W3C Member Submission

SIOC Core Ontology Specification

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Regarding underlying technology, SIOC relies heavily on W3C's RDF technology, an open Web standard that can be freely used by anyone.

This visual layout and structure of the specification was adapted from the FOAF Vocabulary Specification by Dan Brickley and Libby Miller.

Abstract

The SIOC (Semantically-Interlinked Online Communities) Core Ontology provides the main concepts and properties required to describe information from online communities (e.g., message boards, wikis, weblogs, etc.) on the Semantic Web. This document contains a detailed description of the SIOC Core Ontology.

Status of this document

NOTE: *This section describes the status of this document at the time of its publication. Other documents may supersede this document. A list of current W3C publications can be found in the W3C technical reports index at http://www.w3.org/TR/.*

This specification is an evolving document. This document is generated by combining a machine-readable SIOC Core Ontology Namespace expressed in RDF/XML with a specification template and a set of per-term documents.

Authors welcome suggestions on the SIOC Core Ontology Namespace and this document. Please send comments to the SIOC developers' mailing list (SIOC-Dev), public archives are available. This document may be updated or added to based on implementation experience, but no commitment is made by the authors regarding future updates.

Please consult the namespaces.zip archive, a part of this submission, for a snapshot of the SIOC Ontology namespaces referenced in this document. Live namespace documents are located at relevant namespace URIs.

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1. Introduction

Online community sites (weblogs, message boards, wikis, etc.) have replaced the traditional means of keeping a community informed via libraries and publishing. They are a valuable source of information and quite often it is a community site where you will end up when searching for some information. But there is a problem: online community sites are like islands without bridges connecting them. You may find some information in a forum, but not know that there are missing pieces of related information that can be found on other community sites.

Semantically-Interlinked Online Communities, or SIOC, is an attempt to link online community sites, to use Semantic Web technologies to describe the information that communities have about their structure and contents, and to find related information and new connections between content items and other community objects. SIOC is based around the use of *machine-readable information* provided by these sites.

The SIOC Core Ontology described in this document is the foundation for Semantically-Interlinked Online Communities. Developers can use this ontology to express information contained within community sites in a simple and extensible way.

More information about the tools and projects using SIOC can be found on the SIOC Project page (http://sioc-project.org/).

1.1. Terminology and notation

The keywords "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.

Namespace URIs of the general form "http://www.example.com/" represent some application-dependent or context-dependent URI as defined in RFC 2396.

The XML Namespace URIs that MUST be used by implementations of this specification are:

- http://rdfs.org/sioc/ns# - SIOC Core Ontology Namespace
- http://rdfs.org/sioc/types# - SIOC Types Ontology Module Namespace
- http://rdfs.org/sioc/services# - SIOC Services Ontology Module Namespace

2. SIOC at a glance

An alphabetical index of SIOC terms, by class (concepts) and by property (relationships, attributes), are given below. All the terms are hyperlinked to their detailed description for quick reference.

Classes: | Community | Container | Forum | Item | Post | Role | Site | Space | Thread | User | Usergroup |

Properties: | about | account_of | administrator_of | attachment | avatar | container_of | content | creator_of | email | email_sha1 | feed | function_of | has_administrator | has_container | has_creator | has_function | has_host | has_member | has_moderator | has_modifier | has_owner | has_parent | has_reply | has_scope | has_space | has_subscriber | has_usergroup | host_of | id | ip_address | link | links_to | member_of | moderator_of | modifier_of | name | next_by_date | next_version | note | num_replies | num_views | owner_of | parent_of | previous_by_date | previous_version | related_to | reply_of | scope_of | sibling | space_of | subscriber_of | topic | usergroup_of |

3. SIOC overview

The SIOC Core Ontology definitions presented here are written using a computer language (RDF/OWL) that makes it easy for software to process some basic facts about the terms in the SIOC Core Ontology, and consequently about the things described in SIOC documents. A SIOC document, unlike a traditional Web page, can be combined with other SIOC and RDF documents to create a unified database of information.
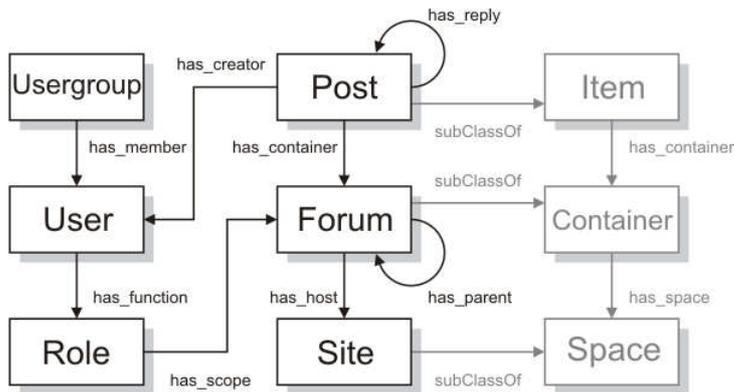
3.1. Example

