codes of the NUTS nomenclature. In particular, local administrative units use the LAU taxonomy

Relationship:

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2	Role type 2
is-part-of	The administrative unit is part of another administrative unit	is-part-of	administrative-unit	is-part-of/whole	administrative-unit	is-part-of/part

3.14. Subject

Subject described as a term in a suitable taxonomy such as Eurovoc

Classname	ID	Subclass of
Subject	subject	

Property:

Property name	Short description	ID	Alternate ID	Typical value domains
Term	Term naming the subject, possibly scoped by language	term		Eurovoc codes (where possible). Necessary extensions should be documented and linked to appropriate Eurovoc subject(s)
Description	Free-text description(s) explaining the term, possibly scoped by language	description	http://purl.org/dc/elements/1.1/description	

Relationships:

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2	Role type 2
is-narrower-than	this subject is narrower than another subject	is-narrower-than	subject	is-narrower-than/broader-subject	subject	is-narrower-than/narrower-subject

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

> **Note:** A subject can be linked to a number of other concepts through the `is-narrower-then` relationship

3.15. Function

Function or activity in or of eGovernment activities. A function is described as a term in a suitable taxonomy analogous to the [Functions of New Zealand (FONZ) thesaurus of NZGLS](#).
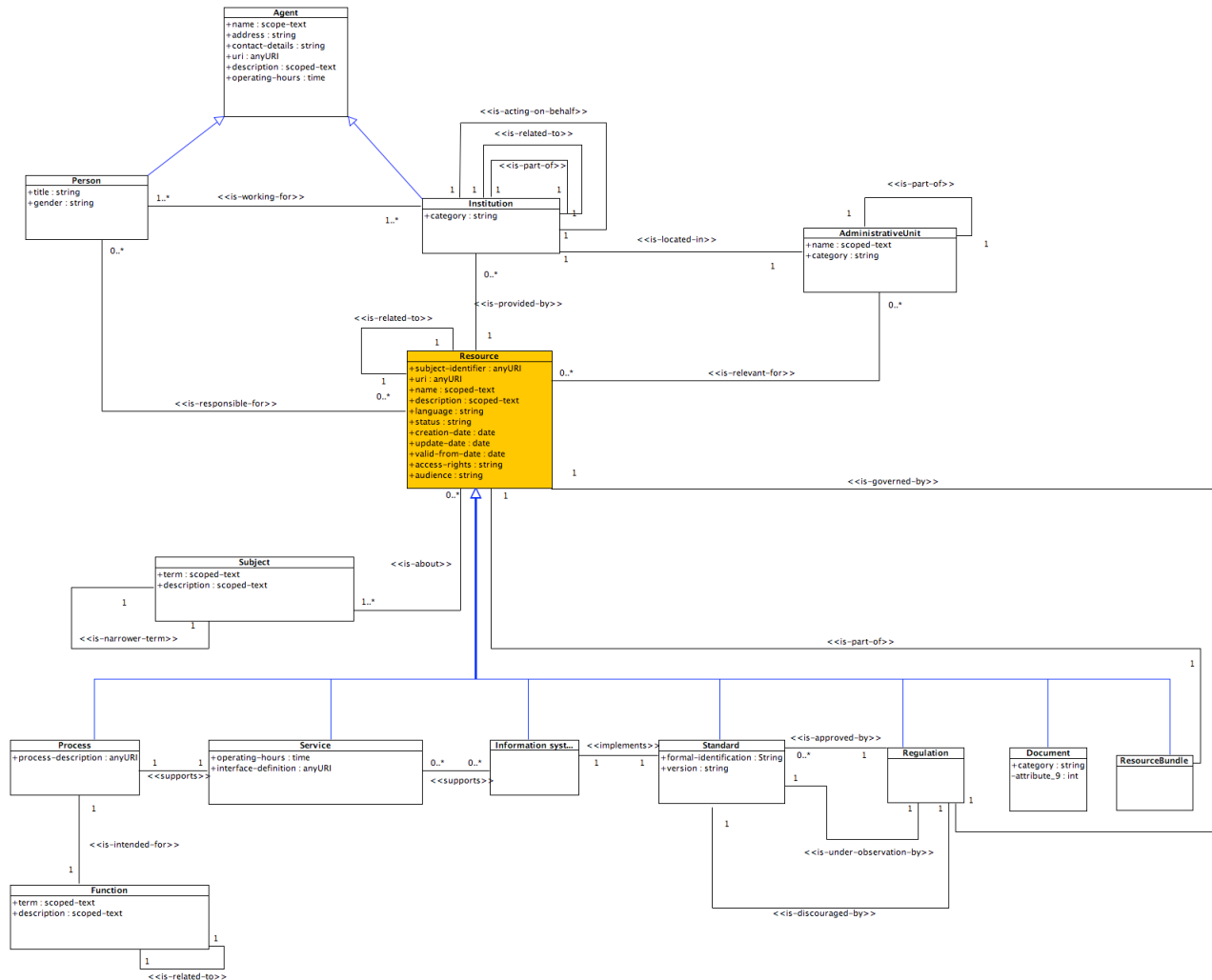
Classname	ID	Subclass of
Function	function	