Here is a very basic document describing a blog entry:

```
<sioc:Post rdf:about="http://johnbreslin.com/blog/2006/09/07/creating-connections-between-discussion-clouds-with-sioc/">
    <dc:title>Creating connections between discussion clouds with SIOC</dc:title>
    <dcterms:created>2006-09-07T09:33:30Z</dcterms:created>
    <sioc:has_container rdf:resource="http://johnbreslin.com/blog/index.php?sioc_type=site#weblog"/>
    <sioc:has_creator>
        <sioc:User rdf:about="http://johnbreslin.com/blog/author/cloud/" rdfs:label="Cloud">
            <rdfs:seeAlso rdf:resource="http://johnbreslin.com/blog/index.php?sioc_type=user&amp;sioc_id=1"/>
        </sioc:User>
    </sioc:has_creator>
    <sioc:content>SIOC provides a unified vocabulary for content and interaction description: a semantic layer that can co
    <sioc:topic rdfs:label="Semantic Web" rdf:resource="http://johnbreslin.com/blog/category/semantic-web/"/>
    <sioc:topic rdfs:label="Blogs" rdf:resource="http://johnbreslin.com/blog/category/blogs/"/>
    <sioc:has_reply>
        <sioc:Post rdf:about="http://johnbreslin.com/blog/2006/09/07/creating-connections-between-discussion-clouds-with-s
            <rdfs:seeAlso rdf:resource="http://johnbreslin.com/blog/index.php?sioc_type=comment&amp;sioc_id=123928"/>
        </sioc:Post>
    </sioc:has_reply>
</sioc:Post>
```

This brief example introduces the basics of SIOC. It says:

- There is a `sioc:Post` object identified as `http://johnbreslin.com/blog/2006/09/07/creating-connections-between-discussion-clouds-with-sioc/` which has the following properties:
  - `dc:title` property with value "Creating connections between discussion clouds with SIOC"
  - `dcterms:created` property with ISO-8601 formatted date value `2006-09-07T09:33:30Z`
  - `sioc:has_container` relationship with an object identified as `http://johnbreslin.com/blog/index.php?sioc_type=site#weblog`indicates a `sioc:Forum` object (a weblog in this case) that this post belongs to
  - `sioc:has_creator` relationship with a `sioc:User` object labelled "Cloud" and identified as `http://johnbreslin.com/blog/author/cloud/` with an `rdfs:seeAlso` property pointing to more SIOC information about this object located at `http://johnbreslin.com/blog/index.php?sioc_type=user&sioc_id=1`
  - `sioc:content` property with a text-only representation of the content
  - `sioc:topic` properties indicating topics: "`Semantic Web`" identified as `http://johnbreslin.com/blog/category/semantic-web/` and "`Blogs`" identified as `http://johnbreslin.com/blog/category/blogs/`
  - `sioc:has_reply` relationship (pointing to replies and comments of a post) with a `sioc:Post` object identified as `http://johnbreslin.com/blog/2006/09/07/creating-connections-between-discussion-clouds-with-sioc/#comment-123928` with an `rdfs:seeAlso` property pointing to more SIOC information about this reply located at `http://johnbreslin.com/blog/index.php?sioc_type=comment&sioc_id=123928`

In other words:

- There is a post titled "Creating connections between discussion clouds with SIOC" created at 09:33:30 on 2006-09-07 written by a user "Cloud" on topics "Blogs" and "Semantic Web" with contents described in `sioc:content`.
- More information about its author can be found at `http://johnbreslin.com/blog/index.php?sioc_type=user&sioc_id=1`
- The post has a reply and detailed SIOC information about this reply can be found at `http://johnbreslin.com/blog/index.php?sioc_type=comment&sioc_id=123928`

This simple example uses only two classes of SIOC objects: `sioc:Post` and `sioc:User`. There are other classes in SIOC used to describe more information about users, sites, communities and other objects.

SIOC documents may use other existing ontologies to enrich the information described. Additional information about the creator of the post can be described using the FOAF Vocabulary. Rich content of the post (e.g., HTML representation) can be described using AtomOwl or the RSS 1.0 Content Module. For more information on classes and properties from other vocabularies that are often used together with SIOC, see the section on external classes and properties.

You can see a full SIOC profile of the example blog post which uses FOAF for personal information and the RSS 1.0 Content Module for rich content: (a) in RDF/XML; (b) rendered in a SIOC Browser. This profile is generated by the WordPress SIOC export plugin.

3.2. Background

SIOC is managed as a collaborative effort amongst members of the Semantic Web Cluster at DERI, NUI Galway (funded by SFI) and Semantic Web developers on the SIOC developers' mailing list (SIOC-Dev). The name "SIOC" is an acronym for "Semantically-Interlinked Online Communities", and is coincidentally the Irish word for "frost".

More resources on SIOC are available on the SIOC Project page.

The SIOC-Dev mailing list is the main discussion list for questions about SIOC. There are also two active and friendly IRC channels on freenode: #sioc (for SIOC) and #swig (for the Semantic Web Interest Group). There is also a wiki for SIOC at wiki.sioc-project.org.

The remainder of this specification describes how to publish and interpret descriptions such as these on the Web, using RDF for syntax (file format) and terms from SIOC. It introduces a number of classes (concepts such as "Post") and properties (relationship and attribute types such as "has_creator" or "content").

The specific contents of the SIOC Core Ontology are detailed in the SIOC Core Ontology Namespace document.

Related publications:

- J.G. Breslin, A. Harth, U. Bojars, S. Decker, "Towards Semantically-Interlinked Online Communities", Proceedings of the 2nd European Semantic Web Conference (ESWC '05), LNCS vol. 3532, pp. 500-514, Heraklion, Greece, 2005.
- U. Bojars, J.G. Breslin, A. Passant, "SIOC Browser - Towards a Richer Blog Browsing Experience", The 4th Blogtalk Conference (Blogtalk Reloaded), Vienna, Austria, October 2006.
- For more SIOC-related publications, see the publications page.

4. The SIOC ontology description

This document presents SIOC as a Semantic Web vocabulary or *ontology*. It describes the SIOC Core Ontology and the terms (RDF classes and properties) that constitute it, so that Semantic Web applications can use those terms in a variety of RDF-compatible document formats and applications. The SIOC Core Ontology is straightforward, pragmatic and designed to allow simultaneous deployment and extension, and is therefore intended for wide scale use.

4.1. Evolution and extension of SIOC

The SIOC ontology is identified by the namespace URI "http://rdfs.org/sioc/ns#".

Revisions and extensions of SIOC are conducted through edits to the namespace document, which by convention is published on the Web at the namespace URI.

The properties and types defined here provide some basic concepts for use in SIOC descriptions. Other vocabularies (e.g. the Dublin Core metadata elements for simple bibliographic description, FOAF, RSS 1.0, etc.) can also be mixed in with SIOC terms, as can local extensions. SIOC is designed to be extended, and some modules have been added (see below).

4.2. SIOC modules

SIOC modules are used to extend the available terms and to avoid making the SIOC Core Ontology too complex and unreadable. At present SIOC has two modules: Types and Services.

SIOC Types Module

During the development of the SIOC ontology, the addition of multiple sub-classes for different types of Forums and Posts was starting to become unwieldy. Therefore, it was decided to move these sub-classes and sub-properties into a "Types" module of SIOC. Some of the SIOC Core Ontology classes and corresponding SIOC Types Module sub-classes include:

- Container: AddressBook, AnnotationSet, AudioChannel, BookmarkFolder, Briefcase, EventCalendar, ImageGallery, ProjectDirectory, ResumeBank, ReviewArea, SubscriptionList, SurveyCollection, VideoChannel, Wiki.
- Item: Poll.
- Forum: ArgumentativeDiscussion, ChatChannel, MailingList, MessageBoard, Weblog.
- Post: BlogPost, BoardPost, Comment, InstantMessage, MailMessage, WikiArticle.

Full descriptions for the identified types are given in the SIOC Types Module at http://rdfs.org/sioc/types. Rather than restrict users to our pre-defined types, we also encourage flexibility whereby people can define their own sub-types of SIOC classes.

SIOC Services Module

Community sites typically publish web service interfaces for programmatic search and content management services (typically SOAP and/or RESTian). These services may be generic in nature (with standardised signatures covering input and output message formats) or service specific (where signatures are unique to specific offerings, à la current Web 2.0 API usage patterns).

A sioc:Service allows us to indicate that a web service is associated with (located on) a sioc:Site or a part of it. This class and its properties are defined in the SIOC Services Module at http://rdfs.org/sioc/services.

This module provides a simple way to tell others about a web service, and should not be confused with web service definitions that define the details of a web service. A sioc:service_definition property can be used to relate a sioc:Service to its full web service definition (e.g., in WSDL).

4.3. SIOC and standards

SIOC depends heavily on W3C's standards work, specifically on XML, XML Namespaces, RDF, and OWL. All *SIOC documents* must be valid RDF documents.

This specification contributes an ontology, "SIOC", to the Semantic Web, specifying it using W3C's Resource Description Framework (RDF). As such, SIOC adopts by reference a syntax (using XML), a data model (RDF graphs), and a mathematically-grounded definition for the rules that underpin the RDF design.

4.4. SIOC and RDF

SIOC is an application of the Resource Description Framework (RDF) because the subject area we are describing - online communities - has so many competing requirements that a standalone format would not capture them or would lead to describing these requirements in a number of incompatible formats. By using RDF, SIOC gains a powerful extensibility mechanism, allowing SIOC-based descriptions to be

mixed with claims made in *any other RDF vocabulary.*

SIOC as an ontology cannot incorporate everything we might want to talk about that is related to communities, about users in these communities, and about the content that users have created, or it would be as large as a full-sized dictionary. Instead of covering all topics within SIOC itself, we describe the basic topics and build into a larger framework - RDF - that allows us to take advantage of work elsewhere on more specific description vocabularies.

RDF provides SIOC with a way to mix together different descriptive vocabularies in a consistent way. Vocabularies can be created by different communities and groups as appropriate and mixed together as required, without needing any centralised agreement on how terms from different vocabularies can be written down in XML.

RDF represents knowledge as a simple set of assertions or triples. The basic model of RDF is a graph formed by combining multiple triples together. For more information on RDF and how to work with it see "What is RDF?" and "Where do I find tools for Semantic Web development?" in the Semantic Web FAQ.

5. Cross-reference for SIOC classes and properties

SIOC introduces the following classes and properties. See the SIOC Core Ontology Namespace in RDFS/OWL for more details.

Class: sioc:Community

Community - Community is a high-level concept that defines an online community and what it consists of.

A Community may consist of different types of objects (people, sites, etc.) joined by a common topic, interests or goals.

A Community is different from a Site: a Site describes a single community site whilst a Community can consist of a number of Sites and other resources described in SIOC or other ontologies (e.g., FOAF). Community is linked to its constituent parts using the property dcterms:hasPart.