Property:

Property name	Short description	ID	Alternate ID	Typical value domains
Term	Term naming the function, possibly scoped by language	term		Eurovoc codes (where possible). Necessary extensions should be documented and linked to appropriate Eurovoc subject(s)
Description	Free-text description(s) explaining the term, possibly scoped by language	description	http://purl.org/dc/elements/1.1/description	

Relationships:

Name	Short description	Type-ID	Player type 1	Role type 1	Player type 2	Role type 2
is-related-to	this function is related to another function	is-related-to	function	is-related-to/function	function	is-related-to/function

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

3.16. Simplified Overview of the Ontology

Machine readable form of the ontology:

- in XTM 2.0: egov_ontology.xtm
- in OWL (RDF/XML syntax): egov_ontology.owl

3.17. Sources

A selected number of relevant existing ontologies and XML schemeta that were consulted during the creation of the ontology

Yannis Charalabidis, Dimitris Askounis: *Interoperability Registries in eGovernment: Developing a Semantically Rich Repository for Electronic Services and Documents of the new Public Administration.* HICCS '08

Makx Dekkers, Marc W. Küster, Graham Moore: *Final Report to the eGovernment Focus Group.* Brussels, 2008 (http://www.egovpt.org/fg/Report?action=AttachFile&do=get&target=report.pdf)

Margot Falck, Marc W. Küster: *Report of the INS project on Standards for Integrated eGovernment Networks to the German Ministry of Economy*, 2006 (unpublished), in particular on Processes in

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

the eGRN (http://www.egovpt.org/din/ProzesseIneGRN)

4. Metadata schema

4.1. Minimum set of entities in a submission

The minimum set of entities that need to be available for submission of information to the exchange layer consists of:

- One Resource (of any type)
- One Agent of type Institution
- One Administrative unit
- One or more Subjects

The metadata to be provided for each of these is:

4.1.1. Resource (all types):

4.1.1.1. Properties:

- Access rights
- Description
- Language
- Name
- URI

4.1.1.2. Relationships:

- is-about (Subject)
- is-provided-by (Institution)
- is-relevant-for (Administrative unit)

4.1.2. Subject

4.1.2.1. Properties:

- Description
- Term

4.1.3. Agent/Institution

4.1.3.1. Properties:

- Category
- Name
- URI

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

4.1.3.2. Relationships:

- is-located-in (Administrative unit)

4.1.4. Administrative unit

4.1.4.1. Properties:

- Category
- Name

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

6. Metadata mapping

In the following table, a mapping of the properties and relationships in the reference ontology to a number of existing metadata standards and schemas is proposed. The red rows correspond to the minimum set defined in the preceding section.
These mappings are based on publicly available specifications of the included standards and schemas. They are the sole responsibility of the authors and should not be taken as authoritative. Any comments from the maintainers of those standards and schemas are welcome, while we are soliciting any proposals to add mappings for other standards and schemas in use by eGovernment programmes in Europe.

	Dublin Core and related Semantic Web vocabularies (FOAF, SKOS)		WD24706 (for standards)	ONIX		INSPIRE	OWMS (Netherlands)		e-GMS (UK)
	Namespace	Property		Code	Term		Namespace	Property	
Resource									
Properties									
Acces Rights	dcterms	accessRights	Rights management	PR.21.	Territorial Rights	Conditions applying to access and use, Limitations on public access	dcterms	accessRights	Rights
Audience	dcterms	audience		PR.14.	Audience		dcterms	audience	Audience
Creation date	dcterms	created		PR.20.	Publishing Dates	Date of creation	dcterms	created	Date/Created
Description	dcterms	description	Introduction, contents, scope, definitions	PR.15.	Descriptions and other supporting text	Abstract	dcterms	description	Description
Language	dcterms	language	Language	PR.11.	Language	Resource language	dcterms	language	Language
Name	dcterms	title	Title	PR.7.	Title	Resource title	dcterms	title	Title
Status			Current status			Lineage?			Status
Update date	dcterms	modified	Date - most recent action			Date of last revision	dcterms	modified	Date/Modified
URI/IRI	dcterms	identifier				Resource locator	dcterms	identifier	Identifier
Valid from-to date	dcterms	temporal				Temporal extent	dcterms	temporal	Coverage/Temporal
Relationships									