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Class: sioc:Container

Container - An area in which content Items are contained.

in-range-of: sioc:has_container sioc:has_parent sioc:owner_of sioc:parent_of sioc:subscriber_of
in-domain-of: sioc:container_of sioc:has_owner sioc:has_parent sioc:has_subscriber sioc:parent_of

Container is a high-level concept used to group content Items together. The relationships between a Container and the Items that belong to it are described using sioc:container_of and sioc:has_container properties. A hierarchy of Containers can be defined in terms of parents and children using sioc:has_parent and sioc:parent_of.

Subclasses of Container can be used to further specify typed groupings of Items in online communities. Forum, a subclass of Container and one of the core classes in SIOC, is used to describe an area on a community Site (e.g., a forum or weblog) on which Posts are made. The SIOC Types Ontology Module contains additional, more specific subclasses of sioc:Container.

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Class: sioc:Forum

Forum - A discussion area on which Posts or entries are made.

sub-class-of: sioc:Container
in-range-of: sioc:has_scope sioc:host_of sioc:moderator_of
in-domain-of: sioc:has_host sioc:has_moderator sioc:scope_of

Forums can be thought of as channels or discussion area on which Posts are made. A Forum can be linked to the Site that hosts it. Forums will usually discuss a certain topic or set of related topics, or they may contain discussions entirely devoted to a certain community group or organisation. A Forum will have a moderator who can veto or edit posts before or after they appear in the Forum.

Forums may have a set of subscribed Users who are notified when new Posts are made. The hierarchy of Forums can be defined in terms of parents and children, allowing the creation of structures conforming to topic categories as defined by the Site administrator. Examples of Forums include mailing lists, message boards, Usenet newsgroups and weblogs.

The SIOC Types Ontology Module defines come more specific subclasses of sioc:Forum.

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Class: sioc:Item

Item - A content Item that can be posted to or created within a Container.

sub-class- foaf:Document

of:
in-range-   sioc:container_of sioc:creator_of sioc:has_reply sioc:modifier_of sioc:next_by_date sioc:next_version
of: sioc:previous_by_date sioc:previous_version sioc:reply_of
in-domain-   sioc:about sioc:has_container sioc:has_creator sioc:has_modifier sioc:has_reply sioc:ip_address sioc:next_by_date
of: sioc:next_version sioc:previous_by_date sioc:previous_version sioc:reply_of

Item is a high-level concept for content items. It has subclasses that further specify different types of Items. One of these subclasses (which plays an important role in SIOC) is sioc:Post, used to describe articles or messages created within online community Sites. The SIOC Types Ontology Module describes additional, more specific subclasses of sioc:Item.

Items can be contained within Containers.

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Class: sioc:Post

Post - An article or message that can be posted to a Forum.

sub-class-of: sioc:Item
in-range-of: sioc:related_to sioc:sibling
in-domain-of: sioc:attachment sioc:content sioc:note sioc:num_replies sioc:related_to sioc:sibling

A Post is an article or message posted by a User to a Forum. A series of Posts may be threaded if they share a common subject and are connected by reply or by date relationships. Posts will have content and may also have attached files, which can be edited or deleted by the Moderator of the Forum that contains the Post.

The SIOC Types Ontology Module describes some additional, more specific subclasses of sioc:Post.

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Class: sioc:Role

Role - A Role is a function of a User within a scope of a particular Forum, Site, etc.

in-range-of: sioc:has_function sioc:scope_of
in-domain-of: sioc:function_of sioc:has_scope

Roles are used to express functions or access control privileges that Users may have.

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Class: sioc:Site

Site - A Site can be the location of an online community or set of communities, with Users and Usergroups creating Items in a set of Containers. It can be thought of as a web-accessible data Space.

sub-class-of: sioc:Space
in-range-of: sioc:administrator_of sioc:has_host
in-domain-of: sioc:has_administrator sioc:host_of

A Site is the location of an online community or set of communities, with Users in Usergroups creating content therein. While an individual Forum or group of Forums are usually hosted on a centralised Site, in the future the concept of a "site" may be extended (for example, a topic Thread could be formed by Posts in a distributed Forum on a peer-to-peer environment Space).

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Class: sioc:Space

Space - A Space is a place where data resides, e.g., on a website, desktop, fileshare, etc.

in-range-of: sioc:has_space sioc:usergroup_of
in-domain-of: sioc:has_usergroup sioc:space_of

A Space is defined as being a place where data resides. It can be the location for a set of Containers of content Items, e.g., on a Site, personal desktop, shared filespace, etc. Any data object that resides on a particular Space can be linked to it using the sioc:has_space property.

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Class: sioc:Thread

Thread - A container for a series of threaded discussion Posts or Items.

sub-class-of: sioc:Container

Mailing lists, forums and blogs on community sites usually employ some threaded discussion methods, whereby discussions are initialised by a certain user and replied to by others. The Thread container is used to group Posts from a single discussion thread together via the sioc:container_of property, especially where a sioc:has_reply / reply_of structure is absent.

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Class: sioc:User

User - A User account in an online community site.

sub-class-of:	foaf:OnlineAccount
in-range-of:	sioc:function_of sioc:has_administrator sioc:has_creator sioc:has_member sioc:has_moderator sioc:has_modifier sioc:has_owner sioc:has_subscriber
in-domain-of:	sioc:account_of sioc:administrator_of sioc:avatar sioc:creator_of sioc:email sioc:email_sha1 sioc:has_function sioc:member_of sioc:moderator_of sioc:modifier_of sioc:owner_of sioc:subscriber_of

A User is an online account of a member of an online community. It is connected to Items and Posts that a User creates or edits, to Containers and Forums that it is subscribed to or moderates and to Sites that it administers. Users can be grouped for purposes of allowing access to certain Forums or enhanced community site features (weblogs, webmail, etc.).

A foaf:Person will normally hold a registered User account on a Site (through the property foaf:holdsAccount), and will use this account to create content and interact with the community.

sioc:User describes properties of an online account, and is used in combination with a foaf:Person (using the property sioc:account_of) which describes information about the individual itself.

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Class: sioc:Usergroup

Usergroup - A set of User accounts whose owners have a common purpose or interest. Can be used for access control purposes.

in-range-of:	sioc:has_usergroup sioc:member_of
in-domain-of:	sioc:has_member sioc:usergroup_of

A Usergroup is a set of members or Users of a community who have a common Role, purpose or interest. While a group of Users may be a single community that is linked to a certain Forum, they may also be a set of Users who perform a certain Role, for example, moderators or administrators.

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Property: sioc:about

about - Specifies that this Item is about a particular resource, e.g., a Post describing a book, hotel, etc.

OWL Type: ObjectProperty
Domain: sioc:Item

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Property: sioc:account_of

account_of - Refers to the foaf:Agent or foaf:Person who owns this sioc:User online account.

OWL Type: ObjectProperty
Domain: sioc:User
Range: foaf:Agent

Links a sioc:User account to a foaf:Person whom it belongs to. The reverse direction - i.e. linking a foaf:Person to a User account that it owns or holds - can be described using the foaf:holdsAccount property.

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Property: sioc:administrator_of

administrator_of - A Site that the User is an administrator of.

Inverse: sioc:has_administrator
OWL Type: ObjectProperty
Domain: sioc:User
Range: sioc:Site

Property: sioc:attachment

attachment - The URI of a file attached to a Post.

OWL Type: ObjectProperty
Domain: sioc:Post

Property: sioc:avatar

avatar - An image or depiction used to represent this User.

OWL Type: ObjectProperty
Domain: sioc:User

Property: sioc:container_of

container_of - An Item that this Container contains.

Inverse: sioc:has_container
OWL Type: ObjectProperty
Domain: sioc:Container
Range: sioc:Item

Containers and Forums may contain Items or Posts, and this property is used to link to these.

Property: sioc:content

content - The content of the Post in plain text format.

OWL Type: DatatypeProperty
Domain: sioc:Post
Range: rdfs:Literal

This property is for a plain-text rendering of the content of a Post. Rich content (e.g., HTML, wiki markup, BBCode, etc.) can be described using the Content class from AtomOwl or the content:encoded property from the RSS 1.0 Content Module.

Property: sioc:creator_of

creator_of - An Item that the User is a creator of.

Inverse: sioc:has_creator
OWL Type: ObjectProperty
Domain: sioc:User
Range: sioc:Item

Links to a User account that an Item was created by. Being a creator of an Item is not a Role.

Property: sioc:email

email - An electronic mail address of the User.

OWL Type: ObjectProperty
 Domain: sioc:User

Property: sioc:email_sha1

email_sha1 - An electronic mail address of the User, encoded using SHA1.

 OWL Type: DatatypeProperty
 Domain: sioc:User
 Range: rdfs:Literal

Property: sioc:feed

feed - A feed (e.g., RSS, Atom, etc.) pertaining to this resource (e.g., for a Forum, Site, User, etc.).

 OWL Type: ObjectProperty

Property: sioc:function_of

function_of - A User who has this Role.

 Inverse: sioc:has_function
 OWL Type: ObjectProperty
 Domain: sioc:Role
 Range: sioc:User

Property: sioc:has_administrator

has_administrator - A User who is an administrator of this Site.

 Inverse: sioc:administrator_of
 OWL Type: ObjectProperty
 Domain: sioc:Site
 Range: sioc:User

Property: sioc:has_container

has_container - The Container to which this Item belongs.

 Inverse: sioc:container_of
 OWL Type: ObjectProperty
 Domain: sioc:Item
 Range: sioc:Container

Property: sioc:has_creator

has_creator - This is the User who made this Item.

 Inverse: sioc:creator_of
 OWL Type: ObjectProperty
 Domain: sioc:Item
 Range: sioc:User

The has_creator property links an Item to its author's User account. Thus, we can follow the link from the Item to the creator and locate the other Items created by the same User. Being the creator of an Item is not a Role.

The community can be seen as a network of Items with Users linked to each Item, and there is also a network of other Items created by a given User stemming from there. We can use this information in community sites to locate more contributions by the given author.

Property: sioc:has_function

has_function - A Role that this User has.

Inverse: sioc:function_of
OWL Type: ObjectProperty
Domain: sioc:User
Range: sioc:Role

Links a User to a Role that this User has (it is a function of this User). Users can have many different Roles in different Forums.

Property: sioc:has_host

has_host - The Site that hosts this Forum.

Inverse: sioc:host_of
OWL Type: ObjectProperty
Domain: sioc:Forum
Range: sioc:Site

Property: sioc:has_member

has_member - A User who is a member of this Usergroup.