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

	Dublin Core and related Semantic Web vocabularies (FOAF, SKOS)		WD24706 (for standards)	ONIX		INSPIRE	OWMS (Netherlands)		e-GMS (UK)
is-about	dcterms	subject		PR.13.	Subject	Topic category, classification of spatial data services, keyword value/originating controlled vocabulary	dcterms	subject	Subject
is-governed-by						Specification/degree?	overheid	authority	Mandate
is-part-of	dcterms	isPartOf		PR.6.?	Set		dcterms	isPartOf	Relation/Is part of
is-provided-by	dcterms	creator	SDO Name, SDO Committee	PR.19.	Publisher	Responsible party/responsible party role	dcterms	creator	Creator
is-related-to	dcterms	relation	Normative references, informative references	PR.23.	Related Products	Coupled resource?	dcterms	relation	Relation
is-relevant-for	dcterms	spatial		PR.21.?	Territorial Rights	Geographic bounding box	dcterms	spatial	Coverage/Spatial
Service									
Properties									
Operating hours									
Interface definition									
Process									
Properties									
Purpose									
Standard									
Properties									
Formal identification			Designation						
Version				PR.10.	Edition	Lineage?			

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

	Dublin Core and related Semantic Web vocabularies (FOAF, SKOS)	WD24706 (for standards)	ONIX	INSPIRE	OWMS (Netherlands)	e-GMS (UK)
Relationships						
is-superseded-by	dcterms isReplacedBy	(Replaces - note this is in the opposite direction)			dcterms isReplacedBy	Relation/Is replaced by
is-approved-by					overheid isRatifiedBy	
is-under-observation-by						
is-discouraged-by						
Document						
Properties						
Category	dc type				dcterms type	Type
Information system						
Relationships						
supports						
implements						
Resource Bundle						
Regulation						
Agent						
Properties						

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

	Dublin Core and related Semantic Web vocabularies (FOAF, SKOS)	WD24706 (for standards)	ONIX	INSPIRE	OWMS (Netherlands)	e-GMS (UK)
Addresses						
Contact details		SDO contact				
Description						
Name	foaf name	SDO name, SDO committee				
Operating hours						
URI/IRI						
Institution						
Properties						
Category						
Relationships						
is-acting-on-behalf-of						
is-located-in						
is-part-of						
is-related-to						
Person						
Properties						
Gender	foaf gender					
Title						
Relationships						
is-responsible-for						
is-working-for						
Administrative Unit						

Gov-Share CWA "Sharing eGovernment resources: a practical approach for designers and developers."

Part 1a: Reference Ontology and Metadata Schema

	Dublin Core and related Semantic Web vocabularies (FOAF, SKOS)	WD24706 (for standards)	ONIX	INSPIRE	OWMS (Netherlands)	e-GMS (UK)
Properties						
Category						
Relationships						
is-part-of						
Subject						
Properties						
Term	skos prefLabel					
Description	skos definition					
Relationships						
is-narrower-than	skos narrower					

Sources

Dublin Core (DCMI Metadata Terms): http://dublincore.org/documents/dcmi-terms/
FOAF (Friend-of-a-friend): http://xmlns.com/foaf/spec/
SKOS (Simple Knowledge Organization System): http://www.w3.org/2004/02/skos/
ISO/IEC WD 24706 Information technology – Metadata for technical standards and specifications documents: http://jtc1sc32.org/doc/N1251-1300/32N1257-WD24706.pdf
ONIX (ONline Information eXchange): http://libraries.mit.edu/guides/subjects/metadata/standards/onix.html
INSPIRE (Infrastructure for Spatial Information in Europe) Draft Implementing Rules for Metadata (Version 3): http://www.ec-gis.org/inspire/reports/ImplementingRules/INSPIRE_Metadata_ImplementingRule_v3_20071026.pdf
OWMS (Overheid.nl Web Metadata Standaard): http://standaarden.overheid.nl/owms/3.5/doc/index.html
EGMS (e-Government Metadata Standard): http://www.govtalk.gov.uk/documents/eGMS%20version%203_1.pdf