Inverse: sioc:member_of
OWL Type: ObjectProperty
Domain: sioc:Usergroup
Range: sioc:User

Property: sioc:has_moderator

has_moderator - A User who is a moderator of this Forum.

Inverse: sioc:moderator_of
OWL Type: ObjectProperty
Domain: sioc:Forum
Range: sioc:User

Property: sioc:has_modifier

has_modifier - A User who modified this Item.

Inverse: sioc:modifier_of
OWL Type: ObjectProperty
Domain: sioc:Item
Range: sioc:User

This property links an Item or Post to the User who modified it (e.g., contributed new content to it after its creation). Being a modifier of a Post is not a Role.

Property: sioc:has_owner

has_owner - A User that this Container is owned by.

Inverse: sioc:owner_of
OWL Type: ObjectProperty

Domain: sioc:Container
Range: sioc:User

Property: sioc:has_parent

has_parent - A Container or Forum that this Container or Forum is a child of.

Inverse: sioc:parent_of
OWL Type: ObjectProperty
Domain: sioc:Container
Range: sioc:Container

Property: sioc:has_reply

has_reply - Points to an Item or Post that is a reply or response to this Item or Post.

Inverse: sioc:reply_of
OWL Type: ObjectProperty
Domain: sioc:Item
Range: sioc:Item

The has_reply property links an Item to other follow-up content Items made on the same topic. Use of this property can result in a single branch of replies from the original Item, or in a tree-like structure with branches forking at different Items along the way.

For example, in Forums such as mailing lists, message boards, etc., has_reply will be used to link a starter Post to any Post that is made in response to the original message. Also, has_reply can be used to connect any type of content Item (images, videos, etc.) to any Item or text Post that is made in response.

Property: sioc:has_scope

has_scope - A Forum that this Role applies to.

Inverse: sioc:scope_of
OWL Type: ObjectProperty
Domain: sioc:Role
Range: sioc:Forum

Property: sioc:has_space

has_space - A data Space which this resource is a part of.

Inverse: sioc:space_of
OWL Type: ObjectProperty
Range: sioc:Space

Property: sioc:has_subscriber

has_subscriber - A User who is subscribed to this Container.

Inverse: sioc:subscriber_of
OWL Type: ObjectProperty
Domain: sioc:Container
Range: sioc:User

Property: sioc:has_usergroup

has_usergroup - Points to a Usergroup that has certain access to this Space.

Inverse: sioc:usergroup_of
OWL Type: ObjectProperty
Domain: sioc:Space
Range: sioc:Usergroup

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Property: sioc:host_of

host_of - A Forum that is hosted on this Site.

Inverse: sioc:has_host
OWL Type: ObjectProperty
Domain: sioc:Site
Range: sioc:Forum

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Property: sioc:id

id - An identifier of a SIOC concept instance. For example, a user ID. Must be unique for instances of each type of SIOC concept within the same site.

OWL Type: DatatypeProperty
Range: rdfs:Literal

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Property: sioc:ip_address

ip_address - The IP address used when creating this Item. This can be associated with a creator. Some wiki articles list the IP addresses for the creator or modifiers when the usernames are absent.

OWL Type: DatatypeProperty
Domain: sioc:Item
Range: rdfs:Literal

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Property: sioc:link

link - A URI of a document which contains this SIOC object.

OWL Type: ObjectProperty

Links to a URI of a document where this SIOC object is located. Usually sioc:link is not needed because it can be assigned directly as a URI of this SIOC object. It is recommended that its usage is limited only to those cases where a document's URI may not be assigned to the object itself.

For example, this may occur in a page that contains a number of objects (e.g., comments to a blog post) that can not be addressed individually.

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Property: sioc:links_to

links_to - Links extracted from hyperlinks within a SIOC concept, e.g., Post or Site.

OWL Type: ObjectProperty
sub-property-of: dcterms:references

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Property: sioc:member_of

member_of - A Usergroup that this User is a member of.

Inverse: sioc:has_member
OWL Type: ObjectProperty
Domain: sioc:User
Range: sioc:Usergroup

Property: sioc:moderator_of

moderator_of - A Forum that User is a moderator of.

  Inverse: sioc:has_moderator
 OWL Type: ObjectProperty
  Domain: sioc:User
   Range: sioc:Forum

Property: sioc:modifier_of

modifier_of - An Item that this User has modified.

  Inverse: sioc:has_modifier
 OWL Type: ObjectProperty
  Domain: sioc:User
   Range: sioc:Item

Property: sioc:name

name - The name of a SIOC instance, e.g. a username for a User, group name for a Usergroup, etc.

 OWL Type: DatatypeProperty
   Range: rdfs:Literal

The name property is used to assign a name to various SIOC objects. For example, it may be username of a User online account, the name of a Usergroup, the name given to a role (e.g. Moderator, Registered User), etc.

Property: sioc:next_by_date

next_by_date - Next Item or Post in a given Container sorted by date.

  Inverse: sioc:previous_by_date
 OWL Type: ObjectProperty
  Domain: sioc:Item
   Range: sioc:Item

Property: sioc:next_version

next_version - Links to the next revision of this Item or Post.

  Inverse: sioc:previous_version
 OWL Type: ObjectProperty
  Domain: sioc:Item
   Range: sioc:Item

Property: sioc:note

note - A note associated with this Post, for example, if it has been edited by a User.

 OWL Type: DatatypeProperty
  Domain: sioc:Post
   Range: rdfs:Literal

Property: sioc:num_replies

num_replies - The number of replies that this Post has. Useful for when the reply structure is absent.

OWL Type: DatatypeProperty
 Domain: sioc:Post
 Range: xsd:integer

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Property: sioc:num_views

num_views - The number of times this Item, Thread, User profile, etc. has been viewed.

OWL Type: DatatypeProperty
 Range: xsd:integer

The num_views property represents the number of times a particular Item, Post, Thread, User profile, etc. has been viewed. This is an example of where content is automatically created by an end-user, and can increase the content's importance in terms of searching. For example, someone creates a query across a set of SIOC-enabled sites, and is returned a list of subjects and extracts from certain Posts, sorted by the popularity of the Post, as indicated by the num_views property.

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Property: sioc:owner_of

owner_of - A Container owned by a particular User, for example, a weblog or image gallery.

Inverse: sioc:has_owner
OWL Type: ObjectProperty
 Domain: sioc:User
 Range: sioc:Container

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Property: sioc:parent_of

parent_of - A child Container or Forum that this Container or Forum is a parent of.

Inverse: sioc:has_parent
OWL Type: ObjectProperty
 Domain: sioc:Container
 Range: sioc:Container

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Property: sioc:previous_by_date

previous_by_date - Previous Item or Post in a given Container sorted by date.

Inverse: sioc:next_by_date
OWL Type: ObjectProperty
 Domain: sioc:Item
 Range: sioc:Item

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Property: sioc:previous_version

previous_version - Links to a previous revision of this Item or Post.

Inverse: sioc:next_version
OWL Type: ObjectProperty
 Domain: sioc:Item
 Range: sioc:Item

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Property: sioc:related_to

related_to - Related Posts for this Post, perhaps determined implicitly from topics or references.

  OWL Type: ObjectProperty
  Domain: sioc:Post
   Range: sioc:Post

Property: sioc:reply_of

reply_of - Links to an Item or Post which this Item or Post is a reply to.

  Inverse: sioc:has_reply
  OWL Type: ObjectProperty
  Domain: sioc:Item
   Range: sioc:Item

Property: sioc:scope_of

scope_of - A Role that has a scope of this Forum.

  Inverse: sioc:has_scope
  OWL Type: ObjectProperty
  Domain: sioc:Forum
   Range: sioc:Role

Property: sioc:sibling

sibling - A Post may have a sibling or a twin that exists in a different Forum, but the siblings may differ in some small way (for example, language, category, etc.). The sibling of this Post should be self-describing (that is, it should contain all available information).

  OWL Type: ObjectProperty
  OWL Type: SymmetricProperty
  Domain: sioc:Post
   Range: sioc:Post

A recent development in online discussion methods is an article or Post that appears in multiple blogs, or has been copied from one Forum to another relevant Forum. In SIOC, we can treat these copies of Posts as siblings of each other if we think of the Posts as non-identical twins that share most characteristics but differ in some manner.

For example, a post is created on one blog and categorized with the topic "TV", but has been copied to another blog with multiple topics such as "Sci-Fi" or "Arts".

In the creation of siblings, the new sibling instance will be fully self-describing but will have a number of changed properties (in the example, has_container and topic would change). A sibling might also be a version of a post in another language.

Property: sioc:space_of

space_of - A resource which belongs to this data Space.

  Inverse: sioc:has_space
  OWL Type: ObjectProperty
  Domain: sioc:Space

Property: sioc:subscriber_of

subscriber_of - A Container that a User is subscribed to.

  Inverse: sioc:has_subscriber
  OWL Type: ObjectProperty
  Domain: sioc:User
   Range: sioc:Container

Property: sioc:topic

topic - A topic of interest, linking to the appropriate URI, e.g., in the Open Directory Project or of a SKOS category.

> **OWL Type:**   ObjectProperty
> **sub-property-of:** dc:subject

A topic definition applies to most of the concepts defined in this ontology, and topic metadata can be a useful way to match documents and people to each other.

While it may be more difficult to require a User to assign a topic to an Item or Post at creation time, it is more likely that a Container will have an associated topic or set of topics that can be propagated to the Items it contains. Similarly, Users or Usergroups can define topics of interest when their profiles are created or modified.

In order to enable the location of related information between the community sites, a common categorisation system has to be used. On large-scale general-interest community sites, topics may be quite broad and a general categorisation system such as the DMOZ category hierarchy may be used.

```
:post_123 a sioc:Post ;
    sioc:topic <http://dmoz.org/Business/Publishing_and_Printing/> .
<http://dmoz.org/Business/Publishing_and_Printing/> rdfs:label "Publishing and Printing" .
```

On specialised sites, which may have a very specific category hierarchy, generic categorisation systems are not suitable because they are too broad and may not have the necessary level of detail. For these sites, the category hierarchy may be defined in the SKOS framework and mappings between these concepts and a common category system may be created.

A proper use of topics can lead to many interesting scenarios in community sites. For example, a User has defined certain topics of interest on registering an account, after which Forums matching those topics are suggested to the User. The User subscribes to some of these Forums, and makes Posts on these and other Forums. The Forums now associated with this User will have certain topics that can be used for purposes of social networking or automatic community creation.

This property is often used to express the information about categories or tags assigned to a Post or Item. The SIOC Types Ontology Module allows one to further specify what type of topic it is using the classes sioc_t:Category and sioc_t:Tag.

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Property: sioc:usergroup_of

usergroup_of - A Space that the Usergroup has access to.

> **Inverse:**   sioc:has_usergroup
> **OWL Type:** ObjectProperty
> **Domain:**   sioc:Usergroup
> **Range:**   sioc:Space

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6. External classes and properties

Classes and properties from other ontologies can be used together with SIOC. During the SIOC ontology design process, some external classes and properties were identified that are suitable for reuse. Such concepts are not included inside SIOC but are used directly together with terms from SIOC to describe the information in online community sites.

This section lists the most important external classes and properties that can be used with SIOC in a meaningful way. This list is not and cannot be exhaustive because many RDF ontologies can be used together.

Class: foaf:Person

Used in SIOC to represent the information about a person who holds an account (sioc:User) on a Site. Account specific information is described by sioc:User, a subclass of foaf:OnlineAccount.

foaf:Person can also be used to describe information about persons that do not have a User account on a Site, e.g., for authors of comments left by visitors.

Class: skos:Concept

May be used to represent topics or tags defined on a community site. The sioc:topic property can be used to link an Item or Post to a skos:Concept.

Property: dc:subject

Can be used for keywords describing the subject of an Item or Post. See also: sioc:topic.

Property: dc:title

Specifies the title of a resource. Usually used to describe the title of an Item or Post.

Property: dcterms:created

Details the date and time when a resource was created. Usually used as a property of an Item or Post.

Property: dcterms:hasPart

A resource that is a part of this subject. Usually used from the domain of a Post or Community.

Property: dcterms:isPartOf

A resource that the subject is a part of. Usually used with the range of a Post or Community.

Property: dcterms:modified

Details the date and time when a resource was modified. Usually used as a property of an Item or Post.

Property: foaf:holdsAccount

Used to link a foaf:Person to a sioc:User. See also: sioc:account_of.

Property: content:encoded

Used to describe the encoded content of a Post, contained in CDATA areas.

These are the ontology namespaces referenced:

Prefix	XML Namespace	Specification
aowl	http://bblfish.net/work/atom-owl/2006-06-06/AtomOwl.rdf	AtomOwl Vocabulary Specification
content	http://purl.org/rss/1.0/modules/content/	RSS 1.0 Content Module
dc	http://purl.org/dc/elements/1.1/	The Dublin Core Metadata Element Set
dcterms	http://purl.org/dc/terms/	Other Dublin Core Elements and Element Refinements
foaf	http://xmlns.com/foaf/0.1/	Friend of a Friend (FOAF) Vocabulary
sioc	http://rdfs.org/sioc/ns#	SIOC Core Ontology
skos	http://www.w3.org/2004/02/skos/core#	SKOS Core Vocabulary
xsd	http://www.w3.org/2001/XMLSchema#	XML Schema (Datatypes)

7. Acknowledgements

8. References

- [RFC 2119] S. Bradner, "Key words for use in RFCs to Indicate Requirement Levels", RFC 2119, Harvard University, March 1997, http://www.ietf.org/rfc/rfc2119.txt.
- [RFC 2396] T. Berners-Lee et al., "Uniform Resource Identifiers (URI): Generic Syntax", RFC 2396, Internet Engineering Task Force, August 1998, http://www.ietf.org/rfc/rfc2396.txt.

9. Change log

- 2005-04-07: Initial version of the SIOC Ontology specification.
- 2005-06-10: Updated template and term descriptions. Removed RDF/XML from specification for XHTML validation.
- 2005-06-24: Created SIOC-Dev mailing list. Added missing links to the template.
- 2005-10-27: Editorial updates.
- 2005-12-19: Fixed multiple domains problem.
- 2006-06-07: Major revision. See a summary of changes sent to the mailing list.
- 2006-08-27: Revised descriptions of SIOC classes and properties. Updated content and layout of the specification.
- 2006-09-14: Removed deprecated properties.
- 2006-09-14: SIOC page moved to http://sioc-project.org/. Updated links in the specification.
- 2006-09-27: Updated SIOC example. Added modules section.
- 2006-10-13: Changed range of sioc:account_of.
- 2006-12-12: Added sioc:Webservice and its properties, sioc:moderator_of / has_moderator, num_replies, and num_views. Removed sioc:views.
- 2007-03-12: Added sioc:Container, sioc:Item, sioc:Space, standardised rdfs:comment placements in schema, added missing domains and ranges, added sioc:has_owner / owner_of, sioc:has_space / space_of, sioc:has_container / container_of, sioc:feed, sioc:content_enhanced, sioc:embeds (the last two properties are pending approval from the SIOC developer community).
- 2007-03-20: sioc:Community subclassed from sioc:Space. Changed descriptions, range and domain of sioc:has_part / part_of and sioc:has_space / space_of.
- 2007-05-11: Added sioc:Thread, sioc:next_by_date / previous_by_date. Revised section "SIOC and RDF". Added a new figure with the main SIOC classes and properties.
- 2007-05-31: Removed mappings file; merged with main namespace. Moved service-related terms to SIOC Services module. Changed some domains and ranges from Post to Item and from Forum to Container. Update some descriptions of terms, e.g. sibling. Added sioc:has_administrator / sioc:administrator_of as follow-up to discussion with danbri last month. Changed sioc:has_group / group_of to has_usergroup / usergroup_of.
- 2007-06-12: Version for member submission.

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